Watershed Management Plan

Volume Two
Watershed Assessment Report

Prepared by the
Santa Clara Basin Watershed Management Initiative
www.scbwmi.org

February 2003

ABOUT THIS VOLUME

This is Volume Two of the Watershed Management Plan, "Watershed Assessment Report," a product of the Santa Clara Basin Watershed Management Initiative (WMI). It is the second volume of a planned three comprising the Watershed Management Plan for the Santa Clara Basin. A summary package of this report, including a CD of the entire report, is also available. This report and the summary package can be obtained from the WMI Project Coordinator at the address below or visit the web site, where this report is available for review and downloading.

WE WOULD LIKE TO HEAR FROM OUR READERS

The WMI values community participation and welcomes your feedback for consideration in future publications. If you would like to comment on this document, or are interested in playing a part in managing our watershed, please send your contact information to:

Project Coordinator
Watershed Management Initiative
c/o City of Palo Alto
2501 Embarcadero Way, Palo Alto CA 94303
650-494-3918
Visit our web site: www.scbwmi.org

Please cite this report as:

> Santa Clara Basin Watershed Management Initiative. 2003. Watershed Assessment Report. Watershed Management Plan, Volume Two. Prepared by the Santa Clara Basin Watershed Management Initiative, which is a stakeholder group organized to protect and enhance the Santa Clara Basin watershed. February 2003.

Table of Contents

Chapter 4 Appendices

Chapter 5 Appendices

Chapter 6 Appendices

Tables

Figures

Report Appendices

Volume Two

Watershed Assessment Report

Foreword

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

EOA, Inc.
Report Preparation Team
Watershed Assessment Subgroup

February 2003

Foreword

Purpose and Goals of the Santa Clara Basin Watershed Management Initiative

The Santa Clara Basin is defined as the portion of San Francisco Bay south of the Dumbarton Bridge and the 840 square mile area of land that drains to it. The basin is located at the southern end of the San Francisco Bay Area as shown in Figure 1-1. Great strides have been made over the last two decades to reduce pollution levels and sources into the Bay. However, contaminant levels of concern still exist throughout the Bay and its tributary streams. In the Basin, which drains to the South Bay, efforts are being made to address the existing pollution problems, which are derived from numerous diffuse sources as well as pollution "legacies" that were introduced to the Bay decades ago. Further improvement will depend on putting into effect a management program that takes into account human activities influencing watershed health and aquatic resources, a program that is not limited to municipal wastewater and urban runoff discharges. The purpose of the WMI is to develop and implement a comprehensive watershed management program, one that recognizes that healthy watersheds mean addressing water quality problems and quality of life issues for the people, animals, and plants that live and work in the watershed. It is appropriate here to note that the purposes of the WMI are of a broader and more long-term nature than the goals specific to the pilot assessment described specifically in this report. This distinction will become more apparent by reading Chapter 3: The Assessment Process.
The six primary goals of the WMI are as follows:

- Ensure that the WMI is a broad, consensus-based process,
- Ensure that necessary resources are provided for implementation,
- Simplify compliance with regulatory requirements without compromising environmental protection,
- Balance the objectives of water supply management, habitat protection, flood management and land use management to protect and enhance water quality,
- Protect and/or restore streams, reservoirs, wetlands and the Lower South Bay for the benefit of fish, wildlife and human uses, and
- Develop an implementable watershed management plan for the Lower South Bay and the wetlands and uplands of the Santa Clara Basin that is based on science and will be continually improved.

For the purposes of the WMI, the Santa Clara Basin is divided into thirteen subbasins or watersheds and the Baylands. The locations and boundaries of these watersheds are shown in Figure 1-2. The thirteen watersheds consist primarily of uplands. The Baylands border San Francisco Bay between Mean Lower Low Water and the highest observed tide. All include the channels through which their draining streams reach the open waters of San Francisco Bay. Of these thirteen watersheds, whose boundaries and areas are shown in Figure 1-2, three watersheds were selected for the pilot watershed assessment (See Figures 1-4 through 1-6).

Planning Process of the Watershed Management Initiative

The watershed management planning process is composed of three elements, each of which concludes with the production of a single volume, as shown diagrammatically in Figure 1-3 (this figure is commonly referred to as the WMI "Roadmap"). A brief description of each element is found below:

- **Element I: Watershed Characterization**: Information was compiled on the overall environmental setting of the Santa Clara Basin. Environmental elements characterized included history, culture, demography, land use and natural resources. Information was also compiled on the regulatory and organizational setting and current water management practices. The resulting product of this element of the WMI process is Volume I of the Watershed Management Plan, titled, *The Watershed Characteristics Report.*

- **Element II: Watershed Assessment**: Environmental conditions in three watersheds were analyzed to determine if selected beneficial uses and stakeholder interests were supported. The resulting product of this element of the WMI process is Volume II of the Watershed Management Plan, titled, *The Watershed Assessment Report.*

- **Element III: Problem Identification and Development of Watershed Action Plan:** The WMI is developing watershed management actions to propose policy and regulatory changes and remedial and restoration programs for implementation. These actions will be described as part of a comprehensive approach to preserving and enhancing the watershed in Volume III, titled, *The Watershed Action Plan.* The objectives of the Action Plan include the following:

  1. Outline a comprehensive approach to preserving and enhancing the watershed and communicate this to WMI stakeholders, decision-makers, potential funders, and the public.
  2. Provide guidance to the WMI by coordinating and phasing actions the WMI is doing or can do to preserve and enhance the watershed.
  3. Identify specific actions that agencies, organizations, and individuals are doing and can do to preserve and enhance the watershed, and describe these in the context of the comprehensive approach.

Volume Two

Watershed Assessment Report

Executive Summary

SANTA CLARA BASIN

WMI

WATERSHED MANAGEMENT INITIATIVE

February 2003

Executive Summary

Objective

There were two principal objectives of the Assessment. The first objective was to test a particular assessment method on three pilot watersheds in the Santa Clara Basin. The second was to produce assessment conclusions, which could help guide the preparation of the Watershed Management Initiative's Action Plan. It was hoped that the conclusions would be of two types: 1) Basin-wide conclusions that would suggest actions for all of the sub-basin watersheds, and 2) Creek-specific conclusions which would suggest actions for each of the three pilot watersheds: Guadalupe, San Francisquito, and Upper Penitencia.

As will be described more fully below, a large amount of useful information was assembled for and obtained from the Assessment. However, available data was insufficient to draw many specific conclusions about the creeks of the pilot watersheds or to make suggestions for basin-wide actions. The principal benefits of the assessment were: 1) identifying data weaknesses and 2) providing information for the design of future assessments.

Approach

The Watershed Management Initiative (WMI) selected the following beneficial uses and stakeholder interest as indicators for conditions of each watershed:

1. Cold Freshwater Habitat (COLD)
2. Preservation of Rare and Endangered Species (RARE)
3. Water-Contact Recreation (REC-1)
4. Municipal and Domestic Water Supply (MUN)
5. Protection From Flooding (PFF)

The Assessment approach was to:

1. Divide each of the three pilot watersheds (Guadalupe, San Francisquito, Upper Penitencia) into "reaches" wherein the physical characteristics within a stream section were fairly similar.
2. Use existing data (instead of conducting new fieldwork).
3. Attempt to determine whether beneficial uses were supported and occurring in a particular reach.

4. Attempt to determine why a reach was not supporting a given beneficial use or stakeholder interest, and determine the limiting factors causing the problem.
5. Evaluate the quality of the data used and determine whether the certainty of each conclusion was high, low, or inbetween.

A “Framework” and logic diagram was developed to help determine whether a given beneficial use was supported. If a beneficial use was not supported, or only partially supported, then physical, chemical, and biological conditions were reviewed in an effort to discover what limiting factors were causing the problem.

The assessment work evaluated information from more than 500 data sets following the Assessment Framework approved by stakeholders. The work process included 10 meetings organized by use/interest, two meetings by watershed, and over four workshops by chapters. A quality review process was enforced throughout the work process.

Resource Limitations

The majority of the assessment work was funded through a CALFED grant ($200,000), provided to the City of San Jose, through the Santa Clara Valley Water District, and in-kind services provided by WMI stakeholders. The contract work was completed in December 2002. The Santa Clara Valley Water District and the Cities of San Jose, Palo Alto and Sunnyvale provided funding and/or staff support for the establishment of the assessment database and Data Repository, for production of major parts of the Report, and for processing of stakeholder comments.

Results

Due to the fact that not all existing data was able to be included, that there were limitations of the data, and that there were different possible ways of segmenting creeks and evaluating the data, it was necessary to heavily qualify assessment results. Thus, the major use of this assessment will be for designing future assessments, and not for selecting particular protection/restoration strategies, either for individual reaches or for the entire Basin.

The pilot assessments established the following important parameters that will serve future assessment efforts and improve long-term watershed management in the Santa Clara Basin:

1. The identification of **special status species** for use as a basis in evaluating the RARE beneficial use.
2. A planning-level approach for **dividing watershed streams into “reaches”** that enhances the ability to manage streams and stream data.
3. Identification of the **best data types** for the assessment of key beneficial uses.

4. A protocol for **managing watershed data** has been established through the development of the Metadata Database (MDDB).

The assessment process also performed the following key functions:

1. Evaluation of the availability and utility of water quality-related data collected over the last fifteen years.
2. Documentation of the suitability and limitations of the WMI Assessment Framework for providing an objective, repeatable approach to conducting beneficial use-oriented watershed assessments.
3. Establishment of a basis for making decisions regarding future data collection efforts.

From an assessment perspective, the stakeholders completed an in-depth look into the existing data sets and an understanding of the "state of the data" was reached. Over 470 data sets were documented and evaluated through the assessment process. The review of the MDDB data sets documented the quantity and quality of data and identified organizations in the region that have collected watershed information, especially water quality data. Significant gaps in the existing data needed to fully evaluate beneficial use support were identified.

The pilot assessments developed support status statements for those reaches and uses that had a sufficient amount of available data. The limiting factors identified for those reaches should serve as a starting point for additional study and data collection designed to determine underlying causes for the limiting factors and identify options for restoring full use support. An overall summary of the key findings is presented below:

Cold Freshwater Habitat (COLD): The primary factors noted in the pilot assessment limiting the availability of cold freshwater habitat are a lack of present indicator macro-invertebrates, low or non-existent summer streamflow, and water temperatures too high to sustain cold freshwater species.

Municipal and Domestic Water Supply (MUN): Turbidity and/or total dissolved solids were common limiting factors, as was fecal coliform count.

Water Contact Recreation (REC-1): In some reaches where data on the primary and secondary indicators were available (fecal coliform count and other water quality constituents), exceedances of the criteria for these indicators represent the limiting factor. For other reaches, however, the only available data were on tertiary (least preferred) indicators covering aesthetics and stream access. Within these reaches, limitations on access to the stream and documented aesthetic problems (presence of trash, poor water clarity, lack of adequate streamflow or water depth) form the limiting factors.

Protection from Flooding (PFF): The limiting factor for reaches that cannot safely convey the 100-year flow without causing property damage is a lack of adequate channel capacity combined with the encroachment of urban/residential land uses into the stream's 100-year floodplain.

Preservation of Rare and Endangered Species (RARE): Because the factors affecting support of the RARE beneficial use are specific to the habitat requirements of individual special status species, it is difficult to identify the factors limiting the presence of these species within the pilot watersheds without conducting detailed habitat surveys. Data available to the assessment team consisted primarily of species observations and no recent detailed species habitat surveys were available among the data compiled for the assessment. Since species observation information does not provide much insight into habitat quality, no limiting factors were identified for these reaches.

Conclusions

1. The principal conclusion of the assessment is that data limitations make it impossible to fully determine the level of beneficial use support and limiting factors in the three pilot watersheds using the assessment approach selected. Therefore, the principle benefit of this assessment is to help design future field data collection and assessment efforts.
2. Since the three pilot watersheds assessed are relatively "data rich" compared to most sub-watersheds, it is very unlikely that conducting more of this type of assessment will be useful in the near term. A regulatory-driven beneficial use-based assessment approach, such as the one embodied in the Assessment Framework, would need substantially more data to determine whether or not a stream supports a given beneficial use or water quality standard.
3. The vast majority of the data available within each watershed is on the main stem or the lower, principal tributary stream reaches, while little data has been collected in upland tributaries.
4. Data gaps identified by the assessment process can be used to develop short- and long-term monitoring program recommendations and guidance.
5. Future data collection efforts undertaken within the Santa Clara Basin should include data which would establish whether the five selected “beneficial uses” are being supported within streams and reservoirs.
6. Monitoring that is targeted toward identifying the source or cause of the limiting factors should be conducted in order to identify the corrective actions needed to restore the use to the reach.

Volume Two
Watershed Assessment Report

Technical Summary

SANTA CLARA BASIN

WMI

WATERSHED
MANAGEMENT INITIATIVE

February 2003

Technical Summary

Scope and Limitations

The assessment work evaluated information from more than 470 data sets following the Assessment Framework approved by stakeholders. It was conducted through a series of 10 meetings organized by use/interest; two meetings by watershed, and over four workshops by chapter. Main product included four assessment chapters, five technical appendices and the assessment database which included data identifications and reach-by-reach reports. Stakeholder comments as well as item-by-item responses to comments were recorded.

The majority of the assessment work was funded through a CALFED grant ($200,000), provided to the City of San Jose, through the Santa Clara Valley Water District, and in-kind services provided by WMI stakeholders. The contract work was completed in December 2002. The Santa Clara Valley Water District and the Cities of San Jose, Palo Alto and Sunnyvale provided funding and/or staff support for the establishment of the assessment database and Data Repository, for production of major parts of the Report, and for processing of stakeholder comments.

The Watershed Management Initiative (WMI) limited the geographic scope of the Assessment to the following three watersheds: those of the Guadalupe River, San Francisquito Creek, and Upper Penitencia Creek. The parameters selected consisted of four beneficial uses and a stakeholder interest, serving as indicators for the waterbodies' suitability for supporting aquatic life, for safe water contact by humans, for providing a source for drinking water, and for reducing flooding of adjacent property. In the course of conducting the assessment, the WMI faced the following limitations:

- The selected parameters did not include stream hydrology or geomorphological processes, which some stakeholders felt should have been used to measure a waterbody's fitness. This led to decision tools that were inaccurate or limited because existing data did not provide direct measures of fitness.
- Local knowledge data was presented but could not be used due to QA/QC measures and resource limitations, and this affected the results of the assessment.
- Any findings from the assessment are a reflection of the existing data, and should not be used as the basis for on-the-ground actions.

Assessment Approach

The Watershed Management Initiative (WMI) developed a Watershed Assessment Framework and process that relied on available data and pre-defined environmental indicators (direct indicators of fitness[1]) to determine whether beneficial uses/stakeholder interests are supported in the waterbodies (reservoirs and stream reaches) within the three pilot watersheds. . The framework consists of two parts: A and B. Part A describes the approach for how the indicators were used and Part B identifies indicators developed. Logic diagrams were developed to systematically determine the level of support of a primary use/interest through a "weight of evidence" approach. For the purposes of analysis, it was necessary for waterbodies to be divided into segments. Segments were selected on the basis of physical characteristics, consistent with the California Department of Fish and Game's *"California Salmonid Stream Habitat Restoration Manual, 2nd Edition"* by Flosi and Reynolds (1994).

The first step in applying the logic diagrams was to evaluate the adequacy of the data used for the assessment. This evaluation was based on the quality of the data, the spatial and temporal coverage of the data, and the extent to which the data were relevant to the conditions being assessed. In a step-wise procedure, the assessment teams reviewed the compiled data to answer the following questions: (1) Does the data pertain to the preferred indicator or to a secondary indicator, was it collected in waterbodies subject to the assessment? (Data relevancy), (2) Is the temporal array of data useful to answer questions posed by the logic diagram, was it collected in accordance with widely accepted scientific methods? (Data quality), and (3) Does the amount of relevant, quality data for the waterbody exist to allow objective, supportable conclusions to be drawn regarding use/interest support? (Data sufficiency). Where preferred indicator data were not available, alternative indicator data were used. In cases where no data sets were available to assess one or more uses/interest in a waterbody, a data gap for that preferred data type was noted. The logic diagram process provided a rationale for substituting additional data to enable the assessment framework to provide a finding.

A final step in the logic diagrams involved the consideration of limiting factors. If a primary use/stakeholder interest was not supported or only partially supported in a waterbody, the relevant data was examined in an attempt to determine what factors limit the waterbody's ability to support the use. The identification of limiting factors focused on physical, chemical and biological conditions in the stream and the riparian corridor that caused non- or partial support of primary uses. It did not address an ultimate or indirect cause of non- or partial support (e.g., urbanization and its effect on stream hydrology).

An uncertainty analysis was conducted to evaluate the level of confidence in each support statement[2]. The methodology designates four uncertainty ratings. Data designated as "A"

---

[1] The assessment framework relies on direct indicators of fitness of a waterbody to support a primary use/interest. Indirect indicators were used only when direct indicators were impractical or limitations in the data prevented use of a direct indicator. Table 1 of Appendix C presents information on direct indicators of fitness for each of the primary uses/stakeholder interest. This concept of a hierarchy of data types and utility for making the assessment is consistent with EPA guidance on conducting water quality assessments from Section 3 of USEPA's *"Guidelines for the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement"* (1997).

[2] Guidance for performing an uncertainty analysis provided by USEPA was utilized to conduct the analysis: *"Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement"* (1997), and *"Draft Guidance for Water Quality-Based Decisions: The*

are of the highest quality and provide a relatively low level of uncertainty. Data designated as "D" may be considered adequate for performing assessments, but involve less rigorous approaches and therefore result in a greater degree of uncertainty.

Watershed Assessment Results

Results of the assessment are based on available data and may be refined under future efforts, as more data becomes available. The goal of the assessment was to begin identifying factors affecting beneficial use support and achieving stakeholder interests in the Santa Clara Basin's streams, as well as providing a scientific basis for selecting and evaluating alternative management strategies.

From a framework and process perspective, the pilot assessments established several important parameters that will serve future assessment efforts and improve long-term watershed management in the Santa Clara Basin, including:

- The identification of **special status species** for use as a basis in evaluating the RARE beneficial use.
- A planning-level approach for **dividing watershed streams into "reaches**" that enhances the ability to manage streams and stream data.
- Identification of the **best data types** for the assessment of key beneficial uses.
- A protocol for **managing watershed data** has been established through the development of the metadata database (MDDB).

While the pilot assessment produced an evaluation of beneficial use support in the three watersheds, the lack of existing data in the pilot watersheds precludes making strong inferences about their specific resource conditions. Nonetheless, the assessment process performed the following key functions: (1) evaluation of the availability and utility of water quality-related data collected over the last fifteen years; (2) documentation of the suitability and limitations of the WMI Assessment Framework for providing an objective, repeatable approach to conducting beneficial use-oriented watershed assessments; and (3) establishment of a basis for making decisions regarding future data collection efforts.

Due to the fact that not all of the data was included, that there were limitations of the data, and that there were different possible ways of segmenting creeks and evaluating the data; it was necessary to heavily qualify assessment conclusions. Thus the major use of this assessment is in designing future assessments, and not for selecting particular protection/restoration strategies, either for individual reaches or for the entire Basin.

From an assessment perspective, the stakeholders completed an in-depth look into the existing data sets and an understanding of the "state of the data" was reached. Over 470 data sets were documented and evaluated through the assessment process. The review of the MDDB data sets documented the quantity and quality of data and identified

---

TMDL Process" (1999). The guidelines addressed different types of data including physical habitat, biological, toxicological and physical/chemical data to determine aquatic life use support.

organizations in the region that have collected watershed information, especially water quality data. Significant gaps in the existing data needed to fully evaluate beneficial use support were identified.

The pilot assessments developed support status statements for those reaches and uses that had a sufficient amount of available data and the limiting factors identified for those reaches should serve as a starting point for additional study and data collection designed to determine underlying causes for the limiting factors and identify options for restoring full use support. An overall summary of the key findings is presented below:

COLD: The primary factors noted in the pilot assessment limiting the availability of cold freshwater habitat are a lack of present indicator macro-invertebrates, low or non-existent summer streamflow, and temperatures too high to sustain cold freshwater species.

MUN: Turbidity and/or total dissolved solids were common limiting factors, as was fecal coliform count.

REC-1: In some reaches where data on the primary and secondary indicators were available (fecal coliform count and other water quality constituents), exceedances of the criteria for these indicators represent the limiting factor. For other reaches, however, the only available data was on tertiary (least preferred) indicators covering aesthetics and stream access. Within these reaches, limitations on access to the stream and documented aesthetic problems (presence of trash, poor water clarity, lack of adequate streamflow or water depth) form the limiting factor.

PFF: The limiting factor for reaches that cannot safely convey the 100-year flow without causing property damage, is a lack of adequate channel capacity combined with the encroachment of urban/residential land uses into the stream's 100-year floodplain.

RARE: Because the factors affecting support of the RARE use are specific to the habitat requirements of individual special status species, it is difficult to identify the factors limiting the presence of these species within the pilot watersheds without conducting detailed habitat surveys. Data available to the assessment team consisted primarily of species observations and no recent detailed species habitat surveys were available among the data compiled for the assessment. Since species observation information does not provide much insight into habitat quality, no limiting factors were identified for these reaches.

Summary of Assessment of Guadalupe Watershed

The Guadalupe River watershed is the second largest of the 13 major watersheds that comprise the Santa Clara Basin (the Basin). The watershed drains the north- and east-facing slopes of the Santa Cruz Mountains above the cities of Los Gatos and San Jose. The Guadalupe River watershed has a total drainage area of approximately 170 square miles.

The detailed results for each of the 63 stream segments in the Guadalupe watershed are shown in Appendix 4-A, in Figures 2-2A through 2-2E (in map form) and in Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 4-B. These tables include information on limiting factors, suspected causes, as well as "local knowledge comments" from WMI stakeholders.

The results of the pilot assessment generally confirmed the pre-assessment recommendations of WMI stakeholders regarding beneficial use designations for Guadalupe River watershed waterbodies. Only in two cases did the available data provide enough confidence to propose additional potential use designations based on the pilot assessment results: cold freshwater habitat (COLD) in Moody Gulch and preservation of rare and endangered species (RARE) in Calero Reservoir. However, as the pilot assessment was based on the review of existing, available data and did not involve a field-checking component, it is recommended that additional focused data collection and review be conducted before any new use designations are adopted.

Detailed comments and suggestions on the assessment of MUN were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

COLD: Twenty-three stream reaches examined for the cold freshwater habitat (COLD) use did not have adequate data to make a support statement determination, commonly due to the lack of sufficient data on primary (fish assemblage and indicator macroinvertebrate) and secondary (temperature and other habitat requirements) indicators. Only three stream reaches were evaluated as having full support for COLD. Partial was designated in 10 of 63 stream reaches in the Guadalupe watershed. Seven reaches were categorized as having potential/seasonal support. Two urban reaches were characterized as being in non-support of the COLD use. From a total of 141 data sets reviewed, 73 were used to develop the assessment results for the Guadalupe River watershed.

MUN: Nineteen of 63 stream reaches in the Guadalupe River watershed were found to have enough data to make conclusions on the support status for the beneficial use of municipal and domestic water supply (MUN). The only part of the Guadalupe watershed that fully supports MUN is the lowest (most downstream) portion of Alamitos Creek (from Lake Almaden to Arroyo Calero), but this conclusion of full support was made with a moderately high level of uncertainty. Two non-urban areas of the Guadalupe watershed indicate partial support for MUN. Thirteen reaches, varying from urban to rural, do not support MUN. From the 32 data sets reviewed, 15 contained data that could be used to develop the assessment results for the Guadalupe River watershed assessment of MUN.

PFF: Thirty-five of 63 stream reaches in the Guadalupe watershed had adequate data to make a determination of support for the PFF interest. A spatially variable mix of urban to rural stream reaches, a total of 27, were determined to be fully supporting PFF. The range in uncertainty associated with the support determinations was from very low to very high, indicative of the variation in detailed, current data among the subwatersheds. Eight stream reaches, all located in urban areas of the Guadalupe watershed, were determined to be non-supporting of PFF. From a total of 31 data sets reviewed for potential use in the PFF interest assessment for the Guadalupe River watershed, 19 contained data that was used to develop the assessment results.

RARE: Sufficient data for assessing support of the RARE beneficial use was limited to approximately one-third (21 of 63) of the stream reaches in the Guadalupe River watershed. Those reaches fully supporting RARE were all characterized with moderately high levels of certainty. A total of nine reaches were determined to fully support the RARE use. No reaches were classified as partial support, however, 11 reaches were classified with a statement of potential support. Only one stream reach, GR/AC-4, was characterized as non-support for RARE. A total of 64 data sets were reviewed for potential use in the RARE use assessment for the Guadalupe River watershed. Of these, 29 contained data that could be used to develop the assessment results.

REC-1: Sufficient data was available for only 20 of the 63 stream reaches in the Guadalupe River watershed to make a determination of the support status for water contact recreation (REC-1). Forty-one reaches did not have adequate primary (pathogens in water) or secondary (other water quality) data available, thus support determinations could not be made. Only five stream reaches were found to fully support REC-1, three partially supporting reaches were identified, and Non-support for REC-1 was identified in 10 reaches. A total of 54 data sets were reviewed for potential use in the REC-1 use assessment for the Guadalupe River watershed. Of these, 23 contained data that could be used to develop the assessment results.

Summary of Assessment of San Francisquito Watershed

The San Francisquito Creek watershed is located in the northwestern portion of Santa Clara County and the southeastern portion of San Mateo County. The watershed's drainage basin is approximately 45 square miles. Much of the watershed lies in steep, mountainous areas of the Santa Cruz Mountains. The highest elevation in the watershed is approximately 2,200 feet. The watershed drains the east-facing slopes of the Santa Cruz Mountains above the cities of Portola Valley, Woodside, Palo Alto, Menlo Park and East Palo Alto, and Stanford University.

The detailed results for each of the 37 stream segments in the San Francisquito watershed are shown in Figures 2-3a through 2-3b (in map form) and in Appendix 5-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 5-B. These tables include information on limiting factors, suspected causes, as well as "local knowledge comments" from WMI stakeholders. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty.

Detailed comments and suggestions on the assessment of MUN were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

COLD: Data were sufficient to assess the COLD use in only 17 of the 37 stream reaches in the watershed. Data from 35 of 97 data sets were used to develop the assessment results. The lower portion of San Francisquito Creek below University Avenue in Palo Alto is dry during most summers and cannot support cold water dependent habitat. From Sand Hill Road on upstream, most of San Francisquito Creek, Bear Creek, and West Union Creek were found to either partially or fully support the COLD use. The lower-most reaches of Corte Madera Creek and Los Trancos Creek fully support the COLD use. However, the next upstream portion of the latter stream does not support COLD due to a lack of sufficient summer flow. Very little or no data were available to assess COLD use support in the upper reaches of the Corte Madera Creek, Sausal Creek, Alambique Creek, and Los Trancos Creek subwatersheds.

MUN: Data were sufficient to assess the MUN use in only 9 of the 37 stream reaches in the watershed. Most of the main stem reaches along San Francisquito Creek do not currently support the MUN use, although uncertainty over this is very high due to limited data. Data from seven of 11 reviewed data sets were used to develop the MUN assessment results. Three reaches were found to partially support MUN and no support was found for MUN in the lower parts of Corte Madera and Los Trancos Creeks.

PFF: Most of the reaches with insufficient data are located in the upper watershed tributaries. However, data for mid-watershed reaches in San Mateo County were also not available. This area is outside of the flood protection jurisdiction of the Water District, which was a primary source of the data used to assess PFF. A total of 34 data sets were reviewed for use in the PFF interest assessment for the San Francisquito Creek watershed. Of these, 25 were used to develop the assessment results. The results of the PFF assessment indicate less than full support in four general locations. Partial support was found for three reaches with a moderately high uncertainty level due to insufficient data on channel capacities, and no support was found for Searsville Lake reservoir and one reach along Buckeye Creek

RARE: Sufficient data for assessing support of the RARE beneficial use was limited to 13 of the stream reaches in the San Francisquito Creek watershed. A total of 36 data sets were reviewed for potential use in the RARE use assessment for San Francisquito Creek. Of these, 14 contained data that could be used to develop the assessment results. Full support was indicated for the lower reaches of Los Trancos Creek and three additional reaches, while potential support was found for two reaches and Searsville Lake reservoir.

REC-1: Sufficient data were available to assess REC-1 use support for only 13 of the 37 stream reaches in the San Francisquito Creek watershed. A total of 22 data sets were reviewed for potential use in the REC-1 use assessment for the San Francisquito Creek watershed. Of these, 14 contained data that could be used to develop the assessment results. Most of the available data was on the tertiary aesthetics and recreational access indicators. A few reaches contained data on secondary water quality constituent indicators. No data on the primary pathogen indicators was available anywhere in the watershed. Thus, complete support determinations for REC-1 could not be made for any reach and the support statements that are made are qualified to indicate which set of indicators they are based on.

Summary of Assessment of Upper Penitencia Subwatershed

The Upper Penitencia Creek subwatershed comprises a portion of the larger Coyote Creek watershed, draining the Diablo Range in the northeast portion of San Jose. Upper Penitencia Creek drains the west-facing slopes of the Diablo Range and has a total drainage area of approximately 24 square miles.

The detailed results for each of the eight stream segments in the Upper Penitencia subwatershed are shown in Figure 2-4 (in map form) and in Appendix 6-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 6-B. These tables include information on limiting factors, suspected causes, as well as "local knowledge comments" from WMI stakeholders. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty.

Detailed comments and suggestions on the assessment of MUN were received from WMI stakeholders and are described in Section 6.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

COLD: Data were available to assess the COLD use in five of the eight reaches in the subwatershed. The uppermost reach of Upper Penitencia Creek, Cherry Flat Reservoir, and Dutard Creek did not have any data. Data was limited in Arroyo Aguague as well. A total of 69 data sets were reviewed for use in the COLD use assessment in the Upper Penitencia Creek subwatershed. Data from 13 of these data sets were eventually used to develop the assessment results. Full support was found for two reaches, partial support found for two reaches, and no support found for one reach.

MUN: There were insufficient data for all reaches in this watershed to make any determinations of support for MUN. A total of five data sets were reviewed for use in the MUN use assessment in the Upper Penitencia Creek subwatershed. No data from any of these data sets were found sufficient for the assessment.

PFF: Six of eight stream reaches in the Upper Penitencia Creek subwatershed had adequate data to make a determination of support for the PFF interest. No data were available for Dutard Creek and Cherry Flat Reservoir. The results of the assessment for the PFF interest indicate full support for all reaches where data were available, with the exception of the two lower-most reaches, UP-1 and UP-2, which were indicated to show no support. A total of 23 data sets were reviewed for use in the PFF interest assessment for the Upper Penitencia Creek subwatershed. Of these, 15 were used to develop the assessment results.

RARE: Sufficient data for assessing support of the RARE beneficial use was limited to three of the stream reaches in the Upper Penitencia Creek subwatershed. A total of 33 data sets were reviewed for potential use in the RARE use assessment for the Upper Penitencia Creek subwatershed. Of these, nine contained data that could be used to develop the assessment results. Full support was indicated for three reaches, and potential support for one reach. Overall, the results of the assessment for RARE were compromised by the lack of sufficient data in five reaches.

REC-1: Sufficient data to make a determination of the support status for water contact recreation (REC-1) were available for five of the eight stream reaches in the Upper Penitencia Creek subwatershed. However, only data on the tertiary (least preferred) aesthetics, water depth, and access indicators for assessing REC-1 support were available in the subwatershed. Thus, all support statements made for REC-1 are limited in applicability to these indicators only and do not represent a conclusion based on the preferred type of data. A total of 10 data sets were reviewed for potential use in the REC-1 use assessment for the Upper Penitencia Creek subwatershed. Of these, five contained data that could be used to develop the assessment results. Seasonal support was found for four reaches and partial support was found for five reaches.

At the onset of the assessment process, the REC-1 assessment was to include a fish consumption component. Based on concern expressed by WMI stakeholders, the Regional Board reviewed this issue and determined that fish consumption should not be evaluated as part of the REC-1 use. Therefore, the results of the fish consumption portion of the pilot assessment were removed from the report.

Conclusions

Overall, the Primary Conclusions of the Pilot Assessment are:

Data Sufficiency

- The spatial distribution of existing data within the watersheds varied from one watershed to another. The vast majority of the data available within each watershed is on the main stem or the lower, principal tributary stream reaches, while little data has been collected in upland tributaries.
- Sufficient existing data was not available to enable the framework to produce a full and sound assessment.
- The amount of information gleaned from existing compiled data was found to exceed that which could have been determined by spending a similar amount of time and money simply collecting new data.

- While the conclusions reached by the assessment teams are valid representations of the compiled data, the gaps in the available data are very real and represent formidable obstacles to the formulation of specific management actions for many of the streams and reservoirs in the pilot watersheds. Even where relatively few data gaps were noted and the uncertainty level assigned to a support statement was low, the assessment results should be field-checked prior to being used as the basis for management decisions and review of other data in the possession of watershed stakeholders should be completed prior to the formal proposal of any beneficial use designation revisions.

Future Data Collection

- Different assessment methodologies are designed to address different questions regarding watershed health. A regulatory-driven beneficial use-based assessment approach, such as the one embodied in the Assessment Framework, would need substantially more data to determine whether or not a stream supports a given beneficial use or water quality standard.
- Data gaps identified by this assessment process or other assessment processes should be evaluated and used to develop short- and long-term monitoring program recommendations and guidance for local agencies.
- Future data collection efforts undertaken within the Santa Clara Basin should be geared to establishing whether public benefits (such as fishery maintenance and recreational uses) are being supported within streams and reservoirs.
- Priority should be placed upon filling the data gaps needed to lower the amount of uncertainty associated with the support statement.
- In reaches without usable data, a geomorphic characterization of the streams should be completed before major data collection efforts are undertaken. Such a characterization would enable data collection to focus on reaches with potential to support beneficial uses and stakeholder flooding interest.
- In reaches without full support, limiting factors to beneficial uses/interest support should be a starting point for data collection to determine underlying causes and options for restoring full use support.

Future Assessments

- Given that significant gaps in the existing data that were needed to fully evaluate beneficial use support were identified, the major use of the pilot assessment should be to help design future assessments.
- Prior to selecting alternative approaches, WMI stakeholders should consider the steps taken in the development of the Assessment Framework, in order to determine fundamental questions regarding the desired types of information to be generated by the assessment as well as the potential uses of that information.
- Two major options for conducting the next phase of assessments are:
    - Refine the pilot assessment framework
    - Compare the utility and feasibility of alternative assessment approaches, such as, but not limited to: geomorphic/sediment budgets; changes in habitat values; restoration potential analysis; management issues approach.

- The review of Assessment Approaches should also include a review of the significant assessment efforts underway within the county and within the San Francisco Bay Region.

Alternate support conclusions for all uses/interest in the Guadalupe pilot assessment are presented in Figures 2-2A through 2-2E in Appendix 4-A. These alternate conclusions were presented by WMI stakeholders based on other data that was not made available to the assessment team for use in the pilot assessment. Though this information was not used to modify the pilot assessment results, it has been recommended by stakeholders that this data should be reviewed as part of future reach-specific assessment work undertaken by WMI stakeholders in order to confirm or, where appropriate, revise the pilot assessment results to fully reflect all relevant existing data.

SANTA CLARA BASIN WATERSHED MANAGEMENT INITIATIVE WATERSHED ASSESSMENT REPORT

DISSENTING GROUP OPINION

The undersigned Watershed Management Initiative (WMI) stakeholders are unable to accept/approve the Watershed Assessment Report (WAR) for the following reasons:

The WAR contains so may inaccuracies that it is virtually useless for providing any type of valid indicator of the condition of the Guadalupe sub-watershed, the largest of the three sub-watersheds covered by the report, or for the designated beneficial uses and stakeholder interest evaluated. In addition, because many of the Guadalupe watershed assessment problems are process and systemic in nature, we have little confidence that the assessment results obtained for the two other sub-watersheds are significantly more credible. We believe the WMI has an obligation to produce an accurate and credible Assessment Report and cannot condone the publication of a document that fails to achieve these goals. We also believe that the publication of an inaccurate report could easily result in poor/ erroneous decisions regarding watershed or beneficial use issues by any organizations having access to the report despite numerous statements contained in the document that caution it should not be used for decision-making purposes.

The WAR inaccuracies for the Guadalupe sub-watershed manifest themselves very clearly to anyone moderately familiar with the river when reviewing the specific assessment data sheets. For example, most of the information provided for the GR-1 segment is incorrect. The Channel Type is not Earthen levee, rock/concrete lined. It is Earthen modified (straightened, confined). The Support Status for COLD is not Potential/Seasonal Support, it is Partial or Limited Support throughout the entire year. Much of the Criteria reportedly used for the assessment were either not used or were inappropriate for the evaluation of the particular Use. The Assessment Comments indicate that Chinook salmon spawn in the upper end of the GR-1 reach. This is not true. This reach is a tidewater reach, so there is no spawning habitat in this reach and Chinook salmon are not known to spawn in tidewater. The report states “the reach does not support cold insect criteria.” The reach would not support, and should not be expected to support, coldwater insects because it is a brackish water area and has little, if any cold insect habitat. The data sets referenced to support this claim indicate there was no attempt to look for coldwater insects in this reach, despite assessment team’s assurances that there were, so there is absolutely no basis for the statement.

The Report lists 10 data sets that were used to evaluate the GR-1 reach for Cold use, but a review of the listed data sets shows that most were not applicable to the reach or for the assessment of the Cold use and some were not even applicable to the Guadalupe sub-watershed. Other data sets were cited but were not used for the evaluation and others were falsely cited. As a result of the above, the Support Status, the Limiting Factors and the Suspected Causes are inaccurate as are the Data Gaps and Data Quality statements. Similar problems exist for the RARE and REC-1 uses and the PFF interest in the GR-1 reach, as well as for these uses/interest in most upstream reaches of the river and its primary tributaries, below the reservoirs. The use of non-applicable, inappropriate or out-dated data for an assessment will most certainly result in an inaccurate assessment. It is believed that the causes for the listed problems are many and some are adequately addressed in the Report but others are not. One of the root causes of the problems is that the WMI's established processes were not followed.

There were substantial concerns with the assessment Framework, the criteria for the various items being assessed, from the very start. Although the Framework was approved by the WMI Core Group, it was only conditionally approved. The Framework was so complex that many had no concept of how it would work or the results that would be obtained as the assessment started, so changes were supposed to be made as problems were identified. This did not happen. There was supposed to be a concentrated effort to gather and use all relevant data in performing the assessments. This did not happen. A lot of the most relevant and timely data were not used. There was supposed to be a process to check the quality/ applicability of the data being used but this obviously did not happen. There is no way that much of the data reportedly used to assess a reach could have been used if even the simplest of quality checks were made. There was supposed to be a heavy reliance on the watershed captains to provide an early sanity check on the data and the preliminary results of the assessment. This was not done. Most of the initial assessment effort was performed at a remote location by consultants not familiar with the watershed, at a time and place when local experts, including the watershed captains, could not participate. The undersigned groups complained strongly about the ill-advised concept of "remote assessments" to no avail. There was never any effort put forth to ground truth or field validate any data supposedly used for the assessments. The Watershed Assessment Subgroup (WAS), which was supposed to lead the assessment effort, did not do so. They seemed to take a back seat to the Report Preparation Team (RPT), which was formed to generate the report, not oversee that assessment. When assessment problems were identified, there was never any real attempt to correct the problems, most of the effort was expended trying to rationalize the results or circumvent, mitigate, or down play the issues. Another problem was that the waterbodies were not properly segmented. The WAR states that the waterbodies were segmented by physical properties and/or or in accordance with the recommendation of the 1994 CA Dept. of Fish and Game Salmonid Habitat Restoration Manual. Neither was done. Water reaches with vastly different physical properties were lumped together and this resulted in assessment inaccuracies as support levels, limiting factors, causes and certainty levels varied within the lumped segments. Still another problem was an improper definition was used for a channel. In most cases, a channel was defined as having the capability of carrying the "100 year" or "designed flood flow." No natural channel can support a "100 year flood." Natural channels flood when their bankfull level is exceeded. Any attempt to modify a channel to carry a 100-year flood flow will seriously degrade all beneficial uses and destroy the proper functioning of the channel.

After strong complaints were made about the above issues (Ref. GCRCD/WWCC letters dated Jan. 21, 02 and Sept. 30, 02), sections entitled "local knowledge" were added to the report in an attempt to address some of the complaints. The local knowledge sections, for the most part, contain far more relevant/accurate information than the reported assessment results but the report was not corrected, the new information was added as local knowledge. The term "local knowledge" is misleading, as it seems to imply undocumented knowledge. Most of the information contained in the local knowledge sections is based on well-documented fact. The quality and timeliness of this information far exceeds the quality of the information in the data sets reportedly used for the assessments but there was never any attempt by the assessment team to review this information, much less include it in the WMI database.

It is recognized that many people put a lot of hard work into the WAR and their efforts need to be commended. However, if the process is flawed and/or not followed, there are inadequate incremental quality checks throughout the process, and identified problems are not adequately resolved, then there is little chance that a quality product will be produced despite the best efforts of individual contributors. Assessment results must be as accurate, timely, succinct and non-contradictory as possible for them to be useful and this is definitely not the case for the Guadalupe sub-watershed assessment.

Guadalupe-Coyote Resource Conservation District

(original signed)
Gary Molle - President

Silichip Chinook Salmon & Steelhead Restoration Group

(original signed)
Roger Castillo - President

Western Waters Canoe Club (American Canoe Association affiliate)

(original signed)
Mike Nalls - President

SCBWMI Guadalupe Watershed co-captain

(original signed)
Lawrence Johmann PE, CQE, CRE

Volume Two
Watershed Assessment Report

Chapter 1
Introduction

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team
Watershed Assessment Subgroup

February 2003

Watershed Assessment Report
Chapter 1: Introduction

List of Authors

REPORT PREPARATION TEAM

WATERSHED ASSESSMENT SUBGROUP

with consultant support from

EOA, Inc.

Rebecca Russell, Associate Scientist
Lori Pettegrew, Senior Scientist

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 1
Table of Contents

Figures

Chapter 1
Introduction

1.1 Purpose and Goals of the Watershed Assessment

The purpose of the Watershed Assessment is to characterize environmental conditions in individual watersheds of the Santa Clara Basin and to determine whether the waters and waterways of the Basin are supportive of certain beneficial uses and stakeholder interests, referred to collectively as primary uses. The assessment process included developing an Assessment Framework, selecting pilot watersheds for evaluation, and identifying parameters to characterize the watersheds. The status of stream reaches and water bodies to support the desired uses is evaluated in this report and recommendations for future data collection and monitoring are presented.

1.2 Scope and Limitations of the Pilot Assessment

Below follows a brief overview of the original geographic scope for the pilot assessment, indicators used to assess watershed condition, a timeline of the assessment and a summary of the primary resource limitations identified during the assessment.

1.2.1 Geographic Scope of Pilot Assessment

Of the thirteen watersheds of the Santa Clara Basin that were demarcated by the Watershed Management Initiative (WMI); three were selected for the pilot assessment. The geographic locations and boundaries of these watersheds are shown in Figures 1-4 through 1-6 and brief geographical descriptions of the three pilot watersheds follows below:

- The Guadalupe River Watershed drains the east-facing slopes of the Santa Cruz Mountains. The Guadalupe River begins at the confluence of Alamitos Creek and Guadalupe Creek, which is just downstream of Coleman Road in San Jose. The total drainage area is approximately 170 square miles, which serves a key role in draining flood waters from the valley floor. This watershed has been identified as a significant mercury source to the Bay. The main stem Guadalupe River has six major tributaries and six major reservoirs built for water conservation and storage purposes. (Chapter 4: *Assessment of Guadalupe Watershed* contains more geographical details of this watershed.)

- The San Francisquito Creek Watershed is located in the northwestern portion of Santa Clara County and the southeastern portion of San Mateo County. This watershed's drainage basin is approximately 45 square miles. Much of the watershed lies in steep, mountainous areas of the Santa Cruz Mountains. The upland portion of the watershed consists of low-density development and open space while the lower portion of the watershed, which encompasses relatively flat portions of the valley floor adjacent to San Francisco Bay has been extensively developed. This watershed has five major tributaries and two reservoirs. (Chapter 5: *Assessment of San Francisquito Watershed* contains more geographical details of this watershed.)

- Upper Penitencia Creek Watershed is a subwatershed of Coyote Creek watershed. This watershed drains the Diablo Range in the northeast portion of San Jose. The total drainage area of the watershed is approximately 24 square miles in size. Much of its topography is rugged with steep slopes and deep and narrow canyons, with little or no flat land along their bottoms. This watershed has two named tributaries and one reservoir. (Chapter 6*: Assessment of Upper Penitencia Subwatershed* contains more geographical details of this watershed.)

1.2.2 Parameters Selected as Indicators of Watershed Condition

Four beneficial uses and one stakeholder interest were selected as indicators of the conditions of each watershed; serving as the foundation of the assessment. A waterbody or stream reach was considered functioning well if it supported the primary uses/interest. The primary uses/interest identified for the assessment were:

- Cold freshwater habitat (COLD)
- Preservation of rare and endangered species (RARE)
- Water-contact recreation (REC1)
- Municipal and Domestic Supply (MUN)
- Protection From Flooding (PFF)

1.2.3 Timeline of the Assessment

The WMI plans to publish three major documents and a number of supporting documents as a complete Watershed Management Plan (WMP). The three major documents are Volume I: the Watershed Characteristics Report, which was published in February 2001, Volume II: this Pilot Watershed Assessment Report, and Volume III: the Watershed Action Plan. It is intended that these reports represent a consensus of the views of the Core Group, the group of stakeholders that participates in the WMI.

The assessment work involved the use of information from 500+ data sets approved by the stakeholders, followed by about 10 assessment team meetings held in September to December 2001; two watershed integration meetings in December 2001 and January 2002 and four review workshops in April through June 2002, and other review workshops in November 2002. Major milestones included an initial and revised outlines, four assessment chapters, eight technical appendices and the assessment database which included data identifications and reach-by-reach print outs. The work was completed in December 2002.

1.2.4 Resource Limitations

The majority of the assessment work is funded through a CALFED grant ($200,000), provided to the City of San Jose, through the Santa Clara Valley Water District, and in-kind services provided by WMI stakeholders.

The City of Palo Alto contributed to the database work and the setup of the Palo Alto Data Repository; and the City of San Jose provided funding for non-assessment chapters, executive summary and processing of comments received.

1.2.5 Technical Limitations

At the onset of the pilot assessment, it was intended that the framework provide results that established a broad baseline status report on the conditions of the watersheds. What was discovered throughout the actual assessment process was that there were various limitations in the resources available to produce a comprehensive status report. A list of these limitations encountered throughout the assessment process are listed below:

- Usefulness of selected indicators is based on assumed or empirically inferred relationships to stream hydrology and geomorphological processes. However, these relationships have not necessarily been verified in the Santa Clara Basin or in the particular reaches assessed. Thus, some of the approximations in the framework may not be generating accurate details for particular uses and use support determinations. Specifically, the parameters that some stakeholders felt should have been used as primary measures of fitness to determine beneficial use support for REC1 and RARE, which were not part of the assessment framework, included flow rates, channel obstructions, channel hardscape, debris, hydrology, hydraulics and stream morphology.

- The intention of the original framework was to use existing data for the assessment. As the assessment process proceeded local knowledge data were discovered to be quite rich and available from local watershed experts. However, because this local knowledge data did not pass through the appropriate QA/QC measures, it was not able to be used to back up the 'weight of evidence' when determining support of the primary uses for each waterbody.

- It was discovered that many of the decision tools used to determine the level of support were inaccurate because existing data did not provide many direct measures of fitness to support primary uses, in particular COLD & RARE uses.

- The decision tools used to determine the level of support for MUN were limited. Water supply in Santa Clara County is provided by a combination of local sources and imported water deliveries. Local sources consist of reservoirs and streams that provide water primarily for recharge of the ground water aquifer. Several local reservoirs also provide an emergency supply of water for the treatment plants. Although values differ from year to year, approximately one-half of the Santa Clara Basin's drinking water supplies are obtained from groundwater that is recharged from local and imported surface waters.

- According to the current Basin Plan, fish consumption is addressed under Ocean Commercial and Sport Fishing, but it is not addressed under REC1. This means that the mercury contamination that affects fish consumption was not relevant for a support statement for REC1. This distinction was made after the assessment process was completed.

- Finally, it should be noted that the findings in this report is a reflection of conditions of the existing data, and should not be used as the basis for taking on-the-ground actions. Chapter 2 provided some insights on future steps and the lessons learned memo further explains the technical limitations and the need for further data gathering.

1.3 Structure and Content of the Watershed Assessment Report

This Watershed Assessment Report contains six chapters and eight appendices comprised of technical results and evaluations of the analytical methods used in the assessment process. Following this introduction, Chapter 2 contains a description of basin-wide conclusions, regarding natural resource and other conditions that can be drawn from the assessment of the pilot watersheds. Chapter 3 describes the method used to assess watersheds and describe the roles and responsibilities of various groups involved in developing and reviewing this report. Chapters 4 through 6 describe the watershed processes and the current status of uses/interests within the Guadalupe River, San Francisquito Creek, Upper Penitencia Creek; respectively. These Chapters document the results of the assessment in terms of support of uses/interests, data limitations, and uncertainty, and recommends further data acquisition and analysis, if necessary. Within Chapters 4 through 6 are Chapter Appendices that contain the assessment results in the form of charts and tables and the list of data sets used in the assessment.

Lastly, the Report Appendices contain the supporting documents for the assessment process (including the Framework for conducting the assessment, the Stream Segmentation memorandum and the Protocol for conducting assessment team meetings) and the following technical memoranda: *Lessons Learned*, *Data Gaps Identified*, and *Limiting Factors Analysis*. The *Lessons Learned* technical memorandum in Appendix B summarizes the lessons learned by the participants in the WMI's pilot watershed assessments. These lessons pertain to each of the major steps in the assessment process. The intent of this appendix is to provide input to the WMI for future watershed assessment activities and to highlight aspects of the pilot assessments that either did or did not work well.

1.4 References:

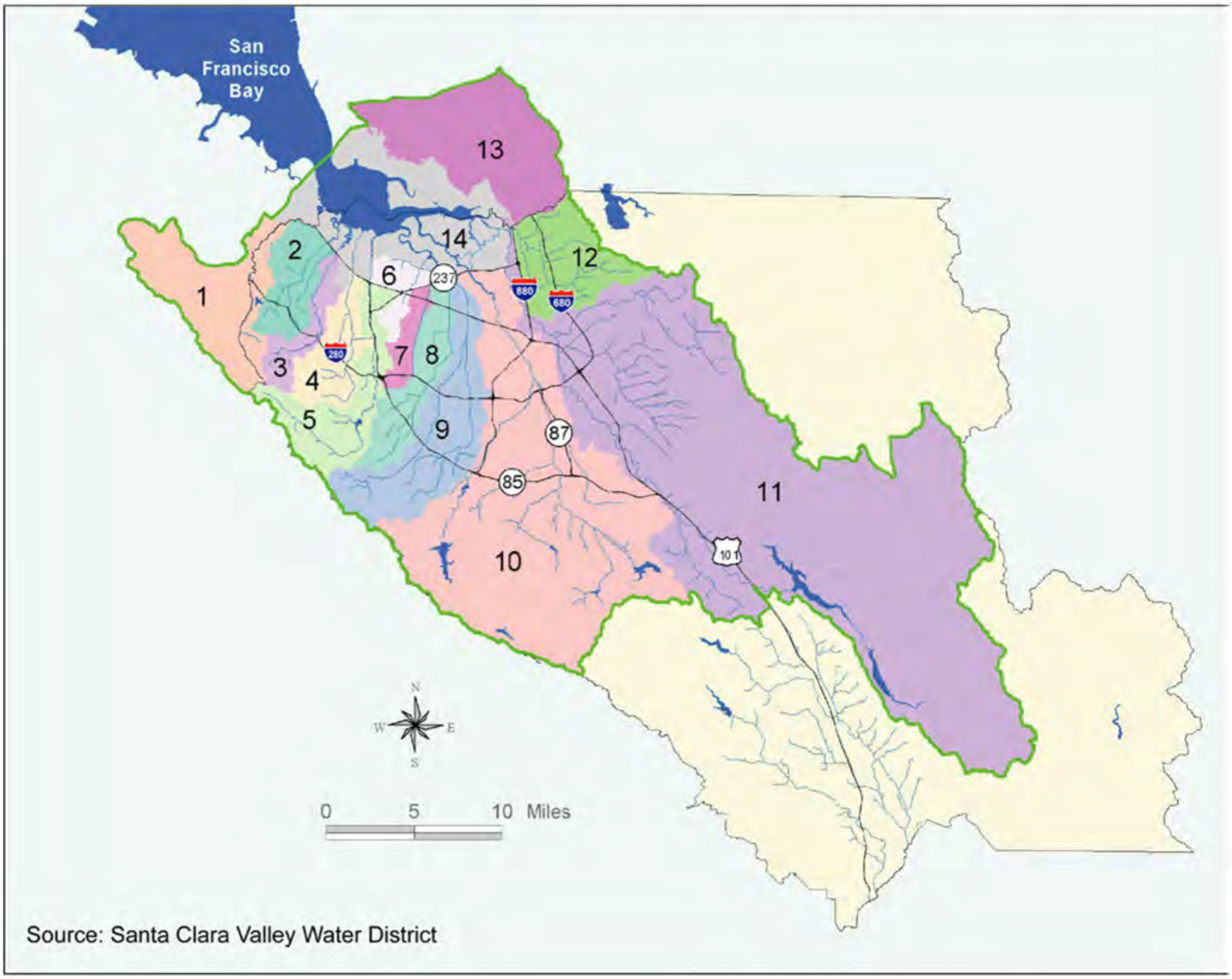
The Santa Clara Basin Watershed Management Initiative. 2003. Watershed Management Plan Volume 1 Unabridged Watershed Characteristics Report. 2003 Revision

Source: Santa Clara Valley Water District

Figure 1-1
Regional Location of Santa Clara Basin

Figure 1-2

Santa Clara Basin Watershed Boundaries



3	Adobe	2	Matadero/Barron
13	Arroyo la Laguna	4	Permanente
14	Baylands	1	San Francisquito
8	Calabazas	9	San Tomas
11	Coyote	5	Stevens
10	Guadalupe	7	Sunnyvale East
12	Lower Penitencia	6	Sunnyvale West

Figure 1-3

Santa Clara Basin Watershed Management Initiative

Major Elements of the *Watershed Management Plan*

April 2001

Watershed Management Planning Process

Incorporate stakeholder input into Watershed Management Plan to achieve ultimate buy-in.

On-going

VOLUME 1
Watershed Characteristics

Describes the general physical and political characteristics of the Basin

VOLUME 2
Watershed Assessment

Assess the condition of the watershed(s) using existing information

Appendix 1 - First Suite of Watersheds
Appendix 2 - Next Suite of Watersheds
Appendix 3 - Next Suite of Watersheds...

DEVELOP
Watershed Action Alternatives

What we can do to meet the stakeholder goals

TM-A - Programmatic
TM -B- First Suite of Watersheds
TM-C- Next Suite of Watersheds...

VOLUME 3
Watershed Action Plan

What we agree to do to meet the stakeholder goals

Reports Include

Watershed Characteristics Report (April 2001)

- Describe watershed characteristics
  - -natural setting
  - -land use
  - -cultural
  - -regulatory
  - -community organizations
  - -water mgmt. facilities
- WMI goals

Watershed Assessment Report (Fall 2001)

- Describe the
  - -approach
  - -watershed selection
  - -evaluation methods
- Analyze condition of watershed using existing data
- Present the results of the analysis
  - -level of use support
  - -uncertainty analysis
  - -identify data gaps
  - -suspected limiting factors

Watershed Action Alternatives (May 2002)

- Evaluate results of assessments
  - -limiting factors analysis
  - -integrate results (connectivity)
  - -linkage to other parallel efforts
  - -linkage to land use analysis rpt
- Identify & develop possible actions
  - -programmatic
  - -watershed specific
  - -policy changes
- WMI infrastructure planning
- Evaluate actions
  - -feasibility
  - -costs
  - -time required

Watershed Action Plan (Draft December 2002)

- Prioritize alternative actions
- Programmatic changes
  - -policy
  - -regulatory
- Watershed specific actions
  - -protection, enhancement, restoration projects
  - -additional data gathering efforts
- WMI infrastructure
  - -program to measure success
  - -long term data & fiscal management
- Schedule
- Resource requirements
- Performance Measures
- Accountability

O:WMI\RPT\Figures\Road02001fb.VDS
B. Goldie

*TM=Technical Memo

Volume Two

Watershed Assessment Report

<u>Chapter 2</u>
Implications of Assessment for Next Phases of WMI

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team

February 2003

Watershed Assessment Report
Chapter 2: Implications of Assessment for Next Phases of WMI

List of Authors

REPORT PREPARATION TEAM

Sarah Young, Santa Clara Valley Water District
Richard McMurtry, Regional Water Quality Control Board
Alice Ringer, WMI Coordinator

with assistance from:

Phil Bobel, City of Palo Alto
Debra Caldon, Santa Clara Valley Water District, formerly City of San Jose

with consultant support from

URS

Rob Carnachan, Senior Water Resources Scientist
Sergio Feld, Senior Scientist
Suzanne Loadholt, Soil Scientist
Jeffrey Hunt, GIS Technician
Stacie Livermore, Graphic Artist

And

Entrix, Inc.

Jerry Smith, San Jose State University, COLD Assessment Team

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 2
Table of Contents

Tables

Figures

Chapter 2
Implications of Assessment for Next Phases of WMI

2.1 Introduction

The pilot watershed assessments provided valuable insight into the strengths and weaknesses of the assessment methodology developed by the WMI. These insights suggest possible directions for future action by the WMI. In addition to producing an evaluation of beneficial use support in the pilot watersheds, the assessment process performed the following key functions: (1) evaluation of the availability and utility of water quality-related data collected over the last fifteen years; (2) documentation of the suitability and limitations of the WMI Assessment Framework for providing an objective, repeatable approach to conducting beneficial use-oriented watershed assessments; and (3) establishment of a basis for making decisions regarding future data collection efforts. The information garnered from this effort is applicable to all of the watersheds in the Basin and provides direction for future WMI stakeholder actions.

While the pilot assessments were conducted in three very different watersheds, the effort provided stakeholders, policy-makers, and administrators with well-documented information that is important to address basin-wide assessments in the future. Lack of data in the pilot watersheds precludes making strong inferences about their specific resource conditions. Nonetheless, our understanding of the basin has been expanded in several key areas. Due to the fact that not all of the data was included, that there were limitations of the data, and that there were different possible ways of segmenting creeks and evaluating the data; it was necessary to heavily qualify the assessment conclusions presented in Chapters 4 through 6. Thus the major use of this assessment is in designing future assessments, not in selecting particular protection/restoration strategies, either for individual reaches or for the entire Basin.

2.2 Basin-wide Implications

The implications and issues discussed in this chapter could be used in several ways. They could form the basis for one section of the Watershed Action Plan, could be used as the basis for issuing papers by different stakeholder agencies to justify funding support for ongoing WMI basin-wide projects, or could be used by any agency to improve its approach to watershed management. The pilot assessments can inform three general types of action by the WMI: (1) development of specific guidance documents based on information already produced; (2) development of institutional approaches; and (3) identification of potential solutions through mandated programs and services.

2.2.1 Parameters Established in Pilot Assessments

The pilot assessments utilized several important parameters including:

(a) The use of ***special status species*** as a basis for evaluating the RARE beneficial use. This effort represents a stakeholder-approved listing of threatened, rare, and endangered species for the Santa Clara Basin. With some potential modification (see Section 2.2.3.5), this information will continue to be useful for additional watershed assessments and, equally important, for other types of land use and habitat protection actions throughout the Basin.

(b) A planning-level approach for ***dividing watershed streams into "reaches***" that enhances the ability to manage streams and stream data. The division of reaches in a consistent manner (see Appendix A) allows local agencies to collect types of data relevant to specific reach types at appropriate sites, and to evaluate stream conditions within reaches of a similar type. Eventually, this approach would serve to compare conditions across watersheds. Refinement of the segmentation will be necessary in order to more closely reflect varying conditions within each segment with regard to specific beneficial uses. Guidance to local agencies regarding the segmentation approach along with data collection protocols would then serve basin-wide improvement in data collection for future assessments as well as improved management of the streams.

(c) Identification of the ***best data types*** for the assessment of key beneficial uses. Pilot assessments lacked enough suitable data to draw sound conclusions about the condition of key beneficial uses, such as cold freshwater aquatic habitat and water contact recreation. This indicates the need for systematic collection of appropriate information. Guidance on the approach for monitoring programs is needed for local agencies and municipalities to establish consistent data collection as a function of project mitigations. This is the only approach that will begin to correct the deficiencies in our understanding of water quality conditions in local watersheds. Future monitoring and data gathering efforts should include collection of those data types.

(d) A protocol for ***managing watershed data*** has been established through the development of the metadata database (MDDB). The MDDB provides the architecture for local agency data sharing and a beginning point for public access to all existing watershed related data. The WMI has begun to provide public access to this data through the support of the City of Palo Alto. A cooperative approach is required for the long-term management of watershed data, including public access of that information. It will also be important to catalog new data sets containing watershed data as they emerge. This should include environmental impact reports pertaining to Basin waterbodies and the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) data for the Guadalupe watershed.

2.2.2 Implications for Future Data Collection

Past data collection efforts within the Santa Clara Basin have been fragmented, project specific, and not well related to determining the beneficial use support conditions of local waterbodies and streams. Short- and long-term watershed monitoring strategies need to be adopted and implemented by local agencies.

The pilot assessment process involved the compilation of extensive existing data. Various agencies have collected a wide variety of water quality and beneficial use-related data over the last twenty years for different purposes. The nature and extent of these data sets had never been fully evaluated and described prior to the WMI's pilot assessments. For the first time, an in-depth look into existing data sets was completed by the stakeholders and an understanding of the "state of the data" was reached. Over 470 data sets in the form of formal reports, formal/informal correspondence, videotapes, and actual data tables were documented and evaluated through the assessment process. The review of the MDDB data sets documented the quantity and quality of data and identified organizations in the region that have collected watershed information, especially water quality data. Significant gaps in the existing data needed to fully evaluate beneficial use support were identified (see Appendix C). On the other hand, the amount of information gleaned from existing compiled data exceeds that which could have been determined by spending a similar amount of time and money simply collecting new data. Nonetheless, not all existing information could be acquired given the resources available for the assessment. Because of this, and the lack of existing data for many areas, the major use of this assessment will be to help design future assessments.

Because data gaps are defined by the assessment method that generates them, any change to the Assessment Framework may result in a change in the data gaps. Therefore, after creating a revised Assessment Framework, the data gaps identified using the original Assessment Framework should be reviewed and modified, as necessary into a revised set of data gaps that corresponds to the revised Assessment Framework.

The following implications that will have to be taken into account by WMI stakeholders in future actions have emerged from the assessment:

(a) *Different assessment methodologies are designed to address different questions regarding watershed health.* The Assessment Framework developed by the WMI for the pilot assessments is a waterbody-based beneficial use assessment. The primary purpose of this type of assessment is to gauge existing support of water quality standards and designated uses outlined in the Basin Plan. The WMI will need to determine the appropriate assessment type required to meet the needs of stakeholders and local agencies charged with managing Basin water resources. A regulatory-driven assessment approach, such as the one embodied in the Assessment Framework, would need substantially more data to determine whether or not a stream supports a given beneficial use or water quality standard. Alternative approaches (discussed in Section 2.3.2) include resource-based assessments of watershed health aimed at identifying causes of impairment and management actions to protect, restore, and enhance desired watershed features.

(b) *Update of the MDDB with additional data sets in the absence of a formal data management system.* As additional data continues to be generated by numerous independent studies either planned or currently underway within the Basin, the WMI will need to develop a mechanism for updating the MDDB to include this data. In the next year the WMI will conduct its annual Stream Studies Inventory that will be used to update the MDDB with the assistance of the SCVURPPP. This effort will need to include the FAHCE data.

(c) *Use of knowledge gathered by the assessment to begin to develop both short- and long-term data collection strategies or monitoring programs to improve the ability to assess local watersheds.* The stakeholders, through the pilot assessments, have documented the "state of the data" and have broadened their understanding of what types of data need to be collected. Questions about who should design, manage, fund and undertake this effort must be answered before moving forward. It is clear that such strategies are a critical need. Future assessments will not likely be cost effective unless they use data collected under a systematic and consistent approach to monitoring. At least three years' worth of data is needed to account for variances resulting from anomalous precipitation years.

(d) *Instituting a Memorandum of Agreement or other formal institutional arrangement between agencies to consistently collect, compile, share and manage future watershed monitoring data is critical to improved watershed management.* Recognizing institutional capacities for watershed data collection is important for future data management and establishing data sharing arrangements. The capacity for data collection varies among local agencies. The pilot assessment process demonstrated that the Department of Fish and Game and Water District have historically been the principal generators of the types of data needed to assess beneficial use support. Of over 470 data sets compiled for the pilot assessments, approximately 250 (or 53%) were generated by these two agencies. Other entities possessing watershed data include the SCVURPPP, Santa Clara County Parks and Recreation Department, the City of San Jose, San Francisco Estuary Institute, USGS, San Francisquito Watershed Council, and local universities.

(e) *Future data collection efforts undertaken within the Santa Clara Basin should be geared to establishing whether public benefits are being supported within streams and reservoirs.* Monitoring information evaluated during the assessment indicated that purposes for data collection vary from project to project. Most local data is collected and managed to meet regulatory requirements imposed by state or federal agencies – some is collected for the environmental review process, some for enforcement or compliance requirements, and some for legal settlements. A relatively small amount of data is attributable to research or other community capacity building. Data collection efforts focused on (and usable for) evaluating the whether local streams support fisheries, swimming and other recreational benefits have been very limited. Guidance on the type of data to be collected, the monitoring approaches, and data management would improve upon the usefulness of previous local data collection efforts.

(f) *A relatively small percentage of the large amounts of data collected proved useful to determining whether public benefits are supported in the pilot watersheds.* Table 2-1 illustrates the number of data sets reviewed and the percentage of data actually used by the assessment team in the analysis. A total of 470 data sets were compiled for potential use in the pilot assessments. Using the COLD freshwater fisheries support evaluation as an example, a subtotal of 307 data sets were identified as being of potential relevance to this use assessment. Of these, only about 57% to 70% were used in the analysis. Data sets were rejected for a variety of reasons, among them a lack of specificity regarding location of data capture, data age, and an inability to interpret the data with respect to the assessment criteria.

Table 2-1
Data Completeness, Quality, and Relevance Summary for Assessment

Beneficial Use/ Stakeholder Interest	Watershed	Data Sets Reviewed	Data Sets Forwarded	Data Sets Rejected	% Forwarded to Analysis
COLD	San Francisquito	97	66	31	68%
	Upper Penitencia	69	43	26	57%
	Guadalupe	141	103	38	70%
RARE	San Francisquito	36	30	6	84%
	Upper Penitencia	33	26	7	70%
	Guadalupe	64	54	10	80%
MUN	San Francisquito	11	7	4	63%
	Upper Penitencia	5	3	2	60%
	Guadalupe	32	25	7	79%
REC-1	San Francisquito	22	20	2	91%
	Upper Penitencia	10	8	2	80%
	Guadalupe	54	36	18	66%
Protection from Flooding (PFF)	San Francisquito	32	26	6	81%
	Upper Penitencia	23	19	4	83%
	Guadalupe	31	22	9	71%

(g) *Although the watersheds selected by the WMI for the pilot assessments included those likely to have the most available data, the amount of relevant data varied among the watersheds. The Guadalupe and San Francisquito watersheds were relatively richer in useful data than the Upper Penitencia subwatershed.* Still, the amount of relevant, quality data available on these streams only allowed the assessment team to make relatively confident use support determinations on a limited number of stream reaches.

(h) *Useful data was not equally available for determining all beneficial uses.* More data was available for assessing the COLD freshwater habitat beneficial use than for all other uses. This seems to reflect the recent public interest and regulatory agency emphasis on protecting salmon and steelhead populations. Data related to the RARE, REC-1, and MUN uses is limited partly due to a lack of agreement on how to evaluate these beneficial uses. Recognizing the lack of understanding concerning the appropriate data to collect for evaluation of any beneficial use as well as the extent of existing data is essential for planning future assessments. Local stakeholders involved with watershed stewardship activities, together with state and federal regulatory agencies, need to develop better protocols regarding the data needed to evaluate support for stream functions and beneficial uses. However, in the absence of agreed-upon protocols, it is incumbent upon local stakeholders to determine those approaches that will best assist them in achieving watershed goals.

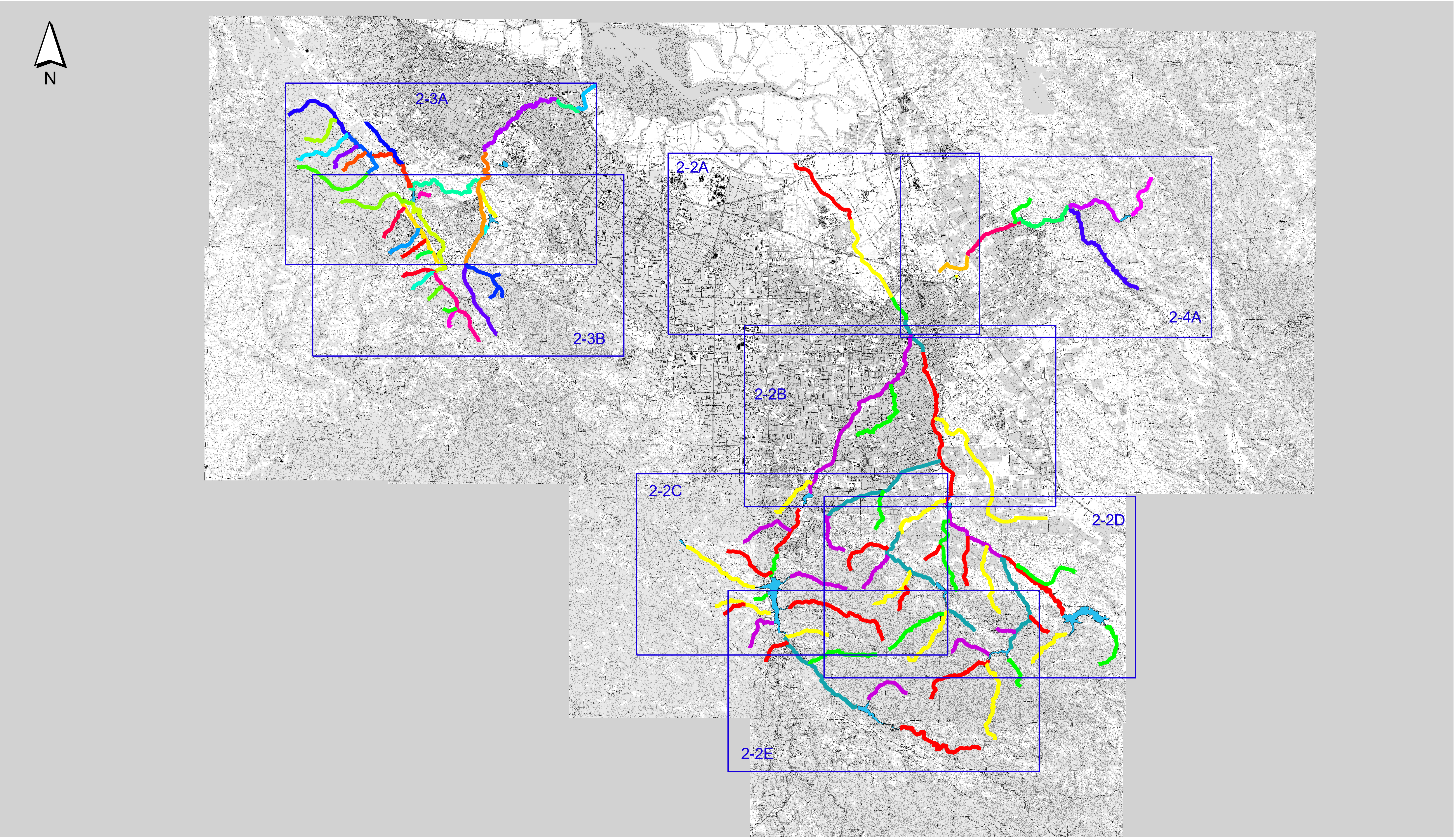
(i) *The spatial distribution of existing data within the watersheds varied from one watershed to another.* The vast majority of the data available within each watershed is on the mainstem or the lower, principal tributary stream reaches, while little data is collected in upland tributaries. Table 2-2 summarizes the number and relative watershed proportion of reaches found to have sufficient and insufficient data for each use/interest within each of the three watersheds. As illustrated, for the cold freshwater habitat (COLD) beneficial use, sufficient data was only available to determine use support in 14 reaches in the Guadalupe watershed, which accounts for 35% of the watershed’s linear stream length. In the Upper Penitencia subwatershed, however, sufficient COLD data was available for only four reaches but these reaches comprise 66% of the watershed’s linear stream length.

Table 2-2
Watershed Data Sufficiency Summary

Watershed	Use/ Interest	Reaches with Insufficient Data			*Reaches with Limited Data			**Reaches with Sufficient Data		
		No.	Miles	%	No.	Miles	%	No.	Miles	%
Guadalupe	COLD	40	69.7	48	9	23.9	17	14	48.6	35
	MUN	46	99.1	69	13	38.8	28	4	4.3	3
	REC-1	43	91.4	63	16	34.8	25	4	16.1	12
	PFF	28	46.4	31	5	0.0	0	30	95.9	69
	RARE	43	78.0	54	9	27.8	20	11	36.4	26
San Francisquito	COLD	20	25.7	38	4	13.3	20	13	28.4	42
	MUN	28	42.0	62	7	17.9	27	2	7.5	11
	REC-1	26	38.1	56	11	26.9	40	1	2.4	4
	PFF	27	44.0	65	2	1.5	2	8	21.9	33
	RARE	24	40.3	60	4	8.6	13	9	18.4	27
Upper Penitencia	COLD	3	3.3	19	1	2.5	15	4	11.6	66
	MUN	8	17.4	100	0	0.0	0	0	0.0	0
	REC-1	3	3.3	19	2	4.2	24	3	9.9	57
	PFF	2	1.4	8	0	0.0	0	6	16.0	92
	RARE	5	9.8	56	0	0.0	0	3	7.7	44

* Includes reaches with support status uncertainty levels of C and D
** Includes reaches with support status uncertainty levels of A and B

(j) Figures 2-1 to 2-4 depict the spatial disparity of the data and the assessment findings. Similar information is displayed in bar chart form in Appendices 4-A, 5-A, and 6-A. As shown, a significantly smaller amount of upland watershed data was available when compared to the amount of data available to evaluate the main stem reaches. In light of this, a relatively small number of reaches throughout the three watersheds had data of a sufficient amount and quality needed to reach a confident support determination. As discussed above, exclusive reliance on the information generated by both historic and recent data collection efforts is, in most instances, not sufficient to make confident conclusions about beneficial use support in pilot watershed streams. Consequently, the pilot assessments could only provide very limited information for use in developing site-specific recommendations for stream restoration or watershed improvement. It should be noted that certain stakeholders believe that additional data exists that, when evaluated, would result in different support status determinations for several reaches within the Guadalupe watershed. Although this data was not provided to the assessment team for use in the assessment, the opinions of these stakeholders are noted on Figures 2-2a through 2-2e and in Appendices 4-A and 4-B, as well as described in the relevant sections of Chapter 4.



9000 0 9000 18000 Feet

Scale 1:225,000

URS

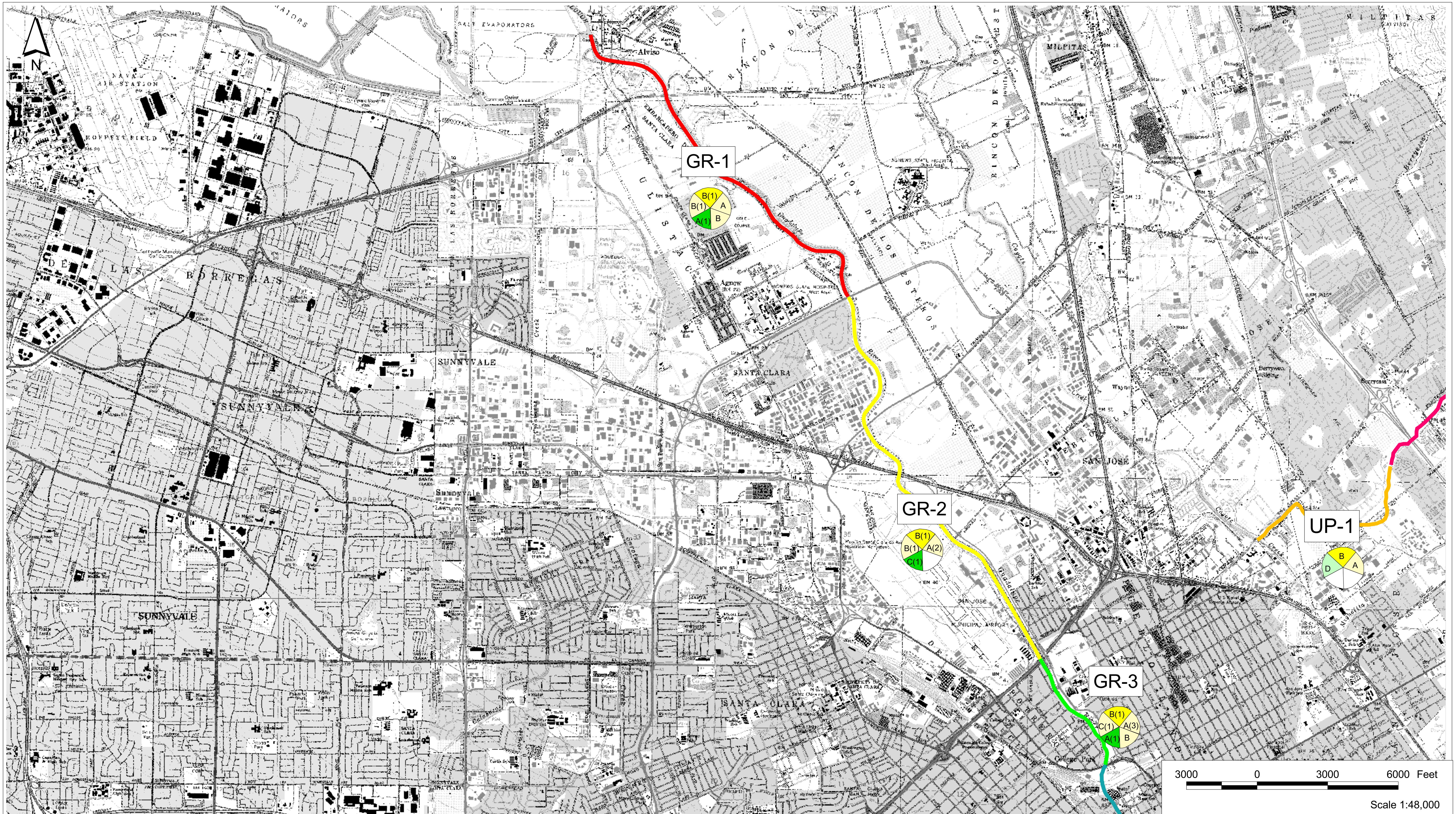
Santa Clara Basin
Watershed Management Initiative

Project No. 51-981086NA.10

INDEX TO WATERSHED ASSESSMENT RESULT MAPS

Figure 2-1

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, REC-1, Flood Protection, Rare, Municipal

SUPPORT:
- Full
- Partial
- Potential Non-support
- No data

SUPPORT NOTATIONS:
(1) - Certain stakeholders believe use is partially supported
(2) - Certain stakeholders believe use is fully/not supported in different sections of segment
(3) - Certain stakeholders believe use is fully supported

UNCERTAINTY:
A - Sufficient good quality data
B - Limited good quality data
C - Limited fair quality data
D - Limited poor quality data

URS

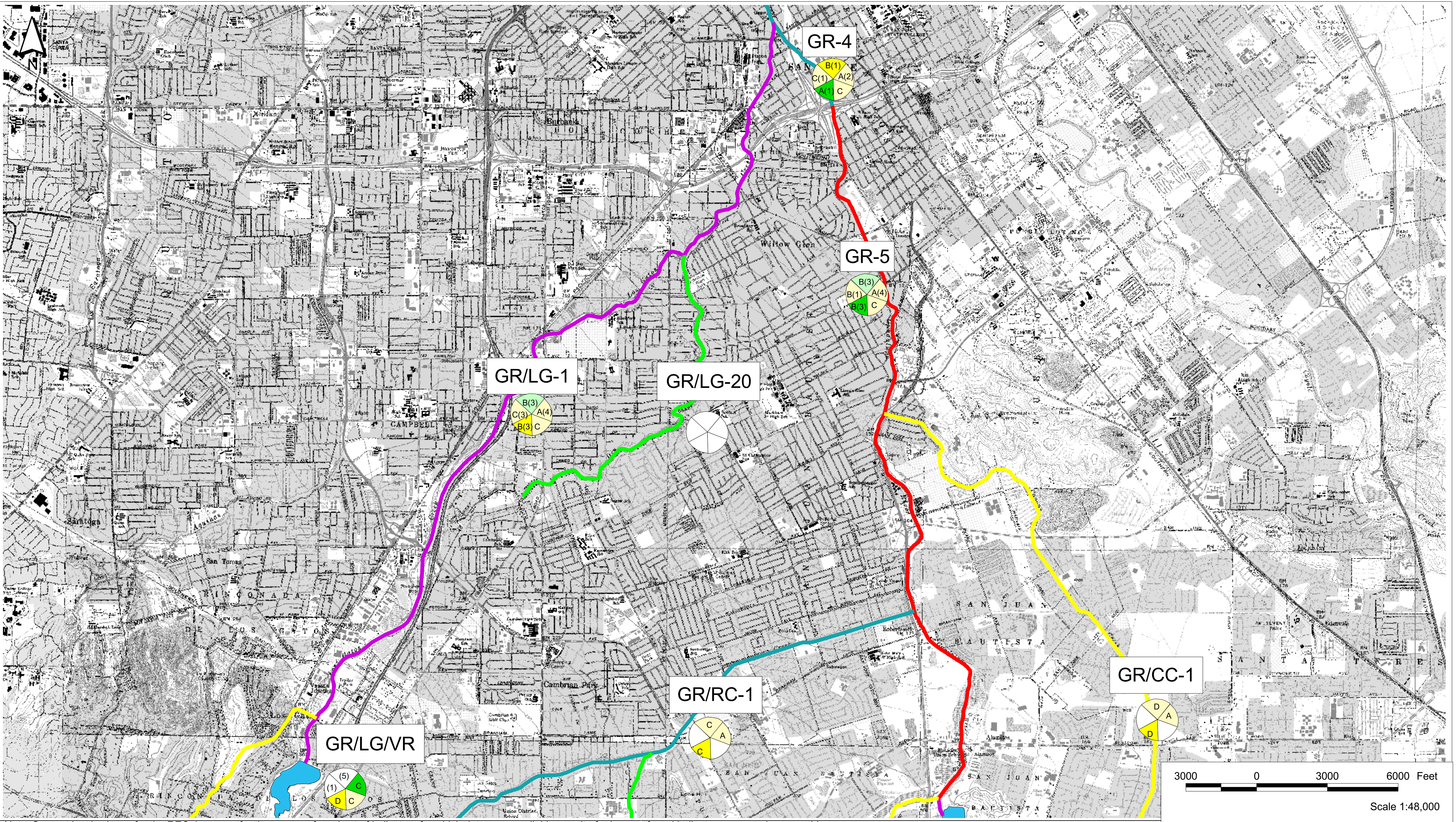
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR GUADALUPE WATERSHED

Figure 2-2A

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, REC-1, Rare, Flood Protection, Municipal

SUPPORT: Full, Partial, Potential, Non-support, No data

SUPPORT NOTATIONS:

(1) - Certain stakeholders believe use is partially supported
(2) - Certain stakeholders believe use is potentially supported
(3) - Certain stakeholders believe use is partially/not supported in different sections of segment
(4) - Certain stakeholders believe use is fully/not supported in different sections of segment
(5) - Certain stakeholders believe use is not supported

UNCERTAINTY:

A - Sufficient good quality data
B - Limited good quality data
C - Limited fair quality data
D - Limited poor quality data

URS

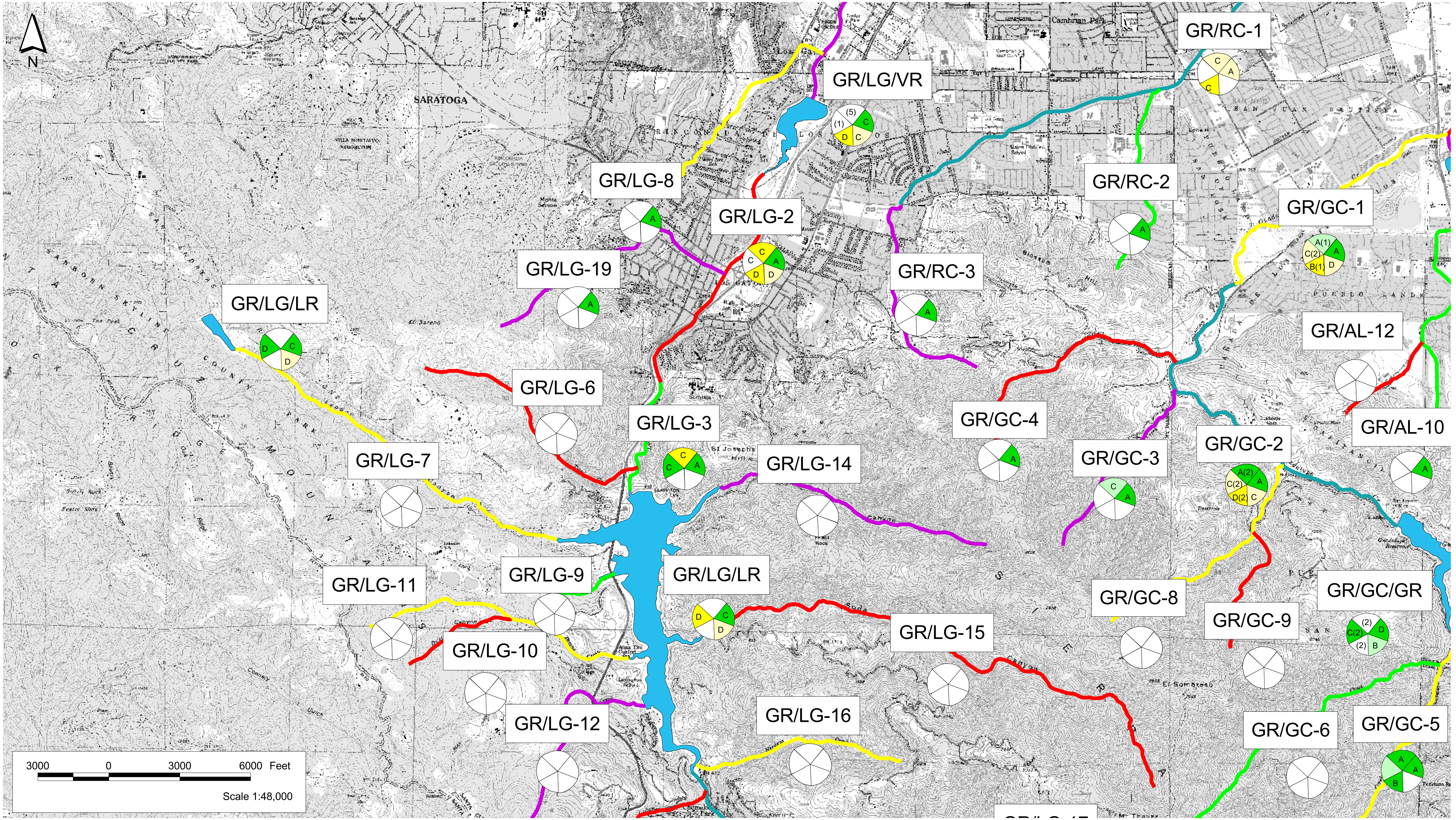
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR GUADALUPE WATERSHED

Figure 2-2B

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

SUPPORT NOTATIONS:
(1) - Certain stakeholders believe use is partially/potentially supported in different sections of segment
(2) - Certain stakeholders believe use is partially supported

UNCERTAINTY:
A - Sufficient good quality data
B - Limited good quality data
C - Limited fair quality data
D - Limited poor quality data

URS

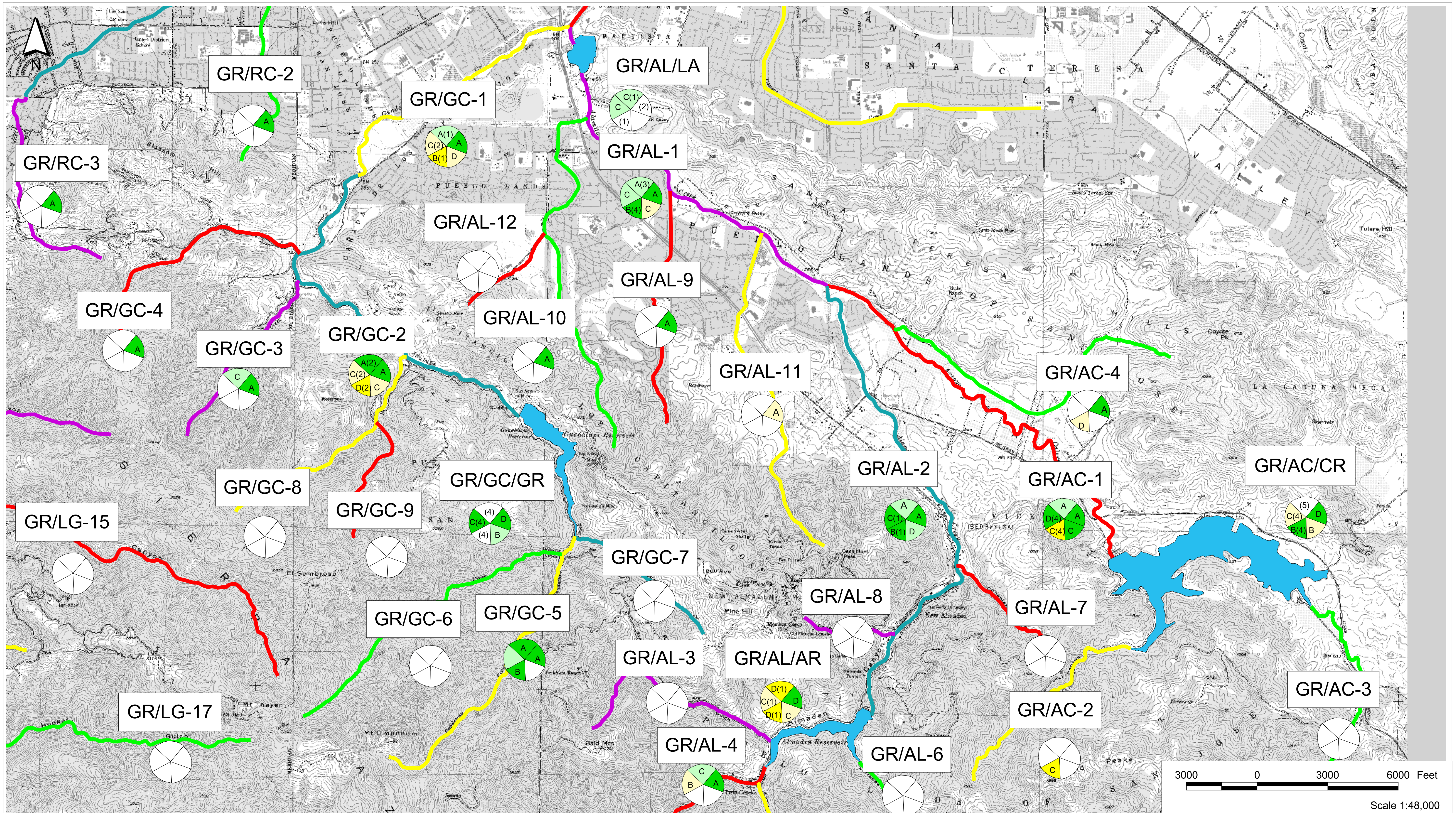
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR GUADALUPE WATERSHED

Figure 2-2C

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

SUPPORT NOTATIONS:
(1) - Certain stakeholders believe use is not supported
(2) - Certain stakeholders believe use is fully supported
(3) - Certain stakeholders believe use is partially/not supported in different sections of segment
(4) - Certain stakeholders believe use is partially supported
(5) - Certain stakeholders believe use is potentially supported

UNCERTAINTY:
A - Sufficient good quality data
B - Limited good quality data
C - Limited fair quality data
D - Limited poor quality data

URS

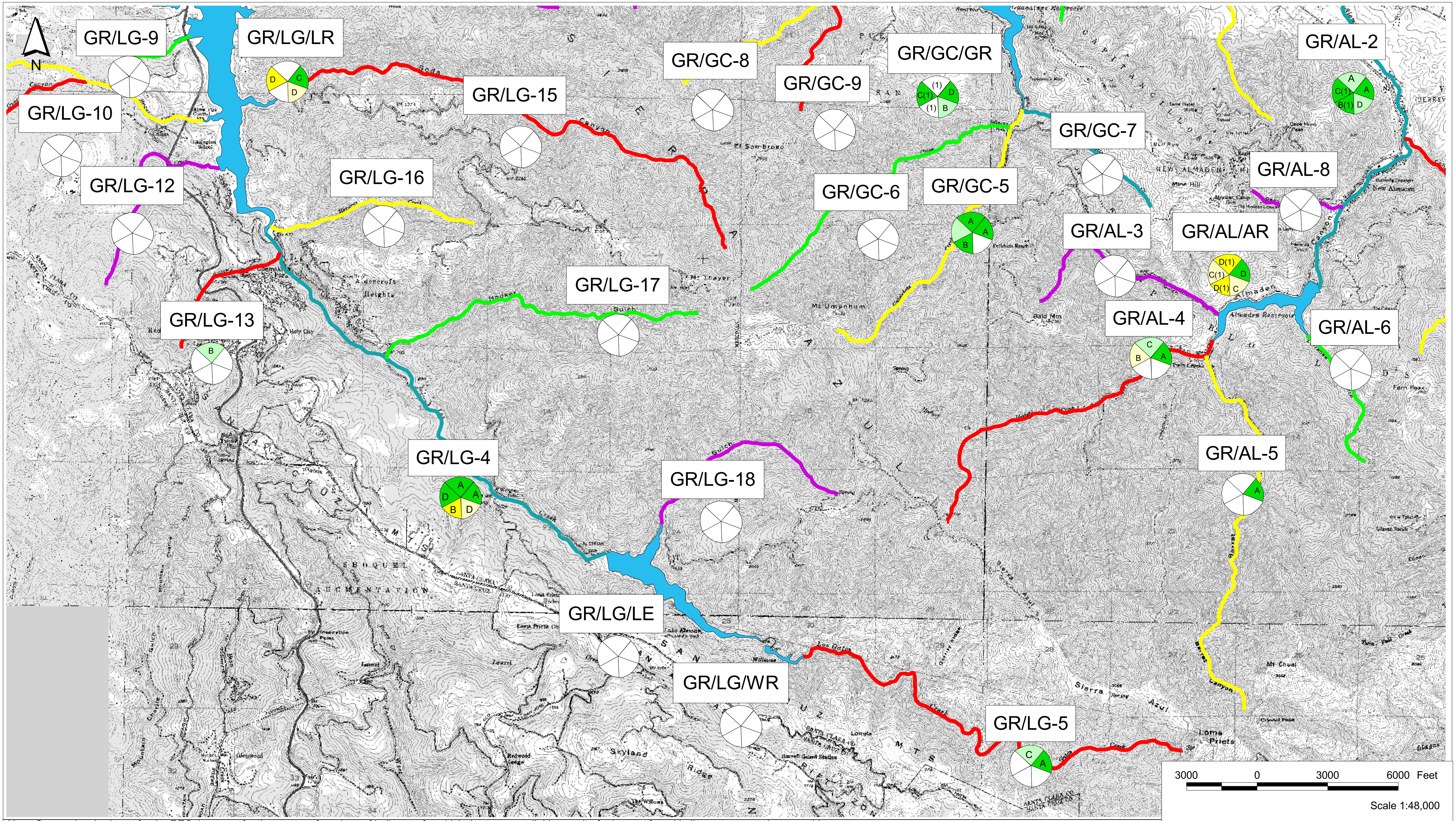
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR GUADALUPE WATERSHED

Figure 2-2D

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

SUPPORT NOTATIONS:
(1) - Certain stakeholders believe use is partially supported

UNCERTAINTY:
- A - Sufficient good quality data
- B - Limited good quality data
- C - Limited fair quality data
- D - Limited poor quality data

URS

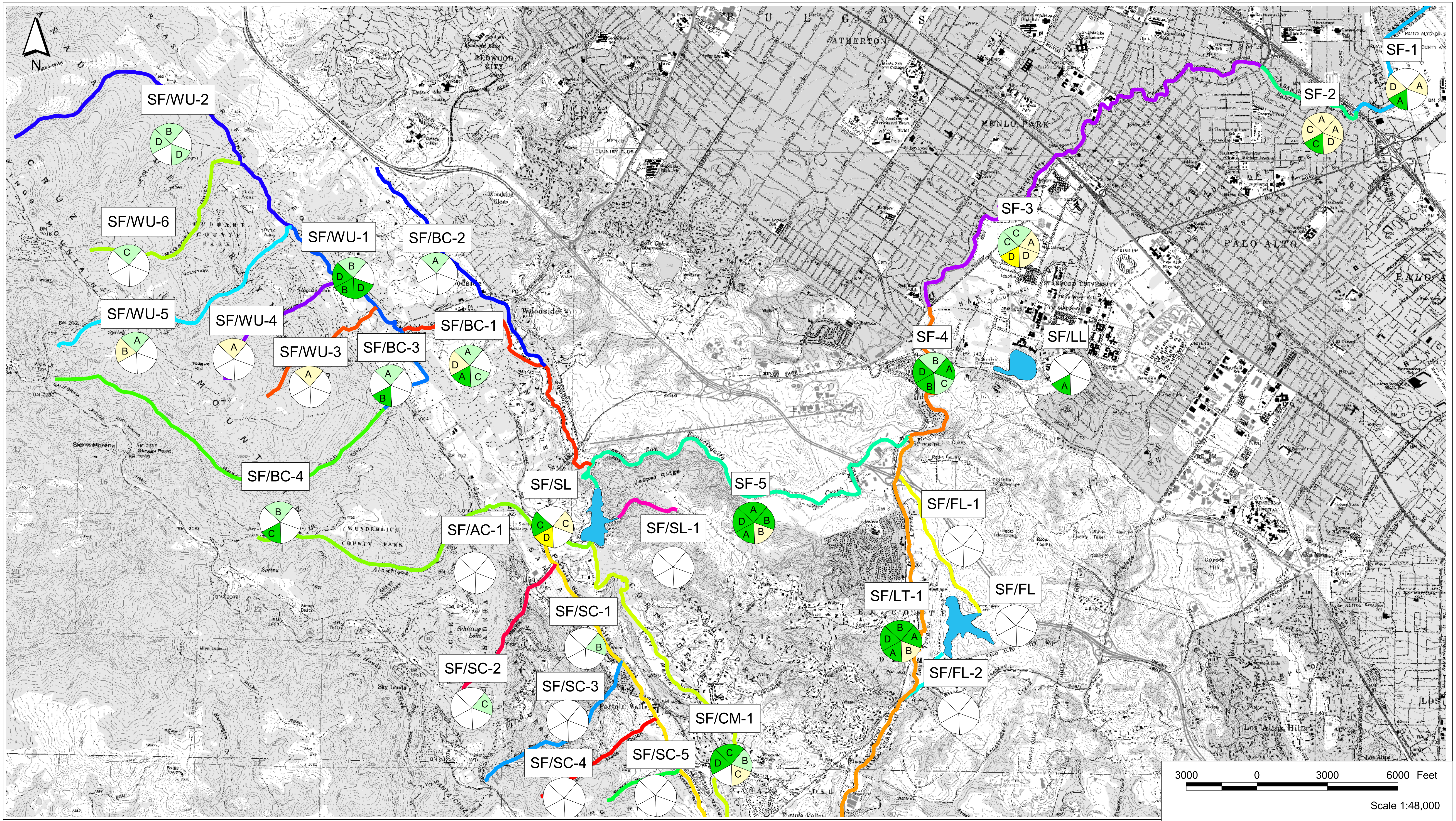
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR GUADALUPE WATERSHED

Figure 2-2E

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

UNCERTAINTY:
- A - Sufficient good quality data
- B - Limited good quality data
- C - Limited fair quality data
- D - Limited poor quality data

URS

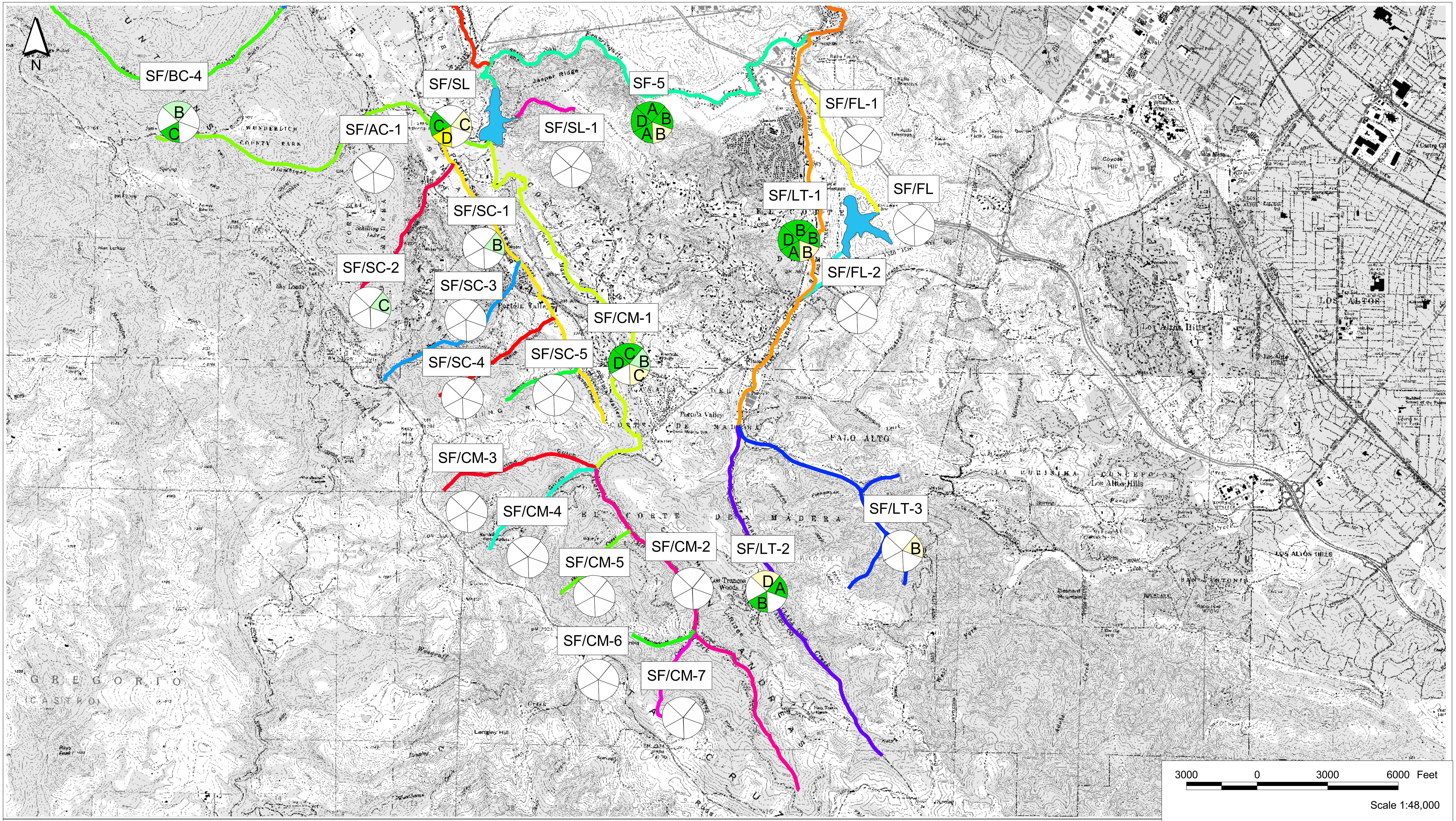
Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR SAN FRANCISQUITO WATERSHED

Figure 2-3A

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

UNCERTAINTY:
- A - Sufficient good quality data
- B - Limited good quality data
- C - Limited fair quality data
- D - Limited poor quality data

URS

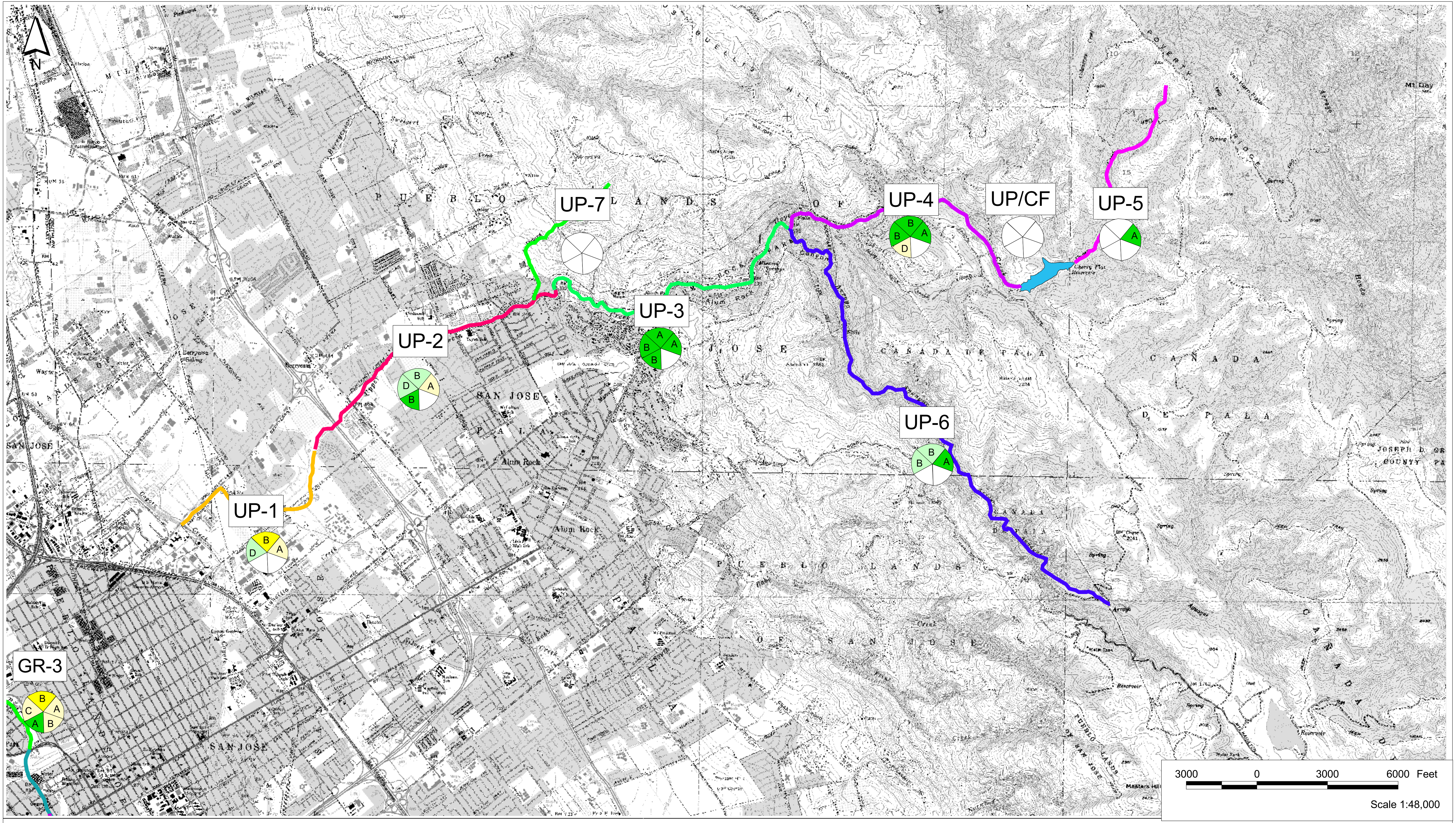
Santa Clara Basin
Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR SAN FRANCISQUITO WATERSHED

Figure 2-3B

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr



Note: Support levels shown for the REC-1 use are for the most preferred set of indicators for which data were available; results for less preferred indicators are not shown on this map.

USE: Cold, Flood Protection, Municipal, Rare, REC-1

SUPPORT:
- Full
- Partial
- Potential
- Non-support
- No data

UNCERTAINTY:
- A - Sufficient good quality data
- B - Limited good quality data
- C - Limited fair quality data
- D - Limited poor quality data

URS

Santa Clara Basin Watershed Management Initiative

Project No. 51-981086NA.10

ASSESSMENT RESULTS FOR UPPER PENITENCIA SUBWATERSHED

Figure 2-4

X:\x_env\WMI\Maps-GIS\wmi\wmi_pies.apr

(k) *Data gaps identified by the assessment process should be evaluated and used to develop short- and long-term monitoring program recommendations and guidance for local agencies.* One purpose of the pilot assessments was to determine if existing data collected for the three watersheds would represent a sufficient base for the sort of rigorous analysis envisioned in the Assessment Framework. One of the criteria used in selecting the three pilot watersheds was the belief among WMI stakeholders that these watersheds were likely to have the largest amount of historic and recent data. In general, two types of data gaps were encountered: (1) reaches where no relevant data were available for a use/interest, and (2) reaches where relevant data were available but were either very limited or of poor or questionable quality. Details on each of these data gap "categories" for every reach and use/interest are presented in Appendix C.

(l) *Data collection activities should be initiated for those reaches where no usable data was available.* Data gaps in the pilot watersheds were substantial enough to compromise overall confidence in the assessment results in a number of the reaches. Therefore, it may not be worthwhile to conduct similar assessments in other, less data-rich watersheds until additional data collection has occurred. Because of the different data requirements for assessing the various uses/interests, WMI stakeholders should identify the highest priority uses in the plan for long-term data collection. Within some of the uses, collection of data on the primary indicators should be prioritized (see Sections 4.4, 5.4, 6.4, and Appendix C). Ideally, a geomorphic characterization of the streams in question should be completed before major data collection efforts pertaining to the COLD and RARE uses and the PFF interest are undertaken. In this way, data collection can be focused in reaches with the potential to support the use/interest.

(m) *Priority should be placed upon filling the data gaps needed to lower the amount of uncertainty associated with the support statement.* For reaches where some data currently exists but the support statements developed in the pilot assessments are compromised by high uncertainty (either C or D), additional data collection should be undertaken for the uses of concern. In some cases, the additional data may result in a change in support status as the amount of uncertainty decreases. Depending on the types of data needed, the data collection effort may be able to be coordinated with the geomorphic characterization.

2.2.3 Factors Limiting Support of Beneficial Uses

The pilot assessments developed support status statements for those reaches and uses that had a sufficient amount of available data. While these statements are specific to the individual stream reaches for which the data was originally collected, some broad conclusions may be applicable to other basin watersheds. In particular, those reaches found to less than fully support at least one of the uses and the factors limiting this support may prove instructive to future analysis of other Basin streams with similar characteristics. At the very least, the limiting factors identified for those reaches should serve as a starting point for additional study and data collection designed to determine underlying causes for the limiting factors and identify options for restoring full use support.

Table 2-3 lists the reaches in the three pilot watersheds for which relatively certain determinations of less than full support were made for each of the five uses evaluated. In the future, when attempting to identify potential causes for the presence of limiting factors, it will be important to have more quality reach-specific data, collected expressly for this purpose. Unfortunately, this sort of data was rarely available in the pilot watersheds. Thus, the assessment team was only able to speculate at potential causes for limiting factors. A potential approach for ground-truthing these limiting factors and pinpointing specific causes is outlined in Section 2.3.3. Limiting factors and potential causes are described below for each of the five uses. Additional detail is provided in Appendix D.

Table 2-3
Stream Reaches with Less Than Full Support of a Use (High Certainty)*

Watershed	Use	**Partial Support		**Potential Support		**Non Support	
		No.	Reach ID	No.	Reach ID	No.	Reach ID
Guadalupe	COLD[1]	6	GR-5, GR/LG-1, GR/LG-13, GR/AL-1 & 2, GR/AC-1	4	GR-1 to 4		
	MUN	1	GR/GC/GR			3	GR-1 & 3, GR/AC/CR
	REC-1[2]					4	GR-1 & 2, GR-5, GR/AL-4
	PFF[3]					9	GR-1 to 5, GR/LG-1, GR/AL-11, GR/CC-1, GR/RC-1
	RARE[4]			3	GR/GC-1, GR/LG-1 & 4		
San Francisquito	COLD	7	SF-4, SF/BC-4, SF/WU-1 & 2, SF/BC-1 to 3, SF/WU-5			3	SF-2, SF/WU-3 & 4
	MUN					2	SF-5, SF/LT-1
	REC-1					1	SF/WU-5
	PFF	2	SF/CM-1, SF/SC-1			3	SF-1 to 3
Upper Penitencia	COLD	2	UP-2 & 6	1	UP-1		
	REC-1	1	UP-6				
	PFF					2	UP-1 & 2

* Includes uncertainty levels of A and B
** See Appendices 4-B, 5-B, and 6-B for a listing of waterbodies and reach identification codes
[1]Certain stakeholders believe partial support for COLD exists in GR-1, GR-2, GR-3, GR-4, GR/GC-2, GR/GC/GR, and GR/AL/AR; non-support exists in the upper section of GR-5 and GR/LG-1 as well as in GR/LG/VR, GR/AL/LA, and the lower section of GR/AL-1; and potential support exists in the lower section of GR/GC-1 and GR/AC/CR.
[2]Certain stakeholders believe partial support for REC-1 exists in GR-1, GR-2, GR-3, GR-4, GR-5, most of GR/LG-1, GR/LG/VR, GR/GC-1, GR/GC-2, GR/GC/GR, GR/AL-2, GR/AL/AR, GR/AC-1, and GR/AC/CR.
[3]Certain stakeholders believe full support for PFF exists in GR-3 and GR/AL/LA as well as in portions of GR-2, GR-5, and GR/LG-1 and that potential support exists in GR-4.

[4]Certain stakeholders believe partial support for RARE exists in GR-1, GR-2, GR-3, GR-4, most of GR-5, most of GR/LG-1, part of GR/GC-1, GR/GC-2, GR/GC/GR, GR/AL-1, GR/AL-2, GR/AL/AR, GR/AC-1, and GR/AC/CR and that non-support exists in the upper section of GR-5, part of GR/LG-1, and in GR/AL/LA.

2.2.3.1 Cold Freshwater Habitat (COLD)

The primary factors noted in the pilot assessment limiting the availability of cold freshwater habitat are a lack of present indicator macro-invertebrates, low or non-existent summer streamflow, and temperatures too high to sustain cold freshwater species.

The causes of these factors are interrelated. A lack of water supply to a reach will result in the gradual loss of replenishing flow. After water percolates into the channel bed, disconnected pools in locations where the substrate is impermeable will remain. The summer sun will raise the temperature in these pools to levels unsuitable for cold water-dependent species. Habitat for the indicator macro-invertebrates (cased caddis flies and stoneflies) is also eliminated through this same process.

2.2.3.2 Municipal and Domestic Water Supply (MUN)

Limiting factors varied in those stream reaches where the assessment team had enough good data to determine the level of use support and where the water quality-oriented use support criteria were exceeded. Turbidity and/or total dissolved solids were common limiting factors, as was fecal coliform count. Without additional data collection, however, it is difficult to isolate the causes of these exceedances. Urban runoff and channel erosion are potential contributors.

2.2.3.3 Water Contact Recreation (REC-1)

Limiting factors affecting support of water contact recreation within the three watersheds are quite varied. In some reaches where data on the primary and secondary indicators were available (fecal coliform count and other water quality constituents), exceedances of the criteria for these indicators represent the limiting factor. As with the MUN use, it is difficult without additional data collection to isolate the causes of these exceedances. Generally, urban runoff and channel erosion are potential contributors.

For other reaches, however, the only available data was on tertiary (least preferred) indicators covering aesthetics and stream access. Within these reaches, limitations on access to the stream and documented aesthetic problems (presence of trash, poor water clarity, lack of adequate streamflow or water depth) form the limiting factor. The list of possible causes for most of these conditions can only be speculated at within the context of this study. For example, while trash is common in urban stream corridors, the data used in the assessment does not allow for a specific source of the trash to be identified.

While it is not a direct component of the REC-1 beneficial use, the ability of the streams in the pilot watersheds to support recreational fish consumption was also evaluated.

Available fish tissue data was extremely limited and was confined to several reaches in the mainstem Guadalupe River and Herbert Creek (GR/AL-4). In these reaches, the presence of elevated mercury in fish tissue samples is likely to be directly traceable to the presence of historic mining waste in the stream sediment.

2.2.3.4 Protection From Flooding (PFF)

As defined by the Assessment Framework, a stream reach is considered to support this interest if its channel can safely convey the 100-year flow without causing property damage. Therefore, the limiting factor for reaches that cannot perform this function is a lack of adequate channel capacity combined with the encroachment of urban/residential land uses into the stream's 100-year floodplain. Stream channels do not naturally have capacity to convey the 100-year flow. This type of event is usually so infrequent that stream channels have not developed in a manner that allows these massive flows to be conveyed within the channel margins. In natural systems, overbank flooding is expected to occur during these events. In urbanized watersheds, however, stream channels are modified and engineered to meet the goal of conveying the projected 100-year flow without causing property damage. Depending on the land use characteristics of the watershed, however, this may or may not be feasible.

For example, floodplain encroachment is common in older residential neighborhoods, mainly along sections of San Francisquito Creek. In those areas, urban development has already occurred in such an extent that there is no way to easily modify the channel to provide for the necessary flood conveyance capacity. Alternatively, the channel may not have been modified yet. This is the case in sections of the main stem Guadalupe River where a major flood control project designed to provide 100-year flow capacity has not yet been completed. Finally, a channel may in fact have the required capacity but, due to lack of maintenance or storm damage associated with the 100-year rainfall, is unable to convey the flood flow due to channel obstructions (downed trees, slugs of sediment, debris, etc.). This can reduce the effective capacity of the channel, resulting in the same type of overbank flooding that might have occurred prior to the completion of channel modification work.

2.2.3.5 Preservation of Rare and Endangered Species (RARE)

Because the factors affecting support of the RARE use are specific to the habitat requirements of individual special status species, it is difficult to identify the factors limiting the presence of these species within the pilot watersheds without conducting detailed habitat surveys. Data available to the assessment team consisted primarily of species observations. No recent detailed species habitat surveys were available among the data compiled for the assessment. Even the species observation data was so temporally and geographically scattered that there were only three stream reaches (all in the Guadalupe watershed) where confident determinations of less than full use support were made. Since species observation information does not provide much insight into habitat quality (other than an assumption that a minimally sufficient level of habitat quality is present), no limiting factors were identified for these reaches.

2.3 Evaluating Assessment Alternatives

One purpose of the pilot assessments was to gauge the effectiveness of the Assessment Framework developed by the WMI. The pilot watershed assessment effort will have achieved this purpose to the extent that the Assessment Framework can be improved for assessment activities in other Santa Clara Basin watersheds or in future phases of assessment in the pilot watersheds. Sufficient existing data was not available to make the framework produce a full and sound assessment.

Two major options for conducting the next phase of assessments are:

1) Refine the assessment framework and develop prioritized data collection plan to fill the data gaps.

2) Compare the utility and feasibility of alternative assessment approaches and shape the data gathering to address the needs of the preferred approach.

The option to be chosen should have the ability to address the set of questions WMI stakeholders want answers to. In addition, the pros and cons for each option in terms of data collection, rigor of analysis, and required resources would need to be fully understood prior to selection.

2.3.1 Refining the Assessment Framework

The experience gained in conducting the pilot assessments revealed that the Assessment Framework is a very data intensive tool for assessing use/interest support. Where quality data is not available, the Framework will not be useful in determining the support status of each use in a stream. No objective assessment approach can function well without sufficient data. The Framework is well-suited to the need for an objective, reproducible, and documented approach to beneficial use-specific waterbody assessment. The Framework is not, however, designed to determine the capacity of a waterbody for supporting a use or how a use might best be restored to a waterbody.

Prior to conducting future assessments using a refined Assessment Framework, a preliminary evaluation of the amount, quality, and type of data available should be conducted. Before additional resources are devoted to watershed assessments based on the Framework, WMI stakeholders should be certain that good quality data on (at least) the primary indicators for the uses in question are available. In the absence of these data, resources would be better devoted to data collection activities.

Because data gaps are defined by the assessment method that generates them, any change to the Assessment Framework may result in a change in the data gaps. Therefore, after creating a revised Assessment Framework, the data gaps identified using the original Assessment Framework should be reviewed and modified, as necessary into a revised set of data gaps that corresponds to the revised Assessment Framework.

Obviously, future assessments will benefit from filling as many of these data gaps as possible. However, it seems clear that, in the short term, a major data collection effort designed to fill all data gaps and provide for a complete assessment of use support in all reaches and for all uses is unlikely. Instead, the WMI should determine which among the five uses/interests are the priority for assessment and then use the Assessment Framework and stream segmentation scheme to conduct a pilot study to fill the data gaps in the three watersheds.

Whenever future watershed assessment work is done, it would be helpful to have established the specific beneficial uses that should be evaluated within each stream reach or reservoir. During the pilot assessments, the initial assumption was made that all five of the selected beneficial uses/stakeholder interests were to be evaluated in all stream reaches. The geomorphic characterization of streams in Basin watersheds will supply valuable information to this process. The Regional Board should be involved in this discussion so that the appropriate beneficial use designations are reflected in future Basin Plan revisions.

Aside from these issues, numerous suggestions for revision and improvement to the Assessment Framework were received during the pilot assessments. Suggestions and recommendations are documented in detail in Appendix B. Some of the recommended actions that should take place before a long-term data collection plan is implemented include the following:

- Revise the Framework to address the question of how much data is sufficient for developing support statements. This will guide future data collection priorities and will allow available resources to be used in the most efficient manner.

- Reduce the number of species on the WMI special status species list for the RARE assessment. Remove non water- or riparian zone-dependent species.

- Remove overlap between COLD and RARE assessments by assessing cold freshwater habitat-dependent species using the COLD logic diagram.

- Revise REC-1 logic diagram to allow for three parallel assessment paths, one each based on primary, secondary, and tertiary indicators.

- Refine/replace threshold criteria in the Assessment Framework for REC-1 parameters on access, aesthetics, and water depth/flow.

- Expand on the definition of "recreation season" and "recreation location" for purposes of using the REC-1 logic diagram. If appropriate, remove these factors from consideration.

- Revisit the question of whether REC-1 is the most appropriate type of recreation-oriented use for all reaches in Basin streams. The REC-2 (non-contact recreation) use may be better suited for the types of recreation either currently occurring or capable of occurring within certain stream reaches.

- Reevaluate the rationale for including the MUN use. Given the paucity of useful data for the MUN assessment and the variety of sources for raw drinking water in the Basin, there was considerable discussion regarding the wisdom of assessing this beneficial use. Since drinking water is treated prior to being delivered to the public, unless those responsible for conducting the treatment are experiencing any problems with the source water, the MUN use should probably be considered supported. Stakeholders (including the Regional Board) should determine the level of expectation that should be associated with the MUN use. If full support of the MUN use means the ability to drink freely from the water in the stream or reservoir, it is likely that very few streams anywhere could support the use (even streams in otherwise pristine environments are known to carry bacteria harmful to humans). If full support is interpreted as the source water being of sufficient quality for use as input to treatment processes designed to provide public drinking water, a different type of data should be compiled to assess the use. This data should consist of water quality information on water delivered to treatment plants. Even so, in the Santa Clara Basin, it would be difficult to isolate source water quality problems deriving from Basin streams, given that raw water extracted from Basin streams is usually blended with raw water from other sources outside of the Basin prior to being delivered to treatment plants.

- Reevaluate the appropriateness of using the 100-year flood as the criterion for PFF interest support. If the 100-year flood is retained as a criterion, revise the logic diagram to eliminate the distinction between current and future development. Consider using actual property damage occurrence as criterion. Several agencies already have flood control programs, including the SCVWD, municipal and county public works departments, floodplain managers, and FEMA. How should this assessment fit within their programs? If the intent is for the WMI's assessment to critically evaluate the flood control and channel maintenance activities of these agencies, then it should be oriented toward a detailed review of the assumptions, tools, and programs in place within each agency for the purpose of flood protection. Reconsider the scope and purpose of the PFF assessment and make refinements to the Assessment Framework consistent with the redefinition.

- Consider evaluating other beneficial uses. Several beneficial uses are designated for Basin streams but were not assessed in the pilot assessments and do not have any detailed assessment methodology developed and/or approved by WMI stakeholders. Some of these uses (such as MIGR and SPWN) are complementary to one or more of the uses studied in the pilot watersheds (COLD, for example) and will need to be considered in order to paint a complete picture within any given stream. Other uses, such as WARM (warm water habitat) may need a new logic diagram with direct measures of support and indicators identified.

- Consider revising the COLD and RARE logic diagrams in the Assessment Framework to place a greater emphasis on habitat quality (over species presence or absence). An example of how the logic diagram for assessing support of the COLD beneficial use might be revised to accomplish this goal is shown in Figure 2-5.

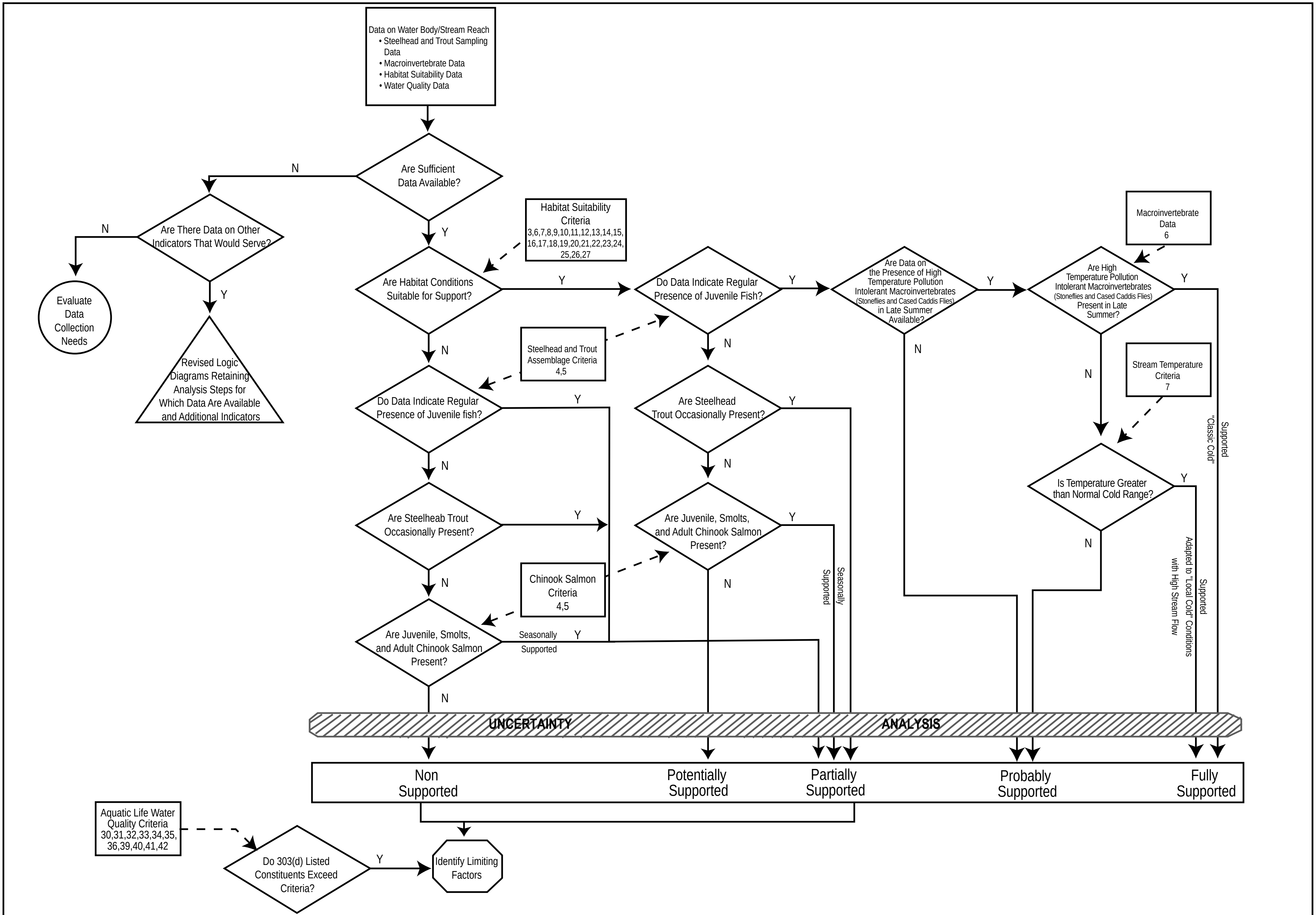
2.3.2 Alternative Assessment Approaches

The completion of the pilot watershed assessments provides an opportunity to consider how other assessment methodologies could be integrated into the assessment framework to increase our understanding of beneficial use support, limiting factors, and potential for restoration of full beneficial use support. Examples of the types of questions that different assessment approaches can address are listed in Table 2-4.

Some of the general alternative approaches that could be considered include:

- *Geomorphologic/sediment budget approaches:* these are concerned with channel-forming and habitat-forming processes on both a watershed and reach scale. Data gathering focuses on sediment loads, sediment load characteristics, channel sediment characteristics, changes in channel geometry, and flow patterns. Approach seeks to determine how best to achieve a dynamic channel equilibrium that efficiently transports sediment and sustains biological communities. Under this approach, it is imperative that consistent sediment data be available so that subjectivity is minimized to the greatest degree possible. The acquisition of long-term trend data on sediment movement within a stream will address this need.

- *Historical and current habitat approaches:* these are concerned with habitat characteristics necessary for a healthy ecosystem. Historical and current habitat characteristics are analyzed, habitat goals necessary for achieving beneficial use support are established, limiting factors are identified, potential for improving habitat is assessed. Data gathering focuses on physical habitat characteristics, abundance and health of important plant and animal communities, instream structures such as barriers to fish migration. A potential integrator of several beneficial uses such as riparian vegetation might be considered a key indicator of watershed health under this approach.



URS

Revised Logic Diagram for Assessing Cold Freshwater Habitat (COLD) Beneficial Use

Figure 2-5

- *Restoration Potential Analysis Approaches:* these approaches focus on developing strategies for protecting and preserving high quality habitats and for restoring habitat value in areas with high potential for success. Data gathering includes similar data as for geomorphic and habitat approaches but with focused objective of determining priorities for efficient intervention.

- *Management Issues Approaches:* these approaches involve gathering data through interviews with individuals knowledgeable about stream, habitat and pollutant discharge conditions for the purpose of framing hypotheses for subsequent monitoring and assessment. They are not distinct from above approaches but rather constitute a specific method of framing monitoring and assessment questions.

Table 2-4
Examples of Alternative Assessment Approaches

Questions	Potential Assessment Approach
What are the stream channel characteristics?	Geomorphic/sediment budget
Do the necessary habitat elements for Species X exist within the stream?	Historical/current habitat
How can steelhead habitat be restored or maintained in Reach X?	Restoration potential analysis
Data appears to show elevated fecal coliform in Reach X. Where is this coming from and how can the problem be abated?	Management issues; ground-truthing pilot assessment results (see Section 2.3.3)
Where are habitat impairments for Species X located in the stream?	Historical/current habitat
Does the stream meet water quality standards and attain designated beneficial uses?	WMI Assessment Framework (refined)

These are not necessarily mutually exclusive approaches but rather can be integrated into the existing Assessment Framework to improve its ability to more rigorously assess beneficial use support. It is also possible that consideration of these alternatives could result in modifications to the Framework itself. However, the WMI may want to consider evaluating the pros and cons of these approaches before venturing into a resource-intensive search for a comprehensive methodology.

The WMI should also conduct a review of the significant assessment efforts underway within the county and within the San Francisco Bay region to determine if the Assessment Framework could benefit from incorporating aspects of these alternative approaches. Some of these assessments or assessment approaches include:

- the San Francisquito Creek assessment work related to the sediment TMDL (being performed by the JPA)
- the Coyote Creek Pilot Assessment (being performed by the SCVURPPP)
- the Upper Guadalupe River hydro-geomorphic study (being performed by the SCVWD)

- the Surface Waters Ambient Monitoring Program (being performed by the Regional Board)
- the Guadalupe Watershed Integration Working Group
- the Watershed Science Approach (developed by the San Francisco Esturary Institute) for understanding hydro-geomorphic conditions of streams
- the Napa River Limiting Factors Analysis (being performed by the Regional Board and Coastal Conservancy)

Other approaches may emerge from the SCVURPPP's hydromodification plan literature review and from the Watershed Action Plan process.

2.3.3 Potential Use of Limiting Factors Analysis

WMI stakeholders are interested in how best to use the limiting factors identified by the assessment teams during the pilot assessments to formulate watershed management actions. While there is a strong desire to begin to translate the assessment results into tangible steps toward watershed improvement, caution should be exercised in doing so.

It is important to remember that the pilot assessments were conducted without any field verification. The only field reconnaissance conducted was for the purpose of delineating stream reaches. While the conclusions reached by the assessment teams are valid representations of the compiled data, the gaps in the available data are very real and represent formidable obstacles to the formulation of specific management actions for many of the streams and reservoirs in the pilot watersheds. Even where relatively few data gaps were noted and the uncertainty level assigned to a support statement was low, the assessment results should be field-checked prior to being used as the basis for management decisions. In many reaches, the "local knowledge" supplied by watershed captains and other WMI stakeholders (shown on the reach summary tables in Appendices 4-B, 5-B, and 6-B) may be a sufficient form of ground-truthing for the assessment results. In other reaches, however, this type of information has not been available.

In order to outline a possible "stepping stone" between the pilot assessments and management recommendations, stream reach/beneficial use (and stakeholder interest) combinations can be divided into some basic categories based on the assessment conclusions:

1. Reaches/uses with a support statement, low uncertainty, limiting factors and suspected causes identified (except in cases of full support)

2. Reaches/uses with a support statement, high uncertainty, and limiting factors identified (except in cases of full support)

3. Reaches/uses with no support statement due to significant data gaps

4. Reaches/uses with a statement of full support but with either high or low uncertainty

Each of these categories can be further divided into "a" and "b" subcategories based on the amount of "local knowledge" available and/or recent, current, or planned data collection efforts pertaining to the reach/use. For example, the GR-5 (Guadalupe River)/COLD assessment results can be supplemented with both "local knowledge" from WMI stakeholders and the new data generated by the FAHCE effort. This might be placed in a Category 1a given that a support statement was developed with low uncertainty and limiting factors and suspected causes were identified. However, the GR/LG-13 (Moody Gulch)/COLD assessment results cannot be supplemented with any "local knowledge" or additional data. Therefore, this reach might be placed in a Category 1b, indicating that no other supplemental information is available or data gathering activities planned. A similar approach can be taken for Categories 2 and 3.

The utility of separating each of these categories into two sub-categories is that it may serve as an aid in prioritizing reaches/uses for initial data collection. The WMI may wish to consider different "next steps" for different categories. Given the desire of WMI stakeholders to begin identifying management actions as quickly as possible, the highest priority should be placed on Category 1 and 4 reaches/uses.

In reviewing Categories 1a and 1b, the WMI could critically evaluate the quality (relevance, scientific reliability, etc.) and quantity of supplemental information currently available for each Category 1a reach/use. In addition, where future studies or data collection efforts are planned for a Category 1a reach/use, the WMI could work with those funding or conducting the work to determine if the data being collected will provide the sort of field confirmation necessary to ground-truth the assessment results. Opportunities for collaborative effort can be identified as well. Where the WMI determines that this supplemental information will be sufficient to confirm the assessment results, confirm the limiting factors, and pinpoint suspected causes more clearly, no further work would be needed. When completely available, the supplemental information can be evaluated against the assessment results, the results modified (where appropriate), and management actions identified. Where the WMI determines that this supplemental information will not provide the necessary certainty, the reach/use could be moved into Category 1b.

Category 1b reaches/uses would be the target of WMI-sponsored field assessments to ground-truth the pilot assessment results. The NRCS's Stream Visual Assessment Protocol (SVAP) (or a version of it modified to fit the characteristics of the pilot watersheds and the indicators required by the Assessment Framework) could be used as a relatively fast method of performing this work. The SVAP integrates physical, chemical, and biological factors and, while not as rigorous as a complete geomorphic study would be, can be used as input to future work of this nature. Other protocols should also be reviewed for potential applicability to this exercise.

A similar approach can be taken for Categories 2 and 3. For Categories 2a and 3a, the WMI should determine if the supplemental information will fill the critical data gaps identified during the pilot assessments and also provide for ground-truthing of the assessment results. If not, reaches/uses can be moved into Categories 2b and 3b. Because of the more significant data gaps present in these categories, the SVAP or similar protocol may not be the best solution. Targeted data collection efforts identified in a long-term data collection plan would likely be necessary to fill the data gaps. The SVAP could be a component of this effort, but would probably not be sufficient by itself to provide the information needed to develop certain support statements and identify limiting factors and their probable causes.

This approach is not inconsistent with refining the Assessment Framework for future assessments. Framework refinement can proceed in tandem with the tasks outlined above, although if certain uses/interests are to be dropped from the assessment, this decision should be made before work on the above tasks begins.

2.4 Long-Term Monitoring, Data Acquisition, and Accessibility

A long-term monitoring approach should be recommended by the WMI to achieve the ends detailed in this chapter. Wherever possible, the plan should be coordinated with monitoring needed to meet the aim of other water quality programs currently in place within the Basin.

The results of the pilot assessments for the San Francisquito, Guadalupe, and Upper Penitencia watersheds can be used to inform future action by WMI stakeholders. For stream reaches and uses where the available data allowed support status determinations to be made with a high degree of certainty (either an A or B rating), the next steps to be taken will depend on the support status for the reach/use combination. For example, if a reach was found to support cold freshwater habitat, recommendations for maintaining this support could be included in the Watershed Action Plan. These recommendations should include some continuing monitoring on key indicators for the COLD use in order to identify future changes in stream conditions that might portend degradation of use support.

In a reach where a use is not being supported (again, with high certainty), the factors limiting use support should be used as a jumping-off point for additional, reach-specific study. Monitoring targeted toward identifying the source or cause of the limiting factors should be conducted in order to identify the corrective actions needed to restore the use to the reach. At the same time, a geomorphic characterization of the stream being investigated (not just the reach in question) should be undertaken. Such a study will supply investigators with current data on the erosion, sediment transport, sediment deposition, channel geometry, and flow characteristics of the stream. If the use could have historically existed, then the factors limiting its current support can be evaluated to determine if restoration of the use is feasible given current land uses in the watershed.

In watersheds where development-related channel modifications, such as dams, preclude restoration of a use in the reaches where it is likely to have historically been supported, enhancement opportunities may need to be examined in reaches where the use may not have been historically supported. If it is determined that the use can be restored, then monitoring designed to identify the causes of the limiting factors should be conducted so that detailed actions can be identified and eventually implemented to restore the use.

2.5 Changes to the Regional Water Quality Control Board Basin Plan

As discussed earlier, the results of the pilot assessments hold certain implications for the beneficial use designations applied to individual streams and reservoirs within the three watersheds in the Basin Plan. The WMI has already proposed corrections and revisions to some of the current designations in the Watershed Characteristics Report (Volume One) – specifically, correcting stream tributary lists and proposing designation of additional beneficial uses for specific streams and stream reaches. These designations and proposed revisions were evaluated against the assessment results in order to identify any inconsistencies. Some additional recommendations based on the pilot assessment results were also identified. Table 2-5 summarizes these recommendations for each of the three pilot watersheds.

Table 2-5
Recommended Revisions to Basin Plan Use Designations for Pilot Watershed Waterbodies

WATERBODY	BENEFICIAL USE			
	Cold Freshwater Habitat (COLD)	Municipal and Domestic Supply (MUN)	Preservation of Rare and Endangered Species (RARE)	Water Contact Recreation (REC-1)
Guadalupe Watershed				
Guadalupe River	WE		WE	P
Guadalupe Creek	WE		WP	
Pheasant Creek	WP		WP	
Shannon Creek				
Guadalupe Reservoir	E	E		E
Rincon Creek				
Los Capitancillos Creek				
Reynolds Creek	WE		WP	
Hicks Creek				
Los Gatos Creek	E	E	WE	
Vasona Reservoir	E/WL			E
Lexington Reservoir	E	E		E
Lake Elsman	E	E		
Williams Reservoir				
Trout Creek				
Lyndon Canyon Creek				

WATERBODY	BENEFICIAL USE			
	Cold Freshwater Habitat (COLD)	Municipal and Domestic Supply (MUN)	Preservation of Rare and Endangered Species (RARE)	Water Contact Recreation (REC-1)
Lake Ranch Reservoir				
Daves Creek				
Black Creek				
Dyer Creek				
Briggs Creek				
Aldercroft Creek				
Moody Gulch	AP			
Limekiln Creek				
Soda Springs Canyon Creek				
Hendrys Creek				
Hooker Gulch				
Austrian Gulch				
Almendra Creek				
Dry Creek				
Lake Almaden				
Alamitos Creek	WE		WP	
Almaden Reservoir	E	E		E
Jacques Gulch				
Herbert Creek	WE			
Barrett Canyon Creek				
Larabee Gulch				
Chilanian Gulch				
Deep Gulch				
Greystone Creek				
Golf Creek				
Randol Creek				
McAbee Creek				
Arroyo Calero	WE		WP	
Calero Reservoir	E	E	AP	E
Cherry Canyon Creek				
Pine Tree Canyon Creek				
Santa Teresa Creek				
Canoas Creek				
Ross Creek				
Lone Hill Creek				
Short Creek				
San Francisquito Watershed				
San Francisquito Creek	E		WE	P
Searsville Lake	E			E
Westridge Creek				
Lake Lagunita			AE	
Bear Creek	AE		AE	
Dry Creek				
Bear Gulch				
West Union Creek				
Appletree Gulch				
Tripp Gulch				

WATERBODY	BENEFICIAL USE			
	Cold Freshwater Habitat (COLD)	Municipal and Domestic Supply (MUN)	Preservation of Rare and Endangered Species (RARE)	Water Contact Recreation (REC-1)
Squealer Gulch	AE			
McGarvey Gulch				
Corte Madera Creek				
Hamms Gulch				
Jones Gulch				
Damiani Creek				
Rengstorff Gulch				
Coal Creek				
Alambique Creek				
Sausal Creek				
Dennis Martin Creek				
Bull Run Gulch				
Neils Gulch				
Bozzo Gulch				
Los Trancos Creek	WE		AE	
Buckeye Creek				
Felt Lake				E
Felt Lake Diversion Channel				
Felt Lake Return Channel				
Upper Penitencia Subwatershed				
Upper Penitencia Creek	WE		WE	
Arroyo Aguague				
Dutard Creek				
Cherry Flat Reservoir		E		L

Legend: E = Existing Beneficial Use; P = Potential Beneficial Use; L = Limited Beneficial Use; WE = WMI stakeholder pre-assessment recommendation for existing beneficial use designation; WP = WMI stakeholder pre-assessment recommendation for potential beneficial use designation; WL = WMI stakeholder pre-assessment recommendation for limited beneficial use designation; AE = WMI pilot assessment results recommendation for existing beneficial use designation; AP = WMI pilot assessment results recommendation for potential beneficial use designation.
Note: Waterbodies in italics are not listed in the Basin Plan.
Source: San Francisco Bay Regional Water Quality Control Board, 1995. San Francisco Regional Water Quality Control Plan, Table 2-5.

The results of the recommended geomorphic characterization of the streams in the pilot watersheds should be used to confirm or further revise these proposed beneficial use designations. The pilot assessment results will help in this process, but because so little data was available in many reaches, data collection targeted to defining stream characteristics (channel geometry, flow pattern, sediment transport) will need to be undertaken. The Basin Plan designations apply to entire streams (or reservoirs), not individual reaches. Therefore, it is important to evaluate the entire length of a stream and to understand how it works to convey water and sediment through its watershed. This type of study is not necessary to gauge *existing* beneficial use support, but it is necessary to determine whether or not the stream is currently (or even historically) *capable of supporting* a use (specifically COLD and RARE as well as the PFF interest). Support for the MUN and REC-1 uses can generally be determined independent of an understanding of the stream's geomorphology, although it is possible (but not likely) that some chemical constituents may be naturally present in a stream at concentrations exceeding those deemed suitable for human consumption and/or recreation.

If the stream is found to be capable of supporting a use that it is not currently supporting, then the causes of the limiting factors will need to be identified and actions proposed to restore the use.

2.6 Watershed Action Plan

The primary objective of the Watershed Action Plan is to outline a comprehensive approach to preserving and enhancing the watershed by identifying specific actions that the WMI and other agencies, organizations, and individuals are undertaking and can undertake to preserve and enhance the watershed. Originally, the process for developing these specific actions within the pilot watersheds was intended to arise from the results and analysis of the pilot assessment. While there are some actions that can be identified based on the assessment results, the Core Group recognized the need to develop a separate process to identify actions that are either proven or thought to be effective for the preservation and enhancement of the watershed. This separate process resulted in a consensus-driven list of actions that are described in the Watershed Action Plan in the context of the comprehensive approach.

The following actions have been identified as outcomes of the pilot assessment process:

- Policy/programmatic approaches:

    1) Repackage information already produced by the WMI into specific guidance documents as indicated above.

    2) Further efforts to develop institutional approaches for the WMI.

    3) Identify areas where the solution can best be addressed through existing mandated programs and services or are already embodied in specific agency missions and programs.

- Watershed related actions:

    1) For reaches that have sufficient data with limiting factors identified, reach-specific actions on maintaining/enhancing the watershed. For these reaches, at least, specific actions to either maintain or restore the use/interest should be identified. Some data collection may be needed to isolate causes of factors limiting use/interest support in certain reaches so that detailed management recommendations can be formulated. This process should proceed with the geomorphic characterization data collection effort to ensure that resources are

spent on identifying management actions that are consistent with flow regimes and natural sediment deposition patterns.

2) Identify process for prioritizing and filling the data gaps in order to update the pilot assessment results.

3) Determine whether to refine the existing assessment framework or select an alternative assessment methodology for future assessments. A key component of this decision is the question(s) WMI stakeholders wish to answer concerning the status of the waterbodies in the Basin. This question should be addressed prior to initiation of any data collection.

2.7 References

Regional Water Quality Control Board. 1975. Regional Water Quality Control Plan, San Francisco Bay Region.

Volume Two

Watershed Assessment Report

Chapter 3

Assessment Process

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team
Watershed Assessment Subgroup

February 2003

Watershed Assessment Report
Chapter 3: Assessment Process

List of Authors

REPORT PREPARATION TEAM

WATERSHED ASSESSMENT SUBGROUP

with consultant support from

EOA, Inc.

Rebecca Russell, Associate Scientist
Lori Pettegrew, Senior Scientist

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 3
Table of Contents

Figures

Tables

Chapter 3
Assessment Process

3.1 Implementation of Assessment Process

The Watershed Management Initiative (WMI) watershed assessment process used available data to determine whether beneficial uses/stakeholder interests are supported in the waterbodies (reservoirs and stream reaches) within the three pilot watersheds: Guadalupe River, San Francisquito Creek, and Upper Penitencia Creek. The uses/interest evaluated include the waterbodies' suitability for supporting aquatic life, for safe water contact by humans, providing a source for drinking water, and how they function in response to high flows.

Results of the assessment are based on available data and may be refined under future efforts, as more data becomes available. The goal of this assessment was to begin identifying factors affecting beneficial use support and achieving stakeholder interests in the Santa Clara Basin's streams, as well as providing a scientific basis for selecting and evaluating alternative management strategies.

The Assessment Framework was used to guide the watershed assessment process. This document was based on several other WMI work products, including the Rationale Paper, the recommended list of data types for assessment of support of the beneficial uses and stakeholder interests, and the list of quantifiable parameters for the beneficial uses and stakeholder interests.

3.1.1 Groups and Subgroups

The work process reflected efforts made by all parties to be adaptive and effective. Adjustment was made along the way to reflect renewed insight to the work processes. The assessment process involved about 10 assessment team meetings organized by beneficial use basis, three watershed integration meetings by watershed, and four review workshops by chapter. Assessment team meetings were organized by the WAC, watershed integration meetings organized by RPT members, and review workshops facilitated by Core Group chairs. All meetings were open to all Core Group members, and to the extent possible, accommodations were made to allow broader participation. Additionally, due to limited staff time available to RPT, Core Group members were invited to participate in RPT meetings on an ad-hoc basis.

3.1.1.1 Role of Core Group

The Core Group directs the WMI. As of November 2002, the Core Group consisted of individuals and representatives from 33 public and private organizations with a stake in the outcome of the watershed planning process for the Santa Clara Basin. The Core Group members represent a wide range of views and interests of affected parties whose participation in the planning process is crucial in obtaining broad community support. Their affiliations are shown in Table 3-1; "WMI Signatories". The Core Group developed and/or approved the following documents to support the watershed assessment:

- Signatory Document: Requires that the Core Group strive to reach a consensus before making a decision. If the Core Group makes a recommendation that is not agreed to by all then the recommendation is accompanied by a report of the views of the dissenting members.

- Consolidated Action Plan (CAP): Describes tasks needed to complete the three elements of the work and the Watershed Management Plan.

- Framework for Conducting Watershed Assessment: Describes the flow diagrams and protocols for determining the level of support of the primary uses/interest.

3.1.1.2 Role of Subgroups

The Core Group established nine special purpose subgroups to conduct or oversee portions of the WMI's work (See Figure 3-1; "Santa Clara Basin WMI Organization Chart"). The subgroups include the Watershed Assessment Subgroup (WAS), Land Use Subgroup (LUS), Bay Monitoring and Modeling Subgroup (BM&MS), Regulatory Subgroup (RS), Communications Subgroup (COS), Flood Management Subgroup (FMS), Sustainable Water Supply Subgroup (SWSS), Wetlands Advisory Group (WAG), Data Management Subgroup (DMS), and the Report Preparation Team (RPT). Each subgroup and team had a mission, goals and objectives. The subgroups and their work statements are listed in Table 3-2; "Subgroups of the Santa Clara Basin Watershed Management Initiative." The membership of the subgroups included both Core Group members and other stakeholder representatives with expertise or an interest in the topics.

The subgroup chairs were informed of the assessment meetings, review schedules and access to working drafts. Initially, it was the subgroup chair's responsibility to disseminate the relevant assessment information to its members. Later in the process, the WMI Project Coordinator streamlined the tiered distribution and created a master distribution list, which included both Core Group members and subgroup members, for important announcements.

Among the groups, WAS was most engaged in the assessment process. They were responsible for coordinating watershed captains' participation, compiling non-assessment chapters, executive summary, and lessons learned from their perspectives. They were instrumental in getting Core Group chairs to facilitate review workshops, and helping to strategize responses to controversial comments.

3.1.1.3 Role of Report Preparation Team

The RPT oversaw the schedule for completing Watershed Assessment Report (WAR). For the WAR, RPT focused on the assessment chapters and technical appendices. RPT coordinated assessment meeting schedules, recorded comments provided through the process, provided limited quality management reviews to the extent that the staff resources available and prepared transmittal for distribution to the Core Group. RPT's staff resource was very limited and members of WMI Core Group were invited to the work process on an ad-hoc basis. Additionally, at the Core Group's direction, the strategies for addressing review comments were facilitated directly by the Core Group Chairs, with broad participation by WMI stakeholders.

3.1.1.4 Role of the Watershed Assessment Consultant

Supported by the WMI Core Group, with funding from a CALFED grant, the City of San Jose, through the Santa Clara Valley Water District, contracted with the WAC to provide technical and production support for the watershed assessment. The WAC operated under the direction of the RPT and consensus reached on the review comments response strategies recorded at each of the review meetings. The WAC focused on the scientific assessment process including data compilation and technical analyses to determine the support of beneficial uses/interest in each of the three watersheds. The WAC integrated into the assessment a database that they developed for the WMI, with support from the City of Palo Alto.

The WAC utilized the following three Technical Assessment Teams to develop the watershed assessment framework: 1) Natural Resources-Related Beneficial Uses (RARE and COLD), 2) Human Health and Recreation Beneficial Uses (MUN and REC1), 3) Protection from Flooding Stakeholder Interest (PFF), and 4) Data Management and Analysis Support (See Table 3-3, "Members of Technical Assessment Teams and Watershed Captains" for a list of these team members). The Assessment Team Coordinator (the Lead consultant from WAC) was responsible for ensuring that methods and results of each team were consistent with the Assessment Framework and Protocol.

Additionally, the WAC participated in two watershed integration meetings, and four review workshops. They followed the recorded response tables in the revision process.

3.1.1.5 Role of Watershed Captains

The WAS suggested the concept of "watershed captain", a person familiar with each watershed, to actively participate in the assessment process and work with the teams to provide a 'reality check' of the initial results. A watershed captain was designated for each of the three pilot watersheds to participate on the appropriate assessment team. The watershed captains provided an integration function to review the separate use support analyses and identified inconsistencies in the findings of the WAC. Table 3-3 lists the Watershed Captains.

3.1.2 Review and Approval Process

For the watershed assessment process to be accepted by policy-makers, the public and the scientific community, the products needed to meet scientific standards for accuracy and consistency. To ensure that this was accomplished, the WMI implemented the following quality assurance/quality control measures:

1. The WAC checked the spatial and temporal coverage in a data quality and sufficiency review before the data was approved for use in the watershed assessment.

2. The Core Group approved data to be used in the assessment processes.

3. The Assessment Teams reviewed compiled data and developed conclusions concerning beneficial use/stakeholder interest support, limiting factors, and causes of the limiting factors for each waterbody where sufficient amount of quality data was available to support such conclusions.

4. The WAC submitted preliminary drafts of the assessment analyses to RPT and interested parties for review.

5. Watershed Integration Meetings (WIMs) were held to bring together Stakeholders and Watershed Captains to review the analytical results presented by the WAC. The primary purpose of the WIMs was to solicit input from stakeholders and Watershed Captains who were able to supply missing and/or anecdotal information concerning individual stream reaches. The input received during these meetings was used to refine the support statements and used in developing a technical memorandum on the identification of limiting factors.

5. A series of WAR Review Workshops were organized by the WAS and facilitated by a member of the Communications Subgroup. The purpose of these review workshops was to generate technical debate and build consensus among WAS members, watershed captains and other interested parties regarding the draft WAR. Information gathered at the workshops was documented for use by the WAC to revise the draft report and for comprehensive historical documentation of the process.

6. The Core Group adopted a procedure for screening and documenting comments in WMI products. Based on this process, the RPT organized a final draft report review process that allowed reviewers to electronically access the report through the WMI website. Hardcopies of the report were made available upon request.

3.1.3 Public Access to the Data: The Palo Alto Data Repository

Reports and data gathered to prepare the Assessment are temporarily stored at the Palo Alto Regional Water Quality Control Plant (2501 Embarcadero Way, Palo Alto, CA 94303). Hard copies of reports as well as electronic versions (where available) were available for use during normal business hours (8-4:30 M-F) prior to the start of the watershed integration meetings in Nov. 2001. Visitors would call first (650-329-2285) to insure that someone would be available to help them. An electronic database ("The Metadata Database") is also available, which summarizes the reports and data gathered for the pilot assessments.

The Palo Alto repository is temporary. It was established as a "stop-gap" measure to insure that the assessment data is accessible. Long term data collection and management continue to be discussed among the WMI members.

3.2 Development of Assessment Framework

The primary focus of the pilot assessments was to assist Santa Clara Basin stakeholders in identifying the condition of the waterbodies to improve management of the basin's water resources. The Assessment Framework is consistent with federal and state water quality assessment methodologies. The application of this framework allowed the WMI assessment information to be used to satisfy Clean Water Act Section 303 (d) and 305(b) requirements.

The objective of the Assessment Framework was to provide a procedure for using environmental indicators to conduct a watershed assessment. The Framework represents a synthesis of work performed by the WMI subgroups and work groups. Figure 3-2 illustrates the three steps used to develop the Framework.

3.2.1 The Rationale Paper

As a first step, the WAS reviewed the designated beneficial uses for waterbodies in the Santa Clara Basin and identified four primary beneficial uses and one stakeholder interest for use in the assessment. The approach used to select primary uses is described in Appendix A1, "Rationale for Selecting Primary Uses as the Basis for the Santa Clara Watershed Assessment Report."

3.2.2 Selection and Classification of Data Types

Based on the primary uses, a list of data types or indicators to judge whether a waterbody supports the designated beneficial uses/interest were selected. The term 'indicator' used here as defined by Work Group A and in the January 25, 1999 memo; *"Quantifiable Parameters and Threshold Levels for Beneficial Uses and Stakeholder Interests"* is consistent with EPA's Section 305 (b) Guidance document.

3.2.3 Development of Quantifiable Parameters and Threshold Values

Based on the list of data types prepared by Work Group A, the WAC developed tables of quantifiable parameters and, where available, threshold values used to judge the fitness of a waterbody for a particular use. The quantifiable parameters and threshold values served as the "watershed assessment criteria" for use with the decision-tools. The tables show the parameters and threshold values together with an identifying number (Id No.) and the original reference number used in the *"Quantifiable Parameters and Threshold Levels for Beneficial Uses and Stakeholder Interests"* technical memo referenced in the Assessment Framework approved at the May 1999 Core Group meeting.

3.2.4 The Assessment Framework

The Framework consists of two parts: A and B. Part A describes the approach for how the indicators were used and Part B identifies indicators developed by Work Group A. Logic diagrams were developed to systematically determine the level of support of a primary use/interest through a "weight of evidence" approach. Figures 1A, 1B and Figures 2 through 5 of Appendix A2, "Framework for Conducting Watershed Assessments (Parts A & B)" show the logic diagrams for each of the selected uses and interests.

The unavailability of preferred indicator data was noted and, depending on the nature of the data needs, was referred to for the initial field sampling program or the long-term monitoring plan per the Consolidated Action Plan (CAP). Figure B of Appendix A2 illustrates the steps in the data evaluation and collection of additional data that will lead to refining the initial programmatic-level assessment. The status of a reach to meet the primary use/interest was described in use support statements on a reach-to-reach basis.

3.3 Application of Assessment Framework

The primary steps for applying the assessment framework were as follows:

- Selecting pilot watersheds for evaluation
- Determining beneficial uses and stakeholder interests to serve as the foundation of the assessment
- Selecting indicators to judge the fitness of a waterbody to support a use/interest
- Applying logic diagrams as described in the assessment framework to obtain use support statements

Due to the inconsistent availability of data for each use/interest in each stream reach, aspects of the original assessment framework were adapted using best professional judgment in order to enable primary use support determinations. Modifications to the original framework are documented in the technical memorandum *"Lessons Learned in the Pilot Watershed Assessment"* (See Appendix B).

3.3.1 Selection of Pilot Watersheds

In November and December 1998, Work Group C developed criteria and a method for selecting the representative watersheds based on requirements described in the CAP. The WAC used the criteria and methods to evaluate and select three representative watersheds for the pilot assessment. A memorandum, *"Selection of Representative Watersheds"* (See Appendix A3) describes the rationale for selecting the suite of three representative watersheds for analysis in the WMI. The following watersheds were selected for the pilot assessment:

- Guadalupe River Watershed
- San Francisquito Watershed
- Upper Penitencia Subwatershed

The original suite selected for the pilot assessment included Lower Penitencia and not Upper Penitencia watershed. It had been determined that little existing data were available to assess Lower Penitencia; however there remained a strong interest from stakeholders to assess a subwatershed of the greater Coyote Creek Watershed. RPT and consultants examined sub-basins within Coyote Creek to identify an appropriate substitute for Lower Penitencia. Upper Penitencia was a top candidate because it met all of the desired size, location, land use, and data availability criteria established by Workgroup C. At the May 6, 1999 Core Group meeting, the decision to replace Lower Penitencia with Upper Penitencia Creek in the Watershed Assessment was approved.

3.3.2 Selection of Beneficial Uses and Stakeholder Interest

Primary beneficial uses were selected to serve as the foundation for watershed assessment with the understanding that if conditions were met that provided protection of these primary beneficial uses, the conditions for other environmentally related beneficial uses would be attained as well.

The four beneficial uses and one stakeholder interest that were selected are:

- Cold freshwater habitat (COLD)
- Preservation of rare and endangered species (RARE)
- Water-contact recreation (REC1)
- Municipal and Domestic Supply (MUN)
- Protection From Flooding (PFF)

In the Rationale document, Groundwater Recharge (GWR) was one of the four uses and one stakeholder interest selected to serve as the foundation for the pilot assessment. It was decided in a Core Group meeting on December 2, 1999 that the GWR beneficial use should be exchanged for the MUN use. The recommendation for making this exchange came from Regional Board staff with the rationale that by meeting MUN uses, the assessment would also meet the GWR uses.

Figures 2A through 2E in Appendix A illustrate how the primary uses support other beneficial uses. A discussion on designating these beneficial uses and one stakeholder interest as "primary" are described in the Rationale Paper (See Appendix A1).

3.3.3 Selection of Quantifiable Parameters, Indicators, and Threshold Values

The assessment framework relies on direct indicators of fitness of a waterbody to support a primary use/interest. Indirect indicators were used only when direct indicators were impractical or limitations in the data prevented use of a direct indicator. Table 1 of Appendix A2 presents information on direct indicators of fitness for each of the primary uses/stakeholder interest. This concept of a hierarchy of data types and utility for making the assessment is consistent with EPA guidance on conducting water quality assessments from Section 3 of USEPA's *"Guidelines for* *the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement"* (1997). It also builds on work conducted by Work Group A, which identified relevant data types and classified each data type in terms of potential utility to the assessment process. See Appendix A2 for a detailed explanation of the direct and indirect indicators used to assess beneficial use support.

3.3.4 Segmentation of Streams

For the purposes of analysis, it was necessary for waterbodies to be divided into segments. Segments were selected on the basis of physical characteristics, consistent with the California Department of Fish and Game's *"California Salmonid Stream Habitat Restoration Manual, 2nd Edition"* by Flosi and Reynolds (1994).

The process for developing stream segments is presented in the technical memorandum, *"Recommended Stream Segmentation for Watershed Assessment."* The memo describes (1) the recommended stream segments for the assessment of each pilot watershed, (2) the process used to establish the stream segments, and (3) the rationale for selecting the recommended segmentation of streams in each watershed. All criteria used in the segmentation process for each pilot watershed are documented in Appendix A4, *"Stream Segmentation Approach for Assessments."*

3.3.5 Selection of Decision Tools to Determine Beneficial Use/Interest Support

As described in The Assessment Framework, logic diagrams were used to determine whether a waterbody or stream reach supported the five uses/stakeholder interests. The logic diagrams provide a systematic determination for the level of support of a primary use/interest through a "weight of evidence" approach. Figures 1A and 1B and Figures 2 through 5 in Appendix A2 show the logic diagrams for each of the selected uses/ interest.

The first step in the logic diagrams was to evaluate the adequacy of the data used for the assessment. This evaluation was based on the quality of the data, the spatial and temporal coverage of the data, and the extent to which the data were relevant to the conditions being assessed. Where preferred indicator data were not available, alternative indicator data were used. The logic diagram process provided a rationale for substituting additional data to enable the assessment framework to provide a finding. It also provided the technical teams a pathway for documenting decisions to include broader data types and a checkpoint for qualifying the use of such data. See Appendix A2 for detailed information on the data types used to assess each beneficial use and stakeholder interest.

The criteria used in the decision process are linked by identifying numbers to the information contained in Table 1 of Part B of the Assessment Framework. The overall process was intended to link stakeholder-valued data with scientifically accepted threshold values, as well as track the current availability of the data for this assessment (See Figure A of Appendix A2).

3.3.6 Data Compilation and Review

Throughout the assessment process, there were four main aspects of data organization:

- Data Compilation and the Metadata Data Base
- Evaluation of the Data using the Assessment Protocol
- Review of Data Sufficiency and Quality
- Identification of Data Gaps

The WAC was responsible for compiling and reviewing data for the assessment. The WAC formally requested the data, or access to the data and then the DMS prepared an inventory and index of all the data collected.

3.3.6.1 Data Compilation and the Metadata Data Base

In an effort to establish a central data 'warehouse', the WAC placed electronic data on CD-ROM and provided the DMS with an inventory and index of data collected in the form of a Metadata Database (MDDB). DMS's role was to ensure that data requested was collected, properly indexed, and managed, as well as to identify potential problem areas, solutions, and recommendations. DMS also ensured that the indices of data attributes were complete and thorough. When practical, hard copies of data were put on file at the data repository. Data that was not physically collected but was available electronically was inventoried and RPT has established procedures for accessing the data. The MDDB is available for use to conduct queries and generate specific reports.

As mentioned in previous sections, Work Group A had the task of identifying the list of data types that could support the assessment. The WAC then made formal requests to organizations for this data which Work Group A had identified. Throughout the assessment process, the WAC prepared a written description of the steps used to evaluate the data, findings, and conclusions. It was determined that the results of the analyses would be presented in a matrix format and organized by watershed stream reach/waterbody.

3.3.6.2 Evaluation of the Data using the Assessment Protocol

Using the indicators, data types, and parameters listed in the technical memorandum, *"Quantifiable Parameters and Threshold Values for Beneficial Uses and Stakeholder Interests,"* the beneficial use/interest evaluations focused on the presence or absence of data for each preferred (or secondary) indicator for each beneficial use for each stream reach/waterbody in the three pilot watersheds. This evaluation of the status of the three selected watersheds with respect to beneficial use and stakeholder interest criteria was conducted in a series of meetings with the three technical assessment teams (See Table 3-3). The appropriate assessment team determined the status of each stream segment with respect to the beneficial uses and one stakeholder interest. The WAC conducted an evaluation of the data compiled for use in conducting the assessment to determine its completeness.

3.3.6.3 Review of Data Sufficiency and Quality

In a step-wise procedure, the assessment teams reviewed the compiled data to answer the following questions: (1) Does the data pertain to the preferred indicator or to a secondary indicator, was it collected in waterbodies subject to the assessment? (Data relevancy), (2) Is the temporal array of data useful to answer questions posed by the logic diagram, was it collected in accordance with widely accepted scientific methods? (Data quality), and (3) Does the amount of relevant, quality data for the waterbody exist to allow objective, supportable conclusions to be drawn regarding use/interest support? (Data sufficiency). This data review step (see Figure 1 in Appendix A5; "Protocol for Assessment Team Meetings") was critical for identifying data gaps, conducting the uncertainty analysis and for forming the basis for generating the 'Data Quality' responses on the Assessment Summary Tables for each waterbody.

3.3.6.4 Identification of Data Gaps

The "Data Gaps" tables found in Appendix C, *"Data Gaps Identified in Pilot Watershed Assessments"* allowed the assessment teams to focus on the waterbodies for which data exists in the WMI data library. In cases where no data sets were available to assess one or more uses/interest in a waterbody, a data gap for that preferred data type was noted. In instances where there was a lack of sufficient data, data insufficiency was identified. Lastly, data sets were identified by number in the data completeness tables for their respective uses/interest to facilitate data quality, relevance, and sufficiency screening.

Following completion of each team's data review, additional data gaps emerged where a sufficient amount of relevant, quality data was not present for a particular waterbody-use/interest combination. These data gaps, along with those identified prior to Step One (See Figure 1 Appendix A5) by the WAC in its data completeness review, were documented by the WAC in a technical memorandum on data gaps, using the table format shown in Appendix C. A final step in the logic diagrams involved the consideration of limiting factors. If a primary use/stakeholder interest was not supported or only partially supported in a waterbody, the relevant data was examined in an attempt to determine what factors limit the waterbody's ability to support the use. The process of Identifying Limiting Factors is discussed further in Section 3.3.8.

3.3.7 Uncertainty Analysis and Use/Interest Support Determination

An uncertainty analysis was conducted to evaluate the level of confidence in each support statement. The WAC followed guidance for performing an uncertainty analysis as provided in two USEPA documents: *"Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement"* (1997), and *"Draft Guidance for Water Quality-Based Decisions: The TMDL Process"* (1999). The guidelines addressed different types of data including physical habitat, biological, toxicological and physical/chemical data to determine aquatic life use support.

The methodology designates four uncertainty ratings. Data designated as "A" are of the highest quality and provide a relatively low level of uncertainty. Data designated as "D" may be considered adequate for performing assessments, but involve less rigorous approaches and therefore result in a greater degree of uncertainty.

Three criteria were used to determine the uncertainty ratings ranging between "A" and "D":

1. Technical Components: refer to the comprehensiveness of the study design including methodology and level of documentation.

2. Spatial and Temporal Coverage: refers to the age, amount, and spatial extent of the data.

3. Data Quality: refers to the QA/QC conducted; the extent of replication, quality considerations in site selection, and rigor associated with laboratory analyses.

Table 3 of Appendix A2 is an example of the criteria recommended by EPA to evaluate uncertainty in bioassessment data US EPA's *"Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement"* (1997). The criteria for Level 4 bioassessment data include monitoring of two assemblages (or one if the data are of high quality), regional reference conditions, a biotic index, broad coverage of monitoring locations for 1-2 sampling seasons, high quality data, and the use of a professional biologist for the survey and assessment. Level 1 criteria include visual observations of biota, no reference conditions, limited monitoring or extrapolations from other sites, and data of unknown or low quality. Also, Level 1 data do not require the participation of a professional biologist.

These guidelines are most appropriate for addressing the COLD beneficial use. The WAC tailored the EPA guidance consistent with the data types to be used in the assessment of COLD, and developed comparable criteria for other uses and interests consistent with EPA and other agency (e.g., DHS) guidance. These criteria were made available to interested stakeholders through the WAS for their review and approval as part of the assessment.

3.3.8 Identification of Potential Limiting Factors

Following these assessments of individual uses and interests by stream reach, these results were combined on a watershed basis and integrated with results for the uses and interests. This integration illustrated areas of support and non-support, and, where appropriate, potential limiting factors.

The identification of limiting factors (see Appendix D, *"Limiting Factors Analysis"*) focused on physical, chemical and biological conditions in the stream and the riparian corridor that caused non or partial support of primary uses. It did not address an ultimate or indirect cause of non- or partial support (e.g., urbanization and its effect on stream hydrology). In addition, the analysis was based only on existing data. Existing data may be insufficient to make more than a tentative identification of limiting factors particularly for the COLD and RARE beneficial uses. Some examples of potential limiting factors for the four beneficial uses and the stakeholder interest are shown in Table 4 of Appendix A2.

References:

Carnachan, Rob, lead Watershed Assessment Consultant (WAC). 2001. Protocol for Assessment Team Meetings Memorandum. Memo to Report Preparation Team (RPT) on September 18.

Davis, John, lead Watershed Assessment Consultant (WAC). 1999. Selection of Representative Watersheds Memorandum. Revised Memo to Core Group on January 19.

Davis, John, P. Mangarella, of the Watershed Assessment Consultant (WAC), and the Report Preparation Team (RPT). 2000. Final Framework for Conducting Watershed Assessment (Parts A & B). Approved by Core Group February 3.

Santa Clara Basin Watershed Management Initiative, The. 2002. Watershed Management Plan Volume 1 unabridged Watershed Characteristics Report. December 2002 Revision.

Watershed Assessment Subgroup (WAS), The. 1998. Final Rationale for Selecting Primary Uses as the Basis for the Santa Clara Basin Watershed Assessment Report. Approved by Core Group August 6.

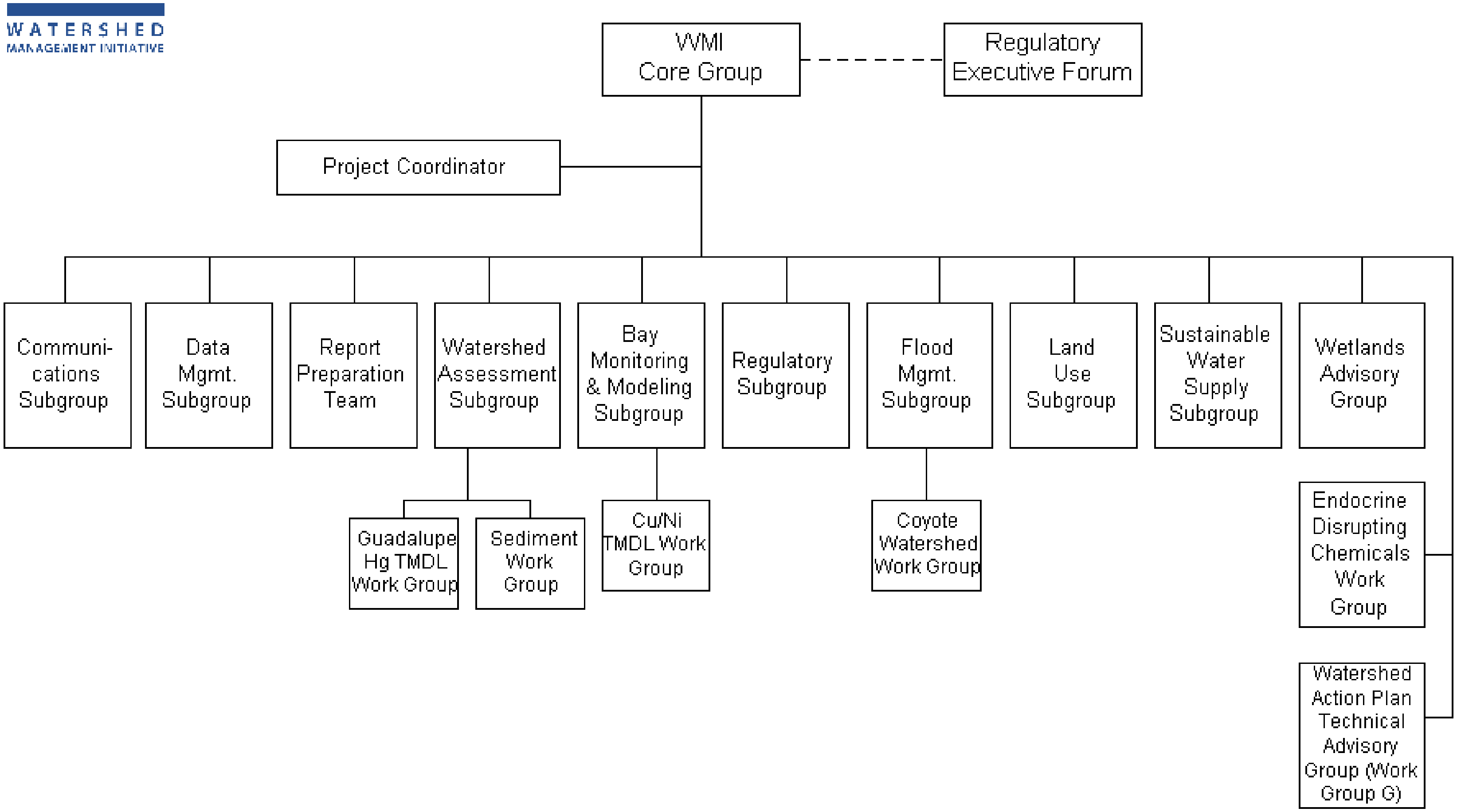
Figure 3-1

Santa Clara Basin Watershed Management Initiative Organization Chart

SANTA CLARA BASIN WMI WATERSHED MANAGEMENT INITIATIVE

As of February 2002

Mission
To protect and enhance the watershed, creating a sustainable future for the community and the environment



Steps Involved in Developing Assessment Framework

1. Rationale Paper
    - Assessment approach focused on support of beneficial uses and stakeholder interests
    - Linked data types to key uses
    - Consistent with 305(b) approach
    - Identified data types by use (general)

↓

2. Work Group A
    - Identified "universe" of data types suitable for establishing use/interest
    - Identified "short list" of data types
    - Developed classification system for prioritizing data types

↓

3. Quantifiable Parameters and Threshold Values
    - Identified indicators for which there is quantifiable guidance regarding use support
    - Identified numerical and descriptive thresholds that would help guide assessment

↓

4. Assessment Framework

    Part A
    - Describes approach for how the indicators will be used

    Part B
    - Identifies best indicators from Work Group A
    - Identifies substitute indicators where data is insufficient

Figure 3-2

Table 3-1
Watershed Management Initiative Signatories[1]

Public Agencies	**Business and Trade Associations**	**Civic and Environmental Groups and Programs**
California Department of Fish and Game	California Restaurant Association/Dairy Belle Freeze	CLEAN South Bay
City of Cupertino	Home Builders Association of Northern California	League of Women Voters
City of Palo Alto	San Jose Silicon Valley Chamber of Commerce	Salmon and Steelhead Restoration Group
City of San Jose	Santa Clara Cattlemen's Association	San Francisco Bay Bird Observatory
City of Santa Clara	Santa Clara County Farm Bureau	San Francisquito Watershed Council
City of Sunnyvale	Silicon Valley Manufacturing Group	Santa Clara County Streams for Tomorrow
Guadalupe-Coyote Resource Conservation District		Santa Clara Valley Audubon Society
San Francisco Bay Regional Water Quality Control Board		Silicon Valley Pollution Prevention Center
San Francisquito Creek Joint Powers Authority		Silicon Valley Toxics Coalition
Santa Clara County		Western Waters Canoe Club
Santa Clara County Open Space Authority		
Santa Clara Valley Transportation Authority		
Santa Clara Valley Urban Runoff Pollution Prevention Program		
Santa Clara Valley Water District		
U.S. Army Corps of Engineers		
U.S. Environmental Protection Agency		
U.S. Department of Agriculture Natural Resource Conservation Service		

[1]As of November 2002

Table 3-2
Subgroups of the Santa Clara Basin Watershed Management Initiative

SUBGROUP	WORK STATEMENT
Bay Modeling and Monitoring	• Provide technically sound tools to investigate and evaluate the potential water quality impacts of various south bay water quality management options. • Develop technically supportable permit limits (concentration & mass). • Develop the technical support for attainable water quality objectives including expected attainment dates. • Develop a technically supportable first phase Total Maximum Daily Loading along with a plan to refine the estimates.
Communications*	• Ensure effective communication across all stakeholders, core group, subgroups and key decision-makers. • Identify, coordinate and initiate effective outreach programs. • Create and disseminate public outreach materials for the WMI. • Establish, track, and document WMI expenditures. • Establish work priorities and recommend expenditures to conduct that work. • Oversee personnel matters of the WMI. • Ensure that the WMI has a comprehensive, overall work plan and the resources to implement the plan. • Providing guidance to Project Coordinator. • Oversee the Action Plan Development Process. • Evaluate structure, functions, and effectiveness of WMI and propose appropriate changes.
Data Management	• Provide the Watershed Management Initiative Stakeholders with accurate and reliable data in a timely and cost-effective manner on an on-going basis.
Flood Management	• Identify and integrate flood management issues as a part of the watershed planning process.
Land Use	• Identify and address land use planning interests and issues that need to be considered within the watershed plan.
Regulatory	• Improve long term regulatory certainty by integrating and prioritizing the permit recommendations of the other subgroups. • Will serve as a discussion and recommendation forum for the Basin's permitting issues.
Report Preparation Team	• Plan and develop the Watershed Characteristics Report, Watershed Assessment Report, and Watershed Action Alternatives.
Sustainable Water Supply	• Identify and recommend sustainable water resource management opportunities that protect beneficial uses within the pilot watersheds and the Santa Clara Basin.
Watershed Assessment	• Provide a solid scientific foundation for watershed planning and land use decisions. • Identify existing data resources, assemble available data, evaluate the quality of existing data, identify data gaps, develop and implement strategies for data acquisition and management and implement data interpretations which will lead to effective planning decisions.
Wetlands Advisory Group	• Promote the integration of wetland management actions into the overall Watershed Management Plan. • Provide technical assistance on wetlands in an advisory function to the Subgroups and the Core Group for all WMI products.

*Includes four workgroups: 1) Budget and Personnel; 2) Outreach; 3) Planning; 4) Workgroup G.

Table 3-3

Watershed Captains and Members of Technical Assessment Teams

Watershed Captains and their respective Watersheds of Expertise
Geoff Brosseau- San Francisquito Creek Watershed Laura Young- San Francisquito Creek Watershed Terry Neudorf- Guadalupe River Watershed Larry Johmann- Guadalupe River Watershed (with Nancy Bernardi/ Roger Castillo as alternates) Mike Will- Upper Penitencia Creek Watershed
Team 1: Natural Resources-Related Beneficial Uses (RARE and COLD)
Jerry Smith (SJSU/Entrix) Fran Demgen (URS) Jon Stead (URS)
Team 2: Human Health and Recreation Beneficial Uses (MUN and REC-1)
Terry Cooke (URS) Lily Panyacosit (URS) Usha Vedigiri (URS)
Team 3: Protection From Flooding Stakeholder Interest (PFF)
Phil Mineart (URS) Gary Palhegyi (URS)
Team 4: Data Management and Analysis Support
Sandy Davidson (URS) Raul Farre (URS) Suzanne Loadholt (URS)

Volume Two

Watershed Assessment Report

Chapter 4

Assessment of Guadalupe Watershed

SANTA CLARA BASIN

WMI

WATERSHED MANAGEMENT INITIATIVE

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team
With Assistance From City of Palo Alto

February 2003

Watershed Assessment Report Chapter 4: Assessment of Guadalupe Watershed

List of Authors

REPORT PREPARATION TEAM

Sarah Young, Santa Clara Valley Water District
Richard McMurtry, Regional Water Quality Control Board
Michael Stanley-Jones, Silicon Valley Toxics Coalition
Alice Ringer, WMI Coordinator

with consultant support from

URS

Rob Carnachan, Senior Water Resources Scientist
Suzanne Loadholt, Soil Scientist
Raul Farre, Staff Scientist
Sandy Davidson, Database Manager
Terry Cooke, MUN and REC-1 Assessment Team
Usha Vedigiri, MUN and REC-1 Assessment Team
Phil Mineart, PFF Assessment Team
Senarath Ekanayake, PFF Assessment Team
Francesca Demgen, RARE Assessment Team
Jon Stead, COLD and RARE Assessment Team

And

Entrix, Inc.

Jerry Smith, San Jose State University, COLD Assessment Team

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 4
Table of Contents

Tables

Chapter 4 Appendices

Chapter 4
Assessment of Guadalupe Watershed

4.1 General Overview and Setting

The Guadalupe River watershed is the second largest of the 13 major watersheds that comprise the Santa Clara Basin (the Basin). The watershed drains the north- and east-facing slopes of the Santa Cruz Mountains above the cities of Los Gatos and San Jose. The Guadalupe River watershed has a total drainage area of approximately 170 square miles. The main stem Guadalupe River has six major tributaries, each of which is described in Section 4.1.1.

There are six major reservoirs in the Guadalupe River watershed that were built for water conservation and storage purposes, but can provide flood control benefits depending on the size of the upstream drainage areas and the available water storage capacity. They are Calero Reservoir on Arroyo Calero, Guadalupe Reservoir on Guadalupe Creek, Almaden Reservoir on Alamitos Creek, and Vasona Reservoir, Lexington Reservoir, and Lake Elsman on Los Gatos Creek. Two smaller reservoirs, Lake Ranch Reservoir and Williams Reservoir, are also located within the Los Gatos Creek subwatershed.

The southern portion of the watershed is largely comprised of steep-sided mountains and deep canyons. The tributary headwaters of the watershed are located near the northern slopes of Loma Prieta in the Santa Cruz Mountains, elevation 3,790 feet. This section of the watershed is largely undeveloped open space, though some rural residential development is located along the canyon bottoms of the major tributary streams. The northern portion of the watershed is located on the San Francisco Bay plain and is heavily urbanized. Most of the large reservoirs in the watershed are located in the tributary canyons just above the transition zone from Bay plain to mountain slopes.

4.1.1 Waterbodies in the Watershed

This section provides a general description of each of the 52 waterbodies in the Guadalupe River watershed. A more extensive discussion of the natural characteristics of the Santa Clara Basin in general is contained in Chapter 7 of the Watershed Characteristics Report (Volume One). The descriptions in this section are, in part, based on the information in the Watershed Characteristics Report.[1] These brief descriptions are included here in order to place the pilot assessment results in context and are not meant to provide the definitive characterization of each stream or reservoir. Additional detail

[1] Because the Watershed Characteristics Report (WCR) itself contains voluminous references to various sources, sections of this chapter that contain information from the WCR are cited with the notation (Santa Clara Basin WMI, 2001). Readers are directed to the references in Chapter 7: Natural Setting of the WCR to determine the original source of the information.

concerning stream channel characteristics and riparian vegetation may be found in the individual stream assessment result discussions in Section 4.3.

4.1.1.1 Guadalupe River

The Guadalupe River begins at the confluence of Alamitos Creek and Guadalupe Creek, which is just downstream of Coleman Road in San Jose. The Guadalupe River has a channel length of 19.78 miles from this location north to its mouth at San Francisco Bay via Alviso Slough. The river flows through heavily urbanized portions of San Jose, including the city's downtown core. Three tributaries join the Guadalupe River as it flows north: Los Gatos Creek, Canoas Creek, and Ross Creek.

The Guadalupe River played an important role in the settlement of San Jose. As a result, it has been subject to considerable modification. The first major modification of the stream channel occurred in 1866 when a canal was dug to alleviate flooding and to improve conditions for rapidly expanding orchards. More recently, in the early 1960s, Canoas Creek and Ross Creek were realigned for the second time (an earlier realignment had moved the Canoas Creek confluence farther upstream). As part of the 1975 Almaden Expressway construction project, about 3,000 feet of the Guadalupe channel were widened and moved eastward. The original stream channel was filled to allow the construction of the northbound expressway (Santa Clara Basin WMI, 2001). An additional major relocation of the river channel was performed around the San Jose Airport. Reservoirs, passage barriers, flood control projects and other channel modifications have significantly altered riparian and aquatic habitats along the Guadalupe River.

Due to the watershed's topography, flooding has long been associated with the Guadalupe River. Rainfall occurs mainly during the winter. Portions of the Basin in the Santa Cruz Mountains receive 40 to 60 inches per year, while the central Santa Clara Valley receives an average between 13 and 14 inches. The steep slopes of the mountains swiftly convey the water in rain-swollen tributaries to the Bay plain where the waters historically spread out across a much larger floodplain. Today, most of this floodplain has been covered with urban and residential development and the river channel itself has been modified to provide flood protection. Nonetheless, major flood incidents have occurred in the past, most recently during the winters of 1980, 1982, 1983, and 1995.

The Guadalupe River has also been identified as a significant mercury source to the Bay. Mercury mining occurred between 1845 and 1975 in what is now the present location of the Almaden Quicksilver County Park. In 1975, the former mining district was purchased by Santa Clara County for use as a recreational park. The principal mercury ore in the area is cinnabar (mercury sulfide), which is situated within a host silica-carbonate rock. The cinnabar is processed by crushing the ore and reducing the ore to elemental mercury in retorts or furnaces. The burned rocks, referred to as calcines, typically were dumped in piles near the processing areas or used as road base material. Generally, the calcines are sandy or silty gravel materials. The calcine piles still remain at the site and vary in area, steepness, mercury concentration, and particle size distribution. Erosion and runoff from calcine piles, waste rockpiles (unprocessed rock), and road material cause mercury-laden sediment to be transported into nearby surface waterbodies that are tributary to the Guadalupe River (Santa Clara Basin WMI, 2001).

4.1.1.2 Los Gatos Creek Subwatershed

Los Gatos Creek has a drainage area of about 55 square miles and joins the Guadalupe River in downtown San Jose. The Los Gatos Creek subwatershed is located on the north-facing slopes of the Santa Cruz Mountains and varies in elevation from 3,483 feet at the peak of Mt. Thayer to about 90 feet at the Creek's confluence with the Guadalupe River. Vasona Reservoir is located on Los Gatos Creek approximately 7.9 miles upstream of its confluence with the Guadalupe River. The watershed above Vasona Dam encompasses about 44 square miles. Lexington Reservoir is located on Los Gatos Creek about 11 miles upstream of its confluence with the Guadalupe River. Lake Elsman and Williams Reservoir are both located on the creek upstream of Lexington Reservoir. There are a total of 15 named tributaries to Los Gatos Creek, as well as several other unnamed tributaries. Lake Ranch Reservoir is located on one such tributary, Lyndon Canyon Creek.

In the upper watershed, the creek's course is through steep, largely undeveloped terrain and the width of the riparian corridor is narrow. In the lower watershed, Los Gatos Creek passes through relatively flat urban areas (Cities of Los Gatos, Campbell, and San Jose), and much of the riparian corridor has been fragmented by bank stabilization for flood control purposes. As with the Guadalupe River, reservoirs, passage barriers, flood control projects and other channel modifications have significantly altered riparian and aquatic habitats along the creek.

Dry Creek

Dry Creek is an ephemeral channel that flows through a heavily urbanized portion of San Jose and empties into Los Gatos Creek approximately 2.5 miles above its confluence with the Guadalupe River. Dry Creek flows northeast and drains an area between Los Gatos Creek on the west and the Guadalupe River on the east. The channel is fully modified, with portions rock-lined, concrete-lined, and encased by an earthen levee.

Daves Creek

Daves Creek is an ephemeral tributary to Los Gatos Creek, rising along the western boundary of the watershed and flowing for just over two miles through urbanized portions of Los Gatos and San Jose before emptying into Los Gatos Creek downstream of Vasona Dam. Daves Creek's channel has been lined with concrete to expedite the drainage of flood flows into Los Gatos Creek downstream.

Almendra Creek

Almendra Creek is an ephemeral stream that rises on the northeast side of the foothills above Los Gatos, flows northeastward into Los Gatos, then turns eastward through the downtown area to empty into Los Gatos Creek approximately halfway between the head of Vasona Reservoir and Lenihan Dam (Lexington Reservoir). The channel is largely rock- or concrete-lined through the urbanized portion of its drainage.

Trout Creek

Trout Creek is a perennial to intermittent tributary to Los Gatos Creek, joining it just downstream of Lenihan Dam (Lexington Reservoir). Trout Creek flows eastward into Los Gatos Creek along a natural channel draining the northern foothills of the Santa Cruz Mountains above Los Gatos and Campbell. Little detailed information is available regarding Trout Creek's drainage area.

Lyndon Canyon Creek

Lyndon Canyon Creek is an intermittent tributary to Lexington Reservoir on Los Gatos Creek, joining it on its western shore approximately one-third of the distance uplake from Lenihan Dam. The creek's headwaters are impounded by Lake Ranch Reservoir. The creek flows slightly southeastward along a natural channel. Little detailed information is available regarding Lyndon Canyon Creek's drainage area.

Black Creek

Black Creek is an intermittent tributary to Lexington Reservoir on Los Gatos Creek, joining it on its western shore approximately one-half of the distance uplake from Lenihan Dam. The creek flows slightly northeastward along a short natural channel. Little detailed information is available regarding Black Creek's drainage area other than that it is steep and rugged with little or no development.

Dyer Creek

Dyer Creek is a short intermittent tributary to Briggs Creek that flows eastward into Lexington Reservoir, joining it on its western shore approximately two-thirds of the distance uplake from Lenihan Dam. The creek flows slightly northeastward along a short natural channel. Little detailed information is available regarding Dyer Creek's drainage area other than that it is steep and rugged with little or no development.

Briggs Creek

Briggs Creek flows eastward into Lexington Reservoir, joining it on its western shore approximately two-thirds of the distance uplake from Lenihan Dam. The intermittent creek flows slightly southeastward along a natural channel, absorbing the flow of Dyer Creek from the southwest approximately one-half of the distance to the reservoir. Little detailed information is available regarding Briggs Creek's drainage area other than that it is steep and rugged with little or no development.

Aldercroft Creek

Aldercroft Creek flows northeastward into Lexington Reservoir, joining it on its western shore approximately four-fifths of the distance uplake from Lenihan Dam. The intermittent creek flows along a natural channel nearly due north from the summit ridge of the Santa Cruz Mountains, then turns east toward Lexington Reservoir, passing under State Highway 17. Little detailed information is available regarding Aldercroft Creek's drainage area other than that it is steep and rugged with little or no development.

Moody Gulch

Moody Gulch flows northeastward into Los Gatos Creek, joining it from the west just upstream of the head of Lexington Reservoir. The intermittent creek flows along a short natural channel for approximately 1.3 miles through steep rugged terrain. Rural residential development is scattered through the Moody Gulch drainage.

Limekiln Creek

Limekiln Creek is a longer intermittent stream that rises on the northwest side of the Sierra Azul and flows through a natural channel westward into Lexington Reservoir. The creek joins the reservoir on its eastern shore approximately one-fifth of the distance uplake from Lenihan Dam. Little is known about the drainage area of Limekiln Creek other than that it is rugged with little or no development.

Soda Springs Canyon Creek

Soda Springs Canyon Creek is a long perennial to intermittent stream that rises on the northwest side of the Sierra Azul and flows through a natural channel westward into Lexington Reservoir. The creek joins the reservoir on its eastern shore approximately one-half of the distance uplake from Lenihan Dam. Little is known about the drainage area of Soda Springs Canyon Creek other than that it is rugged with little or no development.

Hendrys Creek

Hendrys Creek is a shorter intermittent stream that rises on the west side of the Sierra Azul and flows through a natural channel westward into Los Gatos Creek at the head of Lexington Reservoir. Little is known about the drainage area of Hendrys Creek other than that it is rugged with little or no development.

Hooker Gulch

Hooker Gulch is an intermittent stream that rises on the west side of the Sierra Azul and flows through a natural channel westward into Los Gatos Creek approximately halfway between the head of Lexington Reservoir and Lake Elsman. Little is known about the drainage area of Hooker Gulch other than that it is rugged with little or no development.

Austrian Gulch

Austrian Gulch is an intermittent stream that rises on the southwest side of the Sierra Azul and flows through a natural channel southwestward into Lake Elsman, just upstream from the dam along its north shore. Little is known about the drainage area of Austrian Gulch other than that it is rugged with little or no development.

Vasona Reservoir

Vasona Reservoir is owned and operated by the Water District and is located within Vasona Lake County Park in Los Gatos near the intersection of State Highway 17 and State Highway 85. Vasona Dam is located on Los Gatos Creek approximately two miles downstream (northeast) of Lenihan Dam. The watershed drainage area downstream of Lexington Reservoir is approximately 6.46 square miles. Vasona Reservoir was completed in 1935. It has an average surface area of 58 acres and a capacity of 400 acre-feet (Santa Clara Basin WMI, 2001).

The upper part of the drainage area above Vasona Reservoir (excluding the Lexington Reservoir drainage area) is located on the eastern slopes of El Sereno and the northern slopes of St. Joseph's Hill. The lower part of the drainage area consists of the mainly flat Los Gatos area north of the upper part of the watershed. The lower part of the watershed is well developed and urbanized. The upper part is less urbanized in the steeper portions. The Town of Los Gatos and City of Monte Sereno lie within the lower portion of the watershed (Santa Clara Basin WMI, 2001).

Vasona Reservoir is located in the alluvial floodplain formed by Los Gatos Creek prior to its channelization. The Water District uses the reservoir to store and release recharge waters to percolation ponds further downstream on Los Gatos Creek. Park visitors actively use the reservoir and surrounding parklands. Since the capacity of Vasona Reservoir is small, water released from Lexington Reservoir is just momentarily detained in Vasona Reservoir before passing through.

Lexington Reservoir

Lexington Reservoir is owned and operated by the Water District and is located adjacent to State Highway 17 in unincorporated western Santa Clara County approximately one mile south of Los Gatos. Lexington Reservoir was completed in 1952. It has an average surface area of 475 acres and a capacity of 19,834 acre-feet. The James J. Lenihan Dam impounds Los Gatos Creek and numerous other drainages within the surrounding watershed. Los Gatos Creek enters the south end of the reservoir, while Limekiln Creek and Soda Springs Canyon Creek drain into the reservoir from the east, Aldercroft Creek, Black Creek and Briggs Creek from the west, and Moody Gulch and Hendrys Creek from the south. Hendrys Creek, Los Gatos Creek (with Lake Elsman), and Aldercroft Creek contribute water most of the year. Briggs Creek and Black Creek contribute water only part of the year during the wet season (Santa Clara Basin WMI 2001).

The drainage area upstream of Lexington Reservoir is 36.9 square miles. Lexington Reservoir discharges to Los Gatos Creek at the base of the Sierra Azul. Lexington Reservoir is roughly 2.5 miles long and 3,000 feet wide at the northern end near the dam. The primary purpose of the Lexington Reservoir is to store water for scheduled releases to replenish groundwater at recharge facilities further downstream on Los Gatos Creek (Santa Clara Basin WMI 2001).

Of the reservoir watersheds in the county, Los Gatos Creek above Lexington Reservoir is the most highly developed. Aldercroft Heights, Chemeketa Park, Holy City, Redwood Estates, and a development above Lexington Reservoir on the Monte Vina arm are clusters of development within the watershed above Lexington Reservoir. In addition, there are individual houses and estates outside the relatively densely populated areas, and also schools and recreational camps.

Lake Elsman

Lake Elsman is a smaller reservoir located upstream of Lexington Reservoir on Los Gatos Creek. Lake Elsman has a storage capacity of 6,200 acre-feet and is owned and operated by San Jose Water Company. Water released from Lake Elsman flows through a reach of Los Gatos Creek to Lexington Reservoir downstream. The primary purpose of Lake Elsman is to provide water supply for the San Jose Water Company's customers. Most of the watershed above Lake Elsman is undeveloped.

Williams Reservoir

Williams Reservoir is a small impoundment on Los Gatos Creek immediately upstream of Lake Elsman. The two reservoirs adjoin one another. Williams Reservoir is privately owned and operated.

Lake Ranch Reservoir

Lake Ranch Reservoir is a small impoundment near the headwaters of Lyndon Canyon Creek. Lake Ranch Reservoir is within Sanborn-Skyline County Park and is owned and operated by the Santa Clara County Parks Department.

4.1.1.3 Canoas Creek Subwatershed

Canoas Creek is a perennial 7.4-mile long channel that drains a heavily urbanized portion of San Jose east of the Guadalupe River and west of the neighboring Coyote Creek. Canoas Creek has a drainage area of approximately 19 square miles and joins the Guadalupe River just upstream of Curtner Avenue. The creek's channel has been entirely modified, with most of it being concrete-lined. Canoas Creek flows west along the northern base of the Santa Teresa Hills, then turns north/northwest before reaching the Guadalupe River.

4.1.1.4 Ross Creek Subwatershed

Ross Creek extends from Blossom Hill Road near the northern base of the Sierra Azul east of Los Gatos through urbanized portions of San Jose to the Guadalupe River just downstream of Branham Lane, joining it from the west. Ross Creek drains an area of about 10 square miles and is fed by two tributaries: Short Creek and Lone Hill Creek. Ross Creek is intermittent and flows through a concrete-lined channel.

Lone Hill Creek

Lone Hill Creek is an intermittent stream that rises on the northern side of the Sierra Azul and flows north for a short distance into Ross Creek. Most of the creek's channel is concrete-lined as it flows through an urbanized area; however, its upper portion is in a relatively undeveloped foothill area.

Short Creek

Short Creek is essentially the uppermost portion of Ross Creek (above Blossom Hill Road). Short Creek is an intermittent stream that rises on the northern side of the Sierra Azul and flows northwest and then curves north for a short distance into Ross Creek. Most of the creek's channel is natural as it flows from undeveloped foothill areas down into a more urbanized area.

4.1.1.5 Guadalupe Creek Subwatershed

The Guadalupe Creek subwatershed drains the northern side of the Sierra Azul and flows northwest, then northeast to join with Alamitos Creek in forming the Guadalupe River downstream of Coleman Road and Almaden Expressway. Guadalupe Reservoir is located on Guadalupe Creek in the mountainous area southeast of Los Gatos, approximately 5.9 miles upstream of the creek's confluence with the Guadalupe River. There is a total of six named tributary streams, as well as several unnamed tributaries, that drain the surrounding mountainsides.

In the upper watershed, the creek's course is through steep, largely undeveloped terrain and the width of the riparian corridor is narrow. In the lower watershed, Guadalupe Creek passes through relatively flat urban areas (City of San Jose) and much of the riparian corridor has been fragmented by bank stabilization for flood control purposes. As with the Guadalupe River and Los Gatos Creek, reservoirs, passage barriers, flood control projects, gravel mining, percolation pond construction and other channel modifications have significantly altered riparian and aquatic habitats along the creek. Above Guadalupe Reservoir, however, the stream is relatively natural.

Pheasant Creek

Pheasant Creek is a perennial to intermittent stream that rises on the northeasternmost side of the Sierra Azul and flows through a natural channel northeastward into Guadalupe

Creek near its sharp bend to the northeast. There is some rural residential development on the hillsides above the creek, though most of the creek's drainage area is steep and undeveloped.

Shannon Creek

Shannon Creek is an intermittent stream that rises on the northeastern side of the Sierra Azul and flows through a natural channel northeastward into Guadalupe Creek near its sharp bend to the northeast. There is some rural residential development along the lower part of the creek, though most of the creek's drainage area is steep and undeveloped.

Rincon Creek

Rincon Creek is an long perennial stream that rises on the northeastern side of the Sierra Azul and flows through a natural channel northeastward into Guadalupe Creek just above the head of Guadalupe Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Los Capitancillos Creek

Los Capitancillos Creek is an intermittent stream that rises on the northwest side of "Mine Hill" in the former New Almaden Mining District. The creek flows through a natural channel northwestward into Guadalupe Creek just above the head of Guadalupe Reservoir but just downstream of the confluence of Rincon Creek on the opposite bank. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Reynolds Creek

Reynolds Creek is a perennial stream, fed by Cherry Springs, that rises on the northeastern side of the Sierra Azul and flows through a natural channel northeastward into Guadalupe Creek downstream of Guadalupe Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped. One named tributary, Hicks Creek, flows into Reynolds Creek from the southwest.

Hicks Creek

Hicks Creek is a short, perennial tributary of Reynolds Creek stream that rises on the northern side of El Sombroso in the Sierra Azul and flows through a natural channel north into Reynolds Creek. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Guadalupe Reservoir

Guadalupe Reservoir is located on Guadalupe Creek nearly six miles above its confluence with the Guadalupe River. The reservoir is located on the southern boundary of Almaden Quicksilver County Park on Hicks Road. Guadalupe Creek provides perennial flow to the reservoir from its upper drainage area, which includes Rincon and Los Capitancillos Creeks as well. The reservoir was completed in 1935 and has an average surface area of 79 acres and a capacity of 3,228 acre-feet. Its principal purpose is to provide staged releases of impounded water for groundwater recharge purposes in the Guadalupe Creek and Guadalupe River channels and in the Los Capitancillos, Alamitos, and Guadalupe recharge ponds. The Water District owns and operates this reservoir for water conservation purposes (Neudorf, pers. comm., 2002).

The watershed above Guadalupe Reservoir is steep, rugged, and features very little development of any kind.

4.1.1.6 Alamitos Creek Subwatershed

Alamitos Creek and its major tributary Arroyo Calero (often referred to as Calero Creek) are located in the Almaden Valley, a northwest-trending valley located within the larger Santa Clara Valley but separated from it by the Santa Teresa Hills. The Alamitos Creek subwatershed (including the Arroyo Calero subwatershed) is approximately 38 square miles. Alamitos Creek originates in the Santa Cruz Mountains at an elevation of around 3,800 feet. With other tributaries, Alamitos Creek flows northwesterly to Almaden Reservoir. From Almaden Reservoir, Alamitos Creek flows in a northeast direction to its confluence with Arroyo Calero. Along this stretch, the stream gradient is moderately steep. At the Arroyo Calero confluence, Alamitos Creek turns slightly more westward and continues along a moderately steep gradient to the point of confluence with Guadalupe Creek near Blossom Hill Road and Almaden Expressway in San Jose, where the resultant stream becomes known as the Guadalupe. Lake Almaden is located just above this confluence on Alamitos Creek. A total of 10 named tributaries (excluding Arroyo Calero and its tributaries) feed Alamitos Creek (Santa Clara Basin WMI, 2001).

In the upper watershed, the creek’s course is through steep, largely undeveloped terrain and the width of the riparian corridor is narrow. In the lower watershed, Alamitos Creek passes through relatively flat urban areas (City of San Jose), though its gradient through this area is steeper than that of either Guadalupe or Los Gatos Creeks. Though they do exist along Alamitos Creek, reservoirs, passage barriers, flood control projects and other channel modifications have altered riparian and aquatic habitats along the creek to a lesser extent than along either Guadalupe or Los Gatos Creeks. There have been several major floods in the Alamitos Creek subwatershed, some of which have caused significant damage. Alamitos Creek was widened and levees were constructed from McKean Road downstream to its confluence with Guadalupe Creek in the late 1970s (Santa Clara Basin WMI, 2001 and Neudorf, pers. comm., 2002).

Golf Creek

Golf Creek is a 3.3 mile-long intermittent stream that rises on the north slope of the ridgeline separating Guadalupe Creek and Alamitos Creek. This ridge is the location of the former New Almaden Mining District. The creek flows through a natural channel north into the flatter valley area north of the mountains. This area has been urbanized in recent years and the creek is encased in a concrete-lined channel as it curves to the northeast toward its confluence with Almaden Creek a short distance upstream of Lake Almaden. McAbee Creek is a short tributary to Golf Creek.

McAbee Creek

McAbee Creek is a short intermittent tributary to Golf Creek, rising on the northeastern side of the ridgeline separating the Guadalupe Creek and Alamitos Creek subwatersheds. The creek flows through a natural channel north into the flatter valley area north of the mountains. This area has been urbanized in recent years and the creek is encased in a concrete-lined channel in its lower portion before it discharges into Golf Creek from the southwest.

Greystone Creek

Greystone Creek is a two mile-long intermittent stream that rises on the north slope of the ridgeline separating Guadalupe Creek and Alamitos Creek. This ridge is the location of the former New Almaden Mining District. The creek flows through a natural channel north into the flatter valley area north of the mountains. This area has been urbanized in recent years and the creek is encased in a concrete-lined channel as it continues north toward its confluence with Almaden Creek downstream of the Arroyo Calero confluence.

Randol Creek

Randol Creek is a 2.9 mile-long perennial to intermittent stream that rises on the northwestern slope of Church Hill in the former New Almaden Mining District. The creek flows through a natural channel north into the flatter valley area north of the mountains. This area has been urbanized in recent years and the creek is encased in a concrete-lined channel as it curves to the northeast toward its confluence with Almaden Creek a short distance downstream of the Arroyo Calero confluence.

Jacques Gulch

Jacques Gulch is an intermittent stream that rises on the northeast side of Bald Mountain in the Sierra Azul. The creek flows through a natural channel northeastward into Almaden Reservoir, joining it on its northern shore approximately two-thirds of the distance uplake from Almaden Dam. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Herbert Creek

Herbert Creek is a 3.1 mile-long perennial stream that rises on the northeast side of the Sierra Azul crest and flows through a natural channel northeastward into the upper end of Almaden Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped. Barrett Canyon Creek flows into Herbert Creek in its lowermost segment, just above the head of Almaden Reservoir.

Barrett Canyon Creek

Barrett Canyon Creek is a 3.5 mile-long perennial stream that rises on the north slope of Loma Prieta. The creek flows through a natural channel north into Herbert Creek just above the head of Almaden Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Larabee Gulch

Larabee Gulch is a shorter intermittent stream that rises on the northwest slopes of Fern Peak in the Bald Peaks area. The creek flows through a natural channel northwest into Almaden Reservoir approximately one-fourth of the distance uplake from Almaden Dam. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Chilanian Gulch

Chilanian Gulch is an intermittent stream that rises on the northwest slope of the ridge dividing Almaden Creek from Cherry Canyon Creek in the Arroyo Calero subwatershed to the east. The creek flows through a natural channel northwest into Almaden Creek just below the town of New Almaden. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Deep Gulch

Deep Gulch is an intermittent stream that rises on the southeast slope of "Mine Hill" in the former New Almaden Mining District. The creek flows through a natural channel east into Almaden Creek just above the town of New Almaden. The Deep Gulch drainage area was formerly the location of active mercury mining and is now part of Almaden Quicksilver County Park. Several old miner cemeteries and remnants of mining development are scattered through and adjacent to the Deep Gulch drainage.

Lake Almaden

Lake Almaden is a small impoundment on Alamitos Creek a short distance upstream of its confluence with Guadalupe Creek at the head of the Guadalupe River, at Coleman Avenue and Almaden Expressway in San Jose. The lake is the centerpiece of the 65-acre Almaden Lake Park and is owned and operated by the San Jose Conventions, Arts & Entertainment Department in cooperation with the Water District. The lake itself was progressively formed as a result of a rock quarry operation which began in the late 1940s. Excavation for the quarry started at the center of Alamitos Creek and moved outward, transforming what was once a meadow where dairy cows grazed into a lake. In recent years, the lake has been operated by the Water District as a groundwater recharge facility and was first opened for public use as a park in the spring of 1982 (San Jose Regional Parks website, 2002).

Almaden Reservoir

Almaden Reservoir is located on Alamitos Creek south of San Jose. The southeastern end of Almaden Quicksilver County Park is opposite Almaden Reservoir on the north side of Alamitos Road. Almaden Reservoir was completed in 1935. It has an average surface area of 59 acres and a capacity of 1,586 acre-feet. The reservoir is located in a 12-square-mile drainage area of hilly terrain covered with range grass, low bushes, and trees. Almaden Reservoir collects runoff from the surrounding watershed that includes Herbert and Barrett Canyon Creeks flowing into the southwest end of the reservoir near the small community of Twin Creeks. Barrett Canyon Creek and Herbert Creek flow all year. Jacques Gulch feeds the western side of the reservoir and flows most of the year, while Larabee Gulch contributes to the eastern side of the reservoir during high peak flows, then drops off quickly. The reservoir releases water to Alamitos Creek for groundwater recharge. During the rainy season, storms or long wet periods often produce more runoff than the reservoir can contain. Excess runoff is directed to Calero Reservoir via the Almaden-Calero Canal. The Water District owns and operates this reservoir for water conservation purposes only; however, there some incidental flood control benefits (Santa Clara Basin WMI, 2001).

The watershed above Almaden Reservoir is very lightly developed; most is rugged mountainous terrain. Vestiges of historic mercury mining remain within Almaden Quicksilver County Park bordering the reservoir on the northwest.

4.1.1.7 Arroyo Calero Subwatershed

Arroyo Calero (commonly referred to as Calero Creek) is the major tributary to Alamitos Creek, joining it from the east approximately 3.1 miles upstream of Lake Almaden. Of the 12.5 square miles comprising the Arroyo Calero subwatershed, seven are located in the hills above Calero Reservoir. Two named tributaries flow into Calero Reservoir. From Calero Reservoir, Arroyo Calero flows northwest to its confluence with Alamitos Creek. Santa Teresa Creek joins Arroyo Calero from the east just before the confluence with Alamitos Creek.

Arroyo Calero passes through relatively flat urban and open space areas (City of San Jose) for its entire length, though its gradient through this area is steeper than that of either Guadalupe or Los Gatos Creeks. There have been some major floods in the Arroyo Calero subwatershed.

Santa Teresa Creek

Santa Teresa Creek begins in the Santa Teresa Hills and flows northwest, parallel to and about 1,000 feet north of Arroyo Calero for nearly 2.9 miles. Santa Teresa Creek outfalls into Arroyo Calero just below Harry Road. A section of Santa Teresa Creek was widened in the late 1970s. The stream is intermittent and flows through largely developed areas, particularly in its lower segment.

Cherry Canyon Creek

Cherry Canyon Creek is an intermittent stream that rises on the northeast side of Fern Peak and flows through a natural channel northeastward into the southwestern side of Calero Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped.

Pine Tree Canyon Creek

Pine Tree Canyon Creek is an intermittent stream that rises on the eastern side of the Bald Peaks and flows through a natural channel eastward and then north into the upper end of Calero Reservoir. Little is known about the creek's drainage area other than that it is steep and undeveloped. Mud Springs is located near the upper end of the creek.

Calero Reservoir

Calero Reservoir is located on Arroyo Calero just south of the Santa Teresa Hills section of San Jose and east of the community of New Almaden and Almaden Reservoir. Calero Reservoir was completed in 1935 and has a surface area of 347 acres and a capacity of 10,050 acre-feet. Calero Reservoir collects runoff from a seven square-mile drainage area drained by Cherry Canyon and Pine Tree Canyon Creeks and also receives surplus surface water from Almaden Reservoir via the Almaden-Calero Canal. Excess runoff from Almaden Reservoir is transferred to Calero Reservoir, which has a storage capacity five times greater than that of Almaden. The area surrounding the reservoir is predominantly grasslands and oak savannah (Santa Clara Basin WMI, 2001).

The primary purpose for Calero Reservoir is the controlled release of surface runoff for downstream groundwater recharge. Recharge waters are released either directly to Arroyo Calero or to the Almaden Valley Pipeline that delivers raw water to the Vasona Pumping Station, approximately one mile north of Vasona Reservoir. The Water District owns and operates Calero Reservoir for water conservation purposes; however, there may be some incidental flood control benefits.

The watershed above Calero Reservoir is very lightly developed; most is rugged mountainous terrain.

4.1.2 Current Beneficial Use Designations for Watershed Waterbodies

The San Francisco Bay Regional Water Quality Control Board (Regional Board) has designated waterbodies for specific beneficial uses in the Water Quality Control Plan (Basin Plan) for the region. Four of these uses were evaluated by the WMI in the pilot watershed assessments. Prior to the assessments, WMI stakeholders identified some corrections and potential changes to the beneficial use designations in the Basin Plan. These recommendations were based on stakeholder understanding of stream and watershed characteristics. After the pilot assessments were completed, both the existing use designations and the initial WMI stakeholder recommendations for revisions to these designations were reviewed against the assessment results in order to identify any additional revisions that should be highlighted.

Table 4-1 presents the findings of this analysis. Basin Plan beneficial use designations for the four uses evaluated in the pilot assessment are shown, as are the additional use designations recommended by WMI stakeholders prior to the assessment and potential changes based on the pilot assessment findings. Blanks indicate that no designations have been made or proposed. Streams or reservoirs not listed in the Basin Plan are shown in italics. No column is shown for the Protection from Flooding (PFF) interest as it is not a beneficial use identified by the Regional Board.

As not all of the existing data was made available for use in the pilot assessment, this evaluation is limited. Review of other data in the possession of watershed stakeholders should be completed prior to the formal proposal of any beneficial use designation revisions. WMI stakeholders submitted a series of alternative use support determinations for several stream segments in the Guadalupe watershed. These opinions are referenced in Appendix 4-A and shown on Figure 2-2.

Table 4-1
Beneficial Use Designations in the Guadalupe River Watershed

WATERBODY	***BENEFICIAL USE***			
	Cold Freshwater Habitat (COLD)	***Municipal and Domestic Supply (MUN)***	***Preservation of Rare and Endangered Species (RARE)***	***Water Contact Recreation (REC-1)***
Guadalupe River	WE		WE	P
Guadalupe Creek	WE		WP	
Pheasant Creek	WP		WP	
Shannon Creek				
Guadalupe Reservoir	E	E		E
Rincon Creek				
Los Capitancillos Creek				
Reynolds Creek	WE		WP	
Hicks Creek				
Los Gatos Creek	E	E	WE	
Vasona Reservoir	E/WL			E
Lexington Reservoir	E	E		E
Lake Elsman	E	E		
Williams Reservoir				
Trout Creek				
Lyndon Canyon Creek				
Lake Ranch Reservoir				
Daves Creek				
Black Creek				
Dyer Creek				
Briggs Creek				
Aldercroft Creek				
Moody Gulch	AP			

WATERBODY	**BENEFICIAL USE**			
	Cold Freshwater Habitat (COLD)	***Municipal and Domestic Supply (MUN)***	***Preservation of Rare and Endangered Species (RARE)***	***Water Contact Recreation (REC-1)***
Limekiln Creek				
Soda Springs Canyon Creek				
Hendrys Creek				
Hooker Gulch				
Austrian Gulch				
Almendra Creek				
Dry Creek				
Lake Almaden				
Alamitos Creek	WE		WP	
Almaden Reservoir	E	E		E
Jacques Gulch				
Herbert Creek	WE			
Barrett Canyon Creek				
Larabee Gulch				
Chilanian Gulch				
Deep Gulch				
Greystone Creek				
Golf Creek				
Randol Creek				
McAbee Creek				
Arroyo Calero	WE		WP	
Calero Reservoir	E	E	AP	E
Cherry Canyon Creek				
Pine Tree Canyon Creek				
Santa Teresa Creek				
Canoas Creek				
Ross Creek				
Lone Hill Creek				
Short Creek				

Legend: E = Existing Beneficial Use; P = Potential Beneficial Use; WE = WMI stakeholder pre-assessment recommendation for existing beneficial use designation; WL = WMI stakeholder pre-assessment recommendation for limited beneficial use designation; AP = WMI pilot assessment results recommendation for potential beneficial use designation.
Note: Waterbodies in italics are not listed in the Basin Plan.
Source: San Francisco Bay Regional Water Quality Control Board, 1995. San Francisco Regional Water Quality Control Plan, Table 2-5.

The results of the pilot assessment generally confirmed the pre-assessment recommendations of WMI stakeholders regarding beneficial use designations for Guadalupe River watershed waterbodies. Only in two cases did the available data provide enough confidence to propose additional potential use designations based on the pilot assessment results: cold freshwater habitat (COLD) in Moody Gulch and preservation of rare and endangered species (RARE) in Calero Reservoir. However, as the pilot assessment was based on the review of existing, available data and did not involve a field-checking component, it is recommended that additional focused data collection and review be conducted before any new use designations are adopted.

In general, the major streams in the Guadalupe River watershed have diverse characteristics and support different beneficial uses in different locations. As a result, the Basin Plan beneficial use designations should either reflect this diversity by applying only to specific sections of each stream or should be coupled with an understanding that the entire length of the stream will not provide the same level of support for the designated use (Santa Clara Basin WMI, 2001).

4.1.3 Stream Segmentation for Assessment

In order to organize the review of data during the pilot assessment, the Guadalupe River watershed was divided into a total of 63 stream segments (or reaches). Most of the segments consist of individual tributary streams and watershed reservoirs. In the lower portion of the watershed, however, it was necessary to divide the longer streams (Los Gatos, Guadalupe, and Alamitos Creeks) and the Guadalupe River into multiple segments in order to facilitate data evaluation. In such cases, stream reaches were delineated based on common channel type, flow regime, and adjacent land use. It should be noted that the segmentation approach used for the pilot assessment was consistent with and useful for the robustness of the available data but is not based on a detailed study of stream geomorphology or riparian zone condition. WMI stakeholders have noted that a few stream reaches are comprised of individual segments that are quite dissimilar in a number of significant ways. Suggestions for further sub-dividing these reaches were received and are described under the relevant stream in Section 4.3. Additional detail on the stream segmentation approach used for the pilot assessments may be found in Appendix A4, "Stream Segmentation Approach for Assessments."

The stream segments defined for the Guadalupe River watershed are shown on Figures 2-2a through 2-2e. The individual reaches are grouped and designated within the six major subwatersheds. The Guadalupe River itself accounts for five reaches (GR-1 through GR-5). The Guadalupe Creek subwatershed contains 10 reaches (GR/GC-1 through GR/GC-9), including Guadalupe Reservoir (GR/GC/GR). The Los Gatos Creek subwatershed contains 25 reaches (GR/LG-1 through GR/LG-20), including the five reservoirs in the subwatershed. The Alamitos Creek subwatershed contains 14 reaches (GR/AL-1 through GR/AL-12), including two reservoirs. The Arroyo Calero subwatershed contains four reaches (GR/AC-1 through GR/AC-4), including Calero Reservoir (GR/AC/CR). Canoas Creek represents one reach (GR/CC) while the Ross Creek drainage is comprised of three reaches (GR/RC-1 through GR/RC-3).

4.2 General Assessment Results

The methodology and approach used for the pilot assessments is described in Chapter 3. The remainder of this chapter presents and interprets the results of the pilot assessment for the Guadalupe River watershed. Due to its reliance on existing data and the unavailability of some key data sets, the pilot assessment contains inherent limitations. As described in Chapter 2, caution is advised when interpreting the results of the pilot assessment. It is recommended that additional data in the possession of various stakeholders be reviewed in order to confirm or, where appropriate, revise the assessment results to fully reflect all relevant existing data. For additional detail concerning the results of the pilot assessments, please see the following:

- Figures 2-1 and 2-2a through 2-2e for a series of maps illustrating the assessment results for the Guadalupe River watershed
- Appendix 4-A, Tables 1-6 for a series of bar graphs illustrating the assessment results for the Guadalupe River watershed
- Appendix 4-B for a series of tables summarizing the assessment results for the Guadalupe River watershed and containing information on limiting factors, suspected causes, data gaps, and local knowledge comments from WMI stakeholders
- Appendix 4-C for a detailed list of the data sets used in the assessment for the Guadalupe River watershed
- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach
- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

4.2.1 Data Sufficiency

Prior to evaluating the data itself, a data sufficiency review was conducted in order to identify data sets that would be of use in the assessment. This review identified data gaps on a reach-by-reach basis for each of the five beneficial uses and stakeholder interests being evaluated. A summary of the data sufficiency analysis for the Guadalupe River watershed is presented in Table 4-2. A more detailed explanation of the data sufficiency evaluation process and the types of data gaps identified is provided in Appendix C. It should be noted that some data initially identified as useful for the analysis were not made available to the assessment team and, therefore, were not included in the pilot assessment process.

Table 4-2
Guadalupe Watershed Data Sufficiency Summary

Use/ Interest	*Stream Reaches With Insufficient Data*	*Miles of Stream Reaches With Insufficient Data*	*% of Watershed*	*Stream Reaches With Sufficient But Limited Data**	*Miles of Stream Reaches With Sufficient But Limited Data**	*% of Watershed*	*Stream Reaches With Sufficient Data***	*Miles of Stream Reaches With Sufficient Data***	*% of Watershed*
COLD	40	69.7	*48*	9	23.9	*17*	14	48.6	*35*
MUN	46	99.1	*69*	13	38.8	*28*	4	4.3	*3*
REC-1	43	91.4	*63*	16	34.8	*25*	4	16.1	*12*
PFF	28	46.4	*31*	5	0.0	*0*	30	95.9	*69*
RARE	43	78.0	*54*	9	27.8	*20*	11	36.4	*26*

* Includes uncertainty levels of C and D
** Includes uncertainty levels of A and B

As is illustrated in Table 4-2, the data gaps in the Guadalupe River watershed were significant. Support statements with relatively high levels of certainty (rated either A or B) were only developed for between 3 and 69% of the reaches in the watershed, depending on the use being evaluated. While support statements were also developed for other reaches, data deficiencies demanded that these conclusions be qualified with a high level of uncertainty (rated either C or D). For this second group of reaches, no suspected causes were identified for the limiting factors due to the general lack of confidence in the support statements.

4.2.2 Overall Conclusions by Use

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the Guadalupe River watershed on a use-by-use basis. Results for individual waterbodies are described in greater detail in Section 4.3. Local knowledge comments on the assessment results from WMI stakeholders are presented in Section 4.3 as well. The detailed results for each of the 63 stream segments in the watershed are shown in Figures 2-2a through 2-2e (in map form) and in Appendix 4-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 4-B. The list of data sets used in the assessment (in Appendix 4-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 4-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty.

4.2.2.1 Cold Freshwater Habitat (COLD)

Twenty-three stream reaches examined for the cold freshwater habitat (COLD) use did not have adequate data to make a support statement determination, commonly due to the lack of sufficient data on primary (fish assemblage and indicator macroinvertebrate) and secondary (temperature and other habitat requirements) indicators. All but two of the reservoirs within the Guadalupe watershed were included in the 23 reaches with insufficient data. Stream reaches in the "insufficient data" category are located throughout the Guadalupe subwatersheds and include the upper, rural reaches of Guadalupe Creek, a majority of the stream reaches and all of the reservoirs in the Los Gatos Creek subwatershed, most of the tributaries to Alamitos Creek, the tributaries to Arroyo Calero and Calero Reservoir, and two reaches of Ross Creek.

Only three stream reaches were evaluated as having full support for COLD, two of these in the upper, rural reaches of Guadalupe Creek, and the third on Los Gatos Creek between Lake Elsman and Lexington Reservoir. These conclusions were characterized by good data quality and high certainty.

Partial support was the most common designation of reaches for COLD, with 10 of 63 stream reaches in the Guadalupe watershed being designated as such. The determinations were made with varying levels of uncertainty from very low to moderately high, and seven of the 10 reaches were located in either rural-to-urban transition or urban areas. Only one reservoir, Lake Almaden, was determined to partially support COLD.

Under the COLD assessment, a support status of potential/seasonal support was available. Seven reaches were categorized as having potential/seasonal support, most of these in the lower reaches of Guadalupe River (GR-1 through GR-4) and the Los Gatos Creek main stem from Vasona Reservoir to Lexington Reservoir (GR/LG-2 and GR/LG-3). Also included in this designation, but with a very high level of uncertainty is Almaden Reservoir.

Two urban reaches, the main stem of Ross Creek and Canoas Creek, were characterized as being in non-support of the COLD use. The two reaches contained COLD data of fair quality with moderately high and very high uncertainty levels, respectively.

A total of 141 data sets were reviewed for potential use in the COLD use assessment for the Guadalupe River watershed. Of these, 73 contained data that could be used to develop the assessment results.

Subsequent to completion of the pilot assessment, a significant new data set became available from the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). Though this study was completed in early 2000, the findings were not released to the assessment team until after the pilot assessment had been completed. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding the COLD use are described in Section 4.3 under each individual waterbody.[2] This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

Detailed comments and suggestions on the COLD assessment were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. Again, this information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders. Some of this information is based on data that was not made available to the assessment team for use in the pilot assessment. Appendix 4-A describes

[2] FAHCE collected data and developed its conclusions based on the existing habitat. Their charge was not to re-engineer the entire watershed, but rather optimize the management of existing resources. The study area for the FAHCE Limiting Factors Analysis didn't extend into the tidally influenced zone of the stream as water supply operations have minimal impact in this reach. The WMI Assessment Framework and FAHCE did not share the same criteria for cold freshwater habitat suitability. The WMI adopted a more liberal criteria that allows more habitat to be described as suitable for coldwater resources. FAHCE had to accept the criteria that was set by the National Marine Fisheries Service and the California Department of Fish and Game (Akin, pers. comm., 2002).

alternate support conclusions for the COLD use presented by WMI stakeholders based on other data not available for the pilot assessment.

4.2.2.2 Municipal and Domestic Water Supply (MUN)

Nineteen of 63 stream reaches in the Guadalupe River watershed were found to have enough data to make conclusions on the support status for the beneficial use of municipal and domestic water supply (MUN). Approximately half of the reaches without data are in rural/undeveloped areas of the watershed, with the data gaps being spread over most of the subwatersheds including Guadalupe Creek, Los Gatos Creek, Arroyo Calero, and Alamitos Creek.

The only part of the Guadalupe watershed that fully supports MUN is the lowest (most downstream) portion of Alamitos Creek (from Lake Almaden to Arroyo Calero), but this conclusion of full support was made with a moderately high level of uncertainty.

Two non-urban areas of the Guadalupe watershed indicate partial support for MUN. These are Guadalupe Reservoir and a downstream portion of Alamitos Creek (GR/AL-2) with moderately low and very high levels of uncertainty, respectively.

Thirteen reaches, varying from urban to rural, do not support MUN. These include the urbanized lower reaches of the Guadalupe River from its mouth to Alamitos Creek, excluding reach GR-2 where there was insufficient data. However, the data for the Guadalupe River reaches was identified as old and did not distinguish between wet and dry weather sampling, leading to a moderately high level of uncertainty for this area. The main stem of Guadalupe Creek (GR/GC-1 and GR/GC-2) and the majority of Los Gatos Creek from its mouth up to Lake Elsman, including Vasona and Lexington Reservoirs, also do not support MUN. The uncertainty of the data in most of these reaches was moderately high due to older data and lack of a full suite of parameters, except for the rural reaches of Los Gatos Creek and Lexington Reservoir where uncertainty was very high. The lowest reach of Alamitos Creek (GR/AL-1) and the two reservoirs that drain to it, Calero Reservoir and Almaden Reservoir, do not appear to support MUN, though uncertainty over this varies from moderately low to moderately high, mostly due to lack of data on the full suite of parameters and an inability to distinguish between wet and dry weather sampling.

A total of 32 data sets were reviewed for potential use in the MUN use assessment for the Guadalupe River watershed. Of these, 15 contained data that could be used to develop the assessment results.

Subsequent to completing the initial data review, additional data for a few other reservoirs were obtained and used to revise initial conclusions regarding use support. Data for other reservoirs (Lake Elsman, Williams Reservoir) was sought but not obtained and so no changes were made to their support status.

Detailed comments and suggestions on the assessment of MUN were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

4.2.2.3 Protection From Flooding (PFF)

Thirty-five of 63 stream reaches in the Guadalupe watershed had adequate data to make a determination of support for the PFF interest. All but three of the 26 reaches with insufficient data were located in rural parts of the watershed, and the three non-rural reaches without enough data to make a determination on support status are small tributary segments where no data has been collected on flooding.

A spatially variable mix of urban to rural stream reaches, a total of 27, were determined to be fully supporting PFF. The range in uncertainty associated with the support determinations was from very low to very high, indicative of the variation in detailed, current data among the subwatersheds.

Eight stream reaches, all located in urban areas of the Guadalupe watershed, were determined to be non-supporting of PFF. Five of the eight are located in the lowermost portion of the Guadalupe River (GR-1 through GR-5) where channel capacity is not adequate to contain the 100-year flood. The other three reaches occur in Canoas Creek (GR/CC-1), the lowermost portion of Ross Creek (GR/RC-1), and Randol Creek, a tributary to the lower portion of Alamitos Creek. All support determinations were made with a very low level of uncertainty due to recent, reliable data on channel capacities.

A total of 31 data sets were reviewed for potential use in the PFF interest assessment for the Guadalupe River watershed. Of these, 19 contained data that could be used to develop the assessment results.

The logic diagram in the Assessment Framework for the PFF interest required that this evaluation be conducted for “current” development conditions as well as “future” development conditions. Future conditions were defined in the framework as being consistent with the future development assumptions incorporated in the Water District’s Waterways Management Model (WMM). Output from the WMM was the primary data set used to determine the support status for this interest in reaches where the data was available. In reviewing this data, it was difficult to determine exactly how future development was accounted for in the WMM and what assumptions were made. In addition, it was noted that, as flood return intervals increase, the corresponding importance of the amount of impervious area in a watershed on surface runoff decreases. For lower frequency flood events, the amount of imperviousness in a watershed will have a large impact on the amount of runoff that is generated. However, at high return interval floods (such as the 100-year), it makes little difference whether a watershed is fully or partially developed with urban uses (impervious surfaces). Virtually all of the precipitation is going to generate surface runoff due to ground saturation (Hollis, 1975).

Therefore, the distinction between current and future development in Santa Clara Basin watersheds for the purpose of evaluating 100-year flooding may be relatively moot. Given these findings and the uncertainty over the level of future development assumed in the WMM data, the team decided to simply use the Water District's designed channel capacity data as the benchmark for determining the adequacy of each reach to convey the 100-year flow.

For some reaches, however, use of the WMM data yielded initial assessment conclusions that were clearly inaccurate based on input from WMI stakeholders. Additional data was sought concerning these reaches and the initial assessment results were revised accordingly, where data were available for review.

Detailed comments and suggestions on the assessment of PFF were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders. Some of this information is based on data that was not made available to the assessment team for use in the pilot assessment. Appendix 4-A describes alternate support conclusions for the PFF interest presented by WMI stakeholders based on other data not available for the pilot assessment.

4.2.2.4 Preservation of Rare and Endangered Species (RARE)

Sufficient data for assessing support of the RARE beneficial use was limited to approximately one-third (21 of 63) of the stream reaches in the Guadalupe River watershed. Data gaps were generally due to three different reasons: (1) a lack of special status species data, (2) outdated data, and (3) current data sets being too general to be useful. The majority of the stream reaches with data gaps were rural.

Those reaches fully supporting RARE were all characterized with moderately high levels of certainty. A total of nine reaches, occurring in both urban and rural parts of the Guadalupe River watershed were determined to fully support the RARE use. The first five reaches of the Guadalupe River are included, primarily based on the presence of special status fish species (steelhead). An upper, rural tributary of Guadalupe Creek (GR/GC-5, above Guadalupe Reservoir), Calero Reservoir, and the first two reaches of Alamitos Creek are the remaining reaches classified as full support.

No reaches were classified as partial support. However, 11 reaches were classified with a statement of potential support, meaning there is existing habitat suitable to support special status species within the reach. These reaches occurred within a mix of urban and rural environments, and varied spatially across the watershed. The majority of these were classified with moderately high to very high levels of uncertainty due to limited data and a concern with the data quality.

Only one stream reach, GR/AC-4, was characterized as non-support for RARE. This reach, Santa Teresa Creek, is a tributary to Arroyo Calero, flows through a rural-to-urban transition environment, and is subject to a very high level of uncertainty based on the expectation that red legged frogs should be found in the reach.

A total of 64 data sets were reviewed for potential use in the RARE use assessment for the Guadalupe River watershed. Of these, 29 contained data that could be used to develop the assessment results.

More so than perhaps any of the other uses/interests, the RARE assessment was hampered by the reliance on existing data. Biological field surveys are really needed to assess habitat conditions within the watershed for the species on the list. Very few of these types of surveys were included in the data compiled for the assessment. As a result, most of the support statements for RARE were based on species observations rather than habitat conditions.

Subsequent to completion of the pilot assessment, a significant new data set became available from the FAHCE project. Though this study was completed in early 2000, the findings were not released to the assessment team until after the pilot assessment had been completed. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding the RARE use are described in Section 4.3 under each individual waterbody. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

Detailed comments and suggestions on the assessment of RARE were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders. Some of this information is based on data that was not made available to the assessment team for use in the pilot assessment. Appendix 4-A describes alternate support conclusions for the RARE use presented by WMI stakeholders based on other data not available for the pilot assessment.

4.2.2.5 Water Contact Recreation (REC-1)

Sufficient data was available for only 20 of the 63 stream reaches in the Guadalupe River watershed to make a determination of the support status for water contact recreation (REC-1). Many of the reaches contained some data on the tertiary (least preferred) aesthetics, water depth, and access indicators for assessing REC-1 support, but 41 reaches did not have adequate primary (pathogens in water) or secondary (other water quality) data available, thus support determinations could not be made.

Only five stream reaches were found to fully support REC-1, and these five are spread spatially throughout the Guadalupe River watershed. They include Guadalupe Reservoir, parts of the Los Gatos Creek subwatershed including Lexington Reservoir, and Arroyo Calero from its origin to Calero Reservoir. However, these reaches were identified as fully supporting only with moderately high and very high levels of uncertainty due to lack of data and old data.

Three partially supporting reaches were identified within the Guadalupe River watershed, although two of these reaches (GR/LG-3 and GR/AL-1) had different levels of support based on the different types of REC-1 indicators. For example, if the support determination was based solely on tertiary indicators and it indicated partial support, but other secondary data parameters indicated the reach was non-supporting of REC-1, then the reach was classified as both partial and non-support. All three of these reaches were associated with moderately high levels of uncertainty due to significant data gaps (i.e., no primary or secondary data available).

Non-support for REC-1 was identified in 10 reaches, with seven of these comprising the lower, urbanized portion of the Guadalupe River watershed, including the two lowest reaches of Guadalupe Creek. These reaches were associated with moderately high to moderately low levels of uncertainty in the support determination, again due to data gaps or limited data sets. The other three non-supporting reaches occurred in urban and rural areas of the Los Gatos Creek, Alamitos Creek, and Arroyo Calero subwatersheds and have moderately high levels of uncertainty associated with them.

A total of 54 data sets were reviewed for potential use in the REC-1 use assessment for the Guadalupe River watershed. Of these, 23 contained data that could be used to develop the assessment results.

As outlined in the Assessment Framework, the REC-1 assessment was to include a fish consumption component. Based on concern expressed by WMI stakeholders, the Regional Board reviewed this issue and determined that fish consumption should not be evaluated as part of the REC-1 use. Therefore, the results of the fish consumption portion of the pilot assessment have been removed from this report. A different set of criteria was used for this evaluation; these criteria have been removed from the report as well. The remaining criteria were identified in the Assessment Framework as being important for the REC-1 evaluation.

Subsequent to completion of the initial data review, additional data was obtained for Lake Almaden, and the support statement revised accordingly. Additional data concerning other reservoirs was also sought at this time, but no data was obtained.

Detailed comments and suggestions on the assessment of REC-1 were received from WMI stakeholders and are described in Section 4.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders. Some of this information is based on data that was not made available to the assessment team for use in the pilot assessment. Appendix 4-A describes alternate support conclusions for the REC-1 use presented by WMI stakeholders based on other data not available for the pilot assessment.

4.3 Detailed Assessment Results by Waterbody

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the Guadalupe River watershed on a waterbody-by-waterbody basis. The methodology and approach used for the pilot assessments is described in Chapter 3. Information regarding data sufficiency for the Guadalupe River watershed is provided in Section 4.2.1. Overall results for each beneficial use/stakeholder interest are described in Section 4.2.2.

The detailed results for each of the 63 stream segments in the watershed are shown in Figures 2-2a through 2-2e (in map form) and in Appendix 4-A, Tables 1-6 (in bar chart form). Alternative conclusions regarding use support in several stream reaches have been presented by WMI stakeholders based on data that was not made available to the assessment team. These conclusions are also shown on Figures 2-2a through 2-2e and in Appendix 4-A. Individual summary tables containing the assessment results for each reach are presented in Appendix 4-B. These tables include information on limiting factors, suspected causes, as well as "local knowledge comments" from WMI stakeholders. The primary messages contained in this information are also summarized in the text of this section for each waterbody in the watershed. The final page of Appendix 4-B contains a listing of the stream reaches in the Guadalupe River watershed for which insufficient data was available for all five uses.

The list of data sets used in the assessment (in Appendix 4-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 4-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty. For additional detail concerning the results of the pilot assessments, please see the following:

- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach
- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

Subsequent to completion of the pilot assessment, a significant new data set became available from the FAHCE project. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments.

Due to the significance of this information, some of the key conclusions of the FAHCE project regarding factors limiting the COLD and RARE uses are described in this section and in the "Suspected Causes" boxes in Appendix 4-B. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

4.3.1 Guadalupe River (GR-1 through GR-5)

COLD: The COLD use was found to be potentially/seasonally supported in the first four reaches and partially supported in the upper portion of the Guadalupe River. Indicator macroinvertebrates were generally not present along the river where the data were available. The Guadalupe River is characterized by relatively high, but variable, water temperatures in winter, spring and summer. While these temperatures exceed the criteria for support, they may support Chinook rearing in some years. Spring and summer streamflows are dependent upon regulated releases from upstream reservoirs for groundwater percolation, though the required release to the lower reaches of the river (GR-1 through GR-4) is only 1 cubic foot per second. The channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data is available to indicate whether successful Chinook spawning and rearing occurs in GR-1. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet the temperature criteria in the Guadalupe River. Conditions may be suitable for Chinook spawning in GR-2, GR-3, and GR-4 in some years. During wet periods (1995-1999), cool groundwater inflows may be present in GR-2, GR-3, and GR-4. High storm flows resulting from urban runoff may degrade habitat in all reaches but GR-1. The upper reach of the river (GR-5) is within the recharge zone where streamflows are higher. However, flows rapidly decline and temperatures increase downstream within this reach and suitable fast-water feeding habitat is scarce within the reach, so summer steelhead rearing is usually limited in GR-5 but variable among years. GR-5 is lightly shaded and the channel is generally wide.

The FAHCE data that became available subsequent to completion of the assessment notes that habitat in the downstream reaches of the Guadalupe River (generally corresponding to GR-2 through GR-5) is typified by long, deep, slackwater pools separated by an occasional short run or riffle. Baseflow velocities are very low and water quality poor in these reaches. The lack of food production areas and food transport are probably major factors limiting production. The reaches below Alamitos Creek serve primarily as a migration corridor for steelhead and have either no or poor rearing habitat (FAHCE, 1999).

Stakeholder comments have provided the following information regarding COLD use support in the Guadalupe River (alternate conclusions on use support are also shown in Appendix 4-A):

- GR-1: The support status should either be supported, partially supported or not applicable. Channel morphology, river flow rates, debris, trash and pollution should be listed as limiting factors (Johmann, pers. comm., 2002).

- GR-2: This reach should be split into two parts - above and below Trimble Avenue. Below Trimble, support status should be Limited Support. The primary limiting factors are channel morphology, flow rates, and pollution. Above Trimble Ave., support status should be Limited Support. Limiting factors should be channel flow rates, morphology, temperature, lack of shade or hide cover, lack of good riparian zone, and pollution (Johmann, pers. comm., 2002).

- GR-3 and GR-4: Support status should be Limited Support. Limiting Factors should be channel flow rates, morphology, temperature, lack of shade or hide cover (marginal in GR-4), marginal riparian zone, pollution, barriers in GR-4, and poaching (Johmann, pers. comm., 2002).

- GR-5: This reach should be split into four parts - (A) from lower end to Curtner Ave; (B) Curtner to Gage Station 23B; (C) Gage Station 23B to Branham Lane; and (D) Branham to Lake Almaden. In Segment A, support status should be Limited Support. Limiting factors should be channel flow rates, morphology, water temperature, pollution, debris and rubble. In Segment B, support status should be Limited Support. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, gabions, pollution, and poaching. In Segments C and D, support status should be Limited Support. Limiting factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, pollution, 15-foot high dam in Segment D, and poaching (Johmann, pers. comm., 2002).

MUN: The MUN use is generally not supported in the Guadalupe River (one reach, GR-2, had insufficient data). Fecal coliform, DDT, turbidity, mercury, nickel, selenium, and copper all have exceeded criteria for drinking water. Natural sources and urban runoff may contribute to nickel. Historic mining waste in stream contributes to elevated concentrations of mercury in water samples. The sources of fecal coliform and turbidity are not clear from the data.

PFF: The PFF interest is not supported in the Guadalupe River. Data indicates that the river channel does not currently have adequate capacity to convey the expected 100-year flow throughout the entire length of the river. Urban commercial and residential development has encroached into the natural channel floodplain and the river has been straightened and channelized through much of this area. In GR-3, a major flood control project designed to add capacity to the river channel is underway. However, only Contract 1 is completed to date. Therefore, this reach of the river cannot be considered "protected" from large flood events such as the 100-year flood until all portions of the project are completed. Once all the portions are completed the support status can be revised to full support.

Stakeholder comments have provided the following information regarding PFF interest support in the Guadalupe River (alternate conclusions on use support are also shown in Appendix 4-A):

- GR-1: This reach is really a modified, straightened earth channel - when first excavated, it was far wider and probably deeper than at present but the stream is attempting to regain its natural form; the active river channel is not confined by levees, though the corridor is. The channel is not rock or concrete lined except in very limited segments around bridges or outfall pipes (Johmann, pers. comm., 2002).

- GR-2: This reach should be split into two parts - above and below Trimble Avenue. The lower part of the reach contains a river channel that for the most part is above tidewater. A steep berm has been constructed on the east side of the river but both sides of the channel are well vegetated. Except for a short stretch just below Trimble Ave. there is good riparian habitat and Shaded Riverine Aquatic (SRA) cover. An overflow channel has also been constructed down the right side of the river and the area between the river and overflow channel was planted as a mitigation site for the 1983 Lower Guadalupe Flood Control Project. This site failed as the river has broken through the berm in a number of areas and washed out the mitigation plantings. It has also deposited tons of sediment in the overflow area as it attempts to regain its natural form and build a flood plain. There is no overflow channel, right side channel berm, or dense riparian area downstream of this segment or in the segment immediately upstream. This should be listed as a Quasi-Natural Modified (East Side Berm with a overflow passage) channel. The upper part of the reach should be designated a Modified, Straightened channel. The entire river channel has been moved to the east in the area of San Jose Airport. The channel used to flow through the airport area but it has been substantially straightened and the riverine corridor has been confined by levees on both sides. For the most part, there is little to no shade cover in this segment. There are a few established trees in the riparian areas bordering the river but only a few are close enough to provide shade cover and these are in a few small patches downstream of Airport Blvd. and US 101 (Johmann, pers. comm., 2002).

- GR-3: Support status should be full support after completion of the Downtown Flood Control Project (Contract 2); channel type should be Quasi-Natural Straightened, Incised (berms on both sides of main channel). The main channel is down cutting (about a foot per year since 1996) as a direct result of the recently constructed flood control project. Areas of the bypass channel are eroding and in other areas there is severe deposition. The berm on the west side of the channel was breached a number of times soon after project construction and has since been armored with rocks and log crib walls in areas which are now being undercut. The low flow channel weirs just downstream of Coleman Ave. that were installed to guarantee fish passage have for the most part been buried by sediment (Johmann, pers. comm., 2002).

- GR-4: Channel type should be Quasi-Natural Widened, Straightened and Incised. The upper part of this segment has a concrete bypass channel, which is not operational as yet. At least two more bypass channels are slated for construction downstream. Much of the channel has been lined with rock gabions and is down-cutting (Johmann, pers. comm., 2002).

- GR-5: Reach should be split into four parts - (A) from lower end to Curtner Ave; (B) Curtner to Gage Station 23B; (C) Gage Station 23B to Branham Lane; and (D) Branham to Lake Almaden. Segment A is a Quasi-Natural, Incised channel with a decent riparian zone but the channel is deeply incised. It contains a lot of construction rubble that is sliding off the banks where it has been dumped in the past. The channel has very limited access. Water temperatures start to cool down in this area as a result of the shade cover. Segment B should be listed as Widened, Straightened and Gabion Contained. The river channel was relocated in this segment when Almaden Expressway was constructed. This segment of channel has little, if any, SRA cover and the riparian vegetation is poor. The designed channel was overly widened and gabion-lined on both sides but the stream has since constructed a narrower channel. Segment C should be listed as Quasi-Natural Straightened, Incised. The channel is overly wide in areas but has natural but steep banks in most areas. This segment also has two areas where drop structures have been removed and replaced with a series of rock weirs. While the weirs have improved conditions greatly they were not properly designed which is causing some erosion problems in both areas. This area has a fair but narrow riparian area and provides fair SRA cover. Segment D should be listed as Modified Straightened. However, a new Quasi-Natural Meandering channel is starting to develop in this segment. The channel's width/depth ratio is substantially decreasing and it is starting to meander within the corridor levees. Riparian vegetation is taking hold, riffles and pools are developing in the new channel and spawning gravel is being recruited. Towards the top of this segment there is a 15 foot-high dam that blocked fish migration up until several years ago when a fish ladder was installed. In the recent past, the channel in this area was wide and shallow due to a series of instream dirt spreader dams that were constructed every year and gabions line a good portion of the channel. There was virtually no riparian habitat or shade cover as the dams would drown upstream vegetation and deprive downstream vegetation of any water. Water temperatures in this area were elevated due to the lack of shade cover, the wide shallow channels, and water coming from Lake Almaden and the creeks upstream (Johmann, pers. comm., 2002).

RARE: The RARE use is fully supported in the Guadalupe River, though uncertainty is relatively high in one reach (GR-2) due to limited data. Support is based on the presence or potential presence of Chinook salmon, Alameda song sparrow, steelhead, sharp shinned hawk, Cooper’s hawk, yellow warbler, merlin, loggerhead shrike, and burrowing owl.

Stakeholder comments have provided the following information regarding RARE use support in the Guadalupe River (alternate conclusions on use support are also shown in Appendix 4-A):

- GR-1: Although rare species such as the clapper rail, harvest mouse, and steelhead are supported they certainly are not fully supported. They are supported on a very limited level. In the case of fish, channel morphology and water flow rates and temperature are certainly limiting factors for this use (Johmann, pers. comm., 2002).

- GR-2: Below Trimble Ave., support status should be Limited Support. Channel morphology, flow rates, and water temperatures are limiting factors for this use. Above Trimble Ave., support status should be Limited Support. Channel morphology, flow rates, water temperature, lack of a mature riparian zone and SRA cover are limiting factors for this use (Johmann, pers. comm., 2002).

- GR-3: Support Status should be Limited Support. Channel morphology, flow rates, and water temperatures are limiting factors for this use (Johmann, pers. comm., 2002).

- GR-4: Support Status should be Limited Support. Channel morphology, flow rates, water temperature, and instream barriers are limiting factors for this use (Johmann, pers. comm., 2002).

- GR-5: Reach should be split into four parts - (A) from lower end to Curtner Ave; (B) Curtner to Gage Station 23B; (C) Gage Station 23B to Branham Lane; and (D) Branham to Lake Almaden. In Segment A, support status should be Limited Support. Channel morphology, flow rates, water temperature, and instream barriers are limiting factors for this use. In Segment B, support status should be Limited Support. Channel morphology, flow rates, water temperature, and the gabion confined channel are limiting factors for this use. In Segments C and D, support status should be Limited Support. Channel morphology, flow rates, and water temperature, are limiting factors for this use (Johmann, pers. comm., 2002).

REC-1: The REC-1 use is non-supported in the Guadalupe River as measured against primary (data available for one reach only) and secondary indicators (pathogens and general water quality constituents, respectively). Tertiary indicators on aesthetics and recreational access indicate partial support for REC-1 in some reaches of the river, though uncertainty is generally high due to spotty data. The presence of historic mining waste in the river contributes to mercury. Copper, nickel, and PCB exceedences are possibly linked to historic urban stormwater discharges and/or elicit direct discharges to stream. Chlordane and dieldrin are components of commonly used pesticides/herbicides and are present in urban stormwater. Trash is common in urban stream corridors while algae is the product of excessive nutrient inputs, possibly yard or landscaping waste from upstream or detergents and human or animal waste.

Stakeholder comments have provided the following information regarding REC-1 use support in the Guadalupe River (alternate conclusions on use support are also shown in Appendix 4-A):

- GR-1: Status should be limited support. The limiting factors for water contract recreation are access, flow levels, channel morphology, waterborne pathogens, and trash/debris (Johmann, pers. comm., 2002).

- GR-2: Support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, waterborne pathogens and debris (Johmann, pers. comm., 2002).

- GR-3 and GR-4: Support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments and human waste (Johmann, pers. comm., 2002).

- GR-5: Reach should be split into four parts - (A) from lower end to Curtner Ave; (B) Curtner to Gage Station 23B; (C) Gage Station 23B to Branham Lane; and (D) Branham to Lake Almaden. In Segment A, support status should be Limited Support The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and rubble. In Segment B, support status should be Limited Support. The primary limiting factors for this use are water flow levels, pollution, debris, waterborne pathogens and vagrant encampments. In Segment C, support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments. In Segment D, support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, waterborne pathogens, and the dam (Johmann, pers. comm., 2002).

4.3.2 Los Gatos Creek Subwatershed

Assessment results for waterbodies in the Los Gatos Creek subwatershed are discussed by individual waterbody in this section.

4.3.2.1 Los Gatos Creek (GR/LG-1, GR/LG-2, GR/LG-4, and GR/LG-5)

COLD: The entire main stem was designated as either partial/potential or full support for COLD though there is moderately high uncertainty associated with the potential support designations in GR/LG-2 and GR/LG-5 due to limited recent data. In general, the support level for COLD improved with distance up Los Gatos Creek. In the lower section of the creek (below Vasona Dam), spring and summer streamflows are dependent upon releases from Lexington and Vasona Reservoirs, with substantial water heating through the percolation zones upstream of Meridian Avenue. Some augmentation from groundwater has occurred during in wet periods (1995-1999). Low streamflows and high water temperatures restrict summer steelhead rearing to scarce fast-water habitats. Winter and spring water temperatures are likely to exceed Chinook spawning and rearing criteria due to limited shading in portions of this reach; however, temperature data and winter/spring fish sampling data are absent. High storm flows resulting from urban runoff may degrade habitat in the lower part of the creek.

Stakeholder comments have provided the following information regarding COLD use support in Los Gatos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/LG-1: This reach should be split into six segments - (A) Guadalupe River to Auzerais; (B) Auzerais to Lincoln; (C) Lincoln to Leigh; (D) Leigh to Camden; (E) Camden to Lark; and (F) Lark to Vasona Dam. Segments A-D should be Limited Support. Limiting factors should be channel flow rates, morphology, water temperature, shade/hide cover, pollution and poaching. Segment E should be Not Supported. Temperatures are high in this segment as the water backs up behind the dams and bakes in the sun, as there is no shade cover. Segment F should be Limited Support. Limiting factors should be channel flow rates, morphology, water temperature, dams shade/hide cover, and pollution (Johmann, pers. comm., 2002).

- GR/LG-2 and GR/LG-3: Should be Limited Support. Limiting factors should be channel flow rates, morphology, water temperature, dams shade/hide cover, and pollution (Johmann, pers. comm., 2002).

MUN: The MUN use is not supported in the portions of Los Gatos Creek where sufficient data were available, though uncertainty over these conclusions is high due to significant data gaps. Fecal coliform and total dissolved solids exceeded the applicable drinking water criteria.

PFF: The PFF interest is fully supported in all reaches of Los Gatos Creek except the portion below Vasona Dam (GR/LG-1) where the channel cannot safely convey the expected 100-year flow in two specific segments. Land uses adjacent to the channel in these segments consist of urban residential and/or commercial uses where the likelihood of property damage during a 100-year event is high.

Stakeholder comments have provided the following information regarding PFF interest support in Los Gatos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/LG-1: Reach should be split into six segments - (A) Guadalupe River to Auzerais; (B) Auzerais to Lincoln; (C) Lincoln to Leigh; (D) Leigh to Camden; (E) Camden to Lark; and (F) Lark to Vasona Dam. Segment A always has a flow of water from groundwater pump discharges and upwelling and has a good but narrow riparian habitat. Should be listed as Quasi Natural, Straightened, Incised. The channel has very steep banks along most of its length and very limited access. Segment B usually dries out in the summer and has a narrow marginal riparian area with little SRA cover. Should be listed as Quasi Natural, Straightened, Widened, Incised. The riverine corridor has very steep banks along most of its length. Segment C usually has water in it unless the water is shut off by the Water District. The segment has a fairly good riparian area with good SRA cover. It also has some very deep pools, which are good holding areas for salmonids. Should be Quasi Natural, Incised. The riverine corridor has very steep banks along most of its length. Segment D always has water in it but the riparian area is marginal because much of this segment had dirt instream spreader dams installed yearly until 1995 when the permits for such dams were not renewed. For the first few years after construction of the spread dams was prohibited, the channel was devoid of vegetation and was overly wide and shallow. In the past few years the channel has narrowed, started to meander and vegetation has established itself in the newly forming flood plain. There is a substantial drop structure at Campbell Ave. that salmonids can only jump at high flows. There is an impassable 20 foot-high dam at Camden Ave/San Tomas Expressway, which blocks fish passage and navigation. Should be listed as Quasi Natural, Straightened, Widened, Incised. The riverine corridor has very steep banks along most of its length. Segment E always has water in it but there is little to no riparian area. The channel and corridor are straight and there are a series of impassable dams in this section. The 20-foot high Camden Ave./San Tomas Expressway dam blocks fish migration and navigation at the lower end of this segment. Should be listed as Modified, Straightened, Widened. The riverine corridor has very steep banks and a series of dams used for water percolation and diversion, which elevates water temperatures, limits downstream flows and block fish migration. Segment F always has water in it. There is a quasi-natural channel and fair to good riparian area. Should be listed as Quasi Natural. The river channel is fairly natural and has attempted to restore itself after the construction of the Vasona Dam at the upstream end of this segment (Johmann, pers. comm., 2002).

RARE: The RARE use is potentially supported in three reaches of Los Gatos Creek, though uncertainty is high for Yellow warbler support in GR/LG-2 due to limited data. Support is based on the potential presence of Yellow warbler, western pond turtle, red legged frog, double crested cormorant, and salmonids.

Stakeholder comments have provided the following information regarding RARE use support in Los Gatos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/LG-1: Reach should be split into six segments - (A) Guadalupe River to Auzerais; (B) Auzerais to Lincoln; (C) Lincoln to Leigh; (D) Leigh to Camden; (E) Camden to Lark; and (F) Lark to Vasona Dam. Segment A should be Limited Support. No rare species animal or bird species are known in this area. Channel morphology, flow rates, water temperatures, and lack of a wide riparian zone and steep eroding banks are limiting factors for this use. Segment B should be Limited Support. Chinook salmon and steelhead are known to migrate through and probably spawn in this segment. Channel morphology, flow rates, water temperatures, and lack of a wide riparian zone and steep eroding banks are limiting factors for this use. Segment C should be Limited Support. Chinook salmon and steelhead are known to migrate through and spawn in this segment. Channel morphology, flow rates, water temperatures, and steep eroding banks are limiting factors for this use. Segment D should be Limited Support. Chinook salmon and steelhead are known to migrate through and spawn in this segment. Channel morphology, flow rates, water temperatures, and lack of a mature riparian zone and steep eroding banks are limiting factors for this use. Segment E should be Non-Support. There is no riparian habitat in the area and no rare species are known to exist in or frequent the area. Segment F should be Potential Support. This segment has good riparian habitat in the area and could easily support rare species. Channel morphology, flow rates, water temperatures, and dams are limiting factors for this use (Johmann, pers. comm., 2002).

- GR/LG-2: Support status should be Limited Support. If there was a special status species observed using the area there must be limited support. Channel morphology, flow rates, water temperatures, good riparian areas and dams are limiting factors for this use (Johmann, pers. comm., 2002).

- GR/LG-3: Channel morphology, flow rates, water temperatures, good riparian areas and dams are limiting factors for this use (Johmann, pers. comm., 2002).

REC-1: The REC-1 use is non-supported in Los Gatos Creek below Vasona Dam but is fully supported in the reach above Vasona Reservoir. The reach below Lexington Reservoir (GR/LG-3) exhibits partial support based on against primary indicators (pathogens) and partial support based on tertiary indicators (aesthetics and recreational access). However, uncertainty is moderately high to very high with respect to all of these conclusions due to spotty data.

Stakeholder comments have provided the following information regarding REC-1 use support in Los Gatos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/LG-1: Reach should be split into six segments - (A) Guadalupe River to Auzerais; (B) Auzerais to Lincoln; (C) Lincoln to Leigh; (D) Leigh to Camden; (E) Camden to Lark; and (F) Lark to Vasona Dam. Segments A and B should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments. Segments C and D should be Limited Support. The primary limiting factors for this use are water flow levels, access, pollution, debris, and waterborne pathogens. Segment E should be Potential Limited Support. This area could provide limited support for fishing. It is possible for warm water fish, such as carp, to live in this area if they are washed over the dams or through the diversion gates. Segment F should be Limited Support. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens (Johmann, pers. comm., 2002).

- GR/LG-2 and GR/LG-3: Support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens (Johmann, pers. comm., 2002).

4.3.2.2 Trout Creek (GR/LG-6)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Trout Creek:

- COLD: Support status should be limited support. Limiting factors should be channel flow rates, morphology, water temperature, downstream dams, shade/hide cover, and pollution. Trout Creek is reported to support good populations of rainbow trout (Johmann, pers. comm., 2002).

- RARE: Channel morphology, flow rates, water temperatures, good riparian areas and downstream dams are limiting factors for this use (Johmann, pers. comm., 2002).

- REC-1: Support Status should be limited support. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens (Johmann, pers. comm., 2002).

4.3.2.3 Lyndon Canyon Creek (GR/LG-7)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.4 Daves Creek (GR/LG-8)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.2.5 Black Creek (GR/LG-9)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.6 Dyer Creek (GR/LG-10)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.7 Briggs Creek (GR/LG-11)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.8 Aldercroft Creek (GR/LG-12)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.9 Moody Gulch (GR/LG-13)

Sufficient data were available to assess only the COLD use, which is partially supported in this reach. No indicator macroinvertebrate data were available to allow a finding of full support. No limiting factors were identified.

4.3.2.10 Limekiln Creek (GR/LG-14)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.11 Soda Springs Canyon Creek (GR/LG-15)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Soda Springs Canyon Creek:

- <u>COLD</u>: Limiting factors should be channel flow rates, morphology, water temperature, downstream dams, shade/hide cover, and pollution (Johmann, pers. comm., 2002).

- <u>RARE</u>: Channel morphology, flow rates, water temperature, good riparian areas and downstream dams are limiting factors for this use (Johmann, pers. comm., 2002).

- <u>REC-1</u>: Support Status should be Supported. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens (Johmann, pers. comm., 2002).

4.3.2.12 Hendrys Creek (GR/LG-16)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.13 Hooker Gulch (GR/LG-17)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.14 Austrian Gulch (GR/LG-18)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.15 Almendra Creek (GR/LG-19)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.2.16 Dry Creek (GR/LG-20)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.17 Vasona Reservoir (GR/LG/VR)

Vasona Reservoir appears to be in non support of MUN (fecal coliform and turbidity exceed drinking water criteria), full support of PFF, and potential support of RARE based on very limited western pond turtle data. Uncertainty is high for all of these conclusions, however, due to limited data.

Stakeholder comments have provided the following information regarding use/interest support in Vasona Reservoir (alternate conclusions on use support are also shown in Appendix 4-A):

- <u>COLD</u>: Support status should be Limited Support. The primary limiting factors for this use are waterborne pathogens (Johmann, pers. comm., 2002).

4.3.2.18 Lexington Reservoir (GR/LG/LR)

Lexington Reservoir appears to be non-supportive of the MUN use based on fecal coliform and turbidity exceedences. The PFF interest appears to be fully supported as does the REC-1 use, though data on tertiary (aesthetics and recreational access) indicators was not available. Uncertainty for each of these conclusions is moderately high to very high due to limited data.

Stakeholder comments have provided the following information regarding use/interest support in Lexington Reservoir (alternate conclusions on use support are also shown in Appendix 4-A):

- <u>COLD</u>: Should be Supported. There are many reports that the reservoir supports rainbow trout. Limiting Factors should be water temperature, dams and pollution. The dam itself, however, in conjunction with 13 San Jose Water Company diversions upstream of the reservoir, eliminates salmonid access to the tributary headwaters of Los Gatos Creek which feature some of the best habitat in the watershed (Johmann, pers. comm., 2002 and Akin, pers. comm., 2002).

- RARE: Should be Limited Support. It is almost certain that Lexington Reservoir supports trout. Water temperature, well-vegetated perimeter areas, access and dams are limiting factors for this use watershed (Johmann, pers. comm., 2002).

- REC-1: This area supports fishing, wading and boating. The primary limiting factors for this use are water levels, access, pollution and waterborne pathogens watershed (Johmann, pers. comm., 2002).

4.3.2.19 Lake Elsman (GR/LG/LE)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.20 Williams Reservoir (GR/LG/WR)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.2.21 Lake Ranch Reservoir (GR/LG/LA)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.3 Canoas Creek

Canoas Creek was found to be non-supportive of the COLD use due to elevated temperatures and the lack of documented fish presence. Uncertainty is very high, however, due to limited data. The PFF interest is also not supported in Canoas Creek due to an undersized channel throughout most of the stream reach. Land uses in these area are urban commercial and residential where the potential for property damage during the 100-year flood event is very high. The RARE use is potentially supported in Canoas Creek due to sightings of burrowing owl, western pond turtle, and Chinook salmon, though habitat for the latter appears to be very poor.

Stakeholder comments have provided the following information regarding use/interest support in Canoas Creek:

- COLD: Limiting factors should be channel flow rates, morphology, water temperature, concrete culvert drop structure, no riparian area, lack of spawning gravel shade/hide cover, and pollution (Johmann, pers. comm., 2002).

- RARE: Support level should be Non Support. Salmonids normally wouldn't have access to this area, except at very high flows, due to the concrete culvert drop structure, which may be as high as 4 feet, depending on the water levels at the confluence with the Guadalupe River. There is little, if any habitat for salmonids once they gain access to the channel. Channel morphology, flow rates, water temperature, no riparian area, drop structure, lack of natural channel, lack of spawning gravel and pollution are limiting factors for this use (Johmann, pers. comm., 2002).

4.3.4 Ross Creek Subwatershed

Assessment results for waterbodies in the Ross Creek subwatershed are discussed by individual waterbody in this section.

4.3.4.1 Ross Creek

Ross Creek was found to be non-supportive of the COLD use due to the presence of poor habitat, stream cover, and riparian vegetation and the lack of documented fish presence. Uncertainty is moderately high, however, due to limited data. The PFF interest is also not supported in Ross Creek due to an undersized channel throughout most of the stream reach. Land uses in these area are urban commercial and residential where the potential for property damage during the 100-year flood event is very high. The RARE use is potentially supported in Ross Creek due to sightings of Cooper’s hawk and potential rainbow trout observations. Uncertainty is moderately high, however.

4.3.4.2 Lone Hill Creek

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.4.3 Short Creek

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.5 Guadalupe Creek Subwatershed

Assessment results for waterbodies in the Guadalupe Creek subwatershed are discussed by individual waterbody in this section.

4.3.5.1 Guadalupe Creek (GR/GC-1, GR/GC-2, and GR/GC-5)

COLD: The entire main stem was designated as either partial or full support for COLD with high certainty. In general, the support level for COLD improved with distance up Guadalupe Creek. Releases from Guadalupe Reservoir and the Trans-Valley Pipeline for percolation support summer streamflow in GR/GC-1, but flow declines and temperatures increase within the lower reach. The amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. The upper half of the lower reach below Camden Avenue, with higher flows and lower temperatures, is likely to be suitable, but the lower half of the reach may usually be too warm and slow. High storm flows resulting from urban runoff may degrade habitat.

The FAHCE data that became available subsequent to completion of the assessment notes that the riparian zone in GR/GC-1 is very sparse, the channel incised, and the substrate compacted, resulting in a fair to poor rating for salmonid habitat. However, above this reach in GR/GC-2, a moderate to well-developed riparian zone exists with a suitable combination of pools, riffles and runs with good quality habitat and relatively good complex shelter for salmonids. Small localized deposits of suitable spawning substrate are found through this reach (FAHCE, 1999).

Stakeholder comments have provided the following information regarding COLD use support in Guadalupe Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- <u>GR/GC-1</u>: Below Masson Dam, status should be currently not supported but high potential support for steelhead. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, and dam. Above Masson Dam, support status should be supported. Limiting Factors should be flow levels (Johmann, pers. comm., 2002).

- <u>GR/LG-2</u>: Support status should be supported. Rainbow trout are known to inhabit this stream segment and since the Masson Dam has been laddered there is potential for steelhead and perhaps even coho to return (Johmann, pers. comm., 2002).

<u>MUN</u>: The MUN use is not supported in the portions of Guadalupe Creek where sufficient data were available (below Guadalupe Reservoir), though uncertainty over these conclusions is high due to significant data gaps. Fecal coliform, turbidity, DDT, and total dissolved solids exceeded the applicable drinking water criteria.

<u>PFF</u>: The PFF interest is fully supported in all reaches of Guadalupe Creek.

Stakeholder comments have provided the following information regarding PFF interest support in Guadalupe Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- <u>GR/GC-1</u>: Reach should be split into two parts - above and below Masson Dam. Below Masson Dam, the channel is relatively wide and shallow due to a series of instream dirt spreader dams that were constructed every year up until 1995. There is little mature riparian habitat or shade cover as the dams would drown upstream vegetation and deprive down stream vegetation of any water. Water temperatures in this area are extremely elevated due to the lack of shade cover and the wide shallow channels. The channel should be listed as Quasi-Natural, Modified. A restoration project has just been completed in this segment which should reduce channel width and provide shade cover for the stream which should improve flows, increase habitat and decrease temperatures. Above Masson Dam, the channel is a typical meandering C-type channel. There is a good riparian area on both sides of the channel and there is a broad flood plain on the south side (Johmann, pers. comm., 2002).

- GR/GC-2: The creek channel in this segment is a typical B-type channel. There is a good riparian area on both sides of the channel with a narrow flood plain (Johmann, pers. comm., 2002).

RARE: The RARE use is potentially supported in Guadalupe Creek below Guadalupe Reservoir, based on Yellow warbler, red legged frog, double crested cormorant, yellow leged frog, western pond turtle, steelhead, and Chinook salmon. Uncertainty, however, is very low in GR/GC-2 due to limited data. Below Camden Avenue, red-legged frog is not thought to be present due to lack of suitable habitat and the presence of aquatic predators. Habitat is also marginal in this reach for salmonids as flow declines and temperatures increase within the reach. The amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. The upper half of GR/GC-1, with higher flows and lower temperatures is likely to be suitable, but the lower half may usually be too warm and slow. Above the reservoir, the RARE use is fully supported based on the presence of native rainbow trout.

Stakeholder comments have provided the following information regarding RARE use support in Guadalupe Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/GC-1: Below Masson Dam, support status should be Non Support but High Potential. No rare species are known in this area. Channel morphology, flow rates, water temperatures, and lack of mature riparian vegetation are limiting factors for this use. Above Masson Dam, support status should be Full Support. The limiting factors should be flow levels and the dam. The Water District has conducted a specific survey in this reach for red legged frogs and found none (Johmann, pers. comm., 2002).

- GR/GC-2: Support status should be Full Support (Johmann, pers. comm., 2002).

REC-1: The REC-1 use is non-supported in Guadalupe Creek below Guadalupe Reservoir due to exceedences of primary (pathogen) and secondary (other water quality) indicator criteria as well as poor aesthetics. However, uncertainty is moderately high to very high with respect to these conclusions due to spotty data.

Stakeholder comments have provided the following information regarding REC-1 use support in Guadalupe Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/GC-1: Below Masson Dam, support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, and the dam.

Above Masson Dam, support status should be Limited Support. The primary limiting factors for this use are water flow levels, access, debris and the dam (Johmann, pers. comm., 2002).

- GR/GC-2: Support status should be Limited Support. The primary limiting factors for this use are water flow levels, debris and access (Johmann, pers. comm., 2002).

4.3.5.2 Pheasant Creek (GR/GC-3)

Sufficient data were available to assess only the COLD use (partial support) and PFF interest (full support). No indicator macroinvertebrate data was available to allow for a finding of full support for COLD and uncertainty is moderately high due to very limited data.

The FAHCE data made available after completion of the pilot assessment indicates that Pheasant Creek sustains baseflows throughout the early summer, with depth of flow identified as the constraint limiting the quality of salmonid habitat. Several streamside wells probably deplete baseflow in the creek (FAHCE, 1999).

Stakeholder comments have provided the following information regarding use/interest support in Pheasant Creek:

- COLD and RARE: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses (Johmann, pers. comm., 2002).

- PFF: The channel enters Guadalupe Creek via an inadequate elevated pipe culvert under Hicks Road. This culvert is causing erosion both up and downstream of the pipe and due to the large amount of scour below the pipe, a waterfall has developed which blocks fish up-migration opportunities (Johmann, pers. comm., 2002).

4.3.5.3 Shannon Creek (GR/GC-4)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Shannon Creek:

- COLD and RARE: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses (Johmann, pers. comm., 2002).

- PFF: The channel enters Guadalupe Creek via an elevated culvert under Hicks Road and the creek has been buried by the property owner on the west side of the road. This culvert is causing erosion downstream of the pipe and due to the large amount of scour below the pipe, a waterfall has developed which blocks fish up-migration opportunities (Johmann, pers. comm., 2002).

4.3.5.4 Rincon Creek (GR/GC-6)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Rincon Creek:

- COLD: Field observations show Rincon Creek to be larger and have higher flow rates than Guadalupe Creek in late summer and the water temperature has always been measured as being below 60 degrees, even in late summer. Fish have been observed in the creek and there have been many reports it supports rainbow trout (Johmann, pers. comm., 2002).

4.3.5.5 Los Capitancillos Creek (GR/GC-7)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.5.6 Reynolds Creek (GR/GC-8)

Insufficient data were available to assess any of the uses/interests in this reach.

The FAHCE data made available after completion of the pilot assessment indicates that Reynolds Creek sustains baseflows throughout the early summer, with depth of flow identified as the constraint limiting the quality of salmonid habitat. Several streamside wells probably deplete baseflow in the creek (FAHCE, 1999).

Stakeholder comments have provided the following information regarding use/interest support in Reynolds Creek:

- COLD: Reach is reported to have populations of rainbow trout; mainstem feeds into Guadalupe Creek in a natural manner as the creek passes under an adequate bridge, so fish have easy access to the creek (Johmann, pers. comm., 2002).

4.3.5.7 Hicks Creek (GR/GC-9)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Hicks Creek:

- COLD: Reach is reported to have populations of rainbow trout; mainstem feeds into Guadalupe Creek in a natural manner as the creek passes under an adequate bridge, so fish have easy access to the creek (Johmann, pers. comm., 2002).

4.3.5.8 Guadalupe Reservoir (GR/GC/GR)

Guadalupe Reservoir was found to partially support the MUN use as several turbidity criteria exceedences were noted, generally during the winter and spring months. The PFF interest is fully supported, though uncertainty is very high. The REC-1 use is fully supported but uncertainty is moderately high due to limited data. Alternate conclusions on use support are also shown in Appendix 4-A.

4.3.6 Alamitos Creek Subwatershed

Assessment results for waterbodies in the Alamitos Creek subwatershed are discussed by individual waterbody in this section.

4.3.6.1 Alamitos Creek (GR/AL-1 and GR/AL-2)

COLD: The entire creek was designated as partial support for COLD with high certainty. Releases from Almaden and Calero Reservoirs for percolation provide summer streamflow to GR/AL-1 but flows decline and temperatures increase within the reach. Fast-water feeding habitat declines downstream within the reach. The channel is less shaded downstream within the reach increasing temperature effects. High storm flows resulting from urban runoff may degrade habitat here. Above the Arroyo Calero confluence, releases from Almaden Reservoir for percolation in downstream reaches maintain relatively high and cool streamflows for most of summer in most years. Outlet structures at Almaden Dam require periodic maintenance and reservoir draining, which may impact the availability of streamflow and could affect indicator macroinvertebrate presence.

The FAHCE data that became available subsequent to completion of the assessment notes that Alamitos Creek contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for salmonids (FAHCE, 1999).

Stakeholder comments have provided the following information regarding COLD use support in Alamitos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/AL-1: Below Greystone Creek, should probably be either Not Supported or Very Limited Support. Water temperatures in this segment are high due to wide channel width and lack of riparian area and shade cover. Limiting Factors should be channel flow rates, morphology, water temperature, drop structures, downstream, the lake and dam, poor riparian area, shade/hide cover, and pollution. Above Greystone Creek, should be Limited Support. Rainbow trout have been reported in this segment of creek. Limiting Factors should be channel flow rates, morphology, water temperature, drop structures, downstream lake and dam, poor riparian area, shade/hide cover, and pollution (Johmann, pers. comm., 2002).

- GR/AL-2: Limiting factors should be channel flow rates, morphology, water temperature, drop structures, downstream lake and dam, poor riparian area, shade/hide cover, and pollution (Johmann, pers. comm., 2002).

MUN: The MUN use is not supported in GR/AL-1 due to documented exceedences of the total dissolved solids criterion and is partially supported in GR/AL-2 due to total dissolved solids exceedences during wet weather. However, as data is very limited, uncertainty is high.

PFF: The PFF interest is fully supported in all reaches of Alamitos Creek.

Stakeholder comments have provided the following information regarding PFF interest support in Alamitos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/AL-1: The creek is affected by the flood control project where it was over-widened from Lake Almaden upstream. This reach should be split into two segments - above and below Greystone Creek. Below Greystone Creek, it should be listed as a Modified Straightened channel. Just upstream of Golf Creek there is a drop structure and an overflow channel and a very wide corridor. There is another drop structure where the creek empties into Lake Almaden. These drop structures inhibit fish migration except at high flows. Above Greystone Creek, it should be listed as a Quasi Natural, Modified channel. There is more riparian habitat and shade cover and the creek channel starts to meander and is far less incised (Neudorf, pers. comm., 2002 and Johmann, pers. comm., 2002).

- GR/AL-2: The creek is affected by the flood control project where it was over-widened from the confluence with Arroyo Calero upstream to McKean; above McKean it appears much more natural; the creek re-routed itself near New Almaden per some storm flow action, resulting in some stream meander (Neudorf, pers. comm., 2002).

RARE: The RARE use is fully supported in Alamitos Creek based on native rainbow trout observations. Potential support exists for western pond turtle and red legged frog above Arroyo Calero. Habitat appears marginal to poor for salmonids below Arroyo Calero but marginal to good above it, with conditions improving with distance upstream toward Almaden Dam.

Stakeholder comments have provided the following information regarding RARE use support in Alamitos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/AL-1: Below Greystone Creek, should be limited support. Riparian and channel habitat is poor in this area, water temperatures are warm and drop structures impede movement. Channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use. Above Greystone Creek, channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use (Johmann, pers. comm., 2002).

- GR/AL-2: Support level should be limited support. Salmonids normally wouldn't have access to this area except at very high flows due to downstream drop structures. Channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use (Johmann, pers. comm., 2002).

REC-1: The REC-1 use is partially supported based on access and aesthetics below Arroyo Calero but is not supported above it. Water quality data indicates full support of REC-1 based on the secondary criteria above Arroyo Calero. However, uncertainty is moderately high with respect to these conclusions due to spotty data.

Stakeholder comments have provided the following information regarding REC-1 use support in Alamitos Creek (alternate conclusions on use support are also shown in Appendix 4-A):

- GR/AL-1 and GR/AL-2: Status should be limited support. This area supports fishing and wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens (Johmann, pers. comm., 2002).

4.3.6.2 Jacques Gulch (GR/AL-3)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.6.3 Herbert Creek (GR/AL-4)

Herbert Creek was found to partially support the COLD use, though dissolved oxygen criteria were not met based on limited data and little fish presence data was available. Uncertainty, therefore, is moderately high. The PFF interest is fully supported in Herbert Creek.

4.3.6.4 Barrett Canyon Creek (GR/AL-5)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.6.5 Larabee Gulch (GR/AL-6)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.6.6 Chilanian Gulch (GR/AL-7)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.6.7 Deep Gulch (GR/AL-8)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.6.8 Greystone Creek (GR/AL-9)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.6.9 Golf Creek (GR/AL-10)

Sufficient data were available to assess only the PFF interest, which is fully supported in this reach.

4.3.6.10 Randol Creek (GR/AL-11)

Sufficient data were available to assess only the PFF interest, which is not supported in this reach. Two sections of Randol Creek do not have adequate capacity to convey 100-year flows. Land uses in these areas consist of urban residential development where flooding is likely to cause property damage.

Stakeholder comments have provided the following information regarding use/interest support in Randol Creek:

- The West Branch of Randol Creek has a very good riparian area and natural channel (Johmann, pers. comm., 2002).

4.3.6.11 McAbee Creek (GR/AL-12)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.6.12 Lake Almaden (GR/AL/LA)

Lake Almaden was found to partially support the COLD use, with high turbidity and high temperature at the surface being limiting factors. Data were limited, however, leading to a moderately high level of uncertainty regarding this conclusion. The REC-1 use appears to be fully supported based on the primary pathogen indicator but data was limited and no data on other REC-1 indicators was available, so uncertainty is moderately high.

Stakeholder comments have provided the following information regarding use/interest support in Lake Almaden (alternate conclusions on use support are also shown in Appendix 4-A):

- This lake most likely would not support cold water species. Water temperature is far too warm. Data loggers on lower parts of Guadalupe and Alamitos Creeks and one just downstream of the Alamitos Drop Structure all indicate high summer and winter temperatures not favored by salmonids. This lake supports swimming, wading, fishing and boating (Johmann, pers. comm., 2002).

4.3.6.13 Almaden Reservoir (GR/AL/AR)

Almaden Reservoir was found to potentially support the COLD use, but there is very high uncertainty about this due to the lack of recent data. Temperatures exceeded habitat suitability criteria. The MUN use was not supported due to elevated fecal coliform, MTBE, and turbidity in excess of drinking water criteria. Uncertainty is moderately high, however, due to recent data indicating improvements in water quality. If current trends continue, the MUN use may become fully supported. The PFF interest is fully supported based on very limited data with high uncertainty. Potential support for the RARE use was noted based on western pond turtle observations, but the uncertainty is high. The REC-1 use is not supported due to mercury exceedences in reservoir sediment but data is limited and uncertainty moderately high. Alternate conclusions on use support are also shown in Appendix 4-A.

4.3.7 Arroyo Calero Subwatershed

Assessment results for waterbodies in the Arroyo Calero subwatershed are discussed by individual waterbody in this section.

4.3.7.1 Arroyo Calero (GR/AC-1)

COLD: Arroyo Calero was designated as partial supporting the COLD use with high certainty. The stream substrate is dominated by fine sediment and summer streamflows are relatively turbid, which may affect insect abundance and presence of intolerant species. Summer streamflows depend upon releases from Calero Reservoir for groundwater percolation, primarily downstream of the reach. Releases vary seasonally and among years due to reservoir storage. Summer temperatures are relatively cool, but increase downstream within the reach. High storm flows resulting from urban runoff may degrade habitat.

The FAHCE data that became available subsequent to completion of the assessment notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for salmonids (FAHCE, 1999).

MUN: The MUN use is fully supported in Arroyo Calero, though data is relatively limited and therefore uncertainty moderately high.

PFF: The PFF interest is fully supported in Arroyo Calero.

RARE: The RARE use is potentially supported in Arroyo Calero based on California tiger salamander and red legged frog. The saltmarsh common yellowthroat is also assumed to be common because of the location and habitat. Potential support exists for burrowing owl, golden eagle, tricolored blackbird, Opler's longhorn moth, unsilvered frittilary, Horn's microblind harvestman, peregrine falcon, western pond turtle, and bay checkered butterfly.

Alternate conclusions on use support are also shown in Appendix 4-A.

REC-1: The REC-1 use is fully supported based on secondary water quality indicators though very limited data is available, resulting in a very high uncertainty level.

Stakeholder comments have provided the following information regarding REC-1 use support in Arroyo Calero (alternate conclusions on use support are also shown in Appendix 4-A):

- Wading and fishing may be supported but there are access problems (Johmann, pers. comm., 2002).

4.3.7.2 Santa Teresa Creek (GR/AC-4)

Santa Teresa Creek fully supports the PFF interest but does not support the RARE use (very high uncertainty) based on the lack of presence of red legged frogs. Data for other uses were insufficient.

4.3.7.3 Cherry Canyon Creek (GR/AC-2)

Cherry Canyon Creek potentially supports the RARE use based on red legged frog observations. Limited data does not reveal whether the population is reoccurring, however. Uncertainty is moderately high. Data for other uses were insufficient.

4.3.7.4 Pine Tree Canyon Creek (GR/AC-3)

Insufficient data were available to assess any of the uses/interests in this reach.

4.3.7.5 Calero Reservoir (GR/AC/CR)

Calero Reservoir does not appear to support the MUN use due to elevated fecal coliform, MTBE, and turbidity in excess of drinking water criteria. The MTBE is almost certainly due to use of personal watercraft on the reservoir. It should be noted that MTBE has not exceeded the criterion since the Water District developed an MTBE management strategy with the County Parks Department (Brewster, pers. comm., 2002). The PFF interest is fully supported based on very limited data with high uncertainty. Full support for the RARE use was noted based on golden eagles and tiger salamanders. The REC-1 use is not supported due to mercury exceedences in reservoir sediment but data is limited and uncertainty moderately high.

Stakeholder comments have provided the following information regarding use/interest support in Calero Reservoir (alternate conclusions on use support are also shown in Appendix 4-A):

- COLD: Most of the reservoir is quite warm; there is no opportunity for trout to move away from the heat during summer months; the deeper hole in front of the dam where the water may be cooler is often low in oxygen (Neudorf, pers. comm., 2002).

- REC-1: Support status should be Full Support. This reservoir supports fishing, wading and boating (Johmann, pers. comm., 2002).

4.4 Recommendations on Further Data Collection and Analysis

Future data collection in the Guadalupe River watershed will depend upon priorities established by the WMI. Some uses/interests may be prioritized over others, and this will identify the most important types of data for early collection. Additional detail regarding data gaps is provided in Appendix C. Also see Chapter 2 for a more comprehensive discussion of future data collection.

For the five uses/interests studied in the pilot assessment, the following represent the most significant data gaps:

COLD:

- Accurate data on stream temperature and channel morphology in the main stem of Guadalupe River is needed to evaluate the availability of appropriate habitat

- Fish assemblage and indicator macroinvertebrate presence data for Los Gatos Creek (excluding GR/LG-1) including all five reservoirs in the subwatershed, and for the Arroyo Calero main stem reaches (excluding GR/AC-1) including Calero Reservoir; and macroinvertebrate data for Lake Almaden and Almaden Reservoir in the Alamitos Creek subwatershed

MUN:

- Wet and dry weather data on a majority of parameters (of a total of 16 designated parameters) in all reaches of Guadalupe River (excluding GR-1), Guadalupe Creek, Los Gatos Creek, Alamitos Creek, and Arroyo Calero; especially the reservoirs within these subwatersheds used for drinking water supply

PFF:

Data was adequate in the main stem reaches of the subwatersheds

RARE:

- Data on special status species presence and/or habitat in most reaches of Los Gatos Creek (above GR/LG-1), Guadalupe Creek (not including GR/GC-1), and the stream reaches in Alamitos Creek not including GR/AL-1 and GR/AL-2

REC-1:

- Water quality data on pathogens (fecal coliform, e.coli) could be collected in the main stem of Guadalupe River, Guadalupe Creek, and the most frequently used reservoirs for water contact recreation including Guadalupe Reservoir, Vasona Reservoir, Lexington Reservoir, Almaden Reservoir, Lake Almaden, and Calero Reservoir to allow for complete support statements with high certainty. Data collection should be focused on the reaches where water contact recreation (swimming, wading, sport fishing) is known to occur.

4.5 References

Akin, Scott. 2002. Personal Communication. FAHCE Data Manager, Santa Clara Valley Water District.

FAHCE (Fisheries and Aquatic Habitat Collaborative Effort). 1999. Preliminary Report of Aquatic Habitat Survey Results of Santa Clara Valley Streams. Prepared by Entrix, Inc. for the November 9, 1999 Consensus Committee Meeting.

Hollis, G.E. 1975. The Effect of Urbanization on Floods of Different Recurrence

Intervals. Water Resources Research 11(3): 431-435.

Johmann, Larry. 2002. Personal Communication. WMI Guadalupe watershed Co-Captain. Guadalupe-Coyote Resource Conservation District.

Neudorf, Terry. 2002. Personal Communication. WMI Guadalupe watershed Co-Captain. Biologist, Santa Clara Valley Water District.

Regional Water Quality Control Board. 1975. Regional Water Quality Control Plan, San Francisco Bay Region.

San Jose Regional Parks. 2002. Lake Almaden Park Profile. SJRP website (www. www.ci.san-jose.ca.us/cae/parks/alp)

Santa Clara Basin WMI. 2001. Watershed Characteristics Report (Volume One), Chapter 7: Natural Setting.

Appendix 4-A
Pilot Assessment Result Charts

Appendix 4-A contains a series of six tables displaying bar charts which illustrate the conclusions of the pilot assessment for the Guadalupe River watershed. Table 1 summarizes the support status for each of the five beneficial uses/stakeholder interests within each of the 63 stream reaches in the watershed. Tables 2 through 6 display the same information, along with the associated uncertainty rating, for each individual use/interest. In instances where no bar is present above a stream reach identification code, sufficient data were not available to assess any of the uses/interests for that reach. A list of stream reaches, waterbodies, and identification codes is located in Appendix 4-B.

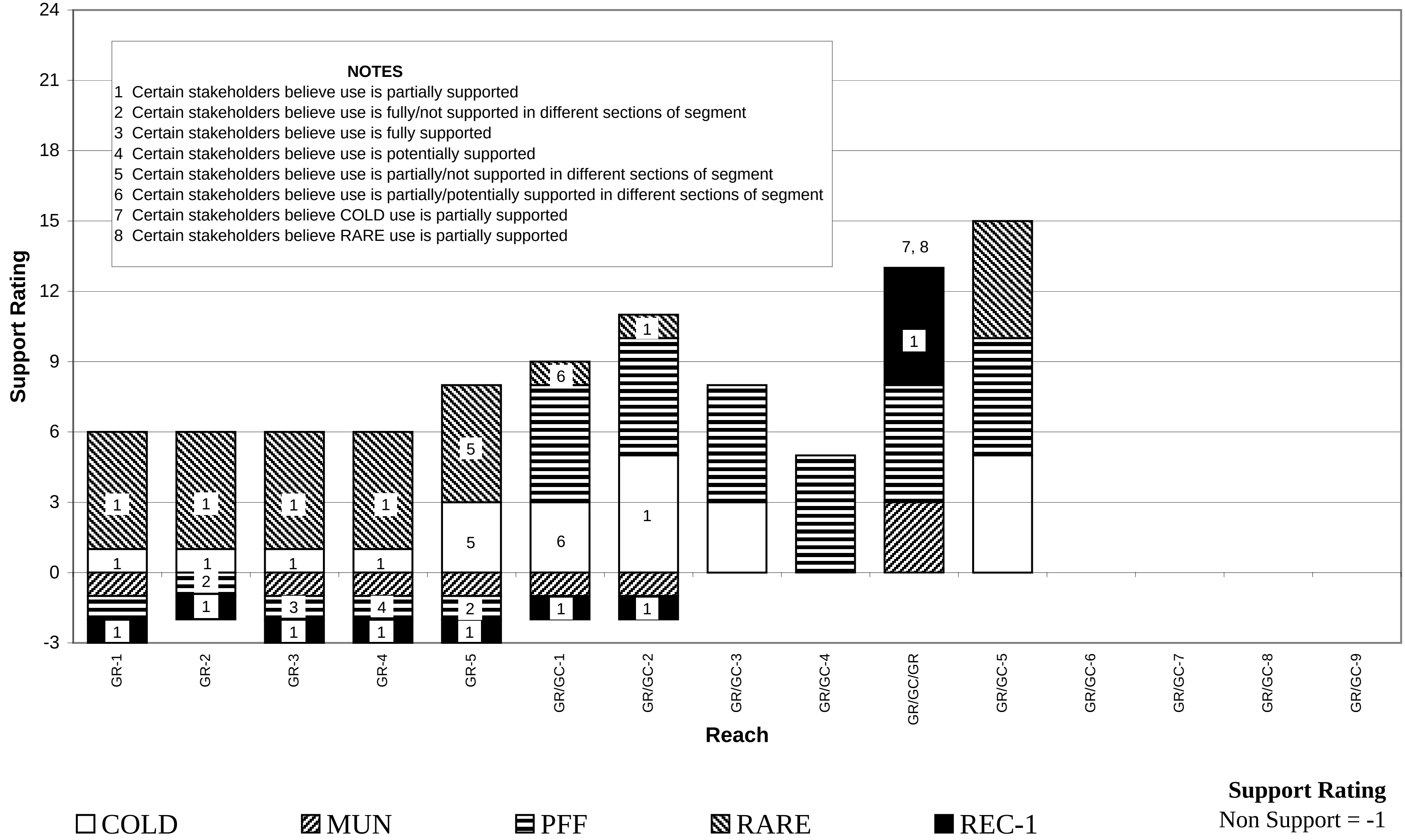
The tables in Appendix 4-A are organized as follows:

- Table 1: Overall Support Status by Reach (all uses)
- Table 2: Support Status and Uncertainty Ratings for COLD
- Table 3: Support Status and Uncertainty Ratings for MUN
- Table 4: Support Status and Uncertainty Ratings for PFF
- Table 5: Support Status and Uncertainty Ratings for RARE
- Table 6: Support Status and Uncertainty Ratings for REC-1

Notes have been placed on each of the tables in Appendix 4-A (excepting Table 3) to indicate where certain stakeholders are in disagreement with the findings of the pilot assessment. This disagreement is based on other data or information that was not provided to the assessment team.

Appendix 4-A
Table 1

Guadalupe Watershed
Support by Reach
Sheet 1 of 3

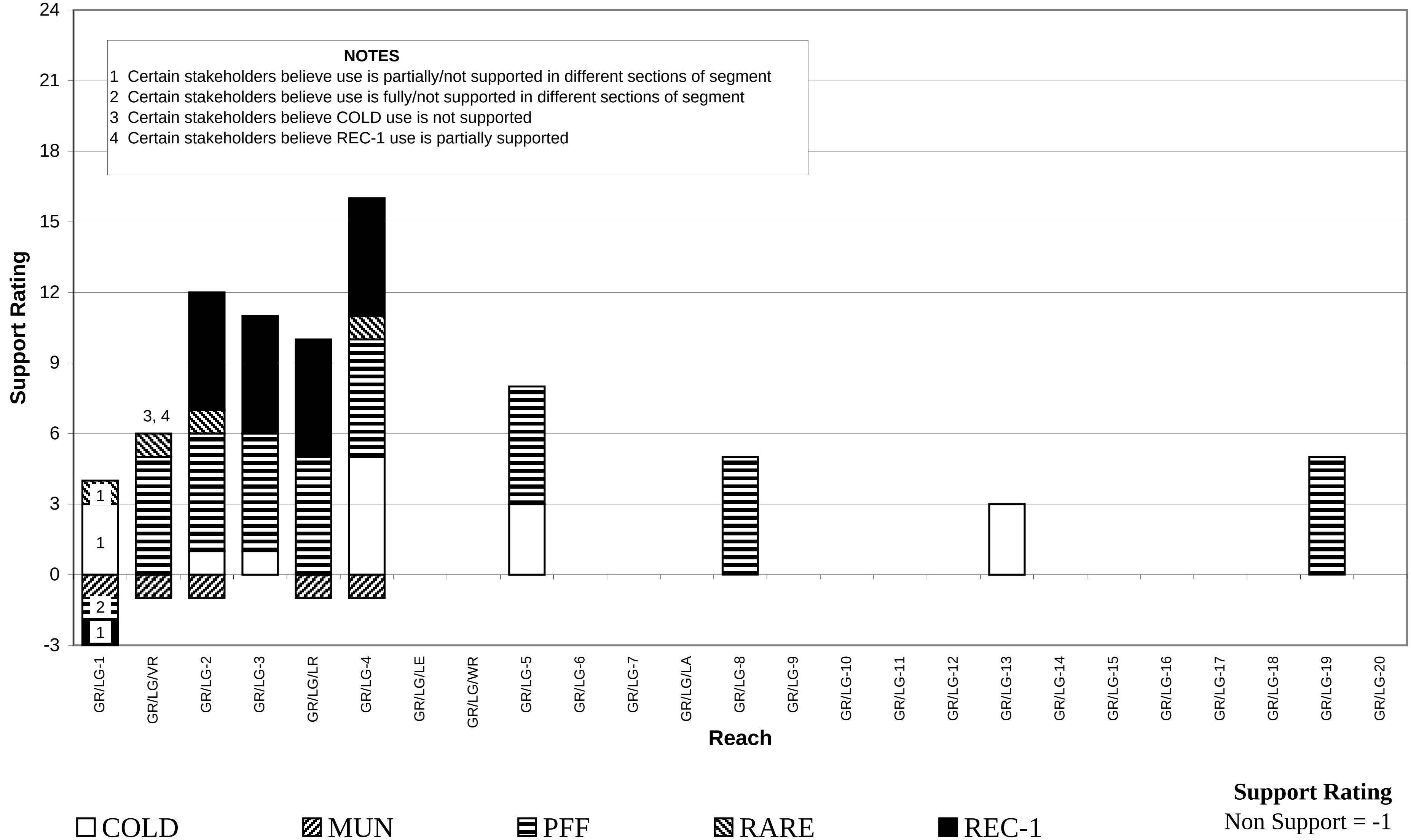


Support Rating
Non Support = -1
Unable to Determine = 0
Potential Support = 1
Partial Support = 3
Fully Supported = 5

Where the reach bars show fewer than five uses, sufficient data were not available to evaluate the other uses. Where no bar is present above a reach, sufficient data were not available to assess any of the five uses.

Appendix 4-A
Table 1

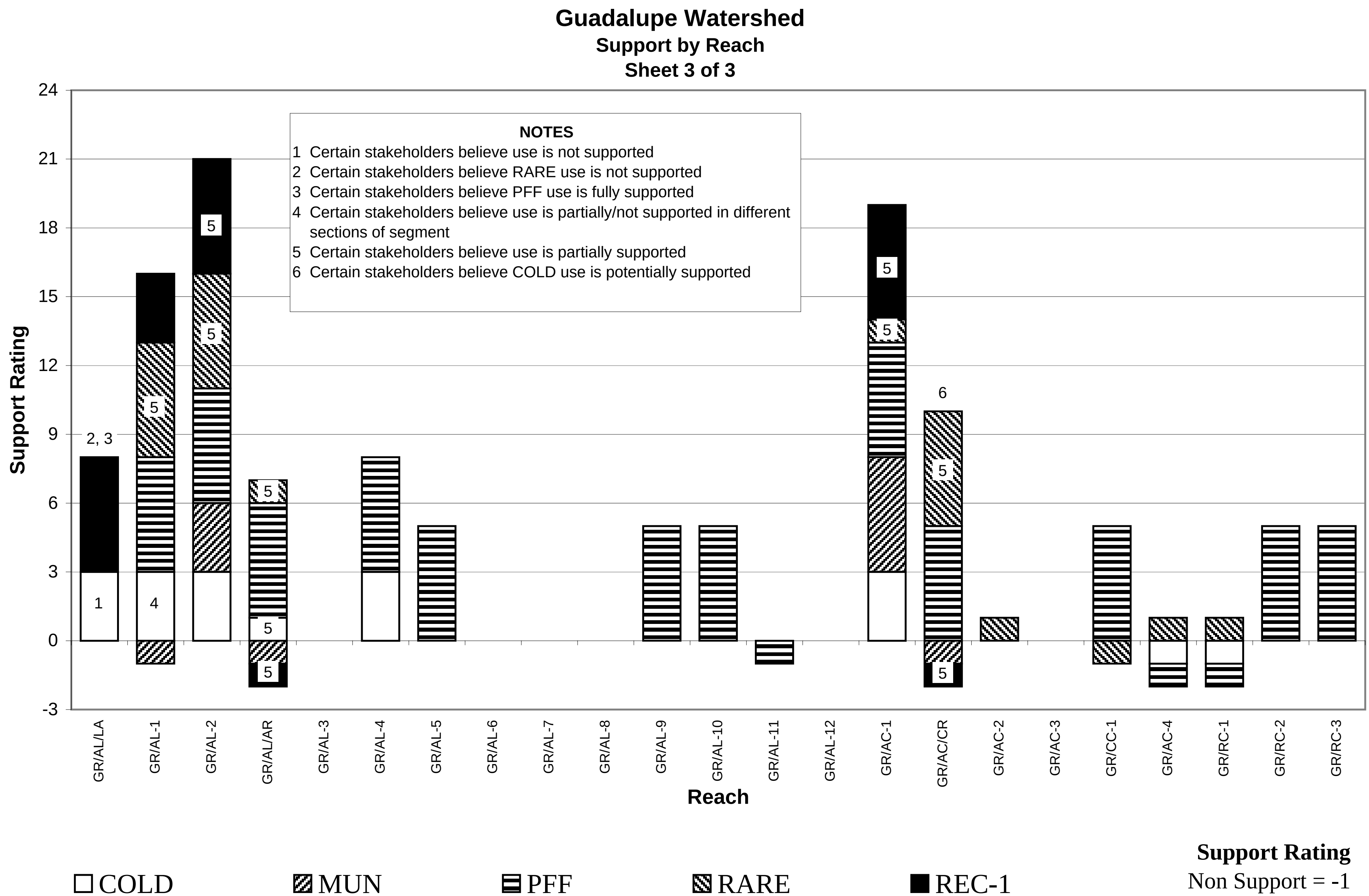
Guadalupe Watershed
Support by Reach
Sheet 2 of 3



Support Rating
Non Support = -1
Unable to Determine = 0
Potential Support = 1
Partial Support = 3
Fully Supported = 5

Where the reach bars show fewer than five uses, sufficient data were not available to evaluate the other uses. Where no bar is present above a reach, sufficient data were not available to assess any of the five uses.

Appendix 4-A
Table 1

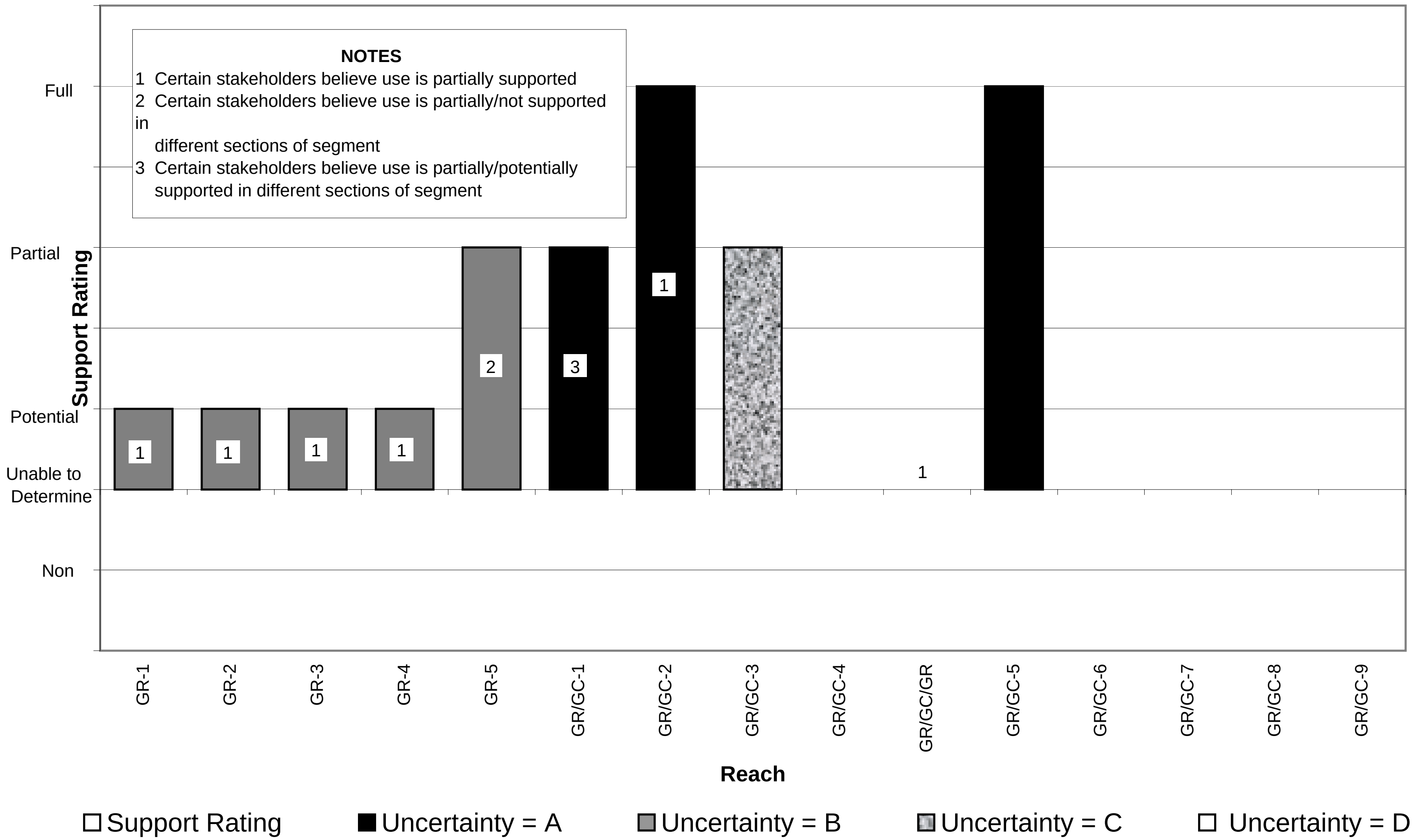


Support Rating
Non Support = -1
Unable to Determine = 0
Potential Support = 1
Partial Support = 3
Fully Supported = 5

Where the reach bars show fewer than five uses, sufficient data were not available to evaluate the other uses. Where no bar is present above a reach, sufficient data were not available to assess any of the five uses.

Appendix 4-A
Table 2

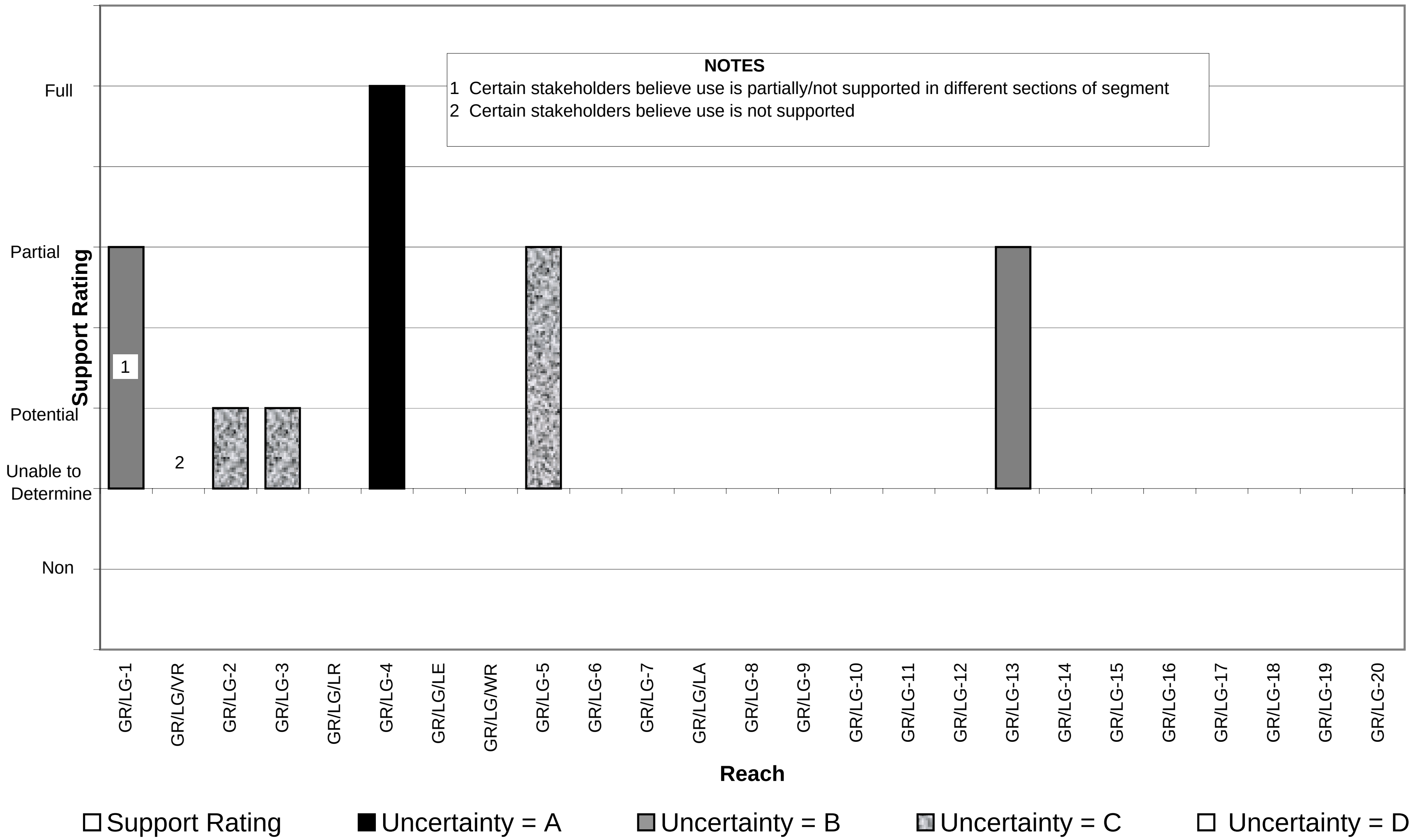
Guadalupe Watershed
Support and Uncertainty Ratings for COLD
Sheet 1 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 2

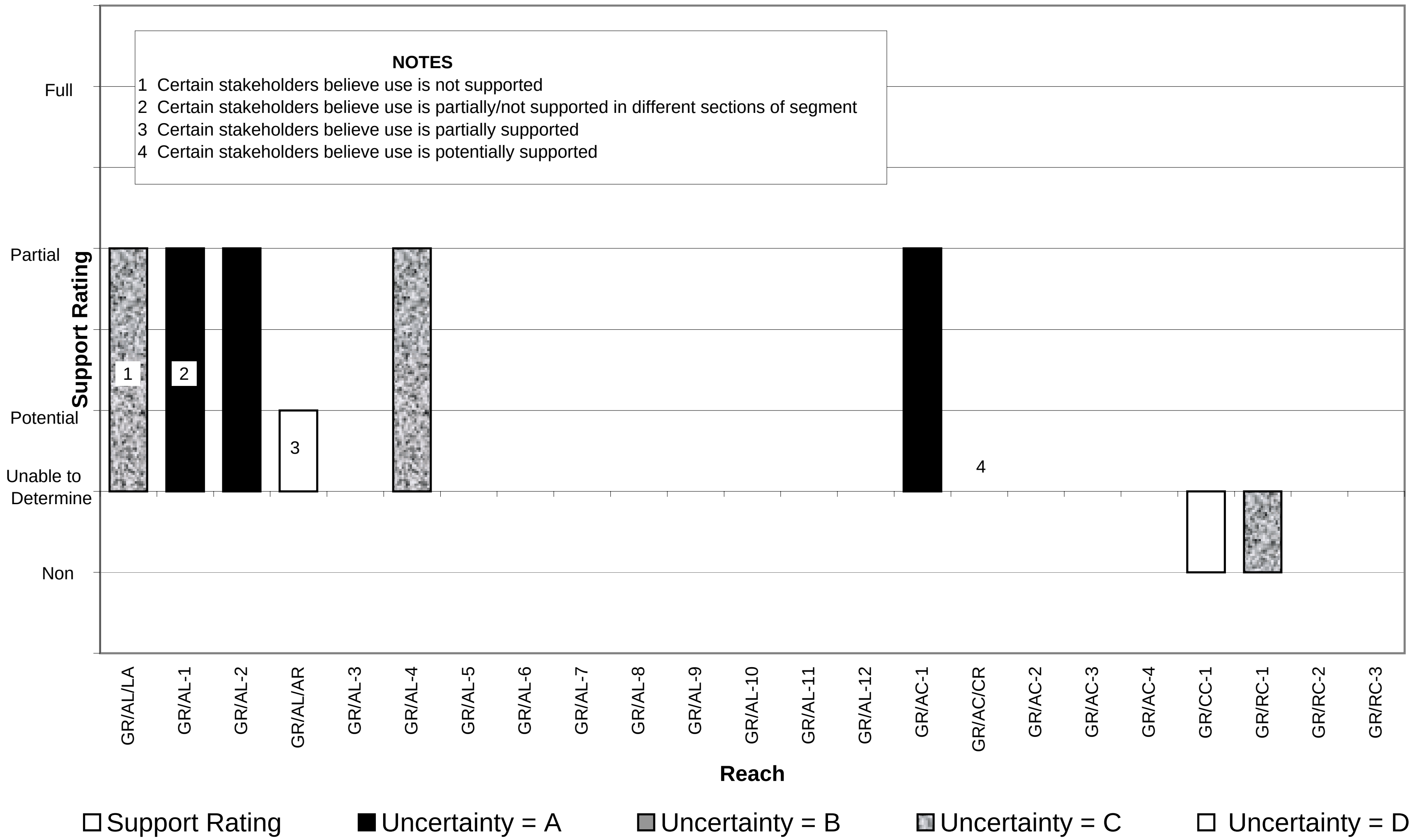
Guadalupe Watershed
Support and Uncertainty Ratings for COLD
Sheet 2 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 2

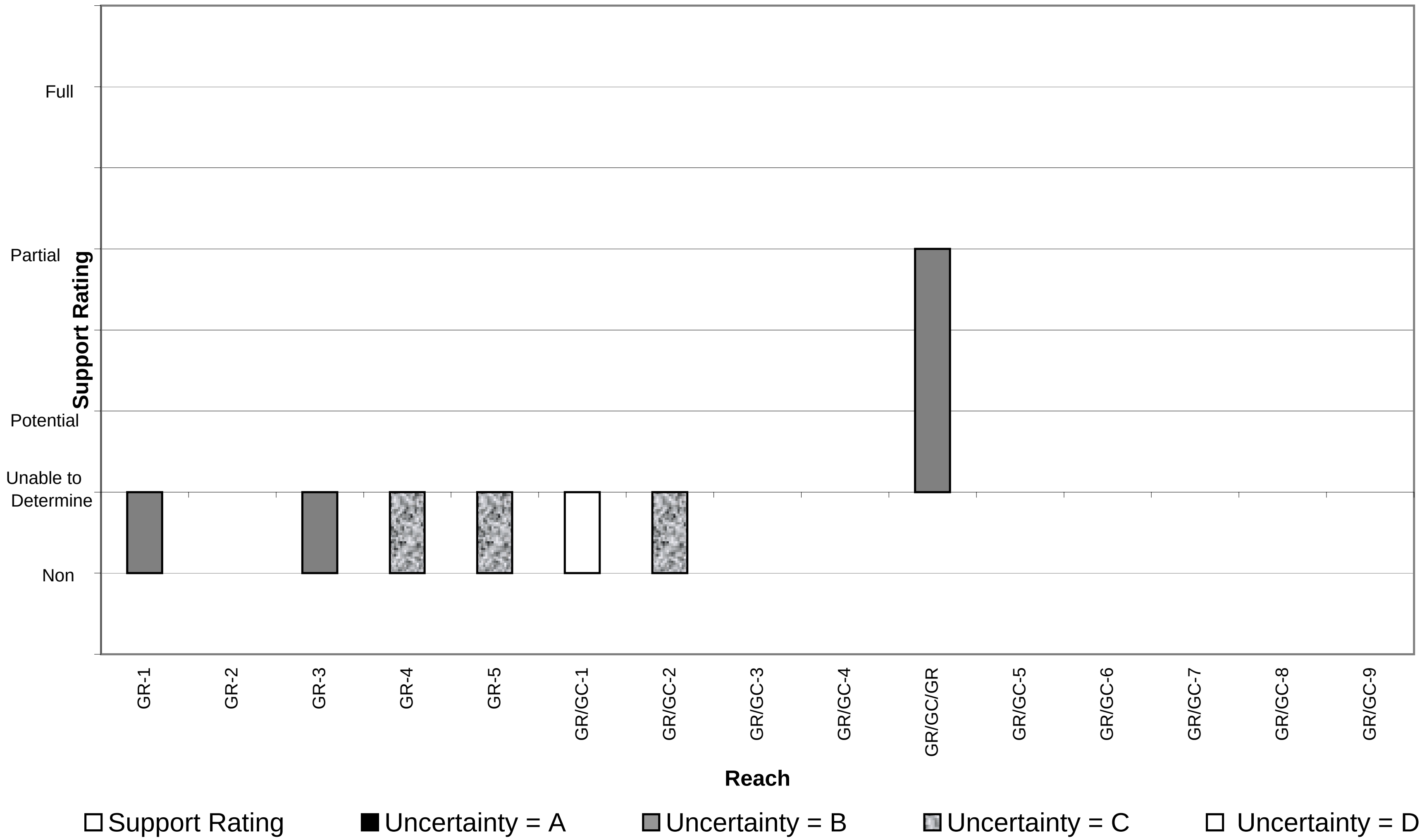
Guadalupe Watershed
Support and Uncertainty Ratings for COLD
Sheet 3 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 3

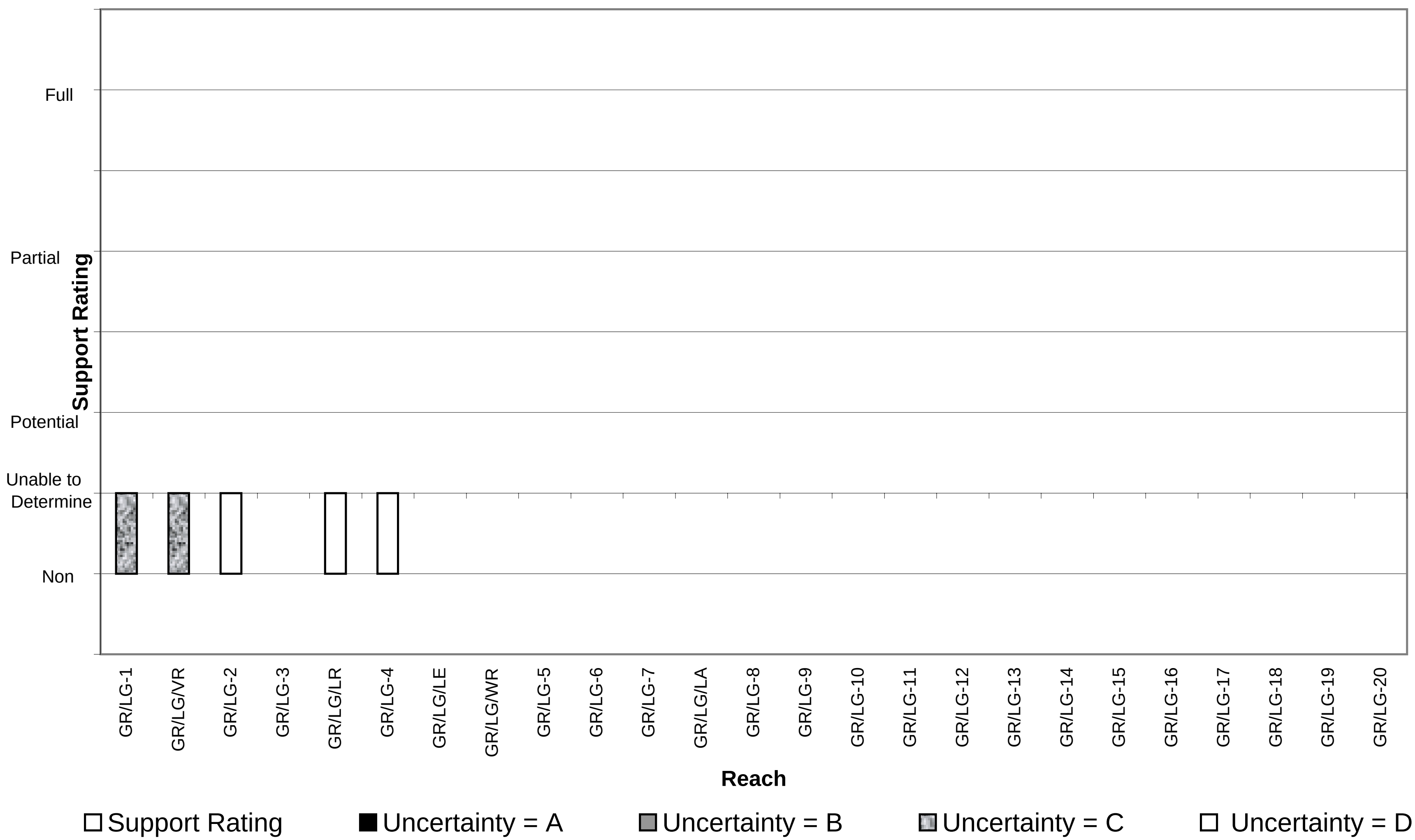
Guadalupe Watershed
Support and Uncertainty Ratings for MUN
Sheet 1 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 3

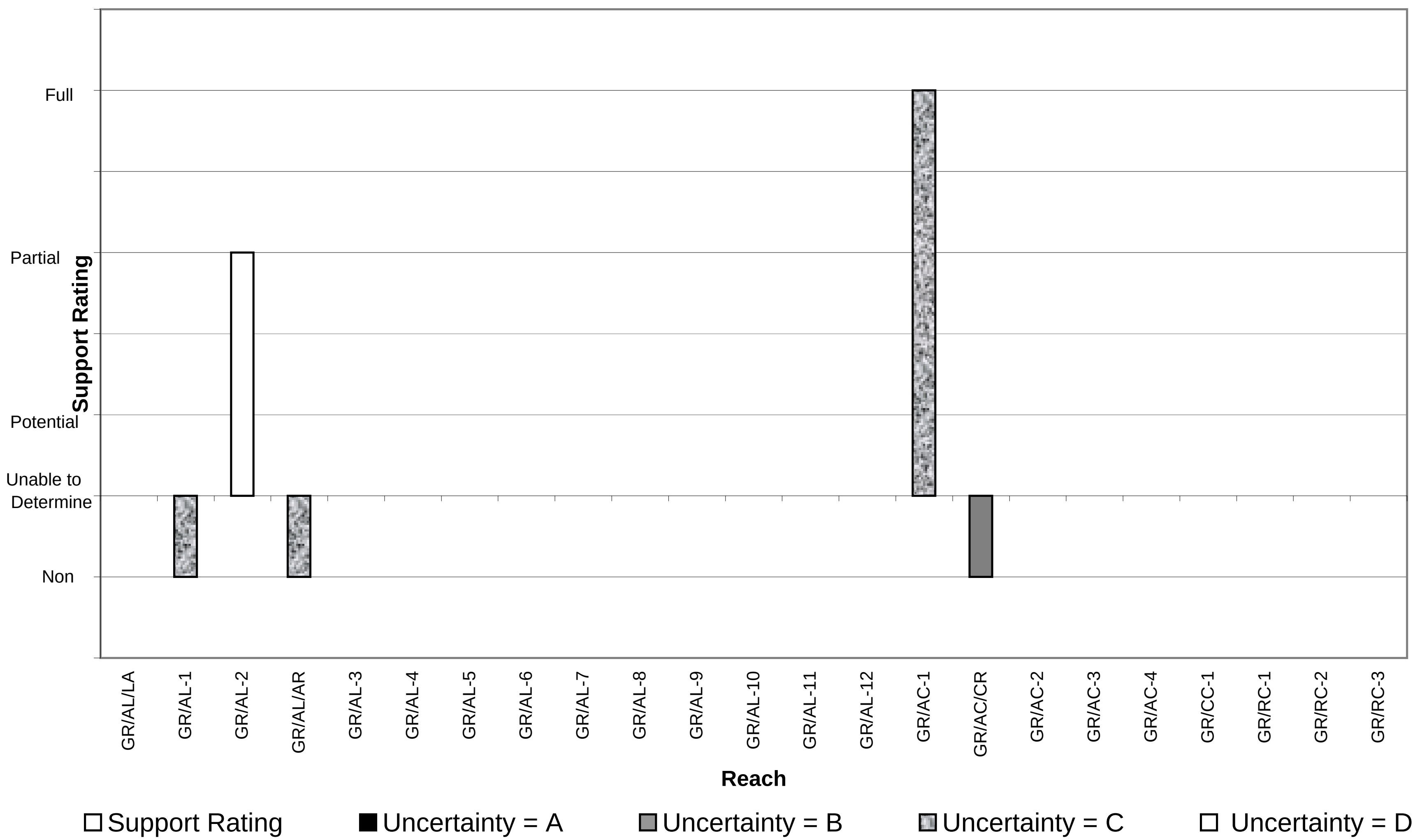
Guadalupe Watershed
Support and Uncertainty Ratings for MUN
Sheet 2 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 3

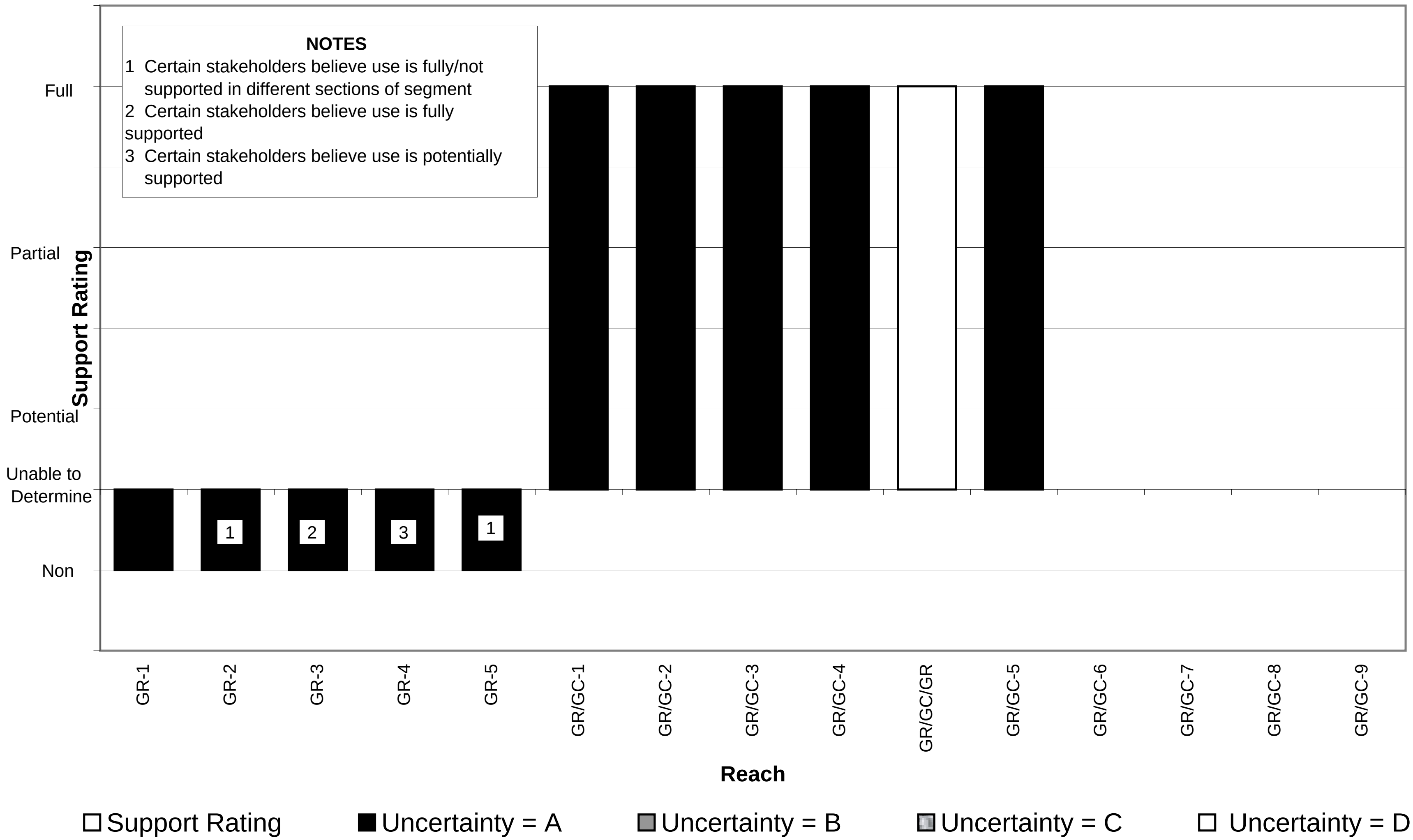
Guadalupe Watershed
Support and Uncertainty Ratings for MUN
Sheet 3 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

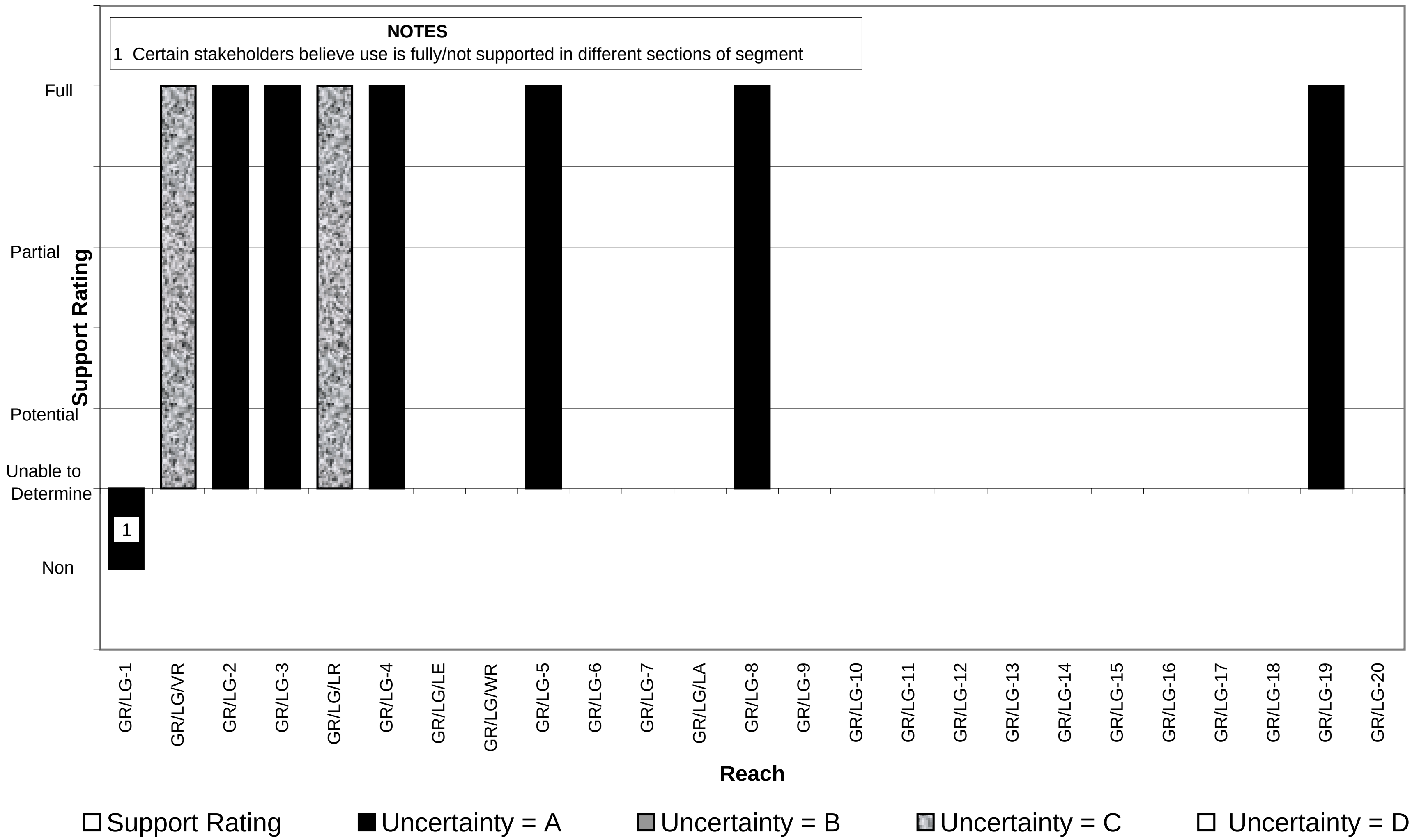
Appendix 4-A
Table 4

Guadalupe Watershed
Support and Uncertainty Ratings for PFF
Sheet 1 of 3



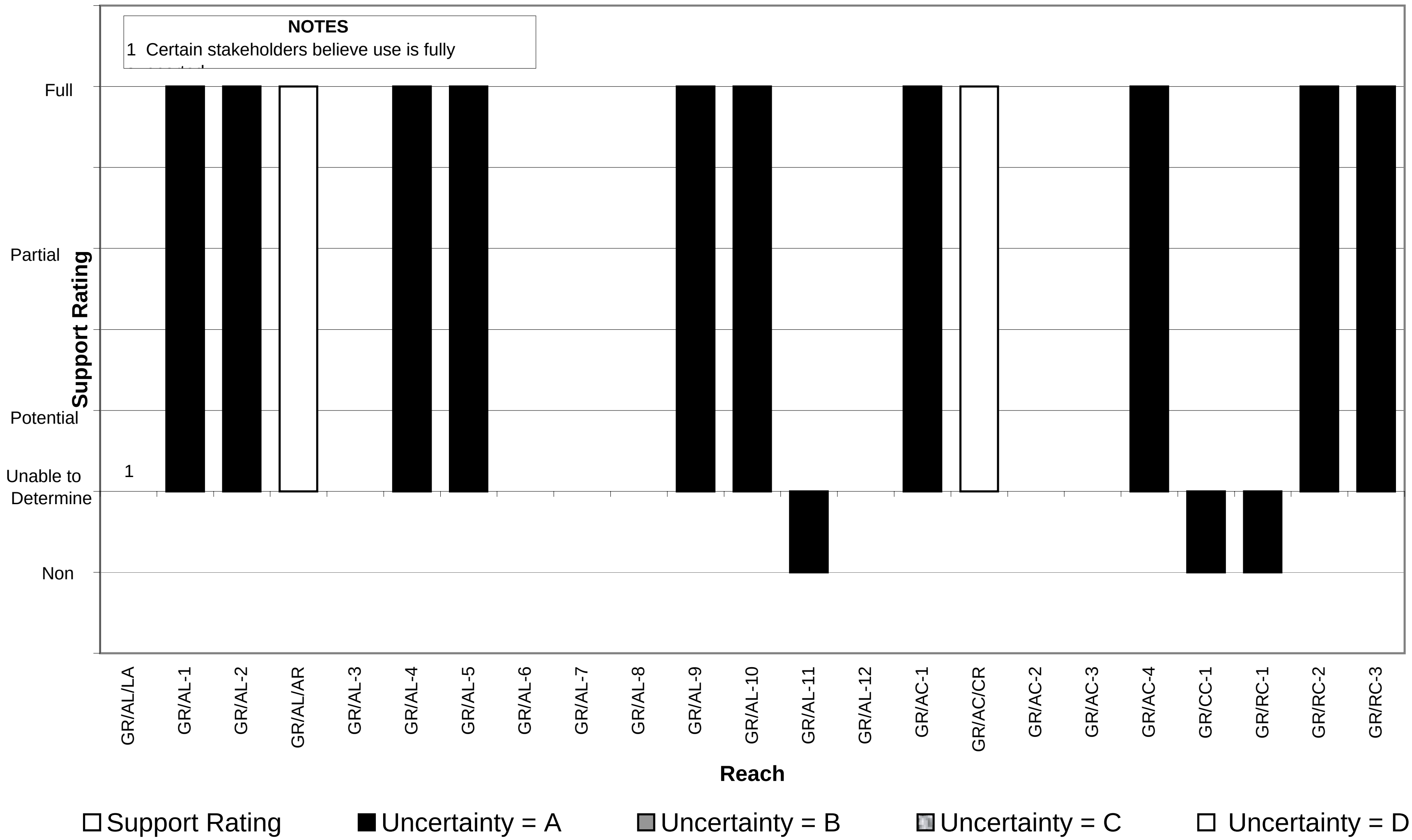
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 4
Guadalupe Watershed
Support and Uncertainty Ratings for PFF
Sheet 2 of 3



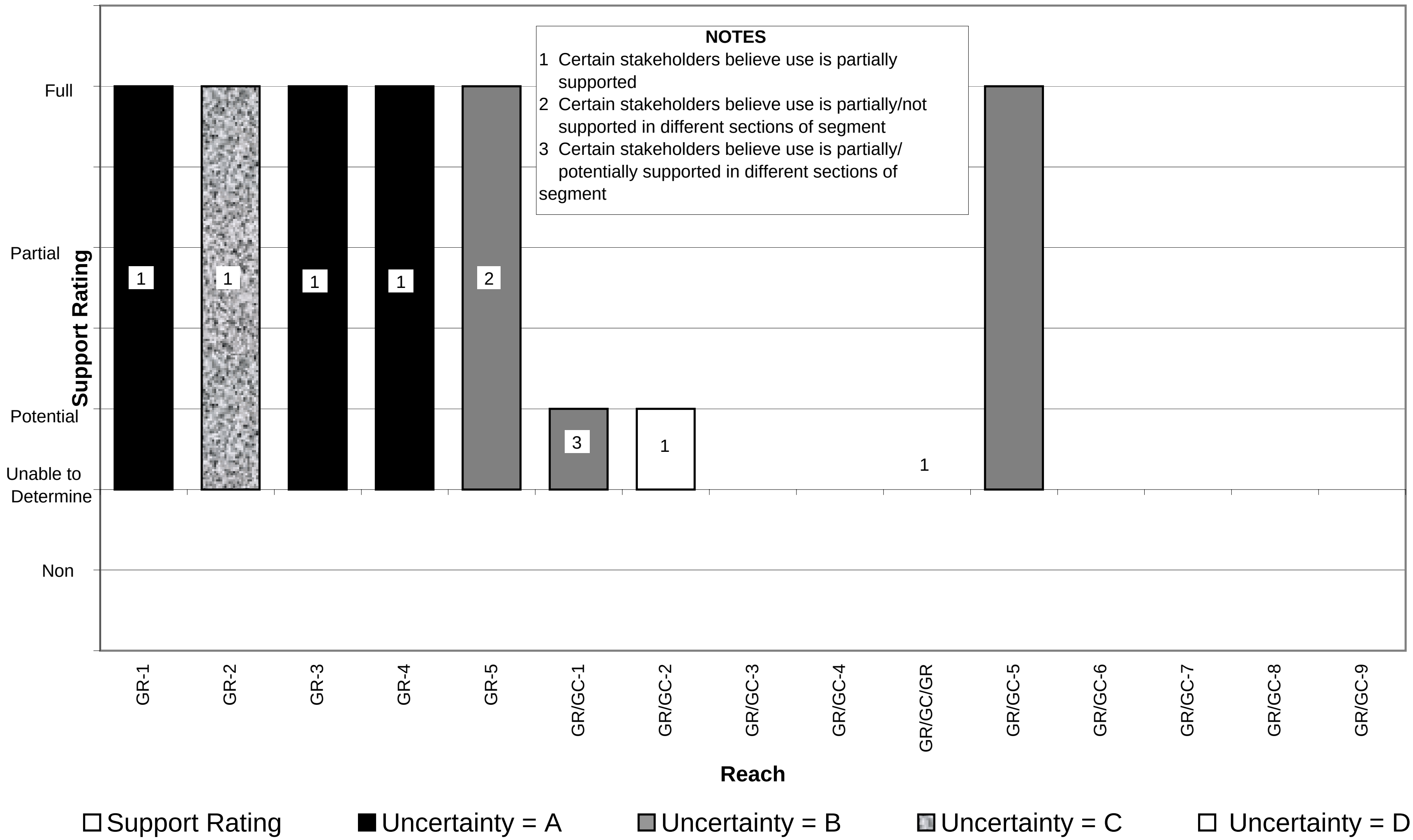
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 4
Guadalupe Watershed
Support and Uncertainty Ratings for PFF
Sheet 3 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

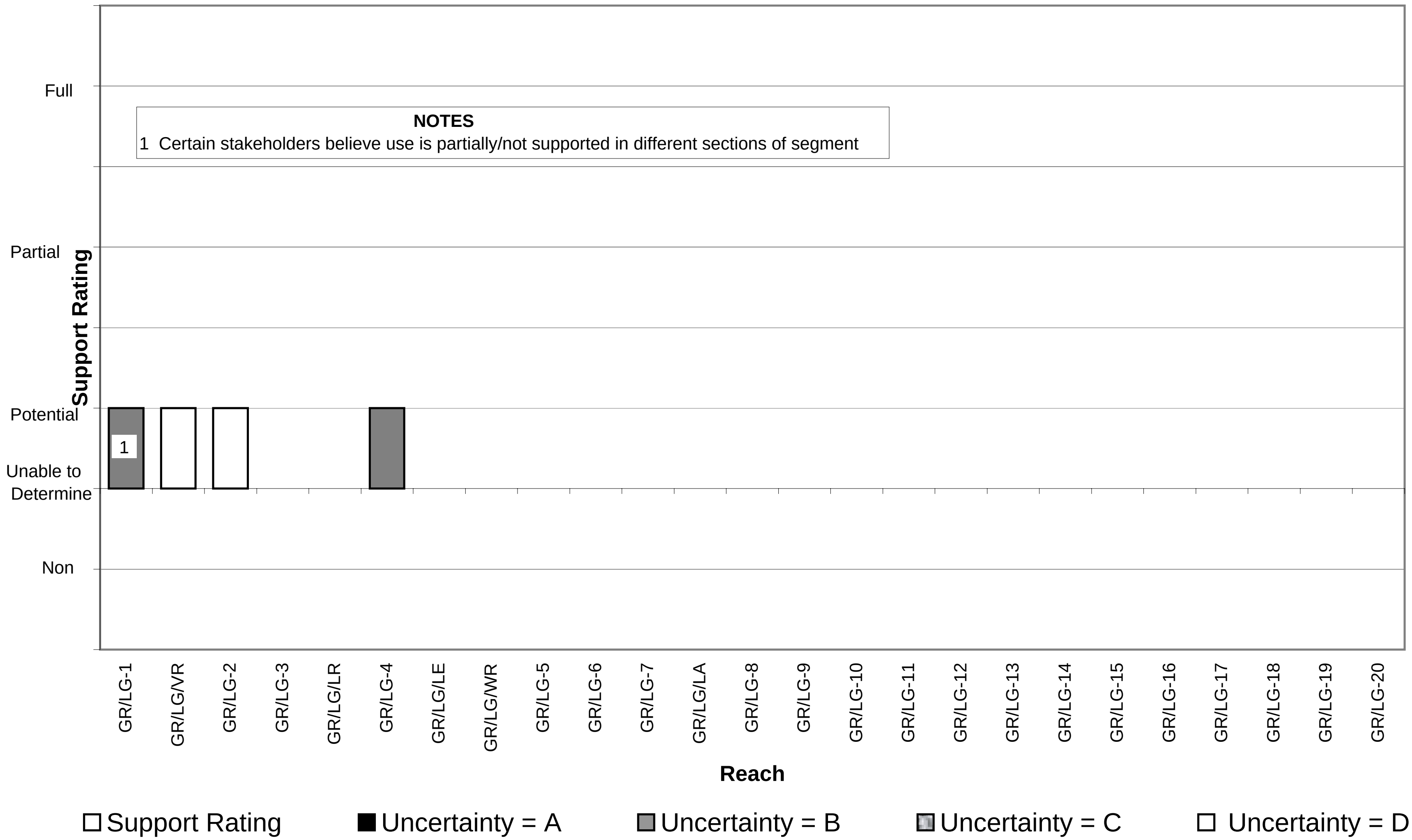
Appendix 4-A
Table 5
Guadalupe Watershed
Support and Uncertainty Ratings for RARE
Sheet 1 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

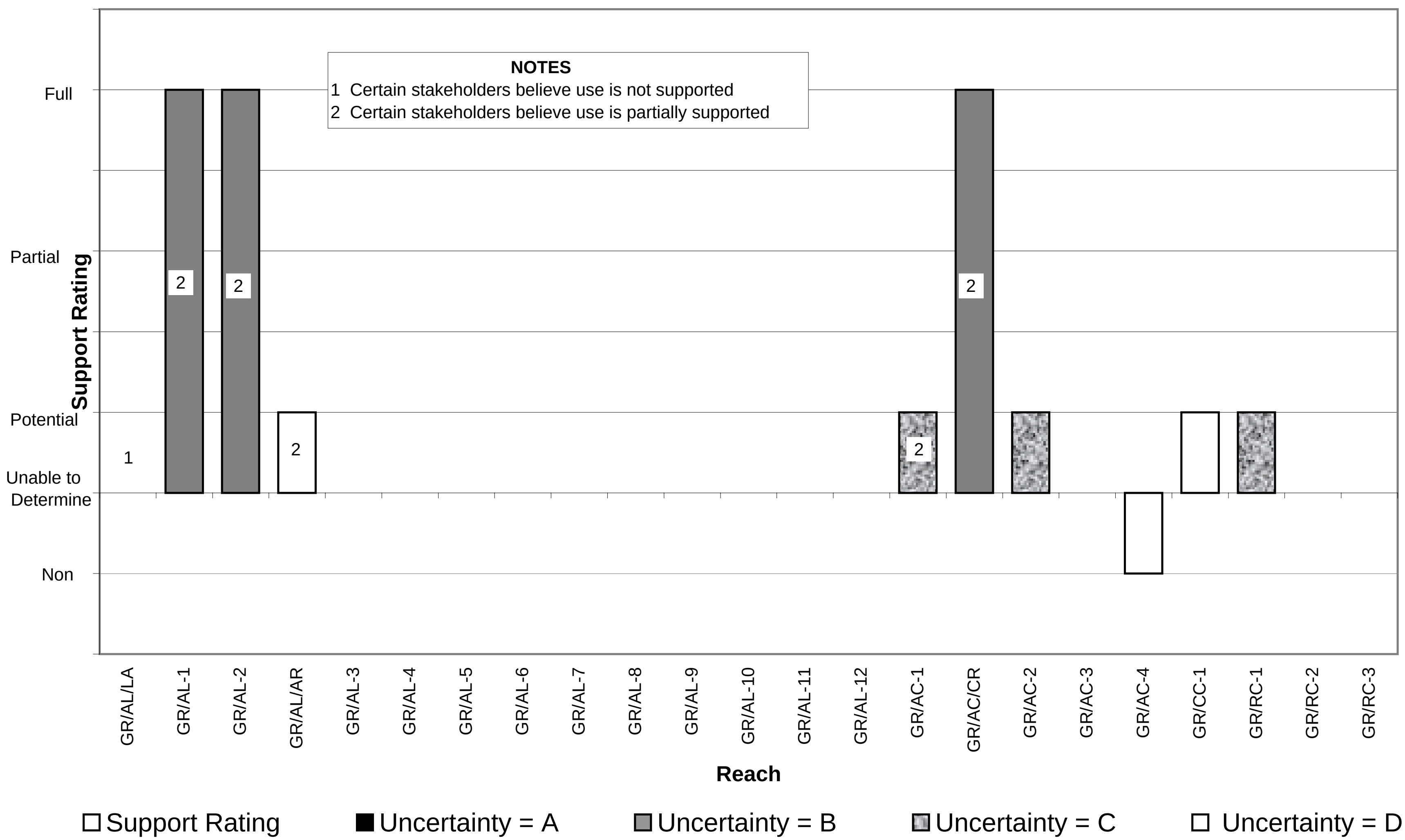
Appendix 4-A
Table 5

Guadalupe Watershed
Support and Uncertainty Ratings for RARE
Sheet 2 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

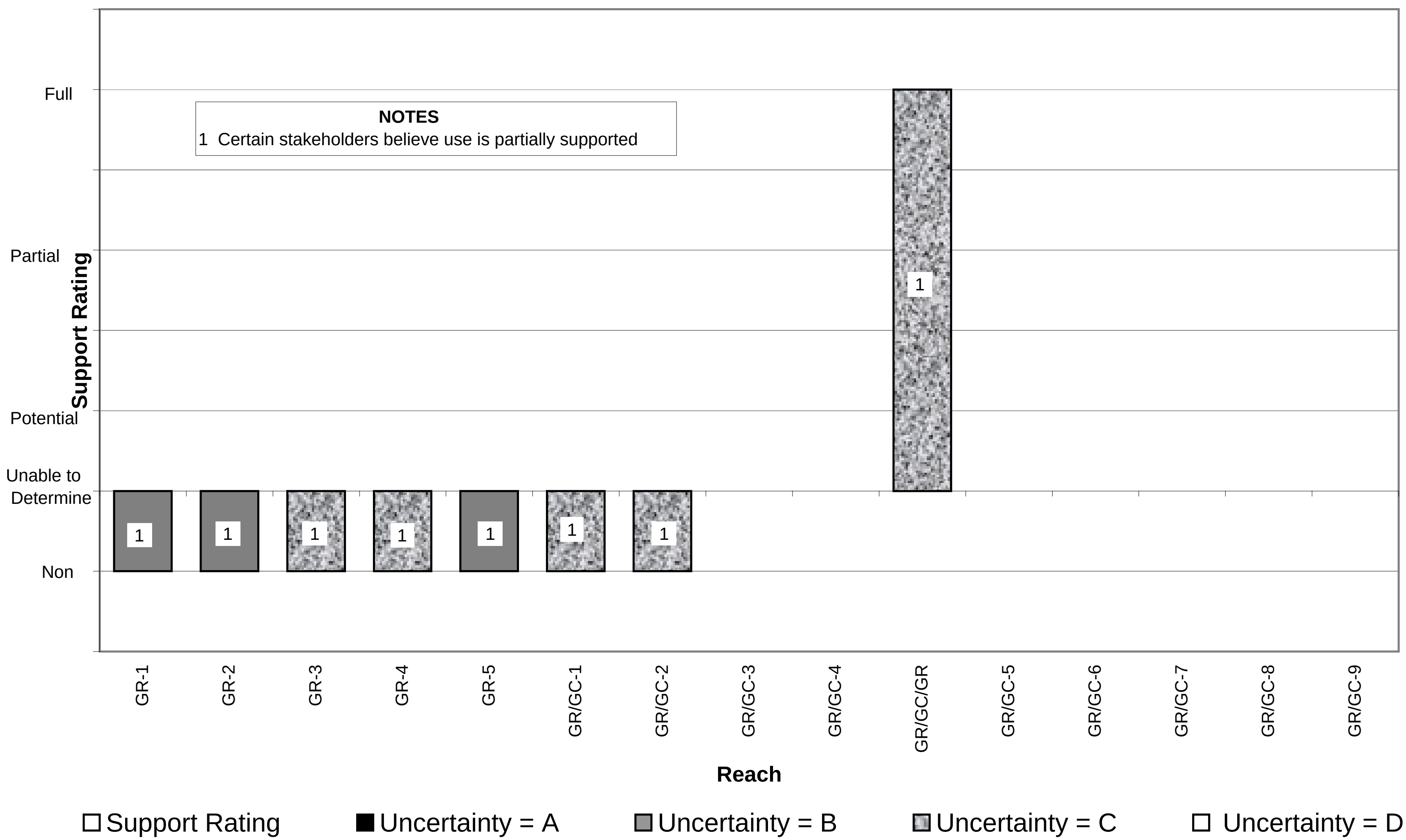
Appendix 4-A
Table 5
Guadalupe Watershed
Support and Uncertainty Ratings for RARE
Sheet 3 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

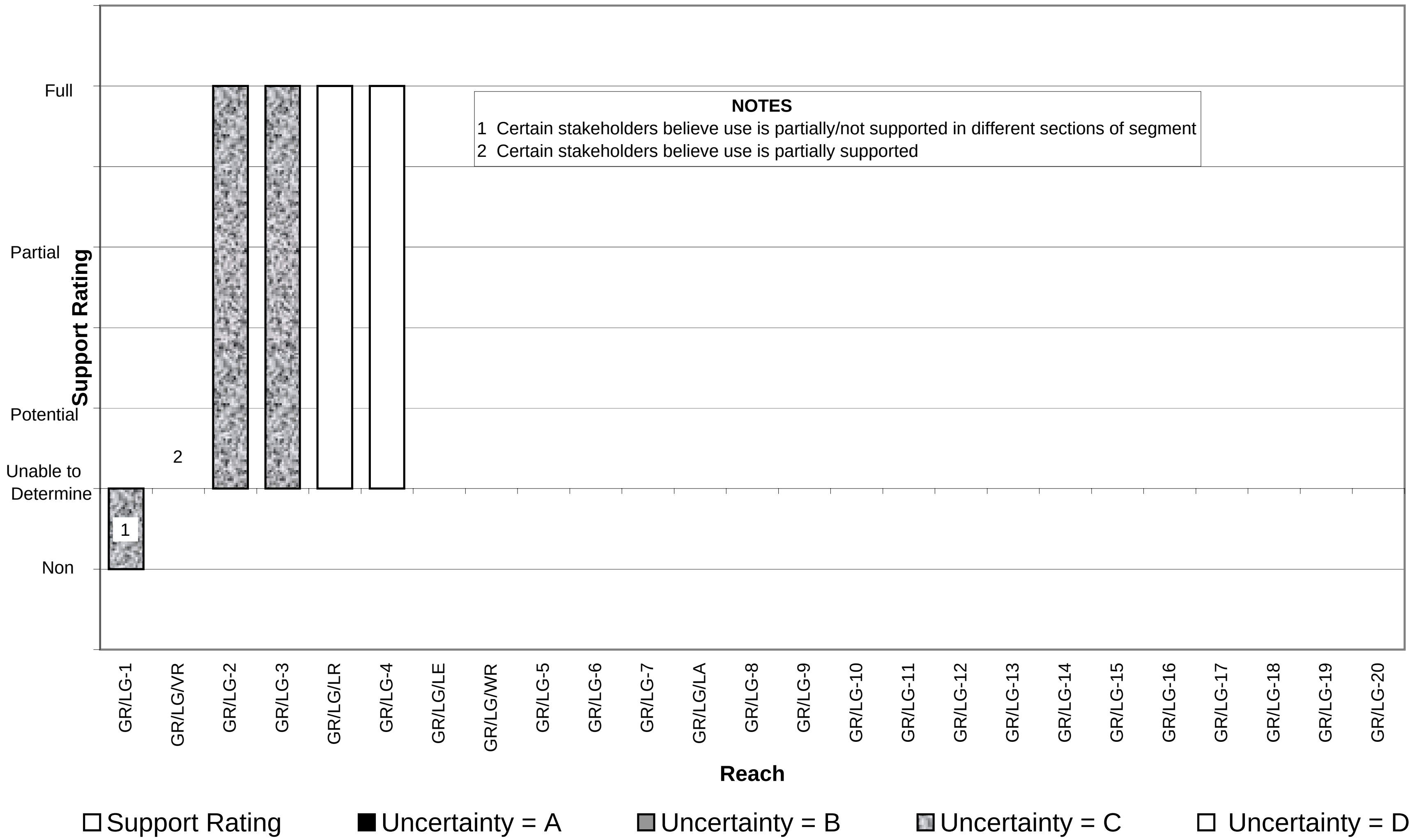
Appendix 4-A
Table 6

Guadalupe Watershed
Support and Uncertainty Ratings for REC-1
Sheet 1 of 3



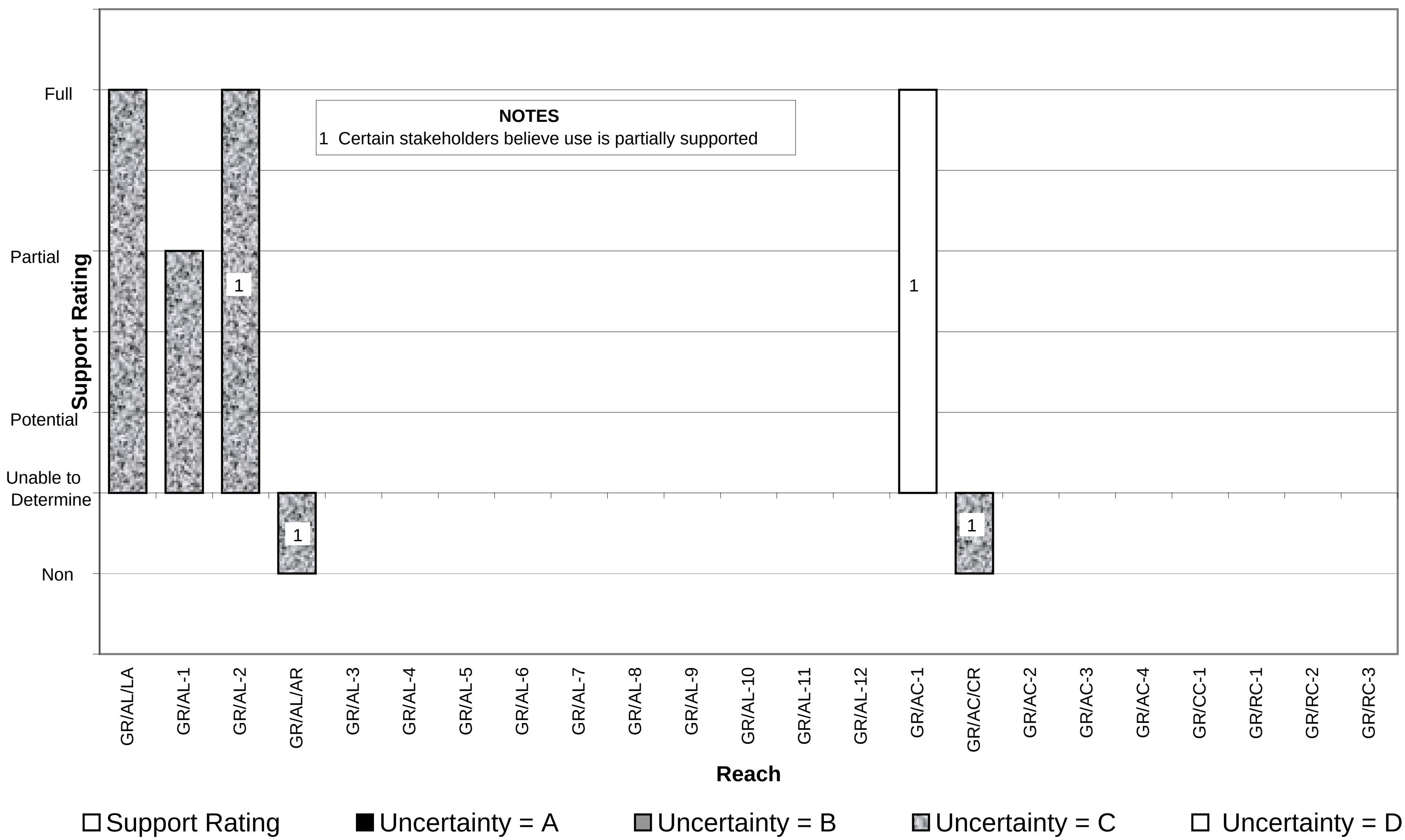
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 6
Guadalupe Watershed
Support and Uncertainty Ratings for REC-1
Sheet 2 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-A
Table 6
Guadalupe Watershed
Support and Uncertainty Ratings for REC-1
Sheet 3 of 3



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 4-B
Reach Summary Tables

Appendix 4-B contains a series of tables summarizing the pilot assessment results for all of the reaches in the Guadalupe River watershed where sufficient data existed for at least one of the five uses/interests. Reaches with insufficient data for all uses/interests do not have individual tables but are instead compiled and listed on the last page of this appendix. A listing of all reaches in the watershed and the page number in this appendix where each reach can be found is provided below.

GR/LG-6	Trout Creek	Entire Creek	124
GR/LG-7	Lyndon Canyon Creek	Entire Creek	124
GR/LG/LA	Lake Ranch Reservoir	Entire Reservoir	124
GR/LG-8	Daves Creek	Entire Creek	70
GR/LG-9	Black Creek	Entire Creek	124
GR/LG-10	Dyer Creek	Entire Creek	124
GR/LG-11	Briggs Creek	Entire Creek	124
GR/LG-12	Aldercroft Creek	Entire Creek	124
GR/LG-13	Moody Gulch	Entire Creek	72
GR/LG-14	Limekiln Creek	Entire Creek	124
GR/LG-15	Soda Springs Canyon Creek	Entire Creek	124
GR/LG-16	Hendrys Creek	Entire Creek	124
GR/LG-17	Hooker Gulch	Entire Creek	124
GR/LG-18	Austrian Gulch	Entire Creek	124
GR/LG-19	Almendra Creek	Entire Creek	74
GR/LG-20	Dry Creek	Entire Creek	124
GR/AL/LA	Lake Almaden	Entire Reservoir	76
GR/AL-1	Alamitos Creek	Lake Almaden to Arroyo Calero confluence	78
GR/AL-2	Alamitos Creek	Arroyo Calero confluence to Almaden Reservoir	82
GR/AL/AR	Almaden Reservoir	Entire Reservoir	86
GR/AL-3	Jacques Gulch	Entire Creek	124
GR/AL-4	Herbert Creek	Entire Creek	89
GR/AL-5	Barrett Canyon Creek	Entire Creek	92
GR/AL-6	Larabee Gulch	Entire Creek	124
GR/AL-7	Chilanian Gulch	Entire Creek	124
GR/AL-8	Deep Gulch	Entire Creek	124
GR/AL-9	Greystone Creek	Entire Creek	95
GR/AL-10	Golf Creek	Entire Creek	97
GR/AL-11	Randol Creek	Entire Creek	99
GR/AL-12	McAbee Creek	Entire Creek	124
GR/AC-1	Arroyo Calero	Alamitos Creek confluence to Calero Reservoir	102
GR/AC/CR	Calero Reservoir	Entire Reservoir	106
GR/AC-2	Cherry Canyon Creek	Entire Creek	109
GR/AC-3	Pine Tree Canyon Creek	Entire Creek	124
GR/AC-4	Santa Teresa Creek	Entire Creek	111
GR/CC-1	Canoas Creek	Entire Creek	114

GR/RC-1	Ross Creek	Guadalupe River confluence to Blossom Hill Road	117
GR/RC-2	Lone Hill Creek	Entire Creek	120
GR/RC-3	Short Creek	Entire Creek	122

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-1 **Reach Length (miles):** 3.22

Reach Limits (downstream to upstream): Gaging Station at Alviso to Montague Expressway **Flow Regime:** Tidal

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Stream shading, fish assemblage, temperature, DDT, PCBs, chlordane, mercury, selenium, riparian vegetation, barriers, stream type, streambank erosion potential, flow, macroinvertebrates	D0102	Potential/Seasonal Support	B	This reach is an important migratory corridor for salmon and steelhead; Chinook salmon spawn at upper end of reach; the reach does not meet cold insect criteria based on data from a wet summer (1998) or even in May 1997 at upstream end of reach
				D0135			
				D0214			
				D0237			
				D0311			
				D0312			
				D0315			
				D0561			
				D0603			
				D0625			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-1 **Reach Length (miles):** 3.22

Reach Limits (downstream to upstream): Gaging Station at Alviso to Montague Expressway **Flow Regime:** Tidal

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Transition

Local Knowledge Comments: Chinook salmon have never been documented as spawning at the upper end of this reach and would not be expected to do so. Chinook do not spawn in tide water. This area would also not be expected to meet the cold water indicator insect criteria because it is a tidewater area. This reach is also a critically important area where outgoing fish mature and grow and where both incoming and outgoing fish hold to adapt to changes in water salinity. GCRCD temperature data loggers at Tasman Ave. and Montague Expressway show that average hourly temperatures in this reach range from 54 degrees F in the winter to 70 degrees F in the mid summer. From November to April average temperatures were almost always below 60 degrees F. Published temperature information we have seen indicate these temperatures fall within the acceptable range for salmonids. Salmonids are currently supported in this reach and can be expected in this reach pretty much on a continuous basis. Adult Chinook have been documented in upstream areas as early as June and their runs often last into January. Juvenile fish have been documented out-migrating from February to May. Steelhead normally migrate up the river in the December to April time frame and the juveniles out migrate in the April to June time frame after spending at least a year in the river. Lamprey eels normally migrate up the river in the December to April time frame. Out-migrating Chinook juveniles reportedly use estuary areas for maturing and adapting to salt water but it is unknown how long they must remain in the estuary environment. Most likely it would be from several weeks to several months, which would put them in this reach from February to at least July. So salmonids could be expected in this segment year around. This reach should be evaluated for brackish and saltwater biota, which mature or maturing fish will feed on. There is absolutely no canopy cover for the river downstream of the 500 meter point below Montague Expressway, the only shade is provided by the Tasman, SR 237 and Gold Street bridges. Up to about 500 meters below Montegue Expressway there are only about a half dozen to a dozen trees and some of them are not in close proximity to the active channel so the river does not have a 94% cover in this area. Channel morphology, river flow rates, debris, trash and pollution should be listed as limiting factors. The support statement for GR-1 should either be Supported, Partially Supported or Not Applicable. This segment definitely supports the in and out migration of cold water species, the maturing of juvenile Chinook salmon and the adaptation of salmonids to fresh/or salt water, depending on if they are in or out migrating. However, it is unclear if tidewater fits the Basin Plan's definition for Cold.

Limiting Factor(s): Exceeds Chinook and steelhead temperature criteria; macroinvertebrate criteria are not met based on limited sampling

Suspected Cause(s): Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River.

Data Gap(s) - No Data: Secondary Indicators = dissolved oxygen, TSS, turbidity, channel substrate, width to depth ratio, bankfull, stage, discharge and width, special status species, instream spawning habitat, instream rearing habitat, water depth, physical barriers to migration, copper, chlorpyrifos, diazinon, dieldrin, dioxin, nickel.

Fair/Poor Quality Data: Secondary Indicators =stream shading, streambank erosion potential, altered channel materials, riparian vegetation, chlordane, DDT, PCB, selenium, mercury.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Good	Selenium, mercury, copper, nickel, chlordane, diazinon, dieldrin, chlorpyrifos, nitrate, nitrite, PCBs, DDT	D0237	Non Support	B	Data on 12 of the 16 parameters; no data on turbidity or TDS; unable to distinguish between wet and dry weather samples
				D0607			
				D0608			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-1 **Reach Length (miles):** 3.22

Reach Limits (downstream to upstream): Gaging Station at Alviso to Montague Expressway **Flow Regime:** Tidal

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Transition

Local Knowledge Comments

Limiting Factor(s): DDT exceeds criteria

Suspected Cause(s): Uncertain

Data Gap(s) - No Data: Fecal coliform, turbidity, dioxin, MTBE, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0639 and stakeholder input suggest that this reach is not able to convey 100 -year flood flows.
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0561			
				D0564			
				D0609			
				D0621			
				D0639			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-1 **Reach Length (miles):** 3.22

Reach Limits (downstream to upstream): Gaging Station at Alviso to Montague Expressway **Flow Regime:** Tidal

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Transition

Local Knowledge Comments This reach is really a modified, straightened earth channel - when first excavated, it was far wider and probably deeper than at present but the stream is attempting to regain its natural form; the active river channel is not confined by levees, though the corridor is; channel is not rock or concrete lined except in very limited segments around bridges or outfall pipes

Limiting Factor(s): Channel is unable to convey the 100- year flood

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).

Data Gap(s) - No Data: Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	A	Full support based on salmonids; additional potential support for CA Clapper Rail, Western Snowy Plover, and Alameda song sparrow; Full support for reaches 1-4 based on the assumption that if salmon are running up the river then all reaches below Los Gatos Creek are essential to migration
				D0084			
				D0087			
				D0111			
				D0112			
				D0135			
				D0136			
				D0561			
				D0580			
				D0609			

Local Knowledge Comments The clapper rail and salt marsh harvest mouse have been documented in this reach. The channel is filling with sediment and is being choked off by reeds due to inadequate flows. Although rare species such as the clapper rail, harvest mouse, and steelhead are supported they certainly are not fully supported. They are supported on a very limited level. In the case of fish, channel morphology and water flow rates and temperature are certainly limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-1 **Reach Length (miles):** 3.22

Reach Limits (downstream to upstream): Gaging Station at Alviso to Montague Expressway **Flow Regime:** Tidal

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (6 of 9 parameters); data on tertiary indicators present	Good	Flow (depth), access, copper, nickel, mercury, PCBs, dieldrin, DDT, chlordane	D0102	Non Support based on secondary indicators; Partial Support based on tertiary indicators; no support statement is able to be made for primary indicators	B	No data sets are available on primary indicators; D0561, D0607, and D0608 have data exceeding criteria for metals and toxic organics in both the water and sediment; access is limited in lower end of reach but good otherwise, limited data on water depth is available; trash problems have been noted
				D0382			
				D0561			
				D0607			
				D0608			

Local Knowledge Comments Status should be limited support. This entire reach supports fishing and small watercraft boating, the lower reaches even support power boating. The limiting factors for water contract recreation are access, flow levels, channel morphology, waterborne pathogens, and trash/debris.

Limiting Factor(s): Copper, nickel, PCBs, DDT, mercury, chlordane, dieldrin all exceed criteria either in water, sediment, or both; access is poor in lower part of reach and some trash problems have been noted

Suspected Cause(s): Historic mining waste in stream contributes to mercury; copper, nickel, and PCB exceedances possibly linked to historic urban stormwater discharges and/or illicit direct discharge to stream; chlordane and dieldrin are components of commonly used pesticides/herbicides and is present in urban stormwater; uncertain regarding DDT; trash is common in urban stream corridors; uncertain regarding access.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-2 **Reach Length (miles):** 3.59

Reach Limits (downstream to upstream): Montague Expressway to Interstate 880 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Fish assemblage, instream spawning habitat, temperature, dissolved oxygen, macroinvertebrates, riparian vegetation, barriers, instream rearing habitat quality, streambank erosion potential, altered channel materials and dimensions, flow	D0135	Potential/Seasonal Support	B	Adult spawning Chinook are present in this reach; reach does not meet cold insect criteria based upon sampling in May 1997 and September 1998.
				D0162			
				D0163			
				D0174			
				D0201			
				D0214			
				D0311			
				D0312			
				D0315			
				D0426			
				D0438			
				D0561			
				D0562			
				D0569			
				D0603			
				D0625			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-2 **Reach Length (miles):** 3.59

Reach Limits (downstream to upstream): Montague Expressway to Interstate 880 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Below Trimble Ave., support status should be Limited Support. Chinook and chum salmon, steelhead trout and lamprey eel migrate through the area. Chinook salmon have also been photo documented as holding and spawning in this segment for over the last 10 years. GCRCD data loggers at Trimble Ave and upstream indicate hourly temperatures during the dry season, April to September average from 67 to 69 degrees F. Fall/winter temperatures average from 52 to 68 degrees F. Published temperature information we have seen indicates that these temperatures fall within the acceptable summer range for salmonids. The primary limiting factors of channel morphology, flow rates, and pollution are not identified. Above Trimble Ave., support status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment from July through January for over 10 years. A mature chum salmon and numerous steelhead have been documented in this segment and juvenile Chinook have been captured out-migrating. Average hourly water temperatures vary from about 68 degrees F in the dry months to 52 degrees F in the fall/winter. Limiting Factors should be channel flow rates, morphology, temperature, lack of shade or hide cover, lack of good riparian zone and pollution. (GCRCD)

Limiting Factor(s): Indicator macroinvertebrate criteria are not met; no records of summer steelhead rearing during 1985-94 sampling; exceeds summer temperature criteria at 3 of 4 sites in reach

Suspected Cause(s): Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that habitat in the mainstem Guadalupe River is typified by long, deep, slackwater pools separated by an occasional short run or riffle. Baseflow velocities are very low and water quality poor. Lack of food production areas and no food transport are probably major factors limiting production.

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, special status species, stream type, channel substrate, width to depth ratio, bankfull, stage, discharge and width, shaded riverine aquatic habitat, water depth, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0639 and stakeholder input suggest that this reach is not able to convey 100 -year flood flows.

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-2 **Reach Length (miles):** 3.59

Reach Limits (downstream to upstream): Montague Expressway to Interstate 880 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0639 and stakeholder input suggest that this reach is not able to convey 100 -year flood flows.
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0561			
				D0564			
				D0609			
				D0621			
				D0639			

Local Knowledge Comments Reach should be split into two parts - above and below Trimble Avenue. The lower part of the reach contains a river channel that for the most part is above tidewater. A steep berm has been constructed on the east side of the river but both sides of the channel are well vegetated. Except for a short stretch just below Trimble Ave. there is good riparian habitat and Shaded Riverine Aquatic (SRA) cover. An overflow channel has also been constructed down the right side of the river and the area between the river and overflow channel was planted as a mitigation site for the 1983 Lower Guadalupe Flood Control Project. This site failed as the river has broken through the berm in a number of areas and washed out the mitigation plantings. It has also deposited tons of sediment in the overflow area as it attempts to regain its natural form and build a flood plain. There is no overflow channel, right side channel berm, or dense riparian area downstream of this segment or in the segment immediately upstream. This should be listed as a Quasi-Natural Modified (East Side Berm with a overflow passage) channel. The upper part of the reach should be designated a Modified, Straightened channel. The entire river channel has been moved to the east in the area of San Jose Airport. The channel used to flow through the airport area but it has been substantially straightened and the riverine corridor has been confined by levees on both sides. For the most part, there is little to no shade cover in this segment. There are a few established trees in the riparian areas bordering the river but only a few are close enough to provide shade cover and these are in a few small patches downstream of Airport Blvd. and US 101.

Limiting Factor(s): Channel is unable to convey the 100- year flood

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).

Data Gap(s) - No Data: Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-2 **Reach Length (miles):** 3.59

Reach Limits (downstream to upstream): Montague Expressway to Interstate 880 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

RARE	Sufficient	Fair	Special status species observations, Habitat	D0020	Full Support	C	Full support for Chinook, potential support for Alameda song sparrow based on historic data; full support for reaches 1-4 based on the assumption that if salmon are running up the river then all reaches below Los Gatos Creek are essential to migration; limited data on species presence and habitat for this reach
				D0084			
				D0087			
				D0112			
				D0135			
				D0136			
				D0174			
				D0561			
				D0569			
				D0609			

Local Knowledge Comments: Below Trimble Ave., support status should be Limited Support. Although Chinook and steelhead are known to use this area, aquatic habitat and temperatures are marginal. The good riparian habitat has high potential for special status bird species. We have seen reports that indicate several special status bird species have been identified in this area in the past few years. It is recommended that the Audubon Society be contacted for this information. Channel morphology, flow rates, and water temperatures are limiting factors for this use. Above Trimble Ave., support status should be Limited Support. Although Chinook and steelhead are known to use this area, aquatic habitat and temperatures are marginal. Riparian mitigation has been recently planted along channel banks in sections of this segment but it will take years to mature and provide meaningful benefit. A southwestern pond turtle was observed in this segment around 1995. Channel morphology, flow rates, water temperature, lack of a mature riparian zone and SRA cover are limiting factors for this use.

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data available on primary indicators; limited data on secondary indicators (3 of 9 parameters); limited data on tertiary indicators	Fair	Flow (depth), mercury, access, copper, nickel, aesthetics	D0102	Non Support based on secondary indicators; Partial Support based on tertiary indicators; no support statement is able to be made based on primary indicators	B	No data sets are available on primary indicators; D0557 and D0561 have data exceeding criteria for metals and toxic organics in both the water and sediment; access is generally good, limited data on water depth is available, trash problems have been noted
				D0147			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-2 **Reach Length (miles):** 3.59

Reach Limits (downstream to upstream): Montague Expressway to Interstate 880 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

REC-1	No data available on primary indicators; limited data on secondary indicators (3 of 9 parameters); limited data on tertiary indicators	Fair	Flow (depth), mercury, access, copper, nickel, aesthetics	D0163	Non Support based on secondary indicators; Partial Support based on tertiary indicators; no support statement is able to be made based on primary indicators	B	No data sets are available on primary indicators; D0557 and D0561 have data exceeding criteria for metals and toxic organics in both the water and sediment; access is generally good, limited data on water depth is available, trash problems have been noted
				D0382			
				D0561			

Local Knowledge Comments Below Trimble Ave., support status should be Limited Support. The reach supports fishing, wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, waterborne pathogens and debris. Above Trimble Ave., support status should be Limited Support. The reach supports fishing, wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, waterborne pathogens and debris.

Limiting Factor(s): Copper, nickel, mercury exceed criteria for water and sediment based on limited data; aesthetics may be a problem

Suspected Cause(s): Historic mining waste in stream contributes to mercury; copper, nickel exceedances possibly linked to historic urban stormwater discharges and/or illicit direct discharge to stream; trash is common in urban stream corridors; algae is product of excessive nutrient inputs, possibly yard or landscaping waste from upstream or detergents and human or animal waste.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-3 **Reach Length (miles):** 1.05

Reach Limits (downstream to upstream): Interstate 880 to Coleman Avenue **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Fish assemblage, instream spawning habitat, temperature, dissolved oxygen, macroinvertebrates, riparian vegetation, barriers, instream rearing habitat	D0135	Potential/Seasonal Support	B	Pools present in reach during most summers as streamflow is low and variable; Chinook salmon spawn in reach; reach does not meet insect criteria during late summer based on 1998 sampling; temperature data indicates that criteria are exceeded even in wet years (1998, 1999)
				D0163			
				D0201			
				D0214			
				D0224			
				D0311			
				D0312			
				D0315			
				D0426			
				D0438			
				D0568			
				D0569			
				D0576			
				D0603			
				D0625			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-3 **Reach Length (miles):** 1.05

Reach Limits (downstream to upstream): Interstate 880 to Coleman Avenue **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Support status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment. Average hourly temperatures in this segment in dry months vary from 64 to 70 degrees F and in fall/winter months from 52 to 64 degrees F. Limiting Factors should be channel flow rates, morphology, temperature, lack of shade or hide cover, marginal riparian zone, pollution and poaching. SCVWD gauges show a lack of streamflow during summer. (GCRCD) The SCVWD would prefer to manage the mainstem reaches of the Guadalupe River as a passage corridor. There will always be stray fish that don't stay where they should but observing a fish in a stream reach doesn't provide the basis for a management plan.

Limiting Factor(s): Indicator macroinvertebrate criteria are not met in late summer; no records of summer steelhead rearing during 1985-94 sampling

Suspected Cause(s): Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no rearing habitat.

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, streambank erosion potential, channel substrate, width to depth ratio, bankfull, stage, discharge and width, shaded riverine aquatic habitat, water depth, special status species, altered channel materials and dimensions, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Turbidity, nitrate, nitrite, copper, nickel, fecal coliform, mercury, diazinon, DDT, selenium	D0206	Non Support	B	Data on 9 of 16 parameters; uncertainty based on age of some of the data and lack of data on certain parameters; unable to distinguish dry and wet weather sampling for one data set
				D0219			
				D0597			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform exceeds criteria; some DDT, turbidity, mercury, and nickel samples also exceed criteria

Suspected Cause(s): Natural sources and urban runoff may contribute to nickel. Historic mining waste in stream contributes to elevated concentrations of mercury in water samples. Uncertain regarding fecal coliform and turbidity.

Data Gap(s) - No Data: Chlordane, chlorpyrifos, dieldrin, dioxin, MTBE, PCB, nickel, TDS

Fair/Poor Quality Data: Fecal coliform, turbidity, copper, DDT, diazinon, nitrate, nitrite, selenium, mercury, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-3 **Reach Length (miles):** 1.05

Reach Limits (downstream to upstream): Interstate 880 to Coleman Avenue **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for two critical urban reaches which are not large enough to convey the 1% flood: Hedding to Taylor (SCVWD stationing #59450 to 61450) and Hobson to Coleman (62200 to 63600) (3) Only Contract 1 of the Flood Control Project is completed to date (as per personal communication with Randy Talley of SCVWD on March 13, 2002), therefore, this reach of the river cannot be considered "protected" from large flood events such as the 100-year flood, until all portions of the project are completed -- once all the portions are completed the suport status of this reach can be changed from "Non-Support" to "Full Support"
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0564			
				D0565			
				D0577			
				D0609			
				D0621			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-3 **Reach Length (miles):** 1.05

Reach Limits (downstream to upstream): Interstate 880 to Coleman Avenue **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Support status should be full support after completion of the Downtown Flood Control Project (Contract 2); Channel type should be Quasi-Natural Straightened, Incised (berms on both sides of main channel). The main channel is down cutting (about a foot per year since 1996) as a direct result of the recently constructed flood control project. Areas of the bypass channel are eroding and in other areas there is severe deposition. The berm on the west side of the channel was breached a number of times soon after project construction and has since been armored with rocks and log crib walls in areas which are now being undercut. The low flow channel weirs just downstream of Coleman Ave. that were installed to guarantee fish passage have for the most part been buried by

Limiting Factor(s): Channel is unable to convey the 100-year flow in two segments; land uses adjacent to the stream in these segments consist of urban commercial

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban commercial development into the natural channel floodplain. Problem segments are: Hedding to Taylor (SCVWD stationing #59450 to 61450) and Hobson to Coleman (62200 to 63600). Only Contract 1 of the Flood Control Project is completed to date. Therefore, this reach of the river cannot be considered "protected" from large flood events such as the 100-year flood until all portions of the project are completed. Once all the portions are completed the support status of this reach can be changed from "Non-Support" to "Full Support".

Data Gap(s) - No Data: Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	A	Full support based on Chinook; full support for reaches 1-4 based on the assumption that if salmon are running up the river then all reaches below Los Gatos Creek are essential to migration
				D0084			
				D0087			
				D0135			
				D0136			
				D0568			
				D0569			
				D0609			

Local Knowledge Comments: Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, aquatic habitat and temperatures are marginal. Vegetation has been planted in the area between the channel and bypass channel and advertised as riparian mitigation but it is out of the riparian zone and does not provide shade cover for the river. Much of the once dense riparian zone has been lost due to bank erosion caused by river confinement, denying the river access to a floodplain. This area has potential habitat for the southwestern pond turtle based on a 1995 survey by a pond turtle expert hired by the GCRCD. Channel morphology, flow rates, and water temperatures are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-3 **Reach Length (miles):** 1.05

Reach Limits (downstream to upstream): Interstate 880 to Coleman Avenue **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient on primary indicator; sufficient on secondary indicator; limited on tertiary indicator	Fair	Aesthetics, flow (depth), fecal coliform, copper, mercury, nickel, chlordane, DDT, dieldrin	D0147	Non Support based on primary indicator; Non Support based on secondary indicators; insufficient data on tertiary	C	D0206 and D0597 have data on fecal coliform, but the former is 20 years old and the latter is only for winter (non-recreation season) -- most data exceed criteria; limited data is available on several secondary indicators -- these indicate that toxic organics exceed criteria in reach, as do some of the mercury water samples and all mercury sediment samples; very limited aesthetics data indicates some problems but data is insufficient to base a support
				D0163			
				D0206			
				D0383			
				D0561			
				D0570			
				D0597			

Local Knowledge Comments: Support Status should be Limited Support. The reach supports fishing, wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments and human waste.

Limiting Factor(s): Fecal coliform exceeds criteria, including during one recreation season (summer); mercury, chlordane, DDT, and dieldrin exceed criteria based on limited sampling

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-4 **Reach Length (miles):** 1.44

Reach Limits (downstream to upstream): Coleman Ave. to Interstate 280 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Fish assemblage, instream spawning habitat, temperature, dissolved oxygen, macroinvertebrates, mercury, nickel, copper, TSS, riparian vegetation, barriers, turbidity, instream rearing	D0135	Potential/Seasonal Support	B	Pools present in reach during most summers as streamflow is variable; adult Chinook present in reach and spawning sites have been observed; reach does not meet insect criteria in late summer; temperature data indicates that the criteria are exceeded even in wet years (1998, 1999) at 2
				D0163			
				D0201			
				D0207			
				D0214			
				D0311			
				D0312			
				D0315			
				D0426			
				D0438			
				D0568			
				D0569			
				D0576			
				D0603			
				D0625			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-4 **Reach Length (miles):** 1.44

Reach Limits (downstream to upstream): Coleman Ave. to Interstate 280 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Support Status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment, lamprey eel also migrate and spawn in this area. Average hourly temperatures in this segment in dry months vary from 64 to 70 degrees F and in fall/winter months from 52 to 64 degrees F. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, pollution, poaching, barriers. SCVWD stream gauges show a lack of streamflow during summer. (GCRCD) The SCVWD would prefer to manage the mainstem reaches of the Guadalupe River as a passage corridor. There will always be stray fish that don't stay where they should but observing a fish in a stream reach doesn't provide the basis for a management plan. (SCVWD)

Limiting Factor(s): Indicator macroinvertebrate criteria are not met in late summer; no records of summer steelhead rearing during 1985-94 sampling (see comment under D0163 below)

Suspected Cause(s): Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no rearing habitat.

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, streambank erosion potential, channel substrate, width to depth ratio, bankfull, stage, discharge and width, shaded riverine aquatic habitat, water depth, special status species, altered channel materials and dimensions, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Mercury, nickel, copper, selenium, turbidity, nitrite	D0207	Non Support	C	Data available on 6 of 16 parameters; uncertainty over USGS data reporting -- some data is highly irregular and questionable; lack of other constituents; unable to distinguish dry from wet weather samples
				D0426			

Local Knowledge Comments:

Limiting Factor(s): Turbidity, nickel, mercury, selenium, copper all exceed criteria

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB

Fair/Poor Quality Data: Turbidity, copper, selenium, mercury, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-4 **Reach Length (miles):** 1.44

Reach Limits (downstream to upstream): Coleman Ave. to Interstate 280 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for one critical urban reach which is not large enough to convey the 1% flood: upstream of Auzerais Street (70000 to 71500)
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0564			
				D0565			
				D0577			
				D0609			
				D0621			

Local Knowledge Comments: Channel type should be Quasi-Natural Widened, Straightened and Incised. The upper part of this segment has a concrete bypass channel, which is not operational as yet. At least two more bypass channels are slated for construction down stream. Much of the channel has been lined with rock gabions and is

Limiting Factor(s): Channel is unable to convey the 100-year flow in one segment; land uses adjacent to the stream in this segment consist of urban commercial and residential

Suspected Cause(s): (a) Creek does not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segment is upstream of Auzerais Street (70000 to 71500).

Data Gap(s) - No Data: Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	A	Full support based on Chinook; full support for reaches 1-4 based on the assumption that if salmon are running up the river then all reaches below Los Gatos Creek are essential to migration
				D0084			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-4 **Reach Length (miles):** 1.44

Reach Limits (downstream to upstream): Coleman Ave. to Interstate 280 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

RARE	Sufficient	Good	Special status species observations, Habitat	D0087	Full Support	A	Full support based on Chinook; full support for reaches 1-4 based on the assumption that if salmon are running up the river then all reaches below Los Gatos Creek are essential to migration
				D0135			
				D0136			
				D0568			
				D0569			
				D0609			

Local Knowledge Comments: Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, aquatic habitat and temperatures are marginal. The riparian area is narrow and has been degraded by the rock gabions. Much of the mitigation vegetation planted in the gabions has been washed away. Channel morphology, flow rates, water temperature, and instream barriers are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data available on primary indicators; limited data on secondary indicators (3 of 9 parameters); limited data on tertiary indicators	Good	Aesthetics, mercury, nickel, copper, flow (depth)	D0147	Non Support on secondary indicator; Non Support on tertiary indicator; no support statement is able to be made on primary indicators	C	D0281, D0561, and D0570 have data on mercury in water (some samples exceed criteria) and sediment (all samples exceed criteria), other constituents meet criteria, though data is limited; limited aesthetics information indicates problems but data is quite old; no pathogen data is available
				D0163			
				D0207			
				D0383			
				D0561			
				D0570			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-4 **Reach Length (miles):** 1.44

Reach Limits (downstream to upstream): Coleman Ave. to Interstate 280 **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Support Status should be Limited Support. The reach supports fishing, wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments and human waste.

Limiting Factor(s): Mercury in both water and sediment exceeds criteria; aesthetics are poor based on limited data

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-5 **Reach Length (miles):** 6.12

Reach Limits (downstream to upstream): Interstate 280 to Guadalupe and Alamitos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Barriers, riparian vegetation, fish assemblage, temperature, dissolved oxygen, instream spawning habitat, flow, channel alterations, instream rearing habitat, macroinvertebrates	D0001	Partial Support and Potential/Seasonal Support	B	Well documented use of this reach by spawning Chinook and steelhead; occasionally used by juvenile steelhead; reach does not meet insect criteria during late summer; high summer stream temperatures exist within this reach; exceeds steelhead and Chinook temperature criteria
				D0087			
				D0135			
				D0159			
				D0161			
				D0163			
				D0164			
				D0165			
				D0172			
				D0173			
				D0174			
				D0201			
				D0214			
				D0224			
				D0227			
				D0311			
				D0312			
				D0315			
				D0412			
				D0416			
				D0418			
				D0419			
				D0422			
				D0423			
				D0426			
				D0438			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-5 **Reach Length (miles):** 6.12

Reach Limits (downstream to upstream): Interstate 280 to Guadalupe and Alamitos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Barriers, riparian vegetation, fish assemblage, temperature, dissolved oxygen, instream spawning habitat, flow, channel alterations, instream rearing habitat, macroinvertebrates	D0569	Partial Support and Potential/Seasonal Support	B	Well documented use of this reach by spawning Chinook and steelhead; occasionally used by juvenile steelhead; reach does not meet insect criteria during late summer; high summer stream temperatures exist within this reach; exceeds steelhead and Chinook temperature criteria
				D0603			
				D0625			

Local Knowledge Comments: In Segment A, Support Status should be Limited Support. Chinook salmon are known to migrate through, hold and spawn in this segment. Lamprey eel also migrate and spawn in this area. Average hourly temperatures in this segment in dry months vary from 64 to 70 degrees F and in fall/winter months from 52 to 64 degrees F. Limiting Factors should be channel flow rates, morphology, water temperature, pollution, debris and rubble. In Segment B, Support Status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment over the past 10 years. Lamprey eels also migrate and spawn in this area. Rock gabions are detrimental to salmonid spawning as the fish often try to dig the rock out of the wire baskets and rip themselves apart on the wire or they will sometimes deposit their eggs in the baskets and then can not cover them. Average hourly temperatures in this segment in dry months vary from 66 to 72 degrees F and in fall/winter months from 52 to 66 degrees F. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, gabions, pollution and poaching. In Segment C, Support Status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment over the past 10 years. Lamprey eel are also known to migrate and spawn in the lower parts of this segment. Average hourly temperatures in this segment in dry months vary from 65 to 72 degrees F and in fall/winter months from 55 to 65 degrees F and are elevated from downstream temperatures because of the lack of shade cover upstream. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, pollution and poaching. In Segment D, Support Status should be Limited Support. Chinook salmon have been photo documented as migrating through, holding in and spawning in this segment over the past few years. Average hourly temperatures in this segment in dry months vary from 65 to 72 degrees F and in fall/winter months from 55 to 65 degrees F and are elevated from downstream temperatures because of the lack of shade cover in this segment and upstream areas. Unfortunately the fish ladder installed on the dam only leads the fish to an inhospitable environment at this time (Lake Almaden and shallow hot creeks). The dam has backed up sediment, which is causing problems both up and down stream and needs to be removed. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, pollution, 15 foot high dam and poaching. (GCRCD) The SCVWD would prefer to manage the mainstem reaches of the Guadalupe River as a passage corridor. There will always be stray fish that don't stay where they should but observing a fish in a stream reach doesn't provide the basis for a management plan. (SCVWD)

Limiting Factor(s): Indicator macroinvertebrate criteria are not met in late summer

Suspected Cause(s): Similar to reaches GR-1-4, in that summer streamflows depend upon releases from upstream reservoirs for groundwater percolation. However, the reach is within the recharge zone and streamflows are higher within this reach, but flows rapidly decline and temperatures increase downstream within this reach; suitable fast-water feeding habitat is scarce within the reach, so summer steelhead rearing is usually limited, but variable among years. The reach is lightly shaded and the channel is generally wide. Winter water temperatures exceed Chinook spawning and rearing criteria, but successful spawning and rearing may occur in some years. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, streambank erosion potential, channel substrate, width to depth ratio, bankfull, stage, discharge and width, shaded riverine aquatic habitat, water depth, special status species, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-5 **Reach Length (miles):** 6.12

Reach Limits (downstream to upstream): Interstate 280 to Guadalupe and Alamitos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Turbidity, nitrate, nitrite, copper, nickel, fecal coliform, mercury, diazinon, chlordane	D0073	Non Support	C	Data on 8 of 16 parameters; much of the data is very old; cannot distinguish dry/wet weather samples for most of data
				D0206			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform, with some nickel samples exceeding criteria

Suspected Cause(s):

Data Gap(s) - No Data: Chlorpyrifos, DDT, dieldrin, dioxin, MTBE, PCB, selenium, TDS

Fair/Poor Quality Data: Fecal coliform, turbidity, chlordane, copper, diazinon, nitrate, nitrite, mercury, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for three specific critical urban locations: 78000 (at WPRR), 82700 (Malone), 90800 (Capital Expwy) where channel is too
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0562			
				D0564			
				D0609			
				D0621			

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-5 **Reach Length (miles):** 6.12

Reach Limits (downstream to upstream): Interstate 280 to Guadalupe and Alamitos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Reach should be split into four parts - (A) from lower end to Curtner Ave; (B) Curtner to Gage Station 23B; (C) Gage Station 23B to Branham Lane; and (D) Branham to Lake Almaden. Segment A is a Quasi-Natural, Incised channel with a decent riparian zone but the channel is deeply incised. It contains a lot of construction rubble that is sliding off the banks where it has been dumped in the past. The channel has very limited access. Water temperatures start to cool down in this area as a result of the shade cover. Segment B should be listed as Widened, Straightened and Gabion Contained. The river channel was relocated in this segment when Almaden Expressway was constructed. This segment of channel has little, if any, SRA cover and the riparian vegetation is poor. The designed channel was overly wide and gabion lined on both sides but the stream has since constructed a narrower channel. Segment C should be listed as Quasi-Natural Straightened, Incised. The channel is overly wide in areas but has natural but steep banks in most areas. This segment also has two areas where drop structures have been removed and replaced with a series of rock weirs. While the weirs have improved conditions greatly they were not properly designed which is causing some erosion problems in both areas. This area has a fair but narrow riparian area and provides fair SRA cover. Segment D should be listed as Modified Straightened. However, a new Quasi-Natural Meandering channel is starting to develop in this segment. The channel's width/depth ratio is substantially decreasing and it is starting to meander within the corridor levees. Riparian vegetation is taking hold, riffles and pools are developing in the new channel and spawning gravel is being recruited. Towards the top of this segment there is a 15 foot high dam that blocked fish migration up until several years ago when a fish ladder was installed. In the recent past, the channel in this area was wide and shallow due to a series of instream dirt spreader dams that were constructed every year and gabions line a good portion of the channel. There was virtually no riparian habitat or shade cover as the dams would drown upstream vegetation and deprive downstream vegetation of any water. Water temperatures in this area were elevated due to the lack of shade cover, the wide shallow channels, and water coming from Lake Almaden and the creeks upstream.

Limiting Factor(s): Channel is unable to convey the 100-year flow in three segments; land uses adjacent to the stream in these segments consist of urban commercial and residential

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segments are: 78000 (at WPRR), 82700 (Malone), 90800 (Capital Expwy).

Data Gap(s) - No Data: Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	B	Full support based on Chinook and steelhead presence; potential support for sharp shinned hawk, Cooper's hawk, yellow warbler, merlin, loggerhead shrike, burrowing owl (it is believed that double crested cormorant is present and should be on the list and burrowing owl is present and on the list however, owl is dependent on the levees and not on
				D0084			
				D0087			
				D0135			
				D0136			
				D0137			
				D0159			
				D0164			
				D0165			
				D0174			

RARE	Sufficient	Good	Special status species observations, Habitat	D0412	Full Support	B	Full support based on Chinook and steelhead presence; potential support for sharp shinned hawk, Cooper's hawk, yellow warbler, merlin, loggerhead shrike, burrowing owl (it is believed that double crested cormorant is present and should be on the list and burrowing owl is present and on the list however, owl is dependent on the levees and not on
				D0416			
				D0418			
				D0419			
				D0425			
				D0561			
				D0566			
				D0569			
				D0609			

Local Knowledge Comments: In Segment A, Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, aquatic habitat and temperatures are marginal. The riparian area is narrow and has been degraded by concrete rubble dumped over the banks in the past. A southwestern pond turtle was observed and photographed in the upper end of this segment in 1994. Channel morphology, flow rates, water temperature, and instream barriers are limiting factors for this use. Because of this segment's isolation there is good potential habitat for rare song bird species. In Segment B, Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, shade and hide cover and temperatures are marginal. The riparian area is poor and there is little, if any SRA cover. An April 2001 survey of this segment revealed evidence that young trees that were trying to establish themselves had recently been sprayed with herbicide. Channel morphology, flow rates, water temperature, and the gabion confined channel are limiting factors for this use. In Segment C, Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, water temperatures are marginal. Channel morphology, flow rates, and water temperature, are limiting factors for this use. In Segment D, Support Status should be Limited Support. Although Chinook and steelhead are known to use this area, water temperatures are marginal. Channel morphology, flow rates, and water temperature, are limiting factors for

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient on primary indicator; limited but sufficient on secondary indicator; limited on tertiary indicator	Fair	Aesthetics, flow (depth), fecal coliform, copper, mercury, nickel, chlordane	D0147	Non Support (primary indicator meets criteria during recreation season, some secondary indicators exceed relevant criteria, tertiary indicators do not appear to meet criteria)	B	D0206 has data on fecal coliform, but is 20 years old -- most data meets criteria for REC; limited data is available on several secondary indicators -- these indicate that chlordane and mercury exceed criteria in reach, as do some mercury sediment samples; aesthetics data indicates some problems, particularly with water clarity

Watershed: Guadalupe

Waterbody: Guadalupe River **Reach:** GR-5 **Reach Length (miles):** 6.12

Reach Limits (downstream to upstream): Interstate 280 to Guadalupe and Alamitos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

REC-1	Sufficient on primary indicator; limited but sufficient on secondary indicator; limited on tertiary indicator	Fair	Aesthetics, flow (depth), fecal coliform, copper, mercury, nickel, chlordane	D0163	Non Support (primary indicator meets criteria during recreation season, some secondary indicators exceed relevant criteria, tertiary indicators do not appear to meet criteria)	B	D0206 has data on fecal coliform, but is 20 years old -- most data meets criteria for REC; limited data is available on several secondary indicators -- these indicate that chlordane and mercury exceed criteria in reach, as do some mercury sediment samples; aesthetics data indicates some problems, particularly with water clarity
				D0206			
				D0383			
				D0557			
				D0561			
				D0603			
				D0613			

Local Knowledge Comments: In Segment A, Support Status should be Limited Support. The reach supports small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and rubble. In Segment B, Support Status should be Limited Support. The reach supports fishing, wading small watercraft boating. The primary limiting factors for this use are water flow levels, pollution, debris, waterborne pathogens and vagrant encampments. In Segment C, Support Status should be Limited Support. The reach supports fishing, wading small watercraft boating. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments. In Segment D, Support Status should be Limited Support. The reach supports fishing, wading, small watercraft boating. The primary limiting factors for this use are water flow levels, access,

Limiting Factor(s): Fecal coliform exceeds criteria during winter; mercury, chlordane exceed criteria based on limited sampling; aesthetics appear to be poor throughout reach (water clarity, trash do not meet criteria)

Suspected Cause(s): Historic mining waste in stream contributes to mercury; uncertain regarding fecal coliform; chlordane is a component of commonly used pesticides/herbicides and is present in urban stormwater; trash is common in urban stream corridors; uncertain regarding water clarity (possible illicit discharges/spills).

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-1 **Reach Length (miles):** 2.41

Reach Limits (downstream to upstream): Guadalupe River to Camden Avenue **Flow Regime:** Perennial (Intermittent in recent past)

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Riparian vegetation, fish assemblage, temperature, barriers, instream rearing habitat, macroinvertebrates, instream spawning habitat	D0001	Partial Support	A	Adult and juvenile rainbow trout observed in upstream portion of reach; no records for trout in lower half of reach; reach met insect criterion at midreach site during a very wet year (1998); suitable habitat declines with distance downstream in this reach
				D0087			
				D0102			
				D0135			
				D0157			
				D0160			
				D0201			
				D0227			
				D0312			
				D0315			
				D0422			
				D0438			
				D0569			
				D0624			
				D0625			

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-1 **Reach Length (miles):** 2.41

Reach Limits (downstream to upstream): Guadalupe River to Camden Avenue **Flow Regime:** Perennial (Intermittent in recent past)

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Below Masson Dam, should be currently Not Supported but High Potential Support for Steelhead. There have been no salmonids observed living in this segment although rainbow trout are known to inhabit upstream segments and could now frequent this area on occasion. This segment of the creek is too shallow and hot to support salmonids, especially large Chinook, which are mainstem spawners. Average hourly water temperatures in this segment in dry months vary from 65 to 88 degrees F and in fall/winter months from 54 to 70 degrees F. They are greatly elevated from upstream temperatures because of the lack of shade cover, wide shallow channels and very low flow rates. At the upstream edge of this segment the Masson Dam provided a fish passage barrier until it was removed and replaced with a dam containing a fish ladder. Unfortunately the flashboard dam and fish ladder require constant maintenance and will have severe impacts on sediment transport and water temperature. Thousands of trees and bushes have been planted which should improve shade cover when they mature. If the new vegetation can protect the channel banks it may become more narrow and increase its depth as it tries to restore its natural form. Limiting Factors should be channel flow rates, morphology, water temperature, marginal shade/hide cover, and dam. Above Masson Dam, Support Status should be Supported. Rainbow trout are known to inhabit this stream segment and since the Masson Dam has been laddered there is potential for steelhead and perhaps even coho to return. Water temperatures in this area rarely get above 60 degrees F, even in the hot summer and early fall months. Limiting Factors should be flow levels.

Limiting Factor(s): Temperature and streamflow conditions decline downstream within reach; upper portion of reach meets criteria in wet years; limited temperature data exceeds criteria

Suspected Cause(s): Releases from Guadalupe Reservoir and Trans-Valley Pipeline for percolation support summer streamflow, but flow declines and temperatures increase within the reach. Amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. Upper half of the reach, with higher flows and lower temperatures is likely to be suitable, but lower half of reach may usually be too warm and slow. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that the riparian zone in this reach is very sparse, the channel incised, and the substrate compacted leading to a fair to poor rating for salmonid habitat.

Data Gap(s) - No Data: Secondary Indicators = TSS, bankfull, stage, disharge and width, altered channel materials and dimensions, shaded riverine aquatic habitat, turbidity, water depth, dissolved oxygen, stream type, channel substrate, streambank erosion potential, width to depth ratio, special status species, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity	D0102	Non Support	D	Uncertainty due to data gaps; only 2 of 16 parameters available

Local Knowledge Comments:

Limiting Factor(s): TDS

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB , selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-1 **Reach Length (miles):** 2.41

Reach Limits (downstream to upstream): Guadalupe River to Camden Avenue **Flow Regime:** Perennial (Intermittent in recent past)

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments: Reach should be split into two parts - above and below Masson Dam. Below Masson Dam, the channel is relatively wide and shallow due to a series of instream dirt spreader dams that were constructed every year up until 1995. There is little mature riparian habitat or shade cover as the dams would drown upstream vegetation and deprive down stream vegetation of any water. Water temperatures in this area are extremely elevated due to the lack of shade cover and the wide shallow channels. The channel should be listed as Quasi-Natural, Modified. A restoration project has just been completed in this segment which should reduce channel width and provide shade cover for the stream which should improve flows, increase habitat and decrease temperatures. Above Masson Dam, the channel is a typical meandering C-type channel. There is a good riparian area on both sides of the channel and there is a broad flood plain

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient; Limited observation data but habitat data allows for potential support finding	Fair	Special status species observations, Habitat	D0020	Potential Support	B	Potential support based on habitat conditions for yellow warbler, red legged frog (and double crested cormorant if included); data contains sightings of several special status species but few repeat
				D0084			
				D0087			
				D0112			
				D0113			
				D0135			

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-1 **Reach Length (miles):** 2.41

Reach Limits (downstream to upstream): Guadalupe River to Camden Avenue **Flow Regime:** Perennial (Intermittent in recent past)

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

RARE	Sufficient; Limited observation data but habitat data allows for potential support finding	Fair	Special status species observations, Habitat	D0416	Potential Support	B	Potential support based on habitat conditions for yellow warbler, red legged frog (and double crested cormorant if included); data contains sightings of several special status species but few repeat
				D0569			
				D0609			

Local Knowledge Comments: Below Masson Dam, Support Status should be Non Support but High Potential. No rare species are known in this area. Channel morphology, flow rates, water temperatures, and lack of mature riparian vegetation are limiting factors for this use. Above Masson Dam, Support Status should be Full Support. The Limiting Factors should be flow levels and the dam. The SCVWD has conducted a specific survey in this reach for red legged frogs and found none.

Limiting Factor(s): None Identified

Suspected Cause(s): Potential support based on habitat conditions for yellow warbler, red legged frog (and double crested cormorant if included); data contains sightings of several special status species but few repeat occurrences. Red-legged frog not thought to be present due to lack of suitable habitat and presence of aquatic predators. Habitat is marginal for salmonids as flow declines and temperatures increase within the reach. The amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. Upper half of the reach, with higher flows and lower temperatures is likely to be suitable, but lower half of reach may usually be too warm and slow. Data did not allow limiting factors specific to this reach affecting other special status species to be

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data available on primary or secondary indicators; limited data on tertiary indicators	Fair	Flow, aesthetics	D0102	Non Support based on tertiary indicator; no support statement is able to be made based on primary or secondary indicators	C	Data is very limited for this reach; aesthetics data does not include any information concerning stream access; no data available on primary or secondary
				D0148			
				D0383			

Local Knowledge Comments: Below Masson Dam, Support Status should be Limited Support. The reach supports fishing, wading and small watercraft boating at high flows. The primary limiting factors for this use are water flow levels, access, and the dam. Above Masson Dam, Support Status should be Limited Support. The reach supports fishing, wading small watercraft boating at high flows. The primary limiting factors for this use are water flow levels, access, debris and the dam.

Limiting Factor(s): Generally poor aesthetics and flow, including significant trash and debris

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-2 **Reach Length (miles):** 3.42

Reach Limits (downstream to upstream): Camden Avenue to Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Good	Fish assemblage, instream rearing habitat, macroinvertebrates, barriers, dissolved oxygen, temperature, flow	D0020	Full Support	A	Rainbow trout are common in this reach; indicator macroinvertebrates were found at multiple sites in 1997 and 1998
				D0102			
				D0135			
				D0201			
				D0312			
				D0315			
				D0438			
				D0558			
				D0569			
				D0598			
				D0603			
				D0624			
				D0625			

Local Knowledge Comments: Support Status should be Supported. Rainbow trout are known to inhabit this stream segment and since the Masson Dam has been laddered there is potential for steelhead and perhaps even coho to return. Water temperatures in this area rarely get above 60 degrees F, even in the hot summer and early fall months.

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = turbidity, special status species, stream type, water depth , TSS, Width to depth ratio, bankfull, stage, disharge and width, shaded riverine aquatic habitat, channel substrate, dissolved oxygen, streambank erosion potential, altered channel materials and dimensions, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, nitrite, copper, fecal coliform, DDT, mercury, chlordane, diazinon,	D0102	Non Support	C	Data on 10 of 16 parameters; uncertainty due to lack of data on some parameters and age of data; generally unable to distinguish dry and wet weather
				D0206			
				D0558			

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-2 **Reach Length (miles):** 3.42

Reach Limits (downstream to upstream): Camden Avenue to Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

MUN	Sufficient	Fair	TDS, turbidity, nitrite, copper, fecal coliform, DDT, mercury, chlordane, diazinon,	D0597	Non Support	C	Data on 10 of 16 parameters; uncertainty due to lack of data on some parameters and age of data; generally unable to distinguish dry and wet weather

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform and turbidity, with some exceedances for DDT and TDS

Suspected Cause(s):

Data Gap(s) - No Data: Chlorpyrifos, dieldrin, dioxin, MTBE, nitrate, PCB, selenium,

Fair/Poor Quality Data: TDS, turbidity, copper , fecal coliform, DDT , mercury, chlordane, diazinon, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments: The creek channel in this segment is a typical B type channel. There is a good riparian area on both sides of the channel with a narrow flood plain.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-2 **Reach Length (miles):** 3.42

Reach Limits (downstream to upstream): Camden Avenue to Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient for habitat; Limited for species observations	Fair	Special status species observations, Habitat	D0020	Potential Support	D	Potential support is based on limited red-legged frog observations within the reach as well as limited habitat data for red legged frog, yellow legged frog, western pond turtle, steelhead, and Chinook
				D0084			
				D0087			
				D0111			
				D0135			
				D0569			
				D0609			

Local Knowledge Comments: Support Status should be Full Support.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient on primary indicator; limited but sufficient on secondary and tertiary indicators	Good	Flow (depth), aesthetics, fecal coliform, copper, nickel, mercury, DDT, e.coli, chlordane, dieldrin	D0102	Non Support (one sample exceeds primary indicator criteria during recreation season, some secondary indicators exceed relevant criteria, tertiary indicators do not meet criteria)	C	D0206 has data on fecal coliform, but is 20 years old; D0558 has more recent data which meets criteria -- most data meets criteria for REC; limited data is available on several secondary indicators -- these indicate that DDT and mercury exceed criteria in reach, as do mercury sediment samples; aesthetics data indicates some problems
				D0148			
				D0206			
				D0383			
				D0557			
				D0558			
				D0597			
				D0603			

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-2 **Reach Length (miles):** 3.42

Reach Limits (downstream to upstream): Camden Avenue to Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments: Support Status should be Limited Support. The reach supports fishing, wading small watercraft boating at high flows. The primary limiting factors for this use are water flow levels, debris and access.

Limiting Factor(s): One fecal coliform sample exceeds criterion during summer (recreation season) though more recent fecal coliform and e.coli data indicates support; mercury in water and sediment and DDT exceed criteria based on limited sampling; aesthetics appear to be poor throughout reach with excessive trash and debris noted in stream channel

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Pheasant Creek **Reach:** GR/GC-3 **Reach Length (miles):** 1.65

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient data on some primary indicators; secondary habitat indicator data available	Poor	Fish assemblage, instream rearing habitat, instream spawning habitat, temperature, barriers	D0158	Partial Support	C	Trout and other fish were present in a one time survey, but data is very limited and no macroinvertebrate data is available for this reach;
				D0160			
				D0312			
				D0315			

Local Knowledge Comments: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses.

Limiting Factor(s): Instream spawning habitat does not meet particle size criteria

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage, Secondary Indicators = instream rearing habitat, temperature, physical barriers to migration

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Waterbody: Pheasant Creek **Reach:** GR/GC-3 **Reach Length (miles):** 1.65

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311 D0321 D0322 D0323 D0324 D0325 D0326 D0380 D0609	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Local Knowledge Comments: The channel enters Guadalupe Creek via an inadequate elevated pipe culvert under Hicks Road. This culvert is causing erosion both up and downstream of the pipe and due to the large amount of scour below the pipe, a waterfall has developed which blocks fish up-migration opportunities.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Watershed: Guadalupe

Waterbody: Pheasant Creek **Reach:** GR/GC-3 **Reach Length (miles):** 1.65

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Shannon Creek **Reach:** GR/GC-4 **Reach Length (miles):** 2.24

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Shannon Creek **Reach:** GR/GC-4 **Reach Length (miles):** 2.24

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments: The channel enters Guadalupe Creek via an elevated culvert under Hicks Road and the creek has been buried by the property owner on the west side of the road. This culvert is causing erosion downstream of the pipe and due to the large amount of scour below the pipe, a waterfall has developed which blocks fish up-migration opportunities.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments: Pipe culvert, waterfall and stream down cutting block anadromous fish migration and are limiting factors affecting these uses.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe Reservoir **Reach:** GR/GC/GR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on primary indicators; very limited data on secondary habitat	Good	Barriers, dissolved oxygen, temperature	D0312	Unable to Determine	N/A	Insufficient data available on primary and secondary indicators
				D0315			
				D0558			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB,

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Good	Mercury, copper, fecal coliform, nitrite, turbidity, chlordane, diazinon, nitrate	D0558	Partial Support	B	Data on 7 of 16 parameters; uncertainty is due to lack of wet/dry weather correlation data and lack of data on several parameters
				D0584			
				D0642			

Local Knowledge Comments:

Limiting Factor(s): Several turbidity samples exceed criteria during winter/spring months

Suspected Cause(s): Uncertain

Data Gap(s) - No Data: Chlorpyrifos, DDT , dieldrin, dioxin, MTBE, PCB, selenium, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe Reservoir **Reach:** GR/GC/GR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

PFF	None on primary indicators; data on secondary indicators consist of GIS shapefiles without hard supporting data available for	Fair	Historic flooding; 100-year flood zones	D0321	Full Support	D	(1) No data available on primary indicators; (2) SCVWD GIS files show no historic flooding around the reservoir; no areas within FEMA flood zones are
				D0322			
				D0323			
				D0324			
				D0326			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated estimated 100-yr flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historic flooding occurrence information

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Very limited data on historic species observations and general habitat (not reach specific)	Poor	Special status species observations, Habitat	D0020	Unable to Determine	N/A	Limited data on historic rainbow trout sightings; data is not of recent vintage; insufficient data to make a support statement
				D0084			
				D0087			
				D0135			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Watershed: Guadalupe

Waterbody: Guadalupe Reservoir **Reach:** GR/GC/GR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient on primary indicator; limited but sufficient on secondary indicator; no data on tertiary indicator	Good	Mercury, copper, e.coli, fecal coliform, chlordane, dieldrin	D0557 D0558	Full Support based on primary and limited secondary indicator data; no support statements are able to be made based on tertiary indicator	C	Fecal coliform and e.coli data are below criteria (1973 data appears to be total coliform and not of any use); limited water quality and sediment sampling meets relevant criteria or detection limit is above criteria; no data on aesthetics

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-5 **Reach Length (miles):** 2.75

Reach Limits (downstream to upstream): Entire Creek above Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Good	Fish assemblage, barriers, macroinvertebrates	D0020	Full Support	A	Rainbow trout regularly present within reach; indicator macroinvertebrates found at one site in 1997 and 1998 in late summer
				D0201			
				D0312			
				D0315			
				D0438			
				D0624			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = temperature, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, dissolved oxygen, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-5 **Reach Length (miles):** 2.75

Reach Limits (downstream to upstream): Entire Creek above Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0087	Full Support	B	Full support based on native rainbow trout

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Guadalupe Creek **Reach:** GR/GC-5 **Reach Length (miles):** 2.75

Reach Limits (downstream to upstream): Entire Creek above Guadalupe Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

REC-1	No data on primary or secondary indicators; insufficient data	Poor	Flow (depth)	D0383	Unable to Determine	N/A	No data on primary or secondary indicators is available; limited general data on water depth indicates that reach carries water in the summer -- cannot base support statement on this

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Fair	Riparian vegetation, fish assemblage, temperature, altered channel dimensions, flow, instream rearing habitat, nickel, copper, TSS, barriers, dissolved oxygen, instream spawning habitat, macroinvertebrates	D0001	Partial Support and Potential Seasonal Support	B	Chinook spawning noted within reach; some juvenile steelhead records; indicator macroinvertebrates were not found in late summer in 1998
				D0044			
				D0046			
				D0048			
				D0049			
				D0102			
				D0135			
				D0207			
				D0311			
				D0312			
				D0315			
				D0328			
				D0412			
				D0418			
				D0419			
				D0422			
				D0423			
				D0438			
				D0569			
				D0603			
				D0625			

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Segment A should be Limited Support. A steelhead/rainbow trout was observed and video documented living in the area of Santa Clara Street most of the summer several years ago. Average hourly water temperatures range from about 51 to 60 degrees F in the fall/winter months to 55 to 67 in the dry months. Chinook salmon and lamprey eel migrate through and probably spawn in this reach. Limiting Factors should be channel flow rates, morphology, water temperature, shade/hide cover, pollution and poaching. Segment B should be Limited Support. Steelhead trout, Chinook salmon and lamprey eel are known to migrate though and spawn in this segment. The riparian area and shade cover along this segment is poor due to heavy water diversions. Limiting Factors should be channel flow rates, morphology, water temperature, shade/hide cover, pollution and poaching. Segment C should be Limited Support. Steelhead trout, Chinook salmon and lamprey eel are known to migrate though and spawn in this segment. The riparian area and shade cover along this segment is fairly good. Limiting Factors should be channel flow rates, morphology, water temperature, shade/hide cover, pollution and poaching. Segment D should be Limited Support. Steelhead trout, Chinook salmon and lamprey eel are known to migrate though and spawn in this segment. The riparian area and shade cover along this segment are poor due to past instream seasonal dirt spreader dam construction but is now improving. Trees are being naturally recruited, the stream's width/depth ratio is decreasing and a meander pattern is emerging. Limiting Factors should be channel flow rates, morphology, water temperature, shade/hide cover, pollution and poaching. Segment E should be Not Supported. Temperatures are high in this segment as the water backs up behind the dams and bakes in the sun, as there is no shade cover. Segment F should be Limited Support. Temperatures are fairly high in this segment as the water flowing in to the area comes from Vasona Reservoir, which is a fairly small facility. Limiting Factors should be channel flow rates, morphology, water temperature, dams shade/hide cover, and pollution.

Limiting Factor(s): Low streamflows and high temperatures; indicator macroinvertebrates not present in late summer (1998)

Suspected Cause(s): Spring and summer streamflows dependent upon releases from Lexington and Vasona reservoirs, with substantial water heating through the percolation zones upstream of Meridian Avenue. Some augmentation from groundwater in wet periods (1995-1999). Low streamflows and high water temperatures restrict summer steelhead rearing to scarce fast-water habitats. Winter and spring water temperatures are likely to exceed Chinook spawning and rearing criteria, due to limited shading in portions of reach; however, temperature data and winter/spring fish sampling data are absent. High storm flows resulting from urban runoff may degrade habitat.

Data Gap(s) - No Data: Secondary Indicators = turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, special status species, shaded riverine aquatic habitat, water depth, chlordane, chlorpyrifos, DDT, diazinon, dioxin, dieldrin, PCB, selenium, mercury.

Fair/Poor Quality Data: Primary Indicators = fish assemblage, macroinvertebrates. Secondary Indicators = riparian vegetation, temperature, altered channel materials and dimensions, flow, instream rearing habitat, nickel, copper, TSS, dissolved oxygen, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity	D0102	Non Support	C	Data available on 2 of 16 parameters; high uncertainty due to lack of data on most parameters

Local Knowledge Comments:

Limiting Factor(s): TDS exceeds in both wet and dry seasons

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for two critical urban sections: 0 to 1800 (lower part of reach) and 37000 to 39650 where channel is too small
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Reach should be split into six segments - (A) Guadalupe River to Auzerais; (B) Auzerais to Lincoln; (C) Lincoln to Leigh; (D) Leigh to Camden; (E) Camden to Lark; and (F) Lark to Vasona Dam. Segment A always has a flow of water from groundwater pump discharges and upwelling and has a good but narrow riparian habitat. Should be listed as Quasi Natural, Straightened, Incised. Channel has very steep banks along most of its length and very limited access. Segment B usually dries out in the summer and has a narrow marginal riparian area with little SRA cover. Should be listed as Quasi Natural, Straightened, Widened, Incised. The riverine corridor has very steep banks along most of its length. Segment C usually has water in it unless the water is shut off by the SCVWD. The segment has a fairly good riparian area with good SRA cover. It also has some very deep pools, which are good holding areas for salmonids. Should be Quasi Natural, Incised. The riverine corridor has very steep banks along most of its length. Segment D always has water in it but the riparian area is marginal because much of this segment had dirt instream spreader dams installed yearly until 1995 when the permits for such dams were not renewed. For the first few years after construction of the spread dams was prohibited, the channel was devoid of vegetation and was overly wide and shallow. In the past few years the channel has narrowed, started to meander and vegetation has established itself in the newly forming flood plain. There is a substantial drop structure at Campbell Ave. that salmonids can only jump at high flows. There is an impassable 20 foot high dam at Camden Ave/San Tomas Expressway, which blocks fish passage and navigation. Should be listed as Quasi Natural, Straightened, Widened, Incised. The riverine corridor has very steep banks along most of its length. Segment E always has water in it but there is little to no riparian area. The channel and corridor are straight and there are a series of impassable dams in this section. The 20-foot high Camden Ave./San Tomas Expressway dam blocks fish migration and navigation at the lower end of this segment. Should be listed as Modified, Straightened, Widened. The riverine corridor has very steep banks and a series of dams used for water percolation and diversion, which elevates water temperatures, limits downstream flows and block fish migration. Segment F always has water in it. There is a quasi-natural channel and fair to good riparian area. Should be listed as Quasi Natural. The river channel is fairly natural and has attempted to restore itself after the construction of the Vasona dam at the upstream end of this segment.

Limiting Factor(s): Channel cannot convey the expected 100-year flow in two specific segments of this reach; land uses adjacent to the channel in these segments consist of urban residential and/or commercial uses

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban and industrial developments into the natural channel floodplain. Problem segments are: 0 to 1800 (lower part of reach) and 37000 to 39650.

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Potential Support	B	Potential support based on yellow warbler, western pond turtle, and red-legged frog, a salmonid redd (nest), and double crested cormorant observations
				D0084			
				D0102			
				D0135			
				D0412			
				D0416			
				D0418			
				D0419			
				D0609			

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Segment A should be Limited Support. No rare species animal or bird species are known in this area. Channel morphology, flow rates, water temperatures, and lack of a wide riparian zone and steep eroding banks are limiting factors for this use. Segment B should be Limited Support. Chinook salmon and steelhead are known to migrate through and probably spawn in this segment. Channel morphology, flow rates, water temperatures, and lack of a wide riparian zone and steep eroding banks are limiting factors for this use. Segment C should be Limited Support. Chinook salmon and steelhead are known to migrate through and spawn in this segment. Channel morphology, flow rates, water temperatures, and steep eroding banks are limiting factors for this use. Segment D should be Limited Support. Chinook salmon and steelhead are known to migrate through and spawn in this segment. Channel morphology, flow rates, water temperatures, and lack of a mature riparian zone and steep eroding banks are limiting factors for this use. Segment E should be Not Supported. There is no riparian habitat in the area and no rare species are known to exist in or frequent the area. Segment F should be Potential Support. This segment has good riparian habitat in the area and could easily support rare species. Channel morphology, flow rates, water temperatures, and dams are limiting factors for this

Limiting Factor(s): None Identified

Suspected Cause(s): Potential support based on yellow warbler, western pond turtle, and red-legged frog, a salmonid redd (nest), and double crested cormorant observations. Low streamflows and high water temperatures restrict summer steelhead rearing to scarce fast-water habitats. Winter and spring water temperatures are likely to exceed Chinook spawning and rearing criteria, due to limited shading in portions of reach. Data did not allow limiting factors specific to this reach affecting other special status species

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient data on primary indicators; sufficient but limited data on secondary indicators; limited but sufficient data on tertiary indicators	Good	Flow (depth), mercury, fecal coliform, copper, nickel, DDT, aesthetics	D0102	Non Support based on primary indicator data (secondary indicator data also signals Non Support, tertiary indicator data also signals Non Support)	C	Fecal coliform data exceeds criteria during winter sampling but data is 20 years old; Mercury in sediment meets criteria but DDT in water exceeds - no other data on primary or secondary indicators is available; water depth appears marginal for REC-1 but data is limited; garbage, oil, and other refuse appears throughout reach based on 1995 data
				D0206			
				D0557			
				D0603			

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-1 **Reach Length (miles):** 7.88

Reach Limits (downstream to upstream): Guadalupe River confluence to Vasona Reservoir **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Segment A should be Limited Support. The reach supports fishing, wading and small watercraft boating at moderate flows. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments. Segment B should be Limited Support. The reach supports fishing, wading and small watercraft boating at moderate flows. The primary limiting factors for this use are water flow levels, access, pollution, debris, waterborne pathogens and vagrant encampments. Segment C should be Limited Support. The reach supports fishing, wading and small watercraft boating at moderate flows. The primary limiting factors for this use are water flow levels, access, pollution, debris, and waterborne pathogens. Segment D should be Limited Support. The reach supports fishing, wading and small watercraft boating at moderate flows. The primary limiting factors for this use are water flow levels, access, pollution, debris, and waterborne pathogens. Segment E should be Potential Limited Support. This area could provided limited support for fishing. It is possible for warm water fish, such as carp, to live in this area if they are washed over the dams or through the diversion gates. Segment F should be Limited Support. This area provides limited support for fishing, wading and small watercraft boating. The primary limiting factors for this

Limiting Factor(s): Fecal coliform data exceeds criterion during winter; DDT; trash and oil problems

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Vasona Reservoir **Reach:** GR/LG/VR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on primary indicators; very limited data on secondary habitat	Fair	Barriers	D0312	Unable to Determine	N/A	Insufficient data available on primary and secondary indicators
				D0315			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Nitrate, fecal coliform, turbidity	D0584	Non Support	C	Nitrate data is too old to be of use, support statement based on fecal coliform and turbidity; as no exceedances have been noted between 1998 and 2001, water quality in this reservoir may be
				D0642			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform, turbidity

Suspected Cause(s):

Data Gap(s) - No Data: Chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data: Nitrate, fecal coliform, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Vasona Reservoir **Reach:** GR/LG/VR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Transition

PFF	None on primary indicators; data on secondary indicators is in the form of GIS shapefiles with no hard data available for review	Fair	Historic flooding; 100-year flood zones	D0311	Full Support	C	(1) No data available on primary indicators; (2) secondary indicator data consists of SCVWD GIS files which display FEMA flood zones and historic flooding; FEMA flood zone extends beyond reservoir perimeter at upstream end; no hard data available to review; land uses in the area that would be inundated consist of parks and recreation; therefore, reach would still support PFF as no critical urban land uses would be affected
				D0321			
				D0322			
				D0323			
				D0324			
				D0326			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historic flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient but Limited	Fair	Special status species observations	D0020	Potential Support	D	Potential support based on western pond turtle observation; little data available however
				D0111			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Vasona Reservoir **Reach:** GR/LG/VR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Transition

REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	1973 coliform data was not used as it appears to be total coliform, not fecal; no other data on primary, secondary, tertiary indicators are available

Local Knowledge Comments: Support Status should be Limited Support. This area provides limited support for fishing, wading and small watercraft boating. The primary limiting factors for this use are waterborne pathogens.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-2 **Reach Length (miles):** 2.07

Reach Limits (downstream to upstream): Vasona Reservoir to County Park boundary **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient on primary indicators, additional data on secondary habitat indicators	Poor	Riparian vegetation, barriers, temperature, macroinvertebrates	D0311	Potential Support	C	No fish data for reach; indicator macroinvertebrates were found in late summer in 1998
				D0312			
				D0315			
				D0603			
				D0625			

Local Knowledge Comments: Limiting Factors should be channel flow rates, morphology, water temperature, dams shade/hide cover, and pollution.

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = macroinvertebrates. Secondary Indicators = riparian vegetation, temperature, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity	D0102	Non Support	D	Data on 2 of 16 parameters; some question concerning data quality; high uncertainty due to data

Local Knowledge Comments:

Limiting Factor(s): TDS exceeds criteria during wet season

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-2 **Reach Length (miles):** 2.07

Reach Limits (downstream to upstream): Vasona Reservoir to County Park boundary **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for one section: 46000 to 47550 where channel is too small; however, land uses are park/recreation open space so segment
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient but Limited	Fair	Special status species observations	D0020	Potential Support	D	Potential support based on Yellow warbler observation; little data available however
				D0084			
				D0112			
				D0609			

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-2 **Reach Length (miles):** 2.07

Reach Limits (downstream to upstream): Vasona Reservoir to County Park boundary **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments: Support Status should be Limited Support. If there was a special status species observed using the area there must be limited support. Channel morphology, flow rates, water temperatures, good riparian areas and dams are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Limited but sufficient data available on primary and secondary indicators; limited and insufficient data available on tertiary indicator	Fair	Flow (depth), fecal coliform, copper, nickel, mercury	D0102	Full Support based on primary and secondary indicator data; insufficient data on tertiary indicators available	C	Data on fecal coliform meets criteria but data is 20 years old, leading to higher uncertainty; water and sediment quality data meets relevant criteria but data is old; limited water depth data indicates flows that are too minimal to support recreational use but data is very limited and insufficient to base support statement on; no other data available on indicators
				D0206			
				D0383			

Local Knowledge Comments: Support Status should be Limited Support. This area most likely supports fishing and wading. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-3 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): County Park boundary to Lexington Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient on primary indicators, additional data on secondary habitat indicators	Poor	Riparian vegetation, barriers, temperature, macroinvertebrates	D0311	Potential Support	C	No fish data for reach; indicator macroinvertebrates were found in late summer in 1998
				D0312			
				D0315			
				D0625			

Local Knowledge Comments: Limiting Factors should be channel flow rates, morphology, water temperature, dams shade/hide cover, and pollution.

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = macroinvertebrates. Secondary Indicators = riparian vegetation, temperature, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS, turbidity

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-3 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): County Park boundary to Lexington Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0321	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Insufficient for support statement	Poor	Special status species observations	D0020	Unable to Determine	N/A	No recent, reach-specific species or habitat data is available
				D0084			
				D0609			

Local Knowledge Comments: Channel morphology, flow rates, water temperatures, good riparian areas and dams are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-3 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): County Park boundary to Lexington Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

REC-1	No data on primary indicators; sufficient but very limited data on secondary indicators; insufficient, limited data on tertiary indicators	Good	Flow (depth), mercury, copper, nickel	D0383	Full Support based on secondary indicators; partial support based on tertiary indicators; no support statement able to be made for primary indicators	C	Limited water quality data indicates support based on 3 secondary indicators; water depth appears to be marginal during dry seasons; no other data available on primary indicators
				D0597			
				D0603			

Local Knowledge Comments: Support Status should be Limited Support. This area most likely supports fishing and wading. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens.

Limiting Factor(s): Water depth is marginal for supporting recreation during dry season

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Lexington Reservoir **Reach:** GR/LG/LR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on primary indicators; very limited data on secondary habitat	Good	Temperature, dissolved oxygen, barriers	D0246	Unable to Determine	N/A	Insufficient data available on primary and secondary indicators
				D0312			
				D0315			

Local Knowledge Comments: Should be Supported. There are many reports that the reservoir supports rainbow trout. Limiting Factors should be water temperature, dams and pollution. The dam itself, however, in conjunction with 13 other diversions upstream of the reservoir (SJWC) eliminates salmonid access to the tributary headwaters which feature some of the best habitat in the watershed.

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macroinvertebrates. Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = dissolved oxygen, temperature, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Limited but sufficient	Good	Mercury, nitrite, fecal coliform, nickel, nitrate	D0246	Non Support	D	Data on 6 of 16 parameters; high uncertainty due to data gaps and age of data; unable to distinguish between wet and dry weather samples; Most samples from recent years are below criteria suggesting that water quality may be improving in this reservoir
				D0584			
				D0642			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform and turbidity

Suspected Cause(s):

Data Gap(s) - No Data: Chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, PCB, selenium, TDS, turbidity

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Lexington Reservoir **Reach:** GR/LG/LR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None on primary indicators; data on secondary indicators is in the form of GIS shapefiles with no hard data available for review	Fair	Historic flooding; 100-year flood zones	D0311	Full Support	C	(1) No data available on primary indicators; (2) secondary indicator data consists of SCVWD GIS files which display FEMA flood zones and historic flooding; FEMA flood zone extends beyond reservoir perimeter in a few places; no hard data available to review; land uses in the area that would be inundated consist of parks and recreation; therefore, reach would still support PFF as no critical urban land uses would be affected
				D0321			
				D0322			
				D0323			
				D0324			
				D0326			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historic flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Insufficient for support statement	Poor	Special status species observations	D0020	Unable to Determine	N/A	No recent, reach-specific species or habitat data is available

Local Knowledge Comments: Should be Limited Support. It is almost certain that Lexington supports trout. Water temperature, well-vegetated perimeter areas, access and dams are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Watershed: Guadalupe

Waterbody: Lexington Reservoir **Reach:** GR/LG/LR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Sufficient on primary indicator; limited but sufficient on secondary indicators; no data on tertiary	Fair	Fecal coliform, mercury, nickel	D0246 D0557	Full Support (based on primary and secondary indicators; no data on tertiary indicators)	D	No data is available on tertiary aesthetics indicators in order to make a confident support statement; 1973 coliform data not used as it appears to be for total, not fecal coliform

Local Knowledge Comments: This area supports fishing, wading and boating. The primary limiting factors for this use are water levels, access, pollution and waterborne pathogens.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-4 **Reach Length (miles):** 4.15

Reach Limits (downstream to upstream): Lexington Reservoir to Lake Elsman **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators	Good	Fish assemblage, barriers, macroinvertebrates	D0020	Full Support	A	Trout regularly present in reach; indicator macroinvertebrates were found in late summer in 1998 at two sites
				D0312			
				D0315			
				D0438			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths and velocities, instream rearing habitat, instream spawning habitat, dissolved oxygen, temperature, riparian vegetation, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Limited but sufficient	Poor	Mercury, nitrite, fecal coliform, nickel	D0246	Non Support	D	Data on 4 of 16 parameters; high uncertainty due to data gaps and age of data; unable to distinguish between wet and dry weather samples

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform

Suspected Cause(s):

Data Gap(s) - No Data: Chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, PCB, selenium, TDS, turbidity, nitrate

Fair/Poor Quality Data: Mercury, fecal coliform, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-4 **Reach Length (miles):** 4.15

Reach Limits (downstream to upstream): Lexington Reservoir to Lake Elsman **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0020	Potential Support	B	Potential support based on CA red-legged frog and western pond turtle observations
				D0111			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s): Potential support based on CA red-legged frog and western pond turtle observations. Data did not allow limiting factors specific to this reach affecting other special status species to be identified.

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-4 **Reach Length (miles):** 4.15

Reach Limits (downstream to upstream): Lexington Reservoir to Lake Elsman **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

REC-1	Limited but sufficient on primary indicator; insufficient on secondary indicator; no data on tertiary indicator	Poor	Fecal coliform, mercury, nickel	D0246	Full Support based on primary indicator data; insufficient data on secondary and tertiary indicators available	D	Fecal coliform data is limited; no other useful data is available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-5 **Reach Length (miles):** 4.13

Reach Limits (downstream to upstream): Entire Creek above Williams Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient but limited on primary indicators, additional data on secondary habitat indicators	Poor	Instream spawning habitat, fish assemblage, instream rearing habitat, macroinvertebrates, barriers	D0043	Partial Support	C	Rainbow trout observed on one occasion but data is very old; recent macroinvertebrate data did not find indicator insects in late summer; high uncertainty
				D0312			
				D0315			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): Indicator macroinvertebrates not present in late summer

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage, macroinvertebrates. Secondary Indicators = stream rearing habitat, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Waterbody: Los Gatos Creek **Reach:** GR/LG-5 **Reach Length (miles):** 4.13

Reach Limits (downstream to upstream): Entire Creek above Williams Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0321	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Insufficient for support statement	Poor	Special status species observations	D0020	Unable to Determine	N/A	No recent, well-documented, reach-specific species or habitat data is available
				D0043			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Watershed: Guadalupe

Waterbody: Los Gatos Creek **Reach:** GR/LG-5 **Reach Length (miles):** 4.13

Reach Limits (downstream to upstream): Entire Creek above Williams Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Daves Creek | **Reach:** GR/LG-8 | **Reach Length (miles):** 2.04

Reach Limits (downstream to upstream): Entire Creek | **Flow Regime:** Ephemeral

Channel Type(s): Concrete-lined | **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Daves Creek **Reach:** GR/LG-8 **Reach Length (miles):** 2.04

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Moody Gulch **Reach:** GR/LG-13 **Reach Length (miles):** 1.26

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient but limited on one primary indicator, very limited data on secondary habitat indicator available	Good	Fish assemblage, barriers	D0312	Partial Support	B	Rainbow trout observed in 2001 by USFWS; no indicator macroinvertebrate data is available; no other habitat data is available
				D0315			
				D0598			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s): Probably fully supported, at least during wet years, but insect data are absent.

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Watershed: Guadalupe

Waterbody: Moody Gulch **Reach:** GR/LG-13 **Reach Length (miles):** 1.26

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity. Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Almendra Creek **Reach:** GR/LG-19 **Reach Length (miles):** 2.21

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Concrete-lined, rock-lined **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Almendra Creek **Reach:** GR/LG-19 **Reach Length (miles):** 2.21

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Concrete-lined, rock-lined **Generalized Land Use in Area:** Transition

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Lake Almaden **Reach:** GR/AL/LA **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient data on primary indicators, other data is available on secondary habitat indicators	Poor	Fish assemblage, turbidity, temperature, dissolved oxygen	D0073	Potential/Seasonal Support	C	Rainbow trout observed in spring 1996 but no summer fish data is available; no indicator macroinvertebrate data is available; other habitat data indicates that temperature and turbidity exceed criteria in places but data is temporally limited
				D0074			
				D0075			
				D0076			
				D0077			
				D0078			

Local Knowledge Comments: This lake most likely would not support cold water species. Water temperature is far too warm. Data loggers on lower parts of Guadalupe and Alamitos Creeks and one just downstream of the Alamitos Drop Structure all indicate high summer and winter temperatures not favored by salmonids.

Limiting Factor(s): Turbidity is high, temperature at surface is high

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage. Secondary Indicators = temperature, dissolved oxygen, turbidity.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Lake Almaden **Reach:** GR/AL/LA **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity. Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	Data on one primary indicator	Fair	Fecal coliform	D0641	Full Support for primary indicator based on limited data; No data on secondary or tertiary indicators	C	Limited data on primary; No data on secondary, tertiary indicators available

Local Knowledge Comments: This lake supports swimming, wading, fishing and boating.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-1 **Reach Length (miles):** 3.08

Reach Limits (downstream to upstream): Lake Almaden to Arroyo Calero confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators; additional data available on secondary habitat indicators	Fair	Flow, fish assemblage, riparian vegetation, macroinvertebrates, instream spawning habitat, temperature, barriers, instream rearing habitat,	D0024	Partial Support	A	Rainbow trout present within reach; reach does not meet insect criteria at 2 out of 3 sites during key late summer period
				D0028			
				D0029			
				D0030			
				D0087			
				D0102			
				D0163			
				D0201			
				D0311			
				D0312			
				D0315			
				D0328			
				D0438			
				D0569			
				D0603			
				D0613			
				D0625			

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-1 **Reach Length (miles):** 3.08

Reach Limits (downstream to upstream): Lake Almaden to Arroyo Calero confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Below Greystone Creek, should probably be either Not Supported or Very Limited Support. Water temperatures in this segment are high due to wide channel width and lack of riparian area and shade cover. Winter temperatures normally range from 55 to 60 degrees F and spring, summer and fall temperatures range from the mid 60's to low 70's. Limiting Factors should be channel flow rates, morphology, water temperature, drop structures, downstream, the lake and dam, poor riparian area, shade/hide cover, and pollution. Above Greystone Creek, should be Limited Support. Rainbow Trout have been reported in this segment of creek. Limiting Factors should be channel flow rates, morphology, water temperature, drop structures, downstream lake and dam, poor riparian area,

Limiting Factor(s): Indicator macroinvertebrates not present at 2 of 3 locations in late summer

Suspected Cause(s): Releases from Almaden and Calero Reservoirs for percolation provide summer streamflow, but flows decline and temperatures increase within the reach. Fast-water feeding habitat declines downstream within the reach. Channel is less shaded downstream within the reach increasing temperature effects. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for salmonids.

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, dissolved oxygen, water depth, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity	D0102	Non Support	C	Data on 2 of 16 parameters; some question concerning data quality; high uncertainty due to data gaps; unable to distinguish between dry and wet

Local Knowledge Comments:

Limiting Factor(s): TDS

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0311			
				D0321			
				D0322			
				D0323			

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-1 **Reach Length (miles):** 3.08

Reach Limits (downstream to upstream): Lake Almaden to Arroyo Calero confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0324	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0325			
				D0326			
				D0380			
				D0593			
				D0609			
				D0621			

Local Knowledge Comments: The creek is affected by the flood control project where it was over-widened from Lake Almaden upstream. This reach should be split into two segments - above and below Greystone Creek. Below Greystone Creek, it should be listed as a Modified Straightened channel. Just upstream of Golf Creek there is a drop structure and an overflow channel and a very wide corridor. There is another drop structure where the creek empties into Lake Almaden. These drop structures inhibit fish migration except at high flows. Above Greystone Creek, it should be listed as a Quasi Natural, Modified channel. There is more riparian habitat and shade cover and the creek channel starts to meander and is far less incised.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	B	Full support based on native rainbow trout observations; habitat is marginal to poor for salmonids
				D0084			
				D0087			
				D0102			
				D0569			
				D0609			

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-1 **Reach Length (miles):** 3.08

Reach Limits (downstream to upstream): Lake Almaden to Arroyo Calero confluence **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Below Greystone Creek, should be Limited support. Riparian and channel habitat is poor in this area, water temperatures are warm and drop structures impede movement. Channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use. Above Greystone Creek, channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary	Good	Aesthetics, flow (depth)	D0102	Partial Support based on tertiary indicators; no support statement able to be developed on primary and secondary	C	Aesthetics data indicates some algae and debris/garbage problems and flow appears to be marginal for supporting summer recreation
				D0199			
				D0383			
				D0603			

Local Knowledge Comments: Below Greystone Creek, should be Limited Support. This area supports fishing and wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens. Above Greystone Creek, should be Limited Support. This area supports fishing and wading and small watercraft boating. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens.

Limiting Factor(s): Some concern over aesthetics and marginal flow for summer recreation

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-2 **Reach Length (miles):** 4.30

Reach Limits (downstream to upstream): Arroyo Calero confluence to Almaden Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators; additional data available on secondary habitat indicators	Fair	Temperature, flow, turbidity, dissolved oxygen, fish assemblage, riparian vegetation, macroinvertebrates, instream rearing habitat, barriers, instream spawning habitat	D0023	Partial Support	A	Rainbow trout regularly present; steelhead observed occasionally; indicator macroinvertebrates present but not in late summer during most recent sampling (DO625) possibly due to 97/98 reservoir construction; mercury exceeds criteria
				D0025			
				D0026			
				D0031			
				D0102			
				D0163			
				D0201			
				D0311			
				D0312			
				D0315			
				D0438			
				D0569			
				D0598			
				D0603			
				D0613			
				D0625			

Local Knowledge Comments: Limiting Factors should be channel flow rates, morphology, water temperature, drop structures, downstream lake and dam, poor riparian area, shade/hide cover, and pollution.

Limiting Factor(s): Indicator macroinvertebrates not present in late summer 1998; older data indicates they are present; mercury exceeds criteria; turbidity exceeds criteria in limited sampling

Suspected Cause(s): Releases from Almaden Reservoir for percolation in downstream reaches maintain relatively high and cool streamflows for most of summer in most years. Outlet structures require periodic maintenance and reservoir draining, which may impact availability of streamflow and could affect indicator macroinvertebrate presence. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, dissolved oxygen, water depth, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, nickel.

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-2 **Reach Length (miles):** 4.30

Reach Limits (downstream to upstream): Arroyo Calero confluence to Almaden Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity	D0023	Partial Support	D	Data on 2 of 16 parameters; some question concerning data quality; high uncertainty due to data
				D0102			

Local Knowledge Comments:

Limiting Factor(s): TDS during wet season

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for one section: 23000 to 33100 where channel is too small; however, land uses are undeveloped and open space so segment is not
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0593			

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-2 **Reach Length (miles):** 4.30

Reach Limits (downstream to upstream): Arroyo Calero confluence to Almaden Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments: The creek is affected by the flood control project where it was over-widened from the confluence with Arroyo Calero upstream to McKean; above McKean it appears much more natural; the creek re-routed itself near New Almaden per some storm flow action, resulting in some stream meander

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations, Habitat	D0020	Full Support	B	Full support based on native rainbow trout observations, potential support for western pond turtle and red legged frog; habitat conditions appear marginal for salmonids at lower end of reach but good at upper end
				D0027			
				D0084			
				D0087			
				D0102			
				D0569			
				D0609			

Local Knowledge Comments: Support level should be Limited Support. Salmonids normally wouldn't have access to this area except at very high flows due to downstream drop structures. Channel morphology, flow rates, water temperature, poor riparian area drop structures and downstream lake and dam are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Alamitos Creek **Reach:** GR/AL-2 **Reach Length (miles):** 4.30

Reach Limits (downstream to upstream): Arroyo Calero confluence to Almaden Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

REC-1	No data available on primary indicators, limited data on secondary indicators; limited data on tertiary indicators	Fair	Flow (depth), aesthetics, mercury, copper, nickel	D0102	Full Support based on secondary indicators; Non Support based on tertiary indicators; no support status able to be determined based on primary indicators	C	This reach appears from the data to have problems with vegetative overgrowth blocking access to the stream and negatively impacting aesthetics - trash is also a problem; flow in the lower end of the reach also appears marginal during the late summer
				D0199			
				D0597			
				D0603			

Local Knowledge Comments: Support Status should be Limited Support. This area probably supports wading and fishing. The primary limiting factors for this use are water flow levels, access, and waterborne pathogens.

Limiting Factor(s): Poor aesthetic environment noted in data; marginal flow in lower portion of reach for recreation

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Almaden Reservoir **Reach:** GR/AL/AR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Very limited on primary indicator; additional secondary habitat indicator data available	Fair	Temperature, dissolved oxygen, instream spawning habitat, fish assemblage, barriers	D0025	Potential Support	D	Rainbow trout observed in 1956 CDFG study; no recent fish assemblage data and no macroinvertebrate data is available; high uncertainty.
				D0026			
				D0071			
				D0072			
				D0312			
				D0315			

Local Knowledge Comments:

Limiting Factor(s): Temperature, barriers

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, dissolved oxygen, water depth and velocity, instream rearing habitat, riparian vegetation, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage. Secondary Indicators = temperature, dissolved oxygen, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Fecal coliform, turbidity, MTBE, nitrate	D0584	Non Support	C	Nitrate data is too old to be of use, support statement based on fecal coliform, turbidity and MTBE
				D0642			

Local Knowledge Comments:

Limiting Factor(s): fecal coliform, MTBE, turbidity

Suspected Cause(s):

Data Gap(s) - No Data: Chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, fecal coliform, MTBE, nitrate

Watershed: Guadalupe

Waterbody: Almaden Reservoir **Reach:** GR/AL/AR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None on primary indicators; data on secondary indicators consist of GIS shapefiles without hard supporting data available for	Fair	Historic flooding; 100-year flood zones	D0321	Full Support	D	(1) No data available on primary indicators; (2) SCVWD GIS files show no historic flooding around the reservoir; no areas within FEMA flood zones are
				D0322			
				D0323			
				D0324			
				D0326			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historic flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient but Limited	Poor	Special status species observations	D0020	Potential Support	D	Potential support based on western pond turtle observation; no details are available on this sighting so uncertainty level is high
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblage of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Almaden Reservoir **Reach:** GR/AL/AR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

REC-1	No data available on primary indicator; limited data on secondary indicator; insufficient data on tertiary indicator	Fair	Access, mercury	D0071	Non Support based on secondary indicator; no determination is able to be made on primary and tertiary	C	Limited access data is over 40 years old; 1973 coliform data is probably total, not fecal
				D0557			

Local Knowledge Comments:

Limiting Factor(s): Mercury in sediment

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Herbert Creek **Reach:** GR/AL-4 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators; additional data available on secondary habitat indicators	Fair	Riparian vegetation, temperature, dissolved oxygen, fish assemblage, barriers, macroinvertebrates	D0025	Partial Support	C	Indicator macroinvertebrates common in reach; only one obeservation of rainbow trout in 1997; no other fish data available
				D0311			
				D0312			
				D0315			
				D0613			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): Dissolved oxygen (limited data)

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS, turbidity

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Herbert Creek **Reach:** GR/AL-4 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311 D0321 D0322 D0323 D0324 D0325 D0326 D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited and cannot be interpreted	Poor	Special status species observations	D0609	Unable to Determine	N/A	Data cannot be interpreted

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Watershed: Guadalupe

Waterbody: Herbert Creek **Reach:** GR/AL-4 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Barrett Canyon Creek **Reach:** GR/AL-5 **Reach Length (miles):** 3.50

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on one primary indicator; insufficient data on secondary habitat indicators	Poor	Macroinvertebrates, riparian vegetation, barriers	D0201	Unable to Determine	N/A	No fish assemblage data is available; macroinvertebrates are present in May 1997, but no late summer data is available
				D0311			
				D0312			
				D0315			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, temperature, water depths and velocities, instream rearing habitat, instream spawning habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium,

Fair/Poor Quality Data: Primary Indicators = macroinvertebrates. Secondary Indicators = physical barriers to migration, riparian vegetation.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Barrett Canyon Creek **Reach:** GR/AL-5 **Reach Length (miles):** 3.50

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient	Good	Channel capacity, design flow	D0321	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited and cannot be interpreted	Poor	Special status species observations	D0609	Unable to Determine	N/A	Data cannot be interpreted

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Watershed: Guadalupe

Waterbody: Barrett Canyon Creek **Reach:** GR/AL-5 **Reach Length (miles):** 3.50

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Greystone Creek **Reach:** GR/AL-9 **Reach Length (miles):** 1.99

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Greystone Creek **Reach:** GR/AL-9 **Reach Length (miles):** 1.99

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Data is not species specific	Poor	Habitat	D0609	Unable to Determine	N/A	Data is too general to be used for support statement

Local Knowledge Comments:
Limiting Factor(s): None identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = assemblages of special status species.
Fair/Poor Quality Data: Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Golf Creek **Reach:** GR/AL-10 **Reach Length (miles):** 3.28

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Golf Creek **Reach:** GR/AL-10 **Reach Length (miles):** 3.28

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data available on primary, secondary indicators; insufficient data on tertiary	Good	Flow (depth)	D0603	Unable to Determine	N/A	No data on primary, secondary indicators available; limited flow data indicates non support

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Randol Creek **Reach:** GR/AL-11 **Reach Length (miles):** 2.93

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach does not supports PFF along most of its length: from 79 to 2150 and from 2651 to 2875; land uses along these segments are critical urban uses
				D0321			
				D0322			
				D0323			

Watershed: Guadalupe

Waterbody: Randol Creek **Reach:** GR/AL-11 **Reach Length (miles):** 2.93

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

PFF	Sufficient	Good	Channel capacity, design flow	D0324	Non Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach does not supports PFF along most of its length: from 79 to 2150 and from 2651 to 2875; land uses along these segments are critical urban uses
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments: The West Branch of Randol Creek has a very good riparian area and natural channel.

Limiting Factor(s): Channel does not have adequate capacity to convey expected 100-year flows along most of this reach; land uses adjacent to the channel within the flood zone in this reach consist of urban residential (most of this reach is culverted)

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential developments into the natural channel floodplain. Problem segments are: from 79 to 2150 and from 2651 to 2875.

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Data is not species specific	Poor	Habitat	D0609	Unable to Determine	N/A	Data is too general to be used for support statement

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species.

Fair/Poor Quality Data: Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Watershed: Guadalupe

Waterbody: Randol Creek **Reach:** GR/AL-11 **Reach Length (miles):** 2.93

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial to Intermittent

Channel Type(s): Concrete-lined, rock-lined, earthen levee **Generalized Land Use in Area:** Urban

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Arroyo Calero **Reach:** GR/AC-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Alamitos Creek confluence to Calero Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators; additional data available on secondary habitat indicators	Good	Temperature, dissolved oxygen, instream rearing habitat, fish assemblage, macroinvertebrates, riparian vegetation, barriers, instream spawning habitat, flow	D0025	Partial Support	A	Rainbow trout are regularly present in this reach; indicator macroinvertebrates were reported as common but in one recent study (DO625) did not meet macroinvertebrate criteria at 3 of 4 sites
				D0102			
				D0163			
				D0201			
				D0311			
				D0312			
				D0315			
				D0438			
				D0569			
				D0598			
				D0603			
				D0613			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): Indicator macroinvertebrates not present at 3 of 4 sites in reach in 1998

Suspected Cause(s): Stream substrate is dominated by fine sediment and summer streamflows are relatively turbid, which may affect insect abundance and presence of intolerant species. Summer streamflows depend upon releases from Calero Reservoir for groundwater percolation, primarily downstream of the reach. Releases vary seasonally and among years due to reservoir storage. Summer temperatures are relatively cool, but increase downstream within the reach. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good

Data Gap(s) - No Data: Secondary Indicators = TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, altered channel materials and dimensions, special status species, water depths , chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Arroyo Calero **Reach:** GR/AC-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Alamitos Creek confluence to Calero Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

MUN	Sufficient	Fair	TDS, turbidity, selenium, mercury, copper, nickel	D0102	Full Support	C	Data on 6 of 16 parameters available; turbidity exceeds on rare occasions but nearly always is below the criteria; uncertainty due to data gaps and inability to distinguish dry and wet weather samples
				D0597			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB

Fair/Poor Quality Data: TDS, turbidity, selenium, mercury, nickel, copper

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for two sections: 2000 to 3000 and 8250 to 21000 where channel is too small; however, land uses are undeveloped and park land/open space so segment is not critical
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Watershed: Guadalupe

Waterbody: Arroyo Calero **Reach:** GR/AC-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Alamitos Creek confluence to Calero Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations, Habitat	D0020	Potential Support	C	Potential support based on California tiger salamander and red legged frog; saltmarsh common yellowthroat assumed to be common because of the location and habitat; potential support due to presence of habitat suitable for burrowing owl, golden eagle, tricolored blackbird, red-legged frog, Opler's longhorn moth, unsilvered frittilary, Hom's microblind harvestman, peregrine falcon, California tiger salamander, western pond turtle and bay checkered
				D0111			
				D0125			
				D0569			
				D0609			

Local Knowledge Comments:
Limiting Factor(s): None identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Arroyo Calero **Reach:** GR/AC-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Alamitos Creek confluence to Calero Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

REC-1	No data on primary indicators; sufficient but very limited data on secondary indicators; insufficient, limited data on tertiary indicators	Good	Flow (depth), mercury, copper, nickel, aesthetics	D0102	Full Support based on secondary indicators; no support statement is able to be made based on primary, tertiary indicators	D	Very limited data is available for this reach; support statement made based on very limited sampling at upper end of reach (1988) so uncertainty is high; flow depth appears marginal for supporting recreation but not enough information is available
				D0383			
				D0597			
				D0603			

Local Knowledge Comments: Wading and fishing may be supported but there are access problems.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Calero Reservoir **Reach:** GR/AC/CR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient on primary indicators; insufficient on secondary habitat indicators	Poor	Fish assemblage, streambank erosion potential, barriers, instream spawning habitat	D0070	Unable to Determine	N/A	Limited fish data from 1977 does not indicate presence of cold freshwater species; secondary habitat data is too general to use as basis for support
				D0121			
				D0312			
				D0315			
				D0569			

Local Knowledge Comments: Most of the reservoir is quite warm; there is no opportunity for trout to move away from the heat during summer months; the deeper hole in front of the dam where the water may be cooler is often low in oxygen

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage. Secondary Indicators, streambank erosion potential, physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Good	Fecal coliform, turbidity, MTBE, nitrate	D0584	Non Support	B	Nitrate data is too old to be of use, support statement based on fecal coliform, turbidity and MTBE
				D0642			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform, MTBE, turbidity

Suspected Cause(s): MTBE due to use of personal watercraft on reservoir; uncertain regarding fecal coliform and turbidity. It should be noted that MTBE has not exceeded the criterion since the SCVWD developed an MTBE management strategy with the County Parks Dept.

Data Gap(s) - No Data: Chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Calero Reservoir **Reach:** GR/AC/CR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

PFF	None on primary indicators; data on secondary indicators consist of GIS shapefiles without hard supporting data available for	Fair	Historic flooding; 100-year flood zones	D0321	Full Support	D	(1) No data available on primary indicators; (2) SCVWD GIS files show no historic flooding around the reservoir; no areas within FEMA flood zones are
				D0322			
				D0323			
				D0324			
				D0326			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historic flooding occurrence information, 100-yr flood zones.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0020	Full Support	B	Full support based on golden eagles, tiger salamanders and abundance of several other special
				D0111			
				D0113			
				D0122			
				D0569			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Calero Reservoir **Reach:** GR/AC/CR **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicators; sufficient but very limited data on secondary indicators; insufficient, limited data on tertiary indicators	Fair	Access, mercury	D0121 D0557	Non Support based on secondary indicator; no support statements are able to be made based on primary or	C	Access is good but no other aesthetics data is available; 1973 coliform data was not used as it appears to be total, not fecal coliform

Local Knowledge Comments: Support Status should be Full Support. This reservoir supports fishing, wading and boating.

Limiting Factor(s): Mercury in sediment

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Cherry Canyon Creek **Reach:** GR/AC-2 **Reach Length (miles):** 1.96

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on primary indicators; very limited data on secondary habitat	Fair	Barriers, macroinvertebrates	D0312	Unable to Determine	N/A	Macroinvertebrates common in early summer; no data is available on fish assemblages or late summer macroinvertebrates
				D0315			
				D0613			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = macroinvertebrates. Secondary Indicators = physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Watershed: Guadalupe

Waterbody: Cherry Canyon Creek **Reach:** GR/AC-2 **Reach Length (miles):** 1.96

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity. Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited but sufficient	Fair	Special status species observations	D0111 D0609	Potential Support	C	Potential support based on red legged frog observations; little data is available to assess whether population is reoccurring, thus potential

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirements.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Santa Teresa Creek | **Reach:** GR/AC-4 | **Reach Length (miles):** 2.86

Reach Limits (downstream to upstream): Entire Creek | **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified | **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient data on primary indicators; very limited data on secondary habitat	Fair	Barriers	D0312 D0315	Unable to Determine	N/A	Insufficient data available on primary and secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = physical barriers to migration.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Santa Teresa Creek **Reach:** GR/AC-4 **Reach Length (miles):** 2.86

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for one section: SCVWD stationing #4800 to 10007, where capacity is slightly under the 100-year flow; however, land uses in this area are non-critical (open space, parkland)
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100-yr flood flow, design channel capacity. Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations; Habitat	D0102	Non Support	D	Would expect to find herps (red legged frogs), but the data indicates that none were found within this

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species.

Fair/Poor Quality Data: Secondary Indicators = habitat requirements.

Watershed: Guadalupe

Waterbody: Santa Teresa Creek **Reach:** GR/AC-4 **Reach Length (miles):** 2.86

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data	Fair	Aesthetics	D0102	Unable to Determine	N/A	Some aesthetics concerns based on limited field assessment; no other data on primary, secondary, tertiary indicators available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Canoas Creek **Reach:** GR/CC-1 **Reach Length (miles):** 7.37

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited data on one primary indicator; limited secondary habitat indicator data	Fair	Temperature, fish assemblage, riparian vegetation, barriers	D0163	Non Support	D	Based on limited data, this reach does not meet temperature criteria nor were cold freshwater fish species observed in limited sampling; high
				D0311			
				D0312			
				D0315			

Local Knowledge Comments: Limiting Factors should be channel flow rates, morphology, water temperature, concrete culvert drop structure, no riparian area, lack of spawning gravel shade/hide cover, and pollution.

Limiting Factor(s): No cold freshwater species present in limited sampling; temperature

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Canoas Creek **Reach:** GR/CC-1 **Reach Length (miles):** 7.37

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non-Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach does not support PFF for most of its length: from 1650 to 29555 and from 29615 to 39000 where channel is too small; all of this is critical urban area; however, reach is only slightly undersized
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0562			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): Channel does not have adequate capacity to convey expected 100-year flows; land uses adjacent to the channel in these areas consist of urban residential and commercial

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential and commercial developments into the natural channel floodplain. Problem segments are from 1650 to 29555 and from 29615 to 39000; however, reach is only slightly undersized.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations; Habitat	D0084	Potential Support	D	Potential support based on burrowing owl and western pond turtle sightings; also on Chinook sighting though habitat for Chinook appears to be very poor
				D0087			
				D0569			
				D0609			

Watershed: Guadalupe

Waterbody: Canoas Creek **Reach:** GR/CC-1 **Reach Length (miles):** 7.37

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Support level should be Non Support. Salmonids normally wouldn't have access to this area, except at very high flows, due to the concrete culvert drop structure, which may be as high as 4 feet, depending on the water levels at the confluence with the Guadalupe River. There is little, if any habitat for salmonids once they gain access to the channel. Channel morphology, flow rates, water temperature, no riparian area, drop structure, lack of natural channel, lack of spawning gravel and pollution are limiting factors for this use.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data	Poor	Flow (depth)	D0163	Unable to Determine	N/A	Water clarity does not meet criteria based on limited data (one-time sampling); no other data on primary, secondary, tertiary indicators are available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Ross Creek **Reach:** GR/RC-1 **Reach Length (miles):** 4.53

Reach Limits (downstream to upstream): Guadalupe River confluence to Blossom Hill Road **Flow Regime:** Intermittent

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited data on one primary indicator; secondary habitat indicator data is available	Fair	Flow, barriers, instream rearing habitat, stream cover, instream spawning habitat, turbidity, riparian vegetation, fish assemblage	D0083	Non Support	C	Based on limited data, this reach does not meet several of the secondary habitat indicator criteria nor were cold freshwater fish species observed in limited sampling; high uncertainty
				D0084			
				D0102			
				D0311			
				D0312			
				D0315			

Local Knowledge Comments:

Limiting Factor(s): No cold freshwater fish found during limited sampling; low streamflows, pool depth, stream cover, instream rearing and spawning habitat do not meet criteria

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates. Secondary Indicators = dissolved oxygen, TSS, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, water depths, temperature, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage. Secondary Indicators = physical barriers to migration, flow, instream rearing habitat, stream cover, turbidity, riparian vegetation.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: Guadalupe

Waterbody: Ross Creek **Reach:** GR/RC-1 **Reach Length (miles):** 4.53

Reach Limits (downstream to upstream): Guadalupe River confluence to Blossom Hill Road **Flow Regime:** Intermittent

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non-Support	A	(1) Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach does not support PFF in three separate sections: from 4411 to 5580, from 8564 to 9503, and from 12710 to 15549 where channel is too small; all of this
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0562			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): Channel does not have adequate capacity to convey expected 100-year flows in three specific segments of this reach; land uses adjacent to the channel in these areas consist of urban residential and commercial

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential and commercial developments into the natural channel floodplain. Problem segments are from 4411 to 5580, from 8564 to 9503, and from 12710 to 15549.

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited but sufficient	Fair	Special status species observations; Habitat	D0084	Potential Support	C	Potential support based on cooper's hawk observations and potential rainbow trout observations
				D0087			
				D0112			
				D0609			

Watershed: Guadalupe

Waterbody: Ross Creek **Reach:** GR/RC-1 **Reach Length (miles):** 4.53

Reach Limits (downstream to upstream): Guadalupe River confluence to Blossom Hill Road **Flow Regime:** Intermittent

Channel Type(s): Earthen levee, rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data	Good	Flow (depth), aesthetics	D0084	Unable to Determine	N/A	Water depth appears marginal for recreational use and one observation of yard waste in the stream was found but no other aesthetic data is available; no other data on primary, secondary, tertiary indicators
				D0102			
				D0383			
				D0603			

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Lone Hill Creek **Reach:** GR/RC-2 **Reach Length (miles):** 1.68

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Lone Hill Creek **Reach:** GR/RC-2 **Reach Length (miles):** 1.68

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.
Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:
Limiting Factor(s): None Identified
Suspected Cause(s):
Data Gap(s) - No Data:
Fair/Poor Quality Data:

Watershed: Guadalupe

Waterbody: Short Creek | **Reach:** GR/RC-3 | **Reach Length (miles):** 1.87

Reach Limits (downstream to upstream): Entire Creek | **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified | **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macroinvertebrates, fish assemblage. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge, width, altered channel materials and dimensions, special status species, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, instream rearing habitat, instream spawning habitat, temperature, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT , diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data set D0380 provides data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators

Watershed: Guadalupe

Waterbody: Short Creek **Reach:** GR/RC-3 **Reach Length (miles):** 1.87

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirements.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data on primary, secondary, tertiary indicators available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Appendix 4-B
Reaches with Insufficient Data for All Uses

Guadalupe Watershed

Reach	Waterbody	Reach Limits (downstream to upstream)
GR/GC-6	Rincon Creek	Entire Creek
GR/GC-7	Los Capitancillos Creek	Entire Creek
GR/GC-8	Reynolds Creek	Entire Creek
GR/GC-9	Hicks Creek	Entire Creek
GR/LG/LE	Lake Elsman	Entire Reservoir
GR/LG/WR	Williams Reservoir	Entire Reservoir
GR/LG-6	Trout Creek	Entire Creek
GR/LG-7	Lyndon Canyon Creek	Entire Creek
GR/LG/LA	Lake Ranch Reservoir	Entire Reservoir
GR/LG-9	Black Creek	Entire Creek
GR/LG-10	Dyer Creek	Entire Creek
GR/LG-11	Briggs Creek	Entire Creek
GR/LG-12	Aldercroft Creek	Entire Creek
GR/LG-14	Limekiln Creek	Entire Creek
GR/LG-15	Soda Springs Canyon Creek	Entire Creek
GR/LG-16	Hendrys Creek	Entire Creek
GR/LG-17	Hooker Gulch	Entire Creek
GR/LG-18	Austrian Gulch	Entire Creek
GR/LG-20	Dry Creek	Entire Creek
GR/AL-3	Jacques Gulch	Entire Creek
GR/AL-6	Larabee Gulch	Entire Creek
GR/AL-7	Chilanian Gulch	Entire Creek
GR/AL-8	Deep Gulch	Entire Creek
GR/AL-12	McAbee Creek	Entire Creek
GR/AC-3	Pine Tree Canyon Creek	Entire Creek

Appendix 4-C
Data Sets Used in Assessment

Appendix 4-C contains a list of every data set that was ultimately used in developing the assessment conclusions in Appendix 4-B. Readers interested in knowing what data sets were used for a specific reach/use evaluation should first locate the reach and use of interest in the reach summary tables in Appendix 4-B. The data set identification numbers listed in those tables can be cross-referenced to the data set identification numbers in this appendix. Information about each data set (title, source, date) is presented in this appendix. This information is extracted from the metadata data base developed to support the WMI assessments.

Appendix 4-C
Data Sources used in Assessment
Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0001	Instream Recharge Program (Draft EIR) Vol. 1	Santa Clara Valley Water District	EIR	19950301	1989-1995
D0020	Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage	California Department of Fish and Game	Determined the distribution and ecology of fishes in 457 sampling sites on 175 streams of the San Francisco Bay drainage	19841000	19810511 to 19811010
D0023	Alamitos Creek Turbidity Monitoring	California Department of Fish and Game	Monitor Turbidity in Alamitos Creek	N/A	19971023
D0024	Alamitos Creek Flows - Telephone Conversation Record	California Department of Fish and Game	record of flows in Alamitos Creek		19971008 to 19971013
D0025	Alamitos Creek Dry Back Reconnaissance	California Department of Fish and Game	Reconnaissance investigation of species occurrence in preparation for a fishery relocation effort	N/A	19970727 to 19970815
D0026	Letter to Margaret Roper	California Department of Fish and Game	Soliciting approval for selection of alternative for release of water stored in Almaden Reservoir to Almaden Creek	19970812	19970807
D0027	Western Pond Turtle Population	California Department of Fish and Game	Observe Western Pond Turtle Populations in Alamitos Creek	19950627	19940417 to 19941111
D0028	Alamitos Creek Fish Kill	California Department of Fish and Game	Describe conditions at Alamitos Creek after fish kill	N/A	19870820
D0029	Alamitos Creek Fish Kill	California Department of Fish and Game	Alamitos Creek Fish Kill Report	N/A	19870814
D0030	Alamitos Creek - Via Valiente	California Department of Fish and Game	Habitat Typing Alamitos Creek		19861217
D0031	Alamitos Creek - Downstream of 2nd Bridge, Below Dam	California Department of Fish and Game	Habitat Typing Alamitos Creek	N/A	19871217
D0043	Los Gatos Creek - Trout Population	California Department of Fish and Game	Assess effects of fire on trout populations in Los Gatos Creek	N/A	19620524
D0044	Fish losses associated with the dewatering of a section of Los Gatos Creek	California Department of Fish and Game	Note losses of fish due to dewatering of Los Gatos Creek	N/A	19880405

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0046	Incident Report of Dryback of Los Gatos Creek	California Department of Fish and Game	Report effects of Los Gatos Creek Dryback	N/A	19961218
D0048	Los Gatos Creek - Chinook Salmon (TCR)	California Department of Fish and Game	Telephone Conversation Record	N/A	19960108
D0049	Los Gatos Creek - Steelhead Sightings (TCR)	California Department of Fish and Game	Document Steelhead sightings in Los Gatos Creek	N/A	19950204
D0070	memorandum on mercury content in fish at Calero Reservoir	California Department of Fish and Game	memo on human health	N/A	197710-19771216
D0071	Lake survey, Almaden Reservoir	California Department of Fish and Game	estimate of fisheries value and wildlife habitat	N/A	19560824
D0072	Temperature and oxygen survey at Almaden Lake	California Department of Fish and Game	physical characteristic surveys	N/A	19560824
D0073	Almaden Lake water chemistry	California Department of Fish and Game	chemistry data	N/A	19960405
D0074	Fish sampling at Almaden Lake	California Department of Fish and Game	fish population surveys	N/A	19960419
D0075	Almaden Lake water chemistry	California Department of Fish and Game	water chemistry	N/A	19950510
D0076	Almaden Lake water chemistry	California Department of Fish and Game	water chemistry	N/A	19950609
D0077	Almaden Lake water chemistry	California Department of Fish and Game	water chemistry	N/A	19960701
D0078	Almaden Lake water chemistry	California Department of Fish and Game	water chemistry	N/A	19960901
D0083	Second annual compliance monitoring report for Ross Creek bypass	Caltrans	fish surveys for compliance monitoring	19930915	199212-199308
D0084	Compliance monitoring program report #1 for the Ross Creek Fishery on Route 85 in Santa Clara County	CalTrans	fish surveys for compliance monitoring	19921020	19911226-19920819
D0087	Santa Clara Valley Water District Upper Guadalupe River Flood Control Project, biotic resources: vegetation, wildlife, and fisheries	Santa Clara Valley Water District	Agency handout on project impacts and mitigation measures	19941204	not given
D0102	Coyote Creek Riparian Station Stream Inventory Data, 1993-1998/Citizen's Water Quality Monitoring of Urban Creeks	Coyote Creek Riparian Station/Theresa Rigney	Stream inventory data, 1993-1998/Master's Thesis	1999/19931201	1993-1998/10/92-10/93
D0111	California Natural Diversity Data Base	California Department of Fish and Game	provide current information on California's most imperiled elements of natural diversity	19981003	? - 19981003

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0112	UC Berkeley Museum of Vertebrate Zoology bird collections from Santa Clara County	University of California at Berkeley Museum of Vertebrate Zoology	list of bird collections at the MVZ from Santa Clara County	19990203	18630315-19790121
D0113	UC Berkeley Museum of Vertebrate Zoology ampibian and reptile collections from Santa Clara County	University of California at Berkeley Museum of Vertebrate Zoology	list of amphibian and reptile collections at the MVZ from Santa Clara County	19990202	1878-19980621
D0121	Calero County Park Master Plan, Final program document	Santa Clara County Parks and Recreation Department	Intermediate report for developing a Master Plan for the park. This document summarizes information collected to date regarding park site and recreation program, and is to be used as a basis for the Master Plan for Calero County	19911231	not included
D0122	Calero County Park Master Plan EIR, baseline study report & Program Draft EIR Calero County Park Draft Master Plan	Santa Clara County Parks and Recreation Department	Present an analysis of potential impacts associated with proposed implementation of Calero County Park Draft Master Plan.	199109 & 199211	not included, probably 1991
D0125	Calero County Park draft Master Plan, program draft, EIR	Santa Clara County Parks and Recreation Department	assess biological resources	199211	199104-199204
D0135	Guadalupe/Coyote Resource Conservation District photos and videos	Guadalupe/Coyote Resource Conservation District	document fish and condition	N/A	1993-1994, probably others
D0136	Personal communication report on Guadalupe River chinook salmon	California Department of Fish and Game	record of oral communications on salmon in Guadalupe River	N/A	19950322-19960930
D0137	Anadromous fish species utilization of Guadalupe River and Coyote and Penitencia Creeks, Santa Clara County (1986-87)	California Department of Fish and Game	assess anadromous fish utilization of streams	19870108	19860216-19871216
D0147	Data sheets for habitat inventory of Guadalupe River study reach	California Department of Fish and Game	estimate of fisheries value and wildlife habitat	N/A	19879716-19870811
D0148	Data sheets for habitat inventory of Guadalupe Creek study reach	California Department of Fish and Game	estimate of fisheries value and wildlife habitat	N/A	19810812
D0157	Guadalupe Creek Stream Survey Datasheet	California Department of Fish and Game	Assess fish populations and fish habitat characteristics of Guadalupe Creek	N/A	19861118
D0158	Guadalupe Creek (at Pheasant Creek trib.) Stream Survey Datasheet	California Department of Fish and Game	Assess fish populations and fish habitat characteristics of Guadalupe Creek	N/A	19861118

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0159	Guadalupe River Steelhead Sighting	California Department of Fish and Game	Document Steelhead sighting in Guadalupe River	19950717	19950221
D0160	Guadalupe Creek and River Site Visit Field Notes	California Department of Fish and Game	Report site visit observations	N/A	19950509
D0161	Guadalupe River Salmon	California Department of Fish and Game	Salmon estimates in Guadalupe River	N/A	19941210
D0162	Silichip Chinook Salmon Survey	California Department of Fish and Game	documentation of reported sighting and capture of salmon in Guadalupe Creek	N/A	19940831 and 19940901
D0163	Guadalupe River EIR - Affected Environment Fishery Section	California Department of Fish and Game	EIR	N/A	19860900 to 19870600
D0164	Guadalupe River Steelhead Sighting	California Department of Fish and Game	Report Steelhead sighting in Guadalupe River	N/A	19880329 and 19880330
D0165	Guadalupe River Steelhead Sighting Interview - Hank Nishijima	California Department of Fish and Game	Verify Reports of Steelhead Sightings in Guadalupe River	N/A	19870304
D0170	Downtown Guadalupe River FCP - Alamitos Creek Water Temperature Data	California Department of Fish and Game	Response to request for additional data for Alamitos Creek	N/A	19950700 to 19950800, and 19960700 to 19960800
D0172	Chinook Salmon: Guadalupe River - TCR	California Department of Fish and Game	Record observations of Salmon in Guadalupe River	N/A	19940600 to 19941200
D0173	Salmonids Prior to Spawning Guadalupe River - San Jose, CA Brokaw Rd. to Coleman Ave.	California Department of Fish and Game	DNA sampling of steelhead in Guadalupe River	N/A	19931020 to 19940508
D0174	Spreader (Summer) Dams Fisheries Study 1993 Annual Report	California Department of Fish and Game	Summary of Field Work November 1992 to October 1993 and Four-Year Summary 1989-1993	19940400	19890000 to 19930000
D0199	Data sheets for habitat inventory of Alamitos Creek study reach	California Department of Fish and Game	estimate of fisheries value and wildlife habitat	19870813-19870820	19870813-19870820
D0201	The Distribution and Abundance of Lotic Macroinvertebrates during Spring 1997 in Seven Streams of the Santa Clara Valley area, California	USGS	A model to predict: 1) the expected invertebrate community at urban stream sites; 2) determine the level of sampling effort and taxonomic resolution that is most cost effective to use the model; and 3) provide useful mactoinvertebrate data.	in press	199705 - 199808

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0206	Water Quality and Flow of Streams in Santa Clara Valley (1979-1981)	USGS	Describe the water quality of streams in Santa Clara Valley and ot evaluate the adequacy of existing water quality sampling programs.	1986	1979-1981
D0207	Santa Clara Valley Nonpoint Source Control Program Annual Report - Toxicity Testing	Santa Clara Valley Urban Runoff Pollution Prevention Program	Annual report for storm water NPDES permit	19910901	1990-1991
D0214	Temperature Water Quality Data from SCVWD	Santa Clara Valley Water District	This data summarizes hourly termperature data in creeks in the Santa Clara Basin.	not published	1996, 1997, 1998. Data dates vary by waterbody and stations within the waterbodies.
D0219	Santa Clara Valley Nonpoint Source Pollution Control Program Annual Report 1996 Volume III (Annual Monitoring)	Santa Clara Valley Urban Runoff Pollution Prevention Program	This is the implementation report for the monitoring plan of the Santa Clara Valley Nonpoint Source Pollution Control Program for the fiscal year 1995-96.	19960901	19951211, 19960116, 19960130, 19960304, 19960401
D0224	Upper Guadalupe River Flood Control Project	Santa Clara Valley Water District	To reduce economic damage and threat to human safety caused by flooding along the Guadalupe River within the City of San Jose		
D0227	Fisheries and Aquatic Habitat Collaborative Effort (FAHCE)	Santa Clara Valley Water District	To identify contribution of SCVWD facilities and operations to existing fishery habitat conditions; to identify reasonable flow and non-flow measures that will improve fish habitat conditions		
D0237	1998 RMP Estuary Interface Pilot Study, Phase II	San Francisco Estuary Institute	To evaluate 2 years of pollutant data to determine regional applicability of findings, and to identify sources of variability that could be minimized using basic physical watershed characteristics.		February 1996 - August 1996
D0246	Water Quality of the Lexington Reservoir, Santa Clara County, Califronia	US Geological Survey /Water Resources Investigation/ Santa Clara Valley Water District	Analize the data collected in 1979 and 1980 by the USGS and the SCVWD to , and determine water quality conditions in the reservoir.	1988	All samples collected in seven field trips in between 19780615 and 19800924

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0311	EIR Creek Land Use Buffer (crkslu)	SANTA CLARA VALLEY WATER DISTRICT	To establish a map of land use adjacent to the creeks within SCVWD. For a number of different planning functions,including environmental quality analysis, hazard impact work and EIR Routine Maintenance GIS projects.	N/A	N/A
D0312	Dams	Santa Clara Valley Water District	Establish a basemap of all the dams in Santa Clara Valley Water District.	19960700	N/A
D0315	Reservoirs	Santa Clara Valley Water District	Establish a basemap of all reservoirs in Santa Clara County.	19960400	N/A
D0321	FEMA Flooding Areas	Santa Clara Valley Water District	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19960500	N/A
D0322	SCVWD Flooding Area	SANTA CLARA VALLEY WATER DISTRICT	To delineate the boundary of the 1% flood zone for planning purposes.	N/A	N/A
D0323	Historical Flooding	SANTA CLARA VALLEY WATER DISTRICT	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19971100	N/A
D0324	Historical Flooding-Points	SANTA CLARA VALLEY WATER DISTRICT	This shapefile shows locations of overbank flooding from 1978-1997.	N/A	N/A
D0325	Areas Now Protected	SANTA CLARA VALLEY WATER DISTRICT	This shape shows areas now protected from a 1% flood event.	N/A	N/A
D0326	Fema Panels	Santa Clara Valley Water District	This data is a dissolve on the fema Q3 data on firm panel.	19960500	N/A
D0328	Percolation Ponds	SANTA CLARA VALLEY WATER DISTRICT	The coverage was developed to establish a basemap of percolation ponds within the jurisdiction of the SCVWD.	19960500	N/A
D0380	Geo-hydro (WWMM)	Santa Clara Valley Water District	Adapt SCVWD Waterways Management Modle data to GIS creek system	1997	
D0383	Outfall Locations	Santa Clara Valley Water District	Outfalls into creek system		

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0412	Summer dams fisheries study summary of field work, 1989-90	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	19910620	198911-1990/10
D0416	Santa Clara Valley Water District instream recharge program mitigation and monitoring plan	Santa Clara Valley Water District	Mitigation and monitoirng plan in support of permit application for operation of groundwater recharge program	19941115	198407-198410
D0418	Summer dams fisheries study 1992 annual report	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	19930730	199111-199210
D0419	Summer dams fisheries study summary of field work, November 1990-March 1992	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	19920407	199011-199203
D0422	Summer dams fisheries study summary of field work, November 1992-October 1993	Santa Clara Valley Water District	Annual report of field work conducted between 11/1992 to 10/1993 and four-year summary 1989-1993	199404	198911-199310
D0423	Spreader (Summer) dams fisheries study 1994 annual report	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	199503	198911-199410
D0425	Draft environmental impact report/environmental impact statement for the Upper Guadalupe River Flood Control Project	Santa Clara Valley Water District	EIR/EIS for flood control project	199701	198607-198706
D0426	Draft environmental impact report/environmental impact statement for the Upper Guadalupe River Flood Control Project, Volume I	Santa Clara Valley Water District	EIR/EIS for flood control project	199701	198607-198706
D0557	Final Assessment of Mercury in Water and Sediments of Santa Clata Valley Streams and Reservoirs	Santa Clara Valley Nonpoint Source Pollution Control Program	To identify the potential sources and contribution of mercury derived from inactive mines in the Santa Clara Valley to beneficial uses of water resources in lower South Bay	19920701	1971-1991
D0558	Water Quality Data for Guadalupe reservoir	Santa Clara Valley Water District	Unknown		1995-1997
D0559	Waterways Management Model Data for Three WMI Pilot Watersheds	Santa Clara Valley Water District	Stream Data for Three watershed	2000	

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0561	Guadalupe River Watershed Planning Study: Engineer's Report	Santa Clara Valley Water District	To provide a project alternative to meet the goal of the District to provide a supply of water, adequate in both quantity and quality, needed to meet the desired quality of life in the community, and to provide protection against flooding.	199701	
D0562	Final EIR/EIS Upper Guadalupe River Feasibility Study	Santa Clara Valley Water District & U.S. Army Corps of Engineers	Analyze the impacts associated with proposed flood control measures for the upper Guadalupe River in San Jose, California	199801	
D0564	Guadalupe River and Adjacent Streams Survey Investigations: Main Text for Stage 2 Report	U.S. Army Corps of Engineers, San Francisco District	Present results of the first two stages of planning process to determine if the Federal Government should assist the people of Santa Clara Valley in solving their flood problems	198006	
D0565	Final Guadalupe River Interim Feasibility Report and EIS: Guadalupe River and Adjacent Streams Investigations	U.S. Army Corps of Engineers, San Francisco District	To investigate public concerns in the Guadalupe River study area regarding flood prevention and associated environmental impacts, and urban redevelopment.	198507	
D0566	Santa Clara Valley Water District: Guadalupe River Fish Ladder and Fish Screen at the Alamitos Drop Structure: Final Initial Study and Mitigated Negative Declaration	Santa Clara Valley Water District	To determine the feasibility of the Guadalupe River Fish Ladder and Fish Screen Project	199812	
D0568	Guadalupe River Flood Control Project, Downtown San Jose, California: Working Paper on Environmental Effects of Proposed Project Modifications	U.S. Army Corps of Engineers, Sacramento District	Describe and evaluate the environmental effects of the Project, which includes construction and operation of an underground bypass system and the addition of a new mitigiation area to the mitigation program.	19991004	
D0569	Biological Data Report on Steelhead and Chinook Salmon Guadalupe River Flood Control Project, Downtown San Jose, California	National Marine Fisheries Service	This BDR was prepared in support of proposed modifications to the Guadalupe River Project in downtown San Jose, Califonia	20000208	
D0570	Soil Characterization Report for River Channel (Area 22); Guadalupe River Flood Control Project Construction Reach 3	Santa Clara Valley Water District	Presents methodology used to characterize and classify the soil to be excavated from within the river channel in construction Reach 3 of the project	199408	

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0576	Masson Diversion Dam Fish Ladder and Fish Screen on Guadalupe Creek: Final Mitigated Negative Declaration & Initial Study	Santa Clara Valley Water District	Support findings in a Negative Declaration	199902	
D0577	Hydraulic Analyses of the Guad 106 reach Along the Guadalupe River	U.S. Army Corps of Engineers, Sacramento District	This report provides hydarulic analyses for a segment of the study reach	198911	
D0580	Delineation of Jurisdictional Waters and Biotic Report for San Francisco Water Department, Bay Division of Pipelines No's. 3 and 4 Crossings of the Guadalupe River	Santa Clara Valley Water District	Delineates potential jurisdictional "Waters of the United States". Provides a description of the existing biological conditions of the project and assists the USACE ini determining whether the project is consistent with permit conditions	19921223	199206-199210
D0584	Environmental Setting of the Watersheds and Floodplains of the Guadalupe River, Coyote Creek and their Tributaries	Santa Clara Valley Water District	Characterize the environmental setting of the study area, and to identify environmental concerns with implications for the planning of the possible future flood control improvements	197404	1955-1973
D0593	Master Plan for the Los Alamitos/Calero Creek Park Chain	City of San Jose	Respond to the City of San Jose's policy to develop a recreational trail system utilizing creek rights-of-way wherever available throughout the City	198706	
D0597	Stormwater Monitoring in the Bay Area	Map key by Woodward-Clyde	Monitoring results	Unknown	198802-1988903
D0598	Electrofishing Data, Guadalupe River Watershed	Sacramento Fish and Wildlife Office	Results of electrofishing conducted by the U.S. Fish and Wildlife Service in selected tributaries of the Guadalupe River, Santa Clara County, August-October 1998.	Unpublished	August-October 1998
D0603	FAHCE data	Santa Clara Valley Water District	FAHCE water temperature, streamflow, and habitat mapping data		
D0607	San Francisco Estuary Regional Monitoring Program for Trace Substances, 1997 Annual Report	San Francisco Estuary Institute	To describe the concentrations of pollutants in water, sediment, and tissue samples of oysters, mussels, and clams at 15 to 24 sampling locations in SF Estuary for three discrete sampling events	19990601	1997

Guadalupe Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0608	San Francisco Estuary Regional Monitoring Program for Trace Substances, 1998 Annual Report	San Francisco Estuary Institute	To describe the concentrations of pollutants in water, sediment, and tissue samples of oysters, mussels, and clams at 15 to 24 sampling locations in SF Estuary for three discrete sampling events		1998
D0609	Revised SMP Appendix E, Santa Clara Valley Water District Stream Maintenance Program, Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities	SANTA CLARA VALLEY WATER DISTRICT	Programmatic impact assessment and mitigation for routine bank protection activities	20010801	1988-2001
D0613	Various USFWS Studies	Jim Haas	Almaden Quicksilver County Park and surrounding area.		
D0621	SCVWD Stream Maintenance Criteria and Gudelines	SCVWD	Developes a tracking system for the maintenance activittes of three pilot watersheds.		
D0624	Leidy Fish Data -EPA- http://sfeidev.stgeorgeconsulting.com/about.html	EPA	Fish population data		
D0625	USGS Spreadsheet Macroinvertebrate Data	Jim Carter and Steve Fend	Santa Clara Valley macroinvertebrate data		
D0639	FEMA, National Flood Insurance Program, Q3 Flood Data, Disc 1	FEMA	Flood data		
D0641	Almaden Lake Swim Beach Water Quality Data for Recreation Purposes	Rick Pooler	Recreation information for Almaden Lake Swim Area	2002	
D0642	Water Quality Data for Almaden, Calero, Guadalupe, Vasona, and Lexington	Santa Clara Valley Water Disitrict	Check drinking water exceedences for several areas	2002	1995-6/2001

Volume Two

Watershed Assessment Report

Chapter 5
Assessment of San Francisquito Watershed

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team

February 2003

Watershed Assessment Report
Chapter 5: Assessment of San Francisquito Watershed

List of Authors

REPORT PREPARATION TEAM

Sarah Young, Santa Clara Valley Water District
Richard McMurtry, Regional Water Quality Control Board
Michael Stanley-Jones, Silicon Valley Toxics Coalition
Alice Ringer, WMI Coordinator

with consultant support from

URS

Rob Carnachan, Senior Water Resources Scientist
Suzanne Loadholt, Soil Scientist
Raul Farre, Staff Scientist
Sandy Davidson, Database Manager
Terry Cooke, MUN and REC-1 Assessment Team
Usha Vedigiri, MUN and REC-1 Assessment Team
Phil Mineart, PFF Assessment Team
Senarath Ekanayake, PFF Assessment Team
Francesca Demgen, RARE Assessment Team
Jon Stead, COLD and RARE Assessment Team

And

Entrix, Inc.

Jerry Smith, San Jose State University, COLD Assessment Team

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 5
Table of Contents

Tables

Chapter 5 Appendices

Chapter 5
Assessment of San Francisquito Watershed

5.1 General Overview and Setting

The San Francisquito Creek watershed is located in the northwestern portion of Santa Clara County and the southeastern portion of San Mateo County. The watershed's drainage basin is approximately 45 square miles. Much of the watershed lies in steep, mountainous areas of the Santa Cruz Mountains. The highest elevation in the watershed is approximately 2,200 feet. The watershed drains the east-facing slopes of the Santa Cruz Mountains above the cities of Portola Valley, Woodside, Palo Alto, and Menlo Park. The main stem of San Francisquito Creek has five major tributaries, each of which is described in Section 5.1.1.

There are three small reservoirs in the San Francisquito Creek watershed that were built for water conservation and storage purposes. The first is Searsville Lake on Corte Madera Creek. The other two are Felt Lake and Lake Lagunita which are off-stream reservoirs fed by diversions from Los Trancos Creek and San Francisquito Creek respectively. All are on Stanford University property. Additionally, water is diverted from Bear Gulch to an off-stream California Water Service Company reservoir located outside the watershed in Atherton.

The upland portion of the watershed consists of low-density development and open space while the lower portion of the watershed, which encompasses relatively flat portions of the valley floor/Bay plain adjacent to San Francisco Bay, has been extensively developed. The San Andreas Rift Zone crosses the mid-section of the watershed and has created a series of long northwest-southeast trending valleys through which many of the major tributary streams flow. Searsville Lake is located just above the transition zone from Bay plain to mountain slopes.

5.1.1 Waterbodies in the Watershed

This section provides a general description of each of the 29 waterbodies in the San Francisquito Creek watershed. A more extensive discussion of the natural characteristics of the Santa Clara Basin in general is contained in Chapter 7 of the Watershed Characteristics Report (Volume One). The descriptions in this section are, in part, based on the information in the Watershed Characteristics Report.[1] These brief descriptions are

[1] Because the Watershed Characteristics Report (WCR) itself contains voluminous references to various sources, sections of this chapter that contain information from the WCR are cited with the notation (Santa Clara Basin WMI, 2001). Readers are directed to the references in Chapter 7: Natural Setting of the WCR to determine the original source of the information.

included here in order to place the pilot assessment results in context and are not mean to provide the definitive characterization of each stream or reservoir. Additional detail concerning stream channel characteristics and riparian vegetation may be found in the individual stream assessment result discussions in Section 5.3.

5.1.1.1 San Francisquito Creek

San Francisquito Creek is the major waterway in the watershed. It is approximately 12.5 miles long and extends from the base of Searsville Dam (on Stanford University land) to San Francisco Bay. Tributaries in the upper watershed that feed into Searsville Lake include Alambique Creek, Sausal Creek, and Corte Madera Creek. Tributaries that enter San Francisquito Creek downstream of Searsville Dam include Bear Creek and Los Trancos Creek. Downstream of the confluence with Los Trancos Creek, San Francisquito Creek forms the boundary between San Mateo County and Santa Clara County. Bordering the creek on the north are the cities of Menlo Park and East Palo Alto, and on the south is the city of Palo Alto. San Francisquito Creek runs through Stanford University lands. The towns of Woodside and Portola Valley are in the upper portion of the watershed. Urban land uses border the lower portion of the creek, while the upper portion above the Los Trancos Creek confluence has remained relatively natural, though low-density urban residential development is present (although significantly set back from the stream corridor) throughout this area.

The lower portion of San Francisquito Creek has been significantly modified, both directly through channelization downstream of U.S. Highway 101, and indirectly through changes in runoff and infiltration patterns caused by extensive urban development of its floodplain. Creekside development, passage barriers, flood protection and stormdrain projects, Searsville Dam, and other channel modifications have significantly altered riparian and aquatic habitats along San Francisquito Creek.

Due to the watershed's topography, flooding has long been associated with San Francisquito Creek. Rainfall occurs mainly during the winter. Portions of the watershed near the crest of the Santa Cruz Mountains receive 40 to 60 inches per year, while the central Santa Clara Valley receives an average between 13 and 14 inches. The steep slopes of the mountains swiftly convey the water in rain-swollen tributaries to the Bay plain where the waters historically spread out across a much larger floodplain. Today, most of this floodplain has been covered with urban and residential development and the creek channel itself has been modified in some areas to provide flood protection. Nonetheless, major flood incidents have occurred in the past, most recently in 1955, 1958, 1982, 1995, and 1998. In an attempt to control flooding and bank erosion in portions of the lower channel, areas on both sides of the channel between the University Avenue bridge and U.S. Highway 101 have been lined with sacked concrete and protected with berms or low floodwalls. Additionally there are intermittent areas of sacked concrete as far upstream as the Waverley Street bike bridge. The reach between U.S. Highway 101 and the Bay has been widened and leveed. The severity of flooding has been increased due to sedimentation. Sedimentation occurs in the reach of the creek downstream of U.S. Highway 101 due to tidal action, as well as due to deposition of sediment from upstream sources. Sediment that is transported from the headwaters of the creek is deposited when water slows down as the gradient of the stream changes in the flatter parts of the watershed. Once deposited, sediment occupies space in the channel that is no longer available to transport floodwaters. In 1996, sediment occupied at least one-third of the flow area in the channel beneath the U.S. Highway 101 crossing. Sediment can also interfere with local drainage outfalls by blocking pipes and culverts. Recent studies in the headwaters of San Francisquito Creek indicate that erosion rates are currently quite high. Since the forested headwaters have not been extensively burned for more than 100 years, the high rate of erosion cannot be attributed to fire (Santa Clara Basin WMI, 2001).

After the floods of 1955 and 1958, interim flood protection measures were implemented on the creek in the reaches upstream and downstream of U.S. 101. The creek flooded again in 1998, when streamflows exceeded the highest on record (approximating the 100-year or 1% flood) and resulted in substantial flooding, causing over $28 million in property damage in Santa Clara County alone (Santa Clara Basin WMI, 2001).

Much of the watershed lies in a steep, mountainous area of the Santa Cruz Mountains and includes open space, Stanford University's Jasper Ridge Biological Preserve, and rural residential housing. This mix of land uses has preserved areas of high quality steelhead habitat in the upper tributaries of Los Trancos and Bear Creeks. Good steelhead habitat also exists in main stem reaches just downstream of Searsville Dam to the Lagunita Diversion. The Lake Lagunita Diversion Dam (owned by Stanford University) was a significant passage barrier for anadramous fish until 1978, when the fish ladder was replaced with a Denil-style fishway. Since then, the fishway has been further modified to improve passage. Searsville Dam, built in the late 1800s and located within Stanford's Jasper Ridge Biological Preserve, is a terminal barrier on San Francisquito Creek for all upstream migrating fish. While the primary passage barrier on the main stem San Francisquito has been laddered, other passage obstructions and barriers exist on the main stem and in the tributaries.

The upper portion of the watershed is vegetated with scattered oak and madrone woodlands that are intermingled with grassland habitat, in some areas forming a savanna. A grove of upland redwood forest occurs along San Francisquito Creek just below Searsville Lake.

Searsville Lake

Searsville Lake is the major reservoir in the San Francisquito Creek watershed. Searsville Lake was built in 1892 and is located within Stanford University's Jasper Ridge Biological Preserve. Major tributaries feeding Searsville Lake include Alambique Creek, Sausal Creek, Corte Madera Creek, and Dennis Martin Creek. Westridge Creek, a small drainage entering the lake from the east, contributes ephemeral flows. The reservoir is situated at the head of San Francisquito Creek. The lake once covered 90 acres in a "Y" shape, with arms reaching through swamp and marshlands. Today, the swamp is drying out, and the lake itself covers less than 23 acres. More than 45 feet of silt have gathered on the bottom, reducing the lake's depth to only 22 feet at the center (Santa Clara Basin WMI, 2001).

Searsville Dam is 68 feet high with a drainage area upstream of 14.8 square miles. The dam is owned and operated by Stanford University. Two of the tributary inflows to the lake are perennial; the other (Sausal Creek) is ephemeral. The upstream drainage area is lightly developed with low-density residential land uses, with much of the area being rugged open space.

Westridge Creek

Westridge Creek is a short, ephemeral tributary to Searsville Lake. The creek drains the west-facing side of Jasper Ridge dividing Searsville Lake from Los Trancos Creek. The creek's drainage area is undeveloped open space that is part of the Jasper Ridge Biological Preserve.

Lake Lagunita

Lake Lagunita is a small off-stream impoundment located east of San Francisquito Creek on the Stanford University campus. Lake Lagunita is fed through diversions from San Francisquito Creek. Lake Lagunita is owned and operated by Stanford University for water supply and recreational use and originated as a livestock watering facility for the original Stanford farm. The lake normally goes dry in the summer as diversions from the creek are suspended.

5.1.1.2 Los Trancos Creek Subwatershed

Los Trancos Creek is a tributary that enters San Francisquito Creek from the south two miles downstream of Searsville Lake. Los Trancos Creek is 6.5 miles long and has a drainage area of 7.25 square miles. The Los Trancos Creek subwatershed drains the northeast facing slopes of the Santa Cruz Mountains, as well as the west-facing slopes of Palo Alto's Foothills Park. Felt Lake, an off-stream reservoir, is located just east of Los Trancos Creek in its lower section and is fed by a diversion channel from the creek. Felt Lake releases flow back to the creek via a return channel. The only tributary to Los Trancos Creek is Buckeye Creek, which drains the west-facing slopes in Foothills Park.

The creek's upper course is through steep terrain with very low-density residential/rural development. As the topography levels out somewhat downstream, the riparian corridor becomes wider. Urban development (and Alpine Road) abut the creek along its lower course. Los Trancos Creek forms the boundary between San Mateo and Santa Clara Counties.

Buckeye Creek

Buckeye Creek is a perennial tributary to Los Trancos Creek, joining it from the east in Portola Valley. Buckeye Creek drains the west-facing slopes of Palo Alto's Foothills Park and has a largely undeveloped drainage area.

Felt Lake

Felt Lake is a small off-stream impoundment located just east of Los Trancos Creek and west of Interstate 280 in Palo Alto. Felt Lake is fed by a diversion channel from the creek and releases flow back to the creek via a return channel. Felt Lake is owned and operated by Stanford University for water supply and was built in 1930. The dam is earthen and is 67 feet high. Felt Lake stores 900 acre-feet of water and covers 40 acres of surface area.

Felt Lake Diversion Channel

The Felt Lake Diversion Channel is a short, engineered channel that diverts flow from Los Trancos Creek to Felt Lake.

Felt Lake Return Channel

The Felt Lake Return Channel is a short, engineered channel that returns flow to Los Trancos Creek from Felt Lake.

5.1.1.3 Bear Creek Subwatershed

Bear Creek is a tributary that flows through the town of Woodside and enters San Francisquito Creek just downstream of Searsville Lake. The West Union Creek subwatershed is tributary to Bear Creek, as are Bear Gulch and Dry Creek. Bear Creek itself is perennial, with the largest component of its flow coming from West Union Creek. The creek begins at the confluence of Bear Gulch and West Union Creek in Woodside and flows first east, then southeast after absorbing the flow of Dry Creek. The drainage area along Bear Creek is developed with low-density residential land uses.

Dry Creek

Dry Creek is an ephemeral to intermittent tributary to Bear Creek, joining it from the north approximately halfway along its route. Dry Creek drains a fairly large area west of Interstate 280 that is developed with medium-density residential land uses. Gradients are relatively gentle through out this drainage.

Bear Gulch

Bear Gulch joins West Union Creek in Woodside to form Bear Creek. Bear Gulch drains the steep northeast-facing slopes of the Santa Cruz Mountains above Woodside. The upper edge of the drainage is along the crest of the mountains at approximately 2,200 feet elevation. The Bear Gulch Diversion Dam, operated by the California Water Service Company, is located on Bear Gulch west of State Highway 82. Streamflow above this point is perennial but below it is intermittent. Water removed from the stream at this diversion structure is piped out of the watershed to Bear Gulch Reservoir.

5.1.1.4 West Union Creek Subwatershed

West Union Creek drains the northwestern portion of the watershed before eventually joining Bear Creek at the confluence with Bear Gulch in Woodside. Four tributary streams join West Union Creek from the west, each draining a small catchment in the Santa Cruz Mountains. West Union Creek rises near the crest of the mountains near the 2,000 foot level and flows northeast into the San Andreas Rift Zone, at which point the topography levels out and the stream flows along the faultline to the southeast, absorbing its tributaries along the way. This section of the creek flows through Huddart County Park before entering Woodside. Most of the West Union Creek drainage area is undeveloped with low-density residential development existing in its lower section. Flow in West Union Creek is intermittent in the lower portion (below the park) and ephemeral to intermittent in its upper portion.

Appletree Gulch

Appletree Gulch is a short, steep ephemeral tributary to West Union Creek, joining it from the southwest just above its confluence with Bear Creek. The drainage area is steep and rugged with little development.

Tripp Gulch

Tripp Gulch is a short, steep ephemeral tributary to West Union Creek, joining it from the southwest just above its confluence with Appletree Gulch. The drainage area is steep and rugged with little development, except near the confluence where low-density residential development exists.

Squealer Gulch

Squealer Gulch is a longer but still steep tributary to West Union Creek, joining it from the southwest just north of its confluence with Tripp Gulch. The drainage area is steep and rugged with little development, except near the confluence where low-density residential development exists. Summit Spring at the headwaters of Squealer Gulch allows the stream to maintain a perennial flow.

McGarvey Gulch

McGarvey Gulch is a steep ephemeral to intermittent tributary to West Union Creek, joining it from the southwest along the northern boundary of Huddart County Park. The drainage area is steep and rugged with little development.

5.1.1.5 Corte Madera Creek Subwatershed

Corte Madera Creek begins high in the Santa Cruz Mountains near the 2,000 foot elevation level and flows northwest down through Portola Valley. The creek follows the San Andreas Rift Zone and is separated from the Los Trancos Creek subwatershed to the east by Coal Mine Ridge. Five small tributary streams join the creek from the west, each draining a small catchment in the Santa Cruz Mountains. At Spring Ridge, Corte Madera Creek is forced to make a sharp turn to the east where it enters Portola Valley. The creek runs parallel to neighboring Sausal Creek on the west (separated by a small rise) and flows into a willow swamp complex at the head of Searsville Lake. Sausal and Alambique Creeks also feed into this wetland area. Flow in Corte Madera Creek is perennial.

Land uses in the upper portion of the drainage area are open space and very low density residential, while the downstream portion in Portola Valley is developed with urban and medium-density residential uses.

Hamms Gulch

Hamms Gulch is a short, steep perennial tributary to Corte Madera Creek, joining it from the west at the base of Spring Ridge below Windy Hill. The drainage area is steep and rugged with virtually no development.

Jones Gulch

Jones Gulch is a short, steep perennial tributary to Corte Madera Creek, joining it from the west at almost the same location as Hamms Gulch near the base of Spring Ridge below Windy Hill. The drainage area is steep and rugged with little development.

Damiani Creek

Damiani Creek is a short, steep perennial tributary to Corte Madera Creek, joining it from the southwest upstream of Jones Gulch. The drainage area is steep and rugged with virtually no development.

Rengstorff Gulch

Rengstorff Gulch is a short, steep perennial tributary to Corte Madera Creek, joining it from the northwest upstream of Damiani Creek. The drainage area is steep and rugged with virtually no development.

Coal Creek

Coal Creek is a short, steep perennial tributary to Corte Madera Creek, joining it from the southwest just upstream of Rengstorff Gulch. The drainage area is steep and rugged with virtually no development.

5.1.1.6 Alambique Creek

Alambique Creek is a perennial stream that drains the northeast-facing slopes of the Santa Cruz Mountains above Woodside. The stream rises south of Bear Gulch Road at around the 2,000 foot elevation and flows east through Wunderlich County Park, crossing State Highway 84 and exiting the mountains into the Portola Valley lowland area. The stream flows into a large willow swamp complex, with Sausal Creek, at the head of Searsville Lake. The upper portion of the creek's drainage is virtually undeveloped while the lower part on the valley floor features low- to medium-density residential development.

5.1.1.7 Sausal Creek Subwatershed

Sausal Creek begins near the base of Spring Ridge above Portola Valley and flows northwest along the San Andreas Rift Zone, paralleling the course of Corte Madera Creek to the east (separated by a low ridge). Four tributaries join Sausal Creek, each draining a small catchment in the Santa Cruz Mountains. Sausal Creek joins Alambique Creek in a willow wetland complex at the upper end of Searsville Lake. Most of the Sausal Creek drainage area is developed with low- to medium-density residential uses. Sausal Creek is an ephemeral stream.

Dennis Martin Creek

Dennis Martin Creek is a steep, ephemeral stream that drains a small, rugged catchment on the northeast-facing side of the Santa Cruz Mountains. The stream is a tributary to the wetland complex at the head of Searsville Lake. The drainage area is developed with low-density residential uses in the upper headwater area, though the lower section is encased in a deep canyon.

Bull Run Gulch

Bull Run Gulch is a steep, ephemeral stream that drains a small, rugged catchment on the northeast-facing side of the Santa Cruz Mountains. The stream joins Sausal Creek in Portola Valley upstream of Dennis Martin Creek. The drainage area is virtually undeveloped in the upper headwater area but includes a residential subdivision near the confluence with Sausal Creek.

Neils Gulch

Neils Gulch is a steep, ephemeral stream that drains a small, rugged catchment on the northeast-facing side of the Santa Cruz Mountains. The stream joins Sausal Creek in Portola Valley upstream of Bull Run Gulch. The drainage area is virtually undeveloped in the upper headwater area but includes some residential uses near the confluence with Sausal Creek.

Bozzo Gulch

Bozzo Gulch is a short ephemeral stream that drains a small catchment on the north side of Spring Ridge. The stream joins Sausal Creek in Portola Valley. The drainage area is virtually undeveloped in the upper headwater area but includes some urban/residential uses near the confluence with Sausal Creek.

5.1.2 Current Beneficial Use Designations for Watershed Waterbodies

The San Francisco Bay Regional Water Quality Control Board (Regional Board) has designated waterbodies for specific beneficial uses in the Water Quality Control Plan (Basin Plan) for the region. Four of these uses were evaluated by the WMI in the pilot watershed assessments. Prior to the assessments, WMI stakeholders identified some corrections and potential changes to the beneficial use designations in the Basin Plan. These recommendations were based on stakeholder understanding of stream and watershed characteristics. After the pilot assessments were completed, both the existing use designations and the initial WMI stakeholder recommendations for revisions to these designations were reviewed against the assessment results in order to identify any additional revisions that should be highlighted. Table 5-1 presents the findings of this analysis. Basin Plan beneficial use designations for the four uses evaluated in the pilot assessment are shown, as are the additional use designations recommended by WMI stakeholders prior to the assessment and potential changes to these designations based on the pilot assessment results. Blanks indicate that no designations have been made or proposed. Streams or reservoirs not listed in the Basin Plan are shown in italics. No column is shown for the Protection from Flooding (PFF) interest as it is not a beneficial use identified by the Regional Board.

Table 5-1
Beneficial Use Designations in the San Francisquito Creek Watershed

WATERBODY	**BENEFICIAL USE**			
	Cold Freshwater Habitat (COLD)	**Municipal and Domestic Supply (MUN)**	**Preservation of Rare and Endangered Species (RARE)**	**Water Contact Recreation (REC-1)**
San Francisquito Creek	E		WE	P
Searsville Lake	E			E
Westridge Creek				
Lake Lagunita			AE	
Bear Creek	AE		AE	
Dry Creek				
Bear Gulch				
West Union Creek				
Appletree Gulch				
Tripp Gulch				
Squealer Gulch	AE			
McGarvey Gulch				
Corte Madera Creek				
Hamms Gulch				
Jones Gulch				

WATERBODY	**BENEFICIAL USE**			
	Cold Freshwater Habitat (COLD)	**Municipal and Domestic Supply (MUN)**	**Preservation of Rare and Endangered Species (RARE)**	**Water Contact Recreation (REC-1)**
Damiani Creek				
Rengstorff Gulch				
Coal Creek				
Alambique Creek				
Sausal Creek				
Dennis Martin Creek				
Bull Run Gulch				
Neils Gulch				
Bozzo Gulch				
Los Trancos Creek	WE		AE	
Buckeye Creek				
Felt Lake				E
Felt Lake Diversion Channel				
Felt Lake Return Channel				

Legend: E = Existing Beneficial Use; P = Potential Beneficial Use; WE = WMI stakeholder pre-assessment recommendation for existing beneficial use designation; AE = WMI pilot assessment results recommendation for existing beneficial use designation.
Note: Waterbodies in italics are not listed in the Basin Plan.
Source: San Francisco Bay Regional Water Quality Control Board, 1995. San Francisco Regional Water Quality Control Plan, Table 2-5.

The results of the pilot assessment generally confirmed the pre-assessment recommendations of WMI stakeholders regarding beneficial use designations for San Francisquito Creek watershed waterbodies. The available data reviewed during the assessment provided enough confidence to propose additional existing use designations for cold freshwater habitat (COLD) in Bear Creek and Squealer Gulch and preservation of rare and endangered species (RARE) in Lake Lagunita, Bear Creek, and Los Trancos Creek. However, as the pilot assessment was based on the review of existing, available data and did not involve a field-checking component, it is recommended that additional focused data collection and review be conducted before any new use designations are adopted.

In general, the major streams in the San Francisquito Creek watershed have diverse characteristics and support different beneficial uses in different locations. As a result, the Basin Plan beneficial use designations should either reflect this diversity by applying only to specific sections of each stream or should be coupled with an understanding that the entire length of the stream will not provide the same level of support for the designated use (Santa Clara Basin WMI, 2001).

5.1.3 Stream Segmentation for Assessment

In order to organize the review of data during the pilot assessment, the San Francisquito Creek watershed was divided into a total of 37 stream segments (or reaches). Most of the segments consist of individual tributary streams and watershed reservoirs. In some portions of the watershed, however, it was necessary to divide the longer streams (San Francisquito, West Union, Corte Madera, and Los Trancos Creeks) into multiple segments in order to facilitate data evaluation. In such cases, stream reaches were delineated based on common channel type, flow regime, and adjacent land use. It should be noted that the segmentation approach used for the pilot assessment was consistent with and useful for the robustness of the available data but is not based on a detailed study of stream geomorphology or riparian zone condition. WMI stakeholders have noted that a few stream reaches are comprised of individual segments that are quite dissimilar in a number of significant ways. Suggestions for further sub-dividing these reaches were received and are described under the relevant stream in Section 5.3. Additional detail on the stream segmentation approach used for the pilot assessments may be found in Section 3.3.4 and in Appendix A4, *Stream Segmentation*.

The stream segments defined for the San Francisquito Creek watershed are shown on Figures 2-3a and 2-3b. The individual reaches are grouped and designated within the seven major subwatersheds. San Francisquito Creek itself accounts for five reaches (SF-1 through SF-5). The Bear Creek subwatershed contains four reaches (SF/BC-1 through SF/BC-4). The West Union Creek subwatershed contains six reaches (SF/WU-1 through SF/WU-6). The Sausal Creek subwatershed contains five reaches (SF/SC-1 through SF/SC-5). The Corte Madera Creek subwatershed contains seven reaches (SF/CM-1 through SF/CM-7). The Los Trancos Creek subwatershed contains six reaches, including Felt Lake and its two connecting channels (SF/LT-1 through SF/LT-3, SF/FL, and SF/FL-1 and SF/FL-2). Alambique Creek represents one reach (SF/AC-1) while Lake Lagunita (SF/LL) and Searsville Lake (SF/SL) with its one direct tributary Westridge Creek (SF/SL-1) represent the remaining reaches.

5.2 General Assessment Results

The methodology and approach used for the pilot assessments is described in Chapter 3. The remainder of this chapter presents and interprets the results of the pilot assessment for the San Francisquito Creek watershed. For additional detail concerning the results of the pilot assessments, please see the following:

- Figures 2-1 and 2-3a through 2-3b for a series of maps illustrating the assessment results for the San Francisquito Creek watershed
- Appendix 5-A, Tables 1-6 for a series of bar graphs illustrating the assessment results for the San Francisquito Creek watershed

- Appendix 5-B for a series of tables summarizing the assessment results for the San Francisquito Creek watershed and containing information on limiting factors, suspected causes, data gaps, and local knowledge comments from WMI stakeholders
- Appendix 5-C for a detailed list of the data sets used in the assessment for the San Francisquito Creek watershed
- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach
- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

5.2.1 Data Sufficiency

Prior to evaluating the data itself, a data sufficiency review was conducted in order to identify data sets that would be of use in the assessment. This review identified data gaps on a reach-by-reach basis for each of the five beneficial uses and stakeholder interests being evaluated. A summary of the data sufficiency analysis for the San Francisquito Creek watershed is presented in Table 5-2. A more detailed explanation of the data sufficiency evaluation process and the types of data gaps identified is provided in Appendix C.

Table 5-2
San Francisquito Watershed Data Sufficiency Summary

Use/ Interest	**Stream Reaches With Insufficient Data**	**Miles of Stream Reaches With Insufficient Data**	***% of Watershed***	**Stream Reaches With Sufficient But Limited Data***	**Miles of Stream Reaches With Sufficient But Limited Data***	***% of Watershed***	**Stream Reaches With Sufficient Data****	**Miles of Stream Reaches With Sufficient Data****	***% of Watershed***
COLD	20	25.7	*38*	4	13.3	*20*	13	28.4	*42*
MUN	28	42.0	*62*	7	17.9	*27*	2	7.5	*11*
REC-1	25	38.1	*56*	11	26.9	*40*	1	2.4	*4*
PFF	27	44.0	*65*	2	1.5	*2*	8	21.9	*33*
RARE	24	40.3	*60*	4	8.6	*13*	9	18.4	*27*

* Includes uncertainty levels of C and D
** Includes uncertainty levels of A and B

As is illustrated in Table 5-2, the data gaps in the San Francisquito Creek watershed were significant. Support statements with relatively high levels of certainty (rated either A or B) were only developed for between 4 and 42% of the watershed, depending on the use being evaluated. While support statements were also developed for other reaches, data deficiencies demanded that these conclusions be qualified with a high level of uncertainty (rated either C or D). For this second group of reaches, no suspected causes were identified for the limiting factors due to the general lack of confidence in the support statements.

5.2.2 Overall Conclusions by Use

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the San Francisquito Creek watershed on a use-by-use basis. Results for individual waterbodies are described in greater detail in Section 5.3. Local knowledge comments on the assessment results from WMI stakeholders are presented in Section 5.3 as well. The detailed results for each of the 37 stream segments in the watershed are shown in Figures 2-3a through 2-3b (in map form) and in Appendix 5-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 5-B. The list of data sets used in the assessment (in Appendix 5-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 5-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty.

5.2.2.1 Cold Freshwater Habitat (COLD)

Data were sufficient to assess the COLD use in only 17 of the 37 stream reaches in the watershed. The lower portion of San Francisquito Creek below University Avenue in Palo Alto is dry during most summers and cannot support cold water dependent habitat. Upstream of University, year-round pools may be present during most years. The creek is perennial above Sand Hill Road, though in wet years, flow may be present below this location. From this spot on upstream, most of San Francisquito Creek, Bear Creek, and West Union Creek were found to either partially or fully support the COLD use with moderately high to very high certainty. Where full support was not found through strict application of the logic diagram, it was often expected to exist with the limitation being a lack of indicator macroinvertebrate data. Some of these reaches also have very low summer flows during dry years. Appletree and Tripp Gulches in the West Union Creek subwatershed do not support cold freshwater habitat because they are generally dry in the summer.

The lower-most reaches of Corte Madera Creek and Los Trancos Creek fully support the COLD use. However, the next upstream portion of the latter stream does not support COLD due to a lack of sufficient summer flow. Very little or no data were available to assess COLD use support in the upper reaches of the Corte Madera Creek, Sausal Creek, Alambique Creek, and Los Trancos Creek subwatersheds.

A total of 97 data sets were reviewed for use in the COLD use assessment of the San Francisquito Creek watershed. Data from 35 of these data sets were used to develop the assessment results.

Detailed comments and suggestions on the COLD assessment were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. Again, this information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

5.2.2.2 Municipal and Domestic Water Supply (MUN)

Data were sufficient to assess the MUN use in only 9 of the 37 stream reaches in the watershed. Most of the main stem reaches along San Francisquito Creek (SF-2, SF-3, and SF-5) do not currently support the MUN use, although uncertainty over this is very high due to limited data. Constituents that are limiting factors in these stream reaches include mercury, selenium, fecal coliform, dieldrin, TDS, and DDT. Reach SF-4 partially supports the use with turbidity during the wet season being the limiting factor.

Moving up the watershed away from urbanized areas there is less evidence of fecal coliform and dieldrin in the streams. However, the lower segments of the upper subwatersheds have turbidity and TDS concentrations that resulted in partial support findings in Bear Creek and West Union Creek. The uncertainty levels associated with these ratings are moderately high and very low respectively. Turbidity and TDS concentrations were also limiting factors causing non-support for MUN in the lower parts of Corte Madera and Los Trancos Creeks.

Support statements were not developed for the MUN use in the Alambique Creek, Corte Madera Creek, and Sausal Creek subwatersheds, as well as in most reaches of the Bear Creek and Los Trancos Creek subwatersheds due to a lack of data.

A total of 11 data sets were reviewed for potential use in the MUN assessment of the San Francisquito Creek watershed. Data from seven of these data sets were used to develop the MUN assessment results.

Detailed comments and suggestions on the assessment of MUN were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

5.2.2.3 Protection From Flooding (PFF)

Sufficient data for assessing the PFF interest were available for only 10 of the 37 stream reaches in the watershed. Most of the reaches with insufficient data are located in the upper watershed tributaries. However, data for mid-watershed reaches in San Mateo County (Bear Creek, West Union Creek) were also not available. This area is outside of the flood protection jurisdiction of the Water District, which was a primary source of the data used to assess PFF.

The results of the assessment for the PFF interest indicate less than full support in four general locations. The lowest stream reaches in the watershed along the main stem of San Francisquito Creek (SF-1, SF-2, and SF-3) recently overtopped in the February 2-3, 1998 flood event, which was approximately equivalent to a 100-year event. The flooding that resulted caused significant property damage. Given the data documenting recent flooding in these reaches, the certainty associated with these support findings is very high. The San Francisquito Creek Joint Powers Authority is funding an interim flood control project to restore the levees in reach SF-1 to their original design height. Other hydraulic model data may now be available from the Water District to better document the actual channel capacity in these reaches.

Searsville Lake does not support PFF as it has no value as a flood control facility. The reservoir is maintained at capacity and therefore cannot provide any flood storage or attenuation. The existing capacity of the lake is continually shrinking due to the trapping of sediment behind the dam. This sedimentation is potentially contributing to noted flooding occurrences upstream of the reservoir.

The lower ends of tributaries entering Searsville Lake (Corte Madera, Sausal, and Dennis Martin Creeks) provide inadequate capacity to convey flows, a problem that has resulted in flooding at Cooper's Corner on the Family Farm Road overcrossing of Sausal Creek. This may partially be caused by the presence immediately downstream of the large willow swamp, which has little drainage relief. Partial support for PFF was assigned to these reaches with a moderately high uncertainty level due to insufficient data on channel capacities.

There has also been historical flooding and erosion damage along Buckeye Creek in the City of Palo Alto's Foothills Park. The creek flows through an undersized culvert in this reach (at Los Trancos Woods Road) which does not have enough capacity to convey large storm flows. This stream reach was assigned a non-support status.

Support statements for the PFF interest were not developed due to a lack of data for the upper reaches in the Corte Madera Creek, West Union Creek, Sausal Creek, Bear Creek, and Alambique Creek subwatersheds. The data indicated that these channels were generally deeply incised and likely to produce significant erosion during high flow events.

A total of 34 data sets were reviewed for use in the PFF interest assessment for the San Francisquito Creek watershed. Of these, 25 were used to develop the assessment results. Where data documenting recent flooding was available, this data was used as the primary source.

The assessment framework for the PFF interest required that this evaluation be conducted for "current" development conditions as well as "future" development conditions. Future conditions were defined in the framework as being consistent with the future development assumptions incorporated in the Water District's Waterways Management

Model (WMM). Output from the WMM was the primary data set used to determine the support status for this interest in reaches where the data was available. In reviewing this data, it was difficult to determine exactly how future development was accounted for by the WMM and what assumptions were made. Additionally, another data set indicated that 100% buildout of all remaining undeveloped (and developable) land in the San Francisquito Creek watershed would not result in any significant change to the 100-year flood flow (San Francisquito Creek CRMP, 1998). Other literature supports this statement. Generally speaking, as flood return intervals increase, the corresponding importance of the amount of impervious area in a watershed on surface runoff decreases. Eventually, at high return interval floods (such as the 100-year), it makes little difference whether a watershed is fully or partially developed with urban uses (impervious surfaces). In either case, virtually all of the precipitation is going to generate surface runoff due to ground saturation (Hollis, 1975). Therefore, the distinction between current and future development in Santa Clara Basin watersheds for the purpose of evaluating 100-year flooding may be relatively moot. Given these findings and the uncertainty over the level of future development assumed in the WMM data, the team decided to simply use the Water District’s designed channel capacity data as the benchmark for determining the adequacy of each reach to convey the 100-year flow.

For some reaches, however, use of the WMM data yielded initial assessment conclusions that were clearly inaccurate based on input from WMI stakeholders. Additional data was sought concerning these reaches and the initial assessment results were revised accordingly.

Detailed comments and suggestions on the assessment of PFF were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

5.2.2.4 Preservation of Rare and Endangered Species (RARE)

Sufficient data for assessing support of the RARE beneficial use was limited to 13 of the stream reaches in the San Francisquito Creek watershed. Data gaps were generally due to three different reasons: (1) a lack of special status species data, (2) outdated data, and (3) current data sets being too general to be useful. The majority of the stream reaches with data gaps were in the upper tributaries.

The tidally-influenced lower portion of San Francisquito Creek (SF-1) contains breeding clapper rail, breeding salt marsh harvest mouse, and breeding salt common yellow throat, and may contain yellow rumped warbler. Full support for RARE was identified in this reach based upon the documented presence of these species. The salt marsh harvest mice is also documented upstream in SF-2. Above University Avenue, San Francisquito Creek provides potential support for the western pond turtle (with high uncertainty due to limited data). Above Sand Hill Road, the stream channel is natural and provides steelhead habitat and the potential to support the western pond turtle and red-legged frog.

The Bear Creek subwatershed provides good steelhead habitat and their presence are supported by sufficient data. The upper portion of Bear Gulch has a full support rating but an uncertainty level of moderately high due to a lack of recent, good quality data.

The lower reaches of the Los Trancos Creek subwatershed provide full support based on the presence of the western leatherwood and steelhead. These ratings have an uncertainty level ranging from moderately low to very low.

A finding of potential support was made for Searsville Lake based on potential western leatherwood presence, though uncertainty is high as the data is extremely old.

No data on other WMI-listed special status species was available for the San Francisquito Creek watershed. More so than perhaps any of the other uses/interests, the RARE assessment was hampered by the reliance on existing data. Biological field surveys are needed to assess habitat conditions within the subwatershed for the species on the list. Very few of these types of surveys were included in the data compiled for the assessment. As a result, most of the support statements for RARE were based on species observations rather than habitat conditions.

A total of 36 data sets were reviewed for potential use in the RARE use assessment for San Francisquito Creek. Of these, 14 contained data that could be used to develop the assessment results.

Detailed comments and suggestions on the assessment of RARE were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

5.2.2.5 Water Contact Recreation (REC-1)

Sufficient data were available to assess REC-1 use support for only 13 of the 37 stream reaches in the San Francisquito Creek watershed. Most of the available data was on the tertiary aesthetics and recreational access indicators. A few reaches contained data on secondary water quality constituent indicators. No data on the primary pathogen indicators was available anywhere in the watershed. Thus, complete support determinations for REC-1 could not be made for any reach and the support statements that are made are qualified to indicate which set of indicators they are based on.

Water quality (secondary indicator) support status for REC-1 was limited to San Francisquito Creek above Sand Hill Road (full support but high uncertainty due to limited data), Bear Creek (non-support due to elevated mercury in the water but with high uncertainty due to limited data), West Union Creek (full support but with high uncertainty due to limited data), and the lower parts of Corte Madera and Los Trancos Creeks (full support but with high uncertainty).

Aesthetics and recreational access (tertiary indicator) support status for REC-1 was found to be variable from reach to reach with support generally increasing with distance up the watershed from the Bay. The lower portion of the watershed appears to be limited by algae, debris, and limited/poor access to the streams. As a result, the lower reaches of San Francisquito Creek do not support REC-1 (tertiary) and reach SF-3 was assigned a partial support status. Continuing up San Francisquito Creek, reaches SF-4 and SF-5 were assigned full support status. Data on stream aesthetics, depth, and access becomes more scarce in the upper subwatersheds. Limited aesthetics data in Bear Creek indicates full support. Partial support (with a lack of summer streamflow being limiting) was found in portions of the West Union Creek subwatershed. A documented aesthetics concern resulted in Squealer Gulch being designated non-support.

No data for other reaches was deemed sufficient for findings of support. Given the lack of data on the preferred REC-1 indicators throughout the watershed, overall uncertainty regarding REC-1 support must be considered extremely high.

A total of 22 data sets were reviewed for potential use in the REC-1 use assessment for the San Francisquito Creek watershed. Of these, 14 contained data that could be used to develop the assessment results.

As outlined in the Assessment Framework, the REC-1 assessment was to include a fish consumption component. Based on concern expressed by WMI stakeholders, the Regional Board reviewed this issue and determined that fish consumption should not be evaluated as part of the REC-1 use. Therefore, the results of the fish consumption portion of the pilot assessment have been removed from this report.

Detailed comments and suggestions on the assessment of REC-1 were received from WMI stakeholders and are described in Section 5.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

5.3 Detailed Assessment Results by Waterbody

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the San Francisquito Creek watershed on a waterbody-by-waterbody basis. The methodology and approach used for the pilot assessments is described in Chapter 3. Information regarding data sufficiency for the San Francisquito Creek watershed is provided in Section 5.2.1. Overall results for each beneficial use/stakeholder interest are described in Section 5.2.2.

The detailed results for each of the 37 stream segments in the watershed are shown in Figures 2-3a through 2-3b (in map form) and in Appendix 5-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 5-B. These tables include information on limiting factors, suspected causes, as well as “local knowledge comments” from WMI stakeholders. The primary messages contained in this information are also summarized in the text of this section for each waterbody in the watershed. The final page of Appendix 5-B contains a listing of the stream reaches in the San Francisquito Creek watershed for which insufficient data were available for all five uses.

The list of data sets used in the assessment (in Appendix 5-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 5-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty. For additional detail concerning the results of the pilot assessments, please see the following:

- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach
- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

5.3.1 San Francisquito Creek (SF-1 through SF-5)

COLD: The COLD use is supported in San Francisquito Creek on a gradient from the upstream end to the Bay. The lowest reach below U.S. 101 is tidal and would not normally be expected to contain cold freshwater habitat. However, the reach is an important migratory route for anadromous fish. No data were available for this reach. Above U.S. 101, the stream dries up during most summers and cannot support COLD habitat. Again, the reach serves as a migratory corridor. Low streamflows from upstream are lost to percolation and riparian vegetation use before they get to this reach in summer. Above University Avenue, the stream is dry or intermittent during average to dry years, though is flowing in wet years. In all years, streamflows are low in this reach and decline or are absent in the lower portion. Substrate quality and stream gradient decline downstream within the reach, reducing riffle quantity and quality. Groundwater pumping may be aggravating naturally dry watershed conditions. Above Sand Hill Road, steelhead are regularly present in the creek though low flows and scarce riffles inhibit insect production. Above the confluence of Los Trancos Creek, steelhead are regularly present and the data indicates presence of indicator macroinvertebrates. Habitat is good and this reach is considered to fully support the COLD use.

Stakeholder comments have provided the following information regarding COLD use support in San Francisquito Creek:

- SF-1: Steelhead/rainbow trout were not observed during recent (1999-2001) surveys but this reach is an important acclimation zone for smolts and migrating adult steelhead (Stoecker, 2002).

- SF-2: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches. The Clarke St. barrier was notched by the San Francisquito Watershed Council and is no longer considered a significant problem. Steelhead/rainbow trout were observed from 300 feet upstream of U.S. 101 to University Avenue in 1999-2001 (juveniles during out-migration) (Mulvey, pers. comm., 2002 and Stoecker, 2002).

- SF-3: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration) (Stoecker, 2002).

- SF-4: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration and over-summering) (Stoecker, 2002).

- SF-5: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (observed 29-inch long steelhead attempting to jump Searsville Dam in 1991) (Stoecker, 2002).

MUN: The MUN use is generally not supported in San Francisquito Creek, based upon the limited available data. Very high uncertainty accompanies the assessment conclusions downstream of Sand Hill Road due to data limitations – selenium, mercury, fecal coliform, dieldrin, and DDT water samples were all found to exceed applicable criteria for use support. The amount of data increases upstream of Sand Hill Road, leading to more confident conclusions of partial support (SF-4) and non support (SF-5). Limiting factors are total dissolved solids in summer, turbidity in winter, fecal coliform, DDT, and dieldrin. High total dissolved solid concentrations may be due to groundwater sources to the stream in summer. Turbidity is likely caused by erosion (stream or rill) during winter storms.

PFF: The PFF interest is not supported in San Francisquito Creek downstream of Sand Hill Road. This section overtopped in the February 2-3, 1998 flood event, which was approximately equivalent to a 100-year event. The creek in this area does not have sufficient channel capacity to convey the 100-year flood flow and urban commercial and residential development has encroached into the natural channel floodplain. Upstream of Sand Hill Road, the PFF interest is fully supported.

Stakeholder comments have provided the following information regarding PFF interest support in San Francisquito Creek:

- SF-1: The February 1998 flood event was estimated at between 6,500 and 8,000 cfs, which is within the range of the 100-year flow estimates of both FEMA (7,860 cfs) and USGS (6,925 cfs). The San Francisquito Creek JPA is funding an interim flood control project to restore the levees downstream of U.S. 101 to their original design height because of existing creek capacity deficiencies. An updated hydraulic model that documents the inadequacy of the reaches' flood-carrying capacity is now available from the Water District. Flood problems in SF-1 would be worse if water did not overtop and exit the creek upstream in SF-3 during severe storms and capacity in SF-1 will need to be increased if SF-3 is improved to allow passage of additional flow. The continuing build-up of sediment is incrementally decreasing flow capacity in SF-1. The JPA has recently received approval from Congress for an Army COE Reconaissance Study (Teresi, pers. comm., 2002).

- SF-2: In the lower part of SF-2, flood protection is provided by a "temporary" flood wall of questionable integrity - a portion of this wall is proposed to be replaced as part of the JPA's levee restoration project. Flood problems in SF-2 would be worse if water did not overtop and exit the creek upstream in SF-3 during severe storms and capacity in SF-2 will need to be increased if SF-3 is improved to allow passage of additional flow (Teresi, pers. comm., 2002).

- SF-3: The upper end of this reach will vary depending on the year (dry, wet, normal) with the limit of streamflow. Future analyses should consider splitting this reach into different segments corresponding to amount or type of streamflow and location of perennial pools (Young, pers. comm., 2002).

- SF-4: The lower end of this reach will vary depending on the year (dry, wet, normal) with the limit of streamflow (Young, pers. comm., 2002).

RARE: The RARE use is fully supported in the tidally-influenced lower portion of San Francisquito Creek, which contains breeding clapper rail, breeding salt marsh harvest mice, and breeding salt common yellow throat, and may contain yellow rumped warbler. The salt marsh harvest mice is also documented upstream in SF-2. Above University Avenue, San Francisquito Creek provides potential support for the western pond turtle (with high uncertainty due to limited data). Above Sand Hill Road, the stream channel is natural and provides steelhead habitat and the potential to support the western pond turtle and red-legged frog.

Stakeholder comments have provided the following information regarding RARE use support in San Francisquito Creek:

- SF-1: Fieldwork associated with the sediment TMDL by the JPA and complementary habitat assessment by SCVWD will enable refinement of the RARE assessment through several reaches of the SFC watershed. Steelhead/rainbow trout were not observed during recent (1999-2001) surveys but this reach is an important acclimation zone for smolts and migrating adult steelhead (Mulvey, pers. comm., 2002 and Stoecker, 2002).

- SF-2: Steelhead/rainbow trout were observed from 300 feet upstream of US 101 to University Avenue in 1999-2001 (juveniles during out-migration) (Stoecker, 2002).

- SF-3: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration) (Stoecker, 2002).

- SF-4: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration and over-summering) (Stoecker, 2002).

- SF-5: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys (Johnson, pers. comm., 2002 and Stoecker, 2002).

REC-1: Secondary water quality indicators for the REC-1 use are fully supported in San Francisquito Creek above Sand Hill Road, but with high uncertainty due to limited data. Support for the aesthetics and recreational access indicators for REC-1 generally improved with distance up the creek from the Bay. The lower portion of the creek appears to be limited by algae, debris, and limited/poor access to the streams. Above Sand Hill Road, these problems, while still present in places, appear from the data to be less chronic. Given the lack of data on the preferred REC-1 indicators throughout the watershed, overall uncertainty regarding REC-1 support must be considered extremely high.

Stakeholder comments have provided the following information regarding REC-1 use support in San Francisquito Creek:

- SF-5: Well permit data for the watershed have been obtained as a follow-up to concerns about base flow depletion raised by the recent Regional Board draft report on the South Bay Groundwater Basins (January 2002) (Mulvey, pers. comm., 2002).

5.3.1.1 Searsville Lake (SF/SL)

Limited data were available for assessing uses/interests in Searsville Lake. The PFF interest is likely not supported; data indicates that the lake has no value as a flood control facility. The RARE use is potentially supported based on very old western leatherwood data. No recent data is available, however, so uncertainty is very high on this. The access and aesthetics component of the REC-1 use appears to be fully supported, but no data on other REC-1 indicators is available so overall uncertainty is moderately high.

Stakeholder comments have provided the following information regarding use/interest support in Searsville Lake:

- PFF: The capacity of Searsville Lake is shrinking due to the continual trapping of sediment behind the dam. Studies are also currently underway about options to address the continuing siltation of Searsville Lake as only about twelve feet of freeboard now remain at the 64-foot high 110-year old dam (Teresi, pers. comm., 2002 and Mulvey, pers. comm., 2002).

- COLD and RARE: Lake may be too small to support trout during the warm, late summer period. No steelhead/rainbow trout were observed during recent (1999-2001) surveys; exotic species appear to dominate, prey on native salmonids, spread downstream (Neudorf, pers. comm., 2002 and Stoecker, 2002).

- MUN: Stanford University historically used water from Searsville for irrigation and groundwater recharge for non-potable supply wells. Data from Stanford were not made available to the assessment team (Mulvey, pers. comm., 2002).

- REC-1: Data from Stanford concerning recreational uses were not made available to the assessment team (Mulvey, pers. comm., 2002).

5.3.1.2 Westridge Creek (SF/SL-1)

Insufficient data were available to assess any of the uses/interests in this reach.

5.3.1.3 Lake Lagunita (SF/LL)

Insufficient data were available to assess any of the uses/interests in this reach with the exception of RARE, which is fully supported based on California tiger salamander presence and potential western pond turtle presence.

Stakeholder comments have provided the following information regarding use/interest support in Lake Lagunita:

- COLD and RARE: No steelhead/rainbow trout were observed during recent (1999-2001) surveys; an adult steelhead was caught here (likely from diversion on San Francisquito Creek) in the early 1970s (Stoecker, 2002).

- MUN: Stanford University uses water from Lake Lagunita for irrigation and groundwater recharge for non-potable supply wells. Data from Stanford were not made available to the assessment team (Mulvey, pers. comm., 2002).

- REC-1: Data from Stanford concerning recreational uses were not made available to the assessment team (Mulvey, pers. comm., 2002).

5.3.2 Los Trancos Creek Subwatershed

Assessment results for waterbodies in the Los Trancos Creek subwatershed are discussed by individual waterbody in this section.

5.3.2.1 Los Trancos Creek (SF/LT-1 and SF/LT-2)

COLD: The COLD use is fully supported in Los Trancos Creek below the confluence of Buckeye Creek. Steelhead are regularly present in this reach, as are indicator macroinvertebrates. Low summer streamflows may affect the support level during some years, however. Above Buckeye Creek, the use is not supported though uncertainty is high due to limited fish assemblage and indicator macroinvertebrate data. Steelhead and rainbow trout may occur in the headwater portion of this reach but the lower portion in Portola Valley is ephemeral.

Stakeholder comments have provided the following information regarding COLD use support in Los Trancos Creek:

- SF/LT-1: Steelhead/rainbow trout found throughout this reach during recent surveys (1999-2001); good spawning and rearing habitat for steelhead; diversion dam limits flow downstream and migration upstream (Stoecker, 2002).

- SF/LT-2: Steelhead/rainbow trout found from the confluence of Buckeye Creek upstream for 0.7 miles during recent surveys (1999-2001); the lower part of this reach becomes dry but pools remain in the upper reach; steelhead/rainbow trout also observed 150 feet upstream of the PV Ranch (Stoecker, 2002).

MUN: The MUN use is not supported below Buckeye Creek as both total dissolved solids and turbidity criteria are exceeded, the former during summer and the latter during winter. High dissolved solids are possibly due to groundwater sources to streams during summer. High turbidity is possibly due to local geologic conditions (faulting), which contribute to increased erosion during wet weather. Above Buckeye Creek, MUN data were not available.

Stakeholder comments have provided the following information regarding MUN use support in Los Trancos Creek:

- SF/LT-1: Stanford University uses water from Los Trancos for irrigation and groundwater recharge for non-potable supply wells (Teresi, pers. comm., 2002).

PFF: The PFF interest is fully supported in Los Trancos Creek.

RARE: The RARE use is fully supported in Los Trancos Creek based on presence of steelhead trout and western leatherwood.

Stakeholder comments have provided the following information regarding RARE use support in Los Trancos Creek:

- SF/LT-1: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys (Johnson, pers. comm., 2002 and Stoecker, 2002).

- SF/LT-2: Steelhead/rainbow trout found from the confluence of Buckeye Creek upstream for 0.7 miles during recent surveys (1999-2001); the lower part of this reach becomes dry but pools remain in the upper reach; steelhead/rainbow trout also observed 150 feet upstream of the PV Ranch (Stoecker, 2002).

REC-1: Data indicate support based on secondary water quality REC-1 indicators, though data is limited. Available data on tertiary access and aesthetics indicators was also spotty, though what was available indicates good access but poor aesthetics and streamflow. Above Buckeye Creek, no data were available.

5.3.2.2 Buckeye Creek (SF/LT-3)

Insufficient data were available to assess all of the uses in this reach except for the PFF interest which is not supported due to the presence of an undersized culvert at the Los Trancos Woods Road stream crossing. There has been historical flood and erosion damage along Buckeye Creek through Foothills Park. The creek flows though an 18-inch culvert which is unlikely to have enough flow capacity for large storm events such as the 100-year flood event. Historical data suggests that the road section at this location has flooded many times during large storm events.

Stakeholder comments have provided the following information regarding use/interest support in Buckeye Creek:

- COLD and RARE: Steelhead/rainbow trout were observed from the Los Trancos Creek confluence upstream to the Los Trancos Woods Road culvert during recent surveys (1999-2001); juvenile steelhead were present in the reach downstream of the culvert; unable to check upstream of Los Trancos Road (private property) (Stoecker, 2002).

- PFF: The 18-inch culvert with flooding problems is located outside the boundary of Foothill Park (beneath Los Trancos Woods Road) (Mulvey, pers. comm., 2002).

5.3.2.3 Felt Lake (SF/FL)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Felt Lake:

- COLD and RARE: Several exotic fish species present; steelhead/rainbow not observed (Stoecker, 2002).

- MUN: Stanford University uses water from Felt Lake for irrigation and groundwater recharge for non-potable supply wells. Data from Stanford were not made available to the assessment team (Teresi, pers. comm., 2002 and Mulvey, pers. comm., 2002).

- REC-1: Data from Stanford concerning recreational uses were not made available to the assessment team (Mulvey, pers. comm., 2002).

5.3.2.4 Diversion Channel to Felt Lake (SF/FL-2)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in the Felt Lake diversion channel:

- COLD and RARE: A dead adult steelhead/rainbow trout was observed here in 1987 (near the lake) and juveniles were observed during 1999-2000 surveys just downstream of the broken fish screen at the diversion (Stoecker, 2002).

5.3.2.5 Return Channel from Felt Lake (SF/FL-1)

Insufficient data were available to assess any of the uses/interests in this reach.

5.3.3 Bear Creek Subwatershed

Assessment results for waterbodies in the Bear Creek subwatershed are discussed by individual waterbody in this section.

5.3.3.1 Bear Creek (SF/BC-1)

Bear Creek was found to partially support the COLD use, with the limiting factor being low summer streamflows. Support here is probably full, however data on the presence of indicator macroinvertebrates were not available. Portions of Bear Creek are intermittent in drier years. The channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed. The MUN use is partially supported in Bear Creek, though limited data leads to moderately high uncertainty. Turbidity during winter exceeds applicable criteria for drinking water. Most other parameters meet criteria for MUN use. The RARE use is fully supported based on steelhead presence. Data for assessing support of the REC-1 use was very limited, though data on one secondary indicator (mercury) did exceed the criterion. Uncertainty is very high regarding REC-1. No data were available to assess PFF interest support.

Stakeholder comments have provided the following information regarding use/interest support in Bear Creek:

- COLD and RARE: The San Francisquito Watershed Council has been awarded a grant by the California Department of Fish and Game to remediate two of the three Bear Creek high priority sites identified in the report "Adult Steelhead Passage in the Bear Creek Watershed" (Bear dams #1 and #3). The third high priority barrier is Woodside's bridge apron (#10) at the Fox Hollow Road crossing. Woodside has no capital improvement scheduled, so the Steelhead Taskforce will evaluate an alternative of a series of weirs downstream of the bridge. Steelhead/rainbow trout were observed throughout this reach during recent surveys (1999-2001); two steelhead (27- and 30-inch) were observed in 1995 and 1998. Potential presence of western pond turtle in mid-watershed reaches (Mulvey, pers. comm., 2002 and Stoecker, 2002).

- REC-1: Well permit data for the watershed have been obtained as a follow-up to concerns about base flow depletion raised by the recent Regional Board draft report on the South Bay Groundwater Basins (January 2002) (Mulvey, pers. comm., 2002).

5.3.3.2 Dry Creek (SF/BC-2)

The only use with sufficient data for assessment in Dry Creek was the COLD use, which was determined to be partially supported. Dry Creek is generally dry by the end of summer during all but the wettest years. Juvenile steelhead are sometimes present during early summer. This is a small, dry drainage, with substrate dominated by sand and is unlikely to support significant steelhead rearing even in wet years due to lack of surface flow by fall. This is a case where the limiting factors are primarily natural.

Stakeholder comments have provided the following information regarding use/interest support in Dry Creek:

- COLD and RARE: At the time fieldwork was done for the steelhead passage report, landowner permissions were not obtained for access to Dry Creek. Juvenile steelhead/rainbow trout were present 50 feet upstream of the Woodside Road crossing in 1999 (Stoecker, 2002).

5.3.3.3 Bear Gulch (SF/BC-3 and SF/BC-4)

The COLD use is partially supported in Bear Gulch. The lower portion of the stream is intermittent (below the diversion dam), with steelhead present during wet years. The upper portion is perennial with resident rainbow trout and probably fully supports the COLD use, though data on indicator macroinvertebrates are missing. The channel is well-shaded and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed. A major diversion for domestic water upstream reduces streamflows. Above this diversion, the stream is cool with relatively abundant summer streamflows. Based on documented steelhead habitat and presence, the RARE use is fully supported in Bear Gulch. Data to assess the other uses/interests were not available for Bear Gulch.

Stakeholder comments have provided the following information regarding use/interest support in Bear Gulch:

- COLD and RARE: Discussions with Cal Water about the Bear Gulch Diversion Dam are being explored by the Watershed Council, the California Department of Fish and Game and the Department of Water Resources. The dam is considered a high priority for remediation. Steelhead/rainbow trout were present throughout reach during recent (1999-2001) surveys; a 31-inch steelhead was relocated from downstream of the SR 84 culvert in June of 1999 - important habitat. Steelhead/rainbow trout were present from the diversion dam upstream 0.4 miles to natural falls; this reach has some of the best salmonid habitat in the watershed with good summer flow but much is inaccessible to steelhead (Mulvey, pers. comm., 2002 and Stoecker, 2002).

- MUN: Data from Cal Water were not available for use in the assessment. The Bear Gulch diversion dam provides water to a municipal drinking water supply owned by California Water Service; this water is blended with other sources and treated prior to being delivered to consumers (Mulvey, pers. comm., 2002).

5.3.4 West Union Creek Subwatershed

Assessment results for waterbodies in the West Union Creek subwatershed are discussed by individual waterbody in this section.

5.3.4.1 West Union Creek (SF/WU-1 and SF/WU-2)

West Union Creek was found to partially support the COLD use in certain reaches with adequate summer flow. A lack of indicator macroinvertebrate data prevented a finding of full support in these reaches, though portions of the creek are dry or intermittent during most summers. The channel is well-shaded and summer water temperatures should be cool, though private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed. Data for assessing the MUN use was very limited, though full support was assigned to the lower portion of the creek and partial support to the section above Huddart Park (turbidity exceeds criterion during winter). The lower portion of the stream fully supports the RARE use based on documented steelhead habitat and presence. Limited data were available for the REC-1 assessment, and generally not on the most preferred indicators (pathogens in water). Thus, REC-1 findings, where they are made, are focused on secondary (general water quality) and tertiary (aesthetics, access, water depth) indicators. The lack of continuous summer flow in the stream indicates partial support for REC-1, though uncertainty is very high. Data were not available to assess the PFF interest.

Stakeholder comments have provided the following information regarding use/interest support in West Union Creek:

- COLD: The steelhead passage report assigns low to moderate priority for remediation to the barriers in West Union Creek with the CalTrans bridge apron (#17) at Highway 84 deemed the most important. At this time, CalTrans has no maintenance improvement planned at that site. Steelhead/rainbow trout were found throughout this reach during recent surveys (1999-2001); important spawning and rearing habitat in this reach. In the upper part of the creek, steelhead/rainbow trout were found upstream to the falls and 150 feet upstream of the Huddart Park boundary during recent surveys (1999-2001); important spawning and rearing habitat in this reach, GGNRA steelhead surveys are available (Mulvey, pers. comm., 2002 and Stoecker, 2002).

- RARE: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys (Johnson, pers. comm., 2002 and Stoecker, 2002).

- REC-1: The San Francisquito Watershed Council is currently corresponding with the San Mateo County Board of Supervisors regarding low flows in West Union Creek (Mulvey, pers. comm., 2002).

5.3.4.2 Appletree Gulch (SF/WU-3)

Sufficient data were available to assess only the COLD use, which is not supported as the stream is ephemeral. This is a naturally dry, small watershed with winter streamflow only. Limiting factors are primarily natural.

Stakeholder comments have provided the following information regarding use/interest support in Appletree Gulch:

- COLD: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches (Mulvey, pers. comm., 2002).

5.3.4.3 Tripp Gulch (SF/WU-4)

Sufficient data were available to assess only the COLD use, which is not supported as the stream is ephemeral. This is a naturally dry, small watershed with winter streamflow only. Limiting factors are primarily natural.

Stakeholder comments have provided the following information regarding use/interest support in Tripp Gulch:

- COLD: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches (Mulvey, pers. comm., 2002).

5.3.4.4 Squealer Gulch (SF/WU-5)

Sufficient data were available to assess only the COLD and REC-1 uses. Partial support exists for COLD, though natural steelhead passage barriers are present in the upper part of the stream. This is likely full support but the necessary indicator macroinvertebrate data were not available. Squealer Gulch is a small spring-fed stream, which presently sustains flows throughout the year and is suitable for small juvenile steelhead. California giant salamanders are present in the steeper, fishless portions of the stream. A documented aesthetics problem in the upper part of the stream (illegally dumped car body) indicates non-support for the REC-1 aesthetics indicator. Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Squealer Gulch:

- COLD and RARE: No steelhead/rainbow trout were observed during recent (1999-2001) surveys (only one short field trip) (Stoecker, 2002).

5.3.4.5 McGarvey Gulch (SF/WU-6)

Sufficient data were available to assess only the COLD use. Partial support exists for COLD in McGarvey Gulch as the stream is either intermittent or dry in late summer except in wet years and natural passage barriers exist in the steep upper portion of the stream.

Stakeholder comments have provided the following information regarding use/interest support in McGarvey Gulch:

- COLD and RARE: Steelhead/rainbow trout were observed from the West Union Creek confluence 0.3 miles upstream during recent (1999-2001) surveys; important rearing habitat for juvenile steelhead (Stoecker, 2002).

5.3.5 Corte Madera Creek Subwatershed

Assessment results for waterbodies in the Corte Madera Creek subwatershed are discussed by individual waterbody in this section.

5.3.5.1 Corte Madera Creek (SF/CM-1 and SF/CM-2)

Data was only available for the section of Corte Madera Creek below the Hamms Gulch confluence. The COLD use is fully supported here, though uncertainty is moderately high due to limited data. The MUN use is not supported due to excessive turbidity throughout the year and dissolved solids during summer. Again, uncertainty is moderately high due to limited data. The PFF interest is partially supported due to documented flooding problems at Cooper's Corner on the Family Farm Road overcrossing. Creek does not have sufficient flow capacity in the main channel to convey major flood flows here with the probable cause being residential/urban encroachment into the stream channel or an undersized stream crossing. Very limited water quality data indicates support for the REC-1 use but uncertainty is very high.

Stakeholder comments have provided the following information regarding use/interest support in Corte Madera Creek:

- COLD and RARE: Steelhead/rainbow trout were observed throughout this reach during recent surveys (1999-2001) but are most abundant in the upper reach (upstream of Westridge Bridge). Steelhead/rainbow trout were observed to 400 feet upstream of Coal Creek during recent surveys (1999-2001); good habitat conditions and late summer flow; rainbow trout present consistently since late 1970s. Potential presence of western pond turtle in mid-watershed reaches (Stoecker, 2002).

- PFF: These issues are part of continuing discussions between the residents and Stanford University (Mulvey, pers. comm., 2002).

5.3.5.2 Hamms Gulch (SF/CM-3)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Hamms Gulch:

- COLD and RARE: Steelhead/rainbow trout observed in the lowest 150 feet of this small stream with good late summer flow during recent surveys (1999-2001) (Stoecker, 2002).

5.3.5.3 Jones Gulch (SF/CM-4)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Jones Gulch:

- COLD and RARE: Steelhead/rainbow trout not observed during recent surveys (1999-2001) but the lower part is likely utilized; small stream with late summer flow (Stoecker, 2002).

5.3.5.4 Damiani Creek (SF/CM-5)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Damiani Creek:

- COLD and RARE: Steelhead/rainbow trout observed in the lowest 150 feet of this stream; one of the larger Corte Madera tributaries with late summer flow during recent surveys (1999-2001) (Stoecker, 2002).

5.3.5.5 Rengstorff Gulch (SF/CM-6)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Rengstorff Gulch:

- COLD and RARE: Steelhead/rainbow trout not observed during recent surveys (1999-2001) but the lower part is likely utilized at certain times (Stoecker, 2002).

5.3.5.6 Coal Creek (SF/CM-7)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Coal Creek:

- COLD and RARE: Steelhead/rainbow trout observed in the lowest 250 feet of this stream consistently from 1999-2001; always good late summer flow (Stoecker, 2002).

5.3.6 Alambique Creek (SF/AC-1)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Alambique Creek:

- COLD and RARE: Good salmonid habitat conditions and late summer flow in the upper creek (Stoecker, 2002).

5.3.7 Sausal Creek Subwatershed

Assessment results for waterbodies in the Sausal Creek subwatershed are discussed by individual waterbody in this section.

5.3.7.1 Sausal Creek (SF/SC-1)

Insufficient data were available to assess any of the uses/interests in this reach with the exception of the PFF interest, which is partially supported. The limiting factor is a documented flooding problem at Cooper's Corner on the Family Farm Road overcrossing. Creek does not have sufficient flow capacity in the main channel to convey major flood flows here with the probable cause being residential/urban encroachment into the stream channel or an undersized stream crossing.

Stakeholder comments have provided the following information regarding use/interest support in Sausal Creek:

- PFF: These issues are part of continuing discussions between the residents and Stanford University (Mulvey, pers. comm., 2002).

5.3.7.2 Dennis Martin Creek (SF/SC-2)

Insufficient data were available to assess any of the uses/interests in this reach with the exception of the PFF interest, which is partially supported. The limiting factor is a documented flooding problem at Cooper's Corner on the Family Farm Road overcrossing. Creek does not have sufficient flow capacity in the main channel to convey major flood flows here with the probable cause being residential/urban encroachment into the stream channel or an undersized stream crossing. Uncertainty over this is moderately high.

5.3.7.3 Bull Run Gulch (SF/SC-3)

Insufficient data were available to assess any of the uses/interests in this reach.

5.3.7.4 Neils Gulch (SF/SC-4)

Insufficient data were available to assess any of the uses/interests in this reach.

5.3.7.5 Bozzo Gulch (SF/SC-5)

Insufficient data were available to assess any of the uses/interests in this reach.

Stakeholder comments have provided the following information regarding use/interest support in Bozzo Gulch:

- COLD and RARE: Stream becomes dry in summer (Stoecker, 2002).

5.4 Recommendations on Further Data Collection and Analysis

Future data collection in the San Francisquito Creek watershed will depend upon priorities established by the WMI. Some uses/interests may be prioritized over others, and this will identify the most important types of data for early collection. Additional detail regarding data gaps is provided in Appendix C. Also see Chapter 2 for a more comprehensive discussion of future data collection.

For the five uses/interests studied in the pilot assessment, the following represent the most significant data gaps:

COLD:

- Recent data on steelhead/trout and indicator macroinvertebrate presence in the Bear Creek and West Union Creek subwatersheds to facilitate confident findings of support status for reaches SF/BC-1 through SF/BC-4 and SF/WU-1, 2, 5, and 6

- Recent data on steelhead/trout and indicator macroinvertebrate presence for much of the upper Corte Madera Creek, Sausal Creek, Alambique Creek, and upper Los Trancos Creek subwatersheds

MUN:

- Drinking water quality data is needed in all reaches, but the focus should be on reaches from which drinking water supplies are currently being drawn (SF/BC-4)

PFF:

- Data on channel capacities in the Bear Creek and West Union Creek subwatersheds (primarily SF/BC-1 and 2 and SF/WU-1) and the lower reaches of Corte Madera and Sausal Creeks where property damage is more likely to occur during flooding

<u>RARE</u>:

- Data on stream- and riparian corridor-dependent special status species presence and habitat for all of the Corte Madera Creek, Sausal Creek, and Alambique Creek subwatersheds, as well as for most of the reaches in the West Union Creek and the Los Trancos Creek subwatersheds

<u>REC-1</u>:

- Water quality data on pathogens (fecal coliform, e.coli) and other parameters of concern for skin contact should be collected in all reaches where swimming and wading are most likely to occur

- Though the existing data on aesthetics, access, and water depth should be supplemented with current information, the priority should be on collecting data pertaining to the preferred indicators of REC-1 use support so that complete support statements can be developed for the key recreation-intensive reaches in the watershed

5.5 References

Hollis, G.E. 1975. The Effect of Urbanization on Floods of Different Recurrence Intervals. Water Resources Research 11(3): 431-435.

Johnson, Jim. 2002. Personal Communication. San Francisquito Creek Watershed Council.

Mulvey, Trish. 2002. Personal Communication. CLEAN South Bay.

Neudorf, Terry. 2002. Personal Communication. WMI Guadalupe watershed Co-Captain. Biologist, Santa Clara Valley Water District.

Regional Water Quality Control Board. 1975. Regional Water Quality Control Plan, San Francisco Bay Region.

San Francisquito CRMP. 1998. A Reconaissance Investigatioin Report of Flooding in San Francisquito Creek.

Santa Clara Basin WMI. 2001. Watershed Characteristics Report (Volume One), Chapter 7: Natural Setting.

Stoecker, Matt. 2002. San Francisquito Creek Watershed Steelhead/Rainbow Trout Observations and Distribution 1999-2001. Unpublished data.

Teresi, Joe. 2002. Personal Communication. City of Palo Alto.

Young, Laura. 2002. Personal Communication. San Francisquito Creek watershed WMI Co-Captain. Santa Clara Valley Water District.

Appendix 5-A
Pilot Assessment Result Charts

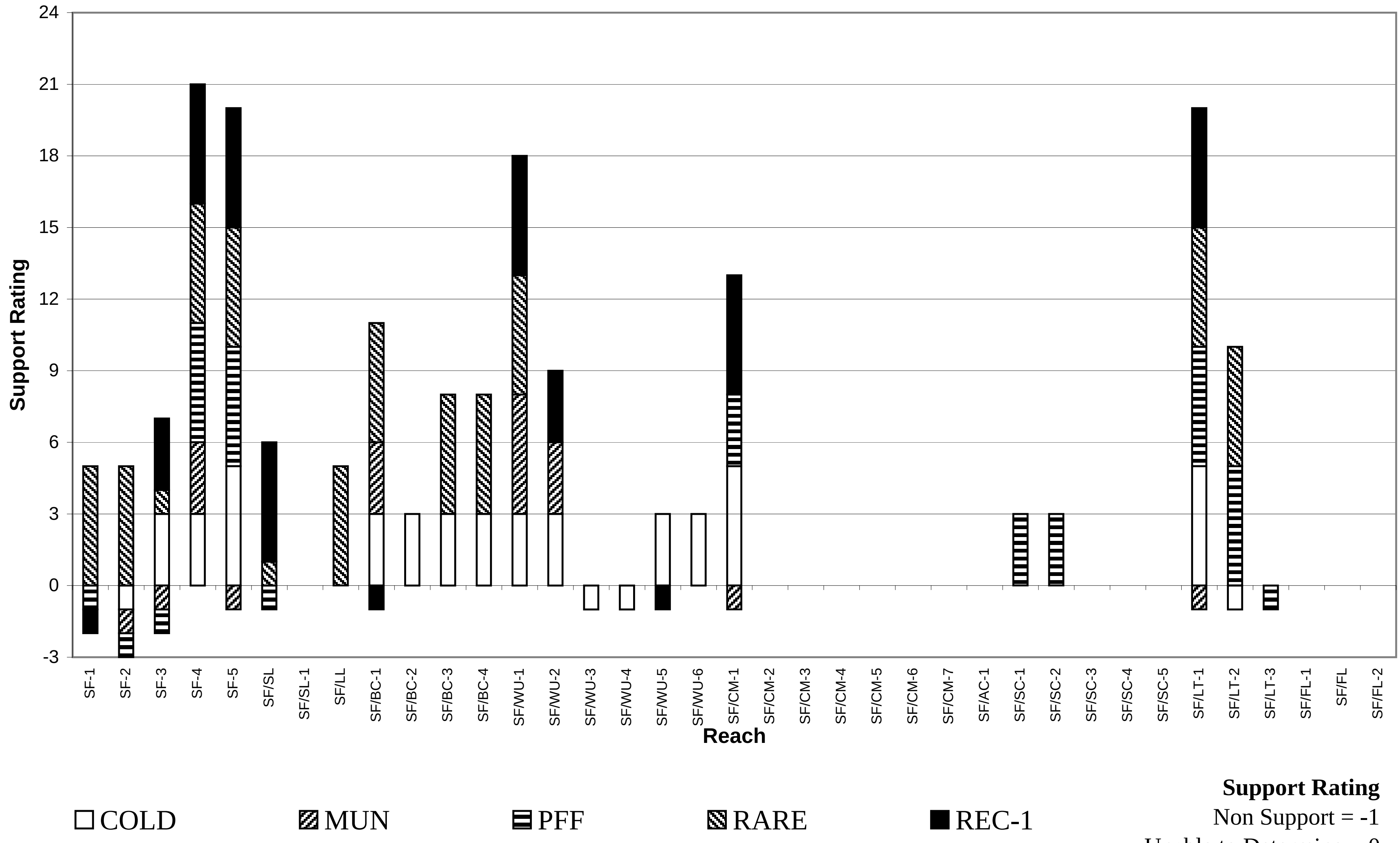
Appendix 5-A contains a series of six tables displaying bar charts which illustrate the conclusions of the pilot assessment for the San Francisquito Creek watershed. Table 1 summarizes the support status for each of the five beneficial uses/stakeholder interests within each of the 37 stream reaches in the watershed. Tables 2 through 6 display the same information, along with the associated uncertainty rating, for each individual use/interest. In instances where no bar is present above a stream reach identification code, sufficient data were not available to assess any of the uses/interests for that reach. A list of stream reaches, waterbodies, and identification codes is located in Appendix 5-B.

The tables in Appendix 5-A are organized as follows:

- Table 1: Overall Support Status by Reach (all uses)
- Table 2: Support Status and Uncertainty Ratings for COLD
- Table 3: Support Status and Uncertainty Ratings for MUN
- Table 4: Support Status and Uncertainty Ratings for PFF
- Table 5: Support Status and Uncertainty Ratings for RARE
- Table 6: Support Status and Uncertainty Ratings for REC-1

Appendix 5-A
Table 1

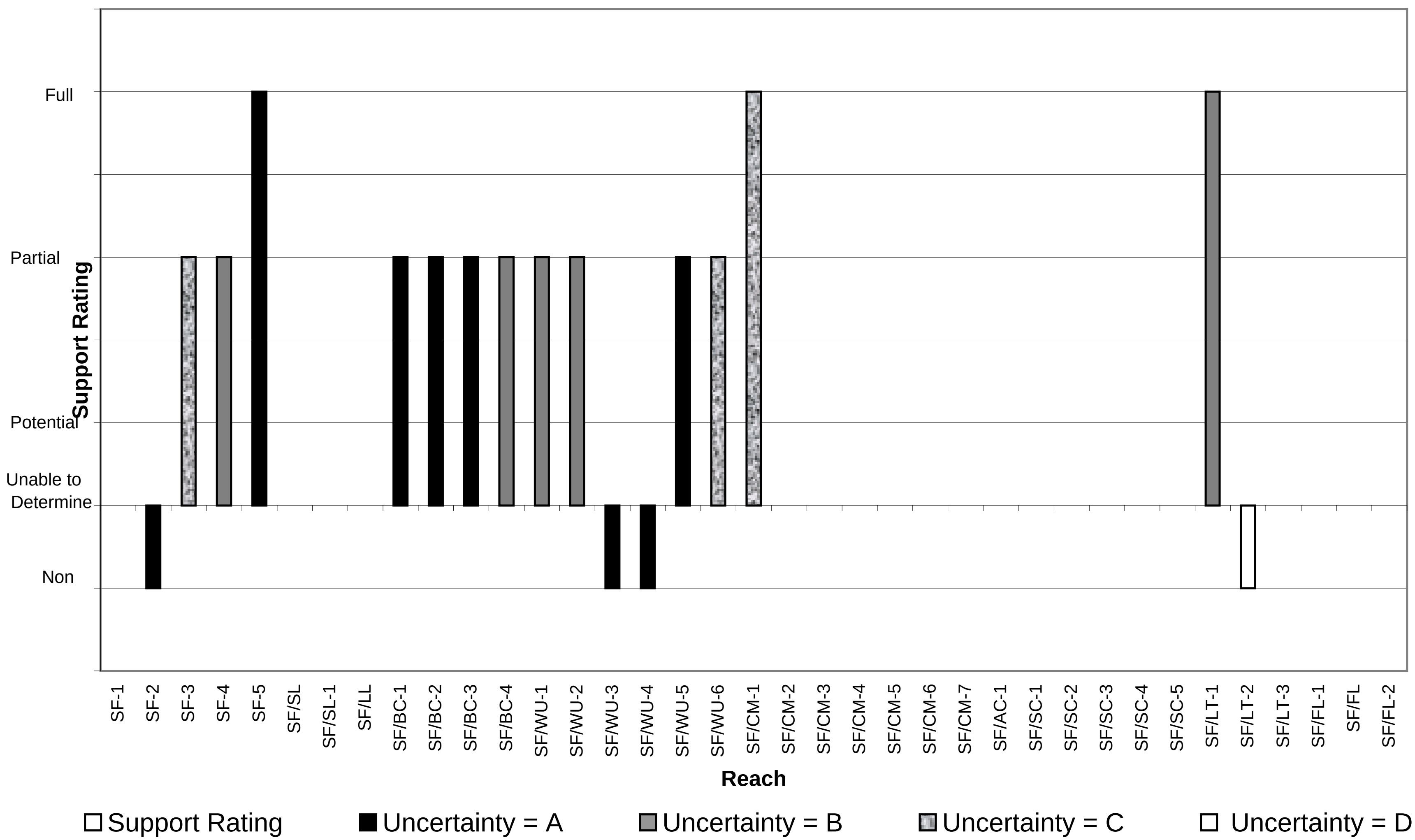
San Francisquito Watershed
Support by Reach



Support Rating
Non Support = -1
Unable to Determine = 0
Potential Support = 1
Partial Support = 3
Fully Supported = 5

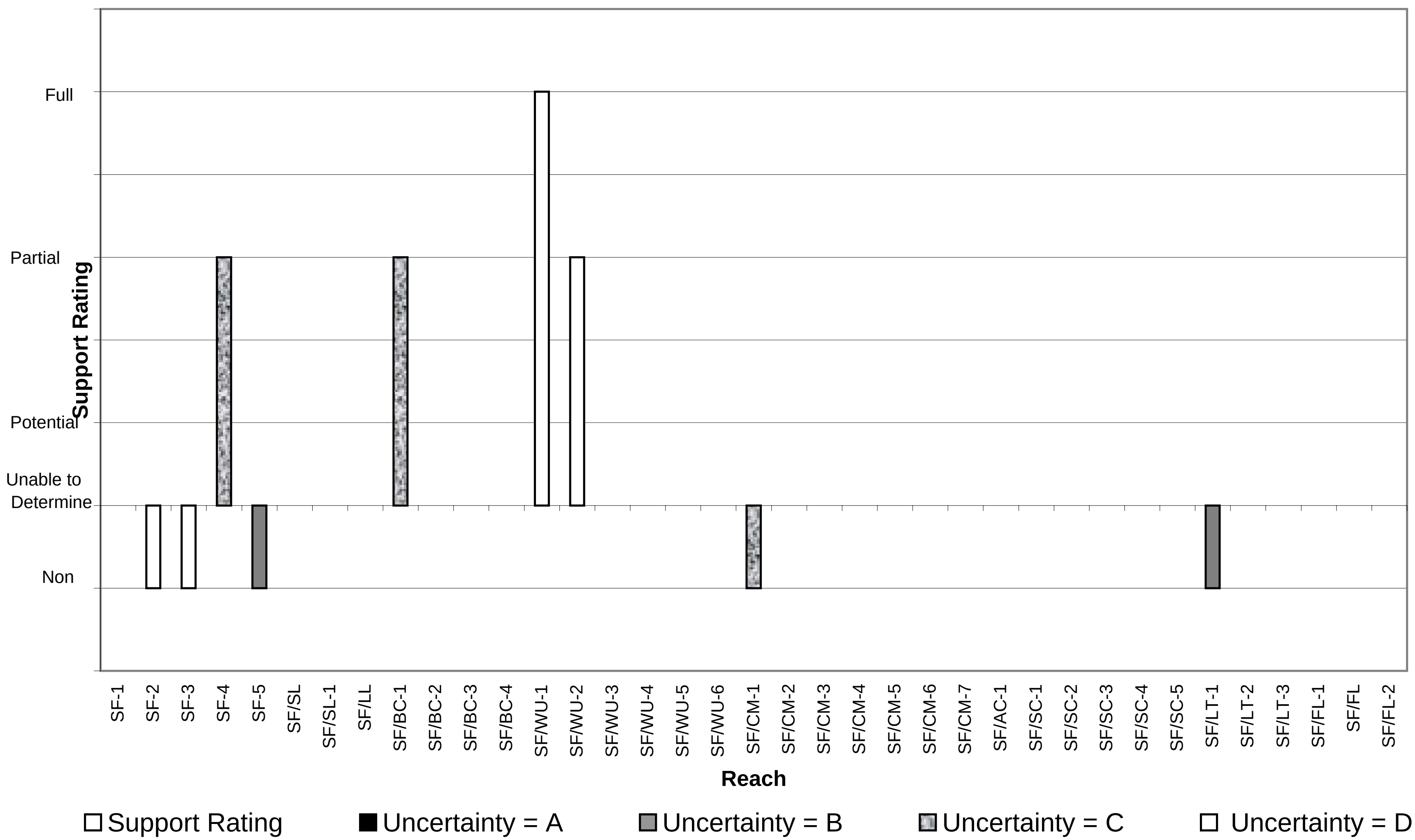
Where the reach bars show fewer than five uses, sufficient data were not available to evaluate the other uses. Where no bar is present above a reach, sufficient data were not available to assess any of the five uses.

Appendix 5-A
Table 2
San Francisquito Watershed
Support and Uncertainty Ratings for COLD



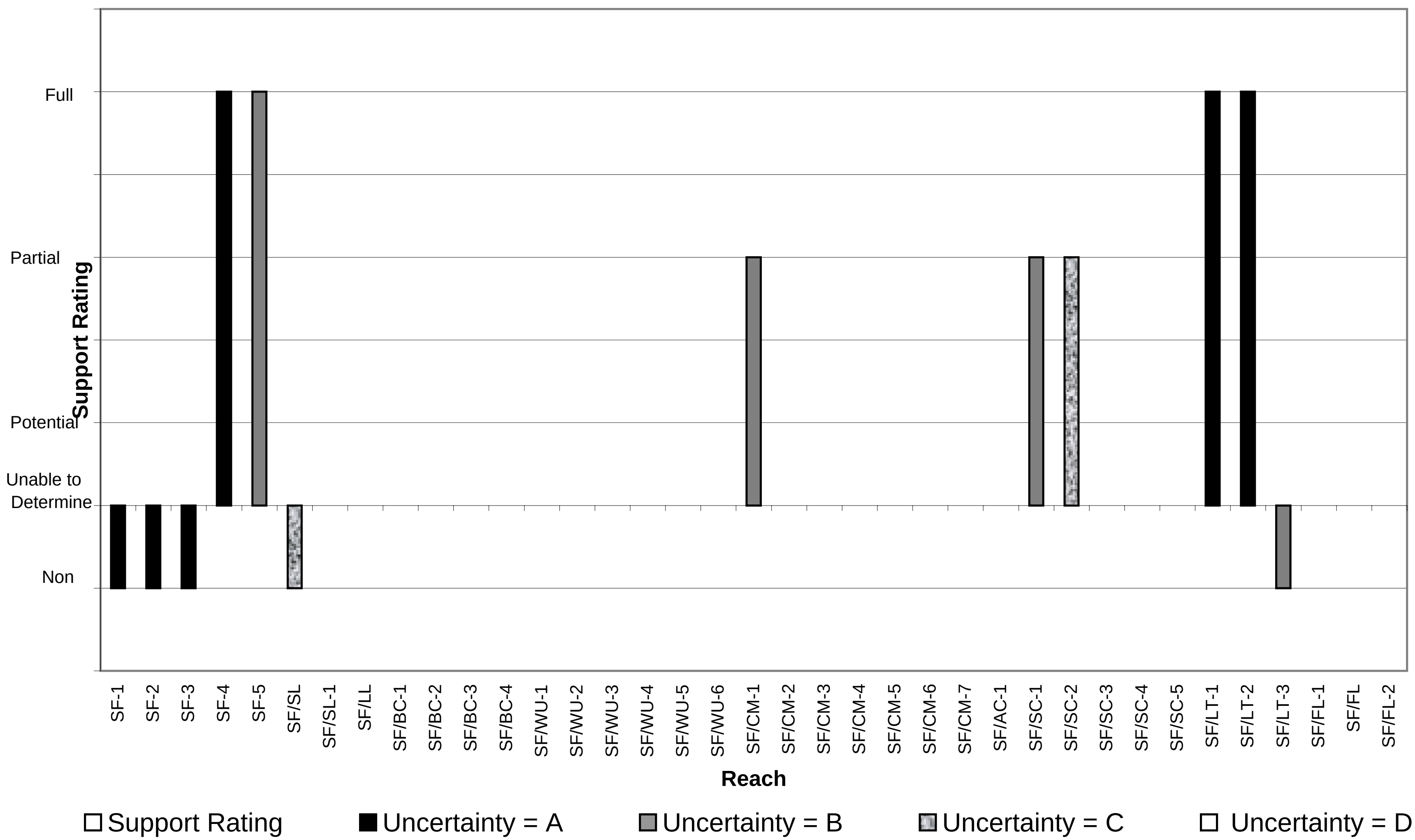
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 5-A
Table 3
San Francisquito Watershed
Support and Uncertainty Ratings for MUN



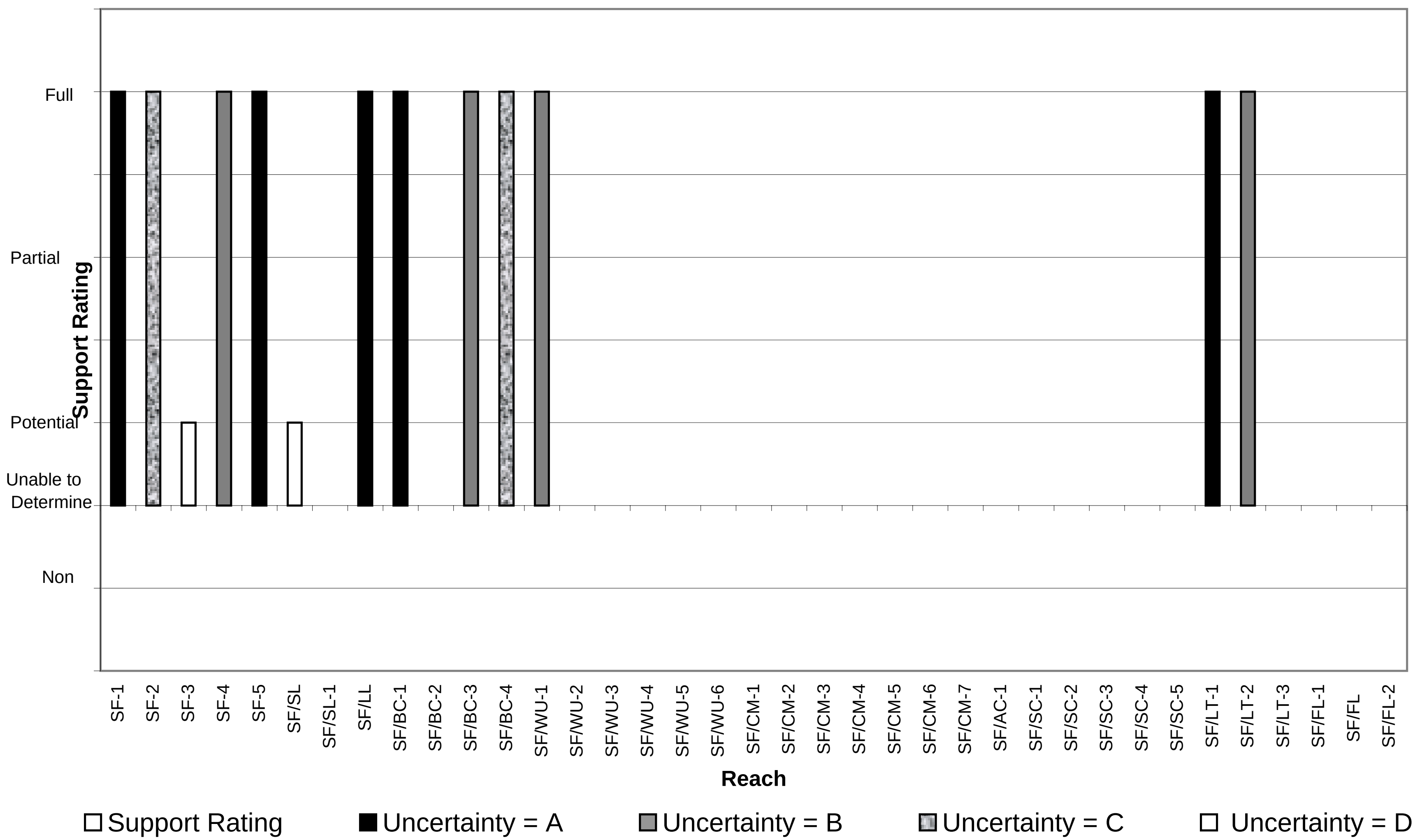
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 5-A
Table 4
San Francisquito Watershed
Support and Uncertainty Ratings for PFF



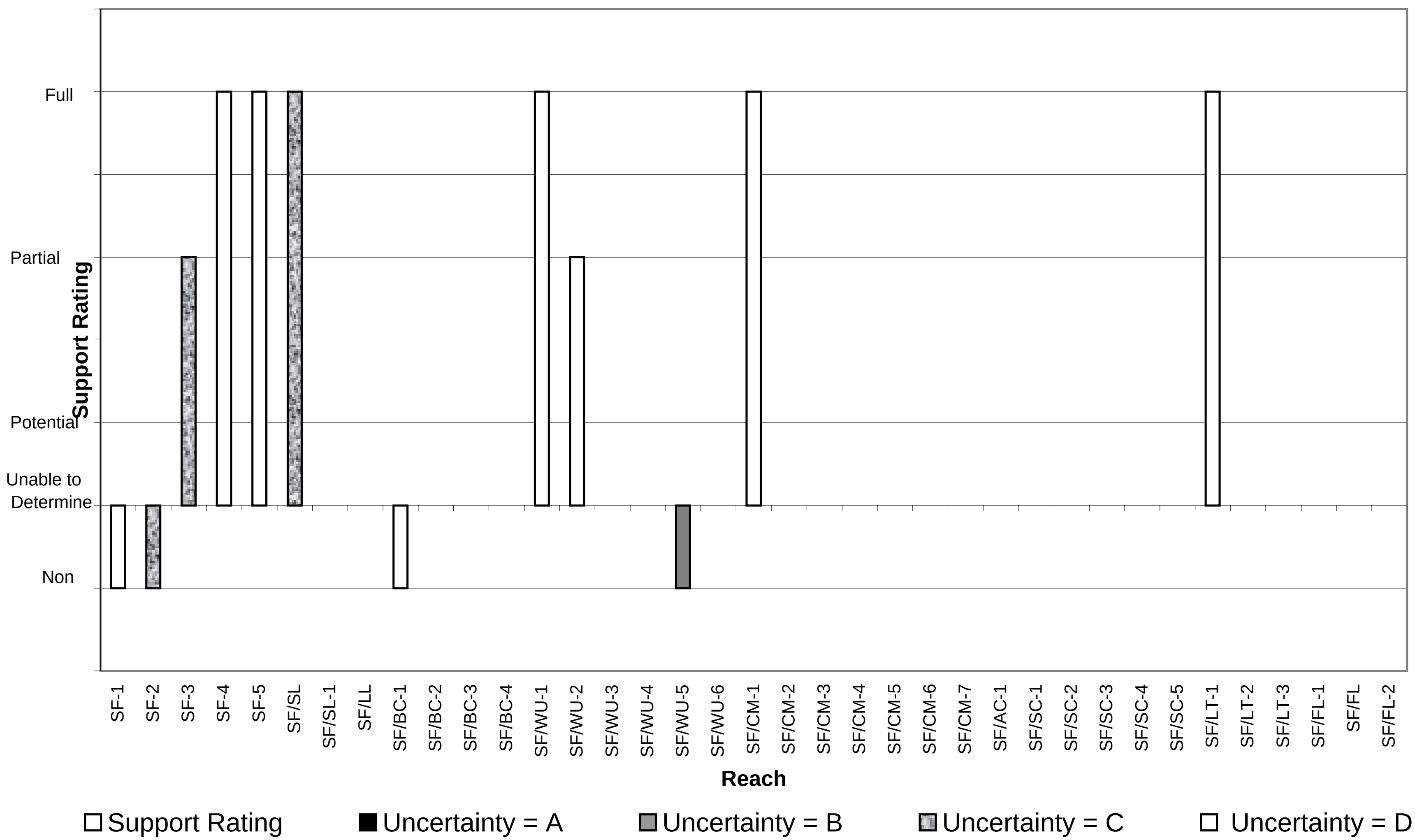
Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 5-A
Table 5
San Francisquito Watershed
Support and Uncertainty Ratings for RARE



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 5-A
Table 6
San Francisquito Watershed
Support and Uncertainty Ratings for REC-1



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 5-B
Reach Summary Tables

Appendix 5-B contains a series of tables summarizing the pilot assessment results for all of the reaches in the San Francisquito Creek watershed where sufficient data existed for at least one of the five uses/interests. Reaches with insufficient data for all uses/interests do not have individual tables but are instead compiled and listed on the last page of this appendix. A listing of all reaches in the watershed and the page number in this appendix where each reach can be found is provided below.

SF/CM-6	Rengstorff Gulch	Entire Creek	67
SF/CM-7	Coal Creek	Entire Creek	67
SF/AC-1	Alambique Creek	Terminus near wetlands above Searsville Lake to source	67
SF/SC-1	Sausal Creek	Terminus near wetlands above Searsville Lake to source	52
SF/SC-2	Dennis Martin Creek	Entire Creek	55
SF/SC-3	Bull Run Gulch	Entire Creek	67
SF/SC-4	Neils Gulch	Entire Creek	67
SF/SC-5	Bozzo Gulch	Entire Creek	67
SF/LT-1	Los Trancos Creek	San Francisquito Creek confluence to confluence with Buckeye Creek in Palo Alto	58
SF/LT-2	Los Trancos Creek	Entire Creek above confluence with Buckeye Creek in Palo Alto	62
SF/LT-3	Buckeye Creek	Entire Creek	65
SF/FL-1	Return channel from Felt Lake	Entire Channel	67
SF/FL	Felt Lake	Entire Reservoir	67
SF/FL-2	Felt Lake Diversion channel	Entire Channel	67

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-1 **Reach Length (miles):** 1.49

Reach Limits (downstream to upstream): San Francisco Bay to U.S. 101 Bridge **Flow Regime:** Tidal

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient on primary indicators; some limited data on secondary habitat indicators but not sufficient for support statement	Poor	Instream spawning habitat, riparian vegetation, fish assemblage, flow, barriers, macroinvertebrates, instream rearing habitat, stream type, temperature, turbidity, dissolved oxygen, channel substrate, streambank erosion potential	D0042	Unable to Determine	N/A	This reach is an important migratory route for anadromous fish, although the reach is probably too warm for steelhead; insufficient data is available to determine rearing; no reach-specific data on primary indicators (cold water dependent fish species presence, temperature, macroinvertebrates) is available; very limited reach-specific data on two secondary indicators indicates that criteria for support are not met within reach, but data is not sufficient for support statement
				D0101			
				D0103			
				D0104			
				D0459			
				D0602			
				D0609			
				D0620			

Local Knowledge Comments: Steelhead/rainbow trout were not observed during recent (1999-2001) surveys but this reach is an important acclimation zone for smolts and migrating adult steelhead.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = TSS, bankfull, stage, discharge and width, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, turbidity, channel substrate, altered channel materials and dimensions, water depths and velocities.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-1 **Reach Length (miles):** 1.49

Reach Limits (downstream to upstream): San Francisco Bay to U.S. 101 Bridge **Flow Regime:** Tidal

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; D0638 and stakeholder input contain information on this reach of San Francisquito Creek that overtopped in the February 2-3, 1998 flood event, which was estimated between 6,500 to 8,000 cfs, which is equivalent to a 100 -year event.
				D0216			
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0583			
				D0586			
				D0587			
				D0589			
				D0609			
				D0620			
				D0621			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-1 **Reach Length (miles):** 1.49

Reach Limits (downstream to upstream): San Francisco Bay to U.S. 101 Bridge **Flow Regime:** Tidal

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Transition

PFF	Sufficient	Good	Channel capacity, design flow	D0638	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; D0638 and stakeholder input contain information on this reach of San Francisquito Creek that overtopped in the February 2-3, 1998 flood event, which was estimated between 6,500 to 8,000 cfs, which is equivalent to a 100 -year event.

Local Knowledge Comments: The February 1998 flood event was estimated at between 6,500 and 8,000 cfs, which is within the range of the 100-year flow estimates of both FEMA (7,860 cfs) and USGS (6,925 cfs); the San Francisquito Creek JPA is funding an interim flood control project to restore the levees downstream of U.S. 101 to their original design height because of existing creek capacity deficiencies; the SCVWD has recently completed development of an updated hydraulic model that documents the inadequacy of the reaches' flood-carrying capacity; flood problems in SF-1 would be worse if water did not overtop and exit the creek upstream in SF-3 during severe storms and capacity in SF-1 will need to be increased if SF-3 is improved to allow passage of additional flow; continuing build-up of sediment is incrementally decreasing flow capacity in SF-1. The JPA has recently received approval from Congress for an Army COE Reconaissance Study.

Limiting Factor(s): This reach overtopped in the February 2-3, 1998 flood event which was equivalent to a 100-year event

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0101	Full Support	A	Full support based on breeding clapper rail, breeding salt marsh harvest mice, breeding salt common yellowthroat, yellow rumped warblers (Note: data shows SF gartersnake and yellow rumped warbler present on creek but is not reach specific)
				D0111			
				D0112			
				D0459			
				D0609			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-1 **Reach Length (miles):** 1.49

Reach Limits (downstream to upstream): San Francisco Bay to U.S. 101 Bridge **Flow Regime:** Tidal

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Transition

Local Knowledge Comments: Fieldwork associated with the sediment TMDL by the JPA and complementary habitat assessment by SCVWD will enable refinement of the RARE assessment through several reaches of the SFC watershed. Steelhead/rainbow trout were not observed during recent (1999-2001) surveys but this reach is an important acclimation zone for smolts and migrating adult steelhead.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Poor	Aesthetics (trash, algae), access	D0042	Non-Support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	D	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data sets D0042 and D0620 provided limited data, some of which is quite dated; high level of uncertainty regarding this reach
				D0452			
				D0620			

Local Knowledge Comments:

Limiting Factor(s): Presence of trash and algae in reach; poor/limited accessibility to stream

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-2 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): U.S. 101 to University Avenue **Flow Regime:** Ephemeral

Channel Type(s): Rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Insufficient on primary indicators (some limited flow data but no good temperature, fish assemblage, or macroinvertebrate data); sufficient on secondary habitat indicators	Fair	instream rearing habitat, instream rearing (location and extent), stream type, channel substrate, riparian vegetation, physical barriers, temperature, turbidity, dissolved oxygen, instream spawning habitat, fish assemblage	D0101	Non Support	A	Primary consideration is that the reach is dry during most summers and cannot therefore support cold water dependent fish habitat
				D0102			
				D0103			
				D0104			
				D0311			
				D0312			
				D0459			
				D0462			
				D0602			
				D0609			
				D0612			
				D0620			

Local Knowledge Comments: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches. The Clarke St. barrier was notched by the San Francisquito Watershed Council and is no longer considered a significant problem. Steelhead/rainbow trout were observed from 300 feet upstream of US 101 to University Avenue in 1999-2001 (juveniles during out-migration).

Limiting Factor(s): Stream goes dry in most summers - reach is ephemeral; poor spawning habitat; barriers to fish migration

Suspected Cause(s): Low streamflows from upstream are lost to percolation and riparian vegetation use before they get to this reach in summer.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = TSS, width to depth ratio, bankfull, stage, discharge and width, shaded riverine aquatic habitat, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = temperature, dissolved oxygen, turbidity, altered channel materials and dimensions.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Limited but sufficient	Good	Selenium, mercury, fecal coliform, DDT, dieldrin	D0233	Non Support	D	Data is from 1994 and 1995, only six sample dates in entire data set with minimal exceedances

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-2 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): U.S. 101 to University Avenue **Flow Regime:** Ephemeral

Channel Type(s): Rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments:

Limiting Factor(s): Selenium, mercury

Suspected Cause(s):

Data Gap(s) - No Data: Turbidity, chlordane, copper, chlorpyrifos, diazinon, dioxin, MTBE, nitrate, PCB, selenium, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0638 and stakeholder input suggest that this reach can not convey 100- year flood flows
				D0216			
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0583			
				D0586			
				D0587			
				D0589			
				D0609			
				D0620			
				D0621			
				D0638			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-2 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): U.S. 101 to University Avenue **Flow Regime:** Ephemeral

Channel Type(s): Rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments: The February 1998 flood event was estimated at between 6,500 and 8,000 cfs, which is within the range of the 100-year flow estimates of both FEMA (7,860 cfs) and USGS (6,925 cfs); in the lower part of SF-2, flood protection is provided by a "temporary" flood wall of questionable integrity - a portion of this wall is proposed to be replaced as part of the JPA's levee restoration project; flood problems in SF-2 would be worse if water did not overtop and exit the creek upstream in SF-3 during severe storms and capacity in SF-2 will need to be increased if SF-3 is improved to allow passage of additional flow. The JPA has recently received approval from Congress for an Army COE Reconaissance Study.

Limiting Factor(s): Not able to convey 100-year flood flows

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations	D0111	Full Support	C	Full support based on salt marsh harvest mice presence
				D0459			
				D0609			
				D0620			

Local Knowledge Comments: Steelhead/rainbow trout were observed from 300 feet upstream of US 101 to University Avenue in 1999-2001 (juveniles during out-migration).

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species.

Fair/Poor Quality Data: Primary Indicators = special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Poor	Aesthetics (trash, algae), access	D0042	Non-Support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	C	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data sets D0042 and D0620 provided limited data, some of which is quite dated; high level of uncertainty regarding this reach
				D0452			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-2 **Reach Length (miles):** 1.01

Reach Limits (downstream to upstream): U.S. 101 to University Avenue **Flow Regime:** Ephemeral

Channel Type(s): Rock-lined, concrete-lined **Generalized Land Use in Area:** Urban

Local Knowledge Comments:

Limiting Factor(s): Presence of trash and algae in reach; poor/limited accessibility to stream

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-3 **Reach Length (miles):** 4.41

Reach Limits (downstream to upstream): University Avenue to Sand Hill Road **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators (macroinvertebrates, fish assemblage); additional data on secondary habitat indicators	Fair	Instream rearing habitat, instream rearing (location and extent), stream type, channel substrate, riparian vegetation, physical barriers, temperature, turbidity, dissolved oxygen, instream spawning habitat, fish assemblage, streambank erosion potential, macroinvertebrates	D0101	Partial Support	C	Pools present in this reach during most summers; the reach met the insect criteria during a very wet year (1998); documented steelhead occurances within reach; no good reach-specific temperature data leads to high uncertainty; fish data in reach SF-4 upstream indicates declining suitability downstream; COLD support in reach SF-3 is probably marginal even in wet years
				D0102			
				D0103			
				D0104			
				D0311			
				D0312			
				D0315			
				D0457			
				D0459			
				D0464			
				D0602			
				D0609			
				D0612			
				D0620			
				D0624			
				D0625			

Local Knowledge Comments: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration).

Limiting Factor(s): Reach is dry or intermittent during average or dry years

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = TSS, bankfull, stage, discharge and width, altered channel materials, shaded riverine aquatic habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = temperature, dissolved oxygen, turbidity.

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-3 **Reach Length (miles):** 4.41

Reach Limits (downstream to upstream): University Avenue to Sand Hill Road **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Limited but sufficient	Fair	Nitrate, turbidity, fecal coliform, dieldrin, DDT	D0233	Non Support	D	Limited data on 4 of 16 parameters; high uncertainty due to lack of data on most parameters
				D0578			

Local Knowledge Comments:

Limiting Factor(s): Fecal coliform, dieldrin, DDT

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform (wet weather), turbidity, chlordane, copper, chlorpyrifos, DDT (wet weather), diazinon, dieldrin (wet weather), dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0638 and stakeholder input suggest that this reach can not convey 100 -year flood flows; (2) this reach supports PFF except for two critical urban reaches: Chaucer to Middlefield (SCVWD stationing #17700 to 22075) and Middlefield to Waverley (22175 to 25400) that cannot pass the 1% flood
				D0216			
				D0311			
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0455			
				D0559			
				D0583			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-3 **Reach Length (miles):** 4.41

Reach Limits (downstream to upstream): University Avenue to Sand Hill Road **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

PFF	Sufficient	Good	Channel capacity, design flow	D0586	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); data set D0638 and stakeholder input suggest that this reach can not convey 100 -year flood flows; (2) this reach supports PFF except for two critical urban reaches: Chaucer to Middlefield (SCVWD stationing #17700 to 22075) and Middlefield to Waverley (22175 to 25400) that cannot pass the 1% flood
				D0587			
				D0589			
				D0609			
				D0620			
				D0621			
				D0638			

Local Knowledge Comments: The upper end of this reach will vary depending on the year (dry, wet, normal) with the limit of streamflow. Future analyses should consider splitting this reach into different segments corresponding to amount or type of streamflow and location of perennial pools. The JPA has recently received approval from Congress for an Army COE Reconaissance Study.

Limiting Factor(s): Adequate channel capacity to convey the expected 100-year flow does not exist within two sections of this reach; land uses adjacent to the stream within the flood zone consist of urban commercial and residential

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segments are from Chaucer to Middlefield (SCVWD stationing #17700 to 22075) and Middlefield to Waverley (22175 to 25400).

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data	Fair	Special status species observations	D0106	Potential Support	D	Potential support based on western pond turtle; not enough data to indicate full support (regular reproducing population)
				D0111			
				D0459			
				D0609			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-3 **Reach Length (miles):** 4.41

Reach Limits (downstream to upstream): University Avenue to Sand Hill Road **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration).

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirments.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Fair	Aesthetics (trash, algae), access, water depth	D0039	Partial support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	C	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data sets D0039, D0042, D0578, and D0620 provided limited data, some of which is quite dated; high level of uncertainty regarding this reach; poor aesthetics were noted; access appears to be available
				D0042			
				D0578			
				D0620			

Local Knowledge Comments:

Limiting Factor(s): Presence of trash and algae in reach

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-4 **Reach Length (miles):** 1.57

Reach Limits (downstream to upstream): Sand Hill Road to Los Trancos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators (macroinvertebrates, temperature, fish assemblage); additional data on secondary habitat indicators	Fair	Fish assemblage, dissolved oxygen, instream rearing habitat, instream rearing (location and extent), stream type, channel substrate, riparian vegetation, physical barriers, temperature, turbidity, instream spawning habitat, macroinvertebrates, flow	D0020	Partial Support	B	Pools present at lower end of reach during most summers; steelhead regularly present in the reach downstream to the USGS gage though there is a general decline in abundance downstream within the reach; temperature meets criteria; insect criteria were not met at a downstream site within the reach in 1998 (very wet year)
				D0040			
				D0101			
				D0102			
				D0103			
				D0104			
				D0311			
				D0312			
				D0315			
				D0438			
				D0451			
				D0459			
				D0461			
				D0462			
				D0464			
				D0556			
				D0578			
				D0582			
				D0602			
				D0609			
				D0612			
				D0616			
				D0618			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-4 **Reach Length (miles):** 1.57

Reach Limits (downstream to upstream): Sand Hill Road to Los Trancos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Urban

COLD	Sufficient on primary indicators (macroinvertebrates, temperature, fish assemblage); additional data on secondary habitat indicators	Fair	Fish assemblage, dissolved oxygen, instream rearing habitat, instream rearing (location and extent), stream type, channel substrate, riparian vegetation, physical barriers, temperature, turbidity, instream spawning habitat, macroinvertebrates, flow	D0625	Partial Support	B	Pools present at lower end of reach during most summers; steelhead regularly present in the reach downstream to the USGS gage though there is a general decline in abundance downstream within the reach; temperature meets criteria; insect criteria were not met at a downstream site within the reach in 1998 (very wet year)

Local Knowledge Comments: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration and over-summering).

Limiting Factor(s): Low streamflows and scarce riffles inhibit insect production within this reach

Suspected Cause(s): Low streamflows in reach, which decline or are absent in the lower portion of the reach. Substrate quality and stream gradient decline downstream within the reach, reducing riffle quantity and quality. Groundwater pumping may be aggravating naturally dry watershed conditions.

Data Gap(s) - No Data: Secondary Indicators = TSS, altered channel materials, shaded riverine aquatic habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = temperature, instream spawning habitat.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, selenium, mercury, nickel, nitrate, copper, nitrite, chlorpyrifos, diazinon	D0102	Partial Support	C	9 of 16 data types present; no QA/QC for one major data set; uncertainty over dry/wet weather sampling (no information provided in most data sets); no data available on remaining data types
				D0554			
				D0556			
				D0578			

Local Knowledge Comments:

Limiting Factor(s): Turbidity during wet season and to a small degree during dry season (exceeds primary but not secondary MCL by small amount)

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, DDT, diazinon, dieldrin, dioxin, MTBE, PCB

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-4 **Reach Length (miles):** 1.57

Reach Limits (downstream to upstream): Sand Hill Road to Los Trancos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0311			
				D0321			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0586			
				D0587			
				D0589			
				D0609			
				D0620			
				D0621			

Local Knowledge Comments: The lower end of this reach will vary depending on the year (dry, wet, normal) with the limit of streamflow.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0111	Full Support	B	Full support based on steelhead and habitat description; additional potential support status based on western pond turtle and red legged frog
				D0459			
				D0602			
				D0609			
				D0618			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-4 **Reach Length (miles):** 1.57

Reach Limits (downstream to upstream): Sand Hill Road to Los Trancos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0620	Full Support	B	Full support based on steelhead and habitat description; additional potential support status based on western pond turtle and red legged frog

Local Knowledge Comments: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (juveniles during out-migration and over-summering).

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (2 of 9 parameters); data on tertiary indicators present	Good	Aesthetics (trash, algae), access, water depth, some constituents	D0039	Full support on secondary indicator but with high uncertainty due to limited data; partial support on tertiary indicator; no support statement is able to be made for primary indicator	D	No data sets are available on the primary indicators; limited support statement was developed based ONLY on secondary and tertiary indicators; data sets D0556 on secondary indicator and D0039, D0042, D0101, D0102, D0303, D0618, and D0620 on tertiary indicator provided limited data; high level of uncertainty regarding this reach due to lack of data on most water quality parameters; good aesthetics and water depth were noted; access appears to be limited
				D0042			
				D0101			
				D0102			
				D0383			
				D0463			
				D0556			
				D0618			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-4 **Reach Length (miles):** 1.57

Reach Limits (downstream to upstream): Sand Hill Road to Los Trancos Creek confluence **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Urban

Local Knowledge Comments: Well permit data for the watershed have been obtained as a follow-up to concerns about base flow depletion raised by the recent Regional Board draft report on the South Bay Groundwater Basins (January 2002).

Limiting Factor(s): Limited public access

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-5 **Reach Length (miles):** 3.86

Reach Limits (downstream to upstream): Los Trancos Creek to Searsville Lake **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators; additional data on secondary habitat indicators	Good	Fish assemblage, dissolved oxygen, instream rearing habitat, stream type, channel substrate, riparian vegetation, physical barriers, temperature, turbidity, instream spawning habitat, macroinvertebrates, mercury, PCBs	D0020	Full Support	A	Steelhead regularly present; two of four sites met insect criteria in 1998; most sites met criteria in 1993; low summer streamflows (with portions being intermittent) may affect level of COLD support in this reach during some years
				D0040			
				D0101			
				D0103			
				D0104			
				D0438			
				D0451			
				D0459			
				D0461			
				D0556			
				D0578			
				D0602			
				D0612			
				D0615			
				D0616			
				D0618			
				D0625			

Local Knowledge Comments: Steelhead/rainbow trout were observed throughout this reach during recent (1999-2001) surveys (observed 29-inch long steelhead attempting to jump Searsville Dam in 1991).

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = TSS, width to depth ratio, altered channel materials, instream spawning habitat, instream rearing habitat, chlordane, DDT, dieldrin, dioxin, selenium.

Fair/Poor Quality Data: Secondary Indicators = turbidity, physical barriers to migration.

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-5 **Reach Length (miles):** 3.86

Reach Limits (downstream to upstream): Los Trancos Creek to Searsville Lake **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, selenium, mercury, nickel, nitrate, copper, nitrite, chlorpyrifos, diazinon, fecal coliform, dieldrin, DDT	D0101	Non Support	B	12 of 16 data types present; no QA/QC for one major data set; some uncertainty over dry/wet weather sampling (no information provided in most data sets); no data available on remaining data types
				D0233			
				D0554			
				D0556			
				D0578			
				D0582			

Local Knowledge Comments:

Limiting Factor(s): TDS in summer; turbidity in winter; fecal coliform, DDT, dieldrin

Suspected Cause(s): High TDS due to groundwater sources to streams in summer. Turbidity due to erosion (stream or rill) during winter storms. Uncertain regarding fecal coliform, DDT, and dieldrin.

Data Gap(s) - No Data: Chlordane, dioxin, MTBE, PCB

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient with higher uncertainty for upper portion of reach	Good for lower section; fair for upper section	Channel capacity, design flow for lower section of reach; conclulsions regarding channel capacity based on historic flooding, but no direct measurement for upper section of reach	D0102	Full Support	A for lower portion of reach; C for upper portion	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows) for the lower part of the reach (up to a point 1200 feet upstream of I-280); no data on the primary indicator was available for the upper portion of the reach; (2) D0102 provides channel cross sections but existing and 100-year flow data is unavailable so existing and design flows cannot be calculated in order to assess the primary indicator; (3) D0602 contains a qualitative conclusion that the upper part of the reach can convey the 100-year flow and provides a cross-section at a point in this segment to illustrate that the channel has been able to convey historic flows up to the 75-year event
				D0216			
				D0380			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-5 **Reach Length (miles):** 3.86

Reach Limits (downstream to upstream): Los Trancos Creek to Searsville Lake **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient with higher uncertainty for upper portion of reach	Good for lower section; fair for upper section	Channel capacity, design flow for lower section of reach; conclulsions regarding channel capacity based on historic flooding, but no direct measurement for upper section of reach	D0559	Full Support	A for lower portion of reach; C for upper portion	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows) for the lower part of the reach (up to a point 1200 feet upstream of I-280); no data on the primary indicator was available for the upper portion of the reach; (2) D0102 provides channel cross sections but existing and 100-year flow data is unavailable so existing and design flows cannot be calculated in order to assess the primary indicator; (3) D0602 contains a qualitative conclusion that the upper part of the reach can convey the 100-year flow and provides a cross-section at a point in this segment to illustrate that the channel has been able to convey historic flows up to the 75-year event
				D0602			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = channel capacity, estimated 100 year flood flow. Secondary Indicators = historical flooding.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0106	Full Support	A	Full support based on steelhead and red legged frog; additional potential support for western pond turtle
				D0111			
				D0459			
				D0465			
				D0602			
				D0609			
				D0618			
				D0620			

Watershed: San Francisquito

Waterbody: San Francisquito Creek **Reach:** SF-5 **Reach Length (miles):** 3.86

Reach Limits (downstream to upstream): Los Trancos Creek to Searsville Lake **Flow Regime:** Perennial to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Access, aesthetics (trash, algae), flow (depth), copper, mercury, nickel	D0039	Full support on secondary indicator but with high uncertainty due to limited data; partial support on tertiary indicator; no support statement is able to be made for primary indicator	D	No data sets are available on the primary indicators; limited support statement was developed based ONLY on secondary and tertiary indicators; data sets D0556 on secondary indicator and D0039, D0042, D0101, D0102, D0383, D0452, D0463, and D0618 on tertiary indicator provided limited data; high level of uncertainty regarding this reach due to lack of data on most water quality parameters; generally good water depth was noted; access appears to be limited; algae present
				D0042			
				D0101			
				D0102			
				D0383			
				D0452			
				D0463			
				D0556			
				D0614			
				D0618			

Local Knowledge Comments:

Limiting Factor(s): Limited public access; presence of algae

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Searsville Lake **Reach:** SF/SL **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators; reach is a shallow, warm-water reservoir

Local Knowledge Comments: Lake may be too small to support trout during the warm, late summer period. No steelhead/rainbow trout were observed during recent (1999-2001) surveys; exotic species appear to dominate, prey on native salmonids, spread downstream.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: Stanford University historically used water from Searsville for irrigation and groundwater recharge for non-potable supply wells. Data from Stanford were not made available to the assessment team.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	No data on primary indicator (reservoir capacity, 100-year flood volume); data on secondary indicator (utility of facility for flood protection) available	Fair	Flood protection	D0602	Non Support	C	Conclusion of report from 1956 is that Searsville Lake/dam has no value as a flood control facility; storage capacity is limited and normal operation requires that the lake be filled to capacity; conclusion reconfirmed by 2001 sediment impact study; Stakeholder comment: The capacity of Searsville Lake is shrinking due to the continual trapping of sediment behind the dam.

D0621

Watershed: San Francisquito

Waterbody: Searsville Lake **Reach:** SF/SL **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Rural

Local Knowledge Comments: The capacity of Searsville Lake is shrinking due to the continual trapping of sediment behind the dam. Studies are also currently underway about options to address the continuing siltation of Searsville Lake as only about twelve feet of freeboard now remain at the 64-foot high 110-year old dam.

Limiting Factor(s): Limited storage capacity and high water level

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data	Poor	Special status species observations	D0111	Potential Support	D	Potential support based on 1941 Western leatherwood data; no recent data to support a finding of full support.

Local Knowledge Comments: No steelhead/rainbow trout were observed during recent (1999-2001) surveys; exotic species appear to dominate, prey on native salmonids, spread downstream.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Fair	Access	D0614	Full Support for tertiary indicator (access); no support statement is able to be made for primary and secondary indicators	C	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data set D0614 provided general accessibility data

Local Knowledge Comments: Data from Stanford concerning recreational uses were not made available to the assessment team.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Lake Lagunita **Reach:** SF/LL **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Local Knowledge Comments: No steelhead/rainbow trout were observed during recent (1999-2001) surveys; an adult steelhead was caught here (likely from diversion on SF Creek) in the early 1970s

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: Stanford University uses water from Lagunita for irrigation and groundwater recharge for non-potable supply wells. Data from Stanford were not made available to the assessment team.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Lake Lagunita **Reach:** SF/LL **Reach Length (miles):**

Reach Limits (downstream to upstream): Entire Reservoir **Flow Regime:** Reservoir

Channel Type(s): N/A **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0111	Full Support	A	Full support based on California tiger salamander presence; additional potential support based on western pond turtle presence
				D0112			

Local Knowledge Comments: No steelhead/rainbow trout were observed during recent (1999-2001) surveys; an adult steelhead was caught here (likely from diversion on SF Creek) in the early 1970s

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments: Data from Stanford concerning recreational uses were not made available to the assessment team.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Bear Creek **Reach:** SF/BC-1 **Reach Length (miles):** 2.53

Reach Limits (downstream to upstream): Confluence with San Francisquito Creek to confluence with West Union Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, flow, temperature, physical barriers, mercury	D0020	Partial Support	A	Probably full support but no macroinvertebrate data is available for this reach
				D0036			
				D0457			
				D0461			
				D0462			
				D0466			
				D0556			
				D0612			
				D0617			
				D0618			

Local Knowledge Comments: The Watershed Council has been awarded a grant by the California Department of Fish and Game to remediate two of the three Bear Creek high priority sites identified in the report "Adult Steelhead Passage in the Bear Creek Watershed" (Bear dams #1 and #3). The third high priority barrier is Woodside's bridge apron (#10) at the Fox Hollow Road crossing. Woodside has no capital improvement scheduled, so the Steelhead Taskforce will evaluate an alternative of a series of weirs downstream of the bridge. Steelhead/rainbow trout were observed throughout this reach during recent surveys (1999-2001); two steelhead (27- and 30-inch) were observed in 1995 and 1998.

Limiting Factor(s): Low summer streamflows and the presence of a fish passage barrier

Suspected Cause(s): Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, chlordane, diazinon, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, selenium, mercury, nickel, copper, nitrite, chlorpyrifos, diazinon	D0101	Partial Support	C	9 of 16 data types present; no QA/QC for one major data set; some uncertainty over dry/wet weather sampling (no information provided in most data sets); no data available on remaining data types
				D0556			

Watershed: San Francisquito

Waterbody: Bear Creek **Reach:** SF/BC-1 **Reach Length (miles):** 2.53

Reach Limits (downstream to upstream): Confluence with San Francisquito Creek to confluence with West Union Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): Turbidity during the winter months exceeds secondary MCL criteria (most samples exceed primary MCL)

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, DDT, diazinon, dieldrin, dioxin, MTBE, PCB, selenium

Fair/Poor Quality Data: Turbidity, copper, chlorpyrifos, nitrate, mercury, nickel, TDS

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Not Sufficient	Fair	Channel cross sections, bank characteristics	D0102	Unable to Determine	N/A	D0102 provides channel cross sections but existing and 100-year flow data is unavailable so existing and design flows cannot be calculated in order to assess the primary indicator

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0602	Full Support	A	Full support based on steelhead presence
				D0617			
				D0618			
				D0620			

Local Knowledge Comments: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Bear Creek **Reach:** SF/BC-1 **Reach Length (miles):** 2.53

Reach Limits (downstream to upstream): Confluence with San Francisquito Creek to confluence with West Union Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Access, flow (depth), copper, mercury, nickel	D0038	Non Support on secondary indicator but with high uncertainty due to limited data; Full Support on tertiary indicator (flow); no support statement is able to be made for primary indicator	D	No data sets are available on the primary indicators; limited support statement was developed based ONLY on secondary and tertiary indicators; data sets D0556 on secondary indicator and D0038, D0102, D0463, and D0618 on tertiary indicator provided limited data; high level of uncertainty regarding this reach due to lack of data on most water quality parameters; generally good water depth was noted
				D0102			
				D0463			
				D0556			
				D0618			

Local Knowledge Comments: Well permit data for the watershed have been obtained as a follow-up to concerns about base flow depletion raised by the recent Regional Board draft report on the South Bay Groundwater Basins (January 2002).

Limiting Factor(s): Mercury concentration exceeds criteria

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Dry Creek **Reach:** SF/BC-2 **Reach Length (miles):** 2.23

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, physical barriers	D0438 D0617	Partial Support	A	Juvenile steelhead sometimes present in early summer but this reach is dry by end of summer for all but the wettest years; no macroinvertebrate data available

Local Knowledge Comments: At the time fieldwork was done for the steelhead passage report, landowner permissions were not obtained for access to Dry Creek. Juvenile steelhead/rainbow trout were present 50 feet upstream of the Woodside Road crossing in 1999.

Limiting Factor(s): Reach is ephemeral; barriers

Suspected Cause(s): Small, dry watershed, with substrate dominated by sand. Unlikely to support significant steelhead rearing, though some juvenile presence has been noted, even in wet years due to lack of surface flow by fall. This is a case where the limiting factors are primarily natural.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Dry Creek **Reach:** SF/BC-2 **Reach Length (miles):** 2.23

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments: Juvenile steelhead/rainbow trout were present 50 feet upstream of the Woodside Road crossing in 1999.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Bear Gulch **Reach:** SF/BC-3 **Reach Length (miles):** 0.89

Reach Limits (downstream to upstream): Confluence with West Union Creek to Bear Gulch diversion dam **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, physical barriers	D0020	Partial Support	A	Lack of macroinvertebrate data; much of reach is ephemeral or intermittent; steelhead present in portions of reach during wet years
				D0438			
				D0462			
				D0466			
				D0617			

Local Knowledge Comments: Discussions with Cal Water about the Bear Gulch Diversion Dam are being explored by the Watershed Council, the California Department of Fish and Game and the Department of Water Resources. The dam is considered a high priority for remediation. Steelhead/rainbow trout present throughout reach during recent (1999-2001) surveys; a 31-inch steelhead was relocated from downstream of the SR 84 culvert in June of 1999 - important habitat.

Limiting Factor(s): Low summer stream flow

Suspected Cause(s): Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed. Major diversion for domestic water upstream reduces streamflows.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: Data from Cal Water were not available for use in the assessment.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Bear Gulch **Reach:** SF/BC-3 **Reach Length (miles):** 0.89

Reach Limits (downstream to upstream): Confluence with West Union Creek to Bear Gulch diversion dam **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0457	Full Support	B	Full support based on steelhead habitat and presence
				D0602			
				D0617			

Local Knowledge Comments: Steelhead/rainbow trout present throughout reach during recent (1999-2001) surveys; a 31-inch steelhead was relocated from downstream of the SR 84 culvert in June of 1999 - important habitat.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data on tertiary indicators present	Poor	Aesthetics (trash, algae), flow (depth)	D0452	Unable to Determine	N/A	No data available on primary or secondary indicators; limited data on tertiary indicators is too isolated to be used as the basis for a support statement

Watershed: San Francisquito

Waterbody: Bear Gulch **Reach:** SF/BC-3 **Reach Length (miles):** 0.89

Reach Limits (downstream to upstream): Confluence with West Union Creek to Bear Gulch diversion dam **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Bear Gulch **Reach:** SF/BC-4 **Reach Length (miles):** 3.20

Reach Limits (downstream to upstream): Entire Creek above Bear Gulch diversion dam **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage	D0438	Partial Support	B	Probably full support but lacks macroinvertebrate data to make this determination; resident rainbow trout present
				D0466			
				D0617			

Local Knowledge Comments: Steelhead/rainbow trout present from the diversion dam upstream 0.4 miles to natural falls; this reach has some of the best salmonid habitat in the watershed with good summer flow but much is inaccessible to steelhead.

Limiting Factor(s): None Identified

Suspected Cause(s): Cool, relatively abundant summer streamflows. Probably fully supports use.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: The Bear Gulch diversion dam provides water to a municipal drinking water supply owned by California Water Service; this water is blended with other sources and treated prior to being delivered to consumers

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Bear Gulch **Reach:** SF/BC-4 **Reach Length (miles):** 3.20

Reach Limits (downstream to upstream): Entire Creek above Bear Gulch diversion dam **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations; Habitat	D0602 D0617	Full Support	C	Full support due to steelhead habitat and presence

Local Knowledge Comments: Steelhead/rainbow trout present from the diversion dam upstream 0.4 miles to natural falls; this reach has some of the best salmonid habitat in the watershed with good summer flow but much is inaccessible to steelhead.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species.

Fair/Poor Quality Data: Secondary Indicators = habitat requirments for individual special status species, special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data on tertiary indicators present	Poor	Flow (depth)	D0452	Unable to Determine	N/A	No data available on primary or secondary indicators; limited data on tertiary indicators is too isolated to be used as the basis for a support statement

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-1 **Reach Length (miles):** 1.37

Reach Limits (downstream to upstream): Confluence with Bear Gulch/Bear Creek to Huddart Park (confluence with Squealer Gulch) **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Fish assemblage, physical barriers	D0020	Partial Support	B	Pools present during most summers; could be full support but lacks macroinvertebrate data to make this determination; barriers may be a problem during dry winters; portions of reach are intermittent except during very wet years
				D0462			
				D0556			
				D0617			

Local Knowledge Comments: The steelhead passage report assigns low to moderate priority for remediation to the barriers in West Union Creek with the CalTrans bridge apron (#17) at Highway 84 deemed the most important. At this time, CalTrans has no maintenance improvement planned at that site. Steelhead/rainbow trout found throughout this reach during recent surveys (1999-2001); important spawning and rearing habitat in this reach.

Limiting Factor(s): Low summer streamflows; possible barriers

Suspected Cause(s): Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury.

Fair/Poor Quality Data: Primary Indicators = fish assemblage.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	Nitrite, copper, chlorpyrifos, diazinon, selenium, mercury, nickel	D0556	Full Support	D	Questions regarding quality of data, protocols and methods; only one study and one station covering 7 of 16 parameters

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, DDT, dieldrin, dioxin, MTBE, PCB, TDS

Fair/Poor Quality Data: Copper, chlorpyrifos, diazinon, nitrate, selenium, mercury, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-1 **Reach Length (miles):** 1.37

Reach Limits (downstream to upstream): Confluence with Bear Gulch/Bear Creek to Huddart Park (confluence with Squealer Gulch) **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations; Habitat	D0457	Full Support	B	Full support based on steelhead habitat and presence
				D0602			
				D0617			

Local Knowledge Comments: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Access, aesthetics (trash, algae), flow (depth), copper, mercury, nickel	D0452	Full Support on secondary indicator but with high uncertainty due to limited data; Seasonal Support on tertiary indicators (flow and aesthetics); no support statement is able to be made for primary indicator	D	No data sets are available on the primary indicators; limited support statement was developed based ONLY on secondary and tertiary indicators; data sets D0556 on secondary indicator and D0452 on tertiary indicators provided limited data; high level of uncertainty regarding this reach due to lack of data on most water quality parameters; low summer flow may adversely impact recreation value, as may observed pollution problems -- data was not repeated so this could have been a one-time incident
				D0556			

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-1 **Reach Length (miles):** 1.37

Reach Limits (downstream to upstream): Confluence with Bear Gulch/Bear Creek to Huddart Park (confluence with Squealer Gulch) **Flow Regime:** Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments: The San Francisquito Watershed Council is currently corresponding with the San Mateo County Board of Supervisors regarding low flows in West Union Creek.

Limiting Factor(s): Low/discontinuous summer flow; possible pollution problems

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-2 **Reach Length (miles):** 3.09

Reach Limits (downstream to upstream): Entire Watershed above Squealer Gulch **Flow Regime:** Intermittent to Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Fish assemblage, physical barriers	D0020	Partial Support	B	Could be full support but lacks macroinvertebrate data to make this determination; portions of reach intermittent or dry except in the wettest years
				D0438			
				D0462			
				D0466			
				D0617			

Local Knowledge Comments: The steelhead passage report assigns low to moderate priority for remediation to the barriers in West Union Creek with the CalTrans bridge apron (#17) at Highway 84 deemed the most important. At this time, CalTrans has no maintenance improvement planned at that site. Steelhead/rainbow trout found upstream to the falls and 150 feet upstream of the Huddart Park boundary during recent surveys (1999-2001); important spawning and rearing habitat in this reach, GGNRA steelhead surveys are available.

Limiting Factor(s): Low summer streamflows; possible barriers

Suspected Cause(s): Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury.

Fair/Poor Quality Data: Primary Indicators = fish assemblage. Secondary Indicators = nickel, copper.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient but limited	Fair	TDS, turbidity	D0101	Partial Support	D	Very limited data (2 of 16 parameters); some question regarding accuracy of some results leads to high uncertainty

Local Knowledge Comments:

Limiting Factor(s): Data indicate that turbidity exceeds criteria during winter months

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel

Fair/Poor Quality Data: TDS, turbidity

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-2 **Reach Length (miles):** 3.09

Reach Limits (downstream to upstream): Entire Watershed above Squealer Gulch **Flow Regime:** Intermittent to Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Not Sufficient	Fair	Channel cross sections, bank characteristics	D0102	Unable to Determine	N/A	D0102 provides channel cross sections but existing and 100-year flow data is unavailable so existing and design flows cannot be calculated in order to assess the primary indicator

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data on habitat; no data on species presence	Good	Habitat	D0602	Unable to Determine	N/A	Data suggests suitable habitat for steelhead in lower portion of reach; no data on species observation; unable to make a support statement

Local Knowledge Comments: Steelhead/rainbow trout found upstream to the falls and 150 feet upstream of the Huddart Park boundary during recent surveys (1999-2001); important spawning and rearing habitat in this reach, GGNRA steelhead surveys are available.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data on tertiary indicator (aesthetics/access)	Fair	Aesthetics (trash, algae), flow (depth), access	D0102	Seasonal Support for tertiary indicators (flow, access); no support statement is able to be made for primary and secondary indicators	D	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data set D0102 and D0452 provided general flow and accessibility data
				D0452			

Watershed: San Francisquito

Waterbody: West Union Creek **Reach:** SF/WU-2 **Reach Length (miles):** 3.09

Reach Limits (downstream to upstream): Entire Watershed above Squealer Gulch **Flow Regime:** Intermittent to Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments: The San Francisquito Watershed Council is currently corresponding with the San Mateo County Board of Supervisors regarding low flows in West Union Creek.

Limiting Factor(s): Upper portion of reach is dry during low flow season

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Appletree Gulch **Reach:** SF/WU-3 **Reach Length (miles):** 1.23

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient on primary indicator	Fair	Fish assemblage	D0438	Non Support	A	Reach is dry in summer

Local Knowledge Comments: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches.

Limiting Factor(s): Reach is ephemeral

Suspected Cause(s): Naturally small, dry watershed. Winter streamflow only. Limiting factors are primarily natural.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Appletree Gulch **Reach:** SF/WU-3 **Reach Length (miles):** 1.23

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Tripp Gulch **Reach:** SF/WU-4 **Reach Length (miles):** 1.39

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient on primary indicator	Fair	Fish assemblage	D0438	Non Support	A	Reach is dry in summer

Local Knowledge Comments: These findings are an artifact of a methodology that presupposes that all four beneficial uses apply to all reaches.

Limiting Factor(s): Reach is ephemeral

Suspected Cause(s): Naturally small, dry watershed. Winter streamflow only. Limiting factors are primarily natural.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Tripp Gulch **Reach:** SF/WU-4 **Reach Length (miles):** 1.39

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Squealer Gulch **Reach:** SF/WU-5 **Reach Length (miles):** 2.42

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient on primary indicator	Fair	Fish assemblage	D0438	Partial Support	A	Could be full support with macroinvertebrate data though upper part of reach is steep and impassable to steelhead upstream

Local Knowledge Comments: No steelhead/rainbow trout were observed during recent (1999-2001) surveys (only one short field trip)

Limiting Factor(s): Low summer streamflows; natural barriers present in upper part of reach

Suspected Cause(s): Small spring-fed stream, which presently sustains flows throughout year. Suitable for small juvenile steelhead. California giant salamanders present in the steeper, fishless portions of the stream.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: Squealer Gulch **Reach:** SF/WU-5 **Reach Length (miles):** 2.42

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data on habitat; no data on species presence	Good	Habitat	D0602	Unable to Determine	N/A	Data suggests suitable habitat for steelhead in lower portion of reach; no data on species observation; unable to make a support statement
				D0617			

Local Knowledge Comments: No steelhead/rainbow trout were observed during recent (1999-2001) surveys (only one short field trip)

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Fair	Aesthetics (trash, algae), flow (depth)	D0452	Non Support for tertiary indicator (aesthetics); no support statement is able to be made for primary and secondary indicators	B	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator; data set D0452 provided general flow and aesthetics data; flow data indicates likelihood of seasonal support

Local Knowledge Comments:

Limiting Factor(s): Debris located in the stream channel; upper portion of reach has no summer streamflow

Suspected Cause(s): Debris (car body) in stream channel (illegal dumping); streamflow is naturally ephemeral in upper portion of reach.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: McGarvey Gulch **Reach:** SF/WU-6 **Reach Length (miles):** 1.78

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited but sufficient on primary indicator	Fair	Fish assemblage	D0438	Partial Support	C	Reach is intermittent or dry in late summer except in very wet years; natural barriers exist in upper part of reach

Local Knowledge Comments: Steelhead/rainbow trout observed from the West Union Creek confluence 0.3 miles upstream during recent (1999-2001) surveys; important rearing habitat for juvenile steelhead

Limiting Factor(s): Low summer streamflows

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = fish assemblage.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available on either primary or secondary indicators

Watershed: San Francisquito

Waterbody: McGarvey Gulch **Reach:** SF/WU-6 **Reach Length (miles):** 1.78

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral to Intermittent

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data on habitat; no data on species presence	Good	Habitat	D0602	Unable to Determine	N/A	Data suggests suitable habitat for steelhead in lower portion of reach; no data on species observation; unable to make a support statement
				D0617			

Local Knowledge Comments: Steelhead/rainbow trout observed from the West Union Creek confluence 0.3 miles upstream during recent (1999-2001) surveys; important rearing habitat for juvenile steelhead

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Corte Madera Creek **Reach:** SF/CM-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Searsville Lake to Hamms Gulch **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Fish assemblage, streambank erosion potential, macroinvertebrates	D0020	Full Support	C	Macroinverterate data meets criteria; fish presence data is limited within reach, leads to higher uncertainty
				D0556			
				D0614			
				D0624			
				D0625			

Local Knowledge Comments: Steelhead/rainbow trout observed throughout this reach during recent surveys (1999-2001) but are most abundant in upper reach (upstream of Westridge Bridge)

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury.

Fair/Poor Quality Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = copper, nickel.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, nitrite, copper, chlorpyrifos, diazinon, selenium, mercury, nickel	D0101	Non Support	C	Data on 8 of 16 parameters; only two studies with poor QA/QC; generally not able to distinguish between wet and dry weather samples
				D0556			

Local Knowledge Comments:

Limiting Factor(s): Turbidity problems throughout year; TDS exceedances during summer

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, chlordane, DDT, dieldrin, dioxin, MTBE, PCB

Fair/Poor Quality Data: Turbidity, copper, chlorpyrifos, diazinon, nitrate, selenium, mercury, nickel, TDS

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Corte Madera Creek **Reach:** SF/CM-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Searsville Lake to Hamms Gulch **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Not Sufficient for Primary Indicator; Sufficient for Secondary Indicator	Fair	Channel cross sections, historic flooding, erosion detail	D0102	Partial Support	B	(1) D0102 provides channel cross sections but existing and 100-year flow data is unavailable so existing and design flows cannot be calculated in order to assess the primary indicator; the model used in D0555 could be used to evaluate 1% flood capacity of channel but data is not included in report; (2) D0555 and D0614 describe recent flooding events at a specific location in a residential area; no data to indicate flow frequency, but certainly less than 100-year event; (3) conclusions in D0614 regarding erosion and depositional environment within reach likely indicates that the channel can convey large flows without overbank flow except in the specific location described above
				D0555			
				D0614			

Local Knowledge Comments: These issues are part of continuing discussions between the residents and Stanford University.

Limiting Factor(s): Inadequate capacity to convey flows at Cooper's Corner on Family Farm Road overcrossing

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is residential/urban encroachment into stream channel or an undersized stream crossing. Data indicates that the channel can likely convey large flows without overbank flow except in the specific location described above.

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow. Secondary Indicators = historical flooding occurrence information.

Fair/Poor Quality Data: Primary Indicators = design channel capacity.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Limited data on habitat; no data on species presence	Good	Habitat	D0602	Unable to Determine	N/A	Data suggests suitable habitat for rainbow trout; no data on species observation; unable to make a support statement

Local Knowledge Comments: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Corte Madera Creek **Reach:** SF/CM-1 **Reach Length (miles):** 3.97

Reach Limits (downstream to upstream): Searsville Lake to Hamms Gulch **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Transition

REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Aesthetics (trash, algae), nickel, mercury, copper	D0102	Full Support on secondary indicators	D	No data sets are available on primary indicators; D0556 indicates support on secondary indicators but with high uncertainty due to lack of many parameters; other data on tertiary indicator is inconclusive
				D0556			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Sausal Creek **Reach:** SF/SC-1 **Reach Length (miles):** 2.72

Reach Limits (downstream to upstream): Terminus near wetlands above Searsville Lake to source **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Sausal Creek **Reach:** SF/SC-1 **Reach Length (miles):** 2.72

Reach Limits (downstream to upstream): Terminus near wetlands above Searsville Lake to source **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	None on primary indicators; sufficient on secondary indicators	Good	Historic flooding; erosion detail	D0555	Partial Support	B	(1) No data available on primary indicators; (2) D0555 and D0614 describe recent flooding at one location at lower end of reach; unclear what flow level this corresponds to, certainly less than 100-year event; (3) D0614 characterizes upper portion of reach as being deeply incised and eroding; from this, it is concluded that the reach can likely convey the 1% flow without overbank flooding (4) section that drains into large willow swamp at the upstream end of the Searsville Lake could cause floodwaters to backup through the creek over to Portola Road; This general conclusion was made based on data set D0640 from the USGS topographic map for the Searsville Lake area and the observation made by Anne Resenthal during the flood event on 2/6/98 (Palo Alto Weekly, Feb. 18, 1998).
				D0614			
				D0640			

Local Knowledge Comments: These issues are part of continuing discussions between the residents and Stanford University.

Limiting Factor(s): Inadequate capacity to convey flows at Family Farm Road overcrossing

Suspected Cause(s): Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is residential/urban encroachment into stream channel or an undersized stream crossing; the lower end of this reach drains into a large willow swamp at the upstream end of Searsville Lake, which could cause floodwaters to back up through the creek over to Portola Road. Data indicates that the channel can likely convey large flows without overbank flow except in the specific location described above.

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Sausal Creek **Reach:** SF/SC-1 **Reach Length (miles):** 2.72

Reach Limits (downstream to upstream): Terminus near wetlands above Searsville Lake to source **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Dennis Martin Creek **Reach:** SF/SC-2 **Reach Length (miles):** 1.48

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Dennis Martin Creek **Reach:** SF/SC-2 **Reach Length (miles):** 1.48

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	None on primary indicators; qualitative description on secondary indicator	Good	Erosion detail	D0614	Partial Support	C	(1) No data available on primary indicators; (2) D0614 describes reach as incised and sediment producing; is therefore likely to convey high flows such as the 1% (3) section that drains into large willow swamp at the upstream end of the Searsville Lake could cause floodwaters to backup through the creek over to Portola Road; This general conclusion was made based on data set D0640 from the USGS topographic map for the Searsville Lake area and the observation made by Anne Resenthal during the flood event on 2/6/98 (Palo Alto Weekly, Feb. 18, 1998).
				D0640			

Local Knowledge Comments:

Limiting Factor(s): Inadequate capacity to convey flows

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historical flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Watershed: San Francisquito

Waterbody: Dennis Martin Creek **Reach:** SF/SC-2 **Reach Length (miles):** 1.48

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Ephemeral

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-1 **Reach Length (miles):** 3.60

Reach Limits (downstream to upstream): San Francisquito Creek confluence to confluence with Buckeye Creek in Palo Alto **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Fair	Fish assemblage, flow, temperature, physical barriers, riparian vegetation, channel substrate, width/depth, instream spawning habitat, shaded habitat, depth, macroinvertebrates, dissolved oxygen, turbidity	D0020	Full Support	B	Macroinvertebrate data supports at 3 sites during a very wet year (1998); steelhead are regularly present; low summer streamflows may affect support level during some years
				D0036			
				D0041			
				D0311			
				D0312			
				D0315			
				D0413			
				D0438			
				D0461			
				D0466			
				D0556			
				D0578			
				D0582			
				D0618			
				D0624			
				D0625			

Local Knowledge Comments: Steelhead/rainbow trout found throughout this reach during recent surveys (1999-2001); good spawning and rearing habitat for steelhead; diversion dam limits flow downstream and migration upstream.

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage. Secondary Indicators = TSS, turbidity, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Secondary Indicators = dissolved oxygen, shaded riverine aquatic habitat, riparian vegetation.

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-1 **Reach Length (miles):** 3.60

Reach Limits (downstream to upstream): San Francisquito Creek confluence to confluence with Buckeye Creek in Palo Alto **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	Sufficient	Fair	TDS, turbidity, nitrite, copper, chlorpyrifos, diazinon, selenium, mercury, nickel, nitrate	D0101	Non Support	B	Data on 11 of 16 parameters; questionable data quality in some cases; generally not able to distinguish between wet and dry weather samples; good quality sampling in 1994 and 95 but no other years for that data set
				D0233			
				D0556			
				D0578			
				D0582			

Local Knowledge Comments: Stanford University uses water from Los Trancos for irrigation and groundwater recharge for non-potable supply wells

Limiting Factor(s): TDS in summer; turbidity in winter

Suspected Cause(s): High TDS possibly due to groundwater sources to streams during summer. High turbidity possibly due to local geologic conditions (faulting), which contribute to increased erosion during wet weather.

Data Gap(s) - No Data: Fecal coliform, chlordane, DDT, dieldrin, dioxin, MTBE, PCB, TDS

Fair/Poor Quality Data: Turbidity, copper, chlorpyrifos, diazinon, nitrate, selenium, mercury, nickel

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0102	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0380			
				D0559			
				D0586			
				D0587			
				D0589			
				D0609			

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-1 **Reach Length (miles):** 3.60

Reach Limits (downstream to upstream): San Francisquito Creek confluence to confluence with Buckeye Creek in Palo Alto **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow.

Fair/Poor Quality Data: Secondary Indicators = historical flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0041	Full Support	A	Full support based on western leatherwood and steelhead and/or rainbow trout presence.
				D0101			
				D0111			
				D0413			
				D0602			
				D0609			
				D0618			
				D0620			

Local Knowledge Comments: Potential presence of western pond turtle in mid-watershed reaches; steelhead observed during recent surveys

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Aesthetics (trash, algae), flow (depth), access, copper, mercury, nickel	D0102	Full Support on secondary indicators	D	No data sets are available on primary indicators; D0556 indicates support on secondary indicators but with high uncertainty due to lack of many parameters; other data on tertiary indicators indicates that access is good, but aesthetics are poor and flow is marginal to support recreation

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-1 **Reach Length (miles):** 3.60

Reach Limits (downstream to upstream): San Francisquito Creek confluence to confluence with Buckeye Creek in Palo Alto **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

REC-1	No data on primary indicator; limited data on secondary indicator (3 of 9 parameters); data on tertiary indicators present	Fair	Aesthetics (trash, algae), flow (depth), access, copper, mercury, nickel	D0383	Full Support on secondary indicators	D	No data sets are available on primary indicators; D0556 indicates support on secondary indicators but with high uncertainty due to lack of many parameters; other data on tertiary indicators indicates that access is good, but aesthetics are poor and flow is marginal to support recreation
				D0413			
				D0452			
				D0463			
				D0556			
				D0618			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-2 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek above confluence with Buckeye Creek in Palo Alto **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited data on fish assemblage and macroinvertebrate; additional secondary indicators	Fair	Fish assemblage, riparian vegetation, physical barriers, flow, channel substrate, width/depth, instream spawning habitat, shaded habitat, depth, macroinvertebrates	D0041	Non Support	D	Pools present in lower portion of reach during most summers; fish assemblage data is too old to rely upon though there may be steelhead and rainbow trout in headwaters of reach; no indicator macroinvertebrates were present during limited sampling; support statement based on lack of macroinvertebrates, but high uncertainty
				D0311			
				D0312			
				D0315			
				D0413			
				D0466			
				D0625			

Local Knowledge Comments: Steelhead/rainbow trout found from the confluence of Buckeye Creek upstream for 0.7 miles during recent surveys (1999-2001); the lower part of this reach becomes dry but pools remain in the upper reach; steelhead/rainbow trout also observed 150 feet upstream of the PV Ranch Tributary

Limiting Factor(s): Reach is ephemeral except in steeper upstream portion

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream rearing habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = instream spawning habitat, shaded riverine aquatic habitat.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-2 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek above confluence with Buckeye Creek in Palo Alto **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0380	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0559			
				D0586			
				D0587			
				D0589			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity.

Fair/Poor Quality Data: Secondary Indicators = historical flooding occurrence information.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Good	Special status species observations	D0041	Full Support	B	Full support for western leather wood and steelhead trout, however 1985 study noted that fish were in poor condition
				D0111			
				D0413			
				D0609			
				D0620			

Local Knowledge Comments: Steelhead/rainbow trout found from the confluence of Buckeye Creek upstream for 0.7 miles during recent surveys (1999-2001); the lower part of this reach becomes dry but pools remain in the upper reach; steelhead/rainbow trout also observed 150 feet upstream of the PV Ranch Tributary

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Los Trancos Creek **Reach:** SF/LT-2 **Reach Length (miles):** 3.12

Reach Limits (downstream to upstream): Entire Creek above confluence with Buckeye Creek in Palo Alto **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; insufficient data on tertiary indicator (aesthetics/access)	Poor	Flow (depth)	D0413	Unable to Determine	N/A	No data available on primary or secondary indicators; limited data on tertiary indicators is too isolated to be used as the basis for a support statement
				D0618			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Watershed: San Francisquito

Waterbody: Buckeye Creek **Reach:** SF/LT-3 **Reach Length (miles):** 2.99

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary or secondary indicators

Local Knowledge Comments: Steelhead/rainbow trout observed from the Los Trancos Creek confluence upstream to the Los Trancos Road culvert during recent surveys (1999-2001); juvenile steelhead in the reach downstream of the culvert; unable to check upstream of Los Trancos Road (private property)

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Buckeye Creek **Reach:** SF/LT-3 **Reach Length (miles):** 2.99

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

PFF	Sufficient	Good	Channel capacity, design flow	D0643	Non Support	B	Stakeholder comment: There has been historical flood and erosion damage along Buckeye Creek through the City of Palo Alto's Foothills Park; Personal communication with SCVWD on March 13, 2002: The creek flows though an 18' culvert outside the park boundary at Los Trancos Woods Road, which is unlikely to have enough flow capacity for large storm events such as the 100-year flood event; Historical evidence has suggested that the road section at this location has flooded many times during large storm events.

Local Knowledge Comments: The 18-inch culvert with flooding problems is located outside the boundary of Foothill Park (beneath Los Trancos Woods Road)

Limiting Factor(s): Culvert at Los Trancos Woods Road is likely undersized

Suspected Cause(s): Stakeholder comment: There has been historical flood and erosion damage along Buckeye Creek through the City of Palo Alto's Foothills Park; Personal communication with SCVWD on March 13, 2002: The creek flows though an 18' culvert outside the park boundary at Los Trancos Woods Road, which is unlikely to have enough flow capacity for large storm events such as the 100-year flood event; Historical evidence has suggested that the road section at this location has flooded many times during large storm events.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	None	N/A	N/A	No Data Sets	Unable to Determine	N/A	No data available

Local Knowledge Comments: Steelhead/rainbow trout observed from the Los Trancos Creek confluence upstream to the Los Trancos Road culvert during recent surveys (1999-2001); juvenile steelhead in the reach downstream of the culvert; unable to check upstream of Los Trancos Road (private property)

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Watershed: San Francisquito

Waterbody: Buckeye Creek **Reach:** SF/LT-3 **Reach Length (miles):** 2.99

Reach Limits (downstream to upstream): Entire Creek **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Transition

REC-1	No data on primary or secondary indicators; insufficient data on tertiary indicator (aesthetics/access)	Fair	Flow (depth)	D0618	Unable to Determine	N/A	No data available on primary or secondary indicators; limited data on tertiary indicators is too general and qualititative to be used as the basis for a support statement

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Appendix 5-B
Reaches with Insufficient Data for All Uses

San Francisquito Watershed

Reach	Waterbody	Reach Limits (downstream to upstream)
SF/SL-1	Westridge Creek	Entire Creek (tributary to Searsville Lake)
SF/CM-2	Corte Madera Creek	Entire Creek above Hamms Gulch
SF/CM-3	Hamms Gulch	Entire Creek
SF/CM-4	Jones Gulch	Entire Creek
SF/CM-5	Damiani Creek	Entire Creek
SF/CM-6	Rengstorff Gulch	Entire Creek
SF/CM-7	Coal Creek	Entire Creek
SF/AC-1	Alambique Creek	Terminus near wetlands above Searsville Lake to source
SF/SC-3	Bull Run Gulch	Entire Creek
SF/SC-4	Neils Gulch	Entire Creek
SF/SC-5	Bozzo Gulch	Entire Creek
SF/FL-1	Return channel from Felt Lake	Entire Channel
SF/FL	Felt Lake	Entire Reservoir
SF/FL-2	Felt Lake Diversion Channel	Entire Channel

Appendix 5-C
Data Sets Used in Assessment

Appendix 5-C contains a list of every data set that was ultimately used in developing the assessment conclusions in Appendix 5-B. Readers interested in knowing what data sets were used for a specific reach/use evaluation should first locate the reach and use of interest in the reach summary tables in Appendix 5-B. The data set identification numbers listed in those tables can be cross-referenced to the data set identification numbers in this appendix. Information about each data set (title, source, date) is presented in this appendix. This information is extracted from the metadata data base developed to support the WMI assessments.

Appendix 5-C
Data Sources used in Assessment
San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0020	Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage	California Department of Fish and Game	Determined the distribution and ecology of fishes in 457 sampling sites on 175 streams of the San Francisco Bay drainage	19841000	19810511 to 19811010
D0036	San Francisquito Creek Streamflow Measurements and Fish Sampling Activities	California Department of Fish and Game	Report Streamflow measurements and Fish Sampling Activities	N/A	19740703 to 19740715
D0038	San Francisquito Creek Stream Survey (Bear Creek Trib.)	California Department of Fish and Game	Assess stream habitat	N/A	19760624
D0039	San Francisquito Creek Stream Survey	California Department of Fish and Game	Assess stream habitat	N/A	19760701, 19760702, and 19760705
D0040	San Francisquito Creek Fish Sampling	California Department of Fish and Game	Fish Population Sampling	N/A	19760713 to 19760705
D0041	Los Trancos Creek Sampling	California Department of Fish and Game	Notification of Fish Ladder success in Los Trancos Creek	N/A	19780612, 197806113, 19780629
D0042	San Francisquito Creek Stream Survey	California Department of Fish and Game	Habitat survey of San Francisquito Creek	N/A	19810630
D0101	San Francisquito Creek Pilot Volunteer Monitoring Project	Coyote Creek Riparian Station	Study report	19981001	10/92-10/93
D0102	Coyote Creek Riparian Station Stream Inventory Data, 1993-1998/Citizen's Water Quality Monitoring of Urban Creeks	Coyote Creek Riparian Station/Theresa Rigney	Stream inventory data, 1993-1998/Master's Thesis	1999/19931201	1993-1998/10/92-10/93
D0103	San Francisquito Creek Volunteer Habitat Surveys	Coyote Creek Riparian Station	Study report	19981001	19930600-19941000
D0104	San Francisquito Creek Habitat Project	Jill Bernhard	Summary of findings	19990131	1998101 to 19981031
D0106	Volunteer Watershed Monitoring Online Database, Bird Report	San Francisco Estuary Institute (web page)	identify birds utilizing San Francisquito Creek habitat	after 199609	19930713-19960930

San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0111	California Natural Diversity Data Base	California Department of Fish and Game	provide current information on California's most imperiled elements of natural diversity	19981003	? - 19981003
D0112	UC Berkeley Museum of Vertebrate Zoology bird collections from Santa Clara County	University of California at Berkeley Museum of Vertebrate Zoology	list of bird collections at the MVZ from Santa Clara County	19990203	18630315-19790121
D0216	Reconnaissance Investigation Report of San Francisquito Creek	San Francisquito Creek Watershed Coordinated Resource Management and Planning (CRMP) Group	Historical summary of floodplain management proposals that have been made for the San Francisquito Creek & surrounding watershed.	199803	
D0233	Palo Alto Stream Monitoring	City of Palo Alto	To identify trends in levels of metals in creeks during rainy season		
D0311	EIR Creek Land Use Buffer (crkslu)	SANTA CLARA VALLEY WATER DISTRICT	To establish a map of land use adjacent to the creeks within SCVWD. For a number of different planning functions,including environmental quality analysis, hazard impact work and EIR Routine Maintenance GIS projects.	N/A	N/A
D0312	Dams	Santa Clara Valley Water District	Establish a basemap of all the dams in Santa Clara Valley Water District.	19960700	N/A
D0315	Reservoirs	Santa Clara Valley Water District	Establish a basemap of all reservoirs in Santa Clara County.	19960400	N/A
D0321	FEMA Flooding Areas	Santa Clara Valley Water District	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19960500	N/A
D0322	SCVWD Flooding Area	SANTA CLARA VALLEY WATER DISTRICT	To delineate the boundary of the 1% flood zone for planning purposes.	N/A	N/A
D0323	Historical Flooding	SANTA CLARA VALLEY WATER DISTRICT	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19971100	N/A
D0324	Historical Flooding-Points	SANTA CLARA VALLEY WATER DISTRICT	This shapefile shows locations of overbank flooding from 1978-1997.	N/A	N/A

San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0325	Areas Now Protected	SANTA CLARA VALLEY WATER DISTRICT	This shape shows areas now protected from a 1% flood event.	N/A	N/A
D0326	Fema Panels	Santa Clara Valley Water District	This data is a dissolve on the fema Q3 data on firm panel.	19960500	N/A
D0380	Geo-hydro (WWMM)	Santa Clara Valley Water District	Adapt SCVWD Waterways Management Modle data to GIS creek system	1997	
D0383	Outfall Locations	Santa Clara Valley Water District	Outfalls into creek system		
D0413	Stream survey of Los Trancos Creek	California Department of Fish and Game	estimate of fisheries value and wildlife habitat		19760713-19760715 & 1976 0730 (memo date)
D0451	San Francisquito Creek Fishery Survey	California Department of Fish and Game	Characterize the habitat of the San Francisquito Watershed as it relates to fisheries		19740700 to 19780600
D0452	Field Observations and Photos of San Francisquito Watershed	California Department of Fish and Game	Document habitat of San Francisquito Watershed		19880311 to 19950300
D0455	Hydrologic Engineering Design for Channel Stabilization and Habitat Enhancement of San Francisquito Creek @ Bend Downstream of Alma St. Menlo Park/Palo Alto, CA	California Department of Fish and Game	Presents a design for bank stabilization and channel restoration	19950720	
D0457	A Brief Summary of Salmonid Observations on West Union Creek and Bear Gulch, Woodside, California 1992-1996	California Department of Fish and Game	A Brief Summary of Salmonid Observations on West Union Creek and Bear Gulch, Woodside, California		1992-1996
D0459	San Francisquito Creek Survey Summary 1993-1994	California Department of Fish and Game	Summarize San Francisquito Creek survey findings		1993-1994
D0461	Biological Assessment of San Francisquito Creek Watershed to document status of steelheadtrout prior to removal of barriers to migration	California Department of Fish and Game	Document status of steelhead trout prior to removal of barriers to migration		19921000 to 19951000
D0462	Letter from Jim Johnson Regarding Fish Barriers on San Francisquito Creek	California Department of Fish and Game	Discusses Fish Barriers on San Francisquito Creek		
D0463	San Francisquito Creek Streamflow Measurements	California Department of Fish and Game	Present streamflow measurements and fish data from San Francisquito Creek		
D0464	Riparian Study Proposal fro San Francisquito Creek	California Department of Fish and Game	Proposal for new riparian study along San Francisquito Creek		

San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0465	Maps of San Francisquito Creek Drainage System	California Department of Fish and Game	Maps of San Francisquito Creek Drainage System		
D0466	Field Notes and Fish Sampling Data	California Department of Fish and Game	Present Field Notes and Fish Sampling Data		
D0554	Assessment of San Francisquito Creek; Volume 1 or 3: Final Report: Excerpts	Stanford Linear Accelerator Center	Evaluation of whether environmental releases of contaminants have affected soil and water quality in San Francisquito Creek.	199501	N/A
D0555	Sedimentation and Channel Dynamics of the Searsville Lake Watershed and Jasper Ridge Biological Preserve, San Mateo County, California	Stanford University, Jasper Ridge Biological Preserve	Hydrologic study to assess sedimentation of Searsville Lake and tributary streams in the Jasper Ridege Biological Preserve and vicinity.	199606	Bathymetry 19950925-19950927; Elevations 199602; Stream Gaging 1995-1996 (Winter); Sediment 19951211 - 19960331; Conductance 19950831-19960418
D0556	Sampling and Analysis of Water from the San Francisquito Creek Watershed: 1997-1998	San Francisquito Creek CRMP	Summary of Sampling and analysis program of water from the San Francisquito Creek Watershed	19990324	199710 - 199806
D0559	Waterways Management Model Data for Three WMI Pilot Watersheds	Santa Clara Valley Water District	Stream Data for Three watershed	2000	
D0578	Distribution and Abundance of Stream Insects as a Measure of Water Quailty in a Northern California Stream	San Jose State University	Examines the relationship between the macroinvertebrate fauna present in San Francisquito Creek and land use adjacent to the stream	199505	199305-199406
D0582	Volunteer Water Quailty Monitoring of Urban Creeks: Draft	Santa Clara Valley Water District	To determine if citizens could provide credible data on water quality parameters using simple water test kits.	199312	199210-199308
D0583	After the Flood Waters Receded: Assessing the Economic Impacts of San Francisquito Creek's February 1998 Flooding	Santa Clara Valley Water District	Identify and quantify the main economic impacts of the flooding on residents, businesses and organizations and municipalities in these three cities.	199903	Winter 1997-1998 and 1998
D0586	A Creek Runs Through It: The Story of San Francisquito (2 Video Cassettes)	Santa Clara Valley Water District	Video	Unknown	

San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0587	SCVWD Public Meeting San Francisquito Creek Flooding (2 Video Cassettes)	Santa Clara Valley Water District	Video	Unknown	
D0589	Aerial View of County Wide Flooding (2 Video Cassettes)	Santa Clara Valley Water District	Video	19830124	
D0602	Searsville Lake Sediment Impact Study	San Francisquito Creek JPA	Evaluate the downstream consequences of the natural filling of Searsville Lake and the proposed lowering of Searsville Dam to address upstream flooding problems	20010627	
D0609	Revised SMP Appendix E, Santa Clara Valley Water District Stream Maintenance Program, Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities	SANTA CLARA VALLEY WATER DISTRICT	Programmatic impact assessment and mitigation for routine bank protection activities	20010801	1988-2001
D0612	Assessment of Water Quality in Urban and Rural Stormwater Runoff	Kristen Collen Sipes	Thesis		
D0614	Geomorhic Study of Searsville Lake Watershed, Portola Valley, California	Caroline Frey	Thesis		
D0615	Joint Stromwater Agency Project to Study Urban Sources of Mercury and PCBs	Kinnetic Laboratories Inc.	Study to determine urban sources of mercury and PCBs.		
D0616	Microsatellite Analyses of San Francisquito Creek Rainbow Trout	Jennifer Nielson	This data support the implementation of management and conservation programs for rainbow trout in the San Fracisqutio Creek drainage as part of the central Califronia coastal steelhead ESU.		
D0617	Adult Steelhead Passage in the Bear Creek Watershed	Jerry J. Smith, SJSU	To investigate the actual conditions in the stream channel I terms of any structures, manmade or natural, that might serve as a barrier to migrating steelhead trout.		
D0618	Fishes and Amphibians of the San Francisquito Creek and Matadero Creek Watersheds, Stanford University: Report on 1998 & 1999 Field Activities	Center for Conservation Biology: Stanford University	Assess the conditions and distribution of key biotic resources within the San Francisquito Creek watershed.		
D0620	San Francisquito Creek Bank Stabilization and Revegetation Master Plan Report/Existing Conditions Report	City of Menlo Park	Assist agencies and landowners' consultants in the planning, conceptual design and permitting of San Francisquito Creek stabilization and revegetation projects.		

San Francisquito Watershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0621	SCVWD Stream Maintenance Criteria and Gudelines	SCVWD	Developes a tracking system for the maintenance activittes of three pilot watersheds.		
D0624	Leidy Fish Data -EPA- http://sfeidev.stgeorgeconsulting.com/about.html	EPA	Fish population data		
D0625	USGS Spreadsheet Macroinvertebrate Data	Jim Carter and Steve Fend	Santa Clara Valley macroinvertebrate data		
D0638	Streams and Floods, Santa Clara Valley Water District (SCVWD)	SCVWD	flood management policy and planning		
D0640	At the sourece of San Franaicquito Creek	Anne Rosenthal	Flood data		

Volume Two
Watershed Assessment Report

Chapter 6
Assessment of Upper Penitencia Subwatershed

SANTA CLARA BASIN
WMI
WATERSHED
MANAGEMENT INITIATIVE

Prepared for the
Santa Clara Basin Watershed Management Initiative

by

Report Preparation Team

February 2003

Watershed Assessment Report
Chapter 6: Assessment of Upper Penitencia Subwatershed

List of Authors

REPORT PREPARATION TEAM

Sarah Young, Santa Clara Valley Water District
Richard McMurtry, Regional Water Quality Control Board
Michael Stanley-Jones, Silicon Valley Toxics Coalition
Alice Ringer, WMI Coordinator

with consultant support from

URS

Rob Carnachan, Senior Water Resources Scientist
Suzanne Loadholt, Soil Scientist
Raul Farre, Staff Scientist
Sandy Davidson, Database Manager
Terry Cooke, MUN and REC-1 Assessment Team
Usha Vedigiri, MUN and REC-1 Assessment Team
Phil Mineart, PFF Assessment Team
Senarath Ekanayake, PFF Assessment Team
Francesca Demgen, RARE Assessment Team
Jon Stead, COLD and RARE Assessment Team

And

Entrix, Inc.

Jerry Smith, San Jose State University, COLD Assessment Team

Funded by:
CALFED Bay-Delta Program

February 2003

Chapter 6
Table of Contents

Tables

Chapter 6 Appendices

Chapter 6
Assessment of Upper Penitencia Subwatershed

6.1 General Overview and Setting

The Upper Penitencia Creek subwatershed comprises a portion of the larger Coyote Creek watershed, draining the Diablo Range in the northeast portion of San Jose. Upper Penitencia Creek drains the west-facing slopes of the Diablo Range and has a total drainage area of approximately 24 square miles. The creek has two named tributaries, each of which is described in Section 6.1.1.

There is one reservoir in the Upper Penitencia Creek subwatershed, Cherry Flat Reservoir, that was built for water conservation and livestock watering purposes, but can provide some minor flood control benefit depending on the available water storage capacity.

The western portion of the watershed is located on the San Francisco Bay plain and is heavily urbanized. The eastern portion of the watershed is largely comprised of steep-sided mountains and deep canyons. The tributary headwaters of the watershed are located on the western slope of Poverty Ridge in the Diablo Range at an approximate elevation of 3,150 feet. This section of the watershed is largely undeveloped open space used for cattle grazing, though some rural residential development is scattered across the area.

6.1.1 Waterbodies in the Watershed

This section provides a general description of each of the four waterbodies in the Upper Penitencia Creek subwatershed. A more extensive discussion of the natural characteristics of the Santa Clara Basin in general is contained in Chapter 7 of the Watershed Characteristics Report (Volume One). The descriptions in this section are, in part, based on the information in the Watershed Characteristics Report.[1] These brief descriptions are included here in order to place the pilot assessment results in context and are not meant to provide the definitive characterization of each stream or reservoir. Additional detail concerning stream channel characteristics and riparian vegetation may be found in the individual stream assessment result discussions in Section 6.3.

[1] Because the Watershed Characteristics Report (WCR) itself contains voluminous references to various sources, sections of this chapter that contain information from the WCR are cited with the notation (Santa Clara Basin WMI, 2001). Readers are directed to the references in Chapter 7: Natural Setting of the WCR to determine the original source of the information.

6.1.1.1 Upper Penitencia Creek Subwatershed

Upper Penitencia Creek joins Coyote Creek about 10 miles upstream of San Francisco Bay, near the Berryessa Road bridge. The creek is approximately 11 miles long from its headwaters to the confluence with Coyote Creek. The upper watershed, upstream of Dorel Drive, occupies about 21 square miles and includes Upper Penitencia Creek and its principal tributary, Arroyo Aguague. The topography is rugged; the slopes are steep and the canyons are deep and narrow, with little or no flat land along their bottoms. The elevation of the upper watershed ranges from over 3,000 feet to 280 feet at Dorel Drive near the base of the mountains. A small reservoir, Cherry Flat Reservoir, is located on the creek in the upper portion of the watershed. The central part of the creek flows through the middle of Alum Rock Park in San Jose. A waterfall is located on the stream just inside the park boundary. After leaving the Los Buellis Hills, the front portion of the Diablo Range, Upper Penitencia Creek flows westward across the alluvial plain for a distance of about 3.5 miles before joining Coyote Creek.[2] The elevation at the junction of Upper Penitencia and Coyote Creeks is 80 feet. A small tributary, Dutard Creek, joins Upper Penitencia Creek from the northeast in the reach below Alum Rock Park (Santa Clara Basin WMI, 2001).

Below Alum Rock Park, Upper Penitencia Creek has been subject to considerable modification. Percolation ponds operated by the Water District adjacent to the stream channel siphon off a portion of the creek's streamflow during part of the year. Flood control projects, passage barriers, and other channel modifications have significantly altered riparian and aquatic habitats along Upper Penitencia Creek.

Due to the watershed's topography, flooding has long been associated with Upper Penitencia Creek. Rainfall occurs mainly during the winter and is generally heavier at higher elevations in the Diablo Range than on the floor of the Bay plain. The steep slopes of the mountains swiftly convey the water in rain-swollen tributaries to the Bay plain where the waters historically spread out across a much larger floodplain. Today, most of this floodplain has been covered with urban and residential development and the creek channel itself has been modified to provide flood protection. Nonetheless, major flood incidents have occurred in the past, most recently during the winters of 1980, 1982, 1983, and 1995. Near the lower end of the creek, the flooding of Coyote Creek (which drains a much larger area) is normally of a larger magnitude than that of Upper Penitencia Creek.

Much of the riparian habitat along Upper Penitencia Creek has been preserved (interrupted in only a few places), and the creek represents one of the few remaining contiguous riparian corridors connecting the Diablo Range to Coyote Creek (Santa Clara Basin WMI, 2001).

[2] Upper Penitencia Creek was diverted along Berryessa Road into Coyote Creek by farmers in 1875, separating Upper Penitencia Creek from Lower Penitencia Creek.

Arroyo Aguague

Arroyo Aguague is the principal tributary to Upper Penitencia Creek, joining it in the upper (eastern) portion of Alum Rock Park. Arroyo Aguague is a perennial stream confined within a steep canyon trending north-northwest. Conditions are very similar to the upper reaches of Upper Penitencia Creek. A waterfall is located on the stream just inside the park boundary. Moving upstream along Arroyo Aguague, the stream bifurcates into numerous unnamed tributaries, some of which are fed by springs. This area is largely undeveloped open space used for livestock grazing, with some scattered residential development. Access to this area is mostly via private ranch roads.

Dutard Creek

Dutard Creek is a small, ephemeral tributary to Upper Penitencia Creek, joining it from the north just below Alum Rock Park. Dutard Creek drains a small area along the front of the Los Buellis Hills just north of Alum Rock Canyon. Dutard Creek flows southwest adjacent to a residential subdivision, then turns due south as it approaches Upper Penitencia Creek. This lower part of the stream also passes through residential development.

Cherry Flat Reservoir

Cherry Flat Reservoir is located on Upper Penitencia Creek upstream from Alum Rock Park and the confluence with Arroyo Aguague at an elevation of 1,700 feet. It is the only reservoir in the Upper Penitencia Creek subwatershed. Cherry Flat Reservoir was constructed in 1932 as a means of solving the constant problem of reoccurring floods and drought in Alum Rock Park. Cherry Flat Reservoir has a storage capacity of 500 acre-feet, a surface area of 25 acres, and is impounded by a 60 foot-high earthen dam. The City of San Jose owns and operates the reservoir (Santa Clara Basin WMI, 2001).

The upper part of the drainage area above Cherry Flat Reservoir is located along the crest of the Diablo Range and is largely undeveloped open space used for livestock grazing and ranching. Only 2.41 square miles of drainage on Upper Penitencia Creek are located above the reservoir. The land adjacent to the reservoir is private and not open to public access.

6.1.2 Current Beneficial Use Designations for Watershed Waterbodies

The San Francisco Bay Regional Water Quality Control Board (Regional Board) has designated waterbodies for specific beneficial uses in the Water Quality Control Plan (Basin Plan) for the region. Four of these uses were evaluated by the WMI in the pilot watershed assessments. Prior to the assessments, WMI stakeholders identified some corrections and potential changes to the beneficial use designations in the Basin Plan. These recommendations were based on stakeholder understanding of stream and watershed characteristics. After the pilot assessments were completed, both the existing use designations and the initial WMI stakeholder recommendations for revisions to these designations were reviewed against the assessment results in order to identify any additional revisions that should be highlighted. Table 6-1 presents the findings of this analysis. Basin Plan beneficial use designations for the four uses evaluated in the pilot assessment are shown, as are the additional use designations recommended by WMI stakeholders prior to the assessment and potential changes to these designations based on the pilot assessment results. Blanks indicate that no designations have been made or proposed. No column is shown for the Protection from Flooding (PFF) interest as it is not a beneficial use identified by the Regional Board.

Table 6-1
Beneficial Use Designations in the Upper Penitencia Creek Subwatershed

WATERBODY	***BENEFICIAL USE***			
	Cold Freshwater Habitat (COLD)	***Municipal and Domestic Supply (MUN)***	***Preservation of Rare and Endangered Species (RARE)***	***Water Contact Recreation (REC-1)***
Upper Penitencia Creek	WE		WE	
Arroyo Aguague				
Dutard Creek				
Cherry Flat Reservoir		E		L

Legend: E = Existing Beneficial Use; L = Limited Beneficial Use; WE = WMI stakeholder pre-assessment recommendation for existing beneficial use designation.
Note: Waterbodies in italics are not listed in the Basin Plan.
Source: San Francisco Bay Regional Water Quality Control Board, 1995. San Francisco Regional Water Quality Control Plan, Table 2-5.

The results of the pilot assessment confirmed the pre-assessment recommendations of WMI stakeholders regarding beneficial use designations for Upper Penitencia Creek subwatershed waterbodies. Only in two cases did the available data provide an indication that an additional use designation may be appropriate: water contact recreation (REC-1) in both Upper Penitencia Creek and Arroyo Aguague within Alum Rock Park. However, data was not available on the full suite of use support indicators for REC-1, so no new designation recommendations are being made at this time. It is recommended that additional focused data collection and review be conducted before any new use designations are proposed and adopted.

Upper Penitencia Creek possesses diverse characteristics and supports different beneficial uses in different locations. As a result, the Basin Plan beneficial use designations should either reflect this diversity by applying only to specific sections of the stream or should be coupled with an understanding that the entire length of the stream will not provide the same level of support for the designated use (Santa Clara Basin WMI, 2001).

6.1.3 Stream Segmentation for Assessment

In order to organize the review of data during the pilot assessment, the Upper Penitencia Creek subwatershed was divided into a total of eight stream segments (or reaches). Five of the segments comprise Upper Penitencia Creek while the remaining three consist of individual tributary streams and Cherry Flat Reservoir. Upper Penitencia Creek was divided into multiple segments in order to facilitate data evaluation. Stream reaches were delineated based on common channel type, flow regime, and adjacent land use. It should be noted that the segmentation approach used for the pilot assessment was consistent with and useful for the robustness of the available data but is not based on a detailed study of stream geomorphology or riparian zone condition. The reach of Upper Penitencia Creek extending from the North Jackson Avenue bridge upstream to the Alum Rock Park boundary, for example, possesses different streamflow characteristics in different places. WMI stakeholders have also noted that a few stream reaches in the other pilot watersheds are comprised of individual segments that are quite dissimilar in a number of significant ways. Additional detail on the stream segmentation approach used for the pilot assessments may be found in Section 3._ and in Appendix A.

The stream segments defined for the Upper Penitencia Creek subwatershed are shown on Figure 2-4. Upper Penitencia Creek itself accounts for five reaches (UP-1 through UP-5). Arroyo Aguague and Dutard Creek comprise reaches UP-6 and UP-7, respectively, while Cherry Flat Reservoir is designated as reach UP/CF.

6.2 General Assessment Results

The methodology and approach used for the pilot assessments is described in Chapter 3. The remainder of this chapter presents and interprets the results of the pilot assessment for the Upper Penitencia Creek subwatershed. For additional detail concerning the results of the pilot assessments, please see the following:

- Figure 2-4 for a map illustrating the assessment results for the Upper Penitencia Creek subwatershed
- Appendix 6-A, Tables 1-6 for a series of bar graphs illustrating the assessment results for the Upper Penitencia Creek subwatershed
- Appendix 6-B for a series of tables summarizing the assessment results for the Upper Penitencia Creek subwatershed and containing information on limiting factors, suspected causes, data gaps, and local knowledge comments from WMI stakeholders
- Appendix 6-C for a detailed list of the data sets used in the assessment for the Upper Penitencia Creek subwatershed
- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach

- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

6.2.1 Data Sufficiency

Prior to evaluating the data itself, a data sufficiency review was conducted in order to identify data sets that would be of use in the assessment. This review identified data gaps on a reach-by-reach basis for each of the five beneficial uses and stakeholder interests being evaluated. A summary of the data sufficiency analysis for the Upper Penitencia Creek subwatershed is presented in Table 6-2. A more detailed explanation of the data sufficiency evaluation process and the types of data gaps identified is provided in Appendix C.

Table 6-2
Upper Penitencia Subwatershed Data Sufficiency Summary

Use/ Interest	*Stream Reaches With Insufficient Data*	*Miles of Stream Reaches With Insufficient Data*	*% of Watershed*	*Stream Reaches With Sufficient But Limited Data**	*Miles of Stream Reaches With Sufficient But Limited Data**	*% of Watershed*	*Stream Reaches With Sufficient Data***	*Miles of Stream Reaches With Sufficient Data***	*% of Watershed*
COLD	3	3.3	*19*	1	2.5	*15*	4	11.6	*66*
MUN	8	17.4	*100*	0	0.0	*0*	0	0.0	*0*
REC-1	3	3.3	*19*	2	4.2	*24*	3	9.9	*57*
PFF	2	1.4	*8*	0	0.0	*0*	6	16.0	*92*
RARE	5	9.8	*56*	0	0.0	*0*	3	7.7	*44*

* Includes uncertainty levels of C and D
** Includes uncertainty levels of A and B

As is illustrated in Table 6-2, the data gaps in the Upper Penitencia Creek subwatershed were significant. Support statements with relatively high levels of certainty (rated either A or B) were only developed for between 0 and 92% of the reaches in the watershed, depending on the use being evaluated. Sufficient data was not available to assess support of the municipal and domestic drinking water supply (MUN) use in any reach of the subwatershed. While support statements were also developed for other reaches, data deficiencies demanded that these conclusions be qualified with a high level of uncertainty (rated either C or D). For this second group of reaches, no suspected causes were identified for the limiting factors due to the general lack of confidence in the support statements.

6.2.2 Overall Conclusions by Use

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the Upper Penitencia Creek subwatershed on a use-by-use basis. Results for individual waterbodies are described in greater detail in Section 6.3. Local knowledge comments on the assessment results from WMI stakeholders are presented in Section 6.3 as well. The detailed results for each of the eight stream segments in the subwatershed are shown in Figure 2-4 (in map form) and in Appendix 6-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 6-B. The list of data sets used in the assessment (in Appendix 6-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 6-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty.

6.2.2.1 Cold Freshwater Habitat (COLD)

Data were available to assess the COLD use in all but three of the eight reaches in the subwatershed. The uppermost reach of Upper Penitencia Creek, Cherry Flat Reservoir, and Dutard Creek did not have any data. Data was limited in Arroyo Aguague as well.

The COLD use is potentially/seasonally supported in Upper Penitencia Creek below North Jackson Avenue (segment UP-1), with high summer temperatures and very low flows being limiting factors precluding full support. Rainbow trout and/or steelhead have been documented upstream of North Jackson Avenue (in segment UP-2), but high temperatures and a lack data on other criteria prevents a finding of full support. This reach up to the Alum Rock Park boundary was subdivided into three parts due to different critical characteristics germane to COLD use support. The lower part of this reach (up to the Nobel Avenue diversion) is similar to UP-1, but data indicates non-support. There is a sense that this reach may actually have potential/seasonal support, but data limitations prevented such a finding. Support for COLD improves with distance upstream in UP-2, with the middle segment (up to Dorel Road) having partial support and the upper portion full support. Segments UP-3 and UP-4 in Alum Rock Park fully support COLD, with some uncertainty due to a lack of temperature data. Arroyo Aguague (UP-6) was found to partially support COLD, with the lack of available indicator macroinvertebrate data preventing a full support finding.

Currently, the best habitat for steelhead appears to be in the middle section of Upper Penitencia Creek (upper portion of UP-2 through UP-4). Flowing out of Alum Rock Park, the upper stream reaches are less disturbed and provide cool stream temperatures, riffle habitats, and riparian vegetation necessary for successful steelhead spawning and rearing. Resident rainbow trout occur in these reaches. Anadromous fish passage has been improved recently at the Noble Avenue diversion, a frequent barrier in past years.

A total of 69 data sets were reviewed for use in the COLD use assessment in the Upper Penitencia Creek subwatershed. Data from 13 of these data sets were eventually used to develop the assessment results.

Subsequent to completion of the pilot assessment, a significant new data set became available from the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE). While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding the COLD use are described in Section 6.3 under each individual waterbody.[3] This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

Detailed comments and suggestions on the COLD assessment were received from WMI stakeholders and are described in Section 6.3 for each applicable waterbody. Again, this information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

6.2.2.2 Municipal and Domestic Water Supply (MUN)

There are insufficient data for all reaches in this watershed to make any determinations of support for MUN.

A total of five data sets were reviewed for use in the MUN use assessment in the Upper Penitencia Creek subwatershed. No data from any of these data sets were found sufficient for the assessment.

6.2.2.3 Protection From Flooding (PFF)

Six of eight stream reaches in the Upper Penitencia Creek subwatershed had adequate data to make a determination of support for the PFF interest. No data were available for Dutard Creek and Cherry Flat Reservoir.

The results of the assessment for the PFF interest indicate full support for all reaches where data were available, with the exception of the two lower-most reaches, UP-1 and UP-2. In these reaches of Upper Penitencia Creek, the channel's inability to convey the 100-year flood event led to findings of non-support. Historical occurrences of flooding in this area and the presence of urban land uses within the identified floodplain zone reduce the level of uncertainty for these findings to the lowest level. Full support for PFF was found in segments UP-3, UP-4, UP-5, and UP-6, with very low uncertainty due to firm data on those reaches' ability to convey the 100-year event.

[3] FAHCE collected data and developed its conclusions based on the existing habitat. Their charge was not to re-engineer the entire watershed, but rather optimize the management of existing resources. The study area for the FAHCE Limiting Factors Analysis didn't extend into the tidally influenced zone of the stream as water supply operations have minimal impact in this reach. The WMI Assessment Framework and FAHCE did not share the same criteria for cold freshwater habitat suitability. The WMI adopted a more liberal criteria that allows more habitat to be described as suitable for coldwater resources. FAHCE had to accept the criteria that was set by the National Marine Fisheries Service and the California Department of Fish and Game (Akin, pers. comm., 2002).

A total of 23 data sets were reviewed for use in the PFF interest assessment for the Upper Penitencia Creek subwatershed. Of these, 15 were used to develop the assessment results.

The logic diagram in the Assessment Framework for the PFF interest required that this evaluation be conducted for "current" development conditions as well as "future" development conditions. Future conditions were defined in the framework as being consistent with the future development assumptions incorporated in the Water District's Waterways Management Model (WMM). Output from the WMM was the primary data set used to determine the support status for this interest in reaches where the data was available. In reviewing this data, it was difficult to determine exactly how future development was accounted for in the WMM and what assumptions were made. In addition, it was noted that, as flood return intervals increase, the corresponding importance of the amount of impervious area in a watershed on surface runoff decreases. For lower frequency flood events, the amount of imperviousness in a watershed will have a large impact on the amount of runoff that is generated. However, at high return interval floods (such as the 100-year), it makes little difference whether a watershed is fully or partially developed with urban uses (impervious surfaces). Virtually all of the precipitation is going to generate surface runoff due to ground saturation (Hollis, 1975). Therefore, the distinction between current and future development in Santa Clara Basin watersheds for the purpose of evaluating 100-year flooding may be relatively moot. Given these findings and the uncertainty over the level of future development assumed in the WMM data, the team decided to simply use the Water District's designed channel capacity data as the benchmark for determining the adequacy of each reach to convey the 100-year flow.

Detailed comments and suggestions on the assessment of PFF were received from WMI stakeholders and are described in Section 6.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

6.2.2.4 Preservation of Rare and Endangered Species (RARE)

Sufficient data for assessing support of the RARE beneficial use was limited to three of the stream reaches in the Upper Penitencia Creek subwatershed. Data gaps were generally due to three different reasons: (1) a lack of special status species data, (2) outdated data, and (3) current data sets being too general to be useful. The majority of the stream reaches with data gaps were in the rural upper portion of the subwatershed.

The results of the assessment for the RARE use were compromised by the lack of sufficient data in reaches UP-1, UP-CF, UP-5, UP-6, and UP-7. Reaches UP-2, UP-3, and UP-4 fully support the RARE use due to the presence of steelhead trout and/or red-legged frog, with some uncertainty due to limited data on habitat. Segment UP-4 has the potential to support this use based on one sighting of a tiger salamander, with high uncertainty due to a lack of other data. No data on other WMI-listed special status species was available for the Upper Penitencia Creek subwatershed.

More so than perhaps any of the other uses/interests, the RARE assessment was hampered by the reliance on existing data. Biological field surveys are really needed to assess habitat conditions within the subwatershed for the species on the list. Very few of these types of surveys were included in the data compiled for the assessment. As a result, most of the support statements for RARE were based on species observations rather than habitat conditions.

A total of 33 data sets were reviewed for potential use in the RARE use assessment for the Upper Penitencia Creek subwatershed. Of these, nine contained data that could be used to develop the assessment results.

Subsequent to completion of the pilot assessment, a significant new data set became available from the FAHCE project. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding the RARE use are described in Section 6.3 under each individual waterbody. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

Detailed comments and suggestions on the assessment of RARE were received from WMI stakeholders and are described in Section 6.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

6.2.2.5 Water Contact Recreation (REC-1)

Sufficient data to make a determination of the support status for water contact recreation (REC-1) were available for all but three of the stream reaches in the Upper Penitencia Creek subwatershed. However, only data on the tertiary (least preferred) aesthetics, water depth, and access indicators for assessing REC-1 support were available in the subwatershed. Data were not available for any of the reaches on primary (pathogens in water) or secondary (other water quality) indicators. Thus, all support statements made for REC-1 are limited in applicability to these indicators only and do not represent a conclusion based on the preferred type of data.

The aesthetics/access component of the REC-1 use is supported in segments UP-1 through UP-4 and UP-6. In segments UP-1 and UP-2 (lower portion to Nobel Avenue diversion), seasonal support is based solely on water flow, so uncertainty is high. In segments UP-2 (above diversion), UP-3, UP-4, and UP-6, support is based on both water flow and access data. These reaches are largely located in a public park (Alum Rock Park), which offers good access to the public. The use designation for these three reaches is given a lower uncertainty than the previous two reaches based on the strength of the access criterion. However, the uncertainty level applies to the support status on tertiary indicators only. Given the lack of data on preferred indicators throughout the subwatershed, overall uncertainty regarding REC-1 support must be considered extremely high. There are no data applicable to REC-1 for Dutard Creek, Cherry Flat Reservoir, or Upper Penitencia Creek above Cherry Flat Reservoir (segments UP-CF, UP-5, and UP-7).

A total of 10 data sets were reviewed for potential use in the REC-1 use assessment for the Upper Penitencia Creek subwatershed. Of these, five contained data that could be used to develop the assessment results.

As outlined in the Assessment Framework, the REC-1 assessment was to include a fish consumption component. Based on concern expressed by WMI stakeholders, the Regional Board reviewed this issue and determined that fish consumption should not be evaluated as part of the REC-1 use. Therefore, the results of the fish consumption portion of the pilot assessment have been removed from this report.

Detailed comments and suggestions on the assessment of REC-1 were received from WMI stakeholders and are described in Section 6.3 for each applicable waterbody. This information was not used to modify the pilot assessment results but should, where warranted, be addressed as part of future reach-specific assessment work undertaken by WMI stakeholders.

6.3 Detailed Assessment Results by Waterbody

This section discusses the results of the pilot beneficial use/stakeholder interest assessments for the Upper Penitencia Creek subwatershed on a waterbody-by-waterbody basis. The methodology and approach used for the pilot assessments is described in Chapter 3. Information regarding data sufficiency for the Upper Penitencia Creek subwatershed is provided in Section 6.2.1. Overall results for each beneficial use/stakeholder interest are described in Section 6.2.2.

The detailed results for each of the eight stream segments in the subwatershed are shown in Figure 2-4 (in map form) and in Appendix 6-A, Tables 1-6 (in bar chart form). Individual summary tables containing the assessment results for each reach are presented in Appendix 6-B. These tables include information on limiting factors, suspected causes, as well as "local knowledge comments" from WMI stakeholders. The primary messages contained in this information are also summarized in the text of this section for each waterbody in the watershed. The final page of Appendix 6-B contains a listing of the stream reaches in the Upper Penitencia Creek subwatershed for which insufficient data were available for all five uses.

The list of data sets used in the assessment (in Appendix 6-C) may be cross-referenced with the data set identification numbers in the tables of Appendix 6-B to inform the reader of the specific data sets used to reach the conclusions for each stream reach and use. Given the lack of consistent data from reach to reach for each use/interest, it is critical that all statements of use support be viewed in light of the attached level of uncertainty. For additional detail concerning the results of the pilot assessments, please see the following:

- Appendix B to this report describing the lessons learned from the pilot assessments
- Appendix C to this report describing the data sufficiency evaluation and the data gaps identified for each stream reach
- Appendix D to this report describing the factors limiting full use support as discerned by the pilot assessment as well as some suspected causes for these factors

Subsequent to completion of the pilot assessment, a significant new data set became available from the FAHCE project. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding factors limiting the COLD and RARE uses are described in this section and in the "Suspected Causes" boxes in Appendix 6-B. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

6.3.1 Upper Penitencia Creek Subwatershed

Assessment results for waterbodies in the Los Gatos Creek subwatershed are discussed by individual waterbody in this section.

6.3.1.1 Upper Penitencia Creek (UP-1 through UP-5)

COLD: The COLD use was found to be supported in the middle portion of Upper Penitencia Creek, with resident rainbow trout, anadromous steelhead trout, and chinook salmon. Lower reaches have limited flow and high temperatures and thus were found to have potential or partial support only. Augmented summer streamflow (in the form of releases from off-channel percolation ponds and Cherry Flat Reservoir) usually does not extend downstream UP-1. Winter and spring streamflow is variable and may be too warm for Chinook spawning and rearing due to the relatively open channel; however, more temperature data is needed to fully determine this. From the Nobel Ave. diversion upstream to Dorel, pools are present during some summers. This area partially supports the COLD use with steelhead sometimes present. Augmented summer streamflow tends to peter out in this stretch, though pools may remain. Low flows cause an elevation in stream temperatures. Above Dorel, the stream fully supports the COLD use. Steelhead have been documented in these reaches and temperatures meet applicable criteria for support. Low summer streamflows, however, may affect support during drier years. No data were available for the reach above Cherry Flat Reservoir.

The FAHCE data that became available subsequent to completion of the assessment notes that habitat below Alum Rock Park is constrained by urban influences, including a limited flood plain and ongoing human disturbance (FAHCE, 2000).

Stakeholder comments have provided the following information regarding COLD use support in Upper Penitencia Creek:

- UP-4: Natural waterfalls in Alum Rock Park serve as barriers to anadromous fish; an artificial passage barrier was created during the course of streambank protection work in around 1999 (Neudorf, pers. comm., 2002).

- UP-5: Grazing activities in the upper watershed may be impacting the suitability of the stream for COLD (Mulvey, pers. comm., 2002).

MUN: There were insufficient data to make a determination regarding MUN use support in any reach in the Upper Penitencia Creek subwatershed.

Stakeholder comments have provided the following information regarding MUN use support in Upper Penitencia Creek:

- UP-5: Grazing activities in the upper watershed may be impacting the suitability of the stream for MUN (Mulvey, pers. comm., 2002).

PFF: The PFF interest is supported in Upper Penitencia Creek with the exception of the lower reaches (UP-1 and UP-2) which are limited in flood capacity and therefore do not support the PFF interest. In addition, urban commercial and residential land uses have encroached into the natural channel floodplain in such a manner that 100-year flood flows in these areas are likely to cause property damage. Within UP-2, the undersized section is from downstream of Capitol Ave to upstream of Piedmont Road. An additional section downstream of Jackson Ave is only slightly undersized for the 100-year flow.

RARE: The RARE use is supported for steelhead and red-legged frog with moderately high certainty and is potentially supported for tiger salamander, though data limitations for the latter are severe. No data were available for the lower-most reach of the creek and the portion upstream of Cherry Flat Reservoir. Significant portions of Upper Penitencia Creek are protected within Alum Rock Park, which enhances potential special status species habitat.

REC-1: The REC-1 use is partially to fully supported in Upper Penitencia Creek based on tertiary indicators addressing aesthetics and recreational access. In the lower part of the creek (UP-1 and UP-2 below Dorel), support is partial because it is generally limited to the wet season as this portion of the creek is ephemeral to perennial, depending on precipitation. Even so, uncertainty is high due to spotty data. Significant portions of the remainder of Upper Penitencia Creek are protected within Alum Rock Park, which provides excellent public access and recreational opportunity. These reaches are considered to fully support REC-1. Data were not available on aesthetics or access in UP-5, nor were any data on the primary (pathogens) or secondary (other water quality parameters) indicators for REC-1 available in the subwatershed.

6.3.1.2 Arroyo Aguague (UP-6)

Though data were limited, Arroyo Aguague was found to at least partially or seasonally support COLD, PFF, and REC-1. Its confluence with Upper Penitencia Creek is within Alum Rock Park; upstream it flows within a steep canyon and is isolated from most human influence and use. Resident rainbow trout have been recorded here. The stream probably meets criteria for full support of COLD, but indicator macroinvertebrate data are lacking. Summer streamflows are low, but relatively persistent upstream in the reach as seepage in the Calaveras Fault zone. Flow was present upstream even during the 1976-77 drought. Available access and limited streamflow in the lower part of the creek led to the REC-1 support finding. However, access is not available to upper portions of the creek due to several natural barriers, including a waterfall, as well as adjacent private property and rugged, steep topography. In addition, low summer flow in lower end of reach is caused by the natural infiltration of already low summer streamflows as water moves through the reach. No other data on REC-1 indicators were available. No data were available to assess MUN and RARE support in this reach.

The FAHCE data that became available subsequent to completion of the assessment notes that fish passage is difficult due to small boulder cascades along Arroyo Aguague (FAHCE, 2000).

Stakeholder comments have provided the following information regarding use/interest support in Arroyo Aguague:

- COLD and MUN: Grazing activities in the upper watershed may be impacting the suitability of the stream for each of these uses (Mulvey, pers. comm., 2002).

6.3.1.3 Dutard Creek (UP-7)

Insufficient data were available to assess any of the uses/interests in this reach.

6.3.1.4 Cherry Flat Reservoir (UP/CF)

Insufficient data were available to assess any of the uses/interests in this reach.

6.4 Recommendations on Further Data Collection and Analysis

Future data collection in the Upper Penitencia Creek subwatershed will depend upon priorities established by the WMI. Some uses/interests may be prioritized over others, and this will identify the most important types of data for early collection. Additional detail regarding data gaps is provided in Appendix C. Also see Chapter 2 for a more comprehensive discussion of future data collection.

For the five uses/interests studied in the pilot assessment, the following represent the most significant data gaps:

COLD:

- Data on stream temperature and indicator macroinvertebrate presence in late summer in the main stem of Upper Penitencia Creek to facilitate confident findings of support status for reaches UP-1 through UP-4

- Data on stream temperature, indicator macroinvertebrate presence and fish assemblage for reach UP-6, which seems to offer high potential for use support due to the protected nature of its watershed, yet very little data of any kind are available

MUN:

- Wet and dry weather drinking water quality data is needed in all reaches, but the focus should be on reaches from which drinking water supplies are currently being drawn (UP/CF, UP-2, UP-3, UP-4)

PFF:

- Data on channel capacities for Dutard Creek should be collected due to the high level of development in this drainage

RARE:

- Data on special status species presence and/or habitat in UP/CF, UP-5, and UP-6 should be collected due to the potential for use support in these relatively protected reaches

REC-1:

- Water quality data on pathogens (fecal coliform, e.coli) and other parameters of concern for skin contact should be collected in all reaches, particularly those within Alum Rock Park were recreation is most likely to occur. The availability of this data will allow for complete support statements throughout the subwatershed.

6.5 References

Akin, Scott. 2002. Personal Communication. FAHCE Data Manager, Santa Clara Valley Water District.

FAHCE (Fisheries and Aquatic Habitat Collaborative Effort). 2000. Summary and Conclusion FAHCE TAC Evaluation of the Effects of Santa Clara Valley Water District Facilities and Operations on Factors Limiting Habitat Availability and Quality for Steelhead and Chinook Salmon. Draft Report, March 16, 2000.

Hollis, G.E. 1975. The Effect of Urbanization on Floods of Different Recurrence Intervals. Water Resources Research 11(3): 431-435.

Neudorf, Terry. 2002. Personal Communication. WMI Guadalupe watershed Co-Captain. Biologist, Santa Clara Valley Water District.

Regional Water Quality Control Board. 1975. Regional Water Quality Control Plan, San Francisco Bay Region.

Santa Clara Basin WMI. 2001. Watershed Characteristics Report (Volume One), Chapter 7: Natural Setting.

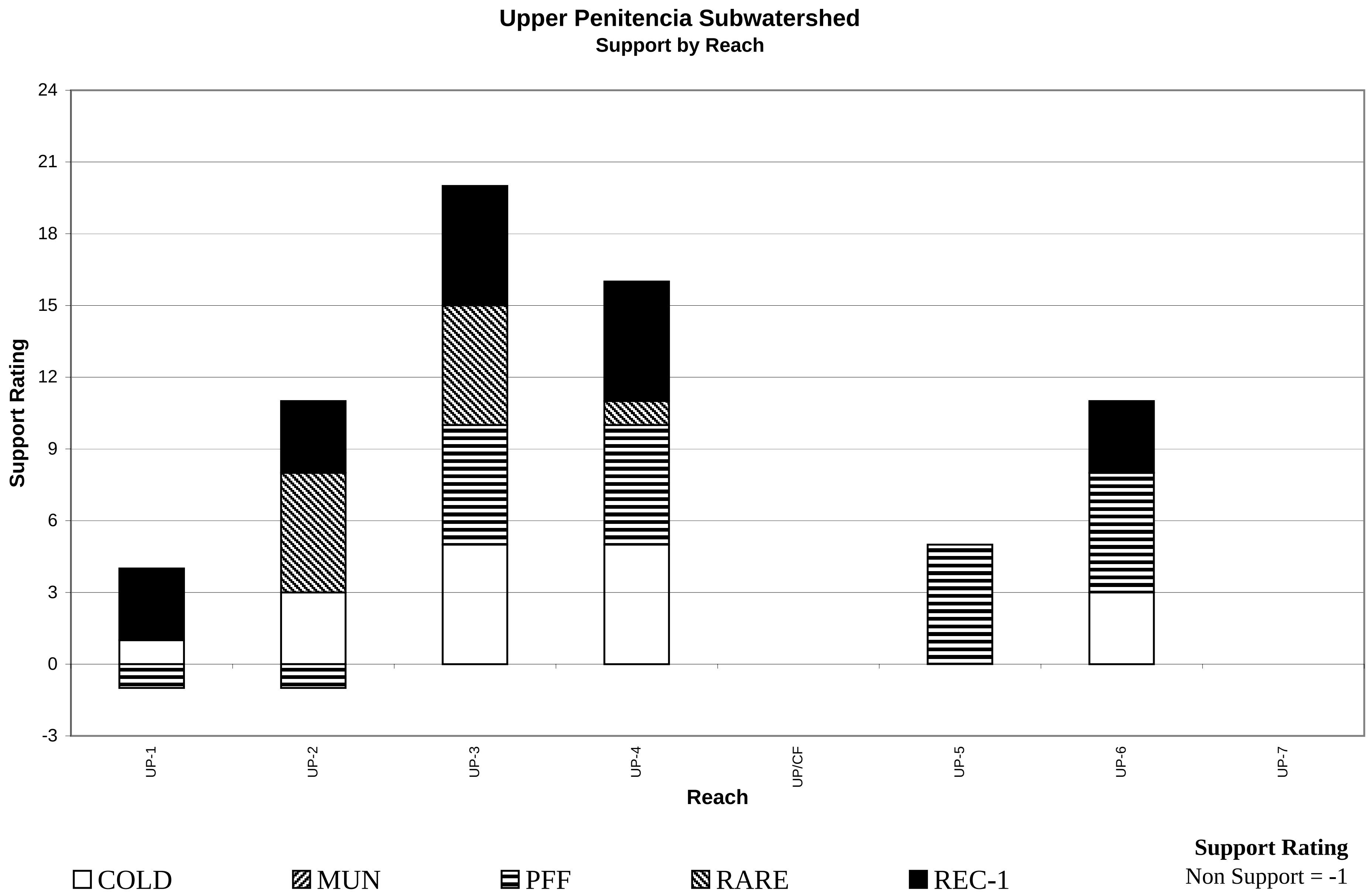
Appendix 6-A
Pilot Assessment Result Charts

Appendix 6-A contains a series of six tables displaying bar charts which illustrate the conclusions of the pilot assessment for the Upper Penitencia Creek subwatershed. Table 1 summarizes the support status for each of the five beneficial uses/stakeholder interests within each of the eight stream reaches in the subwatershed. Tables 2 through 6 display the same information, along with the associated uncertainty rating, for each individual use/interest. In instances where no bar is present above a stream reach identification code, sufficient data were not available to assess any of the uses/interests for that reach. A list of stream reaches, waterbodies, and identification codes is located in Appendix 6-B.

The tables in Appendix 6-A are organized as follows:

- Table 1: Overall Support Status by Reach (all uses)
- Table 2: Support Status and Uncertainty Ratings for COLD
- Table 3: Support Status and Uncertainty Ratings for MUN
- Table 4: Support Status and Uncertainty Ratings for PFF
- Table 5: Support Status and Uncertainty Ratings for RARE
- Table 6: Support Status and Uncertainty Ratings for REC-1

Appendix 6-A
Table 1

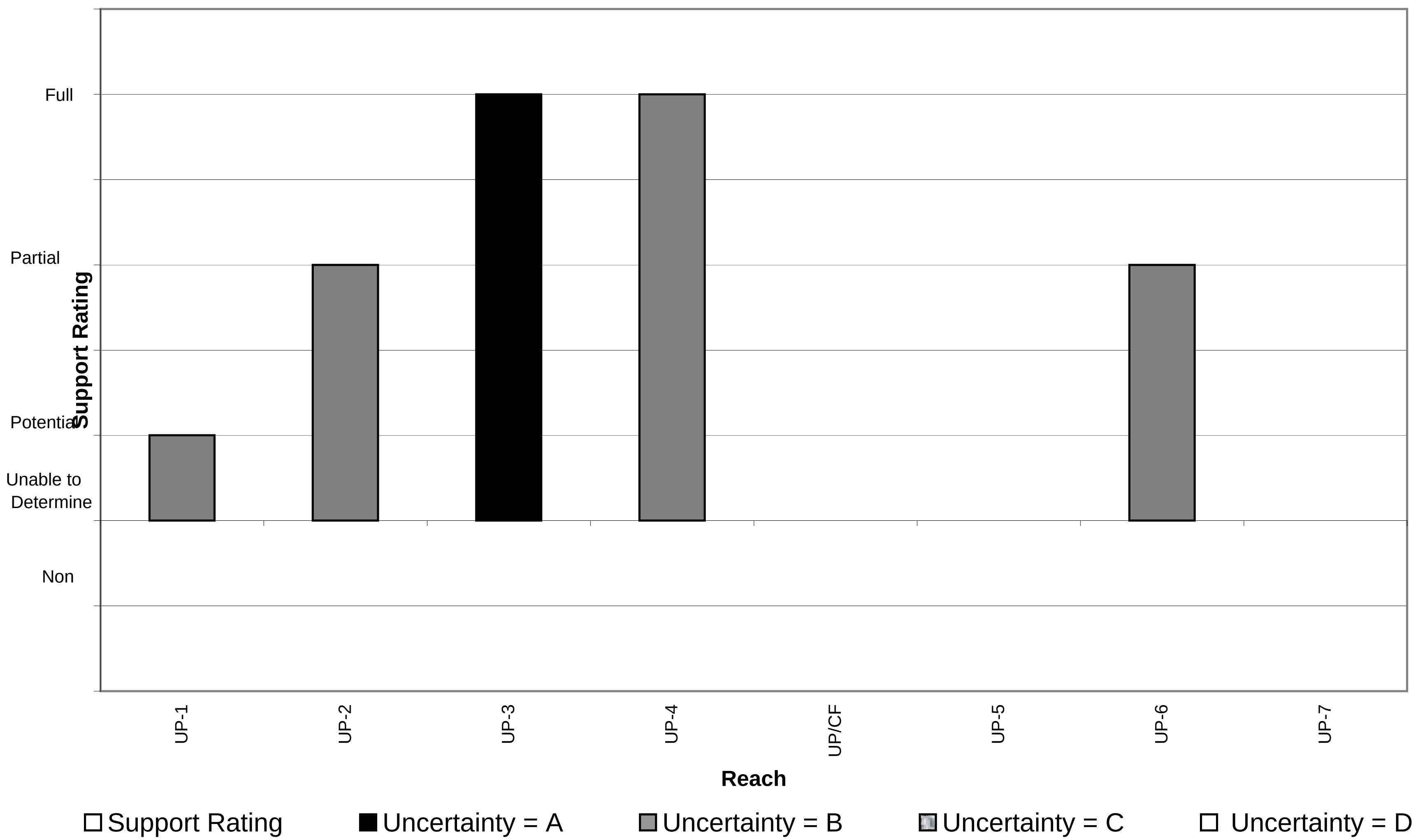


Support Rating
Non Support = -1
Unable to Determine = 0
Potential Support = 1
Partial Support = 3
Fully Supported = 5

Where the reach bars show fewer than five uses, sufficient data were not available to evaluate the other uses. Where no bar is present above a reach, sufficient data were not available to assess any of the five uses.

Appendix 6-A
Table 2

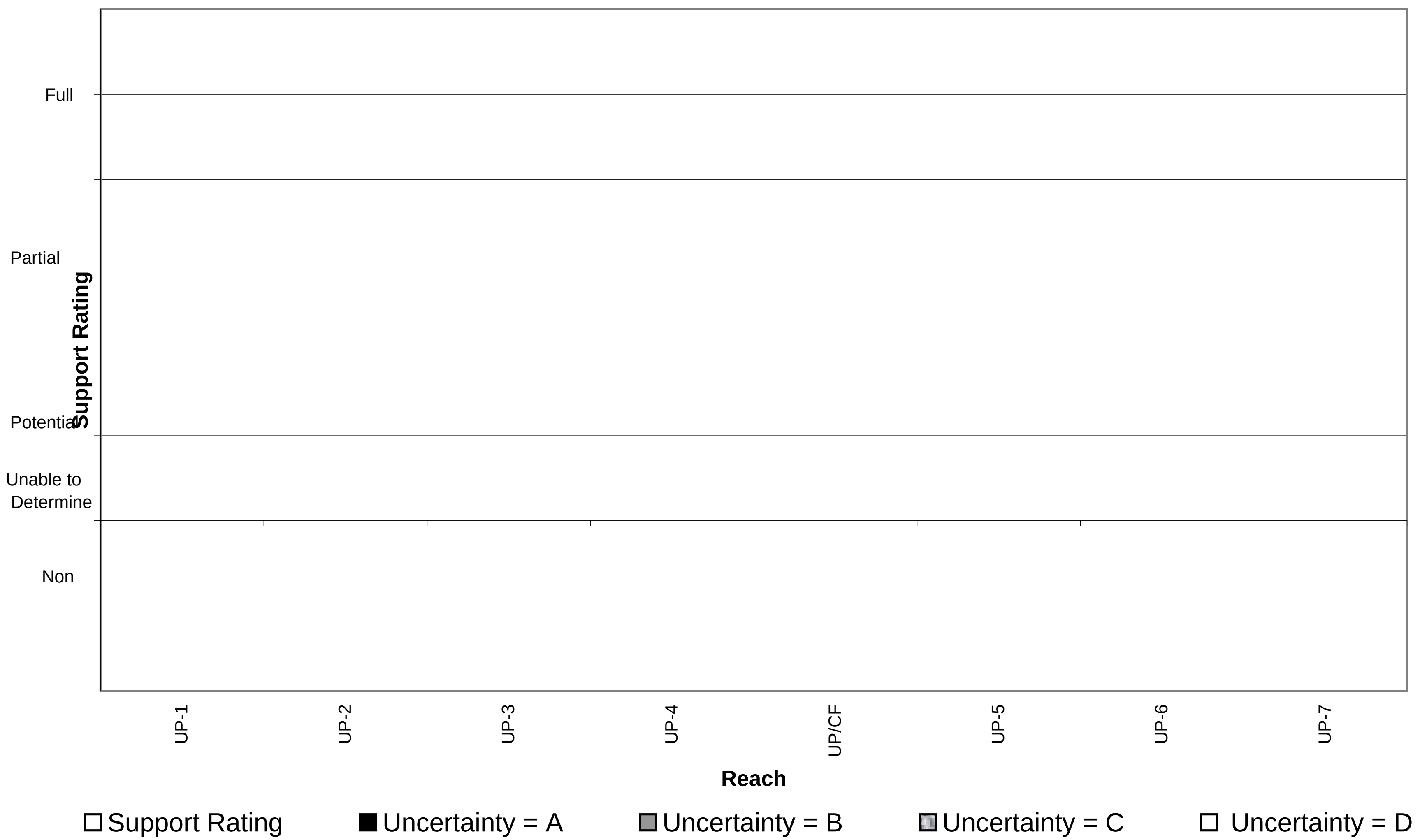
Upper Penitencia Subwatershed
Support and Uncertainty Ratings for COLD



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 6-A
Table 3

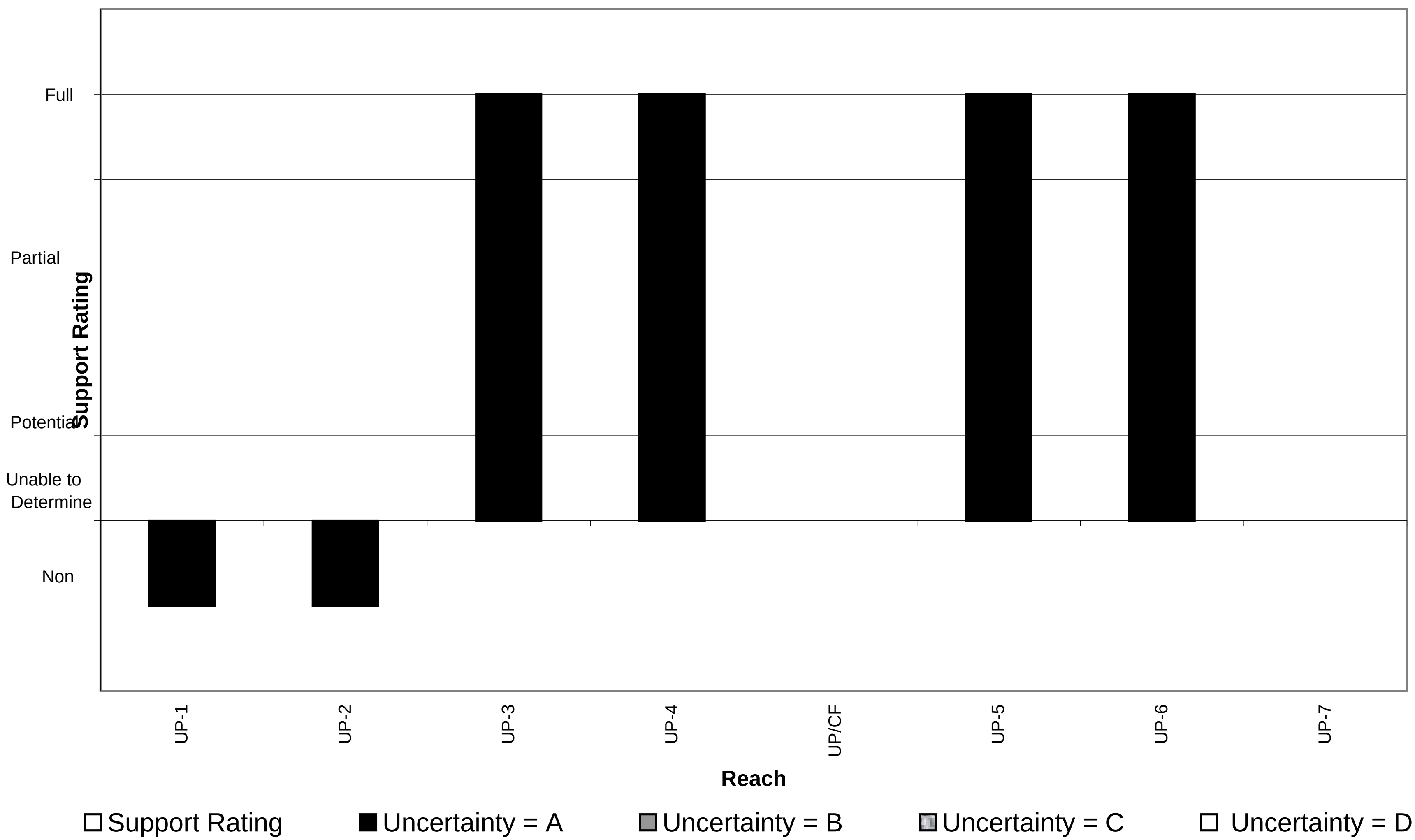
Upper Penitencia Subwatershed
Support and Uncertainty Ratings for MUN



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 6-A
Table 4

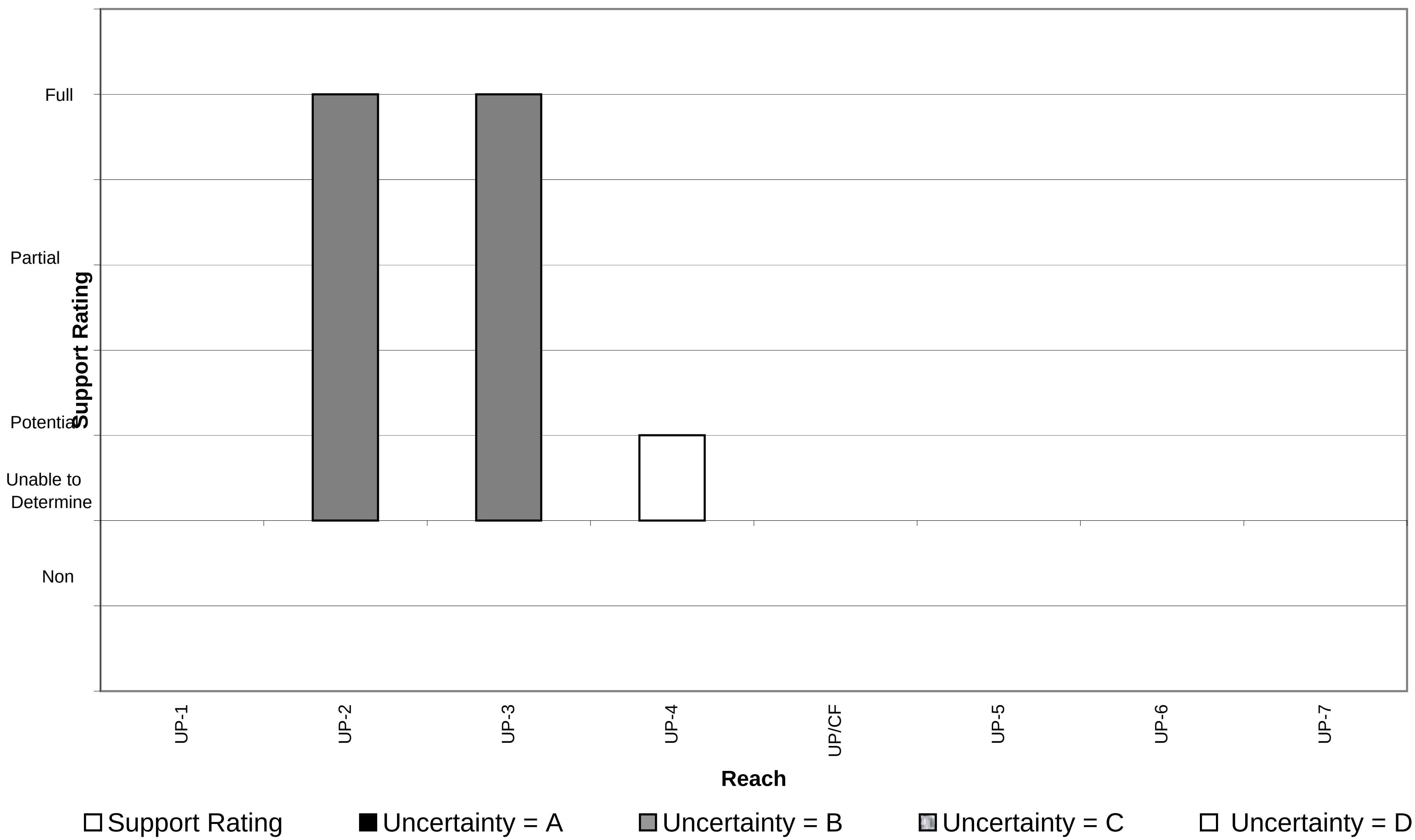
Upper Penitencia Subwatershed
Support and Uncertainty Ratings for PFF



Where no bar is present above a reach, sufficient data were not available to assess the use.

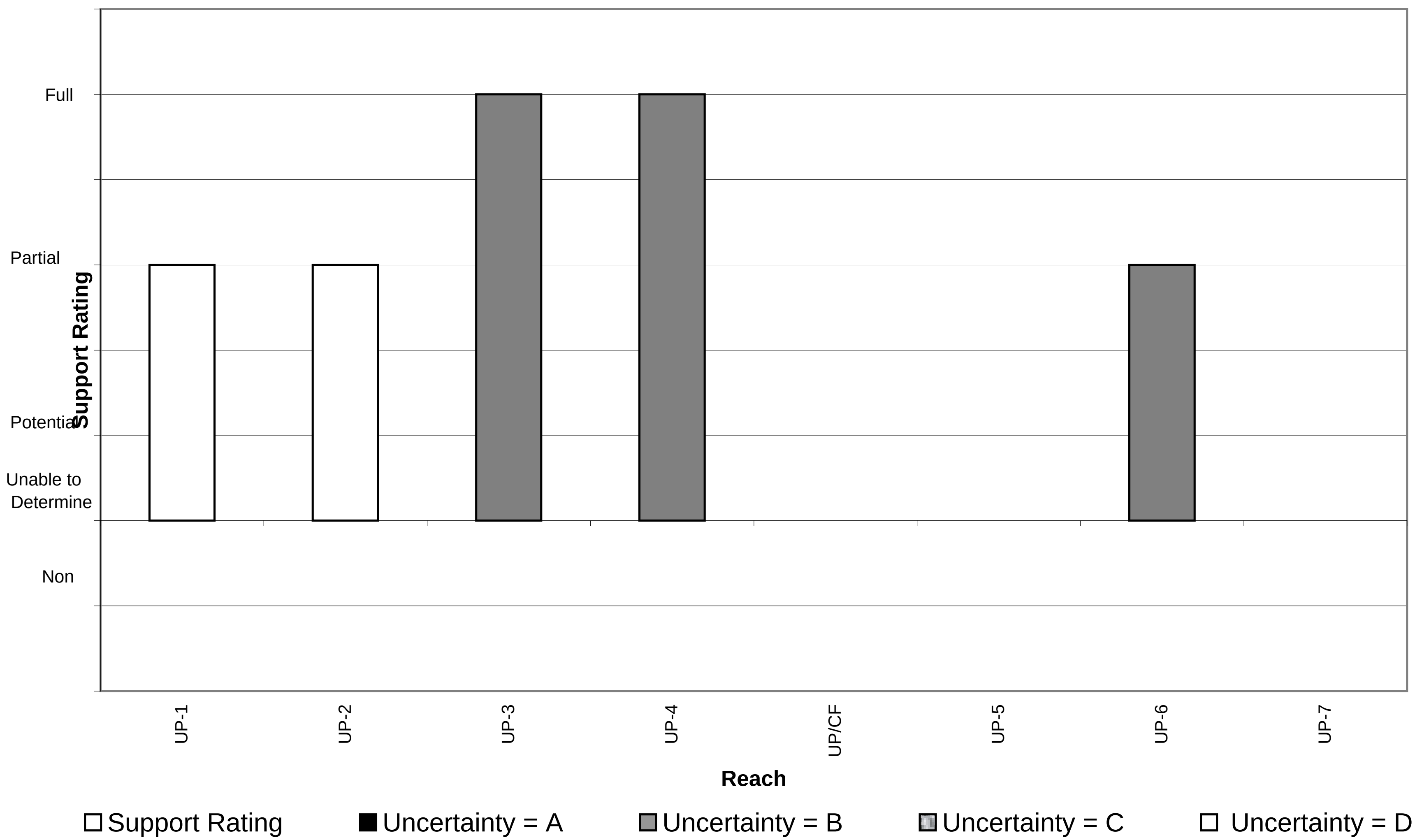
Appendix 6-A
Table 5

Upper Penitencia Subwatershed
Support and Uncertainty Ratings for RARE



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 6-A
Table 6
Upper Penitencia Subwatershed
Support and Uncertainty Ratings for REC-1



Where no bar is present above a reach, sufficient data were not available to assess the use.

Appendix 6-B
Reach Summary Tables

Appendix 6-B contains a series of tables summarizing the pilot assessment results for all of the reaches in the Upper Penitencia Creek subwatershed where sufficient data existed for at least one of the five uses/interests. Reaches with insufficient data for all uses/interests do not have individual tables but are instead compiled and listed on the last page of this appendix. A listing of all reaches in the watershed and the page number in this appendix where each reach can be found is provided below.

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-1 **Reach Length (miles):** 1.66

Reach Limits (downstream to upstream): Confluence with Coyote Creek to North Jackson Avenue Bridge **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Temperature, fish assemblage, macroinvertebrates, habitat conditions	D0214	Potentially/Seasonally Supported	B	No winter temperature data; may be Chinook spawning in reach; seasonal support is possible with additional data on temperature; met insect criteria in very wet year (1998)
				D0437			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): High summer temperatures and low or no summer stream flow

Suspected Cause(s): Augmented summer streamflow (as releases from off-channel percolation ponds and Cherry Flat Reservoir) usually does not extend downstream to this reach. Winter and spring streamflow is variable and may be too warm for Chinook spawning and rearing due to relatively open channel; however, more temperature data is needed to fully determine this. FAHCE information notes that habitat is constrained by urban influences, including a limited flood plain and ongoing human disturbance.

Data Gap(s) - No Data: Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, physical barriers to migration, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-1 **Reach Length (miles):** 1.66

Reach Limits (downstream to upstream): Confluence with Coyote Creek to North Jackson Avenue Bridge **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for a critical urban reach which does not have channel capacity to convey 1% flow (from SCVWD stationing #2300 to 4750)
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0588			
				D0589			
				D0590			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): Channel does not have adequate capacity to convey expected 100-year flow in one segment of this reach; land uses adjacent to the stream consist of urban industrial and commercial

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban industrial and commercial developments into the natural channel floodplain. Problem segment is from SCVWD stationing 2300 to 4750.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-1 **Reach Length (miles):** 1.66

Reach Limits (downstream to upstream): Confluence with Coyote Creek to North Jackson Avenue Bridge **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Earthen levee **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Very limited data on species presence and habitat; not sufficient to develop support statement	Poor	Special status species observations, Habitat	D0609	Unable to Determine	N/A	Very limited data notes presence of "wild trout" in 1950s; no other species observation data is available for reach and little habitat characterization data is available; focused surveys for special status species and/or habitat are needed to allow for a support statement in this reach

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data: Primary Indicators = special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Poor	Flow (depth)	D0383	Seasonal Support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	D	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator of water flow (depth); data sets D0383 and D0584 provided limited data, some of which is quite dated and general; high level of uncertainty regarding this reach
				D0584			

Local Knowledge Comments:

Limiting Factor(s): Lack of summer flow in reach

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-2 **Reach Length (miles):** 2.55

Reach Limits (downstream to upstream): North Jackson Avenue to Alum Rock Park boundary **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, temperature, riparian vegetation, physical barriers, habitat conditions, macroinvertebrates	D0061 D0214 D0311 D0312 D0315 D0328 D0419 D0422 D0423 D0437 D0625	Reach is split into three sub-reaches for COLD assessment: UP-2A: non-support; UP-2B: partial support; UP-2C: full support	UP-CA: C; UP-CB: B; UP-CC: A	UP-2A: North Jackson Ave. upstream to Nobel Ave. diversion -- may be partial/seasonal support since the downstream reach has partial/seasonal support, data doesn't indicate this, so uncertainty level is high; UP-2B: Nobel Ave. diversion to Dorel Rd. -- pools present during some summers; partial support with steelhead sometimes present; UP-2C: Dorel Rd. to Alum Rock Park boundary -- full support as steelhead and temperature criteria are met in this upper portion of UP-2

Local Knowledge Comments:

Limiting Factor(s): UP-2A: no steelhead, temperature exceeds criteria, may be dry. UP-2B: high summer temperatures exceed criteria, summer flow variability affects presence of juvenile steelhead

Suspected Cause(s): UP-2B: Nobel Ave. diversion to Dorel Rd. -- pools present during some summers; partial support with steelhead sometimes present. Augmented summer streamflow tends to peter out in this stretch, though pools may remain. Low flow causes elevation in stream temperatures.

Data Gap(s) - No Data: Secondary Indicators = dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-2 **Reach Length (miles):** 2.55

Reach Limits (downstream to upstream): North Jackson Avenue to Alum Rock Park boundary **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Non Support	A	(1) Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators; (2) this reach supports PFF except for a critical urban reach which cannot convey the 1% flood from downstream of Capitol Ave to upstream of Piedmont Road (11750 to 17200); the rest can except for downstream of Jackson Ave which is only slightly undersized for 1% flow
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0588			
				D0589			
				D0590			
				D0609			
				D0621			

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-2 **Reach Length (miles):** 2.55

Reach Limits (downstream to upstream): North Jackson Avenue to Alum Rock Park boundary **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

Local Knowledge Comments:

Limiting Factor(s): Channel does not have adequate capacity to convey expected 100-year flow in one segment of this reach; land uses adjacent to the stream consist of urban residential

Suspected Cause(s): (a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban residential developments into the natural channel floodplain. Problem segment is from downstream of Capitol Ave to upstream of Piedmont Road (11750 to 17200); segment downstream of Jackson Ave is only slightly undersized for 1% flow.

Data Gap(s) - No Data: Primary Indicators = estimated 100 year flood flow, design channel capacity. Secondary Indicators = historic flooding occurrence information.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations, Habitat	D0061	Full Support	B	Support status based on steelhead presence; fish data is sporadic and there is a lack of habitat data for this reach
				D0066			
				D0412			
				D0419			
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Good	Flow (depth)	D0383	Seasonal Support for tertiary indicator in lower part of reach (goes dry in summer); Full Support for tertiary indicator in upper part of reach (remains wet in summer); no support statement is able to be made for primary and secondary indicators	D	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator of water flow (depth); data sets D0383 and D0603 provided limited data; high level of uncertainty regarding this reach

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-2 **Reach Length (miles):** 2.55

Reach Limits (downstream to upstream): North Jackson Avenue to Alum Rock Park boundary **Flow Regime:** Ephemeral to Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Urban

REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Good	Flow (depth)	D0603	Seasonal Support for tertiary indicator in lower part of reach (goes dry in summer); Full Support for tertiary indicator in upper part of reach (remains wet in summer); no support statement is able to be made for primary and secondary indicators	D	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicator of water flow (depth); data sets D0383 and D0603 provided limited data; high level of uncertainty regarding this reach

Local Knowledge Comments:

Limiting Factor(s): Lack of summer flow in lower portion of reach

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-3 **Reach Length (miles):** 2.61

Reach Limits (downstream to upstream): Alum Rock Park boundary to confluence with Arroyo Aguague **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, physical barriers, riparian vegetation, habitat conditions, altered channel materials, width/depth, macroinvertebrates	D0020	Full Support	A	No temperature station in Alum Rock Park; however, temp. station downstream of reach meets criteria so it is assumed that criteria are met within reach as well; insect criteria were met at 2 sites during 1998; trout and steelhead regularly present; low summer streamflows may affect support level in some years
				D0061			
				D0311			
				D0312			
				D0315			
				D0437			
				D0600			
				D0625			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-3 **Reach Length (miles):** 2.61

Reach Limits (downstream to upstream): Alum Rock Park boundary to confluence with Arroyo Aguague **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0600			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations, Habitat	D0058	Full Support	B	There is a limited data record for this reach, but the data indicates potential support for red legged frog and full support for steelhead; therefore, reach is considered to fully support RARE use
				D0061			
				D0066			
				D0111			
				D0437			

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-3 **Reach Length (miles):** 2.61

Reach Limits (downstream to upstream): Alum Rock Park boundary to confluence with Arroyo Aguague **Flow Regime:** Perennial

Channel Type(s): Natural Modified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Sufficient	Fair	Special status species observations, Habitat	D0600	Full Support	B	There is a limited data record for this reach, but the data indicates potential support for red legged frog and full support for steelhead; therefore, reach is considered to fully support RARE use
				D0609			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species, special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Good	Flow (depth), access	D0383	Full Support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	B	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicators of water flow (depth) and access; data sets D0383 and D0600 provided data
				D0600			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-4 **Reach Length (miles):** 2.50

Reach Limits (downstream to upstream): Confluence with Arroyo Aguague to Cherry Flat Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Sufficient on primary indicators, additional data on secondary habitat indicators available	Good	Fish assemblage, riparian vegetation, physical barriers, habitat conditions, macroinvertebrates	D0020	Full Support	B	Limited fish data for this reach; temperatures probably meet criteria due to downstream readings but no data available for this reach; insect criteria were met at one site in 1998
				D0311			
				D0312			
				D0315			
				D0437			
				D0625			

Local Knowledge Comments: Natural waterfalls in Alum Rock Park serve as barriers to anadromous fish; an artificial passage barrier was created during the course of streambank protection work in around 1999

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-4 **Reach Length (miles):** 2.50

Reach Limits (downstream to upstream): Confluence with Arroyo Aguague to Cherry Flat Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Very limited data on species presence and habitat; sufficient only for potential support statement	Fair	Special status species observations	D0066	Potential Support	D	Potential support based on one observation of CA tiger salamander larvae; data on species presence and habitat not sufficient for a finding of full support
				D0111			
				D0437			
				D0609			

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-4 **Reach Length (miles):** 2.50

Reach Limits (downstream to upstream): Confluence with Arroyo Aguague to Cherry Flat Reservoir **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species, special status species. Secondary Indicators = habitat requirments for individual special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Good	Flow (depth), access	D0600	Full Support for tertiary indicator; no support statement is able to be made for primary and secondary indicators	B	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicators of water flow (depth) and access; data sets D0600 provided data

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-5 **Reach Length (miles):** 1.90

Reach Limits (downstream to upstream): Cherry Flat Reservoir to source **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	No data on primary indicators, very limited on two secondary indicators, not sufficient for support statement	Poor	Riparian vegetation, physical barriers	D0311	Unable to Determine	N/A	No data on primary indicators; limited data on secondary indicator is inconclusive
				D0312			
				D0315			

Local Knowledge Comments: Grazing activities in upper watershed may be impacting suitability of stream for COLD use

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = fish assemblage, macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, riparian vegetation, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: Grazing activities in upper watershed may be impacting suitability of stream for MUN use

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-5 **Reach Length (miles):** 1.90

Reach Limits (downstream to upstream): Cherry Flat Reservoir to source **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient	Good	Channel capacity, design flow	D0321	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Insufficient data for support statement; only available data is too old or too general	Poor	Special status species observations, Habitat	D0066	Unable to Determine	N/A	Data notes presence of wild trout in mid 1950s; no other data available to develop a support statement

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Primary Indicators = assemblages of special status species. Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data: Primary Indicators = special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Subwatershed: Upper Penitencia

Waterbody: Upper Penitencia Creek **Reach:** UP-5 **Reach Length (miles):** 1.90

Reach Limits (downstream to upstream): Cherry Flat Reservoir to source **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

REC-1	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available on primary, secondary, or tertiary indicators

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Subwatershed: Upper Penitencia

Waterbody: Arroyo Aguague **Reach:** UP-6 **Reach Length (miles):** 4.80

Reach Limits (downstream to upstream): Entire Subwatershed **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
COLD	Limited data on fish assemblage; additional secondary indicators	Fair	Fish assemblage, riparian vegetation, physical barriers, habitat conditions	D0020	Partial Support	B	Pools present during some summers in lower portion of reach; limited fish data and no macroinvertebrate data prevents a finding of full support; temperatures probably meet criteria due to downstream readings but no data available for this reach; low summer streamflows may be limiting in lower portion of reach
				D0311			
				D0312			
				D0315			
				D0437			

Local Knowledge Comments: Grazing activities in upper watershed may be impacting suitability of stream for COLD use

Limiting Factor(s): None Identified

Suspected Cause(s): Probably meets criteria for full support, but insect data lacking. Summer streamflows are low, but relatively persistent upstream in the reach as seepage in the Calaveras Fault zone. Flow present upstream even during 1976-77 drought. FAHCE information notes that fish passage is difficult due to small boulder cascades.

Data Gap(s) - No Data: Primary Indicators = macro-invertebrate data. Secondary Indicators = temperature, dissolved oxygen, TSS, turbidity, stream type, channel substrate, streambank erosion potential, width to depth ratio, bankfull, stage, discharge and width, altered channel materials, instream spawning habitat, instream rearing habitat, shaded riverine aquatic habitat, water depths and velocities, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, PCB, selenium, mercury, nickel.

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
MUN	None	N/A	N/A	No data sets	Unable to Determine	N/A	No data available for either wet or dry weather

Local Knowledge Comments: Grazing activities in upper watershed may be impacting suitability of stream for MUN use

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data: Fecal coliform, turbidity, chlordane, copper, chlorpyrifos, DDT, diazinon, dieldrin, dioxin, MTBE, nitrate, PCB, selenium, mercury, nickel, TDS

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments

Subwatershed: Upper Penitencia

Waterbody: Arroyo Aguague **Reach:** UP-6 **Reach Length (miles):** 4.80

Reach Limits (downstream to upstream): Entire Subwatershed **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

PFF	Sufficient	Good	Channel capacity, design flow	D0311	Full Support	A	Data sets D0380 and D0559 provide data on the direct indicator (ability to convey 100-year flood flows); because of this, it was not necessary to review other data sets on secondary indicators
				D0321			
				D0322			
				D0323			
				D0324			
				D0325			
				D0326			
				D0380			
				D0559			
				D0609			
				D0621			

Local Knowledge Comments:

Limiting Factor(s): None Identified

Suspected Cause(s):

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
RARE	Insufficient data for support statement; only available data is too old	Poor	Special status species observations	D0066	Unable to Determine	N/A	Data notes presence of wild trout in mid 1950s; no other data available to develop a support statement
				D0609			

Subwatershed: Upper Penitencia

Waterbody: Arroyo Aguague **Reach:** UP-6 **Reach Length (miles):** 4.80

Reach Limits (downstream to upstream): Entire Subwatershed **Flow Regime:** Perennial

Channel Type(s): Natural Unmodified **Generalized Land Use in Area:** Rural

Local Knowledge Comments:

Limiting Factor(s): None identified

Suspected Cause(s):

Data Gap(s) - No Data: Secondary Indicators = habitat requirments for individual special status species.

Fair/Poor Quality Data: Primary Indicators = assemblages of special status species, special status species.

Use/Interest	Data Quantity	Data Quality	Criteria Used	Data Sets Used	Support Status	Uncertainty Level	Assessment Comments
REC-1	No data on primary or secondary indicators; limited data on tertiary indicator (aesthetics/access)	Fair	Flow (depth), access	D0060	Seasonal Support for tertiary indicator in lower portion of reach (within Alum Rock Park); Non Support for tertiary indicator in upper portion of reach; no support statement is able to be made for primary and secondary indicators	B	No data sets are available on the primary, secondary indicators; limited support statement was developed based ONLY on tertiary indicators of water flow (depth) and access; data sets D0060 and D0600 provided data
				D0600			

Local Knowledge Comments:

Limiting Factor(s): Low summer flow in lower end of reach; access is not available above the confluence with Upper Penitencia Creek

Suspected Cause(s): Natural infiltration of already low summer streamflows as water moves through reach causes low/no flow at lower end; private property and rugged, steep topography discourages access to this reach.

Data Gap(s) - No Data:

Fair/Poor Quality Data:

Appendix 6-B
Reaches with Insufficient Data for All Uses

Upper Penitencia Subwatershed

Reach	Waterbody	Reach Limits (downstream to upstream)
UP/CF	Cherry Flat Reservoir	Entire Reservoir
UP-7	Dutard Creek	Entire Creek

Appendix 6-C
Data Sets Used in Assessment

Appendix 6-C contains a list of every data set that was ultimately used in developing the assessment conclusions in Appendix 6-B. Readers interested in knowing what data sets were used for a specific reach/use evaluation should first locate the reach and use of interest in the reach summary tables in Appendix 6-B. The data set identification numbers listed in those tables can be cross-referenced to the data set identification numbers in this appendix. Information about each data set (title, source, date) is presented in this appendix. This information is extracted from the metadata data base developed to support the WMI assessments.

Appendix 6-C
Data Sources used in Assessment
Upper Penitencia Subwatershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0020	Distribution and Ecology of Stream Fishes in the San Francisco Bay Drainage	California Department of Fish and Game	Determined the distribution and ecology of fishes in 457 sampling sites on 175 streams of the San Francisco Bay drainage	19841000	19810511 to 19811010
D0058	Cultural and natural history of Alum Rock Park	City of San Jose	report on cultural and natural history of Alum Rock Park for the City of San Jose	197212	197203-197207
D0060	Stream Survey, Arroyo Aguague Creek	California Department of Fish and Game	estimate of fisheries value and wildlife habitat	N/A	19750916-19750917
D0061	Memorandum of status of anadromous salmonid resources in the Coyote Creek and Upper Penitencia Creek drainages	California Department of Fish and Game	describe fisheries resources in Coyote Creek and Upper Penitentia Creek	N/A	19860216-19871216
D0066	Field notes on Penitencia Creek	California Department of Fish and Game	field notes	N/A	19541117
D0111	California Natural Diversity Data Base	California Department of Fish and Game	provide current information on California's most imperiled elements of natural diversity	19981003	? - 19981003
D0214	Temperature Water Quality Data from SCVWD	Santa Clara Valley Water District	This data summarizes hourly termperature data in creeks in the Santa Clara Basin.	not published	1996, 1997, 1998. Data dates vary by waterbody and stations within the waterbodies.
D0311	EIR Creek Land Use Buffer (crkslu)	SANTA CLARA VALLEY WATER DISTRICT	To establish a map of land use adjacent to the creeks within SCVWD. For a number of different planning functions,including environmental quality analysis, hazard impact work and EIR Routine Maintenance GIS projects.	N/A	N/A
D0312	Dams	Santa Clara Valley Water District	Establish a basemap of all the dams in Santa Clara Valley Water District.	19960700	N/A
D0315	Reservoirs	Santa Clara Valley Water District	Establish a basemap of all reservoirs in Santa Clara County.	19960400	N/A

Upper Penitencia Subwatershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0321	FEMA Flooding Areas	Santa Clara Valley Water District	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19960500	N/A
D0322	SCVWD Flooding Area	SANTA CLARA VALLEY WATER DISTRICT	To delineate the boundary of the 1% flood zone for planning purposes.	N/A	N/A
D0323	Historical Flooding	SANTA CLARA VALLEY WATER DISTRICT	Floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP).	19971100	N/A
D0324	Historical Flooding-Points	SANTA CLARA VALLEY WATER DISTRICT	This shapefile shows locations of overbank flooding from 1978-1997.	N/A	N/A
D0325	Areas Now Protected	SANTA CLARA VALLEY WATER DISTRICT	This shape shows areas now protected from a 1% flood event.	N/A	N/A
D0326	Fema Panels	Santa Clara Valley Water District	This data is a dissolve on the fema Q3 data on firm panel.	19960500	N/A
D0328	Percolation Ponds	SANTA CLARA VALLEY WATER DISTRICT	The coverage was developed to establish a basemap of percolation ponds within the jurisdiction of the SCVWD.	19960500	N/A
D0380	Geo-hydro (WWMM)	Santa Clara Valley Water District	Adapt SCVWD Waterways Management Modle data to GIS creek system	1997	
D0383	Outfall Locations	Santa Clara Valley Water District	Outfalls into creek system		
D0412	Summer dams fisheries study summary of field work, 1989-90	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	19910620	198911-1990/10
D0419	Summer dams fisheries study summary of field work, November 1990-March 1992	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	19920407	199011-199203
D0422	Summer dams fisheries study summary of field work, November 1992-October 1993	Santa Clara Valley Water District	Annual report of field work conducted between 11/1992 to 10/1993 and four-year summary 1989-1993	199404	198911-199310

Upper Penitencia Subwatershed

Data ID	Title	Originator	Purpose	Publication Date	Range of Dates
D0423	Spreader (Summer) dams fisheries study 1994 annual report	Santa Clara Valley Water District	Five-year study to determine stream use by chinook and steelhead in streams on which SCVWD constructs summer percolation dams	199503	198911-199410
D0559	Waterways Management Model Data for Three WMI Pilot Watersheds	Santa Clara Valley Water District	Stream Data for Three watershed	2000	
D0584	Environmental Setting of the Watersheds and Floodplains of the Guadalupe River, Coyote Creek and their Tributaries	Santa Clara Valley Water District	Characterize the environmental setting of the study area, and to identify environmental concerns with implications for the planning of the possible future flood control improvements	197404	1955-1973
D0588	Coyote River, Lower & Upper Penitencia Creek Flooding (2 Video Cassettes)	Santa Clara Valley Water District	Video	19830301	
D0589	Aerial View of County Wide Flooding (2 Video Cassettes)	Santa Clara Valley Water District	Video	19830124	
D0590	Flooding Upper Penitencia Creek (2 Video Cassettes)	Santa Clara Valley Water District	Video	198204	
D0600	Alum Rock Park Riparian Management Plan, Draft	City of San Jose	Draft riparian management plan	20010115	Historic, 1900, through 2000
D0603	FAHCE data	Santa Clara Valley Water District	FAHCE water temperature, streamflow, and habitat mapping data		
D0609	Revised SMP Appendix E, Santa Clara Valley Water District Stream Maintenance Program, Programmatic Impact Assessment and Mitigation for Routine Bank Protection Activities	SANTA CLARA VALLEY WATER DISTRICT	Programmatic impact assessment and mitigation for routine bank protection activities	20010801	1988-2001
D0621	SCVWD Stream Maintenance Criteria and Gudelines	SCVWD	Developes a tracking system for the maintenance activittes of three pilot watersheds.		
D0625	USGS Spreadsheet Macroinvertebrate Data	Jim Carter and Steve Fend	Santa Clara Valley macroinvertebrate data		

List of Appendices
[for final inclusion in the WAR Table of Contents]

Appendix A1

Santa Clara Basin Watershed Management Initiative

FINAL

Rationale for Selecting Primary Uses as the Basis for the Santa Clara Basin Watershed Assessment Report

SANTA CLARA BASIN

WMI

WATERSHED
MANAGEMENT INITIATIVE

Prepared By

The Watershed Assessment Subgroup

Approved by Core Group August 6, 1998

Rationale for Selecting Primary Beneficial Uses as the Basis for Santa Clara Basin Watershed Assessment Report

Summary

This document provides a rationale for using "primary " beneficial uses and stakeholder interests as the basis for assessing the condition of watersheds in the Santa Clara Basin. This rationale is based upon requirements contained in State and Federal clean water regulations and the need to conduct a timely and cost-effective evaluation of watershed condition within the Basin. A process for conducting a watershed assessment based upon selection of these primary uses and stakeholder interests is described along with examples of data types that are indicators of attainment of each use.

Background and Purpose

*During the early phases of workplan development for the Santa Clara Basin Watershed Management Initiative (SCBWMI), a work group of the Watershed Assessment Subgroup (WAS) considered what environmental data would be needed to document and assess watershed condition. In an effort to remain consistent with the Regional Board's Watershed Management Initiative (July, 1996), WAS focused on the concept of beneficial use protection as a key component for evaluating the environmental quality of waterbodies in the Basin. This concept was further developed in the SCBWMI workplan (*Workplan for the Santa Clara Basin Watershed Management Initiative*. July, 1997) which contained a task (1.1.1) to outline an approach which would focus on "keystone" beneficial uses that address environmental goals defined by the Core Group. For each beneficial use, the WAS work group identified data types that could potentially provide an indication of whether the beneficial use is supported.*

The purpose of this paper is to provide SCBWMI stakeholders with an understanding of:

- *the legal basis and concepts underlying State and Federal water quality standards programs;*
- *the importance of beneficial uses in defining the condition and quality of waterbodies;*
- *and, an approach to focus assessment and data gathering efforts such that SCBWMI resources are efficiently employed.*

Rationale for the Focus on Beneficial Uses

Federal Regulations

*The Federal Water Pollution Control Act (PL 92-500, known as the Clean Water Act) as last reauthorized by the Water Quality Act of 1987 (PL100-4), provides the legal foundation for Federal, State, and Tribal governments to "*restore and maintain the chemical, physical, and biological integrity of the Nation's waters.*"*

To accomplish these goals, the Clean Water Act, section 303(c), established "water quality standards" as a mechanism to measure whether the Nation's waters are meeting "fishable/swimmable" goals. Briefly stated, the key elements of section 303(c) include:

1. *A water quality standard for any waterbody is defined as the designated beneficial uses (such as recreation or protection of aquatic resources), the water quality criteria (expressed as either*

numeric limits or as a narrative statement) necessary to support those uses, and an antidegradation policy to protect existing uses;

2. *States designate beneficial uses for their waterbodies. EPA requires that, at a minimum, beneficial uses include public water supplies, propagation of fish and wildlife, recreation, agricultural uses, industrial uses, and navigation. The criteria applied to these uses to set standards must also protect public health or welfare, enhance the quality of water, and fulfill the goals of the Clean Water Act;*
3. *States must review their water quality standards every three years (Triennial Review process) using a process that includes public participation. The EPA reviews and approves of State Water Quality Standards.*

State Regulations

In California, the Federal requirement for State action is met through provisions of the Porter-Cologne Water Quality Act. The State Water Resources Control Board and the nine Regional Water Quality Control Boards are responsible for implementing water quality protection programs of both the Clean Water Act and Porter-Cologne. Porter-Cologne directs the nine boards to formulate regional water quality control plans (Basin Plans) that include:

- The beneficial water uses of the waterbodies in the Basin (see attached Table 2-5 for current designated uses of waterbodies in the Santa Clara Basin);
- The water quality objectives (equivalent to water quality criteria in the Federal regulations needed to protect the designated beneficial water uses; and
- A plan for achieving the water quality objectives.

The water quality objectives included in each region's Basin Plan must be designed to ensure the "reasonable protection of beneficial uses and the prevention of nuisance." In establishing these objectives, the regional boards are required to consider:

1. *past, present, and potential future beneficial uses of the Basin's waters;*
2. *the water's environmental character;*
3. *water quality that could reasonably be achieved through coordinated water pollution control programs;*

There are two types of objectives: narrative and numerical. Narrative objectives describe water quality that must be attained through pollutant control measures and watershed management, and they also serve as the basis for development of detailed numerical objectives.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses. Together, narrative and numerical objectives indicate the conditions that shall be attained to protect beneficial uses. For some beneficial uses the linkage between specific chemical, physical or biological parameters is well understood. For example, temperature and dissolved oxygen ranges necessary to support coldwater fisheries have been clearly established. In such cases, the relationship between beneficial use protection and the water quality objectives/standards is clear and set forth in the Basin Plan. This linkage provides a firm regulatory basis for establishing whether the water quality of a particular waterbody supports that designated use (see Figure 1). There are other parameters, however, that also provide an indication of water quality conditions and beneficial use protection. These factors, known as "indicators" may not have an easily demonstrated relationship to water quality or to the uses themselves but they provide information that can be related to the environmental integrity of the waterbody. For example, a waterbody may meet all numeric water quality objectives, but not provide suitable spawning habitat for fish. Migration barriers, loss of riparian cover, sedimentation, and changes in stream geomorphology may have a greater impact on spawning and coldwater fish beneficial use protection than water quality.

These factors require a great deal more interpretation to derive an understanding of the water quality conditions for a given waterbody. For this reason, indicators, while useful, do not normally have associated water quality objectives or a regulatory basis.

Assignment of Present and Potential Beneficial Uses

The Regional Board, in consultation with state and local authorities and based upon best available information, designate existing and potential beneficial uses for significant surface and groundwater bodies in the region. Not all beneficial uses are appropriate to all significant waterbodies. Estuarine (EST) resources would only be expected in waters which receive tidal flow from a salt water source.

Beneficial Uses of Waterbodies in the Santa Clara Basin

In assessing the water quality conditions of the waterbodies within the Santa Clara Basin, it will be important to decide; 1) which designated beneficial uses are the most useful in evaluating environmental health and, 2) which parameters, both those with associated water quality objectives and indicators, can best establish the degree of beneficial use protection for such "targeted uses."

The following discussion describes the beneficial uses of surface waters, ground waters and marshes contained in the Regional Water Quality Control Board's Basin Plan for the San Francisco Basin (Basin Plan) and is offered to provide an understanding of the uses and the water quality objectives associated with their protection. The Basin Plan or Regional Water Quality Control Board staff should be consulted regarding detailed beneficial use protection issues and the application of water quality objectives.

Designated beneficial uses for waterbodies in the Santa Clara Basin are listed in Appendix 1 of this report and are taken from the latest Basin Plan (1995). The descriptions of beneficial uses provided below are slightly based on the narratives provided in the current Basin Plan.

(AGR) Agricultural Supply

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

Water quality objectives and standards are set to prevent (1) soluble salt accumulations, (2) chemical changes in the soil, (3)toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these issues.

(COLD) Cold Freshwater Habitat

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Water quality objectives/standards are set to protect cold freshwater habitats to support anadromous salmon, steelhead and trout fisheries. Such objectives set limits on key habitat requirements such as temperature and dissolved oxygen. Life within these waters is relatively intolerant to environmental stresses.

(COMM) Ocean, Commercial and Sport Fishing

Uses of water for commercial and recreational collection of fish, shellfish, and other organisms in oceans, bays, and estuaries, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

(EST) Estuarine Habitat

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

The protection of estuarine habitat is contingent upon; 1) the maintenance of adequate Delta outflow to provide mixing and salinity control, 2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities), and 3) maintenance of dissolved oxygen, pH, and temperature.

(FRSH) Freshwater Replenishment

Uses of water for natural or artificial maintenance of surface water quantity or quality.

(GWR) Groundwater Recharge

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. Hence the water quality objectives are set to protect those future uses.

(IND) Industrial Service Supply

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well pressurization.

Most industrial service supplies have few water quality limitations except for gross constraints, such as freedom from unusual debris.

(MAR) Marine Habitat

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, wildlife (e.g., marine mammals, shorebirds).
In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent objectives may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. This beneficial use does not apply to waters within the estuary. Instead, uses protecting estuarine ecosystems and values are applied to the South San Francisco Bay.

(MIGR) Fish Migration

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.
The water quality objectives established for cold water fisheries protect anadromous fish as well, however, for those migratory species particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish impacts reproduction. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, which prevents migration is an indicator of non-protection of this use.

(MUN) Municipal and Domestic Supply

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.
The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages. Water quality objectives relate to prevention of direct disease transmission, toxic effects, and increased susceptibility to disease. In addition, aesthetic factors are important and include parameters associated with excessive hardness, unpleasant odor or taste, turbidity, and color.

(NAV) Navigation

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

(PRO) Industrial Process Supply

Uses of water for industrial activities that depend primarily on water quality.
Water quality requirements differ widely for the many industrial processes in use today such that no meaningful criteria can be applied to the quality of raw water supplies.

(RARE) Preservation of Rare and Endangered Species

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under slate am/or federal law as rare, threatened, or endangered.
The water quality objectives for protection of rare and endangered species are often the same as those for protection of fish and wildlife habitats. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment of this use vary slightly with the environmental needs of each particular species.

(REC1) Water Contact Recreation

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.
Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, objectives required to protect this use include limits on bacterial concentrations, tastes and odors, and floating material.

(REC2) Noncontact Water Recreation

Uses of water for recreational activities involving proximity to water but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features from odors or floating materials.

(SHELL) Shellfish Harvesting

Uses of water that support habitats suitable for the collection of crustaceans and filter feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation, therefore, bacteriological objectives for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur are established to protect public health.

(SPWN) Fish Spawning

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

(WARM) Warm Freshwater Habitat

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other panfish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of non-fish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and the ranges of objectives for temperature, dissolved oxygen, pH, and turbidity are usually greater.

(WILD) Wildlife Habitat

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as water-fowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be impacted by development, erosion, and sedimentation, and by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality parameters particularly important to waterfowl habitat.

Beneficial Use Protection as the Foundation for Watershed Assessment

A work group of the Watershed Assessment Subgroup was formed during the early months of the Watershed Management Initiatives efforts. This group's goal was to present the Core Group and other interested stakeholders with the kinds of data that might be available from local, regional or state sources and that would support assessment of beneficial use protection. The work group studied the kinds of supporting data that would be required to determine beneficial use support. The result of these studies is represented in Figures 2A to 2E.

Since beneficial use protection forms the foundation for water quality goals and setting standards throughout the United States, a watershed assessment should be based upon whether designated beneficial uses are supported. Numerically based water quality criteria exist for many pollutants of concern. These numeric limits can be applied directly to certain beneficial uses such as Agricultural Supply, Groundwater Recharge, Municipal and Domestic Supply, and Recreation. Many of the "fish and wildlife" beneficial uses, however, do not lend themselves to numeric objectives, and therefore, use attainment must be described through narrative objectives and documented through the use of indicators.

This lack of easily quantifiable criteria has led to the development of biologically based monitoring and assessment methods to serve as the foundation for assessing use protection where no specific numeric criteria exist or where application of pollutant-specific parameters is infeasible. USEPA has recommended that States establish comprehensive monitoring programs for significant waterbodies to provide both qualitative and quantitative information sufficient for agency decisions regarding waterbody conditions (USEPA. 1995). The Interagency Task Force on Monitoring Water Quality (ITFM) has recommended the parameters for stream monitoring programs to address appropriate designated uses. Their approach is summarized in Figure 1.

An analysis of data necessary to determine protection of all beneficial uses was seen by the work group as a *daunting task. To focus assessment efforts in the Basin, it was recommended that a set of* primary keystone beneficial uses *be selected as the foundation for watershed assessment with the understanding that if conditions were met that provided protection of these primary beneficial uses, the conditions for other environmentally related beneficial uses would be attained as well. For a view of how these primary uses support other beneficial uses consult Figures 2A to 2E.*

The primary beneficial uses and the work group's reasoning for their designation as "primary" follow:

- **COLD - Cold Freshwater Habitat**: cold water fish such as salmon and steelhead require stringent chemical, physical and biological conditions which if met would support a wide variety of related aquatic species and habitats including many species of warmwater fish as well as reptile and amphibian populations. In terms of freshwater habitats, anadromous fish populations (such as salmon and steelhead) can be used as indicators for coastal California streams.

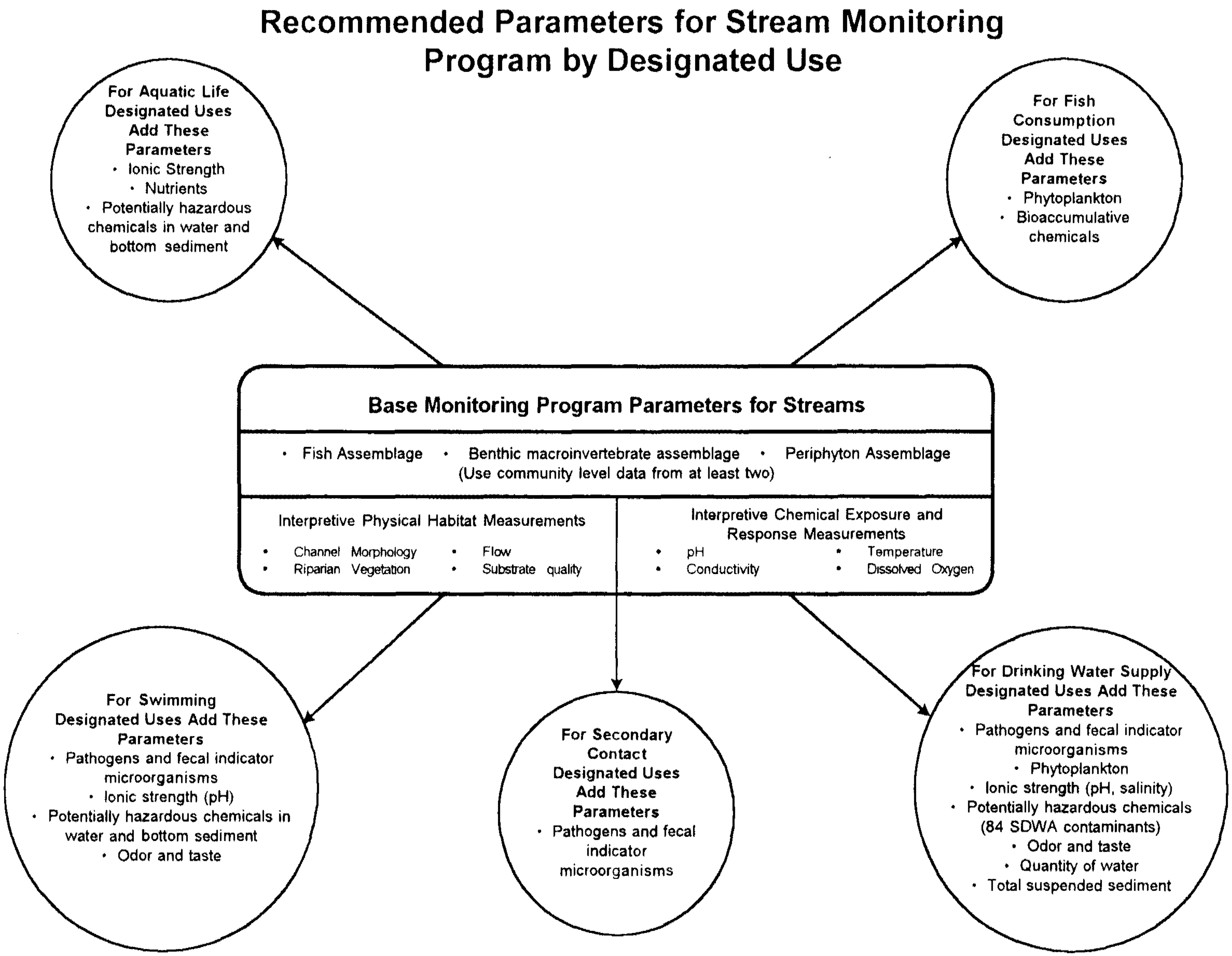


Figure 1. Stream Monitoring Parameters. (After EPA Guidelines for Preparing 305(b) Reports. 1995)

- **RARE - Preservation of Rare and Endangered Species**: Many plant and animal species found in aquatic and terrestrial habitats in the Santa Clara Basin are dependent upon environmental conditions which have been impacted by human activities. Protection of the environmental characteristics which support rare, threatened or endangered species will often result in conditions which are supportive of a wider array of species and habitats. For instance, protection and enhancement of California red-legged frog habitat (which includes small ponds in upland grasslands) provides watering areas for non threatened terrestrial species such as mule deer and tule elk, habitat for fairy shrimp and a host of other aquatic and upland species.

- **REC1 - Water Contact Recreation**: The ability of humans to enjoy body contact recreation such as swimming or wading indicates that many water quality objectives related to contamination and other health and safety considerations are supportive of other human-related beneficial uses of the Basin's waterbodies such as canoeing or kayaking .

- **GWR - Groundwater Recharge**: Since the majority of water uses for human activities are met through groundwater withdrawal, protection of groundwater recharge capacity within the Basin will support many other human-centered beneficial uses.

Other Important Uses of Waterbodies in the Basin

Early stakeholder interest surveys also indicated that flood protection and associated "structural improvements," although not considered a beneficial use by either the State Water Resources Control Board or the USEPA, was of sufficient community benefit to be considered an importantfactor for identifying conditions of surface waters and was added to the list of parameters to assess.

- **Protection from Flooding**: Since much of the urban portion of the Santa Clara Basin is subject to periodic flooding, there was substantial interest by stakeholders in including an assessment of appropriate waterbodies for flood control and private property protection of property.

Addition stakeholder interests may warrant more specific attention as the Watershed Management Initiative progresses.

Process for Primary Use Analysis - Next Steps

If the methodology of primary use and stakeholder parameter assessment is approved by the Core Group, the Watershed Assessment Subgroup can proceed to define which parameters and supporting data would be most suitable to determine the degree of protection of these uses. As shown below in Table 1 there are numerous types of data which can be gathered to indicate the degree of use protection. The next challenge will be to decide which types of data would best serve the goals of the SCBWMI stakeholders.

Once the most useful data types are identified and approved by the Core Group, the data will be identified in the data matrix and made available to the various subgroups of the Watershed Management Initiative for their use in conducting the assessment. It is anticipated that this method of assessment will be applied to all appropriate waterbodies within the Basin regardless of whether the waterbody currently spports or could potentially support these uses or stakeholder interests.

References

California Environmental Protection Agency. 1993. A Summary of California Environmental Laws, Third Edition. *Office of Environmental Health Hazard Assessment.*

California Regional Water Quality Control Board, San Francisco Bay Region. 1995. Water Quality Control Plan, San Francisco Basin (Region 2).

Izaak Walton League of America. A Citizen's Guide to Clean Water. *Arlington, VA.*

Natural Resources Defense Council. 1987. Citizen's Handbook on Water Quality Standards. NRDC. Washington, D.C.

Santa Clara Basin Watershed Management Initiative. 1997. Workplan for Completion of the State of the Watershed Report.

U.S. Environmental Protection Agency. 1994. National Water Quality Inventory: 1992 Report to Congress. *EPA-841-R-94-001.*

U.S. Environmental Protection Agency. 1994. Water Quality Standards Handbook: Second Edition. *EPA-823-B-94-005a.*

U.S. Environmental Protection Agency. 1995. Guidelines for Preparation of the 1996 State Water Quality Assessments (305(b) Reports). *EPA 841 B-95-001.*

Water Environment Federation. 1993. The Clean Water Act of 1987. *WEF. Alexandria, VA.*

Table 1. Summary of data associated with primary beneficial uses.

Data Categories	Data Types	Primary Beneficial Use COLD	RARE	REC-1	GWR	Stakeholder Interest FLOOD
Land Use						
	Developed	✓			✓	
	Undeveloped	✓			✓	
	Extent of recreation			✓		✓
Channel Character						
	Aggrading/degrading	✓				
	Sediment size	✓				
	Longitudinal profile	✓				
	Cross-section	✓				
	Bankfull height/width	✓				
Macroinvertebrates						
	Species	✓	✓			
	Population metrics	✓				
Water Quality						
	Dissolved Oxygen	◆	◆			
	Temperature	◆				
	pH	◆		✓		
	Turbidity	✓				
	Alkalinity	✓				
	Nutrients	●				
	PAH's	✓		◆	◆	
	Pesticides/herbicides	✓			◆	
	Metals/VOC's			◆	◆	
	Microbial pathogens			◆	◆	
	Leaking underground tanks				✓	
Spawning Locations						
	Species	✓	✓			
	History	✓	✓			
	Substrate	✓	✓			
Migration Barriers						
	Location	✓	✓			
	Degree of Impediment	✓	✓			
Vegetation						
	Type		✓			
	Extent of cover	✓				
	Size class	✓				
	Extent of non-natives	✓				
	Shading values	✓	✓			
	Absorption/transpiration				✓	

◆ Data type for which numeric objectives are set.
● Specific limits set for un-ionized ammonia.
✓ Data that may be appropriate for determining beneficial use protection.

Data Categories	Data Types	Primary Beneficial Use				Stakeholder Interest
		COLD	RARE	REC-1	GWR	FLOOD
Flow						
	Rate		✓			✓
	Peak	✓				✓
	Duration	✓			✓	✓
	Rainfall	✓			✓	✓
Erosion						
	Type	✓				✓
	Extent	✓				✓
	Sediment Burden	✓				✓
	Reservoir sedimentation			✓		✓
Wetlands						
	Type	✓	✓			
	Extent	✓	✓	✓		
	Location	✓	✓	✓		
	Condition	✓	✓			
	Visitation rate (people)			✓		
Outfalls						
	Location	✓		✓		
	Size	✓				
	Flow characteristics	✓				
	Drainage area	✓				
	Contamination			✓		
	Proximity to recharge zone				✓	
Habitat						
	Type		✓			
	Extent		✓			
	Condition	✓	✓			✓
Biological Resources						
	Population metrics		✓			
Political/Demographic						
	Jurisdiction		✓	✓		
	Legislative protection		✓			
	Park use			✓		
	Trails and access			✓		✓
Fish Consumption						
	Species taken			✓		
	Catch rate			✓		
	Contamination			✓		
Soils						
	Type				✓	✓
	Location				✓	
	Recharge locations				✓	✓
	Landslide locations					✓
Percolation						
	Location of ponds	✓			✓	
	Location of instream	✓			✓	
Data Categories	Data Types	Primary Beneficial Use				Stakeholder Interest
		COLD	RARE	REC-1	GWR	FLOOD

Rainfall						
	Recharge rate/rainfall				✓	✓
Flooding						
	Flood hazard zones (FEMA maps)					✓
	Flooding History					✓
Sedimentation						
	Frequency of removal		✓			✓
	NPDES monitoring data					✓
	Fines for sediment dumping					✓
Other Agencies						
	CalTrans maintenance					✓
	General Plans countywide					✓
	Impervious surfaces					✓
Aerial Photography						
	All					✓
Hydro-modification						
	Past					✓
	Present					✓
	Planned					✓

Figure 2A Data Needed to Assess Cold Water Fish Beneficial Use

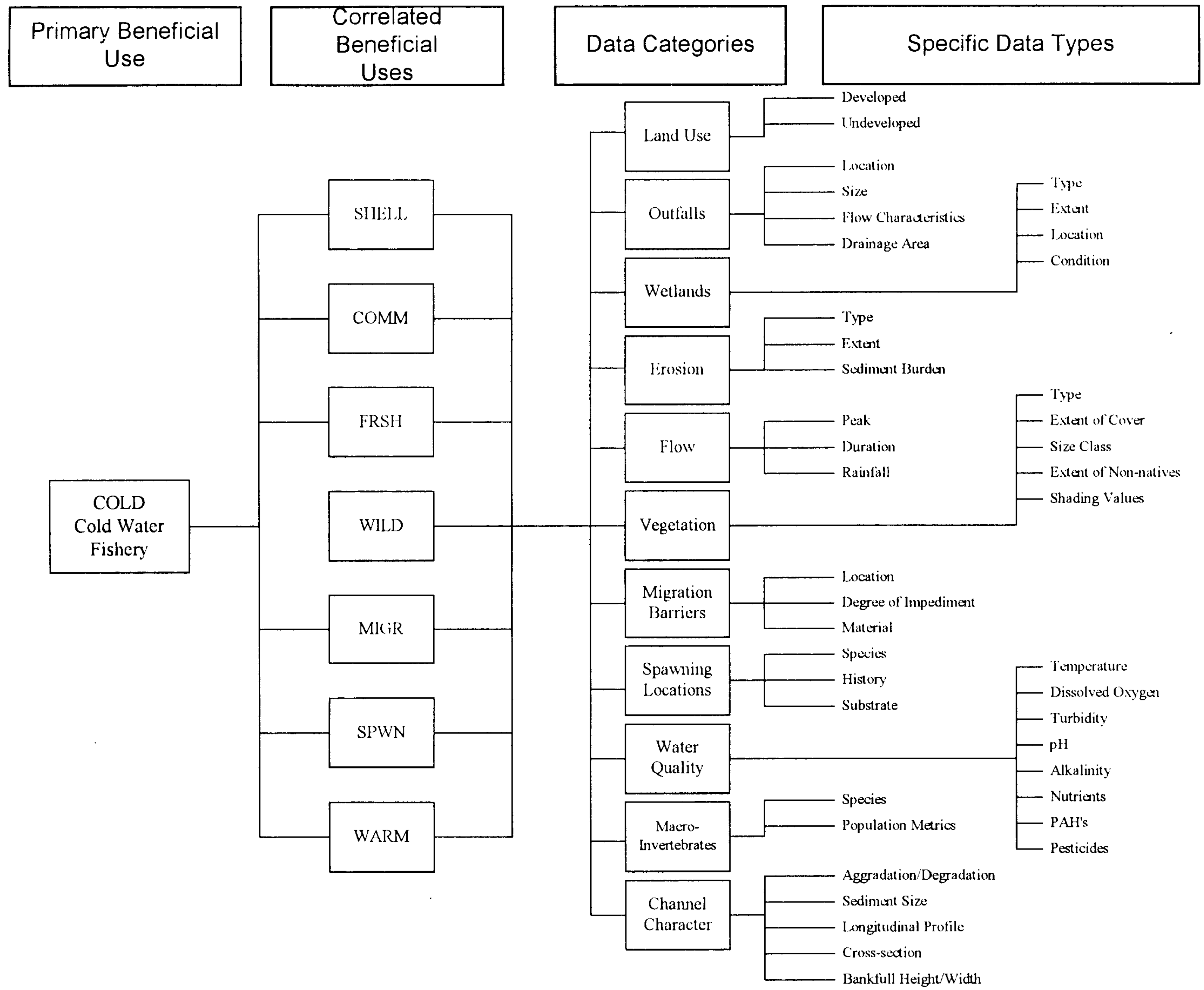


Figure 2B Data Needed to Assess Rare or Endangered Beneficial Use

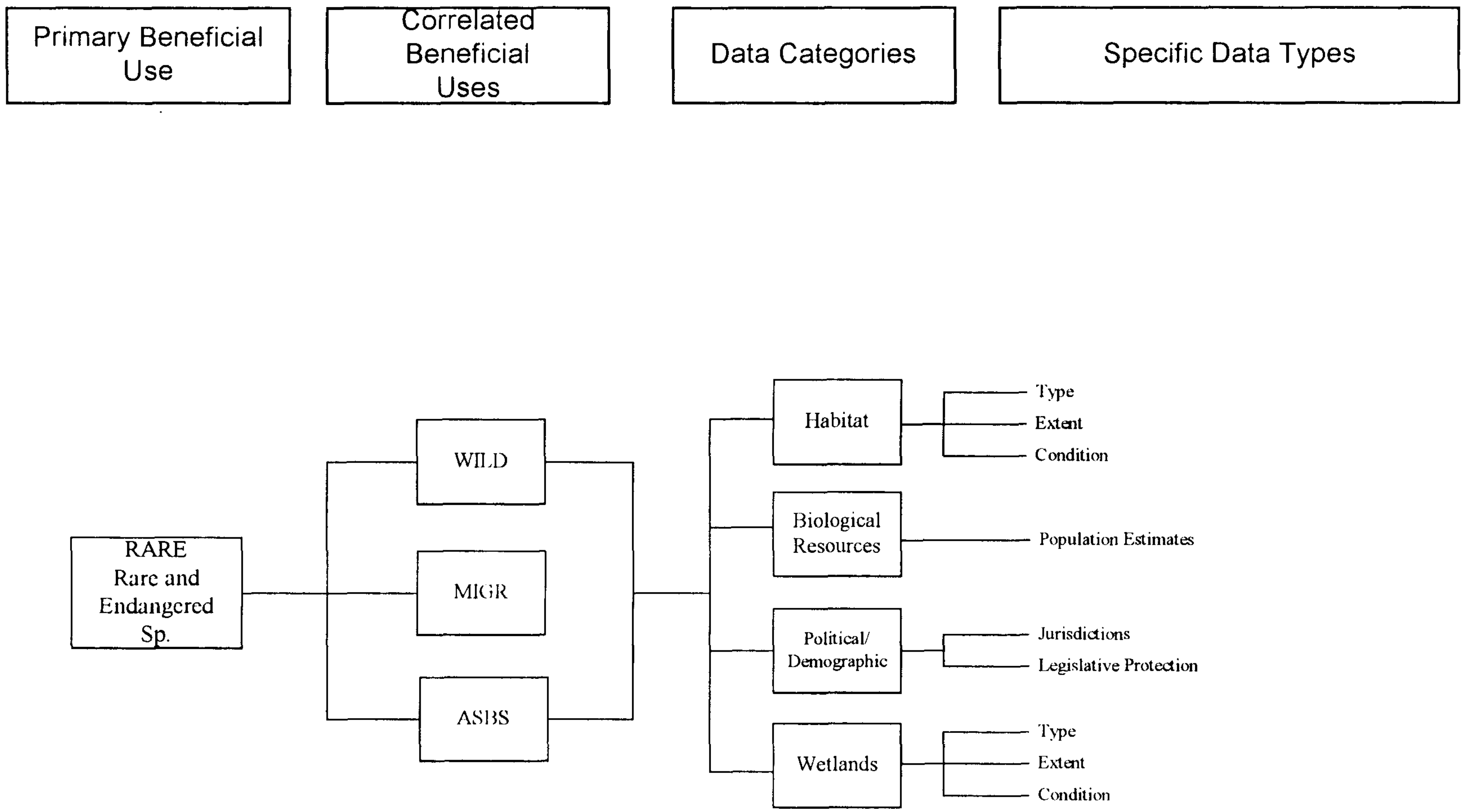


Figure 2C Data Needed to Assess Body-contact Recreation Beneficial Use

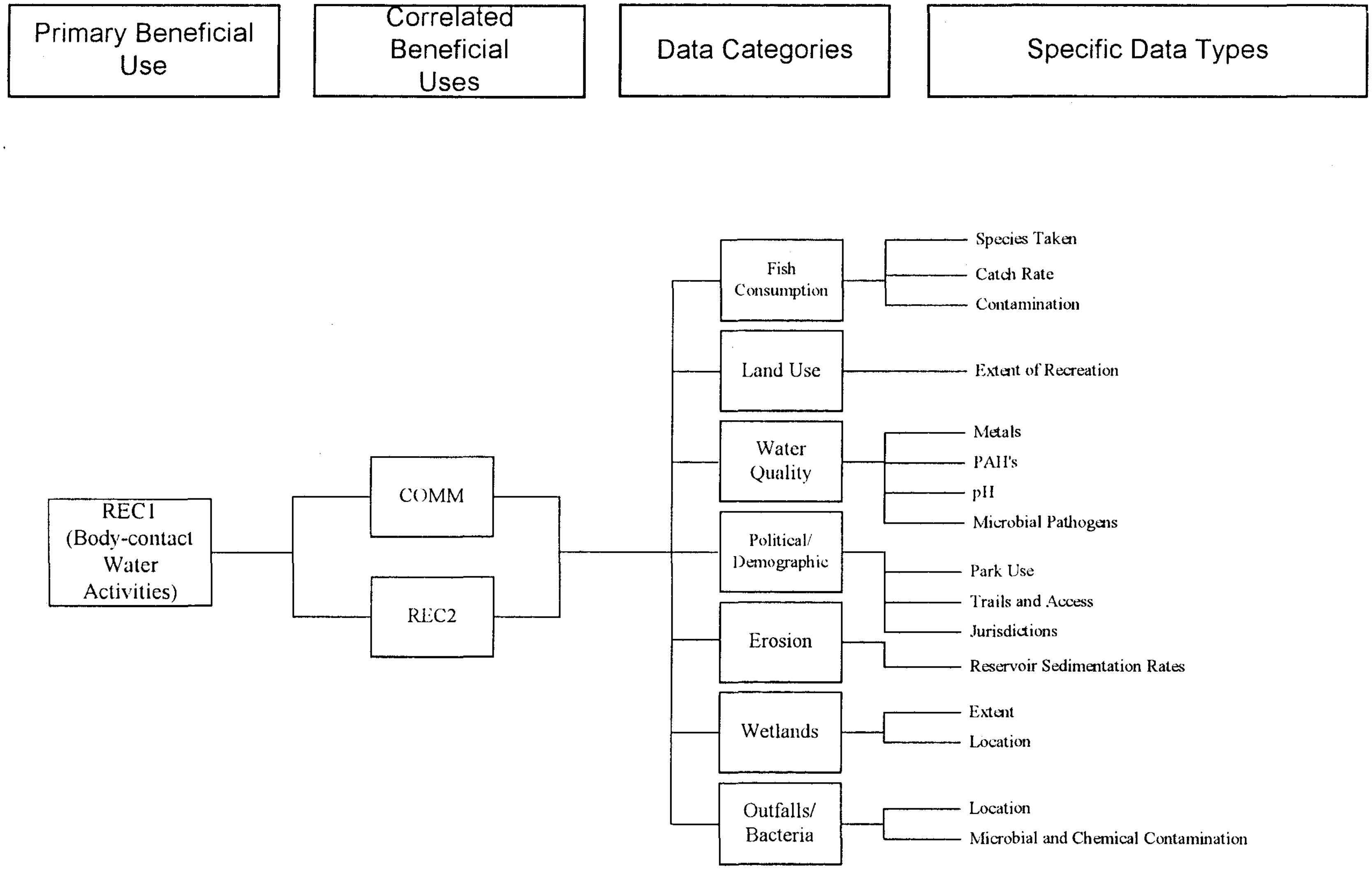


Figure 2D Data Needed to Assess Groundwater Recharge Beneficial Use

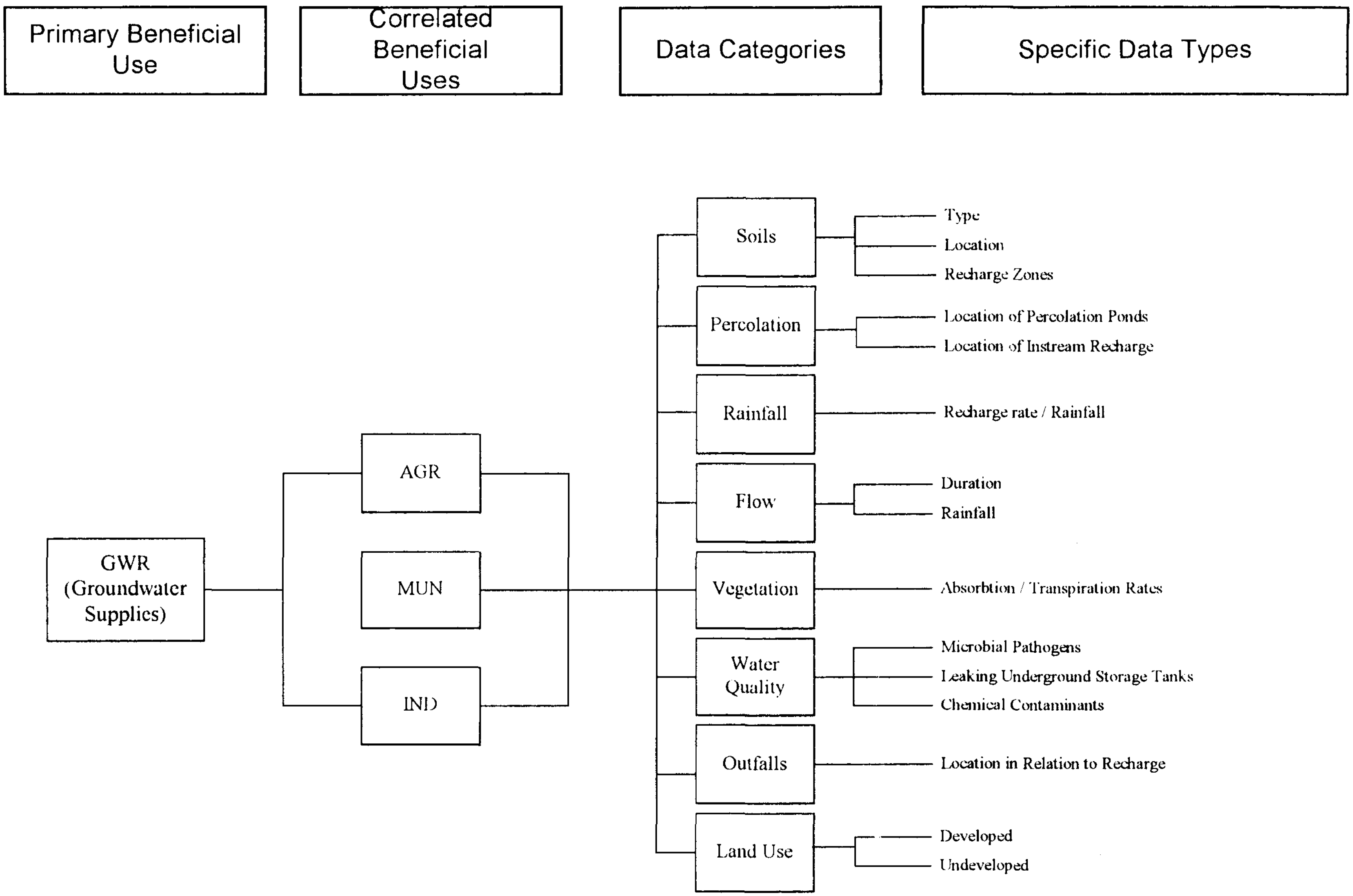


Figure 2E Data Needed to Assess Flood Management Stakeholder Interest

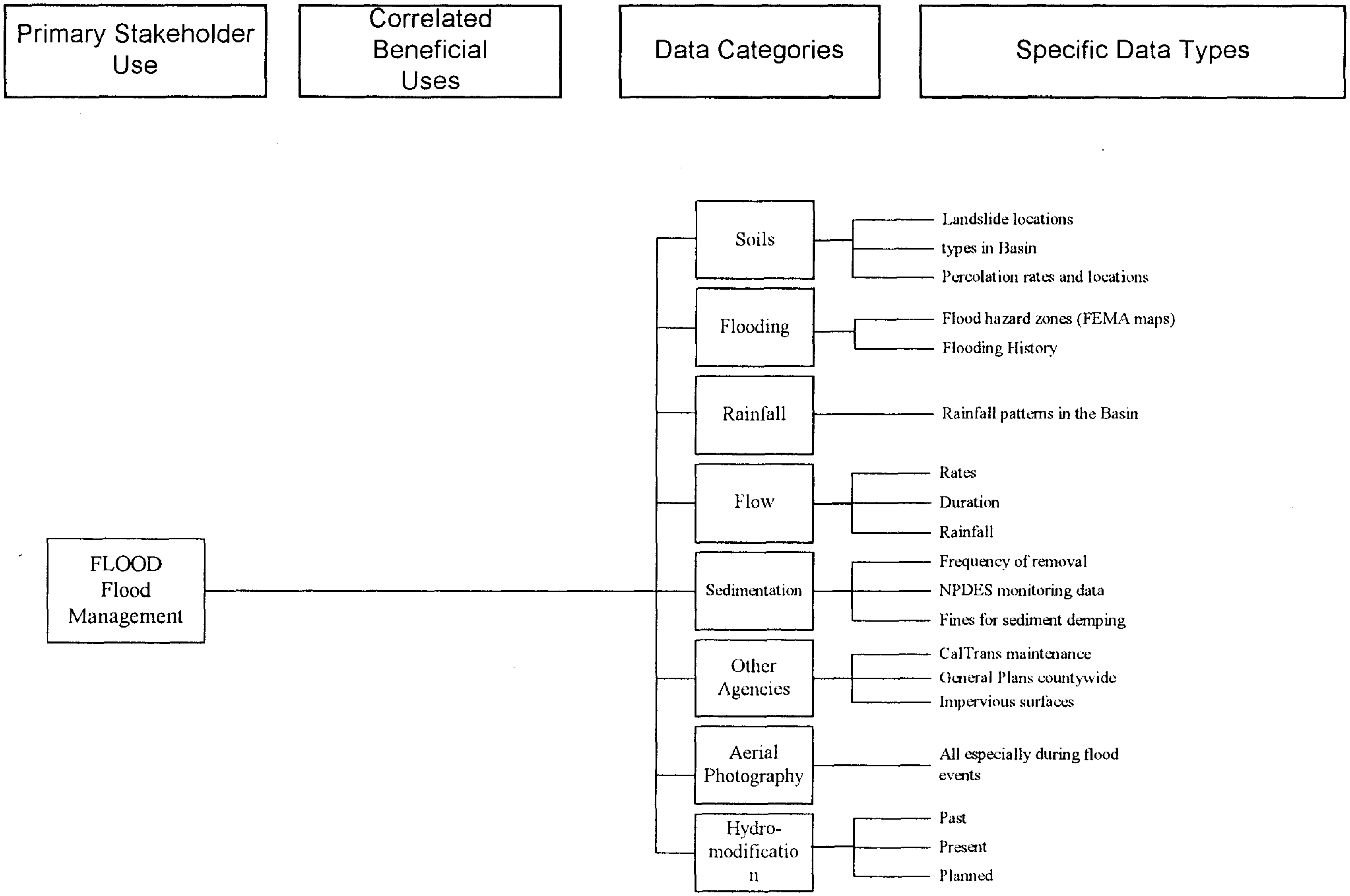


TABLE 2-5 BASIN 5 - SANTA CLARA BASIN

BASIN	WATERBODY	AGR	COLD	COMM	EST	FRSH	GWR	IND	MAR	MIGR	MUN	NAV	PROC	RARE	REC-1	REC-2	SHELL	SPWN	WARM	WILD
San Francisco Bay South				E	E			E		E		E		E	E	E	E	P		E
Matadero Creek			E							E					E	E		E	E	E
Permanente Creek			E												E	E		E		E
Saratoga Creek		E	E			E	E								E	E			E	E
Calabazas Creek		E	E				E					E			E	E			E	E
San Francisquito Creek			E							E					P	P		E	E	E
	Los Trancos Creek																			
	West Union Creek																			
	Felt Lake	E													E	E		E	E	E
Stevens Creek			E			E				E					E	E		P	E	E
	Stevens Creek Reservoir		E				E			E	E					E		E	E	E
Searsville Lake		E	E												E	E		E	E	E
Coyote Creek			E							E				E	P	E		E	E	E
	Elizabeth Lake		E													E		E	E	E
	Fremont Lagoon																			
	Sandy Wool Lake			E						E					E				E	
	Cotton Wood Lake		E												E	E		E	E	E
	Guadalupe Reservoir		E				E				E				E	E		E	E	E
	Coyote Lake	E	E								E				E	E		E	E	E
	Upper Penitencia Creek																			
	Cherry Flat Reservoir	E									E				L	E		E	E	E
	Penitentia Creek																			
	Silver Creek																			
	Soda Springs Canyon Creek																			
	Otis Canyon Creek																			
	San Felipe Creek		P												P	P		P	E	E
	Halls Valley Reservoir														E	E			E	E
	Arroyo Aquague Creek																			
	Berryessa Creek																			
Guadalupe River										P					P	E		P	E	E
	Campbell Percolation Pond																			
	Lexington Reservoir		E								E				E	E		E	E	E
	Los Gatos Creek		E			E	E			P	E					P		P	E	E
	Vasona Lake		E				E								E	E		E	E	E
	Los Gatos Creek																			
	Alamitos Creek																			
	Guadalupe Creek																			
	Herbert Creek																			
	Calero Reservoir						E				E				E	E		E	E	E
	Almaden Reservoir		E				E				E				E	E		E	E	E
	Lake Elsman		E								E									E
	Anderson Lake		E				E				E				L	E		E	E	E
	Barrett Canyon Creek																			
	Herbert Creek																			

E: Existing Beneficial Use P: Potential Beneficial Use L: Limited Beneficial Use Water bodies listed here may not correspond exactly to those that appear on Figure 2-

Appendix A2

Santa Clara Basin Watershed Management Initiative

FINAL

Framework for Conducting Watershed Assessment (Parts A and B)

SANTA CLARA BASIN
WMI
WATERSHED
MANAGEMENT INITIATIVE

Prepared By

The Report Preparation Team and Watershed Assessment Consultant

Approved by Core Group February 3, 2000

Santa Clara Basin Watershed Management Initiative

FINAL

Framework for Conducting Watershed Assessment (Part A)

SANTA CLARA BASIN

WMI

WATERSHED
MANAGEMENT INITIATIVE

Prepared By

The Report Preparation Team and Watershed Assessment Consultant

Approved by Core Group February 3, 2000

TECHNICAL MEMORANDUM (TM 4g, Task 3b)

To: Core Group

From: Watershed Assessment Consultant, John Davis and Peter Mangarella, Leads

Date: February 29, 2000

Subject: Proposed Procedural Framework for Conducting Watershed Assessment (Part A)

Table of Contents

Tables

Figures

Introduction

This memorandum describes a suggested procedural framework for using environmental indicators to conduct the WMI watershed assessment per CAP Task 3b. The framework builds on previous work products developed by the WMI, including the Rationale Document developed by the Watershed Assessment Subgroup, the Data Management Subgroup's Short Term Data Management Plan, Work Group A's identification and classification of environmental indicators, and stakeholder comments regarding the quantifiable parameters. *[WAS comment # 2]*.

Purpose

The purpose of this memorandum is to describe the framework for conducting the assessment to enable stakeholders to understand the suggested approach and agree on an approach. The actual assessment approach used will depend largely on the availability and quality of data, but this memorandum is intended to provide a framework that will enable stakeholders to agree as to how data will be used. The primary focus of the assessment is on assisting Santa Clara Basin stakeholders in identifying the condition of the waterbodies to improve the management of the basin's water resources. To ensure that the assessment is useful to all of the stakeholders, the assessment framework is consistent with federal and state water quality assessment methodologies. Use of this framework would allow the WMI assessment information to be used to satisfy Clean Water Act Section 303 (d) and 305(b) requirements.

An important issue with the approach is coordination with regional efforts, and especially the Regional Board's ongoing efforts in developing a Regional Monitoring and Assessment Strategy. Many among the regulators and the regulated have expressed an interest in improving the assessment process and coordinating it with other monitoring and management programs in the San Francisco Bay Area. Information on related regional efforts to develop an improved approach to monitoring and assessment is contained in Attachment A.

The WMI assessment process described in this memorandum is designed to use available data to determine whether beneficial uses/stakeholder interests are supported in various sub-watersheds and stream reaches in the Santa Clara Basin. The results of the assessment will be programmatic since the assessment is relying on available data, and may be refined, as more data becomes available. The goal of the assessment is to begin to identify the factors that affect beneficial use support and achievement of stakeholder interests in Santa Clara Basin's streams as well as provide a scientific basis for selecting and evaluating alternative management strategies.

It should be noted that the assessment process will not always yield definitive answers with respect to the fitness of a waterbody for a beneficial use. It is expected that in many cases data deficiencies and methodological difficulties will allow only partial or qualified conclusions. *[Response to WAS # 4]*.

Background

The framework presented here represents a synthesis of the work that WMI subgroups and work groups have undertaken to develop an objective method for the assessment process. This overall process supporting the development of the assessment framework is summarized in Figure 1, and discussed below.

<u>The Rationale Paper</u>

As a first step, the Watershed Assessment Subgroup reviewed the designated beneficial uses for waterbodies in the Santa Clara Basin and identified four primary beneficial uses and one stakeholder interest for use in the assessment. The preferred approach was described in the “Rationale for Selecting Primary Uses as the Basis for the Santa Clara Watershed Assessment Report.” The Core Group approved the Rationale Paper and the proposed approach to the assessment on 6 August 1998.

The designated uses are contained in the most recent revision (1995) of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), and the stakeholder interest is flood management. The concept set forth in the Rationale Paper was that if a waterbody supports these four beneficial uses, it could be assumed that other environmentally related correlated beneficial uses would also be supported. Subsequent comments provided by the Regional Board (Gearheart Memorandum dated 12/1/99) indicated that this is not acceptable; therefore this assessment will focus only on four primary uses. No attempt will be made to interpret the condition of other uses. On that basis, the Regional Board, among others, suggested that the MUN beneficial use would be preferred over GWR because water column criteria for MUN are generally more stringent. For this reason the approach described in the Rationale Paper has been modified by stakeholder decisions taken at the December 2, 1999 Core Group Meeting. Although protection from flooding is not a designated beneficial use it is an interest for many WMI stakeholders, and will be evaluated as an important element to be addressed in the Watershed Management Plan.

The five primary uses/stakeholder interests are:

- Cold freshwater habitat (COLD)
- Preservation of rare and endangered species (RARE)
- Water-contact recreation (REC1)
- Municipal and Domestic Supply (MUN)
- Protection From Flooding (PFF)

The Rationale Paper recommended that these uses/interests serve as the foundation of the assessment. Specifically, a waterbody or stream reach would be considered to be functioning well if it supported the primary uses and stakeholder interest. If it did not support the uses and interests it would be considered to be functioning poorly. Finally, the Rationale Paper linked the general types of data that could be used to characterize the condition and assess support of the uses/interest.

Quantifiable Parameters

Based on the primary uses, Work Group A developed a list of data types or indicators for the parameters that could be used to judge whether a waterbody supports these designated beneficial uses/interest. For most beneficial uses/interests, many indicators were listed. Some indicators, for example dissolved oxygen concentration, are well-established water quality criteria and are accepted by water quality regulators as clear indicators of beneficial use support. Other indicators, for example presence of key macro-invertebrates as an indicator of the suitability of a waterbody as cold water habitat, are relatively new. Biological indicators of this sort are only beginning to be accepted by some water quality regulators as "biocriteria." They typically entail the development of region-specific indices and reference conditions to be useful for assessment efforts. The term 'indicator' used here as defined by Work Group A and in the Quantifiable Parameters memo[1], that is, in the generic sense consistent with EPA's Section 305 (b) Guidance document. This Framework continues this application. *[WAS comment #3]*

Based on the list of data types prepared by Work Group A, the WAC developed tables of quantifiable parameters and, where available, threshold values for the parameters, that could be used to judge the fitness of a waterbody for a particular use. Although the tables of quantifiable parameters are comprehensive, they are difficult to use directly for watershed assessment in the absence of a systematic and agreed upon procedure that shows how the quantifiable parameters would be applied. In fact, the quantifiable parameter tables themselves proved to be somewhat controversial in that some stakeholders viewed them as an attempt to create biological criteria that could be misapplied in a regulatory context. The goal here is to provide a systematic approach to watershed assessment tailored to the needs of the WMI stakeholders. The framework attempts to distinguish between critical parameters and important but less critical parameters, and to respond to different levels of data availability and reliability.

[1] See Quantifiable Parameters and Threshold Levels for Beneficial Uses and Stakeholder Interests, January 25, 1999, adopted at the May 1999 Core Group meeting.

Proposed Procedural Framework for Assessment

<u>Decision tools and their application</u>

The proposed assessment procedure consists of a set of decision tools designed for use with the five primary uses/stakeholder interests but which is equally applicable to any other beneficial uses or stakeholder interests. *[WAS comment #1]* The decision-tools illustrated diagrammatically in Figure 2 are discussed in detail in Part B.

The decision tools will be in the form of logic diagrams that enable systematic determination of the level of support of a primary use/interest through a "weight of evidence" approach. The core of the logic diagrams is the analysis step (enclosed in diamond) which asks a question regarding indicator(s) of the beneficial use. For each analysis step there are three possible outcomes:

1) An affirmative answer to the question leads to a support statement.
2) A negative answer leads to another analysis step.
3) Where there is insufficient data to answer the question, additional, less reliable indicators are considered, the lack of available data sets for the preferred indicator documented, and a decision to collect or compile additional data made.

Data are usually required to complete each analysis step and quantitative or qualitative criteria are also needed (enclosed in rectangles). Where preferred indicator data is not available, this will be noted and referred for consideration in the long-term monitoring plan per CAP Task 2 (Develop Process and Criteria for prioritizing collection of missing data). *[WAS comment #12]*.

The logic diagram process provides a rationale for substituting additional data -- essentially weighing more evidence, that may be less reliable, to enable the Assessment process to provide a finding. It provides the technical teams a pathway for documenting decisions to include broader data types and a checkpoint for qualifying the use of such data. It is understood that as decisions are driven further down the logic path there tends to be a decreasing level of reliability in the data to assess use support and a corresponding decrease in the certainty of the findings based on such data. *[WAS comment #13 & 14.]*

For the purposes of analysis, waterbodies will be divided into segments. A separate determination of the fitness of each segment for each primary use/stakeholder interest will be made using each of the decision tools. Segments will be selected on the basis of physical characteristics. For example, a three-mile long reach of creek that is rock- or concrete-lined and passes through many culverts might be designated as a segment.

Immediately upstream is a five-mile reach of relatively natural channel. This reach might also be designated as a segment.[2] *[WAS comment #5]*

<u>Assessment Principles</u>

The proposed procedure is founded on the concept that direct measures of the fitness of a waterbody to support a primary use/stakeholder interest are preferable to indirect measures. Indirect measures or indicators are proposed only when direct measures are impractical or limitations in the data prevent use of a direct measure. Table 1 contains information on direct measures and indicators of fitness for each of the primary uses/stakeholder interests. This concept of a hierarchy of data types and utility for making the assessment is consistent with EPA guidance[3] on conducting water quality assessments. It also builds on work conducted by Work Group A, which identified relevant data types and classified each data type in terms of potential utility to the assessment process.

The reason direct measures are thought to be preferable to indirect measures is because they are typically more conclusive and provide a higher degree of confidence that a waterbody is or is not fit for a primary use/interest over an extended period of time. For example, for COLD and RARE direct measures of the fitness of a waterbody to support these primary uses/stakeholder interests are available and practical to apply. Observations on the presence and condition of cold water fish and endangered species provide evidence to evaluate support. Cold water fish or endangered species will only be present if conditions in the waterbody have been continuously favorable to the organisms for an extended period of time. If cold water fish or endangered species are present and in good condition in a stream reach the assessor can be confident that the primary use/interest is supported.

The most direct measure of a waterbody's fitness for REC 1 would be information on the health of individuals using the waterbody for recreation. Information of this type is derived from epidemiological studies. Epidemiological studies of the health of bathers are technically difficult, time–consuming and expensive. Thus, direct measurement of fitness for REC1 is impractical. A primary indicator of the waterbody's fitness for REC1 might be the concentration of organisms that produce disease in humans (pathogens). However, it is practically impossible to routinely analyze water samples for the many individual strains of pathogens and so a secondary indicator, such as coliform organism concentrations, is routinely used to determine the fitness of waters for contact recreation.

The most direct measure of support of Municipal and Domestic Supply is finished water quality where finished is defined as tap water, water extracted from water supply wells, or finished water from the water treatment plants. However, this type of analysis provides

---

[2]This is consistent with the California Salmonid Stream Habitat Restoration Manual, 2nd Edition (1994). Flosi and Reynolds. Department of Fish and Game. Page Q-16

[3] Section 3 of USEPA (1997), *Guidelines for the Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement*.

little information regarding the condition of the source (or "raw") water, which is a better indication of watershed health. Therefore, the primary indicator for this assessment will be water quality during dry weather in streams and reservoirs used for raw water supply. The threshold criteria in this case are drinking water quality standards in the form of Maximum Contaminant Levels (MCLs) or, where MCLs are not available, Action Levels.

The most direct measure of whether a stream reach provides protection from flooding is data on historic flooding along the stream. However, direct measurement is not useful in a rapidly developing watershed and can be misleading given the infrequency of major flood events. The history of flooding in a watershed is not considered a reliable guide to present or future flood hazard. Instead, a more reliable determination of whether a stream reach provides protection from flooding includes a comparison between the capacity of the channel and the estimated flow in the channel in a large storm. The Santa Clara Valley Water District uses protection from the 1-percent storm, that is, a storm with a 1-percent chance of occurrence in a given year, as a measure of the adequacy of flood management facilities. The assessment of the Flood Protection interest would also consider the effects of flood protection activities (e.g., maintenance) in supporting this use.

<u>Treatment of Data Deficiencies</u>

The WMI watershed assessment is to be performed using existing data. Its goal is to extract the maximum amount of meaning from the existing data and to develop as complete a picture of the current condition of the watershed as is possible. It is expected that for many waterbodies and stream reach data will be limited in quantity and quality affecting the reliability of the conclusions. The assessment framework is designed to accommodate data deficiencies. The first questions in the logic diagrams for assessment of each of the five primary uses/interests assume the availability of good data and the ability to make a conclusive determination of whether a primary use/stakeholder interest is fully supported. If the data are insufficient to make a full determination, the later questions rely on more limited or less statistically rigorous data sets that may lead to a partial support statement.

The problem of data deficiencies affects the five primary uses/stakeholder interests differently. For COLD, if no data are available on fish populations in a waterbody some insight can be obtained by considering primary and secondary indicators as shown in Table 1. Macro-invertebrate or water quality data and data on habitat condition may provide information on the suitability of a waterbody for cold water fish. Similarly, for RARE, if data are lacking on the populations of an endangered species, qualitative assessments of habitat condition can provide some insight into the fitness of a river reach for the species.

For REC1, if no bacteriological data are available for a waterbody then there is no other indicator that sheds much light on the waterbody's fitness for REC1. Bacteriological data are likely to be unavailable for some waterbodies and stream reaches. Chlorophyll data provide a measure of the attractiveness of a waterbody for REC1 but it is difficult to come to a conclusion about fitness based on chlorophyll alone. The REC1 assessment also will address fish consumption related to sport fishing where the primary data type will be fish tissue.

Identification of Limiting Factors

The assessment will attempt to identify factors that may be limiting the use. A final step in the logic diagrams involves the consideration of limiting factors. If a primary use/stakeholder interest is not supported or only partially supported in a waterbody, the relevant data will be examined in an attempt to determine what factors limit the waterbody's ability to support the use.

Products of the Assessment

A principal aim of the Watershed Assessment Report is to organize, present, and convey the most relevant information regarding the condition of the waterbodies as it relates to the primary uses, which include their suitability for supporting aquatic life and for swimming, providing safe drinking water, and how they function in response to high flows.

The results of the assessment will be summarized in a series of annotated tables based on the responses to the framework diagrams for each use and interest. The findings will strive to include as much useful information as possible, including spatial and temporal variation in support, where such data exists to make such a determination. *[WAS comment #18]* The format of the tables will be finalized once the early results of the assessment are available. The content of the tables will be similar to that shown in Tables 2 and 3. A summary table for each stream that lists all the reaches in the stream and the results of each beneficial use will be included. *[WAS comment #24]*.

Implementation of the Assessment

The assessment will be performed by the Watershed Assessment Consultant under the direction of a lead designated from the Report Preparation Team (See Figure 3). It is envisioned that the Report Preparation Team, the Watershed Assessment Subgroup, and the Data Management Subgroup will be involved in providing input to the process and reviewing interim products. The WAC team will be divided into four technical teams as shown in Figure 3. Three of the teams will focus on specific uses and interests while the fourth team will provide data management support. Each team consists of qualified technical specialists in their field charged with carrying out the direction of the Core Group based on the foundation of work established to date, including Work Group A's recommendations and stakeholder comments regarding the quantifiable parameters. The Watershed Assessment Subgroup suggested the concept of "watershed captains" -- a person familiar with each watershed who would actively participate in the assessment process and work with the teams to provide a ‘reality check’ of the initial results. While the WAC will be working together, this would provide an integrator to review the separate use support analyses and ensure that the findings are consistent *[WAS comment #16]* and will contribute to each team's deliberations. The Watershed Assessment Subgroup representative will keep the Core Group apprised of progress.

The Assessment Team Coordinator will be responsible for ensuring that methods and results of each team are consistent with the overall framework described herein. Review of process steps, quantifiable thresholds, and work products will be conducted at the policy, regulatory, and technical levels by the Subgroups involved, the Core Group, the Report Preparation Team, and if appropriate, an outside technical review panel.

Attachment A
Related Regional Assessment Efforts

There are a variety of regional monitoring and assessment planning efforts that are concurrent with the Santa Clara Basin efforts. Key among these efforts is the Regional Board's Regional Monitoring and Assessment Strategy, a draft of which was distributed to interested parties for comments on June 3, 1999. That draft describes related regional work. The following is brief synopsis of these efforts. The reader may wish to refer to the Regional Board's Strategy document for further details.

Regional Board's Regional Monitoring and Assessment Strategy

The Regional Board is in the process of developing a Monitoring and Assessment strategy that once implemented will help focus the monitoring efforts of the regulated community, and to assist the Regional Board in making policy and decisions. The goals of the strategy include coordinating monitoring efforts in the Bay and watersheds, standardizing monitoring protocols, improving the technical basis of the Board's policies and actions, and providing for watershed decision-making and study. A goal for the strategy is the desire to improve the technical basis for the State's waterbody assessment process. This would be achieved by going beyond the typical reliance on chemical and toxicological data to include those physical, biological, and/or chemical indicators that together best characterize the extent to which waterbodies support beneficial uses. A second important concept in the strategy is the acknowledgement that waterbody classifications (and associated benchmark conditions for judging support) should take into account factors such as extent of watershed development and/or channel conditions. Implementation of the strategy (which is targeted for completion around September 2000) will include an information management element, and a phased implementation with pilot watersheds.

Bay Area Stream Protection Policy

A related initiative of the Region Board is to develop a Bay Area Stream Protection Policy. The Policy is intended to address the relationship between beneficial uses and more quantitative physical, chemical, and/or biological indicators, and develop recommendations for the protection of beneficial uses.

Bay Area Stormwater Management Agencies Association (BASMAA) Regional Monitoring Strategy

BASMAA developed recently a Regional Monitoring Strategy in order to better coordinate and focus the monitoring programs of the individual member agencies. The objectives of this strategy address effects of storm water on beneficial uses, improved estimates for loadings of pollutants of concern to San Francisco Bay, and evaluation of effectiveness of storm water management source and treatment controls. The strategy is focused initially on development of environmental indicators and associated monitoring parameters and protocols, and consequently fits in well with the Regional Board's goals, and the goals of the WMI.

Regional Monitoring Program

The Regional Monitoring Program (RMP) is focused on monitoring trace elements and chemicals in the main Bay segments, as well as conducting special research studies. This program is a joint effort between the Regional Board and SFEI and is funded from discharger fees. The Program is currently under review and one of the objectives of the review is modify the program to better coordinate watershed and Bay water quality monitoring. The RMP monitoring plan is scheduled to be modified based on the review by 2002.

Watershed Science Approach

The Watersheds Science Approach (WSA) was published in September 1998 by SFEI. The purpose of the WSA is to foster integration of the various scientific disciplines to better understand the interactions among terrestrial and aquatic environments. The WSA emphasizes the role of geomorphology and provides guidance on classification schemes for stream reaches. Another recommendation of the WSA is the need to understand the historic ecology of the watershed as a necessary first step in understanding the effects of human activities on the watershed.

California Aquatic Bioassessment Workgroup

The Department of Fish and Game, the State Water Resources Control Board, and the U.S. Environmental Protection Agency sponsor the California Aquatic Bioassessment Workgroup. The group formed in 1994 to coordinate scientific efforts towards developing and testing aquatic bioassessment protocols in California. The Workgroup operates a Website (www.dfg.ca.gov/cabw) to facilitate disseminating pertinent technical literature. Such protocols have been developed and applied by other states with some success.

Bayland Ecosystem Goals Report

The recently completed Baylands Ecosystem Habitat Goals Report characterizes the status and quality of wetlands habitat in the Bay Area and includes recommendations regarding preservation and enhancement of wetlands habitat. The report provides data on the Lower South Bay wetlands that will be useful in assessing the Baylands portion of the Basin.

Water Environment Research Foundation Project

The Santa Clara Valley Urban Runoff Pollution Prevention Program was awarded a grant to evaluate the utility of environmental indicators on Coyote Creek and for an industrial catchment. The project has included the collection an analysis of physical, hydrologic, chemical, and biological indicators along the main stem of Coyote Creek. The results of the study will assist the WMI in evaluating the utility of indicators for conditions specific to the Basin.

Table 1
Some Direct and Indirect Measures of Fitness of a Waterbody to Support Primary Uses/Stakeholder Interests[a]

Primary Use/Stakeholder Interests	Direct Measure of Supportive Condition	Is Direct Measurement of Condition Practical?	Primary Indicators	Secondary Indicators
COLD	Presence of population of cold water fish	Yes	Presence of key macroinvertebrate species Water temperature Flow	Water quality Habitat conditions (e.g., substrate particle size distribution, canopy cover, etc.)
RARE	Presence of population of endangered species	Yes	Habitat conditions	*Anecdotal evidence*
REC1 (Water Contact)	Healthy recreationists (based on epidemiological data)	No	Pathogen counts (e.g., typhoid bacteria, cryptosporidium cysts, etc.)	Coliform counts
REC1 (Consumption)	Fish tissue chemical contamination	Yes	Health of food chain	Water and sediment quality
MUN	Drinking water quality	Yes	Source water quality	Pollution sources and proximity to source waters
Flood Management	Comparison of estimated flood flows with channel capacity (FEMA Maps)	Yes	Historic flood damage	Stream classification methodologies

[a]Note that table is provided for illustrative purpose only. A more considered evaluation of direct and indirect measures of fitness will be included in a later memorandum.

Table 2
Example of Assessment Summary for Reach WR6

Waterbody: Widow Reed Creek Reach: WR6 Location: RM7-RM9.5

Use/Interest	Data Quality	Criteria Used	Assessment	Existing Conditions Support Use/Interest?	Limiting Factors
COLD	Good	Population data for fish and macro-invertebrates	Healthy steelhead and cased caddis fly populations. Generally good conditions.	Yes	
RARE	Fair	Population data	Potential endangered species include steelhead and red-logged frogs, steelhead present. No data on frogs.	No	Lack of off-stream channels and pools limiting to frogs
REC1	Good	Total coliform counts	More than 90%of monthly coliform samples meet standard, generally good conditions	Yes	
MUN	Good	Water quality data	Source water data comprehensive and good QA/QC	Yes	
Flood Management	Good	Channel capacity estimation	Channel cannot pass 1% peak flow without flooding	No	Channel capacity

Table 3
Example of Assessment Summary WR5

Waterbody: Widow Reed Creek Reach: WR5 Location:
RM5-RM7

Use/Interest	Data Quality	Criteria Used	Assessment	Existing Conditions Support Use/Interest?	Limiting Factors
COLD	Poor	Habitat data	No data on steelhead or macro-invertebrates, habitat conditions are similar to Reach WR6 suggesting fish presence	Possibly	None evident
RARE	Poor	Habitat data	No data on endangered species potentially present (steelhead and red-legged frog)	No	Lack of off-stream channels and pools limiting to frogs
REC1	Good	Total coliform counts	Only 75% of monthly coliform samples meet standard	No	Large storm drain discharges at upstream end of reach
MUN		Not applicable	Reach does not contribute to water supply	Not Applicable	
Flood Management	Good	Channel capacity estimation	Channel cannot pass 1% peak flow without flooding	No	Channel capacity

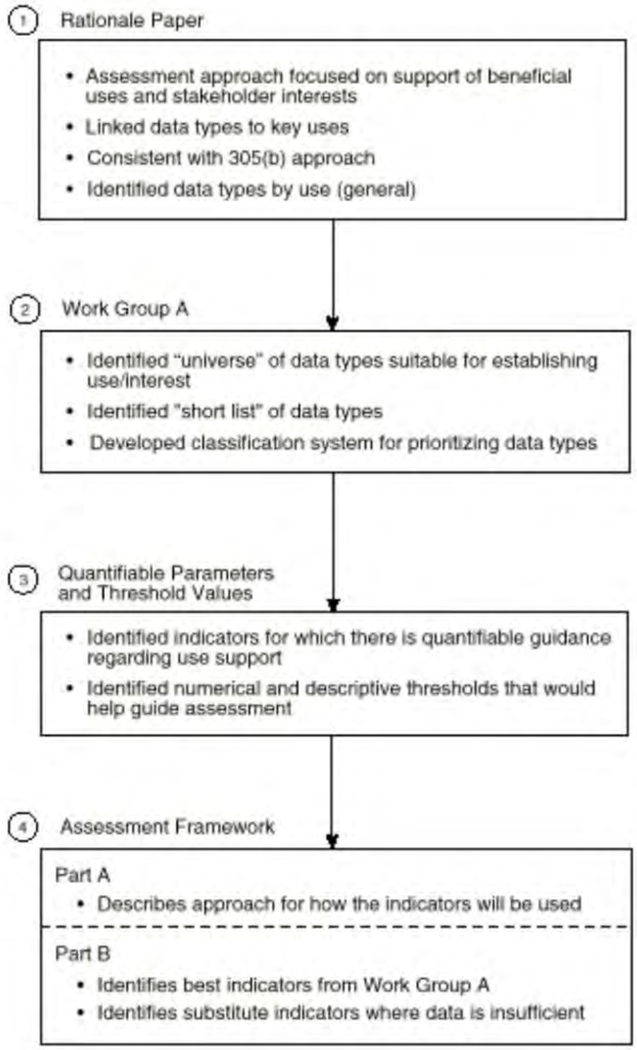


Figure 1. Steps Involved in Developing Assessment Framework

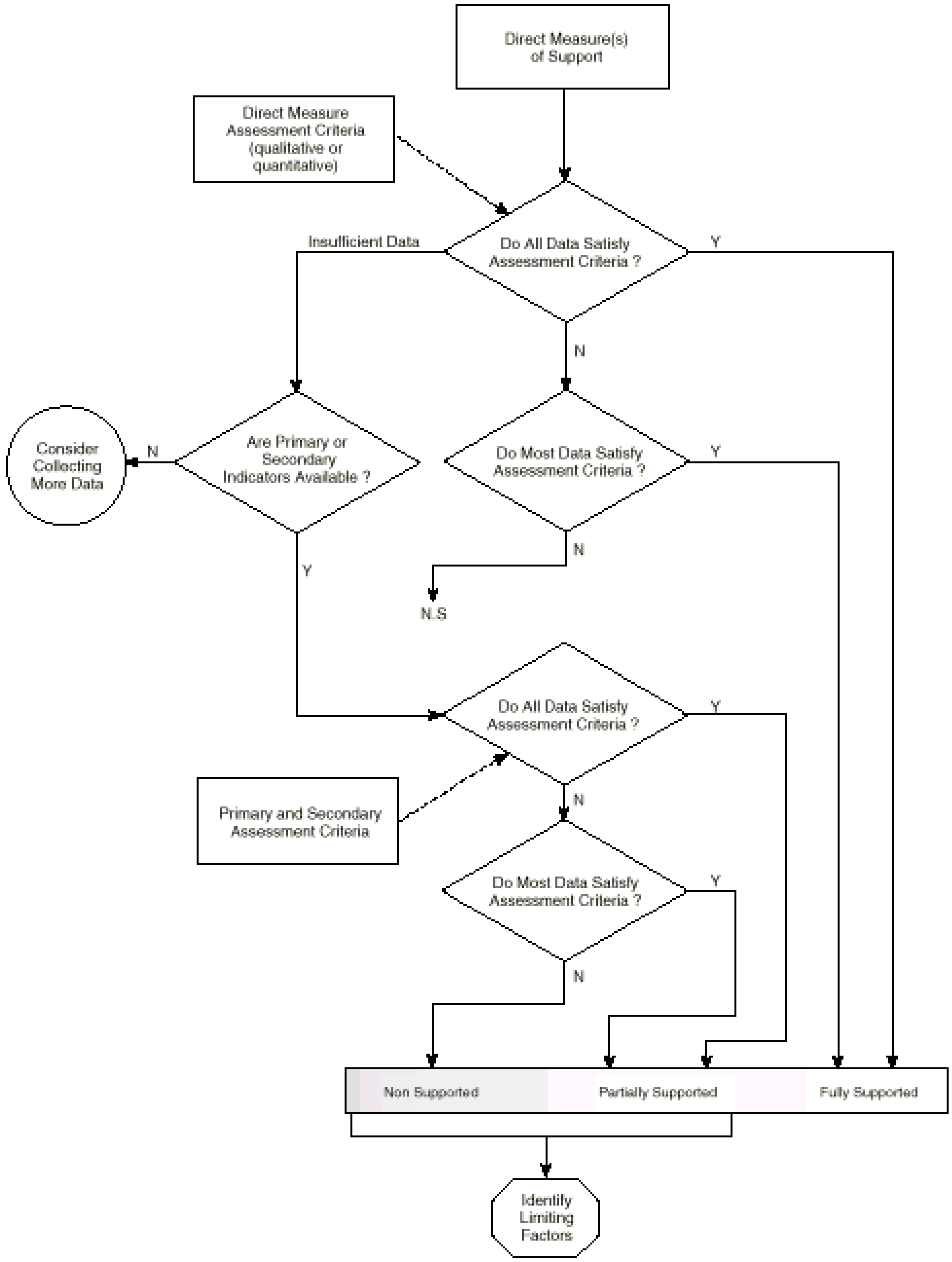


Figure 2. Conceptual Logic Diagram That Illustrates Sequence of Analysis and Decision Steps

51-961086NA.00-00091/012400/gos

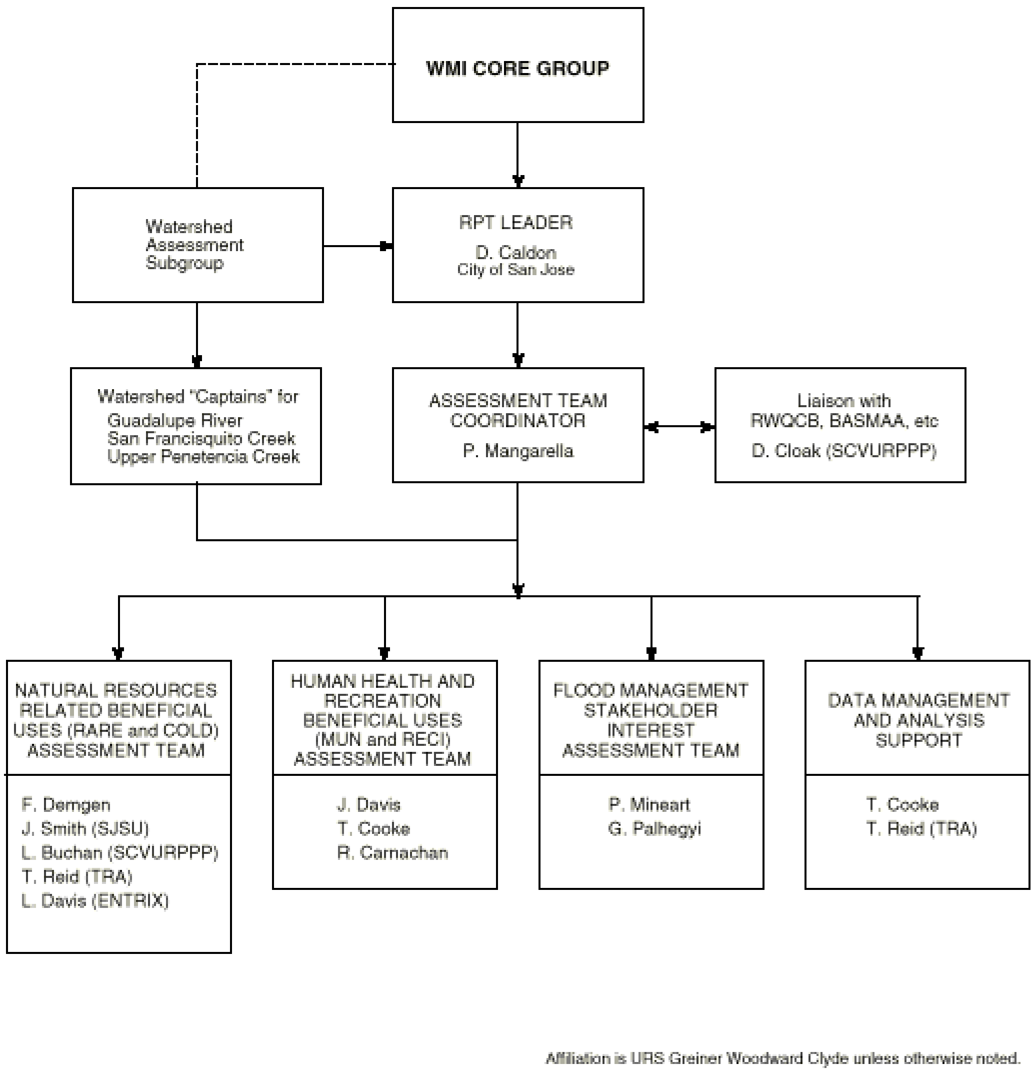


Figure 3. Participants in Developing and Implementing Assessment Framework

Santa Clara Basin Watershed Management Initiative

FINAL

Framework for Conducting Watershed Assessment (Part B)

SANTA CLARA BASIN
WMI
WATERSHED
MANAGEMENT INITIATIVE

Prepared By

The Report Preparation Team and Watershed Assessment Consultant

Approved by Core Group February 3, 2000

FINAL TECHNICAL MEMORANDUM (TM 4g-B, Task 3b)

To: Core Group

From: Watershed Assessment Consultant
Leads: John Davis and Peter Mangarella

Date: February 29, 2000

Subject: Proposed Framework for Conducting Watershed Assessment (Part B)

Purpose

The purpose of this memorandum is to illustrate how the data types developed by Work Group A and the associated threshold values (Quantifiable Parameters TM#4b, January 25, 1999) will be applied in a systematic way to address the assessment of uses and interests identified in the Rationale Paper.

Introduction

This memorandum describes in detail the procedural framework for conducting the WMI watershed assessment that was outlined in a companion memorandum (referred to as Part A of the Assessment Framework (TM 4G-A) dated January 25, 2000). The Part A memorandum describes how the procedural framework evolved from the Core Group's direction to focus the assessment efforts on those uses and interests that had been identified as important to stakeholder goals. The concept was to test the process before applying it broadly to all beneficial uses and interests. In this same spirit, Work Group A's list of key data types or indicators narrows data compilation to those data sets that can best be used to judge whether waterbodies support beneficial uses and stakeholder interests. The Part A memorandum also describes assessment principles, decision tools, treatment of data deficiencies, and examples of the products of the assessment. Figure A shows how the Assessment Framework builds on the assessment principles and the selection of environmental indicators and threshold values, and leads into the next steps of data compilation and evaluation.

This memorandum, TM #4g-B, describes the decision tools that will be used to assess whether each waterbody or stream reach supports the five uses/stakeholder interests set forth by the Core Group in August 1998. The approach is intended to be flexible and expand; similar decision tools could be developed for any other beneficial uses and stakeholder interests as agreed upon by the stakeholder process.

Decision Tools

The proposed assessment procedure consists of a set of decision tools designed for use with the five selected beneficial uses/stakeholder interests but which is equally applicable to any other beneficial uses or stakeholder interests. The decision tools are in the form of logic diagrams that enable systematic determination of the level of support of a primary use/interest through a "weight of evidence" approach. Figures 1-5 show the logic diagrams for each of the selected uses and interests.

Data are usually required to complete each analysis step and quantitative or qualitative criteria are also needed (enclosed in rectangles). So the first step in the logic diagrams is to evaluate the adequacy (or sufficiency) of the data required for the assessment. This evaluation will be based on several factors, the quality of the data, the spatial and temporal coverage of the data, and where transferability of data is being considered, the extent to which the data are relevant to the conditions being assessed. Relevant guidance for conducting this evaluation is provided in Draft Guidance for Water Quality-Based Decisions: The TMDL Process (US EPA, 1999). Criteria for conducting the evaluation of data adequacy and associated uncertainty are discussed below under Uncertainty Analysis.

Where preferred indicator data are not available, alternative indicator data will be used. The logic diagram process provides a rationale for substituting additional data--essentially weighing more evidence, that may be less reliable, to enable the assessment process to provide a finding. It provides the technical teams a pathway for documenting decisions to include broader data types and a checkpoint for qualifying the use of such data.

The unavailability of preferred indicator data will be noted and depending on the nature of the data needs, will be referred to for the initial field sampling program or the long-term monitoring plan per CAP Task 12 (Develop Process and Criteria for prioritizing collection of missing data). Figure B illustrates the steps in the data evaluation and collection of additional data that will lead to refining the initial programmatic-level assessment.

The core of the logic diagrams is the analysis step (enclosed in diamond) which asks a question regarding indicator(s) of the beneficial use. For each analysis step there are two possible outcomes:

1) An affirmative answer to the question leads to a support statement.
2) A negative answer leads to another analysis step.

It is understood that as decisions are driven further down the logic path there tends to be a decreasing level of reliability in the indicators to assess use support and a corresponding decrease in the certainty of the findings based on such data. This information is important in the subsequent uncertainty analysis.

Linkage between Decision Tools and Quantifiable Parameters

Based on the list of data types prepared by Work Group A, the WAC developed tables of quantifiable parameters and, where available, threshold values for the parameters (TM#4b, January 25, 1999). The purpose of the threshold values is to help judge the level of support of a waterbody for a particular use/interest. The quantifiable parameters and threshold values serve as the "watershed assessment criteria" for use with the decision-tools. Table 1 shows these parameters and threshold values together with an identifying number (Id No.) and the original reference number used in the January 25 Quantifiable Parameters Memo (TM#4b). The criteria used in the decision process (enclosed in rectangles in the logic diagrams shown in Figures 1 through 5) are linked to the information contained in Table 1 by the identifying numbers. The overall process is intended to link stakeholder-valued data with scientifically accepted threshold values as well as tracking the current availability of this data for this assessment. (See Figure A: Steps in the Assessment Framework.)

Many comments were received on the original tables of quantifiable parameters and these were summarized in TM#4c dated May 5, 1999. Some of the watershed assessment criteria and threshold values have been modified in response to the comments. For some quantifiable parameters, there were differences of opinion with respect to appropriate threshold values; and in these cases stakeholder comments and recommendations for alternative threshold values were resolved through a meeting held on 12/20/99 between the WAC and stakeholders. Table 1 was revised to reflect the agreed upon threshold values. Also in response to stakeholder comments, the WAC developed a series of tables (Table 2A through 2D) that provide more detailed water quality, sediment quality, and fish tissue criteria. Table 1 includes selected criteria from Table 2 that will likely be used in the assessment; but may be supplemented or replaced with other criteria from Table 2 depending on the type and availability of data.

Uncertainty Analysis

Prior to finalizing support statements, an uncertainty analysis will be conducted to evaluate the level of confidence in the support statement. In general the WAC will follow the guidance for performing an uncertainty analysis as provided in two documents: Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates (US EPA, 1997), and Draft Guidance for Water Quality-Based Decisions: The TMDL Process (US EPA, 1999). The guidelines address different types of data including physical habitat, biological, toxicological and physical/chemical data to determine aquatic life use support.

The methodology designates four levels of uncertainty: Level 1 through Level 4. Level 4 data are of the highest quality and provide a relatively low level of uncertainty. Level 1 data may be considered adequate for performing assessments, but involve less rigorous approaches, and therefore result in a greater degree of uncertainty.

Three categories of criteria are used to designate the level of uncertainty:

1. technical components refer to the comprehensiveness of the study design, including methodology and level of documentation,
2. spatial and temporal coverage of the data refers to the age of the data, the amount of data, and the spatial extent of the data, and
3. data quality refers to the QA/QC conducted; for example, the extent of replication, quality considerations in site selection, and rigor associated with laboratory analyses. Also, data quality can be affected by the expertise/experience of the personnel collecting and analyzing the data.

Table 3 is an example of the criteria recommended by EPA to evaluate uncertainty in bioassessment data (US EPA, 1997). The criteria for Level 4 bioassessment data include monitoring of two assemblages (or one if the data are of high quality), regional reference conditions, a biotic index, broad coverage of monitoring locations for 1-2 sampling seasons, high quality data, and the use of a professional biologist for the survey and assessment. Level 1 criteria include visual observations of biota, no reference conditions, limited monitoring or extrapolations from other sites, and data of unknown or low quality. Also, Level 1 data do not require the participation of a professional biologist.

These guidelines are most appropriate for addressing the COLD beneficial use. The WAC will tailor the EPA guidance consistent with the data types to be used in the assessment of COLD, and will develop comparable criteria for other uses and interests consistent with EPA and other agency (e.g, DHS) guidance. These criteria will be shared with interested stakeholders through the Watershed Assessment Subgroup and/or an ad hoc technical workgroup for their review and approval as part of the assessment.

Determination of Level of Support

The proposed analysis is founded on the concept that direct measures of the fitness of a waterbody to support a primary use/stakeholder interest are preferable to indirect measures. In the logic diagrams indirect measures or indicators are proposed only when direct measures are impractical, and/or limited data prevent the use of a direct measure. This concept of a hierarchy of data types is consistent with EPA guidance on conducting water quality assessments. It also builds on work conducted by Work Group A, which identified relevant data types and classified each data type in terms of potential utility to the assessment process.

The logic diagrams also show the anticipated level of support statement that would be made given the outcome of the analysis steps. Although the goal is to establish clear findings of the level of support for each use, the assessment process, no matter how well conceived will not always yield definitive answers. It is expected that in many cases, data deficiencies and methodological difficulties will allow only partial or qualified conclusions. In such cases an uncertainty analysis as discussed above will be conducted prior to finalizing the determination of support levels.

In order to provide a basis for the level of support statements, the assessment report will document, for each watershed, the results from each step in the logic diagram and qualifications and limitations where appropriate.

Water Contact Recreation (REC1)

Water Contact Recreation is defined in the Basin Plan as *"Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs."*

The decision tool for water contact recreation (REC1) is shown in Figures 1A and 1B. The primary indicators used to determine the fitness of a waterbody for REC1 are fecal coliform and

E. Coli densities. These indicators are well established and accepted by the scientific community, including the WMI's first Technical Review Panel. Threshold levels for these indicators are contained in the Basin Plan. If sufficient coliform data are available a determination of full support of REC1 can be made based on the data. In some cases, it may be possible to make a determination of partial support if criteria are met during the recreation season although not at other times, or if criteria at a bathing beach are met even though they are not met for the entire waterbody or stream segment.

It is recognized that the use of coliform bacteria as an indicator of fitness for REC1 is imperfect. If any epidemiological data is available for a waterbody, for example data on the incidence of skin or eye infections among swimmers, it will also be considered in the evaluation.

After evaluating the microbial data, the assessment will consider evidence for the presence of chemical irritants in the water (including large departures from neutral pH) that could affect the suitability for water contact recreation. Such irritants could include hydrocarbons, or volatile organics. Similarly evidence of hazardous chemicals in sediments would affect the support determination.

Important secondary indicators include aesthetics and safety. A waterbody that meets bacteriological and water and sediment criteria for REC 1 may still not support body contact recreation because it is aesthetically unappealing, too shallow to use, or inaccessible. Where data are available for these indicators they will be considered early on the support determination. Data associated with these factors can also be considered to strengthen the findings, support sensitivity analyses and in assisting in identifying candidate limiting factors.

The REC1 beneficial use also includes fishing and Figure 1B provides the logic diagram for assessing fish consumption as a beneficial use. The focus of the assessment is on fish tissue data, with supporting information provided by information on health advisories or postings that may have been implemented by the County Health Department or other agencies. If there are data on shellfish tissues, the analysis will extend to shellfish as well.

Cold Freshwater Habitat (COLD)

Cold Freshwater Habitat is defined in the Basin Plan as *"uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates."*

The decision tool for Cold Freshwater Habitat (COLD) is shown in Figure 2. Use support for COLD is best determined directly by examination of the assemblage of organisms in a waterbody or stream reach. Such organisms integrate the effects of hydrology, water quality, and habitat conditions. Steelhead, trout and certain macroinvertebrates make up the faunal community in cold water stream in the Santa Clara Basin. If healthy, self-sustaining populations of these species are present then the COLD primary use is supported. A sustainable population is a population that can be expected to persist indefinitely in a waterbody if no significant, long- term environmental changes occur.

The first analysis step involves examination of data on the presence of juvenile steelhead and trout in a stream reach. The primary criteria for the first step are the characteristics of fish and macroinvertebrate populations. If the data indicates that juvenile fish populations are consistently present then any existing macroinvertebrate community data would be examined to determine whether intolerant species (stoneflies and cased caddis flies) are present. If so, a "classic" cold water fishery exists and the COLD designation is fully supported. If not, then water temperature data will be examined. If water temperature data indicates a greater than normal range for cold water species then the steelhead and trout present would be presumed to have adapted to "local temperature" conditions. Streams with artificially high summertime flows in the Santa Clara Valley may support salmonids that are tolerant of a wider range of temperatures compared to those set forth in the Basin Plan. The COLD designation would be fully supported in these cases. If water temperatures are in the normal range for cold water streams then the COLD designation would be only partially supported because an ecosystem component (intolerant macroinvertebrates) would be missing.

It should be noted that this approach relies primarily on the presence of specific macroinvertebrates that are good indicators of water quality and are important in the aquatic food chain. It does not rely on macroinvertebrate indices, although such information would be useful, that are currently being researched (e.g., the WERF Project on Coyote Creek) as possible measures of stream health and/or for providing biocriteria for regulatory purposes.

If data indicates that steelhead and trout are sometimes present or populations are below historic levels then the COLD use is partially supported. If the records of salmonid presence are deficient, the need for additional data collection would be evaluated.

Chinook salmon only occupy a stream for a few months during the fall and winter. If Chinook are regularly present then the COLD use is seasonally supported because conditions favor salmonids in the high-flow months but may not in the low-flow months.

If no salmonids are present, ecosystem characteristics will be used as secondary watershed assessment criteria for determination of support for COLD. They include substrate characteristics, cover, water temperature, and barriers to migration, etc. Use of these criteria will enable determination of the potential of a waterbody to support COLD uses.

In the case of COLD (and to some extent RARE), where the species of interest are migratory during their life stages, it will be necessary to integrate the findings by reach in order to adequately evaluate the extent of support. For example, an interior reach of stream could potentially support steelhead but could be limited by physical, hydrologic, and/or chemical barriers that may prevent access to the interior reach.

Although the emphasis as described in the logic diagram is on biological and physical indicators, chemical indicators are also important as possible limiting factors. Moreover, the assessment of chemical indicators in relation to water quality standards is a key element in the 303(d) listing process and the subsequent TMDL requirements. Thus, the evaluation of COLD will include a thorough consideration of chemical indicators. The constituents to be considered will be those selected by Workgroup A based on current and proposed 303(d) listings. This list consists of the following constituents: metals (copper, nickel, mercury, and selenium), pesticides (diazinon, chlorpyrifos, DDT, dieldrin, chlordane), and others (PCBs, sediment, and dioxin-like compounds). The assessment threshold criteria appropriate for this use will be water quality, sediment, and fish tissue objectives for aquatic life protection as provided in Table 2.

Preservation of Rare and Endangered Species (RARE)

Preservation of rare and endangered species is defined in the Basin Plan as *"uses of waters that support habitats necessary for the survival and successful maintenance of plant and animal species established under state and/or federal law as rare, threatened, or endangered."*

The decision tool for the RARE primary use is shown in Figure 3. As with the COLD designation, support of the RARE use is best determined directly by examination of the creatures in a waterbody or stream reach. The primary criteria are the characteristics of the populations of the special status species. It is recognized, however, that data on special status species is often limited and may be difficult to obtain.

The decision tool is designed for use with special status species that are dependent on streams or riparian habitat. Exclusively upland species will not be considered. Thus, an initial step in the analysis of the RARE primary use is to review the list of special status plant and animal species found in the Santa Clara Basin that was developed by Work Group A based on the Department of Fish and Game's Natural Diversity Database and other sources. This list will then be screened to develop a shorter list consisting only of stream- or riparian zone-dependent special status species. This list will be provided to interested Stakeholders through the Watershed Assessment Subgroup or an ad hoc technical group for their review and approval, and will be subject to Core Group approval.

The first step in the analysis of a particular stream reach or waterbody would be to determine whether a special status species could reasonably be expected to inhabit the waterbody or its environs. The purpose of this step is to eliminate consideration of special status species whose habitat requirements are never likely to have been met, or could be met, in a given waterbody. For example, a reach of stream in the foothills could never support clapper rails even if the reach is in perfect condition. On the other hand, it will be important to consider the characteristics of a Baylands reach that may have provided habitat for clapper rails historically, and could again with appropriate management.

Once a list of the special status species that may be present or could potentially be present in a stream reach is developed then the fitness of the reach to support each special status species would be considered separately. The first step is to determine if the species is present. If it is present then it is next necessary to determine if its population is sustainable. If so, then the RARE use for the species is fully supported. If not, it is partially supported. The WAC wishes to point out to the Core Group that when the WAC Team developed the assessment framework for this use, it was felt that information on species presence as well as information on suitable habitat were both important indicators, and this is reflected in the logic diagram. This is a departure from Workgroup A's earlier recommendation that the assessment would be based primarily on habitat. The WAC took this liberty because Workgroup A's focus was not on the methods for conducting the assessment, and that their discussion of the approach to focus on habitat was relatively brief and incidental to the group's discussion.

If the special status species is not present, the prevailing environmental conditions will be examined to determine whether they are consistent with the species' habitat requirements. Habitat requirements will serve as secondary indicators of fitness. If habitat is suitable for an organism although the organism is currently absent, there may be some immediate potential for support of the organism with modest management changes. If they are not, then the RARE use for the species is not supported.

For the RARE use to be fully supported in a particular waterbody or stream reach, all special status species that can reasonably be expected to be present must be present in sustainable populations. If only some species are supported then the RARE use is only partially supported.

Municipal and Domestic Supply (MUN)

Municipal Water Supply is defined in the Basin Plan as: *"Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply."*

The decision tool for assessing MUN is shown in Figure 4. Water supply in Santa Clara County is provided by a combination of local sources and imported water deliveries. Local sources consist of reservoirs and streams which provide water primarily for recharge of the ground water aquifer. Although values differ from year to year, approximately one-half of the Santa Clara Basin's drinking water supplies are obtained from groundwater that is recharged from local surface waters.

The criterion for evaluating support of this use is meeting the state and EPA drinking water standards in streams and reservoirs. These standards in the State of California are expressed in the forms of Maximum Contaminant Levels (MCLs): Primary MCLs are levels developed for human health protection, and Secondary MCLs are established to ensure adequate taste, odor, and appearance. The evaluation of exceedances would be conducted for those constituents for which primary and secondary MCLs have been adopted.

For constituents for which primary MCLs have not been adopted, DHS may establish Actions Levels (ALs) that are health-based advisory levels, but not enforceable standards. Exceedances of ALs may prompt statutory requirements (e.g., for consumer notice), or recommendations for source removal.

The logic diagram for this use would first evaluate meeting the drinking water standards (MCLs and ALs) in streams and reservoirs during dry weather. Dry weather is defined as periods between runoff events and therefore includes the dry season and that portion of the wet season between runoff events (specific time criteria for defining these periods will be developed as part of the assessment). In this step, samples obtained during dry weather would be compared with drinking water standards. If standards were not met, a condition of non-support would result. If standards were met, a second test would compare water quality from samples obtained during wet weather with drinking water standards. If wet weather water quality met the standards, a condition of full support would be determined. However, if wet weather samples exceeded standards (and dry weather samples met standards), a condition of partial support would be determined.

If on the basis of evaluating water quality there was a determination of non- or partial support, limiting factors would be identified. The analysis would focus on those constituents that prompted the finding of non- or partial support. Such factors could include anthropogenic and natural sources of pollutants, or hydrologic factors that contribute to water quality degradation.

The identification of factors would rely in part on information developed from previous source water assessments conducted either by the water purveyor (e.g., sanitary surveys) or the DHS (e.g., as part of the DHS Drinking Water Source Assessment and Protection (DWSAP) Program.

Protection From Flooding (PFF)

Flood Protection has been defined by the Flood Management Subgroup in their January 4, 2000 memorandum to the RPT as follows: *"Flood Protection consists of activities, including planning, which reduce the potential for flood damages to homes, schools, businesses, transportation networks and other public and private buildings and infrastructure, implemented in a practical, cost-effective, and environmentally sensitive manner."* (see Glossary for further definition of flood protection activities.)

Figure 5 shows the decision tool for Protection From Flooding (PFF). Determination of whether the PFF interest is supported will depend first on a comparison of planned floodway capacity with calculated design flows under various conditions. The calculations will utilize hydrologic modeling results developed by the Santa Clara Valley Water District. These models were developed by the Corps of Engineers and are recognized by the Flood Emergency Management Agency (FEMA) as standards for determining flood plains and stream capacities. The Santa Clara Valley Water District has established the criterion that floodways in the District's jurisdiction should be able to convey the flood corresponding to the 100-year return interval without damage to property or hazard to public safety. This criteria is consistent with National Flood Insurance Program which is administered by FEMA.

The assessment will evaluate support under two development conditions: current conditions, and future conditions (the date corresponding to future conditions will be that used by the District, and may vary depending on watershed or reach.) If floodway capacity is adequate to convey the design flows under current conditions and future conditions, a finding of full support will be made. However, if capacity is sufficient for current conditions, but not future conditions, a finding of partial support will be made.

In addition to the assessment of capacity based on modeling results, we will also assess whether maintenance of the floodway is being conducted such that the planned capacity is being achieved, and erosion prevention/repair is being conducted along streambanks to protect private property. The assessment of maintenance will utilize maintenance criteria (e.g., maintenance activity and frequency) provided by the District. If maintenance criteria are not being met, a finding of partial support or non support will be made depending on the extent to which the lack of maintenance is felt to be reducing the capacity of the channel or otherwise affecting private property (e.g., from streambank erosion).

Note that this interest is based primarily on hydrologic and sediment related indicators, and operational indicators. Important environmental indicators are being addressed as part of the assessment of the beneficial uses, and need not be incorporated into the logic diagram for this use. Ultimately the results of the assessments for the beneficial uses and stakeholder interests will be integrated by watershed and across beneficial uses and interests to begin to identify possible conflicts and opportunities between the PFF interest and other beneficial uses.

Identification of Limiting Factors

If use of the logic diagrams leads to the conclusion that a beneficial use or stakeholder interest is not supported or only partially supported in a stream reach, the factors responsible for non-support or partial support will be identified. The nature of the limiting factors and the ease with which they can be identified will vary depending on the use. In some cases, the limiting factors will be fairly obvious and will emerge directly from the assessment process. For example, if a stream reach has insufficient capacity to convey the 1% flood it would exceed the threshold value of the quantifiable parameter for the stakeholder interest, flood protection. The stream reach would be judged to be non-supportive of flood protection and the limiting factor would be channel capacity.

Identification of limiting factors for the beneficial uses COLD and RARE can be expected to be much more difficult and complicated. If use of the COLD logic diagram leads to the conclusion that a stream reach does not support a salmonid population then the reasons may not be obvious because the ecological requirements of salmonid species are specific and complex. Potential limiting factors include water temperature, dissolved oxygen content, depth of flow in the main channel, velocity of flow, composition of the bottom of the channel, extent of shading of the water surface, extent of in-stream cover, ratio of pools to riffles, size of pools and availability of food.

The identification of limiting factors will be focused on the physical, chemical and biological conditions in the stream and the riparian corridor that cause non or partial support of primary uses. It will not address the ultimate or indirect cause of non- or partial support, for example urbanization and its effect on stream hydrology. In addition, the analysis will be based only on existing data. Existing data may be insufficient to make more than a tentative identification of limiting factors particularly for the COLD and RARE beneficial uses. Some examples of potential limiting factors for the four beneficial uses and the stakeholder interest are shown in Table 4. The identification of potential limiting factors also will assist the stakeholders in addressing management alternatives and potential conflicts amongst uses and interests (see following discussion).

Integration of Assessment Results and Management Alternatives

Following the assessment of individual uses and interests by stream reach, the results of the assessment will be combined on a watershed basis and will integrate the results for the uses and interests. This integration will result in a matrix which shows areas of support and non-support, and, where appropriate, potential limiting factors. The goal of this integration step is to address the overall health of the watershed and also is intended to address many of the stakeholder concerns regarding possible conflicts between PFF and beneficial uses.

The identification of levels of support and limiting factors will help stakeholders develop management alternatives that specifically address environmental problems in the Santa Clara Basin's streams. For example, use of the logic diagrams might lead to a conclusion that a stream reach in a county park is non-supportive of water contact recreation. Access to the stream is good and the depth of flow is sufficient for recreational use but coliform concentrations in the water commonly exceed threshold values. Coliform concentrations are the limiting factor. Examination of the site reveals that elevated summertime coliform concentrations are largely attributable to small flows of excess landscape irrigation and washwater from a large urban storm drain that discharges upstream of the park. Management alternatives might include diversion of the small volume summertime discharge to the sanitary sewer, treatment of the small volume discharge or rerouting of the storm drain to discharge downstream of the park.

In some instances, identification of limiting factors may reveal conflicts between one beneficial use and another. For example, lack of in-stream cover and channel capacity in a stream reach may respectively limit the cold water fishery beneficial use (COLD) and the flood management stakeholder interest. Typically, any steps taken to increase in-stream cover and improve support of the COLD beneficial use would further reduce the ability of the channel to pass flood flows and support the flood management stakeholder interest. Awareness of the conflict will prompt stakeholders to seek unconventional management alternatives that promote support of both desired uses. Examples might include floodwater bypasses that allow low and moderate flows to pass through a relatively natural vegetated stream channel while very large flows are conveyed in a separate high-capacity lined channel or multi-stage channels that carry small, moderate and large flows in different parts of the same channel.

GLOSSARY

Augmented Summer Flow: Summer flows augmented by reservoir or pipeline releases; used in the context of Table 1. An example of an augmented flow system is the Guadalupe River.

Direct Measures: Data types that provide a relatively direct measure of the extent to which a waterbody supports a beneficial use and/or stakeholder interest. (adapted from Table 4, Work Group A memo of January 25, 1999).

Design Flow: The flow of water from a drainage area that, on the average and over a long period of time, has a 1 percent chance (probability of 0.01) of being equaled or exceeded in any given year. It is sometimes referred to as the 100-year flood but should not be thought of as an event which occurs regularly every 100th year.

Flood Protection: Flood Protection consists of activities, including planning, which reduce the potential for flood damages to homes, schools, businesses, transportation networks and other public and private buildings and infrastructure, implemented in a practical, cost-effective, and environmentally sensitive manner. Flood protection activities include both corrective measures and preventive measures. Corrective measures include, but are not limited to, activities such as construction of levees, floodwalls, detention facilities, and floodproofing. Additional ongoing maintenance activities such as sediment removal, vegetation control, and erosion prevention and/or repairs are necessary on all facilities to keep them operating as intended. Preventative measures include, but are not limited to, activities such as floodplain zoning, subdivision ordinances, floodplain preservation, habitat and open-space preservation, and education.

Floodway (Planned): Natural or modified watercourses consisting of a combination of stream channel and adjacent areas planned to convey flood flows. (FEMA defines Regulatory Floodways as the stream channels and adjacent areas within which encroachments are prohibited if they would raise calculated water surface elevations by 1.0 feet or more.) A Planned Floodway would include the stream channel and adjacent areas planned to convey high flows but may also be used for other compatible uses. For example, these uses might include recreation and/or agriculture.

Natural Summer Flow: Stream reaches that support steelhead and resident trout during low flow periods in absence of flow augmentation. Examples of natural summer flow stream systems are San Francisquito Creek and watersheds above most reservoirs. .

Primary Indicators: Data types that are considered reliable indicators of important environmental conditions that affect the extent to which a water body may support beneficial uses and stakeholder interests. A reliable indicator is defined as an indicator for which there is a generally accepted threshold value; and therefore it is clear how data for that indicator will be evaluated in the assessment. (adapted from Table 4, Work Group A memo of January 25, 1999).

Secondary Indicators: Data Types that are considered less reliable measures or indicators of less important environmental conditions that affect the extent to which a water body can support beneficial uses and/or stakeholder interests. (adapted from Table 4, Work Group A memo of January 25, 1999).

Sustainable Population: A population in dynamic equilibrium with various ecological relationships (predator/prey, competition, birth-death, recruitment, etc.) and resilient enough to withstand natural perturbations in environmental conditions such as climate change, and habitat modification.

Uncertainty Analysis: An evaluation of the uncertainty associated with beneficial use and stakeholder interest support statements. The evaluation is based on various criteria including data quality and data coverage and follows EPA Guidance for Preparation of the Comprehensive State Water Quality Assessments (305(b) reports) (EPA, 1997).

Table 1
Watershed Assessment Criteria

Id No.	Correspond Id No. in Table 2 (QP Memo 4b Jan. 25, 1999)	Work Group A/ WAC Recommended Data Type	Quantifiable Parameter	WAC Recommended Threshold Level	Beneficial Use/ Stakeholder Interest Being Assessed	Stakeholder Comments and Recommendations of Alternative Threshold Levels/ Actions Taken in Response to Comments
1	5	Fecal coliform	Density most probable number (MPN) per 100 ml	water contact rec.: log mean <200, 90^{th} % <400;[a] shellfish harvesting: median<14, 90^{th} %<43,[a] drinking water supply: log mean <20[a] (applies only to data from specific, nominal sampling frequencies as defined in RWQCB and EPA documents)	REC1 MUN	
2	6	E. coli	Density in colonies per 100 ml	water contact rec.: 235-576 col/100ml depending on intensity of use[b] (applies only to data from specific, nominal sampling frequencies as defined in RWQCB and EPA documents)	REC1	

Table 1 (*continued*)
Watershed Assessment Criteria

3	N/A	Aesthetics	Water clarity (murkiness) Trash[c] Floating debris/algae[f,g] Odor[f,g] Oil and grease[f,g]	Average (spatial and temporal) Secchi depth >2 ft Streams: <1 lb/mile average dry weight material along stream banks or floating on water surface[d] (averaged spatially and temporally) lakes: <1 lb/mile average dry weight material along lakeshore[e] (averaged spatially and temporally) cover <5% of surface area absence of offensive odor absence of visible oil sheen	REC1	
4	36	Water depth	Depth	depends on activity (for fish requirements see id # 26)	COLD REC1	
5	2	Fish assemblage (see Table 2 of QP Memo 4b of Jan. 25, 1999 for more detail)	Relative abundance of indicator species	DFG Fish in Good Condition guidance to the extent that it applies to COLD; judgment by experts[h]	COLD	Threshold level changed by WAC per 12/20/99 ad hoc technical group.
6	1	Macro-invertebrate data: Stoneflies and cased caddis flies Mayflies and hydrosyche (netted caddis flies)	 Presence as indicator of cold freshwater habitat Density sufficient to provide adequate food supply	 none generally accepted; judgment by experts 10/square foot[i]; judgment by experts	COLD	Resolved per discussion at 12/20/99 ad hoc technical group; J. Carter (USGS) will review protocol.

Table 1 (*continued*)
Watershed Assessment Criteria

7	46	Temperature	Mean daily temperature (degrees F)	trout/steelhead (augmented flow[j]): ≤57°F (Jan-Apr); ≤63°F (May); ≤ 70°F (Jun-Nov); ≤61°F (Dec) with a daily T_{max} ≤75°F (Jul-Sep)[k] trout/steelhead (low summer flow[l]): ≤57°F (Jan-Apr); ≤60°F (May-Dec) with a daily T_{max} ≤75°F (Jul-Sep)[k] chinook salmon: ≤59°F (Jan-Mar); ≤ 70°F (Apr-Jun); ≤64°F (Sep-Oct); ≤59°F (Nov-Dec) (fish not present in Jul/Aug and generally not viable in Sep/Oct)[k]	COLD	Resolved per discussion at 12/20/99 ad hoc technical group and 1/9/00 SFT comments. Keith Anderson, Streams For Tomorrow: The SCVWD considers June to be a smolt out-migration month; therefore, smolt temperatures should govern from their perspective.
8	47	Dissolved oxygen	Dissolved oxygen	7 mg/l, 3 month median not less than 80% of saturation[f,m]	COLD	Revised per discussion at 12/20/99 ad hoc technical group.
9	48	Total suspended solids (TSS)	Concentration (mg/l)	<25 (prevent gills from clogging)[n] <80 (successful development of fish eggs and larvae)[n] <400 (natural movements and migration, light penetration, fish ability to see and obtain food)[n]	COLD	
10	50	Turbidity	Nephalomenter turbidity units (NTUs)	<10 NTU average daily (augmented flow[j]) <5 NTU average daily (low summer flow[l]) <5 NTU (secondary MCL)[o,p] <0.5-1 (primary MCL)[p]	COLD MUN	

Table 1 (*continued*)
Watershed Assessment Criteria

11	51	Stream type	Rosgen stream type	will vary depending on geology, topography, hydrologic, and sediment regimes of watershed[q]	COLD	Ms. Buchan's comments are noted.
12	52	Channel substrate	Dominant particle size of channel materials	will vary depending on stream type[q]	COLD	
13	53	Streambank erosion potential	Rate of channel lateral migration	will vary depending on stream type[q]	COLD	Mr. Fowler's comments are noted.
14	54	Width to depth ratio	Ratio of channel width to channel depth	will vary depending on stream type[q]	COLD	
15	55	Bankfull, stage, discharge and width	Channel geometry and flow of bankfull discharge	will vary depending on stream type[q]	COLD	
16	56	Altered channel materials and dimensions	Occurrence of altered channel materials and dimensions	exceedance of percentage of stream length in altered condition that results in significant changes in upstream or downstream channel stability[q]	COLD	
17	57	Special status species: Instream, riparian, and wetland habitat	Amount, distribution, quality, and continuity of instream, riparian, and wetland habitat	sufficient spatial and temporal connectivity within and between watersheds – connectivity must provide chemically and physically unobstructive routes to areas critical for fulfilling life history requirements of aquatic and riparian dependent species.[r]	COLD RARE	
18	58	Instream spawning habitat: Location and extent (area)	% of streambed having suitable spawning habitat[s]	>1%[m]	COLD	QP supported per discussion at 12/20/99 ad hoc technical group.

Table 1 (*continued*)
Watershed Assessment Criteria

19	59	Instream spawning habitat: Quality (spawning substrate composition)	% fine grain soils (particles that will pass through a number 20 sieve)[t] % particles 1-10 cm % particles 1-7 cm	<15% (for embryo survival by providing gravel permeability, pore space, and DO)[u] >60% (provide suitable substrate for redd construction, Chinook)[v,w,x] >60% (provide suitable substrate for trout/steelhead, augmented[j] and low summer flow[l] streams)[v,w,x]	COLD	
20	60	Instream rearing habitat: Location and extent (area)	% pools[y] % riffles[y]	>30% of stream length (excluding glides)[m,z] >15% of stream length[m,z]	COLD	Revised per discussion at 12/20/99 ad hoc technical group.
21	61	Instream rearing habitat: Quality (pool depth)	Low flow pool depth	mean of 1.5 ft and more than 5% of pools have depths greater than or equal to 2.5 ft[aa]	COLD	
22	62	Instream rearing habitat: Quality (cover/hiding)	Overhead cover[bb] Instream cover[cc]	≥50% of riffle area[m,dd] ≥10% of pool perimeter[m,dd]	COLD	
23	63	Instream rearing habitat: Quality (riffle substrate composition)	d_{50} in riffles (median size of gravel in riffle)	median >= 50 mm (2 inches)[ee,ff,gg]	COLD	Revised per discussion at 12/20/99 ad hoc technical group.
24	64	Shaded riverine aquatic habitat	Stream shading[hh]	70% minimum[ii]; 85% optimum[jj]	COLD	Revised per discussion at 12/20/99 ad hoc technical group and 12/27/99 SFT comments.

Table 1 (*continued*)
Watershed Assessment Criteria

25	65	Riparian vegetation: Type, location, and coverage	Site index for species diversity: Diversity of vegetation appropriate for the site conditions (soil, elevation, aspect) Age class distribution of large woody vegetation % surface cover and undisturbed area	maintain or restore potential site index[kk] well distributed[kk] at least 95%[kk]	COLD	
26	35	Water depths and velocities for fish rearing and migration: Rearing Migration	Flow depth in riffles Velocity Flow depth Flow depth in riffles[ll] Flow depth in riffles[ll]	>0.4 ft[mm,nn] >1 ft/sec[mm,nn] >0.15 ft (out migration)[mm,nn] >0.6 ft (up migration for Chinook, Oct-Dec.)[mm,nn] >0.5 ft (up migration for steelhead under augmented flow or low flow, Jan-April)[mm,nn]	COLD	Revised per discussion at 12/20/99 ad hoc technical group.

Table 1 (*continued*)
Watershed Assessment Criteria

27	43	Location of physical barriers to migration	Man-made barriers to fish passage	height of barrier present should allow upstream and downstream fish passage at all flows[oo]	COLD	
28	N/A	Assemblages of special status species	Special status species population, diversity, health, sustainability (including protection from invasive species)	general guidance developed at national level by federal agencies as part of implementing ESA; ultimately, assessment relies on judgment of local experts	RARE	
29	N/A	Habitat requirements for individual special status species	Habitat requirements for special status species developed by resource agencies and others for Santa Clara County. List developed by Work Group A.	general guidance developed at national level by federal agencies as part of implementing ESA; ultimately, assessment relies on judgment of local experts	RARE	
30	8, 9, 10	Chlordane (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	 0.1 ug/l (drinking water)[p] 0.00059 ug/l (fish consumption)[pp] 0.0043 ug/l (chronic, freshwater)[pp] 2.4 ug/l (acute, freshwater)[pp] 8.9 ppb (freshwater)[qq] 18 ng/g wet	 MUN REC1 COLD REC1 REC1	

Table 1 (*continued*)
Watershed Assessment Criteria

31	12	Copper (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life)	 1.3 mg/l (drinking water)[p] 1.3 mg/l (water plus fish consumption)[pp] hardness dependent; calculate as in Table 2B (chronic/acute, freshwater)[pp]	 MUN REC1 COLD	
32	11	Chlorpyrifos (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life)	 20 ug/l (drinking water)[p] 0.02 ug/l (chronic, freshwater)[rr] 0.083 ug/l (acute, freshwater)[p]	 MUN COLD	
33	13, 14, 15	DDT (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	 0.59 ppt (drinking water and fish consumption)[pp] 0.001 ug/l (chronic, freshwater)[pp] 1.1 ug/l (acute, freshwater)[pp] 50 ppb (freshwater)[qq] 69 ng/g wet	 MUN REC1 COLD REC1 REC1	
34	16	Diazinon (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life)	 14 ug/l (drinking water)[p] 0.04 ug/l (chronic, freshwater)[ss] 0.08 ug/l (acute, freshwater)[ss]	 MUN COLD	

Table 1 (*continued*)
Watershed Assessment Criteria

35	17, 18, 19	Dieldrin (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	 0.00014 ug/l (drinking water and fish consumption)[pp] 0.056 ug/l (chronic, freshwater)[pp] 0.24 ug/l (acute, freshwater)[pp] 6.67 ppb (freshwater)[qq] 1.5 ng/g wet	 MUN REC1 COLD REC1 REC1	
36	20, 21, 22	Dioxin (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	 $3x10^{-8}$ mg/l (drinking water)[p] $1.4x10^{-11}$ mg/l (fish consumption)[pp] <0.00001 ug/l (chronic, freshwater)[p] <0.01 ug/l (acute, freshwater)[p] 0.0088 ppb (freshwater)[qq] 0.15 pg/g wet	 MUN REC1 COLD REC1 REC1	
37	32	MTBE (see Tables 2A-2D for more detail)	Concentration: Water quality (human health)	 5 ug/l (secondary MCL); 13 ug/l (public health goal)(both drinking water)[p]	 MUN	Tables for chemical indicators were added to address issues raised by several stakeholders. See Tables 2A – 2D.
38	7	Nitrate (as NO_3) Nitrate + nitrite (sum as nitrogen) (see Tables 2A-2D for more detail)	Concentration: Water quality (human health)	45 mg/l (CA DHS primary MCL)[p] 10 mg/l (U.S. EPA primary MCL)[p]	MUN	

Table 1 (*continued*)
Watershed Assessment Criteria

39	27, 28, 29	PCB (includes aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016) (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	0.5 ug/l (drinking water)[p] 0.00017 ug/l (fish consumption)[pp] 0.014 ug/l (chronic, freshwater)[pp] 2 ug/l (acute, freshwater)[p] 277 ppb (freshwater)[qq] 23 ppm	MUN REC1 COLD REC1 REC1	
40	30, 31	Selenium (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Fish tissue	0.05 mg/l (primary MCL)[p] 5 ug/l total recoverable (chronic, freshwater)[pp] see Table 2B for calculation method (acute, freshwater)[pp] 11.7 ug/g wet	MUN COLD REC1	
41	23, 24, 25	Mercury (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life) Sediment quality Fish tissue	2 ug/l (drinking water)[p] 0.051 ug/l total recoverable (fish consumption)[pp] 0.025 ug/l (chronic, freshwater)[pp] 1.6 ug/l (acute, freshwater)[pp] 486 ppb (freshwater)[qq] 0.233 ug/g wet	MUN REC1 COLD REC1 REC1	

Table 1 (*continued*)
Watershed Assessment Criteria

42	26	Nickel (see Tables 2A-2D for more detail)	Concentration: Water quality (human health) Water quality (aquatic life)	 0.1 mg/l (primary MCL)[p] 4.6 mg/l total recoverable (fish consumption)[pp] hardness dependent; calculate as in Table 2B (chronic/acute, freshwater)[pp]	 MUN REC1 COLD	
43	45	TDS	TDS concentration	500 mg/l[o]	MUN	
44	33	Current channel capacity with respect to 100-year flow event	Design existing capacity (cfs)	provides 100-year level of protection	PFF	
45	N/A	Access	Large aquatic plants	streams: >1 kg (biomass) emergent, submerged, or floating vegetation per m^2 of water surface area along < 80% of the stream segment being evaluated lakes: >1 kg (biomass) emergent, submerged, or floating vegetation per m^2 of water surface area along < 80% of the shoreline	REC1	

References/Notes

a. California Regional Water Quality Control Board. 1995. *San Francisco Bay Basin Water Quality Control Plan*, Table 3-1. Oakland, CA.
b. ibid, Table 3-2.
c. Stormwater Committee, Victoria, Australia. 1999. *Urban Stormwater: Best Practice Environmental Management Guidelines.* "Trash" is defined as anthropogenic material larger than 5 mm in size. This includes wrecked or discarded equipment such as shopping carts but not vegetative material such as yard clippings or leaf litter.
d. Measured in transects across the bankfull channel width.
e. Measured in the zone around the circumference of the lake from the highest water mark or beach head (where applicable) to waist-level water depth.
f. California Regional Water Quality Control Board. 1995. *San Francisco Bay Basin Water Quality Control Plan*, Chapter 3. Oakland, CA.
g. U.S. Environmental Protection Agency. 1999. *Draft Guidance for Water Quality-Based Decisions: The TMDL Process (2nd Ed.).* EPA-841-D-99-001. Document suggests parameters for assessing aesthetics but not the corresponding threshold levels.

Table 1 (*continued*)
Watershed Assessment Criteria

References/Notes (cont'd)

h. Smith, Jerry J. 1982. Modified from *Fishes of the Pajaro River System.* University of California Publications in Zoology, 115: 83-169.
i. Karr, James R. and Ellen W. Chu. 1998. *Restoring Life in Running Waters*. Island Press. Covelo, CA.
j. High summer flows augmented by reservoir or pipeline releases (example: Guadalupe River).
k. U.S. Army Corps of Engineers, Sacramento District. 1999. *Draft Final Mitigation and Monitoring Plan, Guadalupe River Flood Control Project in Downtown San Jose.* Table F-1 (Suitability Indices for Water Temperature Effects on All Life Stages of Steelhead and Chinook Salmon).
l. Stream reaches that support steelhead and resident trout during low flow periods (examples: San Francisquito and Penetentia Creeks).
m. Smith, Jerry J. 1998. Personal communication. San Jose State University.
n. U.S. Environmental Protection Agency. 1972. *Water Quality Criteria*. EPA822Z99001.
o. California Regional Water Quality Control Board. 1995. *San Francisco Bay Basin Water Quality Control Plan*, Table 3-5. Oakland, CA.
p. Marshack, Jon B. 1998. *A Compilation of Water Quality Goals.* California Regional Water Quality Board, Central Valley Region.
q. Rosgen, Dave. 1996. *Applied River Morphology*. Pagosa Springs, CO.
r. U.S. Forest Service. 1993. *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment.* Report of the Forest Ecosystem Management Assessment Team. Washington, DC.
s. Suitable habitat is defined as areas within the stream having the suitable depth, location (hydraulic break), and gravel quality necessary to support spawning.
t. American Standards for Testing and Materials. 1985. *Unified Soil Classification.* Methodology No. D2487-85.
u. McNeil, William J. and Warren H. Ahnell. 1964. *Success of Pink Salmon Spawning Relative to Size of Spawning Bed Materials*. U.S. Fish and Wildlife Service Special Scientific Report, Fisheries No. 469.
v. Peterson, N.P., A. Hendry and T.P. Quinn. 1992. *Assessment of Cumulative Effects on Salmonid Habitat: Some Suggested Parameters and Target Conditions*. Prepared for the Washington Department of Natural Resources and The Cooperative Monitoring, Evaluation and Research Committee Timber/Fish/Wildlife Agreement. University of Washington, Seattle, WA.
w. Chapmann, D.W. 1988. *Critical Review of Variables Used to Define Effects of Fines in Reeds of Large Salmonids*, Transactions of the American Fisheries Society. Vol. 117, No. 1.
x. Burns, James. 1970. *Spawning Bed Sedimentation Studies in Northern California Streams*. Inland Fisheries Division, California Department of Fish and Game.
y. Used as defined in *Habitat Inventory Methods* in *California Salmonid Stream Habitat Restoration Manual.* 1998. California Department of Fish and Game.
z. Smith, Jerry J. 1998. *Distribution and Abundance of Juvenile Coho and Steelhead in Gazos, Waddell, and Scott Creeks*. Unpublished report.
aa. Flosi, G. and F.L. Reynolds. 1994. *California Salmonid Stream Habitat Restoration Manual, 2nd ed*. California Dept. of Fish and Game, State of California Resources Agency.
bb. Includes overhanging streambank vegetation and large woody debris that spans stream channels.
cc. Includes instream vegetation, debris, surface turbulence, rocks, undercut banks, rip rap, and large woody debris.
dd. Platts, W.S., C. Armour, G.D. Booth, M. Bryant, J.L. Bufford, P. Cuplin, S. Jensen, G.W. Lienkaemper, G.W. Minshall, S.B. Monsen, R.C. Helson, J.R. Sedell, and J.S. Tuhy. 1987. *Methods for Evaluating Riparian Habitats with Applications to Management*. U.S. Forest Service. General Technical Report, INT-221. Ogden, UT. This reference is the source for the proposed protocol only.
ee. Lisle, Thomas E. and Sue Hilton. 1992. *Measuring the Fraction of Poor Volume Filled With Fine Sediment.* U.S. Forest Service. Research Note PSW-414. This reference is the source for the proposed threshold level only.
ff. Knopp, Christopher. 1993. *Testing Indices of Cold Water Fish Habitat*. California Regional Water Quality Control Board, North Coast Region in cooperation with the California Department of Forestry and Fire Protection. This reference is a source for the proposed protocol only.

Table 1 (*continued*)
Watershed Assessment Criteria

References/Notes (cont'd)

gg. U.S. Environmental Protection Agency. 1998. *Total Maximum Daily Load for Sediment: Redwood Creek, California*. Region 9, San Francisco, CA. This reference is a source for the proposed protocol only.

hh. Defined as providing shading over a percent of the wetted channel edge length at mean summer flow during the hours of 10:00 a.m. to 2:00 p.m.

ii. Santa Clara Valley Water District. 1994. *Coyote Creek Reach 3 Mitigation and Monitoring Program.* Page 16.

jj. U.S. Army Corps of Engineers, Sacramento District. 1999. *Draft Final Mitigation and Monitoring Plan, Guadalupe River Flood Control Project in Downtown San Jose.* Appendix F: Monitoring methods. Page F-9.

kk. California Dept. of Forestry. 1996. *Hillslope Monitoring Program*. Sacramento, CA.

ll. Migration depths through critical riffles apply to a clear migration pathway at least 2 feet wide or 10% of the stream width, whichever is greater.

mm. Bjornn, T.C. and D.W. Reiser. 1991. *Habitat Requirements of Salmon in Streams.* American Fisheries Society Special Publication 19:83-138.

nn. Smith, Jerry J. and Hiram W. Li. 1983. *Energetic Factors Influencing Foraging Tactics of Juvenile Steelhead Trout, Salmo gairdneri* in *Predator and Prey in Fishes*, David L.G. Noakes et al. (eds.), Dr. W. junk Publishers, The Hague (pp. 173-180).

oo. National Marine Fisheries Service. 1997. *Aquatic Properly Functioning Condition Matrix* (a.k.a. *Species Habitat Needs Matrix*). Southwest Region Office, Santa Rosa, CA. Developed to meet the habitat needs of anadramous salmonids and other aquatic species.

pp. U.S. Environmental Protection Agency. 1997. *Human Health Consumption for Water and Organisms.* Proposed California Toxics Rule.

qq. Buchman, M.F. 1998. *NOAA Quick Screening Reference Tables*. U.S. National Oceanic and Atmospheric Administration, Hazardous Materials Response and Assessment Division. HAZMAT Report 97-2. Seattle, WA.

rr. Menconi, M. and A. Paul. 1994. *Hazard Assessment of the Insecticide Chlorpyrifos to Aquatic Organisms in the Sacramento-San Joaquin River System.* California Dept. of Fish and Game, Administrative Report. Rancho Cordova, CA.

ss. Menconi, M. and C. Cox. 1994. *Hazard Assessment of the Insecticide Diazinon to Aquatic Organisms in the Sacramento-San Joaquin River System*. California Dept. of Fish and Game, Administrative Report. Rancho Cordova, CA.

Table 2A
Potentially Applicable Water Quality Criteria for Human Health Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR HUMAN HEALTH PROTECTION – Drinking Water and Aquatic Organism Consumption (MUN, REC1); WAC Recommended Threshold Levels are in ***bold italic***
(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (units)	Drinking Water Standards (CA & Federal) Maximum Contaminant Levels (MCLs)					CA Public Health Goal in Drinking Water (CA OEHHA)	CA State Action Level (CA DHS)	Taste & Odor Thresholds	U.S. EPA IRIS
	California Dept. of Health Services		U.S. EPA						Reference Dose as a Drinking Water Level (70 kg body wt.; 2 liters/ day water cons.; 20% source from drinking water)
	Primary MCL	Secondary MCL	Primary MCL	Secondary MCL	MCL Goal		Toxicity		
Nitrate (mg/l)	***45*** (as NO_3); ***10*** (total nitrate plus nitrite; sum as N)		10 (as N); ***10*** total nitrate plus nitrite; sum as N)		10 (as N)	10 (as N); ***10*** (total nitrate plus nitrite; sum as N)			11
Chlordane (ug/l)	***0.1***		2		zero	0.03			
Chlorpyrifos (ug/l)									21
Copper (mg/l)	***1.3*** (can be exceeded in no more than 10% of samples at tap)	1.0	***1.3*** (can be exceeded in no more than 10% of samples at tap)	1.0	***1.3***	0.17			
DDT (ug/l)									
Diazinon (ug/l)							***14***		
Dieldrin (ug/l)							0.05		
Dioxin (mg/l)	***$3x10^{-8}$***		***$3x10^{-8}$***		zero				
Mercury (ug/l)	***2***		***2***		***2***				
Nickel (mg/l)	***0.1***								0.14
PCB (ug/l)	***0.5***		***0.5***		zero				
Selenium (mg/l)	***0.05***		***0.05***		***0.05***				0.035
MTBE (ug/l)		***5*** (based on taste/odor)				***13***	35	15 to 95	
Furan compounds (ug/l)									7

Table 2A *(continued)*
Potentially Applicable Water Quality Criteria for Human Health Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR HUMAN HEALTH PROTECTION - Drinking Water and Aquatic Organism Consumption (MUN, REC1); WAC Recommended Threshold Levels are in ***bold italic***
(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (units)	Drinking Water Health Advisories or suggested No-Adverse-Response levels (SNARLs) (for toxicity other than cancer risk)		One-in-a-Million incremental Cancer Risk Estimates for Drinking Water				
	U.S. EPA	*Nat'l Academy* of Sciences	*Cal/EPA* Potency Factor as a Drinking Water Level	U.S. EPA IRIS	U.S. EPA Drinking Water Health Advisory or SNARL	National Academy of Sciences	*CA Prop. 65* Regulatory Level as a Drinking Water Level
Nitrate (mg/l)	10 (10-day, as N)						
Chlordane (ug/l)	60 (10-day)		0.029/0.027 (assumes 70 kg body weight and 2 liters/day water consumption)	0.1	0.03	0.028	0.25 (regulatory dose level divided by 2 liters/day average consumption)
Chlorpyrifos (ug/l)	***20***						
Copper (mg/l)							
DDT (ug/l)			0.1 (assumes 70 kg body weight and 2 liters/ day water consumption)	0.1000		0.042	1.0 (regulatory dose level divided by 2 liters/day average consumption)
Diazinon (ug/l)	0.6	***14***					
Dieldrin (ug/l)	0.5 (for child)/ 2.0 (for adult) (both 7-year)		0.0022 (assumes 70 kg body weight and 2 liters/day water consumption)	0.002	0.002	0.0019	0.02 (regulatory dose level divided by 2 liters/day average consumption)
Dioxin (mg/l)	$1x10^{-8}$ (for child)/$4x10^{-8}$ (for adult) (both 7-year)	$7x10^{-7}$	$2.7x10^{-10}$ (assumes 70 kg body weight and 2 liters/day water consumption)		$2x10^{-10}$		$2.5x10^{-9}$ (regulatory dose level divided by 2 liters/ day average consumption)
Mercury (ug/l)	***2***						
Nickel (mg/l)	***0.1***						
PCB (ug/l)		50 (7-day)	0.0045 (assumes 70 kg body weight and 2 liters/day water consumption)	0.1	0.005	0.16 (for arochlor 1260)	0.045/0.05 (draft for molecules with 60% chlorine or greater by molecular weight) (regulatory dose level divided by 2 liters/day average consumption)
Selenium (mg/l)							
MTBE (ug/l)	20 to 40						
Furan compounds (ug/l)							

Table 2A *(continued)*
Potentially Applicable Water Quality Criteria for Human Health Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR HUMAN HEALTH PROTECTION - Drinking Water and Aquatic Organism Consumption (MUN, REC1); WAC Recommended Threshold Levels are in ***bold italic***
(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (units)	U.S. EPA National Ambient Water Quality Criteria Human Health and welfare Protection				
	Non-Cancer Health Effects		One-in-a-Million cancer Risk Estimate		
	Sources of Drinking Water (water + organisms)	*Other Waters* (aquatic organism consumption only)	Sources of Drinking Water (water + organisms)	*Other Waters* (aquatic organism consumption only)	Taste & Odor or Welfare
Nitrate (mg/l)	10 (as N)				
Chlordane (ug/l)			0.00057	***0.00059***	
Chlorpyrifos (ug/l)					
Copper (mg/l)	***1.3***				1.0
DDT (ug/l)			***0.00059***	***0.00059***	
Diazinon (ug/l)					
Dieldrin (ug/l)			***0.00014***	***0.00014***	
Dioxin (mg/l)			1.3×10^{-11}	1.4×10^{-11}	
Mercury (ug/l)	0.14 (as total recoverable)	0.15 (as total recoverable)			
Nickel (mg/l)	0.61 (as total recoverable)	***4.6*** (as total recoverable)			
PCB (ug/l)			0.000044 (applies separately to aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016)	0.000045 (applies separately to aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016)	
Selenium (mg/l)					
MTBE (ug/l)					
Furan compounds (ug/l)					

Table 2A *(continued)*
Potentially Applicable Water Quality Criteria for Human Health Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR HUMAN HEALTH PROTECTION - Drinking Water and Aquatic Organism Consumption (MUN, REC1); WAC Recommended Threshold Levels are in ***bold italic***
(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (units)	*Proposed CA Toxics Rule Criteria (U.S. EPA)* Human Health (30-day Average)			*CA Ocean Plan*
	Inland Surface Waters		Enclosed Bay & Estuaries	Numerical Water Quality Objectives Human Health (30-day Average)
	Sources of Drinking Water (water + organisms)	*Other Waters* (aquatic organism consumption only)	(aquatic organism consumption only)	(aquatic organism consumption only)
Nitrate (mg/l)				
Chlordane (ug/l)	0.00057	***0.00059***	0.00059	0.000023
Chlorpyrifos (ug/l)				
Copper (mg/l)	***1.3*** (as total recoverable)			
DDT (ug/l)	***0.00059***	***0.00059***	0.00059	0.00017
Diazinon (ug/l)				
Dieldrin (ug/l)	***0.00014***	***0.00014***	0.00014	0.00004
Dioxin (mg/l)	$1.3x10^{-11}$	***$1.4x10^{-11}$***	$1.4x10^{-11}$	3.9×10^{-12} (for sum of 2,3,7,8-chlorinated dibenzodioxin and dibenzofuran concentrations multiplied by their respective USEPA Toxicity Equivalency Factors)
Mercury (ug/l)	0.05 (as total recoverable)	***0.051*** (as total recoverable)	0.051 (as total recoverable)	
Nickel (mg/l)	0.61 (as total recoverable)	***4.6*** (as total recoverable)	4.6 (as total recoverable)	
PCB (ug/l)	0.00017	***0.00017***		0.000019 (for the sum of aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260)
Selenium (mg/l)				
MTBE (ug/l)				
Furan compounds (ug/l)				

Table 2B
Potentially Applicable Water Quality Criteria for Aquatic Life Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR AQUATIC LIFE PROTECTION (COLD, RARE); WAC Recommended Threshold Levels are in ***bold italic***

(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (units)	Freshwater Aquatic Life Protection					Saltwater Aquatic Life Protection			
	Recommended Criteria			Toxicity Information (Lowest Observed Effect Level)		Recommended Criteria			Toxicity Information (Lowest Observed Effect Level)
	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	*Instantaneous* Maximum	Acute	Chronic	Continuous Concentration (4-day Average)	Maximum Concentration (1-hour Average)	Instan-taneous Maximum	Acute
Chlordane (ug/l)	***0.0043***		***2.4***			0.004		0.09	
Chlorpyrifos (ug/l)	0.041	***0.083***				0.0056	0.011		
Copper (ug/l)	calculate as total recoverable: (e{0.8545[ln(hardness)]-1.465}) where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by 0.960	calculate as total recoverable: (e{0.9422[ln(hardness)]-1.464}) where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by 0.960				2.4 (dissolved)	2.9 (total recov.): 2.4 (dissolved)		
DDT (ug/l)	***0.001***		***1.1***			0.001		0.13	
Diazinon (ug/l)			0.009						
Dieldrin (ug/l)	0.0019		2.5			0.0019		0.71	
Dioxin (ug/l)				***<0.01***	***<0.00001***				
Mercury (ug/l)	0.012 (total recoverable); 0.012 (dissolved)	2.4 (total recoverable); 2.1 (dissolved)				0.025 (total recoverable); 0.025 (dissolved)	2.1 (total recov.); 1.8 (dissolved)		
Nickel (ug/l)	calculate as total recoverable: (e{0.8460[ln(hardness)]+1.1645}) where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by 0.997	calculate as total recoverable: (e{0.8460[ln(hardness)]+3.3612}) where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by 0.998				8.3 (total recoverable); 8.2 (dissolved)	75 (total recov.); 74 (dissolved)		
PCB (ug/l)	***0.014*** (applies separately to aroclors 1242, 1254, 1221, 1232, 1248, 1260, 1016)			***2***		0.03 (applies separately to aroclors 1242, 1254, 1221, 1232, 1248, 1260, 1016)			10
Selenium (ug/l)	***5*** (total recoverable)	20 (total recoverable)				71 (total recoverable); 71 (dissolved)	294 (total recov.); 290 (dissolved)		

Table 2B *(continued)*
Potentially Applicable Water Quality Criteria for Aquatic Life Protection

SUMMARY OF POTENTIALLY APPLICABLE GOALS FOR HUMAN HEALTH PROTECTION - Drinking Water and Aquatic Organism Consumption (MUN, REC1); WAC Recommended Threshold Levels are in ***bold italic***
(chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)

Constituent (Units)	**Proposed California Toxics Rule Criteria (U.S. EPA)**						**California Ocean Plan – Numerical Water Quality**			
	California Inland Surface waters – Freshwater Aquatic Life Protection			*California Enclosed bays & Estuaries –* **Saltwater Aquatic life protection**			**Marine Aquatic Life Protection**			*Other*
	Continuous Concentration (4-day Average)	**Maximum Concentration (1-hour Average)**	*Instantaneous* **Maximum**	**Continuous Concentration (4-day Average)**	**Maximum Concentration (1-hour Average)**	*Instantaneous* **Maximum**	**6-month Median**	**Daily Maximum**	*Instantaneous* **Maximum**	
Chlordane (ug/l)	***0.0043***		***2.4***	0.0043		0.09				
Chlorpyrifos (ug/l)										***0.02*** (interim freshwater; Menconi & Paul, CA DFG 1994)
Copper (ug/l)	calculate as total recoverable: ***(e{0.8545[ln(hardness)]-1.702})*** where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by ***0.960***	calculate as total recoverable: ***(e{0.9422[ln(hardness)]-1.700})*** where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by ***0.960***		3.7 (total recov.); 3.1 (dissolved)	5.8 (total recov.); 4.8 (dissolved)		3	12	30	
DDT (ug/l)	***0.001***		***1.1***	0.001		0.13				
Diazinon (ug/l)										***0.08*** (acute); ***0.04*** (chronic) (freshwater aquatic life; Menconi & Cox, CA DFG 1994)
Dieldrin (ug/l)	***0.056***	***0.24***		0.0019		0.71				
Dioxin (ug/l)										
Mercury (ug/l)	0.91 (total recoverable); 0.77 (dissolved)	***1.6*** (total recoverable); ***1.4*** (dissolved)		1.1 (total recov.); 0.94 (dissolved)	2.1 (total recov.); 1.8 (dissolved)		0.04	0.16	0.4	***0.025*** (total recov. and dissolved)
Nickel (ug/l)	calculate as total recoverable: ***(e{0.8460[ln(hardness)]-0.0584})*** where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by ***0.997***	calculate as total recoverable: ***(e{0.8460[ln(hardness)]-2.255})*** where hardness is mg/l as $CaCO_3$; for dissolved, multiply result of total recoverable calculation by ***0.998***		8.3 (total recov.); 8.2 (dissolved)	75 (total recov.); 74 (dissolved)		5	20	50	
PCB (ug/l)	***0.014***			0.03						
Selenium (ug/l)	***5*** (total recoverable)	calculate as total recov.: ***1/[(selenite fraction/185.9 ug/l)+(selenate fraction/12.83 ug/l)]*** where selenite fraction + selenate fraction = 1		71 (total recov.); 71 (dissolved)	291 (total recov.); 290 (dissolved)		15	60	150	

Table 2C
Potentially Applicable Sediment Criteria

SUMMARY OF POTENTIALLY APPLICABLE GOALS (REC1, COLD, RARE); WAC Recommended Threshold Levels are in ***bold italic*** (chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)											
Constituent (units in dry weight)	**Toxicity Effects Levels (see note at bottom for sources)**								**Freshwater Sediment Background Levels** (see note at bottom for sources)	**Soil Background Level (National Geometric Mean)** (see note at bottom for sources)	**U.S. EPA Proposed Criteria** (based on equilibrium partitioning
	Freshwater Sediment			**Marine Sediment**							
	Threshold Effects Level (TEL)	**Probable Effects Level (PEL)**	**Upper Effects Threshold (UET)**	**Threshold Effects Level (TEL)**	**Effects Range - Low (ERL)**	**Effects Range-Median (ERM)**	**Probable Effects Level (PEL)**	**Apparent Effects Threshold (AET)**			
Chlordane (ppb)	4.5	***8.9***	30 (based on impacts to benthic community	2.26	0.5	6	4.79	>4.5 (based on Echinoderm larvae bioassay)			
DDT (ppb)			50 (based on impacts to benthic community	1.19	1	7	4.77	12 (based on Echinoderm larvae bioassay)			
(Dieldrin (ppb)	2.85	***6.67***	300 (based on impacts to benthic community	0.715	0.02	8	4.3	1.9 (based on Echinoderm larvae bioassay)			11,00 (freshwater); 20,000 (marine) ug/kg OC (ppm organic carbon)
Dioxin (ppb)			***0.0088*** (value on dry weight basis) (based on Hyallela azteca bioassay)								
PCB (ppb)	34.1	***277***	26 (based on Microtox bioassay)	21.55	22.7	180	188.79	130 (based on Microtox bioassay)			
Furan compounds (debenzofuran (ppb)			***5,100*** (based on Hyallela azteca bioassay)					110 (based on Echinoderm larvae bioassay)			
Mercury (ppb)	174	***486***	560 (based on Microtox bioassay)	130	150	696	710	410 (based on Microtox bioassey)	4 to 51	58	
Selenium (ppb)								1,000 (based on Amphipod bioassay)	290	260	
Copper (ppb)	35,700	197,000	86,000 (based on impacts to benthic community	18,700	34,000	108,200	270,000	390,000 (based on Microtox and Oyster larvae bioassay)	10,000 to 25,000	17,000	
Nickel (ppb)	18,000	35,900	43,000 (based on Hyallela azteca bioassay)	15,900	20,900	42,800	51,600	110,000 (based on Echioderm larvae bioassay)	9,900	13,000	

Note: toxicity levels are from Buchman, M.F., 1998. NOAA Screening Quick Reference Tables, NOAA HAZMAT Report 97-2, Seattle WA, Hazardous Materials Response and Assessment Division, National Oceanic and Atmospheric Administration, 12 pages.
This document is a compilation of information from several sources including research from the Great Lakes and Puget Sound.

Note: background freshwater sediment values are from the same source as above; the values come from several original sources, primarily from International Joint Commission Sediment Subcommittee (1988).

Note: background soil concentrations are from the same source as above; the values originate in Shacklette and Boerngen, 1984; USGS Prof. Paper 1270.

Note: meaning of terms used from Buchman, M.F., 1988:

ERL: represents the value at which toxicity may begin to be observed in sensitive species.

ERM: the median concentration of the samples labeled as toxic.

TEL: the concentration below which adverse effects are expected to occur only rarely.

PEL: the level above which adverse effects are expected to occur frequently.

AET: generally equivalent to the concentration observed in the highest non-toxic sample; only the lowest of five potential AETs is listed.

UET: for freshwater sediments, the UET is the lowest AET from a compilation of endpoints.

Table 2D
Potentially Applicable Fish Tissue Criteria

SUMMARY OF POTENTIALLY APPLICABLE GOALS (REC1); WAC Recommended Threshold Levels are in ***bold italic*** (chemical constituents of concern are from the final 1998 303(d) list for Santa Clara Basin waterbodies and the southern portion of San Francisco Bay)				
Constituent (units)	**Fish Tissue Concentration**			**San Francisco Estuary Institute Regional Monitoring Program**
	U.S. EPA Human Health Cancer Risk of 10^{-5}	**U.S. EPA Non-Cancer Hazard Quotient of 1**	**U.S. Food and Drug Administration Guidance/Action/ Tolerance Level**	**Screening Values (based upon consumption rate of 30 g/day) (see note below)**
Chlordane (ppm)	0.083	0.65	0.3	***18 ng/g wet*** (for sum of chlordanes)
Chlorpyrifos (ppm)		32		
DDT (ppm)	0.32	5.4	5	***69 ng/g wet*** (for sum of DDTs)
Diazinon (ppm)		9.7		
Dieldrin (ppm)	0.0067	0.54	0.3	***1.5 ng/g wet***
Dioxin (ppm)				***0.15 pg/g wet*** (for dioxin toxic equivalents)
PCB (ppm)	0.014	0.22 (0.75 for arochlor 1016)	2	***23*** (for sum of arochlors)
Furan compounds (dibenzofuran)(ppm)		43		(included with dioxin toxic equivalents)
Mercury (ppm)		1.1	1	***0.233 ug/g wet***
Selenium (ppm)		54		***11.7 ug/g wet***

Note: Screening values calculated based on 1995 EPA guidance. Defined as concentrations of target analytes in fish or shellfish tissue that are of potential public health concern.

Table 3
Example Approach for Performing Uncertainty Analysis of Bioassessment Data

Level of Information	Technical Components	Spatial/Temporal Coverage	Data Quality
1	• Visual observation of biota • Reference conditions not used • Simple documentation	• Limited monitoring • Extrapolations from other sites	• Unknown or low precision and sensitivity • Professional biologist not required
2	• One assemblage (usually invertebrates) • Reference conditions pre-established by professional biologist • Biotic index or narrative evaluation of historical records	• Limited to a single sampling • Limited sampling for site-specific studies	• Low to moderate precision and sensitivity • Professional biologist may provide oversight
3	• Single assemblage usually the norm • Reference condition may be site-specific, or composite of sites (e.g., regional) • Biotic index (interpretation may be supplemented by narrative evaluation of historical records)	• Monitoring of targeted sites during a single season • May be limited sampling for site-specific studies • May include limited spatial coverage for watershed-level assessments	• Moderate precision and sensitivity • Professional biologist performs survey or provides training for sampling • Professional biologist performs assessment
4	• Generally two assemblages, but may be one if high data quality • Regional (usually based on sites) reference conditions used • Biotic index (single dimension or multimetric index)	• Monitoring during 1-2 sampling seasons • Broad coverage of sites for either site-specific or watershed assessments • Conducive to regional assessments using targeted or probabilistic design	• High precision and sensitivity • Professional biologist performs survey and assessment

Source: Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Upgrades: Supplement EPA-841-B-97-002B, September 1997.

Table 4
Example of Potential Limiting Factors from Assessment of Selected Beneficial Uses and Stakeholder Interest

COLD*	RARE	REC1	MUN	PFF
temperature exceeds criteria for critical life stages of steelhead	limited riparian habitat for salamanders	limited access	MTBE exceeds Action Level at selected drinking water wells	floodway capacity limited by sedimentation in channels
insufficient riffle abundance limits macroinvertebrate population and food supply for fish, or limits fast water feeding habitat to allow fish to feed	barriers to migration of anadramous fish	aesthetic limitations: late summer algal blooms and associated odors		excess woody debris limits floodway capacity
low dissolved oxygen during low summer flow periods	red legged frogs limited by predation from bullfogs	risk of exposure to pathogens, especially during wet weather		floodway lacks capacity to meet future conditions for 1% flood
chemical toxicity during wet weather events		risk to human health from consumption of fish		
lack of woody debris and other instream cover		posted for no fishing		

*these are all factors that may affect one reach, and will be listed in order of probable importance.

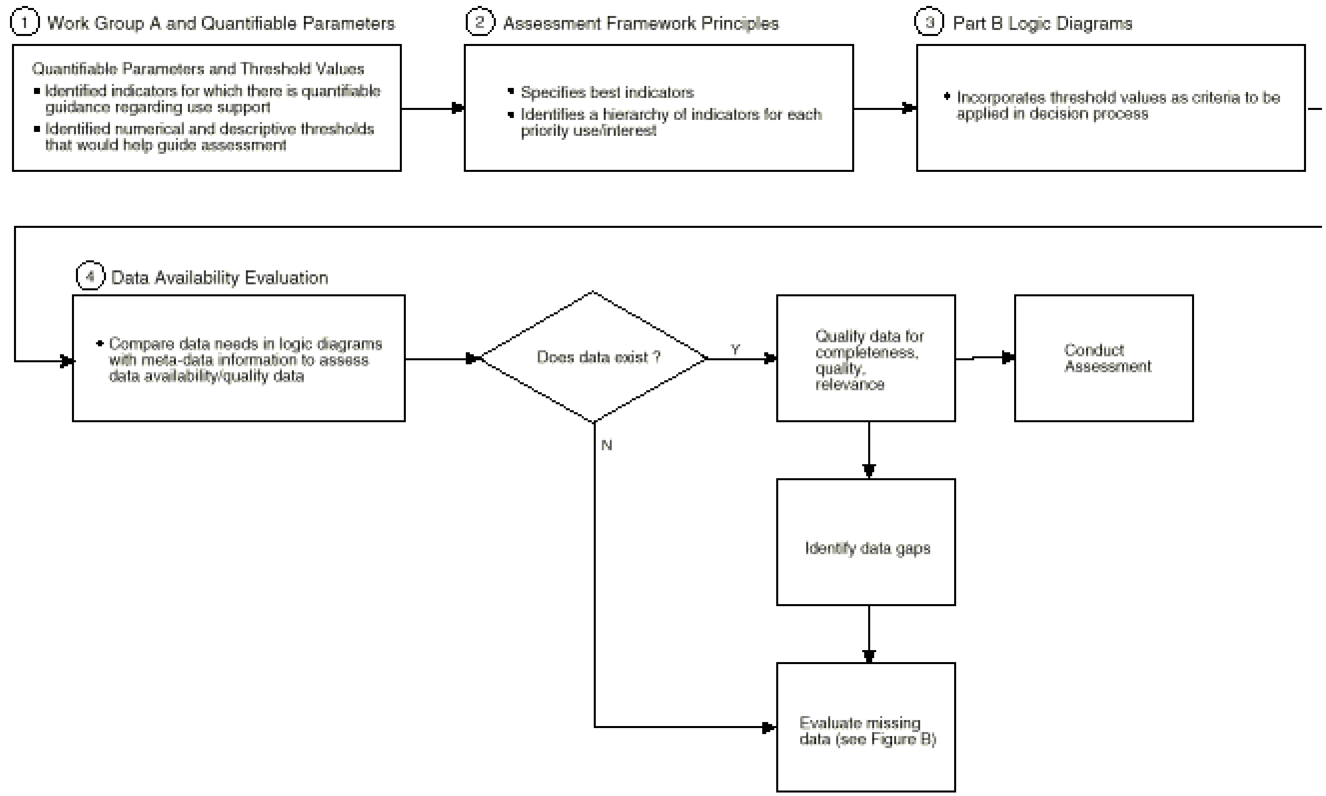


Figure A. Steps in Assessment Showing How Part B of Assessment Framework Leads to Data Availability Evaluation

51-981086NA-00/012000/gos

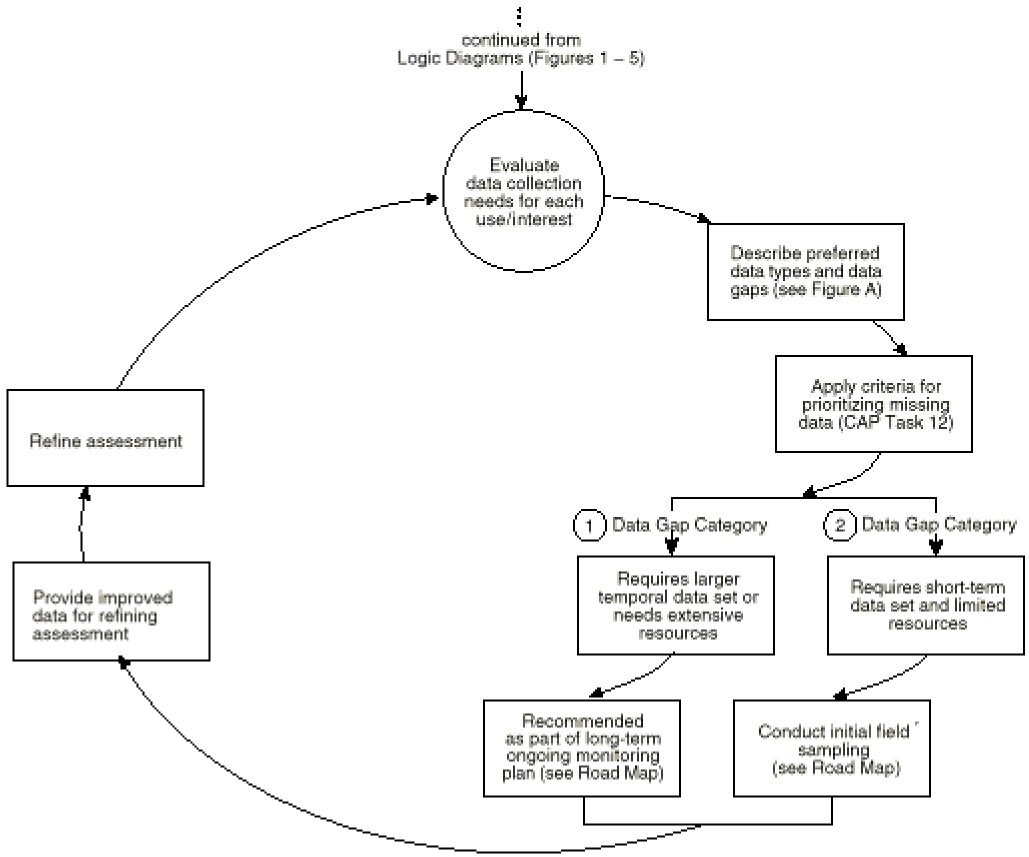


Figure B. Steps Involved in Evaluating Data Collection Needs and Refining Assessment

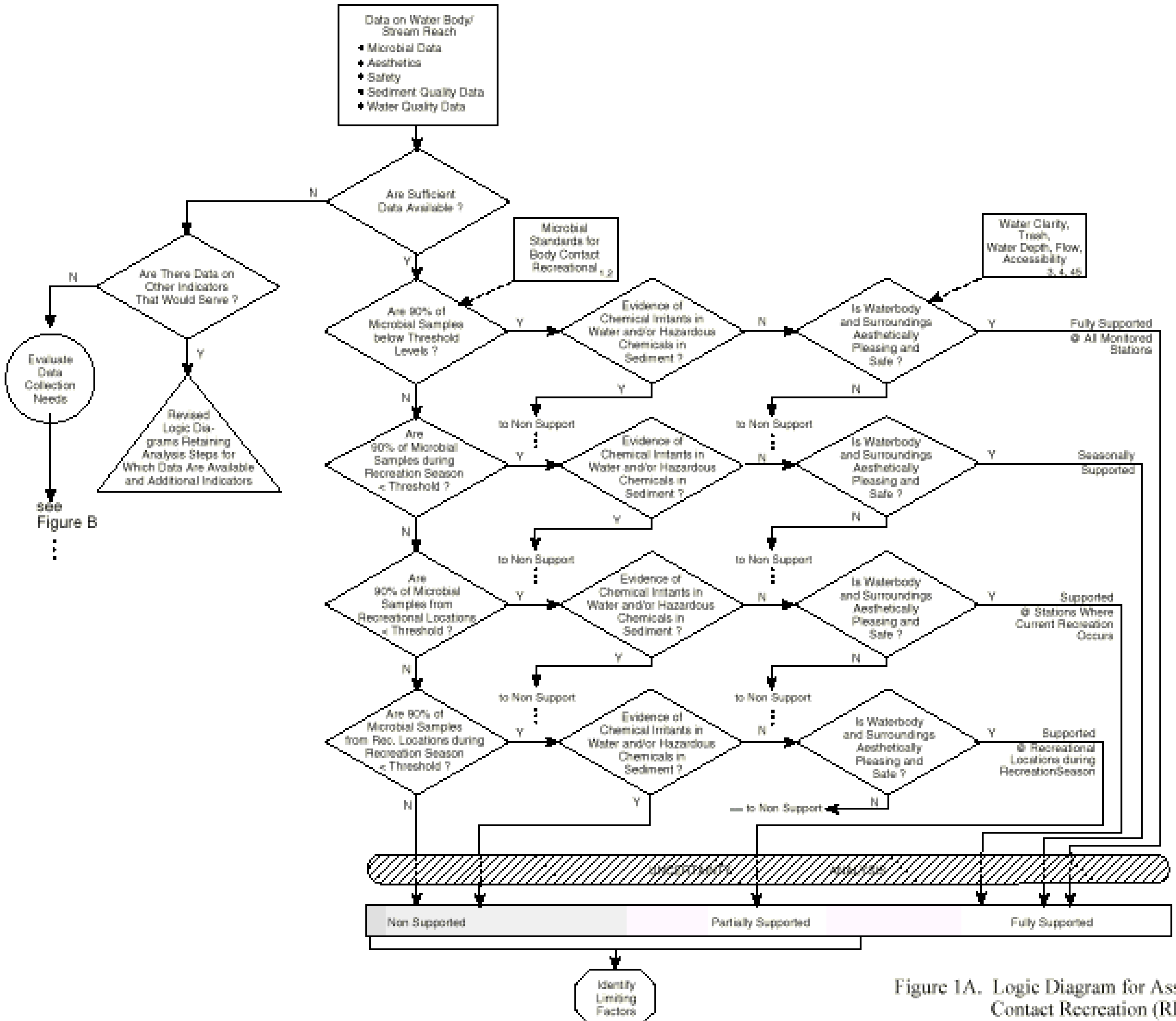


Figure 1A. Logic Diagram for Assessing Water Contact Recreation (REC1) Beneficial Use

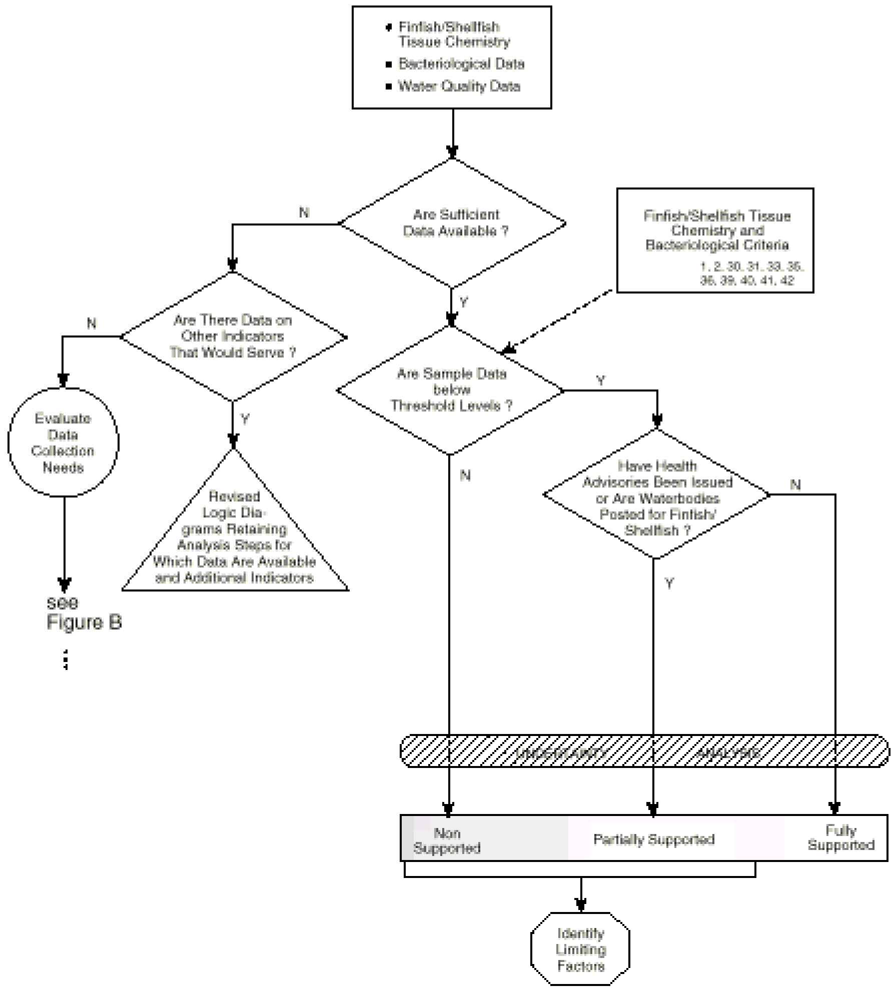


Figure 1B. Logic Diagram for Assessing Support of Finfish/Shellfish Consumption as Part of Sport Fishing (REC1) Beneficial Use

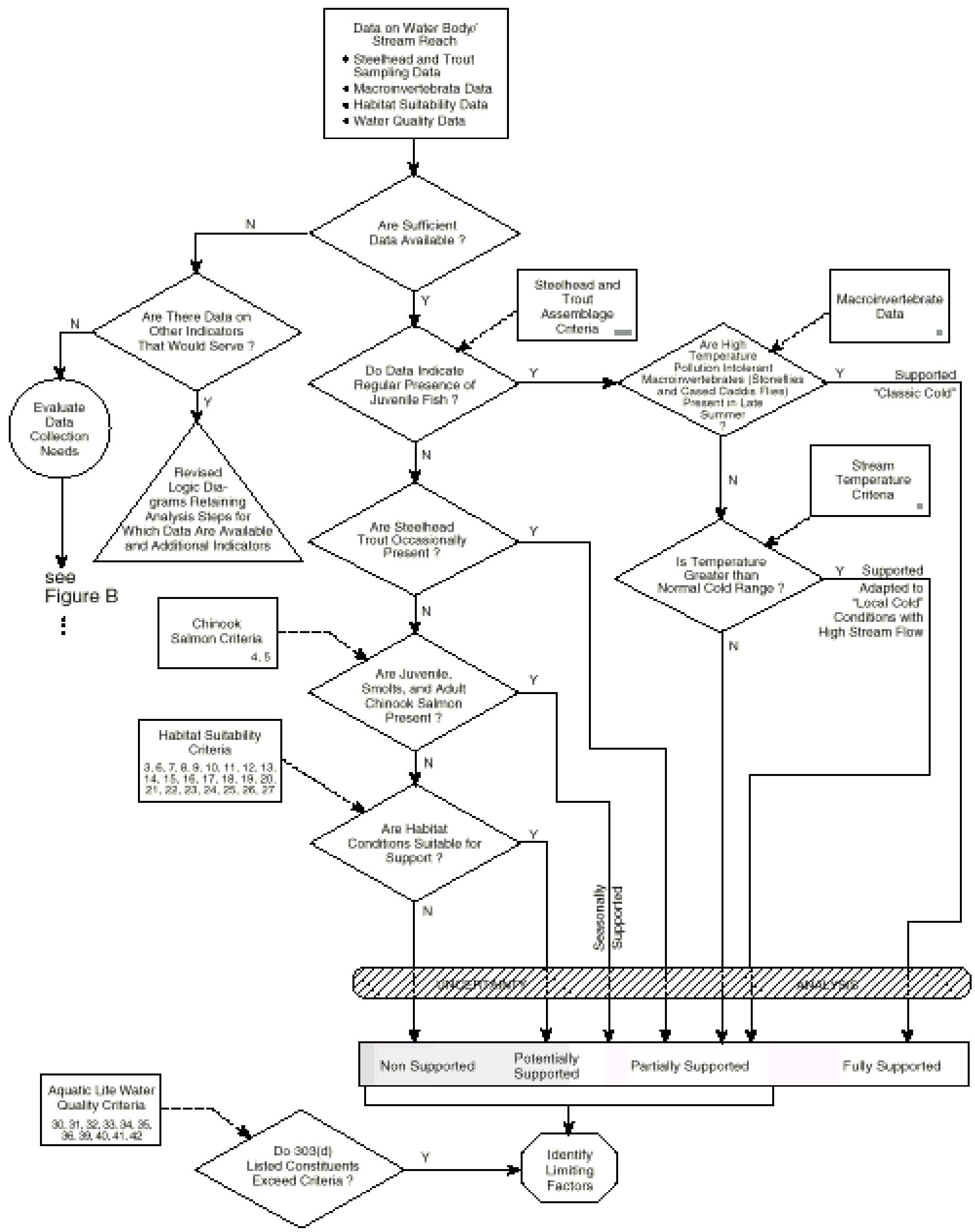


Figure 2. Logic Diagram for Assessing Cold Freshwater Habitat (COLD) Beneficial Use

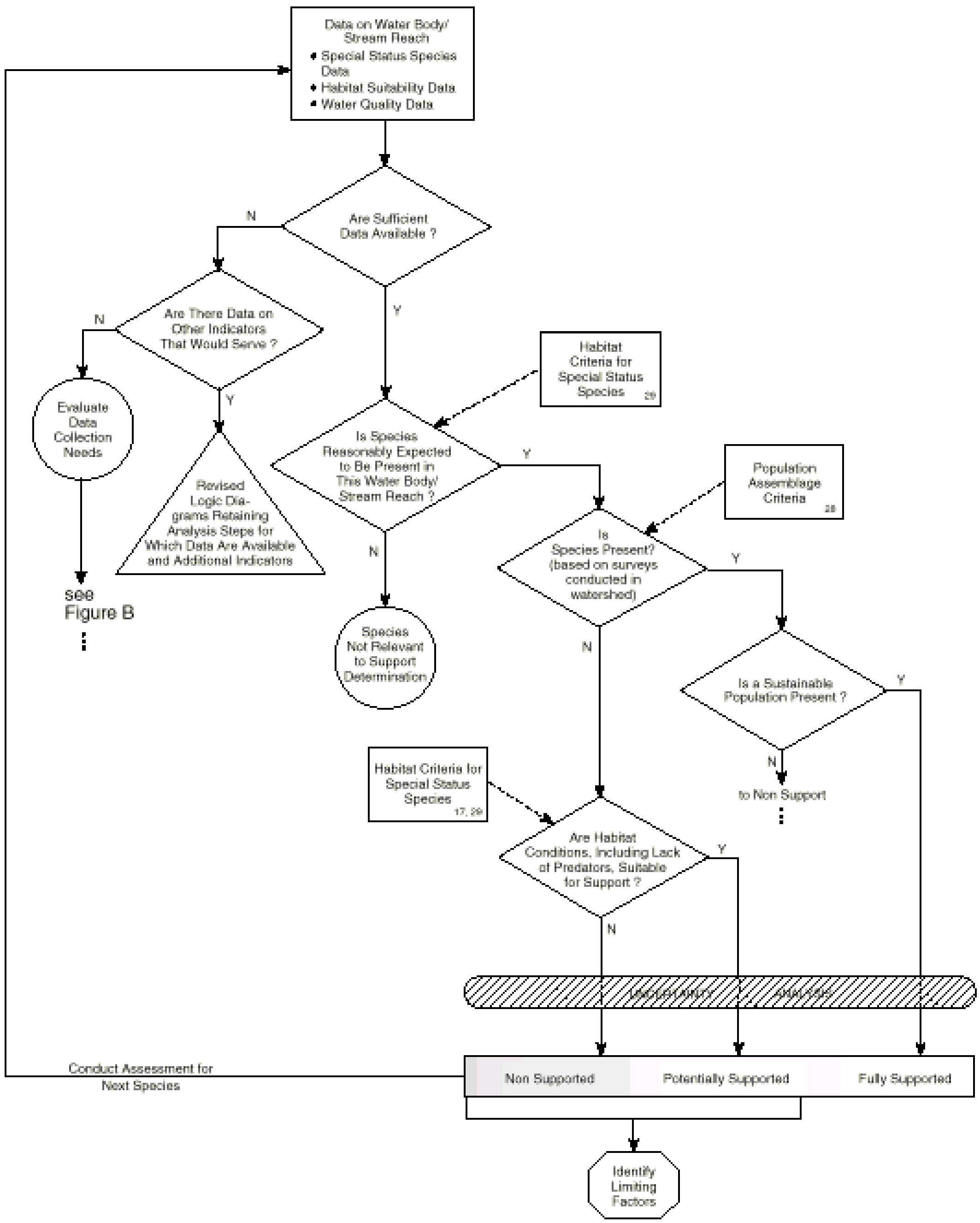


Figure 3. Logic Diagram for Assessing Support of Preservation of Rare and Endangered Species (RARE) Beneficial Use

51-981086NA-00/012000/gos

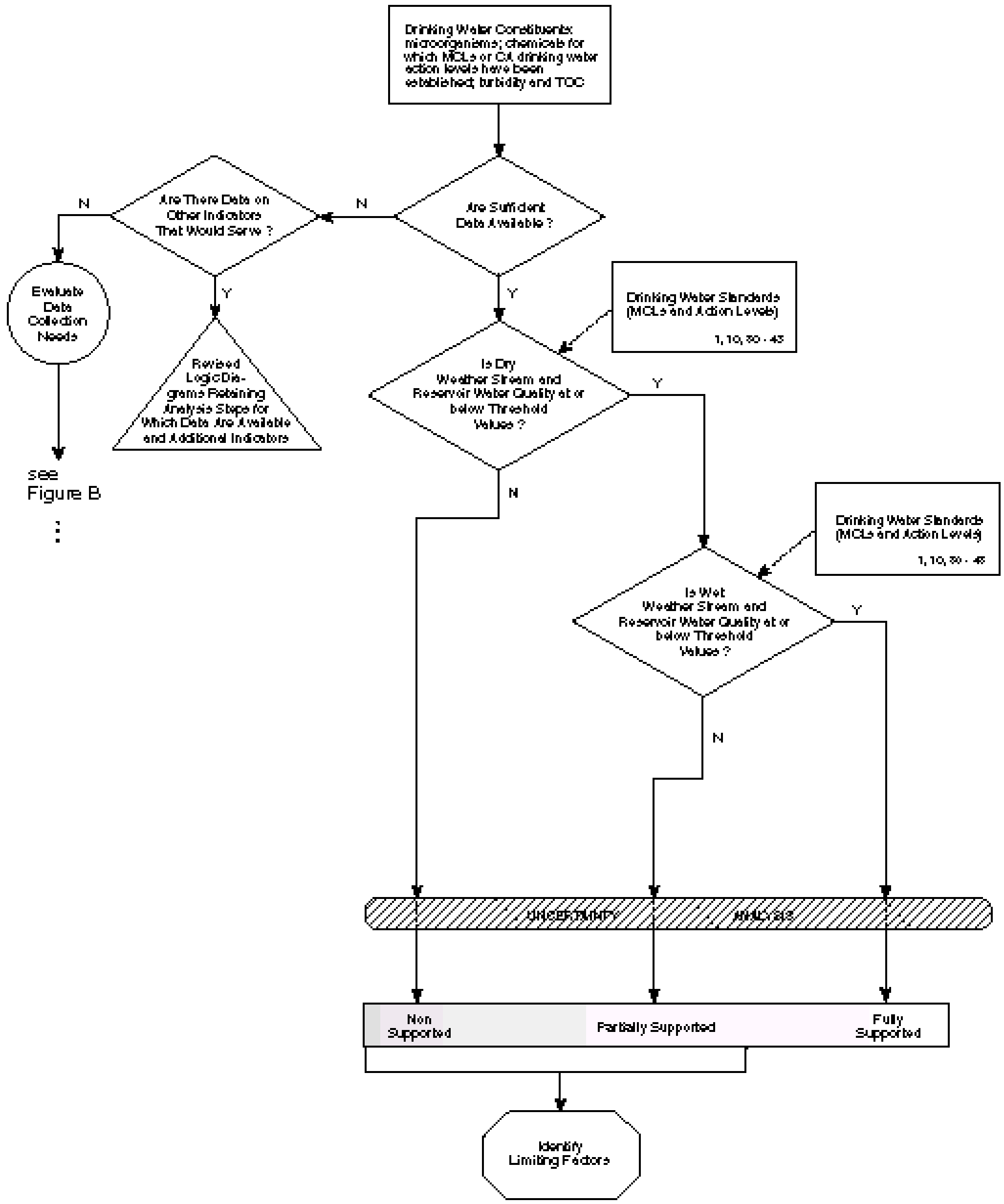
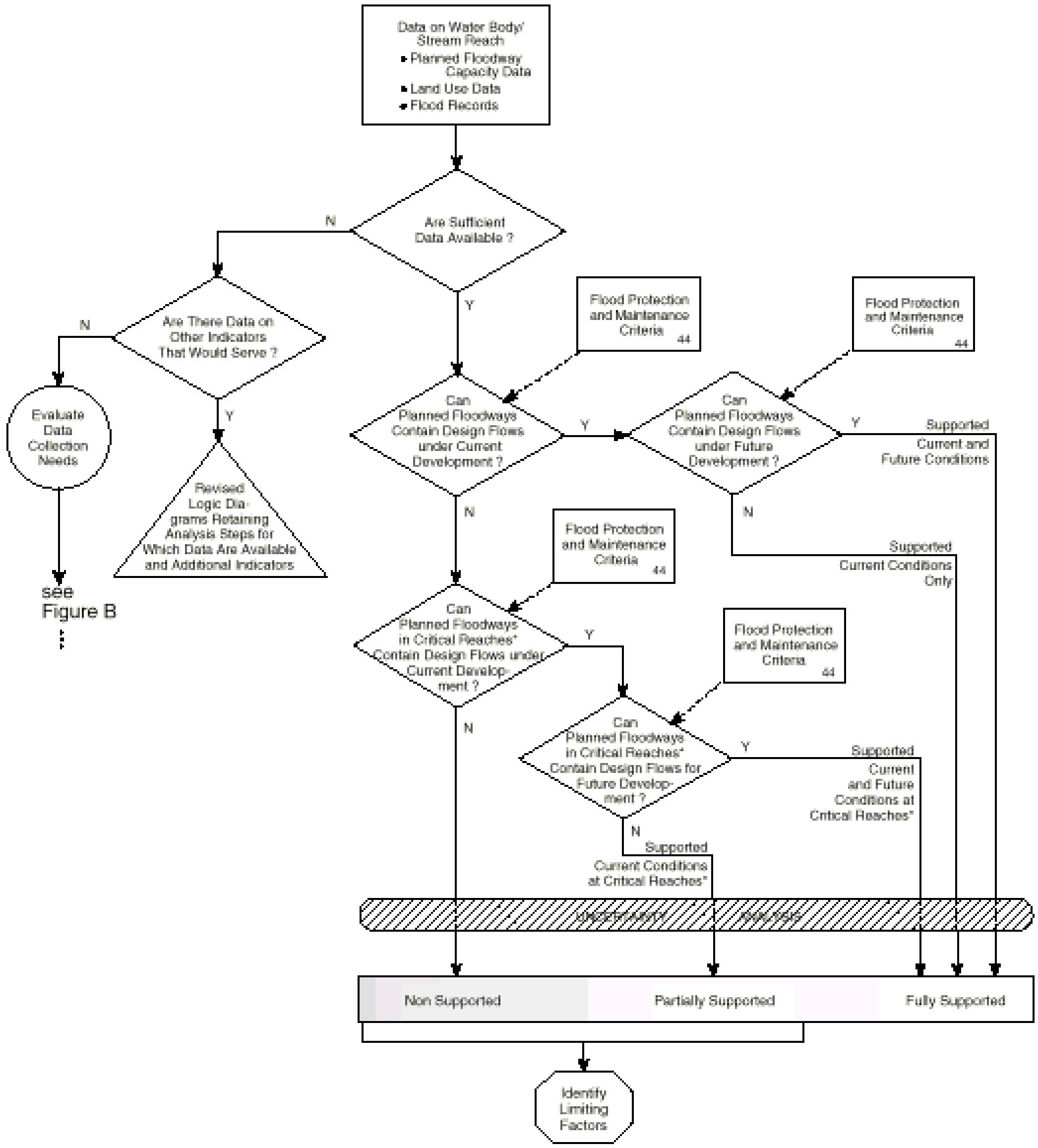


Figure 4. Logic Diagram for Assessing Municipal and Domestic Supply (MUN) Beneficial Use

51-981086NA.00-00091/022900/gcs



* Critical reaches include urban reaches or other reaches where flooding could result in a high level of property damage or loss of life.

Figure 5. Logic Diagram for Assessing Flood Management Stakeholder Interest

51-981086NA-00/012000/gos

Appendix A3
Selection of Representative Watersheds

Santa Clara Basin - Watershed Management Initiative
State of the Watershed Report Preparation Team

MEMORANDUM (Deliverable TM #11c)

TO: Core Group
FROM: John Davis (Watershed Assessment Consultant)

DATE: 14 December, 1998, Revised 19 January, 1999
SUBJECT: Selection of Representative Watersheds

INTRODUCTION:

The consolidated action plan for the Santa Clara Basin Watershed Management Initiative (WMI) calls for the assessment of several representative watersheds in the first phase of the WMI. In November and December 1998, Work Group C developed criteria and a method for selection of the representative watersheds. The criteria and method were summarized in a memorandum from the work group to the Report Preparation Team dated 3 December, 1998. The criteria and method were approved by the Core Group on that same day.

The Watershed Assessment Consultant (WAC) was instructed to use the criteria and method to evaluate and select representative watersheds. This memorandum summarizes the results of the WAC' s analysis and recommends a suite of three representative watersheds for analysis in the WMI.

EVALUATION PROCEDURE:

The method for selection of representative watersheds devised by Work Group C is summarized briefly below. Early in their deliberations, Work Group C concluded that the evaluation criteria should be divided into two groups:

Criteria that will be applied to individual watersheds (Tier 1 criteria)
Criteria that will be represented collectively by a group of watersheds (Tier 2 criteria)

Tier 1 criteria are those criteria that can be used to rate an individual watershed. Habitat value is an example of a Tier 1 criterion. The group concluded that high habitat value is a desirable attribute for a representative watershed and thus individual watersheds could be rated with respect to the habitat value criterion.

Tier 2 criteria are those criteria needed to ensure that the group or suite of watersheds selected for assessment contain certain attributes that are representative of Santa Clara Basin conditions. For example, location within the basin is a Tier 2 criterion. The group felt that the suite of watersheds chosen for assessment should include at least one watershed drained by a stream originating in the Santa Cruz Mountains and one drained by a stream originating in the geomorphically different Diablo Range. The determination of consistency with this criterion cannot be made with reference to a single watershed; it has to made with reference to a suite of watersheds.

Work Group C did not include data availability as an evaluation criterion. However, based on comments received on the draft selection criteria, the Report Preparation Team felt that data availability should be added as a third tier criterion to distinguish between data rich and data poor watersheds that have otherwise received similar scores.

The bulk of the evaluation was performed by the WAC at a one-day workshop. Attendees included Peter Mangarella, Terry Cooke and John Davis of URS Greiner Woodward Clyde and Thomas Reid of Thomas Reid Associates. Information on land use was provided by Lucy Buchan of EOA. The detail of the analysis was limited by availability of data and time.

Each of the watersheds in the basin were rated using the Tier 1 criteria. The watersheds scoring highest with reference to the Tier 1 criteria were arranged in suites and evaluated with respect to the Tier 2 criteria.

The results of the WAC's evaluation of watersheds were reviewed by Work Group C at a meeting on 12 January, 1999. The group called for a number of revisions to this memorandum but concurred with the WAC's findings and recommendations.

RESULTS OF TIER 1 EVALUATION:

The discussion of the results of the Tier 1 evaluation are prefaced by a few notes on assumptions made.

Habitat Value Two types of data were used to assess habitat value. They were channel characteristics and riparian vegetation. It was assumed that habitat value was low for a stream reach if the channel was concrete or rock lined, enclosed in a pipe, confined by levees and devoid of riparian significant riparian vegetation.

Fish The value of streams as fish habitat was determined using data on current fish use of various stream reaches with some consideration of potential use where suitable habitat is present but unoccupied. Five categories were used in descending order of rating; native cold water fishery (steelhead); cold water fishery involving attempts by anadromous fish to use streams (salmon); warm water fishery with substantial proportion of native fish; warm water fishery with non-native fish; and no value.

Species of Special Concern The analysis used data from the California Natural Resource Diversity Database. It considered listed species, candidate species and species of special concern. Most emphasis was given to aquatic species and species that use lands adjacent to streams. Streams with high numbers of recorded sitings of species of special concern received higher ratings.

Results The cumulative scoring of the watersheds with reference to the Tier 1 criteria is shown below. Watersheds are listed in rank order from highest to lowest. Complete scores are shown in Table 1.

San Francisquito Creek	20
Coyote Creek	19
Guadalupe River	17
Stevens Creek	14
Arroyo de la Laguna	14
Lower Penitencia/Berryessa Creek	13

SanTomas Aquino Creek	12
Calabazas Creek	11
Adobe Creek	10
Permanente Creek	9
Matadero/Barron Creeks	8
Sunnyvale West Channel	5
Sunnyvale East Channel	5

RESULTS OF TIER 2 EVALUATION:

The watersheds that ranked highest in the Tier 1 evaluation were assembled into suites of three. Only the six watersheds with the highest Tier 1 scores were considered in the Tier 2 evaluation. This produces 20 suites or combinations of three watersheds. The WAC's decision to use only the six top scoring watersheds was somewhat arbitrary but based on the following reasoning. It is likely that watersheds with valuable individual resources that scored well in the Tier 1 evaluation will combine to make more promising suites of watersheds than watersheds that scored poorly in the Tier 1 evaluation. Also, if more than the six top scoring watersheds are combined into suites the level of analytical effort expands considerably. If the top 8 watersheds are considered, 56 suites or combinations would need to be evaluated. If the top 10 watersheds are considered, there are 120 suites. If all 13 watersheds are considered, there are 286 suites. Work Group C agreed that analysis of 20 suites was sufficient.

For the Tier 2 evaluation, the WAC first compiled information relevant to each of the Tier 2 criteria. This information was used to answer the series of questions that comprise the Tier 2 evaluation. The results of the Tier 2 evaluation are shown in Table 2. A worksheet used to support the evaluation can be found in Appendix A, Table A-1.

The seven suites scoring the highest with reference to Tier 2 criteria are listed below. Cumulative Tier 1 criteria are also shown.

	Tier 2	Tier 1	Data Availability
San Francisquito/Coyote/Stevens	13	53	7
San Francisquito/Guadalupe/Lower Penitencia	13	50	8
San Francisquito/Coyote/ Lower Penitencia	12	52	7
San Francisquito/Coyote/Arroyo de la Laguna	12	53	6
San Francisquito/Guadalupe/Arroyo de la Laguna	12	51	7
Coyote/Stevens/ Lower Penitencia	12	46	6
Guadalupe/Arroyo de la Laguna/ Lower Penitencia	12	44	6

DATA AVAILABILITY:

Work Group C chose not to include data availability as one of the selection criteria for representative watersheds. During review of the selection criteria by the Core Group the suggestion was made that data availability be as a tie-breaker between suites of watersheds that received similar scores in the Tier 1 and Tier 2 evaluations. At the WAC workshop, attendees considered the availability of data for each of the watersheds. The ratings for each watershed are shown in the listing above. The high scoring suite with the best data availability is San Francisquito/Guadalupe/Lower Penitencia.

WAC CONCLUSIONS AND RECOMMENDATIONS:

Although the method developed by Work Group C provides a systematic way to evaluate watersheds, it is unavoidably subjective and depends on the judgement of the evaluators. It also depends on the availability of data at the time of the evaluation. Despite these limitations, we feel confident that the evaluation described in this memorandum is a reasonable one. It is based on factual information and the judgements made were arrived at thoughtfully. We would expect other evaluators using the same methods to score the watersheds similarly, although not identically. To be sure, the evaluation could be improved with more extensive data collection and analysis, but we would be surprised if the conclusions were greatly altered.

In our view, the seven highest scoring suites of watersheds would all provide a range of attributes representative of conditions in the Santa Clara Basin. Because some believe that the Coyote Creek watershed is too large to be analyzed as a single unit, the suites that include the smaller Guadalupe River watershed may be preferable. Of the three suites that do not contain Coyote Creek, two suites, San Francisquito/Guadalupe/Lower Penitencia and San Francisquito/Guadalupe/Arroyo de la Laguna have better overall scores with respect to the Tier 1 and Tier 2 criteria than the other suite. Of these two, data availability is better for the San Francisquito/Guadalupe/Lower Penitencia suite. Accordingly, the WAC recommends the San Francisquito/Guadalupe/Lower Penitencia suite as the best choice.

Table 1

Tier 1 Evaluation of Watersheds

Watershed	Habitat Value		Fisheries		Special Species		Total
	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score	
Coyote Creek	5	10	4	4	5	5	19
Guadalupe River	4	8	4	4	5	5	17
Arroyo de la Laguna	4	8	3	3	3	3	14
San Tomas Aquino Creek	3	6	3	3	3	3	12
San Francisquito Creek	5	10	5	5	5	5	20
Stevens Creek	4	8	4	4	2	2	14
L. Penitencia Creek	4	8	2	2	3	3	13
Calabazas Creek	3	6	2	2	3	3	11
Permanente Creek	3	6	2	2	1	1	9
Matadero/Barron Creeks	2	4	2	2	2	2	8
Adobe Creek	3	6	2	2	2	2	10
Sunnyvale West Channel	1	1	1	1	2	2	5
Sunnyvale East Channel	1	1	1	1	2	2	5

Table 2

Tier 2 Evaluation of Suites of Watersheds

Suite	Does suite contain range of sizes?	Does suite contain streams representative of Santa Cruz & Diablo ranges?	Does suite contain streams with and without public access?	Does suite contain streams representing a range of geomorphic/streamflow conditions?	Does suite contain streams with and without impaired waters?	Does suite contain a mix of land use types and development potentials?	Does suite contain a tidal and freshwater wetlands?	Total
San Francisquito Coyote Guadalupe	No 0	Yes 2	Yes 1	Yes 3	Yes 1	Yes 2	Yes 1	10
San Francisquito Coyote Stevens	Yes 3	Yes 2	Yes 1	Yes 3	Yes 1	Yes 2	Yes 1	13
San Francisquito Coyote Arroyo de la Laguna	Yes 3	Yes 2	No 0	Yes 3	Yes 1	Yes 2	Yes 1	12
San Francisquito Coyote L. Penitencia	Yes 3	Yes 2	No 0	Yes 3	Yes 1	Yes 2	Yes 1	12
San Francisquito Guadalupe Stevens	Yes 3	No 0	Yes 1	Yes 3	Yes 1	No 1	Yes 1	10
San Francisquito Guadalupe Arroyo de la Laguna	Yes	Yes 2	Yes 1	Yes 3	Yes 1	No 1	Yes 1	12
San Francisquito Guadalupe L. Penitencia	Yes 3	Yes 2	Yes 1	Yes 3	Yes 1	Yes 2	Yes 1	13

Table 2 (continued)

Tier 2 Evaluation of Suites of Watersheds

Suite	Does suite contain range of sizes?	Does suite contain streams representative of Santa Cruz & Diablo ranges?	Does suite contain streams with and without public access?	Does suite contain streams representing a range of geomorphic/streamflow conditions?	Does suite contain streams with and without impaired waters?	Does suite contain a mix of land use types and development potentials?	Does suite contain a tidal and freshwater wetlands?	Total
San Francisquito Stevens Arroyo de la Laguna	No 0	Yes 2	Yes 1	Yes 3	Yes 1	No 1	Yes 1	9
San Francisquito Stevens L. Penitencia	No 0	Yes 2	Yes 1	Yes 3	Yes 1	Yes 2	No 0	9
Coyote Guadalupe Stevens	No 0	Yes 2	No 0	No 0	Yes 1	Yes 2	Yes 1	6
Coyote Guadalupe Arroyo de la Laguna	No 0	Yes 2	Yes 1	No 0	Yes 1	No 1	Yes 1	6
Coyote Guadalupe L. Penitencia	No 0	Yes 2	No 0	Yes 3	Yes 1	No 1	Yes 1	8
Coyote Stevens Arroyo de la Laguna	Yes 3	Yes 2	Yes 1	No 0	Yes 1	Yes 2	Yes 1	10
Coyote Stevens L. Penitencia	Yes 3	Yes 2	No 0	Yes 3	Yes 1	Yes 2	Yes 1	12
Coyote Arroyo de la Laguna L. Penitencia	Yes 3	No 0	No 0	Yes 3	Yes 1	No 1	Yes 1	9
Stevens Arroyo de la Laguna L. Penitencia	No 0	Yes 2	Yes 1	Yes 3	Yes 1	Yes 2	No 0	9

Table 2 (continued)

Tier 2 Evaluation of Suites of Watersheds

Suite	Does suite contain range of sizes?	Does suite contain streams representative of Santa Cruz & Diablo ranges?	Does suite contain streams with and without public access?	Does suite contain streams representing a range of geomorphic/streamflow conditions?	Does suite contain streams with and without impaired waters?	Does suite contain a mix of land use types and development potentials?	Does suite contain a tidal and freshwater wetlands?	Total
Guadalupe Arroyo de la Laguna L. Penitencia	Yes 3	Yes 2	Yes 1	Yes 3	Yes 1	No 1	Yes 1	12
Arroyo de la Laguna L. Penitencia San Francisquito	No 0	Yes 2	No 0	Yes 3	Yes 1	Yes 2	Yes 1	9
Guadalupe Stevens Arroyo de la Laguna	Yes 3	Yes 2	Yes 1	No 0	Yes 1	No 1	Yes 1	9
Guadalupe Stevens L. Penitencia	Yes 3	Yes 2	No 0	Yes 3	Yes 1	Yes 2	No 0	11

Appendix A

Table A-1

Additional Evaluation of Selected Watersheds

	Land Use		Wetlands[3]		Size[4]	Location[5]	Public Access[6]	Geomorph./ Managed Flow[7]	Impairment[8]	Data Availability[9]
	Development Potential[1]	% Undeveloped[2]	Tidal	Fresh						
Coyote Creek	3	87	3	3	3	D	2	2	Yes	2
Guadalupe River	2	56	3	2	3	SC	3	2	Yes	3
Arroyo de la Laguna	2	58	3	3	2	D	1	2	Yes	1
San Francisquito Creek	1	65	2	2	1	SC	1	3	Yes	3
Stevens Creek	1	66	2	1	1	SC	3	1	Yes	2
L. Penitencia Creek	3	50	3	1	1	D	2	3	Yes	2

Notes:
1. Development potential rated on scale of 1 to 3 with 3 being high potential
2. Percentage of land not in urban uses
3. Presence of tidal and freshwater wetlands rated on scale of 1 to 3 with 3 indicating high value
4. Size rated on scale of 1 to 3 with 3 indicating high value
5. "D" denotes Diablo Range; "SC" denotes Santa Cruz range
6. Public access rated on scale of 1 to 3 with 3 indicating high value
7. Degree of flow management rated on a scale of 1 to 3 with 3 indicating unmanaged flow
8. All streams are listed as impaired for some substances
9. Availability of data rated on scale of 1 to 3 with 3 indicating high availability

Appendix A4
Stream Segmentation Approach for Assessments

Tables

Figures

Appendix A4
Stream Segmentation Approach for Assessments

1.1 Introduction

This memorandum recommends an approach for dividing waterbodies within each of the three pilot watersheds in the first assessment suite into segments (or "reaches"). This approach is submitted for Core Group approval as the first step in documenting the watershed assessment as presented in Technical Memorandum 4g, Task 3b (Assessment Framework), approved by the Core Group on February 3, 2000.

A first draft of this memorandum was distributed to the Core Group in October 2000. A discussion on this draft was held with interested Core Group members shortly thereafter. Comments received on this draft were incorporated in a second draft, distributed to the RPT in October 2001. This segmentation approach was used in the watershed assessment process. Additional comments pertaining to the segmentation scheme used in the assessment were received during the two Watershed Integration Meetings in December 2001 and January 2002. These comments have been addressed in this final draft of the stream segmentation memo.

1.1.1 Purpose

The purpose of this memorandum is to assist stakeholders in understanding the recommended segmentation approach by:

- setting forth the role of stream segmentation in the Assessment Framework;
- describing the criteria used to segment the waterbodies in the three pilot watersheds;
- explaining the rationale for using the proposed approach; and
- presenting the segmentation schemes resulting from the application of these criteria.

1.1.1.1 Relationship of Segmentation to the Data Sufficiency Evaluation

Segmenting the streams in the three pilot watersheds aids the assessment team in analyzing the compiled data and organizing our approach to the assessment. An important step in the assessment process is the determination of whether there is sufficient data of the optimum type to conduct the analysis. The first question in each of the Assessment Framework logic diagrams for each beneficial use and stakeholder interest (see Part B, Figures 1A through 5) is "are sufficient data available?"

Alternatively stated, does data exist that will allow the use of direct indicators of beneficial use support? If so, the assessment can begin. If not, an assessment must be made of the ability of the available data to address other, less direct indicators of use/interest support. In either case, this initial question can better be answered on a segment-by-segment basis rather than by attempting to evaluate each entire stream network. It is anticipated that we will have more information for some segments of a stream than for others. The segmentation approach allows the WMI to organize the compiled data on the basis of the stream segment(s) for which it was collected and will feed directly into the uncertainty analysis of the assessment findings for each reach.[1] The segment-by-segment approach also allows the WMI to better evaluate where data gaps exist and the type of data that would need to be collected to eliminate uncertainties in the support findings. The data sufficiency evaluation process and results and data gap analysis will each be described fully in separate technical memoranda.

1.1.1.2 Relationship of Segmentation to the Data Sufficiency Evaluation

Segmenting the streams in the three pilot watersheds aids the assessment team in analyzing the compiled data and organizing our approach to the assessment. An important step in the assessment process is the determination of whether there is sufficient data of the optimum type to conduct the analysis. The first question in each of the Assessment Framework logic diagrams for each beneficial use and stakeholder interest (see Part B, Figures 1A through 5) is “are sufficient data available?” Alternatively stated, does data exist that will allow the use of direct indicators of beneficial use support? If so, the assessment can begin. If not, an assessment must be made of the ability of the available data to address other, less direct indicators of use/interest support. In either case, this initial question can better be answered on a segment-by-segment basis rather than by attempting to evaluate each entire stream network. It is anticipated that we will have more information for some segments of a stream than for others. The segmentation approach allows the WMI to organize the compiled data on the basis of the stream segment(s) for which it was collected and will feed directly into the uncertainty analysis of the assessment findings for each reach. The segment-by-segment approach also allows the WMI to better evaluate where data gaps exist and the type of data that would need to be collected to eliminate uncertainties in the support findings. The data sufficiency evaluation process and results and data gap analysis will each be described fully in separate technical memoranda.

[1] The terms “reach” and “segment” are interchangeable for purposes of this memorandum.

1.2 Stream Segmentation Approach

1.2.1 Introduction

The recommended stream segmentation approach relies primarily upon data obtained during field reconnaissance of the three watersheds during the summer of 2000 and channel type information from the Santa Clara Valley Water District's geographic information system (GIS) coverages. Discussions were also held with the WMI's designated watershed captains for each of the watersheds in order to supplement the data obtained from the GIS and during field observation. In order to compare our segmentation criteria to criteria being used to classify streams, we also reviewed stream classification systems under consideration for use in the San Francisco Bay area.

Through the experience gained using this approach in the pilot watersheds, modifications can be made to the segmentation criteria and/or their application in future work conducted by the WMI.

It is important to note that we have not attempted to classify the streams within the pilot watersheds through use of an existing classification system based on geomorphology. Rather, we have attempted to organize the compiled data on the basis of stream segments in order to facilitate conducting the assessment. We have also not attempted to develop segmentation schemes based on each of the beneficial uses/stakeholder interests. We have instead developed a general system that can be used to organize the data review for all five uses/interests without being specific to each one. Where necessary, conclusions regarding segment delineations as they pertain to specific uses/interests will be made as part of the assessment itself.

1.2.2 Background

1.2.2.1 The Assessment Framework

The need to segment the waterbodies in each pilot watershed was established in the Assessment Framework (Part A). The reasons for doing so are threefold. First, the characteristics of the stream/reservoir network in each watershed change in a similar fashion as water flows from the headwaters to the Bay. For example, the headwaters of each watershed may be more comparable with each other than with lower reaches within the same watershed. Second, dividing the streams into relatively homogeneous segments for purposes of analysis will allow for more conclusive determinations to be drawn regarding beneficial use/stakeholder interest support. Third, the recommended approach will result in a clearer presentation of the data analysis, allowing the stakeholders to better identify management issues and determine alternative strategies to achieve WMI goals. For example, strategies proposed to address impediments to use/interest support in intensively developed areas along the main stem reaches will probably be quite different from those proposed for tributary reaches in less developed areas. As outlined in the Assessment Framework (Part A, Tables 2 and 3) and where the available data allow, a separate determination of the conditions for support will be made for each stream segment/waterbody for each of the beneficial uses and stakeholder interests being evaluated.

1.2.2 Proposed Segmentation Criteria

In evaluating possible criteria to use in defining stream segments, we considered the role of the segmentation in the assessment process. We viewed the segmentation as a way of organizing the compiled data to facilitate the assessment. We did not view the segmentation task as an effort to classify streams in the three watersheds or pre-determine the results of the assessment.

1.2.2.1 Segmentation vs. Classification

Stream classification can generally be defined as the placement of streams or stream reaches into a specific class based on certain physical or biological parameters. Numerous stream classification systems have been developed for different purposes. Two such systems (Rosgen and Montgomery-Buffington) are discussed in further detail in this memo (see “Evaluation of Stream Classification Systems”). Most of these systems typically require a common set of data in order to be applied, data which is not consistently available throughout the three pilot watersheds. Additionally, the Regional Board is currently in the process of selecting a preferred system for classifying streams within the San Francisco Bay region (see discussion in this memo under “Relationship to Other Similar Efforts in the Region”). This process is not anticipated to be completed until after the WMI assessment is well underway. Given these two realities, we decided that it would be unwise to initiate a data collection effort until such time as a classification system has been adopted for the region.

The Assessment Framework stated that physical characteristics would be the basis for defining stream segments. While preparing the Framework, we contemplated dividing the streams into segments based upon key, relatively obvious physical characteristics for which data either already existed or could be gathered easily through field observation. In order to keep the initial approach to the assessment relatively simple, we considered criteria that would likely result in a comparatively small number of segments per watershed. The option of segmenting streams differently for each of the five uses/interests was also considered, but was rejected as adding unnecessary complication as well as making it more difficult to achieve the ultimate objective of integrating the results of individual stream reach assessments on a whole watershed basis.

1.2.2.2 Criteria Considered for Segmentation

Several possible criteria were considered for the segmentation. In general, we focused on relatively simple and commonly understood characteristics that can be readily identified in the field. Stream order was considered but rejected, as it did not consistently relate to a specific set of physical characteristics (a second-order stream in one watershed may be considerably different than one in a different watershed). Several geomorphic factors, including substrate composition and channel cross-section width were considered but not used due to the data limitations described above. Predominant land use in the area draining to the stream was considered but rejected as being too unwieldy, particularly in the lower portions of each watershed where mixed land uses are common. The presence of storm drain systems in the areas tributary to the stream was also considered but rejected for being too coarse a distinction (in general, the lower portions of each watershed are served by such systems; the upper portions are not).

In the end, it was felt that four potential criteria would be most illustrative of the differences within the watersheds. Three of these criteria were ultimately used; the fourth, channel gradient (or slope), was not after we determined that its use would not significantly change the way segments were delineated by using the other three criteria. It was also felt that slope, in and of itself, would not likely have as much influence on beneficial use/stakeholder interest support as the other three chosen criteria.

1.2.2.3 Criteria Selected for Segmentation

The following three criteria were used to define the stream reaches:

- existing channel type
- modern flow regime
- generalized land use in area tributary to stream segment

Stream reaches (or segments), defined as the length of the stream channel between landmarks, were described based on easily recognizable landscape features, such as a stream confluence, bridges, culverts, and dams. Input from the watershed captains both during and following field observations aided the process of delineating the reaches. Following is a description of each of the three criteria and how they were generally applied to designate stream reaches for the assessment.

<u>Existing Channel Type</u>: The type of stream channel present in a given location has considerable influence over several stream characteristics, including flow velocity, bank height, sinuosity (presence or absence of meanders), erosion, and the type of vegetative cover within the riparian corridor. Most stream classification systems address at least some of these individual characteristics. We have attempted to represent these characteristics by using the presence or absence of direct human modification as a method of distinguishing between different types of channels. Stream channels within the three pilot watersheds have been modified extensively and, in many places, vary greatly from their pre-development natural form. We also considered the type of human modification to the channel. Some forms of channel modification allow for the presence of vegetative cover, for example, while others do not. Simply stated, similar types of modified channels would be generally expected to display similar characteristics of average flow velocity, sinuosity, and vegetative cover, among others. To this end, the segmentation

scheme recognizes four types of channels -- earthen levee, concrete- or rock-lined, natural modified, and natural unmodified.

- *Earthen levee* channels are those demarcated by engineered levees constructed of excavated earth. Though such levees may or may not be planted with vegetative cover, the opportunity for such cover exists. For this segmentation, no effort was made to distinguish stream reaches based on the presence, absence, or type of riparian vegetation. Channels within earthen levees generally have a low degree of sinuosity and exert a moderate to low amount of erosive power. Bank heights are fixed, though downcutting may occur.

- *Concrete-* or *rock-lined* channels are those where little, if any, vestige of the natural channel form remains. Generally, such channels are completely encased (on three sides) in concrete or rock rip-rap. Such channels are generally void of vegetative cover and have virtually no sinuosity. These channels simply convey eroded materials from higher in the watershed downstream. No erosion is allowed to occur in these channels as long as streamflows remain within design capacities. Bank heights are fixed and downcutting is prevented where the channel bottom is lined.

- *Natural modified* channels generally follow their pre-development alignment, but have seen the installation of numerous retaining walls (often made of concrete or rip-rap), gabions, check dams, or other engineered structures intended to control erosion and/or flooding. In such channels, vegetative cover is generally present, and often flourishes. These channels may meander somewhat, generally between the structural controls (which can influence downstream meandering), and allow for a moderate to high degree of erosion. Bank heights may be fixed in places, but are generally uncontrolled. Downcutting is a common feature in these channels.

- *Natural unmodified* channels also generally follow their pre-development alignment, but exhibit few or no signs of having been engineered in any significant manner. Such channels usually feature significant vegetative cover along streambanks and may exhibit a high degree of sinuosity, depending on channel gradient and the type of material being transported by the stream. Where located in the upper parts of the watersheds, these channels are generally sources of eroded material. In the lower portion of the same watershed, such a channel might be a sink for the same material. Bank heights are not fixed.

It should be noted that, in this segmentation scheme, "natural unmodified" means without extensive alterations to the banks or bed, and not "in a pristine state". This is because there are few streams within the three pilot watersheds that have not been altered in some way. Even where stream alignments have not been changed by development, flow regimes and sediment supplies may have been affected by land use activities within the watersheds, in turn altering channel morphology. Bridges, culverts, and the remains of small diversion structures are present even in the upper-most, least developed reaches of the three watersheds.

Modern Flow Regime: This criterion can be simply stated as the presence or absence of water at different times of the year. Stream segments that are characterized by constant, year-round flow may support different uses than segments where water is not present during the dry season in normal years. For the purpose of conducting an assessment of beneficial use/stakeholder interest support, this criterion seemed to be an important one. Five flow regimes were used in this segmentation scheme: perennial, intermittent, ephemeral, reservoir, and tidal.

- *Perennial* segments are those with at least some surface water flow year-round. Segments that were historically ephemeral but which are now perennial due to modern water management and urban surface water runoff are considered to be perennial.

- *Intermittent* segments are those with at least some surface water flow during certain times of the year, or seasonally.

- *Ephemeral* segments are those with flowing surface water only during the wet season in years of normal rainfall (or during and after precipitation). Segments which flow year-round only during excessively wet years are considered to be ephemeral. Ephemeral segments may have standing water in isolated pools on a year-round basis due to shallow groundwater levels. Stream segments classified as “ephemeral” in this scheme may have been so prior to modern settlement, or may have become so due to human alteration of the watershed (withdrawal of water for off-stream consumptive use, construction of dams, etc.).

- *Reservoirs* are either on-stream segments where the channel has been permanently flooded due to impoundment or are off-stream, constructed waterbodies supplied with water diverted from nearby streams. There are no natural lakes within the three pilot watersheds.

- *Tidal* segments are those subject to mixing with salt water from San Francisco Bay and are thus constantly wet.

Instream percolation ponds and detention basins exist within several sub-watersheds, as do diversion dams, bypass channels, and other points where water is extracted from the natural stream channel. Though each of these facilities may have a direct or indirect impact on water quality, habitat support, and other components of beneficial use/stakeholder interest support, they have been considered to be an integral part of each stream segment identified though this approach and have not been segregated or removed from the context of the segment to which they belong. It is believed that these features are more appropriately considered during the development of support statements for the individual stream segments.

Generalized Land Use in Area Tributary to Stream Segment: When evaluating impacts to the quality of surface waterbodies from various types of land use, imperviousness is one of the most important characteristics to consider. Simply stated, the greater the amount of impervious area, the greater the amount of stormwater runoff.[2] Generally speaking, urban land uses have a higher amount of impervious area than do rural land uses or areas with a mixture of urban and rural land uses. For the purposes of this segmentation, land uses within the three watersheds were categorized either as urban, transitional, or rural as a rough surrogate for characterizing the level of imperviousness in areas tributary to each segment. It should be noted that there are segments within each watershed where effective watershed boundaries differ from natural (or, pre-development) watershed boundaries due to the presence of storm drain systems which convey drainage from outside the natural watershed to a specific stream segment. This situation has obvious implications for streamflow and pollutant source identification, but does not have a direct impact on this segmentation scheme, or the assessment process itself.

The three different generalized land use categories are detailed as follows:

- Segments designated as *rural* generally contain land uses with less than 5% impervious area. These reaches generally contain agricultural pasture, forest, rangeland, and recreational/open space land uses.

- Segments designated as *transitional* generally contain land uses with between 5 and 25% impervious area. These reaches typically contain residential development at a density of one dwelling unit per two to five acres and urban park and recreation land uses.

- Segments designated as *urban* generally contain land uses with greater than 25% impervious area. These reaches typically contain residential development at a density of one or more dwelling unit per acre, commercial and industrial development, roads and other transportation facilities, and utility infrastructure land uses.

1.2.3 Application of Segmentation Criteria to Pilot Watersheds

Data pertaining to the three criteria described above were used to segment the streams within each of the three pilot watersheds. Data on channel type was obtained from the Santa Clara Valley Water District's GIS coverage and was supplemented with observations made during field reconnaissance of the watersheds by the WAC in various visits between April and September, 2000. Data on flow regime was obtained during field observations and through discussions with the WMI's designated watershed captains: Geoff Brosseau (San Francisquito), Dave Grabiec (Upper Penitencia), and Terry Neudorf and Larry Johmann (Guadalupe). Data on percent impervious area within and adjacent to the stream corridor was obtained during field observation and through discussions with the watershed captains. Supplemental information, as well as

---

[2] Schueler, T.R. 1994. The Importance of Imperviousness. *Watershed Protection Techniques* 1:3.

coefficients of imperviousness for different land uses, was obtained from the *Watershed Characteristics Report (Unabridged)* developed by the WMI.

Stream reaches were plotted on USGS topographic maps, supplemented with street maps where necessary. Landmarks were identified during field observation for use in delineating individual reaches. For most reaches, the landmarks coincide with a change in at least one of the criteria. In some cases, however, we used the landmark nearest to the point along the stream where the criteria characteristic changes. This was done only in situations where we could not identify an easily recognizable landscape feature at the exact point of change. In these situations, the distance between the change in stream characteristic and the chosen landmark is generally less than 0.25 mile.

In some places, channel types change from earthen levee to rock- or concrete-lined and back again numerous times within a relatively short distance. In these cases, a strict application of the channel type criterion would result in several different reaches. Where it appeared, based on our field observation, that the other two criteria were potentially more significant in terms of use/interest support, we combined these reaches into one. Instances where this was done are noted in the "comments" column in Tables 1-3 (see "Tables" section at the end of this memo).

1.2.4 Results

By applying the above criteria to the three pilot watersheds, the stream reaches shown in Table 1 (for San Francisquito Creek), Table 2 (for Upper Penitencia Creek), and Table 3 (for Guadalupe River) were identified (see "Tables" section at the end of this memo). Maps of the segments are also included in Figures 1-4 (see "Figures" section at the end of this memo). Reaches are identified in the left-hand column by unique alphanumeric identifiers.

1.2.5 Limitations of Approach

The process of using criteria to define stream segments in the manner described in this memo is part art, part science. As already noted, considerable judgment was exercised in the demarcation of reach endpoints. We have clearly stated in Tables 1-3 where this was done so that, as the assessment proceeds, data for each reach may be evaluated appropriately.

1.2.6 Evaluation of Stream Classification Systems

In the process of developing the recommended stream segmentation method for the WMI pilot watershed assessment, we looked at two stream classification systems that have been developed for evaluating the natural function of streams. We evaluated these systems based on their purpose, proven utility, data requirements, and applicability to our purposes. This was done in order to provide information concerning the relationship of the recommended segmentation approach to widely accepted methods of classifying streams.

As stated earlier, this recommended stream segmentation does not take the place of a detailed stream classification effort for the three pilot watersheds. Such an effort, using either of the systems briefly outlined below (or another system), may prove useful in the future as management strategies are developed and treatment options identified by the WMI. After reviewing the two systems described below, we believe that the segmentation approach described in this memo defines stream reaches that would be generally consistent with, but at a coarser resolution than those that would likely result from use of either classification system. As the necessary data becomes available, future efforts can build upon this segmentation scheme by using one of these classification systems to more finely delineate individual reaches.

1.2.6.1 Rosgen Stream Classification

The purpose of the Rosgen Stream Classification System is to:

1. Predict a river's behavior from its appearance
2. Provide a mechanism to extrapolate site-specific data to stream reaches having similar characteristics
3. Provide a consistent frame of reference for communicating stream morphology and condition among a variety of disciplines and interested parties
4. Develop specific hydraulic and sediment relationships for a given stream type and its state

The Rosgen system is a method of describing the geometry, slope, and substrate (streambed material) of streams. The system relies on the concept of the “bankfull channel", which is the channel that contains a flow with a return rate of approximately 1.5 to 2 years. This flow is considered to have the greatest average influence on the geometry of the stream. The bankfull discharge for a given stream is determined from flow records (if available) and geomorphic indicators in the stream itself. The quantities used to determine each stream’s classification are entrenchment ratio, width to depth ratio, sinuosity, and slope. After the geometry is defined, the streambed material is characterized and assigned a number based on the grain size that is equal to or greater than 50% of the streambed materials present.

The Rosgen classification system is comprised of four increasing levels of information and detail. It also requires an increasing level of effort, time and equipment to obtain the information required by the higher levels of classification. Level I information can be obtained by performing a quick survey or geomorphic characterization of the waterway and consists of a rough definition of channel patterns, shape, width, depth, valley type, valley slope etc. Level II provides a more detailed measurement of the morphological parameters including channel slope, channel materials, entrenchment ratio, width/depth ratio, plan form (pattern, sinuosity, meander width ratio), and longitudinal profile (bed features etc.). Level III defines the stream state or condition and includes riparian vegetation, deposition patterns, debris occurrence, channel stability ratings, sediment supply, flow regime, bank erosion potential, aquatic habitat surveys, etc. Level IV is the validation level and includes more detailed measures of suspended and bedload sediment, hydraulics and resistance, bank and bed stability, bank erosion rates etc. The system is designed so that a quick analysis, Level I, can be made to characterize the waterway and get a general picture of its condition. Then, more detailed and increasingly time-consuming efforts are needed to actually measure field parameters of Levels II, III & IV.

The advantages of the Rosgen system are that all the parameters are easy to measure in the field with standard equipment, and that people familiar with the system can easily visualize what a stream will look like based on its classification. Drawbacks to the system include the difficulty of determining bankfull channel; it can be somewhat subjective, especially when streamflow records are not available. Another challenge is that many streams change in character many times over their length.

1.2.6.2 Montgomery-Buffington Channel Classification System

The Montgomery-Buffington landscape and channel classification system is designed to assess watershed response to environmental change in mountain stream watersheds. In this system, channel reaches are classified as sediment source, transport, or response relative to the initiation of change within the watershed. This system synthesizes stream morphologies into seven distinct reach types: colluvial, bedrock, and five alluvial channel types (cascade, step pool, plane bed, pool riffle, and dune ripple). The system also considers the spatial arrangement of reach morphologies, links to hillslope processes, and channel confinement, riparian vegetation, and the presence of woody debris.

This system has been applied successfully in relatively undeveloped watersheds with a variety of natural channel types in mountain drainage basins in the Pacific Northwest. As with the Rosgen system, this system requires fairly extensive channel morphology and sediment transport data before it can be applied usefully. For the purpose of assessing beneficial use/stakeholder interest support, we believe the data requirements and emphasis of the Montgomery-Buffington system would place a disproportionate weight on sediment-related factors, thereby minimizing the importance of other potential impediments to use/interest support.

1.2.7 Relationship to Other Similar Efforts in the Region

A number of efforts are either currently underway or have recently been conducted within the San Francisco Bay region involving the classification of streams and watersheds. Some general information regarding each of these efforts is presented here, including some discussion of compatibility with the recommended segmentation approach. As the assessment of the pilot watershed areas progresses, the WMI should review and evaluate the progress being made on these other efforts for possible application to future watershed assessments in the Santa Clara Basin.

1.2.7.1 Regional Monitoring and Assessment Strategy (Regional Board)

The Regional Board's Regional Monitoring and Assessment Strategy (RMAS) includes a discussion on the development of a classification scheme for waterbodies. This classification scheme is intended to amplify the current system used in the Basin Plan and organize waterbodies into groups with similar ecological characteristics to develop meaningful reference conditions. The RMAS states that "physical data collected from pilot watersheds should be used to suggest distinct stream reaches within a watershed that may exhibit different levels of beneficial use support". Possible criteria for classifying reaches suggested in the RMAS include percent imperviousness, flow regime, stream biology, and stream order.

The RMAS intends to stimulate further work on this issue and, to this end, outlines a schedule for producing a preferred classification scheme. As far as we have been able to ascertain, the Regional Board has preliminarily recommended use of the Montgomery-Buffington channel classification system (described above) in the development of sediment TMDLs, but has not proposed a detailed stream classification approach for use in assessing beneficial use support.

1.2.7.2 Bay Area Watersheds Science Approach (San Francisco Estuary Institute)

The Bay Area Watersheds Science Approach (WSA), version 3.0, was prepared by the San Francisco Estuary Institute (SFEI). The proposed method of watershed reaches is based on surface flow patterns (perennial, intermittent, seasonal), the movement of sediment (sediment source, sediment transport, and sediment storage), and geomorphic form indicated by use of the Rosgen system (described above). Classification of whole watersheds is based on the largest stream order within the watershed, connectivity to the estuary, and the degree or kind of management (presence of reservoirs, storm drains, concrete/engineered channels, etc.). The WSA views erosion and the supply of surface water as the most important physical factors to consider when discussing watershed health. Like the Rosgen system, the WSA approach entails a relatively rigorous analysis using extensive field data beyond that contemplated by the Assessment Framework.

However, we believe that certain basic assumptions of the WSA approach have been incorporated into the recommended segmentation approach consistent with the goals of the assessment.

1.2.7.3 Stream Protection Policy (Regional Board)

The Regional Board is currently developing a classification system as part of its Stream Protection Policy (SPP). The SPP emphasizes stream function as a way of linking reach classes to beneficial uses, an important approach that would be extremely useful for the assessment. The stream reach classes being considered for the SPP will be based on ecoregion (a surrogate for geomorphology, geology, soil, plant communities, surface water characteristics, etc.), channel slope, degree of stream entrenchment and confinement, and stream order/drainage area. Additional sub-classes will be built into the system as well.

We will continue to monitor new developments relating to the SPP stream classification approach as the assessment proceeds with the intent of ensuring that its key principles are incorporated in the assessment.

1.2.7.4 Coyote Creek Stormwater Indicators Project (Water Environment Research Foundation)

Under a Water Environment Research Foundation grant, the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is testing a series of stormwater environmental indicators proposed by the Center for Watershed Protection. One such indicator, stream widening and downcutting, was applied to the watershed of Coyote Creek. As part of this work, a stream classification system was developed (based on the work of M. Brinson, U.S. Army Corps of Engineers) to characterize channel conditions and geomorphic processes within the creek.

The criteria used to create a geomorphic classification of Coyote Creek included sediment process, average gradient, average stream width, channel type, substrate, lithology, geomorphic process, degree of flow alteration, and a generalized statement of creek form (narrow, braided, meandering, etc.). This system requires fairly rudimentary channel morphology data for application, and could be used to classify streams within the three pilot watersheds relatively easily. However, for the purpose of assessing beneficial use/stakeholder interest support, we believe the emphasis of this system would place a disproportionate weight on geomorphic factors, thereby minimizing the importance of other potential impediments to use/interest support. Nonetheless, some of the geomorphic criteria used in this system could be incorporated into the recommended segmentation approach.

The generalized land use categories from this study have been appropriated and used as criteria for this segmentation approach.

1.2.8 Comments from Watershed Integration Meetings

Several comments were received from stakeholders during the two Watershed Integration Meetings held to present the preliminary assessment results. Because the segmentation scheme outlined in this memo formed the basis for organizing and interpreting the data used in the assessment, stakeholders considered the segmentation approach once again, this time in the context of the assessment results.

Adjustments to the stream reach characterizations based on this input have been made in this final version of the stream segmentation memo. These changes are reflected in the segmentation tables at the end of this document. Some commentors noted that additional unnamed tributary stream reaches exist with the three watersheds and should be added to the segmentation tables. In addressing this concern, rather than adding new reaches to the tables, we have noted this fact in the "comments" column for each reach that the unnamed tributaries drain into. The primary purpose of this segmentation effort is to organize data for review in the assessment. Since no data for these unnamed tributaries was available, there seemed to be little value in adding additional reaches to the tables. The information has been included, however, so that future data collection efforts can include these tributaries where information about them is deemed important for future assessment work.

Another comment addressed the scale of the segmentation scheme. Specifically, that the segmentation criteria should have been primarily based on geomorphic stream channel characteristics. Application of this type of criteria would have produced a different set of stream reaches, particularly in the lower, mainstem portions of the watersheds. Several of the reaches used in the assessment would have been subdivided into separate reaches based on differing geomorphic characteristics.

In addressing this concern, we have added information to the "comments" column for each reach where the commentor's concerns apply. While we agree that a stream classification for the three watersheds should be conducted and that this classification should be based largely (though not exclusively) on geomorphic characteristics, this was not the purpose of the segmentation effort performed for the assessment. With its reliance on existing data, the assessment is out of necessity a planning-level product. The Basin Plan does not identify specific beneficial uses for individual segments of streams; rather, each use is assigned to an entire stream length. The segmentation approach used for the assessment introduces some general characteristics that define portions of these streams and makes them potentially different in some fashion from adjacent segments upstream and downstream. It is acknowledged that a further dissection of these segments is essential before any specific stream restoration or modification projects are implemented.

Performing such a dissection at this point, however, would not substantially change the results of the assessment. For example, a long reach that is found in "non-support" of one beneficial use may, if broken down into four or five component reaches, be found to have "full support" in all but one sub-reach or may be found to have "non-support" in all sub-reaches, depending on the location of data capture. Nonetheless, there would still be a lack of use support within that stretch of stream. Through future WMI action, this lack of use support will trigger further analysis through the filling of data gaps and the development of action strategies designed to restore the beneficial use. As part of this work, it will be necessary to isolate the location and cause of the non-support. Gaining an understanding of the geomorphic characteristics of the stream throughout all portions of the reach will be critical to recommending a successful restoration strategy. Through this process, the segmentation of the reach should be refined to more accurately detail the stream's behavior and characteristics within the reach.

Comments from stakeholders will be used to refine the preliminary assessment results. Details pertaining to specific reaches will be added to the final assessment results under the heading "stakeholder knowledge" but preliminary assessment results for specific reaches will only be changed if supported by existing data that can be reviewed and cited. Other details presented by stakeholders pertaining to the further division of individual reaches will be included, however, to aid in future data collection and focused assessment efforts.

Table 1. Stream Reaches in the San Francisquito Creek Watershed

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
SF-1	San Francisco Bay to U.S. 101 Bridge	Tidal	Earthen levee	Transition	
SF-2	U.S. 101 to University Avenue	Ephemeral	Rock-lined, concrete-lined	Urban	
SF-3	University Avenue to Sand Hill Road	Ephemeral to Intermittent	Natural Modified	Urban	SCVWD GIS shows this as “natural unmodified” but many attempts at bank reinforcement are present; potential fish barriers exist in this reach; several pools are present during dry season; some flows from storm drain discharges of groundwater pumped at parking garages; flow during dry season varies with year
SF-4	Sand Hill Road to Los Trancos Creek confluence	Perennial	Natural Unmodified	Urban	Limit of perennial flow likely varies from year to year – Sand Hill Road chosen as an average limit based on normal precipitation year
SF-5	Los Trancos Creek to Searsville Lake	Perennial to Intermittent	Natural Unmodified	Rural	Bear Creek confluence is near upper end of this reach; much of this reach is on property of the Stanford Linear Accelerator Center and the Jasper Ridge Biological Preserve
SF/SL	Searsville Lake	Reservoir		Rural	
SF/SL-1	Westridge Creek (tributary to Searsville Lake)	Ephemeral	Natural Unmodified	Rural	

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
SF/LL	Lake Lagunita	Reservoir		Transition	Off-stream reservoir on Stanford University campus fed by water diverted from San Francisquito Creek
Bear Creek Subwatershed					
SF/BC-1	Confluence with San Francisquito Creek to confluence with West Union Creek	Perennial	Natural Unmodified	Transition	
SF/BC-2	Dry Creek	Ephemeral to Intermittent	Natural Unmodified	Transition	
SF/BC-3	Bear Gulch from confluence with West Union Creek to Bear Gulch diversion dam	Intermittent	Natural Unmodified	Rural	
SF/BC-4	Bear Gulch above Bear Gulch diversion dam	Perennial	Natural Unmodified	Rural	
West Union Creek Subwatershed					
SF/WU-1	Confluence with Bear Gulch/Bear Creek to Huddart Park (confluence with Squealer Gulch)	Intermittent	Natural Unmodified	Transition	Pools present along reach during dry season

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
SF/WU-2	West Union Creek above Squealer Gulch	Intermittent to Ephemeral	Natural Unmodified	Rural	
SF/WU-3	Appletree Gulch	Ephemeral	Natural Unmodified	Rural	
SF/WU-4	Tripp Gulch	Ephemeral	Natural Unmodified	Rural	
SF/WU-5	Squealer Gulch	Perennial	Natural Unmodified	Rural	
SF/WU-6	McGarvey Gulch	Ephemeral to Intermittent	Natural Unmodified	Rural	
Corte Madera Creek Subwatershed					
SF/CM-1	Searsville Lake to Hamms Gulch	Perennial	Natural Modified	Transition	
SF/CM-2	Above Hamms Gulch	Perennial	Natural Unmodified	Rural	
SF/CM-3	Hamms Gulch	Perennial	Natural Unmodified	Rural	
SF/CM-4	Jones Gulch	Perennial	Natural Unmodified	Rural	
SF/CM-5	Damiani Creek	Perennial	Natural Unmodified	Rural	A large spring feeds this reach
SF/CM-6	Rengstorff Gulch	Perennial	Natural Unmodified	Rural	

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
SF/CM-7	Coal Creek	Perennial	Natural Unmodified	Rural	
Alambique Creek Subwatershed					
SF/AC-1	Terminus near wetlands above Searsville Lake to source	Perennial	Natural Unmodified	Rural	
Sausal Creek Subwatershed					
SF/SC-1	Terminus near wetlands above Searsville Lake to source	Ephemeral	Natural Unmodified	Transition	
SF/SC-2	Dennis Martin Creek	Ephemeral	Natural Unmodified	Rural	
SF/SC-3	Bull Run Creek	Ephemeral	Natural Unmodified	Rural	
SF/SC-4	Neils Gulch	Ephemeral	Natural Unmodified	Rural	
SF/SC-5	Bozzo Gulch	Ephemeral	Natural Unmodified	Rural	
Los Trancos Creek Subwatershed					
SF/LT-1	San Francisquito Creek confluence to confluence with Buckeye Creek	Perennial	Natural Unmodified	Transition	Reach is fed by large serpentine spring

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
SF/LT-2	Los Trancos Creek above confluence with Buckeye Creek in Palo Alto	Epemeral to Perennial	Natural Unmodified	Rural	
SF/LT-3	Buckeye Creek (east fork of Los Trancos Creek)	Perennial	Natural Unmodified	Transition	
SF/FL-1	Return channel from Felt Lake	Ephemeral	Natural Modified	Rural	Though channel is not natural, it exhibits characteristics common to other channels classified as "natural modified"
SF/FL	Felt Lake	Reservoir		Rural	
SF/FL-2	Diversion channel from Los Trancos Creek to Felt Lake	Ephemeral	Natural Modified	Rural	Though channel is not natural, it exhibits characteristics common to other channels classified as "natural modified"

Table 2. Stream Reaches in Upper Penitencia Creek Subwatershed

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
UP-1	Confluence with Coyote Creek to North Jackson Avenue Bridge	Ephemeral to Perennial	Earthen levee	Urban	Flow regime varies with seasonal precipitation

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
UP-2	North Jackson Avenue to Alum Rock Park boundary	Ephemeral to Perennial	Natural Modified	Urban	Some relatively unmodified channel sections exist in this reach, but extensive erosion control measures are in place; flow regime is perennial upstream of Maybury Road and ephemeral to perennial downstream, depending on rainfall
UP-3	Alum Rock Park boundary to confluence with Arroyo Aguague	Perennial	Natural Modified	Rural	
UP-4	Confluence with Arroyo Aguague to Cherry Flat Reservoir	Perennial	Natural Unmodified	Rural	Most of this reach is closed to public access
UP/CF	Cherry Flat Reservoir	Reservoir		Rural	Reservoir is owned and operated by the San Jose Conventions, Arts, and Entertainment Dept.; surrounding land is leased for grazing and is closed to public
UP-5	Cherry Flat Reservoir to source	Perennial	Natural Unmodified	Rural	No known public access to this reach
UP-6	Arroyo Aguague	Perennial	Natural Unmodified	Rural	Lower portion of reach is within Alum Rock Park, upper portion closed to public access
UP-7	Dutard Creek	Ephemeral	Natural Unmodified	Rural	

Table 3. Stream Reaches in the Guadalupe River Watershed

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
GR-1	Gaging Station at Alviso to Montague Expressway	Tidal	Earthen levee, rock-lined, concrete-lined	Transition	Reaches with different channel types were combined here due to potentially dominant common tidal flow regime; "straightened earthen" suggested as a better descriptor of channel type
GR-2	Montague Expressway to Interstate 880	Perennial	Natural Modified	Urban	Gravel levees are set back from the river channel in this reach; banks and channel are armored at river crossings; channel has gravel bottom and vegetated soil banks Suggested that reach be split into two sub-reaches as follows: (1) from Montague Expwy. To Trimble Ave. ("quasi-natural modified" with steep berm on east side of river with an overflow channel parallel) and (2) from Trimble Ave. to Interstate 880 ("modified, straightened" channel that has been moved to the east around the San Jose Airport and confined by levees on both sides)
GR-3	Interstate 880 to Coleman Avenue	Perennial	Natural Modified	Urban	Reach includes a ditched bypass channel; "quasi-natural straightened, incised" suggested as a better descriptor of channel type

Reach Number	*Limits (downstream to upstream)*	*Flow Regime*	*Channel Type(s)*	*Generalized Land Use in Area Tributary to Reach*	*Comments*
GR-4	Coleman Avenue to Interstate 280	Perennial	Natural Modified	Urban	Reach includes a concrete box culvert bypass that is not yet operational; "quasi-natural, widened, straightened, and incised" suggested as a better descriptor of channel type
GR-5	Interstate 280 to Guadalupe and Alamitos Creek confluence	Perennial	Natural Modified	Urban	Suggested that reach be split into four sub-reaches as follows: (1) from Interstate 280 to Curtner Ave. ("quasi-natural, incised" channel with a riparian zone), (2) from Curtner Ave. to Gage Station 23B ("widened, straightened, gabion contained" channel was relocated during construction of Almaden Expwy.), (3) from Gage Station 23B to Branham Lane ("quasi-natural, straightened, incised" channel with a small riparian zone), and (4) Branham Lane to Lake Almaden ("modified straightened" channel that is slowly changing into a "quasi-natural meandering" channel due to recent restoration work)

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
Guadalupe Creek Subwatershed					
GR/GC-1	Guadalupe River to Camden Avenue	Perennial (has been Intermittent in recent past)	Natural Modified	Urban	Suggested that reach be split into two sub-reaches as follows: (1) Guadalupe River to Masson Dam ("quasi-natural modified" channel with some recent restoration work) and (2) Masson Dam to Camden Ave. (meandering "C" type (Rosgen) channel with riparian area on both sides)
GR/GC-2	Camden Avenue to Guadalup Reservoir	Perennial	Natural Unmodified	Rural	Stream channel is typical "B" type channel (Rosgen) with riparian area on both sides and a narrow floodplain
GR/GC-3	Pheasant Creek	Perennial to Intermittent	Natural Unmodified	Rural	Three intermittent unnamed tributaries are listed on USGS maps; pipe culvert is present under Hicks Road just above confluence with Guadalupe Creek – culvert appears to be undersized and causes upstream channel erosion
GR/GC-4	Shannon Creek	Intermittent	Natural Unmodified	Rural	Creek is piped under property adjacent to Hicks Road and under the road itself
GR/GC/GR	Guadalupe Reservoir	Reservoir		Rural	
GR/GC-5	Guadalupe Creek above Guadalupe Reservoir	Perennial	Natural Unmodified	Rural	Three intermittent unnamed tributaries are shown on USGS maps
GR/GC-6	Rincon Creek	Perennial	Natural Unmodified	Rural	Five intermittent unnamed tributaries are shown on USGS maps

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
GR/GC-7	Los Capitancillos Creek	Intermittent	Natural Unmodified	Rural	
GR/GC-8	Reynolds Creek	Perennial	Natural Unmodified	Rural	Exact location unclear; may be tributary feeding Guadalupe Creek just below Reynolds Road (this creek has three to five unnamed intermittent tributaries)
GR/GC-9	Hicks Creek	Perennial	Natural Unmodified	Rural	Exact location unclear; may be one of the tributaries to Reynolds Creek (see above) or may be a separate creek tributary to Guadalupe Creek upstream of Reynolds Road and just below Guadalupe Reservoir
Los Gatos Creek Subwatershed					
GR/LG-1	Guadalupe River confluence to Vasona Reservoir	Perennial to Intermittent	Natural Modified	Urban	Reach has gravel bottom and soil/gravel banks; a number of instream dams have been located between Camden and Lark Avenue; flow regime is perennial above Lincoln Avenue and ephemeral in the lower portion Suggested that reach be divided into six sub-reaches as follows: (1) Guadalupe River to Auzerais St. (perennial flow, "quasi-natural straightened, incised" channel), (2) Auzerais St. to Lincoln Ave. (perennial but has been intermittent due to excess diversion, "quasi-natural straightened, widened, incised"

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
					channel), (3) Lincoln Ave. to Leigh St. (perennial but has been intermittent due to excess diversion, "quasi-natural incised" channel), (4) Leigh St. to Camden Ave. (perennial, "quasi-natural straightened, widened, incised channel that is being restored), (5) Camden Ave. to Lark Ave. (perennial, "modified, straightened, widened" channel with a series of dams), (6) Lark Ave. to Vasona Dam (perennial, "quasi-natural" channel)
GR/LG/VR	Vasona Reservoir	Reservoir		Transition	
GR/LG-2	Vasona Reservoir to County Park boundary	Perennial	Natural Unmodified	Transition	
GR/LG-3	County Park boundary to Lexington Reservoir	Perennial	Natural Unmodified	Rural	
GR/LG/LR	Lexington Reservoir	Reservoir		Rural	
GR/LG-4	Lexington Reservoir to Lake Elsman	Perennial	Natural Unmodified	Rural	Around seven unnamed intermittent tributaries are shown on USGS maps
GR/LG/LE	Lake Elsman	Reservoir		Rural	
GR/LG/WR	Williams Reservoir	Reservoir		Rural	
GR/LG-5	Los Gatos Creek above Williams Reservoir	Perennial	Natural Unmodified	Rural	Two perennial and three intermittent unnamed tributaries are shown on USGS maps

Reach Number	*Limits (downstream to upstream)*	*Flow Regime*	*Channel Type(s)*	*Generalized Land Use in Area Tributary to Reach*	*Comments*
GR/LG-6	Trout Creek	Perennial to Intermittent	Natural Unmodified	Rural	
GR/LG-7	Lyndon Canyon Creek	Intermittent	Natural Unmodified	Rural	
GR/LG/LA	Lake Ranch Reservoir	Reservoir		Rural	
GR/LG-8	Daves Creek	Ephemeral	Concrete-lined	Urban	
GR/LG-9	Black Creek	Intermittent	Natural Unmodified	Rural	
GR/LG-10	Dyer Creek	Intermittent	Natural Unmodified	Rural	
GR/LG-11	Briggs Creek	Intermittent	Natural Unmodified	Rural	
GR/LG-12	Aldercroft Creek	Intermittent	Natural Unmodified	Rural	
GR/LG-13	Moody Gulch	Intermittent	Natural Unmodified	Rural	
GR/LG-14	Limekiln Creek	Intermittent	Natural Unmodified	Rural	Four or five unnamed intermittent tributaries are shown on USGS maps
GR/LG-15	Soda Springs Creek	Perennial to Intermittent	Natural Unmodified	Rural	Five or six unnamed intermittent tributaries are shown on USGS maps
GR/LG-16	Hendrys Creek	Intermittent	Natural Unmodified	Rural	
GR/LG-17	Hooker Gulch	Intermittent	Natural Unmodified	Rural	Four or five unnamed intermittent tributaries are shown on USGS maps

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
GR/LG-18	Austrian Gulch	Intermittent	Natural Unmodified	Rural	Four or five unnamed intermittent tributaries are shown on USGS maps
GR/LG-19	Almendra Creek	Ephemeral	Concrete-lined, rock-lined	Transition	
GR/LG-20	Dry Creek	Ephemeral	Earthen levee, rock-lined, concrete-lined	Urban	Reaches with different channel types were combined here due to potentially dominant common ephemeral flow regime
Alamitos Creek Subwatershed					
GR/AL/LA	Lake Almaden	Reservoir		Urban	Reservoir is raised in the summer and lowered in the winter via use of a flash board dam on top of the Alamitos drop structure
GR/AL-1	Lake Almaden to Arroyo Calero confluence	Perennial	Natural Modified	Urban	Suggested that reach be divided into two sub-reaches as follows: (1) Lake Almaden to Greystone Creek (“modified, straightened” channel with an overflow channel and drop structures) and (2) Greystone Creek to Arroyo Calero (“quasi-natural modified” channel with more riparian area)
GR/AL-2	Arroyo Calero confluence to Almaden Reservoir	Perennial	Natural Unmodified	Rural	Three unnamed intermittent tributaries are shown on USGS maps
GR/AL/AR	Almaden Reservoir	Reservoir		Rural	
GR/AL-3	Jacques Gulch	Intermittent	Natural Unmodified	Rural	

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
GR/AL-4	Herbert Creek	Perennial	Natural Unmodified	Rural	Five or six unnamed intermittent tributaries are shown on USGS maps
GR/AL-5	Barrett Canyon Creek	Perennial	Natural Unmodified	Rural	One perennial and two or three intermittent unnamed tributaries are shown on USGS maps
GR/AL-6	Larabee Gulch	Intermittent	Natural Unmodified	Rural	Two or three unnamed intermittent tributaries are shown on USGS maps
GR/AL-7	Chilanian Gulch	Intermittent	Natural Unmodified	Rural	One perennial and two or three intermittent unnamed tributaries are shown on USGS maps
GR/AL-8	Deep Gulch	Intermittent	Natural Unmodified	Rural	
GR/AL-9	Greyston Creek	Intermittent	Concrete-lined, rock-lined, earthen levee	Urban	Reaches with different channel types were combined here due to potentially dominant common intermittent flow regime
GR/AL-10	Golf Creek	Intermittent	Concrete-lined, rock-lined, earthen levee	Urban	Reaches with different channel types were combined here due to potentially dominant common intermittent flow regime
GR/AL-11	Randol Creek	Perennial to Intermittent	Concrete-lined, rock-lined, earthen levee	Urban	Reaches with different channel types were combined here due to potentially dominant common flow regime Two unnamed intermittent tributaries are shown on USGS maps
GR/AL-12	McAbee Creek	Intermittent	Concrete-lined	Urban	

Reach Number	***Limits (downstream to upstream)***	***Flow Regime***	***Channel Type(s)***	***Generalized Land Use in Area Tributary to Reach***	***Comments***
Arroyo Calero Subwatershed					
GR/AC-1	Alamitos Creek confluence to Calero Reservoir	Perennial	Natural Unmodified	Transition	Two unnamed intermittent tributaries are shown on USGS maps
GR/AC/CR	Calero Reservoir	Reservoir		Rural	
GR/AC-2	Cherry Canyon Creek	Intermittent	Natural Unmodified	Rural	Two unnamed intermittent tributaries are shown on USGS maps
GR/AC-3	Pine Tree Canyon Creek	Intermittent	Natural Unmodified	Rural	At least six unnamed intermittent tributaries are shown on USGS maps
GR/AC-4	Santa Teresa Creek	Perennial	Natural Unmodified	Transition	At least two unnamed intermittent tributaries are shown on USGS maps
Canoas Creek Subwatershed					
GR/CC-1	Canoas Creek from Guadalupe River to source	Perennial	Earthen levee, rock-lined, concrete-lined	Urban	Reaches with different channel types were combined here due to potentially dominant common intermittent flow regime
Ross Creek Subwatershed					
GR/RC-1	Guadalupe River confluence to Blossom Hill Road	Intermittent	Earthen levee, rock-lined, concrete-lined	Urban	Reaches with different channel types were combined here due to potentially dominant common intermittent flow regime
GR/RC-2	Lone Hill Creek	Intermittent	Concrete-lined	Urban	
GR/RC-3	Short Creek	Intermittent	Natural Unmodified	Transition	

Figure 1. San Francisquito Creek Watershed Segmentation Map

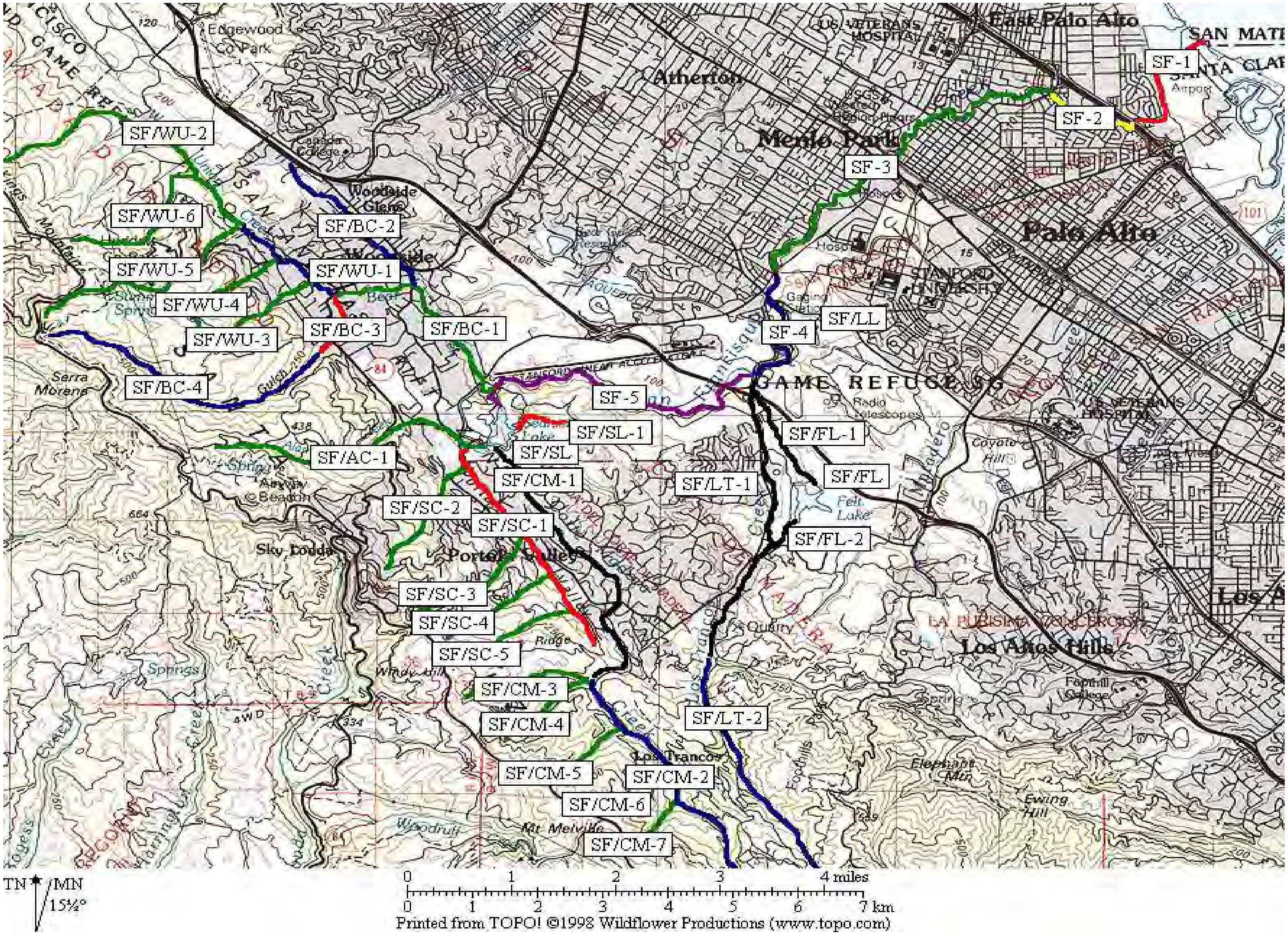


Figure 2. Upper Penitencia Creek Subwatershed Segmentation Map

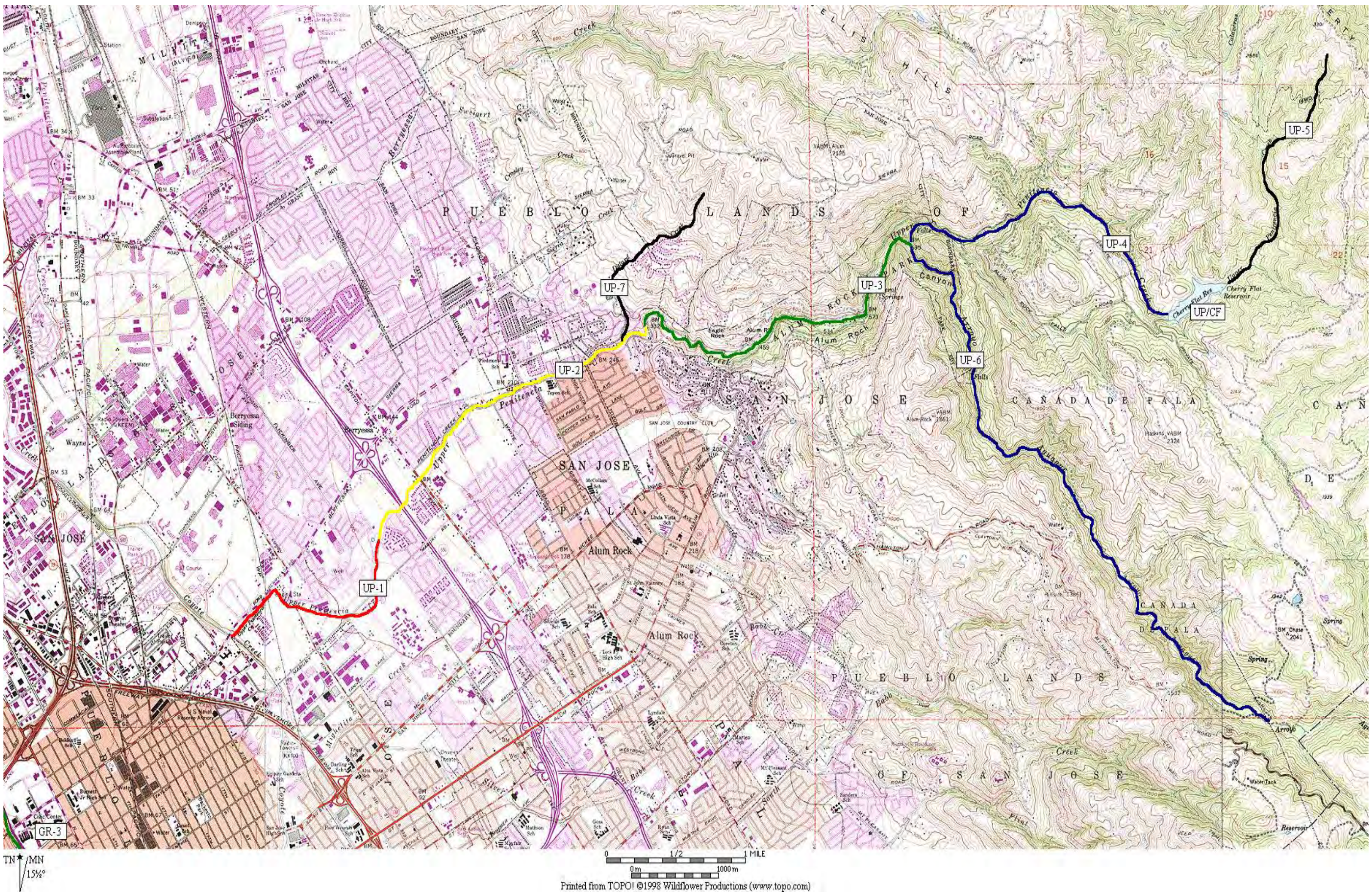
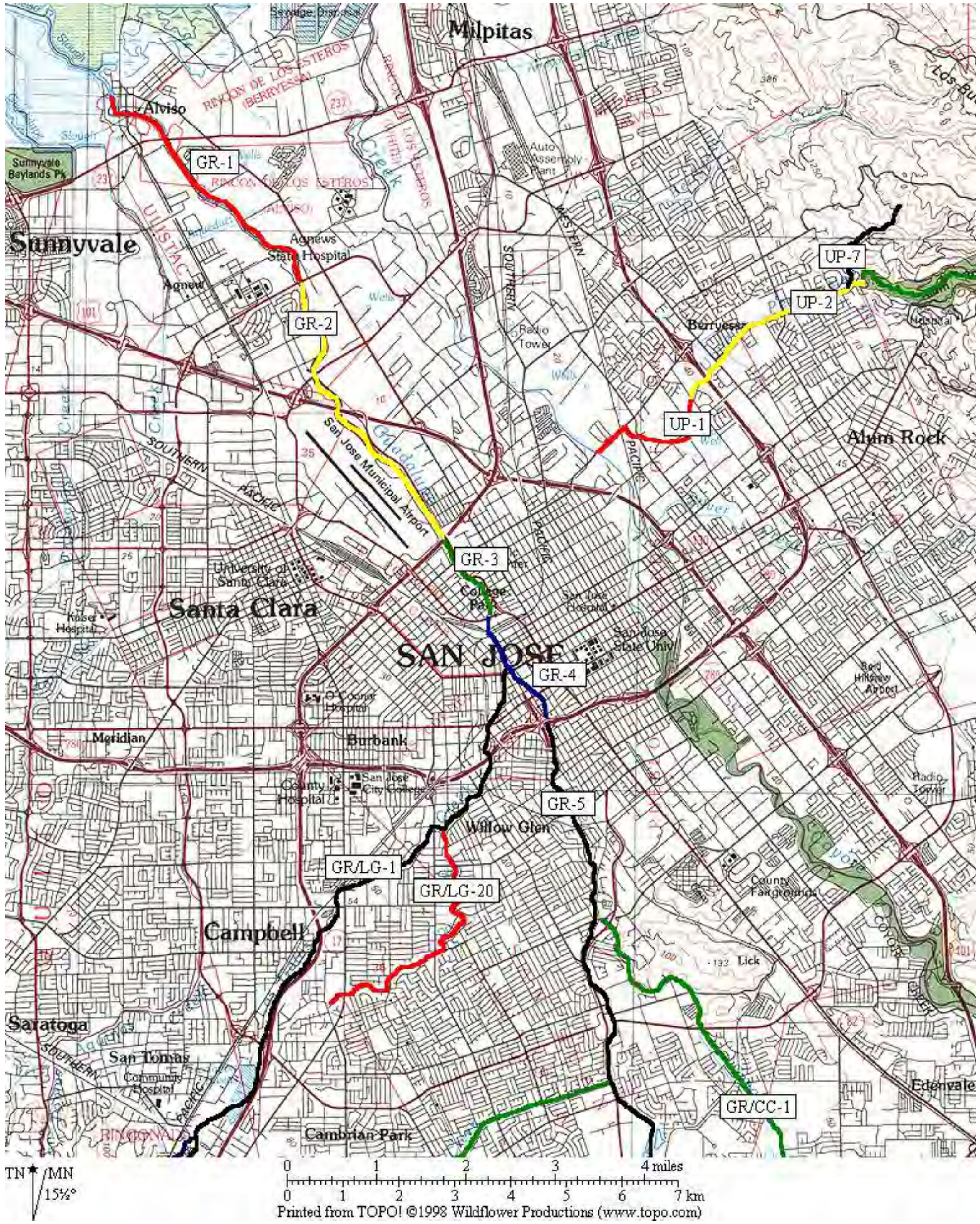
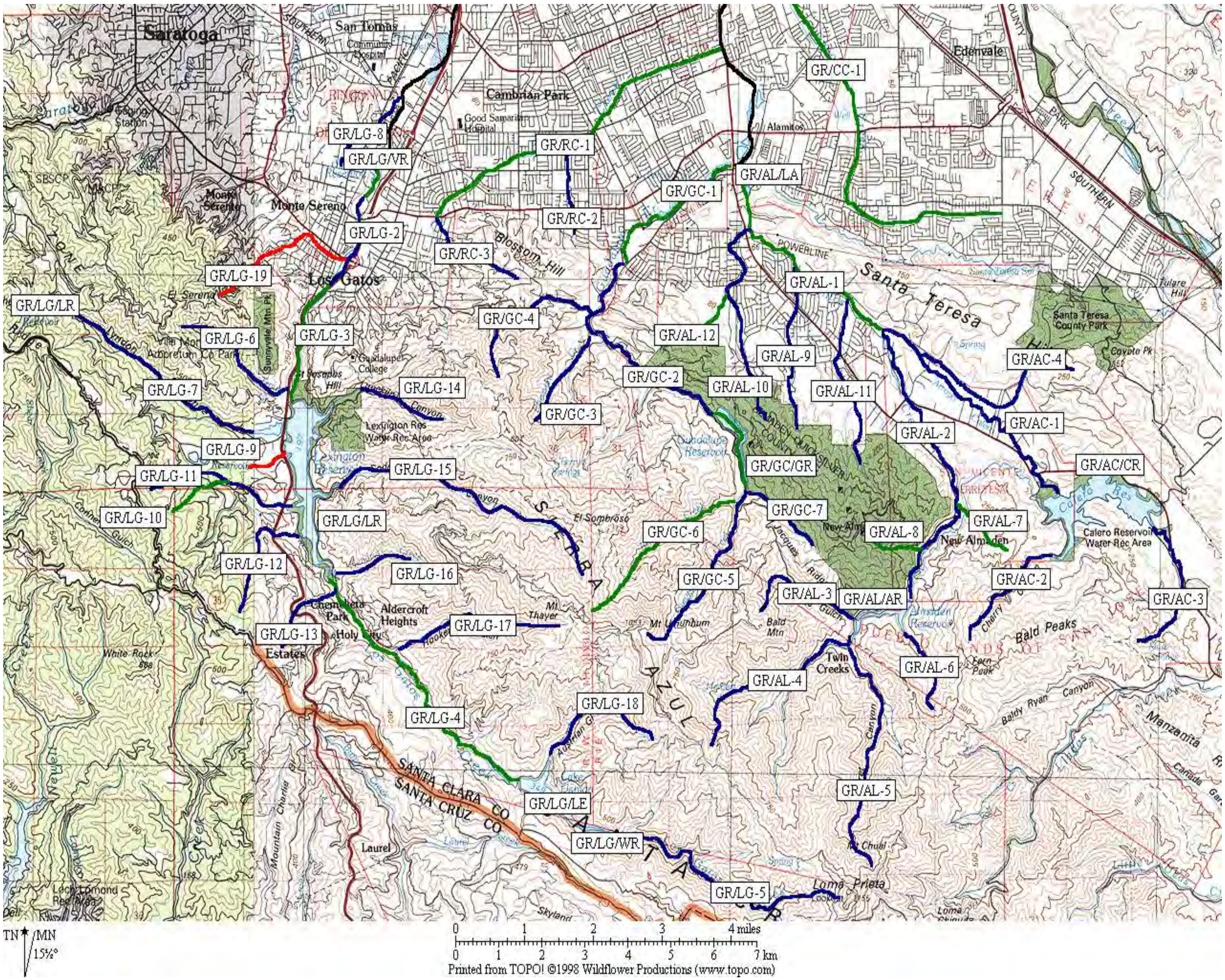


Figure 3. Guadalupe River Watershed Segmentation Map (North Portion)



02/01/18

Figure 4. Guadalupe River Watershed Segmentation Map (South Portion)



Appendix A5
Protocol for Assessment Team Meetings

To: Report Preparation Team
From: Watershed Assessment Consultant (Rob Carnachan)
Date: September 18, 2001
Subject: Protocol for Assessment Team Meetings (Task 13.1.1)

The purpose of this memorandum is to outline the specific steps that will be taken by the Assessment Teams in conducting the analysis of data for the assessment of the three pilot watersheds. Specifically, this memorandum establishes protocols for the Assessment Team meetings themselves and highlights the tasks to be accomplished by the Assessment Teams. As described in Part B of the Assessment Framework (TM #4g), these tasks include reviewing the compiled data and developing conclusions concerning beneficial use/stakeholder interest support, limiting factors, and causes of the limiting factors for each waterbody where a sufficient amount of quality data is available to support such conclusions.

I. Background

As noted in the Assessment Framework, the WMI watershed assessment process is designed to use available data to determine whether beneficial uses/stakeholder interests are supported in various waterbodies (reservoirs and stream reaches) within the three pilot watersheds: Guadalupe River, San Francisquito Creek, and Upper Penitencia Creek. A principal aim of the assessment is to organize, present, and convey the most relevant information regarding the condition of the waterbodies as it relates to the uses/interests of concern. These uses/interests include the waterbodies' suitability for supporting aquatic life and for swimming, providing safe drinking water, and how they function in response to high flows.

The results of the assessment will be programmatic since the assessment is relying on available data, and may be refined under future efforts as more data becomes available. The goal is to begin to identify the factors that affect beneficial use support and achievement of stakeholder interests in the Santa Clara Basin's streams as well as provide a scientific basis for selecting and evaluating alternative management strategies.

The assessment process itself will be guided by the Assessment Framework, which was approved by the Core Group in February of 2000. This document is, in itself, based on several other WMI work products, including the Rationale Paper, the recommended list of data types for assessment of support of the beneficial uses and stakeholder interests (TM#2f), and the list of quantifiable parameters for the beneficial uses and stakeholder interests (TM#4f). The five beneficial uses/stakeholder interests to be assessed are:

- Cold freshwater habitat (COLD)
- Preservation of rare and endangered species (RARE)
- Water-contact recreation (REC1)
- Municipal and Domestic Supply (MUN)
- Protection From Flooding (PFF)

The first four are designated beneficial uses contained in the most recent revision (1995) of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan); the fifth (flood protection) is of particular interest to WMI stakeholders, but is not a designated beneficial use. Where the data allow, the assessment will determine the support status with respect to each use/interest for each waterbody within the three pilot watersheds. The assessment will focus only on these five uses/interests; no attempt will be made to interpret the condition of other uses designated for these waterbodies in the Basin Plan.

The quantifiable parameters and associated criteria to be used in the assessment for determining use/interest support status are summarized in Table 1 of Part B of the Assessment Framework. This table was designed to be used in concert with a set of logic diagrams (Figures 1A-5 of Part B, Assessment Framework) to provide a systematic approach to the assessment, one that is able to distinguish between critical parameters and important but less critical parameters as well as to respond to different levels of data availability and quality. Additional detail concerning the quantifiable parameters and logic diagrams may be found in Part A of the Assessment Framework.

II. Assessment Teams

As shown in Figure 3 (Part A, Assessment Framework), the assessment will be performed by the Watershed Assessment Consultant (WAC) under the direction of a lead designated from the Report Preparation Team (RPT). The WAC will utilize four different "assessment teams". Three of the teams will focus on specific uses and interests while the fourth team will provide data management and other support. Each team consists of qualified technical specialists in their field charged with conducting the assessment in accordance with the principles of the Assessment Framework. The watershed captains, designated by the Watershed Assessment Subgroup (WAS) for each of the three pilot watersheds, will participate on each assessment team during the portion of the analysis involving their respective watersheds.

A. Technical Staff

Technical assessment team members are as follows, depending on individual schedules:

1. <u>Natural Resources-Related Beneficial Uses (RARE and COLD)</u>

   Jerry Smith (SJSU/Entrix)
   Fran Demgen (URS)
   Jon Stead (URS)

2. <u>Human Health and Recreation Beneficial Uses (MUN and REC-1)</u>

   Terry Cooke (URS)
   Lily Panyacosit (URS)
   Usha Vedigiri (URS)

3. <u>Protection From Flooding Stakeholder Interest (PFF)</u>

   Phil Mineart (URS)
   Gary Palhegyi (URS)

4. Data Management and Analysis Support

Sandy Davidson (URS)
Raul Farre (URS)
Suzanne Loadholt (URS)

B. Watershed Captains

The watershed captains will provide local knowledge of the watersheds to supplement the scientific expertise of the other team members and are as follows:

Geoff Brosseau (San Francisquito)
Laura Young (San Francisquito)
Terry Neudorf (Guadalupe)
Larry Johmann (Guadalupe, with Nancy Bernardi/Roger Castillo as potential alternates)
Mike Will (Upper Penitencia)

While other stakeholders are welcome to attend the meetings and observe the data review process, in order to maximize the efficiency of the assessment team meetings, it is requested that other interested stakeholders provide their input to the appropriate watershed captain for discussion during the meetings. The Assessment Team Coordinator (Rob Carnachan) will be responsible for ensuring that methods and results of each team are consistent with the Assessment Framework and the protocol outlined in this memorandum.

III. Steps in the Assessment Process

In conducting the watershed assessments, each of the assessment teams must complete a series of five major steps. Each of these steps is linked to previous steps in the assessment team's deliberations as well as to a number of other products that either serve as inputs to the assessment team action or outputs from their work. The generalized flow of information to and from the assessment teams is illustrated in Figure 1.

A. Step One: Review Data for Quality, Relevance, and Sufficiency

The first task of the assessment teams will be to review the compiled data for relevance, quality, and sufficiency. This step is outlined generically in Figure A (Assessment Framework, Part B) and is critical for identifying data gaps and for conducting the uncertainty analysis. This initial step forms the basis for generating the response regarding "Data Quality" on the Assessment Summary for each waterbody (see attached and updated "Table 2 from Assessment Framework, Part A").

Data analysis will proceed step-wise to answer the following questions:

- does the data pertain to the preferred indicator or to a secondary indicator, was it collected in waterbodies subject to the assessment? (data relevancy)
- is the temporal array of data useful to answer questions poised by the logic diagram, was it collected in accordance with widely accepted scientific methods? (data quality)
- does the amount of relevant, quality data for the waterbody exist to allow for objective, supportable conclusions to be drawn regarding use/interest support? (data sufficiency)

Prior to addressing the data sufficiency question, each assessment team must determine "how much data is enough". The answer to this will likely vary depending on the type of data, the characteristics of the waterbody it pertains to, and the nature of the use/interest being assessed.

1. Step One – Inputs

In order to address these questions, the assessment teams will be provided with a number of documents or other sources of information. In addition to the Assessment Framework and this memorandum, the teams will need to use the metadata data base (MDDB), the stream segmentation scheme, the review of data completeness, and the individual data sets themselves.

The MDDB will be available to each team as a resource to be used for quickly finding information about individual data sets. The stream segmentation scheme will be included with the review of data completeness in a technical memorandum (TM #18f) which will contain a series of tables, one for each waterbody. Based upon the data compiled by the WAC for the assessment, these tables will identify the presence or absence of data sets containing data on the indicators (preferred or secondary) listed in the Assessment Framework for each use/interest. These tables will allow the assessment teams to immediately focus on the waterbodies for which data exists in the WMI data library. In cases where no data sets are available to assess one or more uses/interests in a waterbody, a data gap for that preferred data type will be noted. In instances where there is lack of sufficient data, data insufficiency will be identified. Lastly, each assessment team will be provided with copies of all data sets identified by number in the data completeness tables for their respective uses/interests so that the data quality, relevance, and sufficiency screening can occur.

2. Step One – Outputs

Following completion of each team's data review, it is anticipated that additional data gaps will emerge where a sufficient amount of relevant, quality data is not present for a particular waterbody-use/interest combination. These data gaps, along with those identified prior to Step One by the WAC in its data completeness review, will be documented by the WAC in a technical memorandum on data gaps (TM #15f), using the format shown in Table 1.

Table 1*: Documentation of data gaps and insufficiencies, by waterbody and use/interest.*

Waterbody	**Uses/Interest**	**Data Availability**	**Data Sufficiency – enough data of sufficient quality**			
			Relevance	Data Quality	Data Quantity	Substitute Data
Waterbody Name, Reach Number, Watershed	One row for each of the Beneficial Uses and/or Stakeholder Interest for that segment	Yes or No; how many data sets available; which data set numbers?	Is the data **relevant** (right kind of data)?	Was the data collected using acceptable methodology and adequate QA/QC protocols?	Is there **sufficient** data to allow a weight of evidence approach to arrive at a determination of support/non-support?	If data is insufficient, what **substitutes** are available (i.e., Data on other indicators) and are the substitutes sufficient?

B. *Step Two: Develop Preliminary Statements of Use/Interest Support*

After completing Step One, the assessment teams will have the data they have determined will meet their standards for use in the assessment. The next step is to process the data through the logic diagrams for each use/interest the team is evaluating. The logic diagrams will allow each team to arrive at a preliminary statement of support (full, partial, or non-support) for each waterbody being evaluated through a systematic question and answer process tailored to each use/interest.

1. Step Two – Inputs

Use of the logic diagrams (Figures 1A-5 in the Assessment Framework, Part B) will be applied by the team to complete Step Two.

2. Step Two – Outputs

No stand-alone outputs will be produced during Step Two. Instead, the preliminary statements of support will feed directly into Step Three of the assessment team process; however, careful documentation of the answers to each of the questions poised by the logic diagrams will be kept during the analysis sessions.

C. *Step Three: Uncertainty Analysis*

Prior to finalizing support statements, each assessment team will conduct an uncertainty analysis to evaluate the level of confidence in the support statement. Table 3 of the Assessment Framework (Part B) provides guidance concerning this analysis based on the section 305(b) guidance from the U.S. Environmental Protection Agency; this table is attached to the end of this memorandum. The Assessment Framework guidelines only address bioassessment-type data to determine aquatic life use support and allow for the assignment of different levels of uncertainty to each preliminary support statement. However, the guidelines described in the Assessment Framework are presented as an example approach and may not be appropriate for other data types. Therefore, each assessment team will need to review the section 305(b) guidelines for possible application to their data sets and, if necessary, establish their own "scale" for evaluating uncertainty. Whatever method or criteria are used, it must allow the team members to rank the level of uncertainty associated with a preliminary support statement on a continuum from one (high uncertainty) to four (low uncertainty). The WAC support team will provide a summary of the 305(b) guidelines to each team for their use in establishing uncertainty criteria.

The level of uncertainty associated with a given statement of use/interest support will necessarily be directly related to the quality, relevance, and sufficiency of the data used to develop the support statement. Therefore, the notes taken by the team during their review of the data in Step One will inform the uncertainty analysis in Step Three.

Following the uncertainty analysis, each assessment team will finalize the support statements for each waterbody-use/interest combination. The results will be summarized in a series of annotated tables similar to the one attached to the end of this memorandum ("Table 2 from Assessment Framework, Part A"). These tables will include as much useful information as possible, including any spatial and temporal variation in support status where such data exists to make such a determination. A summary table for each watershed that lists all of the waterbodies in the watershed and the relevant support status for each use/interest will also be developed. A series of maps, one for each watershed, will also be developed to illustrate the support status and level of uncertainty associated with each stream reach for each use/interest.

The tables and maps will be available for review by all WMI stakeholders. Following this review period, a series of "watershed integration" meetings will be held, one within each of the three watersheds. The purpose of these meetings is to solicit comment and input from stakeholders on the support status determinations made by the assessment teams. A designated team leader will be available to provide a brief overview of the team's determinations and then respond to questions and comments. The primary purpose of these meetings will be to solicit input from stakeholders who may be able to supply missing and/or anecdotal information concerning individual stream reaches. The input received during these meetings will be used to refine the support statements where necessary and may also be used in developing the technical memorandum on the identification of limiting factors (Step Four).

1. Step Three – Inputs

Guidelines for determining the level of uncertainty associated with the preliminary support statements will be required in order to conduct the uncertainty analysis. In some cases, the Assessment Framework will provide these guidelines. In others, the assessment team members will need to develop them prior to conducting the analysis.

2. Step Three – Outputs

Output from Step Three will consist of the tables and maps containing the final use/interest support status for each waterbody, with associated uncertainty levels. These tables will constitute the technical memorandum on support status and will form the basis for Chapters 5, 6, and 7 of the Watershed Assessment Report.

D. Step Four: Identification of Potential Limiting Factors

Wherever steps one through three lead to the conclusion that a beneficial use or stakeholder interest is not supported or only partially supported in a waterbody, the factors responsible for non-support or partial support will be identified by the assessment teams to the extent that the data indicates such factors. The nature of the potential limiting factors and the ease with which they can be identified will vary depending on the use. In some cases, the limiting factors will be fairly obvious and will emerge directly from the assessment process. In others, the complex ecological requirements of individual species may allow for numerous potential limiting factors and it may be difficult to precisely determine their relative significance based on the available data.

The identification of potential limiting factors will be focused on the physical, chemical and biological conditions in the stream and the riparian corridor that cause non- or partial support. The ultimate or indirect cause of non- or partial support will be addressed in Step Five of the assessment team process. Some examples of potential limiting factors for the four beneficial uses and the stakeholder interest are shown in Table 4 from the Assessment Framework (Part B), attached to the end of this memorandum.

1. Step Four – Inputs

The Assessment Framework and the data sets used to develop the support statements will serve as inputs to limiting factor identification.

2. Step Four – Outputs

Results of the limiting factor analysis will be compiled and presented in a stand-alone technical memorandum (TM #20b) for use by the WMI in development of the Watershed Action Plan.

E. Step Five: Identification of Suspected Causes of Limiting Factors

The final step of the assessment team review will consist of an identification of potential causes of non- or partial support of a use/interest within a specific waterbody. The information to be used by the assessment teams in this step will generally be limited to two sources: (1) the data sets used to develop the support statements and (2) the on-the-ground knowledge of the watershed captains and other assessment team participants. It is anticipated that sufficient information will not be available to identify suspected causes for every waterbody-use/interest combination. The assessment teams will identify suspected causes where they are able to do so and will fully document the basis for their determination.

1. Step Five – Inputs

The data sets used to develop the support statements will serve as inputs to the identification of suspected limiting factor causes.

2. Step Five – Outputs

Results of the suspected limiting factor cause evaluation will be compiled and presented in a stand-alone technical memorandum (TM #21b) for use by the WMI in development of the Watershed Action Plan.

IV. Assessment Team Meeting Logistics

It is anticipated that each Assessment Team will require at least two full-day equivalent meetings to complete the five steps outlined above. Additional meetings may be necessary depending on the number of data sets being processed through the logic diagrams. The watershed integration meetings will follow completion of each assessment team's analysis.

A. Location and Facility Requirements

In order to most efficiently use the time of the team members, assessment team meetings will be held at the WAC's office in Oakland. The watershed integration meetings will be held in locations to be determined within each of the three watersheds.

B. Materials Required

Prior to the assessment team meetings, the WAC will assemble the needed materials and provide them to team members for review. These materials include the following:

- metadata data base
- stream segmentation/data completeness review tables
- Assessment Framework
- this protocol memorandum
- copies of all data sets (hardcopy and electronic) germane to each team's analysis (identified in data completeness tables)

Team members will be briefed by the Assessment Team Coordinator on the contents of the Assessment Framework and this memorandum at the start of the first meeting. The importance of strict adherence to the logic diagrams will be stressed. Team members will also be asked to note the efficacy of the logic diagram approach for use in later evaluation of the assessment methodology.

A laptop computer with the metadata data base and the electronic data sets loaded will be present at each meeting. The WAC's data base manager for the WMI will be in the office and available to provide assistance in using the metadata data base when needed.

C. Meeting Documentation

Perhaps the most critical aspect of managing the Assessment Team meetings will involve accurate documentation of the proceedings. To this end, a member of the support team will be present with a laptop computer to keep detailed notes of each meeting, including complete documentation of all decisions made by the team and the rationale for those decisions. Notes from each meeting will be available for reference during all subsequent meetings for that team. The complete set of notes from each team will be reviewed for accuracy by one team member prior to the conclusion of the team's work. The final set of team notes will supplement the tabular output from Step Three in developing the Watershed Assessment Report.

D. Meeting Management

The support team member present at each meeting will ensure that the team stays on track in completing its tasks as efficiently as possible. The RPT lead or an alternate will also attend the meetings with the watershed captains and will assist the WAC lead in facilitating the process where needed.

Step One of the assessment team's work (data qualification review) will be tackled without direct regard to the watersheds. Because several data sets will apply to all three watersheds, it will be most efficient for the teams to review the data sets independent of their applicability to the watersheds. For Steps Two through Five, however, the team meetings will be organized in such a way as to focus on individual watersheds during discrete blocks of time. This will also allow the watershed captains to schedule their participation for the period(s) of time during which their watershed will be discussed.

Specific ground rules for the Assessment Team meetings will include:

- review of this protocol and the Assessment Framework will be provided
- consistency with the protocol and Assessment Framework must be maintained
- review of the data as defined in the logic diagrams must be achieved
- follow-up will be provided as needed by the support team

E. Resolving Differences of Opinion

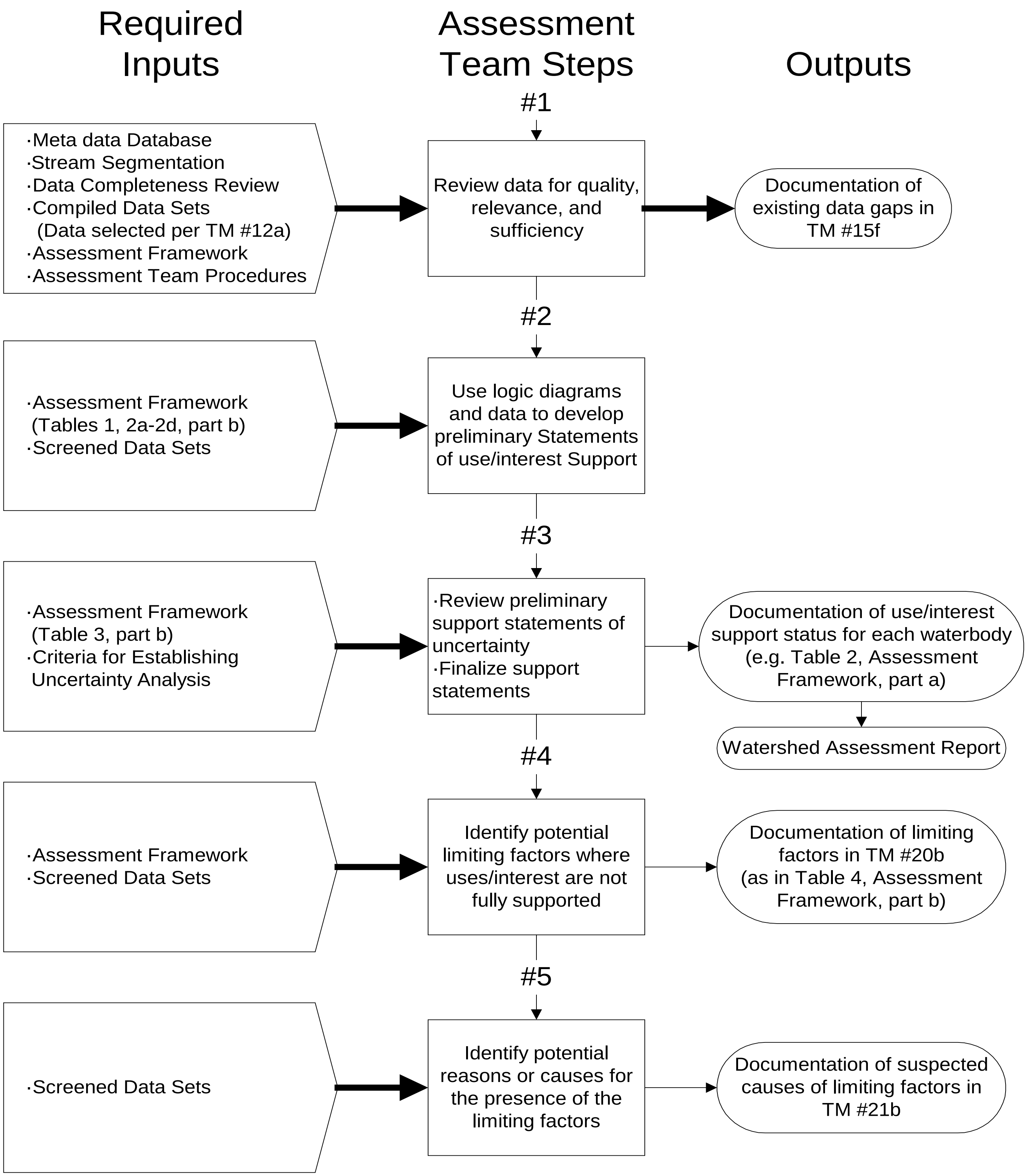
In analyzing data, assessment team members may occasionally draw different conclusions from the same data. Where differing opinions arise, the goal will be to arrive at a determination that all team members can support. In instances where this is not possible, the team will document the nature of the difference and whether there is a majority opinion. If so, the minority opinion will be noted both in the meeting notes and on the relevant output document (tables, etc.).

Where opinions are evenly split, it will be reported that no conclusion was drawn concerning the decision at issue due to internal differences.

V. Follow-On Actions

Three additional actions will come out of the Assessment Team work. First, the metadata data base will be updated following completion of the team meetings to address errors uncovered during the data review steps and to note the data sets that were and were not used in conducting the assessment. In addition, following the completion of their tasks, assessment team participants will be interviewed by the WAC to assess the strengths and weaknesses of the assessment process. These interviews will supplement information contained in the team meeting notes and will be used to draft a technical memorandum on "lessons learned" from the pilot assessments (TM#34a). Lastly, where it is possible to draw supportable basin-wide conclusions concerning use/interest support based on the results of the pilot watershed assessments, team members will be asked to do so. These conclusions will be based on the opinions of the individual team members.

Figure 1: Assessment Team Process and Outputs



ATTACHMENTS

Example Tables

Table 2

Example of Assessment Summary for Reach WR6

Waterbody: Widow Reed Creek   Reach: WR6   Location: RM7-RM9.5

Use/Interest	Data Quality[1]	Criteria Used	Assessment[2]	Existing Conditions Support Use/Interest?	Uncertainty Level[3]	Limiting Factors
COLD	Good	Population data for fish and macro-invertebrates	Healthy steelhead and cased caddis fly populations. Generally good conditions.	Yes	4	
RARE	Fair	Population data	Potential endangered species include steelhead and red-logged frogs, steelhead present. No data on frogs.	No	2	Lack of off-stream channels and pools limiting to frogs
REC1	Good	Total coliform counts	More than 90% of monthly coliform samples meet standard, generally good conditions	Yes	4	
MUN	Good	Water quality data	Source water data comprehensive and good QA/QC	Yes	4	
Flood Management	Good	Channel capacity estimation	Channel cannot pass 1% peak flow without flooding	No	3	Channel capacity

[1] Conclusions in this column will be based on the data gap tables (see Table 1 in the protocol for an example) for each waterbody.
[2] Documentation of minority opinions will be included in this column, where appropriate.
[3] Level to be assigned through uncertainty analysis as illustrated in Table 3 (Assessment Framework, Part B; see next page) or other similar approach defined by Assessment Teams consistent with 305(b) guidance.

Table 3
Example Approach for Performing Uncertainty Analysis of Bioassessment Data

Level of Information	Technical Components	Spatial/Temporal Coverage	Data Quality
1	• Visual observation of biota • Reference conditions not used • Simple documentation	• Limited monitoring • Extrapolations from other sites	• Unknown or low precision and sensitivity • Professional biologist not required
2	• One assemblage (usually invertebrates) • Reference conditions pre-established by professional biologist • Biotic index or narrative evaluation of historical records	• Limited to a single sampling • Limited sampling for site-specific studies	• Low to moderate precision and sensitivity • Professional biologist may provide oversight
3	• Single assemblage usually the norm • Reference condition may be site-specific, or composite of sites (e.g., regional) • Biotic index (interpretation may be supplemented by narrative evaluation of historical records)	• Monitoring of targeted sites during a single season • May be limited sampling for site-specific studies • May include limited spatial coverage for watershed-level assessments	• Moderate precision and sensitivity • Professional biologist performs survey or provides training for sampling • Professional biologist performs assessment
4	• Generally two assemblages, but may be one if high data quality • Regional (usually based on sites) reference conditions used • Biotic index (single dimension or multimetric index)	• Monitoring during 1-2 sampling seasons • Broad coverage of sites for either site-specific or watershed assessments • Conducive to regional assessments using targeted or probabilistic design	• High precision and sensitivity • Professional biologist performs survey and assessment

Source: Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Upgrades: Supplement EPA-841-B-97-002B, September 1997.

Table 4
Example of Potential Limiting Factors from Assessment of Selected Beneficial Uses and Stakeholder Interest

COLD*	RARE	REC1	MUN	PFF
temperature exceeds criteria for critical life stages of steelhead	limited riparian habitat for salamanders	limited access	MTBE exceeds Action Level at selected drinking water wells	floodway capacity limited by sedimentation in channels
insufficient riffle abundance limits macroinvertebrate population and food supply for fish, or limits fast water feeding habitat to allow fish to feed	barriers to migration of anadramous fish	aesthetic limitations: late summer algal blooms and associated odors		excess woody debris limits floodway capacity
low dissolved oxygen during low summer flow periods	red legged frogs limited by predation from bullfogs	risk of exposure to pathogens, especially during wet weather		floodway lacks capacity to meet future conditions for 1% flood
chemical toxicity during wet weather events		risk to human health from consumption of fish		
lack of woody debris and other instream cover		posted for no fishing		

*these are all factors that may affect one reach, and will be listed in order of probable importance.

Appendix B
Lessons Learned in the Pilot Watershed Assessments

Tables

Figures

Appendix B
Lessons Learned in the Pilot Watershed Assessments

1.1 Introduction

This memorandum summarizes the lessons learned by the participants in the WMI's pilot watershed assessments. These lessons are from the perspective of the WAC and pertain to each of the major steps in the assessment process. The intent of this memorandum is to provide input to the WMI for future watershed assessment activities and to highlight aspects of the pilot assessments that either did or did not work well.

1.1.1 Background on Assessment Process

The assessment process is described fully in both the Assessment Framework (TM#4g) and the Assessment Protocol. This memorandum is organized around the principal steps in the assessment process:

- data compilation
- data sufficiency evaluation
- assessment team work sessions
- data analysis/use of assessment framework
- presentation of results/integration meetings

The lessons learned during each of these steps are described in subsequent sections. Due to the iterative nature of the overall assessment effort under the WMI, a number of foundational activities (development of the metadata data base, selection of beneficial uses/stakeholder interests for study, selection of data types) fed into the five steps listed above. While each of these foundational activities is not discussed explicitly in this memorandum, they are touched on where they had an effect on the manner in which the principal assessment steps listed above were completed.

In addition to these foundational activities, there were a number of other tasks conducted during the first two years of the WMI that were designed to lay the groundwork for the assessment as well as numerous other WMI products. The first of these was the Consolidated Action Plan (CAP). While the purpose of the CAP was to guide all activities being overseen by the Report Preparation Team (not just the assessment), it is worth noting that the extensive level of detail in the CAP was probably not appropriate given its development during the gestational phase of WMI activity. While the major tasks delineated in the original CAP were largely on target, most of the detailed subtasks were eventually modified and streamlined as time went by. It probably would have been a better use of resources to produce a simple action plan with work product-specific trigger dates by which an expanded “mini-CAP” would need to be developed for the specific work product. Most active participants in the RPT would probably agree that by the time the assessment got underway in September 2001, they were much smarter about what the detailed steps necessary to complete it would be than they were in August of 1998 when the original CAP was laid out.

1.1.2 Role of Initial Assessments as Pilots

The assessments conducted for the three selected watersheds (Guadalupe, San Francisquito, and Upper Penitencia) were intended by the WMI to be pilot assessments. In addition to furnishing specific results for the three watersheds, the purpose of the pilots was to gauge the effectiveness of the Assessment Framework developed by the WMI. To the extent that the Assessment Framework can be improved for assessment activities in other Santa Clara Basin watersheds, the pilot watershed assessment effort will have achieved one of its primary goals.

Another purpose of the pilot assessments was to determine if existing data that has been collected for the three watersheds would represent a sufficient base for the sort of rigorous analysis envisioned in the Assessment Framework. One of the criteria used in selecting the three pilot watersheds was the feeling among WMI stakeholders that these watersheds were likely to have the largest amount of historic and recent data. If the pilot assessments were to find that the data gaps in these watersheds were substantial enough to compromise confidence in the assessment results, it may not be worthwhile to conduct similar assessments in other, less data-rich watersheds until additional data collection has occurred. Overall, this was a long and thorough process that relied on having a lot of data. The level of data available was modest for almost all reaches. In hindsight, it may have been useful to find the stream reach with the most data and try the assessment there rather than try to do all three watersheds straight away.

1.1.3 Importance of Adaptive Management for Future WMI Assessments

It is perhaps the case that the most important virtue of the pilot assessments will prove to be their value as “test cases”. The WMI should take the opportunity to apply the lessons learned during these pilots to future assessment work. The most immediate benefit of the work done on the pilot assessments is that we have gained a good understanding of the “state of the data”. This will allow the WMI stakeholders to begin developing short- and long-term data collection strategies designed to augment the data compiled for the pilot assessments.

1.2 Data Compilation

For the purposes of this memo, the first phase of the pilot assessments can be thought of as including the development of the metadata data base (including compilation of the data sets) and review of the compiled data.

1.2.1 Development of Metadata Data Base

The metadata data base (MDDB) was originally intended to be a relatively simple matrix that would contain information on data sets considered to be key to the assessment by WMI stakeholders. With input from WMI stakeholders, however, the original matrix concept was expanded into a full-blown data base. The idea was that a formal data base structure would best serve the WMI's long-term data management needs and should be developed in the early stages of the assessment process in order to be of use for short-term (i.e., during the pilot assessments) data management as well.

The original matrix, and later the MDDB was initially populated with information obtained by the WAC and by WMI stakeholders. The intent was to include in the MDDB any data set that might be of use for the watershed assessments. Because this task was proceeding in tandem with development of the Assessment Framework (and, due to delays in developing the latter, actually got out in front of the Framework), the identification of potentially useful data sets took place largely without knowledge of the specific parameters or criteria that would eventually be used to analyze the data. As a result, many of the data sets that were eventually compiled did not turn out to contain any data of use for the assessment.

Nonetheless, the act of obtaining all of the data sets and having them in the MDDB was valuable in and of itself. Establishing a repository for watershed data will serve the WMI well into the future as different assessment approaches are considered and potentially implemented.

The architecture of the MDDB itself proved to be quite suitable for the task of identifying potentially applicable data. In particular, the data type field was probably the most critically important to this task. Future revisions to the MDDB should consider adding a field that allows information concerning the specific location of data applicability within a waterbody to be entered (such as stream reach). This will facilitate a more refined review of data.

1.2.2 Compilation of Data Sets

The data compilation process proceeded relatively smoothly, though difficulty was experienced obtaining some of the data identified during MDDB population. Though the WAC was given specific dates by which all data compilation should be finished, there was a recognition that, without a relatively complete set of existing data, the assessment results could be severely compromised. Thus, additional data sets continued to trickle in over a period of several months.

Once the assessment teams began their work, several additional data sets were identified. Most of this information came via the watershed captains, who were aware of recent studies of relevance that had been completed in the time since the initial data compilation effort had been concluded. Some older studies that had slipped through the initial MDDB population effort were also identified and obtained. This second “round” of data set compilation was largely the outgrowth of an eight-month delay in the assessment process. During this interval, additional data sets became available and were compiled for the assessment and added to the MDDB.

In the end, though some data sets initially identified by WMI stakeholders as being of potential value could not be obtained despite repeated effort, over 90% of the data sets in the MDDB were obtained for the three pilot watersheds. Barriers to obtaining the remaining data sets were generally of two types: (1) data owners were non-responsive to repeated requests and (2) data sets listed in the MDDB could not be obtained from the data owners or sources listed.

1.2.3 Review of Compiled Data

After the data sets identified in the MDDB were compiled, the next step should probably have been to review the data sets against the metadata to ensure accuracy in the MDDB. This should have been done after the Assessment Framework was completed and approved by the WMI stakeholders. In this way, the data sets could have also been reviewed to ensure that they actually contained data on the data types and parameters required by the Assessment Framework. Instead, it was decided to hold off on conducting such a review until the stream segmentation scheme was developed. The reason for doing this was to eliminate one round of data set review by combining the review described above with a review for assigning the data in each data set to specific stream reaches. Given the eight-month delay, WMI stakeholders were eager to get moving with the assessment and it was also felt that combining these two reviews would provide a time savings on the overall schedule. The unfortunate result of this decision was that dozens of data sets that contained no data of any value to the assessment were forwarded through the assessment team review process.

1.2.4 Recommendations – Data Compilation

- The decision to develop the MDDB was a good one. If updated routinely, the MDDB should serve the WMI well into the future. The simple matrix originally envisioned might have been simpler to use during the assessment period but would not have provided long-term benefit to the WMI.
- When metadata for new data is entered into the MDDB, it is suggested that the content of these potential data sets be reviewed and verified as pertinent to the data types and parameters to be used in future assessments. Only data sets that are confirmed to contain relevant data for the assessment approach being selected should

be used by assessment teams. Having this information already contained in the MDDB will greatly aid the process of locating this data.

- Any future revision to the Assessment Framework involving data types and parameters for specific beneficial use assessments should be completed prior to initiation of data compilation.

1.3 Data Sufficiency Evaluation

The data sufficiency evaluation step of the assessment actually worked out somewhat differently than envisioned in the Assessment Protocol, though the process was consistent with the overall approach expressed in that document. The data sufficiency evaluation was conducted in four discrete parts as discussed below.

1.3.1 Data Completeness Review

The initial phase of the data sufficiency evaluation consisted of the relatively straightforward task of reviewing the compiled data sets to determine the stream reaches and beneficial uses they should be used to assess. As outlined previously, this task should probably have been split into two parts, with the first being a quality control check of the data against the metadata in the MDDB. By combining these two steps, the data completeness review took much more time than would have been the case otherwise, as numerous data sets with no relevance to the assessment were reviewed. Errors in the metadata were noted and corrections made in the initial spreadsheets (data sufficiency tables) generated through the MDDB. As part of this effort, specific tables listing data sets "not useful" for the assessment were generated for each of the five uses/interests. These tables would be added to in the next two parts of the data sufficiency evaluation.

The data completeness review was conducted by the WAC's support staff prior to convening the assessment teams. The reasoning was that it would be a relatively simple analysis to determine the presence or absence of appropriate data for each stream reach and use/interest and that, as such, watershed specific technical expertise would not be necessary. In retrospect, however, the watershed captains should have been involved in this review. First, as the designated watershed experts for the WMI, they possessed knowledge about many of the data sets (type and age of data, etc.) that would have allowed the data completeness review to be completed much more quickly. Second, they knew the watersheds and could have helped to identify the appropriate stream reach(es) to which the data sets should be assigned. This last piece of information often proved the most difficult to tease out of the data sets as each researcher used a different method of designating sample retrieval sites. Having people with little "on-the-ground" knowledge of the watersheds conduct this review resulted in it taking longer to complete (with a higher level of error) than would likely have been the case had the watershed captains actively participated.

For future data collection activity conducted under the auspices of the WMI, it is suggested that either GPS or latitude/longitude coordinates be assigned to sampling locations to allow data reviewers to locating the stations without trying to find a report author or a local expert.

1.3.2 Data Quality and Relevance Review

The second part of the data sufficiency evaluation was also the first to involve the assessment teams themselves. At the first assessment team meetings, the data sufficiency tables generated during the data completeness review were provided to team members along with copies of the data sets. The teams' task was to review each data set with the aim of making conclusions regarding the quality and relevance of the data. The purpose of this step was to whittle down the list of data sets a little more by eliminating those of such poor quality or limited relevance that their use in the assessment simply couldn't be justified. More importantly, this task allowed the teams to begin to judge the relative utility of each data set for each assessment. Through this process, assessment team members noted the data sets containing the most recent, robust data and identified weaknesses of other data sets (old data, no information on sampling techniques used, etc.). This sort of relative "rating" of the data sets was an essential input to the uncertainty analysis.

One of the identified purposes of this step was to eliminate data sets of poor quality from further analysis. While this may have worked as intended in a data-rich watershed (where the assessment teams could afford to be selective), it did not work as well for the pilot watersheds. The data completeness review had found that there was so little data on some uses/interests in some watersheds that the assessment teams were reluctant to remove any data sets from consideration in the next step. In fact, more data sets were removed from consideration in this step due to errors made in the data completeness step that were found by the watershed captains. These errors generally involved the misinterpretation of sampling location information and the resulting misapplication of data sets to specific reaches.

The data relevance step had, in essence, already been conducted at a relatively coarse level by the support staff in conducting the data completeness review. Review by the assessment teams generally served as a confirmation or refinement of earlier conclusions regarding the relevance of the data set to the Assessment Framework and, as such, proved a valuable quality assurance measure. During this step, the data quality and relevance columns of the data sufficiency tables generated during the data completeness review were filled in with the assessment teams' conclusions.

1.3.3 Data Analysis

The data analysis step was originally envisioned as taking place after determining data sufficiency. However, as the assessment teams completed the data quality and relevance review, it became apparent that they would need to have more specific information concerning each data set before they could really gauge the overall sufficiency of the data for the assessment. In short, they needed to have all of the data laid out in front of them. Thus, a second round of data set review took place, with the primary purpose being to extract the actual data from the data sets and enter it into a series of data analysis tables (identical to the data sufficiency tables with some additional columns).

Much of the data analysis work was conducted by WAC support staff. For some of the uses/interests (MUN, REC-1), the data types and parameters lent themselves to unambiguous numeric analysis. What was required was labor to review the data and determine whether the threshold criteria were exceeded, how often, and under what conditions. For other uses/interests (RARE, PFF), specific expertise was required to interpret the data and develop conclusions with regard to the threshold criteria in the Assessment Framework. Thus, the data analysis step was conducted by a hybrid of the assessment team members and WAC support staff, depending on the use/interest.

In retrospect, the data analysis step should have been combined with the data quality and relevance review. This would have eliminated the need to go through the data sets twice and would have allowed the data quality discussion to occur within the context of the actual data rather than simply the overall study design/methodology.

1.3.4 Data Sufficiency Determination

The final part of the data sufficiency review involved answering the following question: "Does enough data exist to allow the assessment team to use the Assessment Framework to develop a support statement for this stream reach?" This step was a precursor to assessing support status and is indicated as such on the logic diagrams in the Assessment Framework.

One of the questions left unanswered in the Assessment Framework, however, is that of "how much data is enough?" Did the assessment teams need to have data on each and every data type for each use/interest? Or just one? This was an issue that the assessment teams wrestled with during this step. The reality was that holding out for data on every data type would have likely resulted in "insufficient data" determinations for virtually every stream reach in the three watersheds. Though there was some internal debate, the assessment team members eventually agreed that it was better to provide an indication to the WMI stakeholders of what the available data could tell them about use/interest support than to provide nothing at all other than a "more data needed" statement. It was decided that a liberal reading of the data would be applied to the logic diagrams. In other words, if even one data set was found to be relevant and of at least fair quality, the teams would attempt to develop a support statement. The uncertainty rating would be used to qualify that support statement as being predicated on a relatively small amount of data. At the same time, it was decided to use an expanded "comments" column in the data analysis tables to communicate the reasoning behind the support determinations to stakeholders.

Some of the issues that came up during the data sufficiency determination grew out of specific characteristics of the individual logic diagrams in the Assessment Framework. These issues are discussed for each use/interest in the next section.

1.3.5 Recommendations – Data Sufficiency Evaluation

- For future data collection activity conducted under the auspices of the WMI, it is suggested that either GPS or latitude/longitude coordinates be assigned to sampling locations to allow data reviewers to locating the stations without trying to find a report author or a local expert.
- Conduct quality assurance check on MDDB by reviewing compiled data against the metadata prior to initiating data completeness review.
- Watershed captains should participate in the data completeness review in order to ensure proper attribution of data sets to stream reaches.
- Data analysis should occur at the same time as data quality/relevance review in order to streamline the overall assessment process and reduce the number of times each data set is examined.
- The Assessment Framework should be revised to address the "how much data is enough" question for developing support statements. Some WMI stakeholder-approved guidance should be given to future assessment teams in this area.

1.4 Support Statement Development

The assessment teams relied upon the guidance provided by the Assessment Framework in developing the use/interest support statements for each watershed. More so than in the other phases of the assessment, recommendations for improving this step bear directly upon the Assessment Framework.

1.4.1 Inputs to Support Statement Development

In addition to the assessment-related tasks discussed previously in this memorandum, there were three other decisions or work products that fed directly into the development of use/interest support statements. Each is briefly discussed below.

1.4.1.1 Global Application of Beneficial Use Designations

A seemingly simple decision that had a profound impact on the course of the assessment was to assume at the outset that each of the four beneficial uses (and one stakeholder interest) could potentially be supported in every one of the stream reaches (including the reservoirs) in every watershed.

On the face of it, this may seem a mildly ridiculous assertion. However, the process of developing the Watershed Characteristics Report had revealed widespread concern over the appropriateness of the beneficial use designations in the Regional Board's Basin Plan. To simply follow that approach would clearly not have addressed the needs of WMI stakeholders. While suggested revisions to these designations have been advanced by the WMI (and are included in the Watershed Characteristics Report), there was enough imprecision imbedded in these recommendations that the assessment teams did not feel comfortable arbitrarily "assigning" beneficial uses to each reach. It was decided that the assessment teams should keep an open mind and focus on what the data could reveal about the characteristics of each reach. For example, if it had been determined in advance that a particular reach should not be assessed for a particular use/interest, and if the data analysis had indicated potential or actual support for that use in that reach, this fact would have been completely missed by the assessment teams. It was felt that it would be better to assess each use in each reach and then to review the resulting support statements against the Basin Plan designations and the WMI's list of recommended changes to those designations as a sort of "reality check". The down side of this approach is that the assessment teams undoubtedly spent some time assessing uses/interests in reaches that likely never would have supported those uses/interests under any past or present conditions. On balance, however, the approach that was taken seems the least subjective. Where information regarding the inability of a reach to support a use was obtained, comments were added to the assessment conclusions indicating these limitations.

In hindsight, perhaps the first step following the compilation of data should have been to map the availability of data and take a best guess at which uses could occur or are occurring in which locations to focus the assessment on reaches that had relevant and critical data. The Assessment Framework seemed to be able to find non-support fairly well (when data existed), but a good conclusion of use support was more difficult because the amount of data required was large and no programs have been established to collect the necessary data. The WMI should determine which among these five uses/interests are the priority for assessment and then use the Assessment Framework and stream segmentation scheme to conduct a pilot study to fill the data gaps needed for these one or two uses/interests. It seems clear that, in the short term, a major data collection effort designed to provide for a complete assessment of use support in all reaches and for all uses is unlikely to be implemented. Based on the results of these pilot assessments, maybe the WMI should think about which management actions have the potential to achieve a new use or maintain an existing one and use this as a basis for focusing future assessments and data collection efforts.

1.4.1.2 Stream Segmentation

The Assessment Framework stipulated that the waterbodies within each watershed should be segmented for purposes of managing the assessment and organizing the compiled data. The memorandum on stream segmentation (TM #18f) fully describes the approach taken by the WAC on this task.

The Basin Plan beneficial use designations apply to the entire lengths of streams. It was felt that some level of refinement would be valuable for the pilot assessments in order to assess levels of use/interest support at different locations along a given stream. At the same time, it was recognized that the lack of consistent existing data throughout all three watersheds would prevent development of the type of detailed stream classification study that would be necessary to fully understand stream processes. Instead, a sort of middle ground was chosen. Streams in the three watersheds were broken into segments based on three relatively simple criteria: flow regime, channel type, and land use. Several different approaches to categorizing reaches using these criteria were attempted before the method described in TM #18f was settled on. The goal here was to provide a basis for comparison among similar reaches and some context for understanding the data.

Still, numerous issues have continued to crop up concerning the segmentation scheme used in the assessment. First, it was advocated that a different segmentation scheme be developed for each use/interest. For example, land use is not as important as flow regime to COLD use support. Reaches that might fall into a common land use type may in fact have different flow regimes along the same distance. Second, it was felt by some that individual reaches were far less homogenous than implied by the segmentation scheme and that this could have an effect on support status determination. Third, there has been a question over how to handle the numerous unnamed tributaries in the upper portions of the three watersheds.

Each of these issues is addressed in TM#18f. Briefly, it was decided that a common segmentation scheme should be used for all five uses/interests primarily for the sake of simplicity. Unique characteristics of any given reach pertaining to a specific use could be reflected in the data analysis tables. Creating different segment definitions for each use/interest didn't seem to be consistent with the "all uses for all reaches" assumption outlined previously. With its reliance on existing data, the assessment was out of necessity a planning-level product. The segmentation approach used for the assessment introduces some general characteristics that define portions of these streams and makes them potentially different in some fashion from adjacent segments upstream and downstream. This information should be used to provide a general context for the assessment results but a further dissection of these segments based upon stream processes will be essential before any specific stream restoration or modification projects are implemented. Performing such a dissection at this point, however, would not substantially change the results of the assessment. Since no data for the unnamed tributaries was available, there was deemed to be little value for the pilot assessments in adding them to the segmentation scheme. However, information concerning the presence of these tributaries has been included so that future data collection efforts can include them as warranted.

Many of the concerns over the stream segmentation approach might have been better addressed in the pilot assessments had the memorandum outlining the segmentation approach been finalized prior to the start of data review. At the same time, many of the comments from stakeholders on the proposed segmentation were not raised until the third draft of the memorandum was being circulated, by which time it was thought that most of the major issues had been settled.

1.4.1.3 Special Status Species List

The list of special status species to be included in the RARE beneficial use assessment was developed to support the Assessment Framework. While the RARE assessment approach is discussed in more detail below, it was felt by members of the assessment team that the WMI special status species list contained too many species for the purpose of evaluating RARE use support. In particular, species that are not water- or riparian zone-dependent were included in the list. Considering that this was an assessment of the ability of the waterbodies within the three watersheds to support special status species and/or their habitats (as opposed to an assessment of species presence or available habitat within the entire land area of the three watersheds), there seemed to be no justification for reviewing data on non water- or riparian zone-dependent species. This simply added to the amount of time it took to analyze the data and develop support statements for the RARE use.

In addition, numerous species on the list are known to occur only in the Baylands portions of the watersheds. Because the pilot assessments did not include the Baylands portions of the watersheds, these species should have been excluded from the data review process. The Baylands are a critical component of two of the pilot watersheds and will be included as part of future assessment work. Species unique to the Baylands should be retained on the overall WMI list of special status species but excluded from studies of upland reaches.

1.4.2 Beneficial Use/Stakeholder Interest Logic Diagrams

The Assessment Framework contains a series of logic diagrams designed to be used in conjunction with the table of data types, parameters, and criteria in developing support statements for each use/interest. Specific problems or difficulties encountered in using these tools during the pilot assessments are described below. In general, however, the logic diagrams did perform as intended in that they pointed out the true scarcity of good quality data useful for assessing beneficial use support in Basin streams and reservoirs.

1.4.2.1 Cold Freshwater Habitat (COLD) Assessment

For the COLD assessment, the assessment team determined that gathering all of the available data could not provide the means to judge the status of stream reaches by the established criteria without substantial uncertainty. There are actually very few relevant, reliable sources of data available that relate to the criteria. This may be typical for most watersheds in California. At the time the COLD assessment criteria were developed it was recognized that sufficient data were generally lacking. The criteria were developed as a guide to the types of information that should be gathered (primarily from new sources) to answer the questions. It was recognized that many stream reaches lacked any data on insects, few had detailed steelhead or trout data, and that chinook salmon data, which might be used for seasonally satisfied conditions, were inadequate (it was known where salmon had been seen and had spawned, but knew nothing of hatching success or where the smolts were actually being produced). The few useful data sets were generally known before the assessment team review process was begun. The process was especially frustrating to the team when a support statement could not be made for a reach that the team "knew" was in support of the use because of a lack of data or where it was "known" that the reach could not support the use because it goes dry or has otherwise not been sampled because it "obviously" would not have trout. This was a fundamental feature of the way the assessment was structured, and while it produced some frustration to assessment team members and stakeholders alike, did allow for the most objective review of the limited available data.

In the review of the data sets, several things stand out. General statements made in some data sets, without any reach-specific information, tended to bog down the process (e.g., steelhead are in Penitencia Creek) by triggering a check for each reach and then not being able to use the source for any support statement. Relatively few data sets applied to the primary (biological) criteria and these were mostly already known by team members prior to the start of the assessment. Many data sets contained little useful information that applied mostly to secondary (environmental) criteria (e.g., the water temperature was 72 degrees, the gravels were silty, the pools were 3 feet deep). They were retained during the initial round of data quality/relevance review and then had to be evaluated again when the support statements were developed.

One of the difficulties in using the COLD logic diagram was found to be its insistence upon indicator macroinvertebrate data as a prerequisite for a finding of partial or full support. Many reaches met the criteria for other data types but could not be found to support the COLD use if no insect data was available. If the data indicated the regular presence of juvenile fish but no insect data were available, the diagram did not provide a decision path to reach any support statement.

Another issue that emerged as the assessment progressed was the partial overlap between the COLD and RARE assessments. The special status species list used in the RARE assessment includes some of the key indicator species for the COLD assessment. The COLD assessment was designed to be a much more rigorous analysis than the RARE assessment using different criteria. Thus, it was initially the case in a few reaches that the support statements indicated support for RARE due to salmonid presence but potential seasonal support for COLD. The assessment teams reviewed the preliminary results for each use against those for the other to ensure that the data was interpreted consistently. However, habitat for indicator COLD species should probably be assessed using the COLD diagram rather than the RARE diagram and should probably be removed from the special status species list for the RARE assessment.

The COLD assessment criteria (and the logic diagrams) have some minor problems, but will serve as a good use support evaluation tool once the proper data is available. The criteria should not be changed to match the types of data that are currently available. Rather, the proper data should be gathered to allow the criteria to be used as intended.

A revised logic diagram for the COLD use assessment is shown in Figure 1. This is provided as an example of how the logic diagrams in the Assessment Framework can be reconfigured to respond to some of the lessons learned during the pilot assessments. This revised diagram represents one possible approach to revising the diagram; others may also accomplish a similar goal.

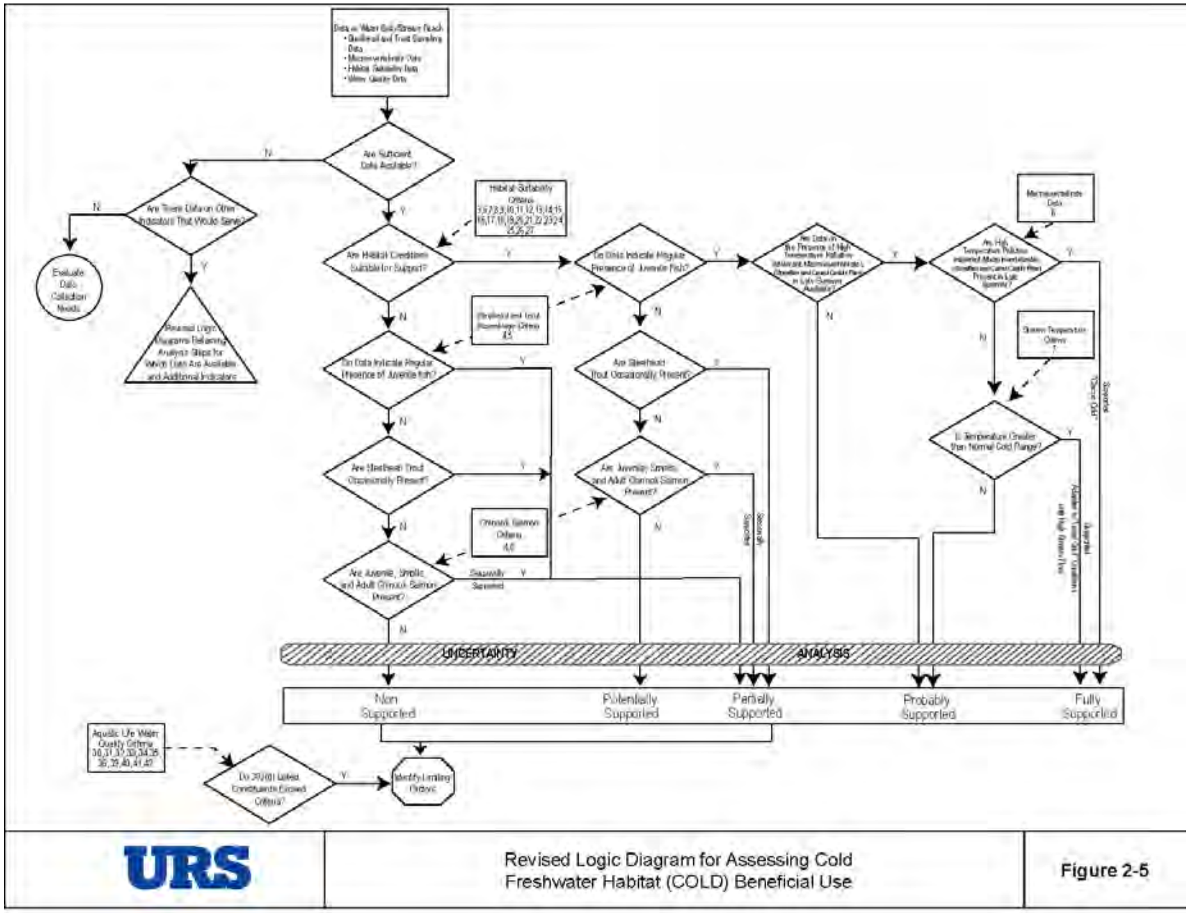


Figure 1. Revised Logic Diagram for Assessing COLD Beneficial Use

1.4.2.2 Preservation of Rare and Endangered Species (RARE) Assessment

The Assessment Framework correctly noted that data on special status species would likely be limited and difficult to obtain. The assessment team found that very little data exists for many of the species on the WMI's list. As was outlined earlier, the assessment team believes that too many species were included on the WMI's list of special status species for the purpose of assessing RARE use support. The Assessment Framework stipulates that only species dependent on streams or riparian habitat would be included on the list. For some reason, a number of species with no dependency on streams or riparian habitat or that would not be reasonably expected to be present in the watersheds were included on this list.

The assessment teams also noted a discrepancy between the narrative discussion in the Assessment Framework and the logic diagram. The issue involved relates to the determination of "partial" support for reaches where data indicates presence/habitat for some, but not all of the species being evaluated. This decision path is not shown anywhere on the RARE logic diagram. The team also felt that using such an approach would yield partial support statements for virtually every reach where data was available simply because the likelihood of there being data available for every species in a reach and the likelihood of that data indicating both presence and habitat for every species were both extremely remote. To provide what was believed would be more useful information, the team decided to focus on the species for which data was available. It was also decided to use the comments column in the data analysis table to identify the individual species to which the support statements apply. For example, a reach with data indicating presence of a sustainable population of steelhead was determined to fully support the RARE use *based on steelhead*. This does not mean that all species on the list are supported within the reach. Statements of either potential or full support were only based on the species for which data was present. For all other species, the results should be considered "unable to determine" based on lack of data.

More so than perhaps any of the other uses/interests, the RARE assessment was hampered by the reliance on existing data. Biological field surveys are really needed to assess habitat conditions within the watersheds for the species on the list. Very few of these were included in the data compiled for the assessment. As a result, most of the support statements for RARE were based on species observations rather than habitat conditions. In addition, much of the species presence data was either quite old or not detailed enough to provide any indication of the sustainability of the population. The RARE logic diagram should be revised to address these data characteristics. For example, where the only data available was more than around 20 years old, no matter how thorough or robust the data is concerning a particular species, the finding should be potential, rather than full support. Similarly, where data indicates species presence but no information is available to evaluate the sustainability of the population, the finding should be potential support. The logic diagram currently does not provide such decision paths.

1.4.2.3 Municipal and Domestic Supply (MUN) Assessment

Less data was available throughout the three pilot watersheds for the MUN assessment than for the other four uses/interests (in fact, no MUN data was available in the Upper Penitencia assessment). The assessment team believes that this is an outgrowth of what were possibly flawed assumptions made when this use was chosen for the assessment. Since raw water from Basin streams and reservoirs is not currently being delivered to the public as drinking water, it seems as though the assessment strategy should be focused on evaluation of factors that would potentially affect the operation of drinking water systems rather than a direct comparison of in-stream water quality to drinking water maximum contaminant levels (MCLs). The major problem with the direct comparisons are that the level of data required to do a complete and valid comparison demonstrating that this use is or is not attained is very intensive and not practical. Drinking water agency operations are designed to comply with a specific set of laws and regulations.

In most urban areas, and indeed, in many rural areas as well, raw sources of drinking water are submitted to some form of treatment prior to being delivered to customers (municipal or private). Treatment technologies are designed to produce drinking water that complies with federally-mandated MCLs or California-mandated action levels for specific constituents. These technologies are generally designed to accomplish this regardless of the quality of the raw water. In addition, it is usually the case in the Santa Clara Basin that several different raw water sources are combined prior to this treatment. Treatment plants monitor the quality of the combined raw water inflow to the plant. Purveyors of drinking water do not generally monitor the quality of each original source waterbody. The MUN assessment was designed to gauge the quality of each raw water source and was substituted for an assessment of the groundwater recharge (GWR) beneficial use by WMI stakeholders late in the process of developing the Assessment Framework. Thus, data on source water fed to treatment plants was not deemed useful unless the water was drawn from a single source waterbody within the watersheds.

Given the paucity of useful data for the MUN assessment and the myriad of sources for raw drinking water in the Basin, there was considerable discussion regarding the wisdom of assessing this beneficial use. Since drinking water is treated prior to being delivered to the public, unless those responsible for conducting the treatment are experiencing any problems with the source water, shouldn't the MUN use be considered supported? This question relates directly to the level of expectation associated with this use. Should full support of the MUN use be interpreted to mean that the public should expect to be able to drink freely from the water in the stream or reservoir? If so, then it is likely that very few streams anywhere could support the use (even streams in otherwise pristine environments are known to carry bacteria harmful to humans). If full support is interpreted as the source water being of sufficient quality for use as input to treatment processes designed to provide public drinking water, then a different type of data should be compiled to assess the use. This data should consist of water quality information on water delivered to treatment plants. Even so, in the Santa Clara Basin, it would be difficult to isolate source water quality problems deriving from Basin streams, given that raw water extracted from Basin streams is usually blended with raw water from other sources outside of the Basin prior to being delivered to treatment plants. It is suggested that future assessments for MUN should begin with the managers of the drinking water supply agencies/companies who could identify stream reaches that are used as raw water supply or for water transfers, factors in the raw water that affect treatment operations and finished water quality (TSS, TOC, hardness), and assessment of how in-stream quality can impact these factors for the purpose of developing management strategies to help water agencies do their job. This approach may help to focus future assessments and develop useful management actions for the agencies charged with providing drinking water.

A secondary problem experienced by the assessment team in reviewing the available MUN data was the general lack of precipitation data to use in correlating water quality samples with either wet or dry weather stream conditions. This determination is a key distinction of the logic diagram as it allows differentiation between partial and full support. While the reasons for making such a distinction are valid, the existing data did not allow the teams to evaluate this issue except in a very few cases. Given the nature of precipitation patterns in the Bay Area, it would be possible to develop this type of correlation by comparing documented rainfall records against the sampling dates in the data, but this level of effort was determined to be beyond the scope of the assessment team's review. Thought was given to designating certain months as "wet" and others as "dry" and evaluating the data under those assumptions. This approach was rejected as too arbitrary given the unpredictability of California's rainfall patterns from year to year. Finally, it was simply assumed (unless otherwise indicated in the data) that all samples were collected during dry weather.

1.4.2.4 Water Contact Recreation (REC-1) Assessment

The REC-1 assessment proved to be the most complicated of the five. There were essentially two different assessments conducted under the REC-1 use: one for fish consumption (under sport fishing) and the other for all other forms of water contact recreation. This, in and of itself, is not the reason this assessment was so involved. There proved to be very little fish tissue data available through the three watersheds and so the number of reaches where a support statement could be developed concerning fish consumption were relatively few. Subsequent to the assessments, the Regional Board indicated that fish consumption should not be considered as part of the REC-1 use.

The logic diagram for the rest of the REC-1 assessment contains three parallel decision paths, each based on a different set of indicators. Primary indicators are defined as microbial samples (fecal coliform, e.coli), secondary indicators as irritants or hazardous substances in the water column, and tertiary indicators as aesthetics and access. The logic diagram is structured so that the primary indicator data is reviewed first. Unfortunately, where no primary indicator data is available, the logic diagram does not provide any decision path to reach the secondary and tertiary indicator paths. It turned out that primary indicator data was available for only a few reaches, while tertiary indicator data was available for many reaches. Strict adherence to the logic diagram would have resulted in “unable to determine” status for most reaches. Therefore, the team decided to conduct three parallel assessments for the REC-1 diagram – one based on each set of indicators. For most reaches, no data on primary indicators and little data on secondary indicators was available. Thus, the analysis turned on the tertiary indicator data. Notes placed in the comments column of the data analysis table describe the type(s) of indicator(s) used to develop the support statement for each reach.

Another problem was encountered reviewing the data on tertiary indicators. The linkage between water depth and flow was not well described in the Assessment Framework for the REC-1 use, and no numeric criteria were included. The team had to assume that a lack of measurable flow or water depth would be an impediment to REC-1 use support. As obvious as this seems, it needs clarification in the Framework. Similarly, the issue of access turned out to be somewhat more complicated than envisioned in the Framework. Does a stream need to be accessible to the general public in order to support REC-1? Or is accessibility more an issue of the ability to physically reach the waterbody without probing through thickets of vegetation (either along the banks or emergent vegetation within the waterbody)? The assessment teams generally placed more emphasis on the latter definition where such data was available.

Another problem noted in using the REC-1 logic diagram is that the terms “recreation season” and “recreation locations” were not defined in the Assessment Framework. The timing and length of the recreation season will vary depending on the type of recreation being considered (swimming in summer, fishing all year). None of this was specified in the Framework and so the operating assumption was that the recreation season covered the entire year. Criteria for defining recreation locations were not included in the Framework. While public parks and stream crossings are the most commonly used sites for recreation, this definition would preclude consideration of the recreational potential of stream reaches passing through private property, whether the recreational activity is being conducted by the adjacent landowners or by members of the public exercising their public trust rights to access the stream reach. Rather than attempt to wrestle with the intent of the REC-1 use, the assessment teams simply considered all reaches as potential recreation locations. Either the logic diagram should be simplified to recognize this approach or definitions of these terms should be developed consistent with Regional Board guidance so that the logic diagram as presented in the Framework can be used in future assessments.

1.4.2.5 Protection From Flooding (PFF) Assessment

The team conducting the PFF assessment had to address a number of issues in the process of analyzing the data. In the process, a number of questions concerning the purpose of the PFF assessment were raised. The Assessment Framework defines “flood protection” for the WMI (a definition that was developed by the Flood Management Subgroup (FMS)) as activities which reduce the potential for flood damages to property. The criterion for support of the PFF interest in a specific reach was defined in the Assessment Framework as the reaches’ ability to safely convey the 100-year (or 1%) flood flow without causing property damage. This criterion is consistent with those used by the

Santa Clara Valley Water District (SCVWD) and the Federal Emergency Management Agency (FEMA).

The logic diagram for PFF required that this evaluation be conducted for “current” development conditions as well as “future” development conditions in the three watersheds. Future conditions were defined as being consistent with the future development assumptions incorporated in the SCVWD’s Waterways Management Model (WMM). This presented the first difficulty encountered by the team. It was difficult to determine exactly how future development was accounted for by the WMM. Very little documentation regarding inputs and assumptions built into the model was provided with the data set. Discussions with SCVWD staff provided some answers, but the specifics of land use assumptions were still unclear to the assessment team. Furthermore, another data set indicated that 100% buildout of all remaining undeveloped (and developable) land in the San Francisquito Creek watershed would not result in any significant change to the 100-year flood flow. Other literature reviewed by the team supported this statement. While the amount of imperviousness in a watershed will have a direct effect on the amount of runoff generated by storms of a high return frequency, the corresponding importance of the amount of impervious area in a watershed on surface runoff will decrease as storm return intervals increase. Eventually, at high return interval floods (such as the 100-year), it makes little difference whether a watershed is fully or partially developed with urban uses (impervious surfaces). In either case, virtually all of the precipitation is going to generate surface runoff due to ground saturation. Therefore, the distinction between current and future development in Santa Clara Basin watersheds for the purpose of evaluating 100-year flooding may be inconsequential. Given these findings, the team decided to simply use the SCVWD’s designed channel capacity data as the benchmark for determining the adequacy of the reach to convey the 100-year flow.

In doing this, however, the team ran into a second problem. The decision was made to rely exclusively on the WMM output in the reaches for which it was available. The reasoning here was that the SCVWD, as the flood control agency for most of the watersheds, should have the best available data concerning channel flow capacity. The evaluation was completed, supplemented with other data documenting historic flooding in other watershed reaches, and the results were presented to interested parties at the watershed integration meetings. Immediate questions were raised about statements of full support for the PFF interest in a few mainstem reaches in the San Francisquito and Guadalupe watersheds. Recent flooding and property damage was noted in these reaches, some of which had occurred during events smaller than the projected 100-year level for the reach. Clearly there was some problem with either the data or the team’s use of it.

Discussions with SCVWD hydrologists indicated that there were some problems with the WMM output data. In some instances the improvements associated with flood control projects had not yet been incorporated, in other cases, lack of recent channel maintenance had resulted in a reduction in the effective channel capacity – a situation which was not visible in the model output. While it was not the team’s role to evaluate the WMM itself, it clearly should not have relied exclusively on the WMM output in developing PFF support statements. Thus, the team undertook a second review, this time evaluating the other data relevant to 100-year flooding. Additional data from FEMA aided the team in identifying areas impacted in relatively recent floods – areas which had been shown as having adequate channel capacity to convey 100-year flows by the WMM output. Given that these floods (San Francisquito Creek, 1998) were estimated to be on the 80- to 100-year return order, it became apparent that 100-year capacity did not exist in these reaches and the support statements were revised accordingly. It should be stated that natural or quasi-natural channels are not formed in such a way that will allow for conveyance of the 100-year or 1% flood flow.

Still, some important questions about this assessment were raised by the team. Using a criterion such as the 100-year flood requires that only quantitative data be used for the assessment since qualitative data does not generally associate flood damages with a return period. It would be better to use a more general set of criteria that is more consistent with the WMI definition of the PFF interest: flooding that causes property damage or overtops banks. Several agencies already have flood control programs, including the SCVWD, municipal and county public works departments, floodplain managers, and FEMA. How should this assessment fit in with their programs? If the intent is for the WMI's assessment to critically evaluate the flood control and channel maintenance activities of these agencies, then it should have been oriented toward a detailed review of the assumptions, tools, and programs in place within each agency for the purpose of flood protection. The experience of the pilot assessments turned up some inconsistencies between FEMA and the SCVWD in their methods of evaluating the likelihood of flooding – inconsistencies which may or may not be symptomatic of other problems with current modeling methods used in Basin watersheds. However, further evaluation of a different sort than that described in the Assessment Framework would be needed in order to make any such determinations.

Another factor to consider is the scope of the PFF interest. Should it take a regional or local perspective? A reach may still experience localized flooding and consequent property damage even though it has adequate design capacity to convey an even greater flow than that which caused the flooding. A reason for this is that storm events that cause flooding can also down trees or erode streambanks. This type of erosion and debris generation can temporarily dam up or otherwise constrict channel flows, causing local flooding. Property owners are likely to take a more local view and clamor for additional flood protection. Flood management agencies are likely to take a regional view and indicate that no channel improvements are needed. The PFF assessment should probably take a regional view but this may ignore some of the concerns of citizen groups.

1.4.3 Uncertainty Analysis

The uncertainty analysis was the final step of the support statement development process and involved assigning a level of uncertainty to the support statement for each reach. Because guidance has been provided by the U.S. Environmental Protection Agency (EPA) on the subject of uncertainty for certain types of data, the teams developed variations on that guidance for each of the five assessments. In keeping with the EPA guidance, a rating scale of 1 to 4 was used for uncertainty – with 1 being the greatest amount of uncertainty and 4 the least amount.

The different teams struggled with the application of this analysis and came to some different conclusions. Some preferred the four-point system, others proposed the use of half-points to further distinguish levels of uncertainty, and another suggested that four levels were too many and that a simple “high/medium/low” classification system be used. It was decided that the scale should be consistent among all assessments, if each number was uniquely defined for the context of each assessment. After all uncertainty levels and support statements were assigned, each team found it necessary to go back again and review the uncertainty levels against all other reaches in the assessment to make sure that consistency had been achieved. The teams found that, as they moved through all of the reaches, what may have been considered a “3” in the early going, suddenly became either a “4” or a “2” by the time they had reviewed all reaches. This “migrating norm” effect is common to any sort of subjective evaluation and should be taken into account in future assessments (and discussed in a revised Assessment Framework).

During watershed integration meeting discussions, considerable confusion was generated by the assignment of 4 to the lowest level of uncertainty. Some preferred the use of the term “certainty”. It may be that a letter grade system (A, B, C, D) should be used, with A being the “best” (or lowest level of uncertainty/greatest certainty). This should get around confusion over which number rating is “best”.

Regardless of which scale is used, the uncertainty analysis proved to be an essential means of providing context for each support statement. Given the reliance on existing data with spotty coverage and little depth or replication, and the bias adopted during the assessment in favor of developing support statements whenever possible (even if based on only one data set), the uncertainty analysis becomes a critical part of the final assessment results. The uncertainty rating should never be severed from the support statement for any reach/use combinations in any future WMI (or other) document, as without it, the ability to properly interpret the support statement is lost.

1.4.4 Recommendations – Support Statement Development

- Review initial assumption that all beneficial uses/stakeholder interests are to be evaluated in all stream reaches. Involve Regional Board in this discussion but be sure to clearly state the assumptions involved before starting any future assessment work.
- It may not be possible to reach complete agreement among all stakeholders on a protocol for determining beneficial use support or for assessing watersheds. However, all positions and points of view should be carefully considered before selecting an approach to be used in future assessment work.
- The WMI should determine which among these five uses/interests are the priority for assessment and then use the Assessment Framework and stream segmentation scheme to conduct a pilot study to fill the data gaps needed for these one or two uses/interests.
- Do not begin data review until agreement has been reached on how to segment/classify individual streams.

- Replace the 1-4 uncertainty scale with an A-D scale with 'A' corresponding to '4' in the current system (adopted).
- Expand uncertainty analysis discussion in Assessment Framework to incorporate the lessons learned in the pilot assessments.
- The "migrating norm" effect should be addressed in the uncertainty analysis discussion in a revised Assessment Framework.
- The uncertainty rating should never be severed from the support statement for any reach/use combinations in any future WMI (or other) document, as without it, the ability to properly interpret the support statement is lost.
- Specific recommendations pertaining to the beneficial use/stakeholder interest assessments are presented in Table 1.

Table 1. Recommended Revisions to Beneficial Use Assessments

Use/Interest	Recommendation
RARE	Reduce the number of species on the list for the RARE assessment. Unless it is known that any of these species is dependent on a waterbody during a critical life stage or has particular habitat needs involving a waterbody, remove non water- or riparian zone-dependent species as follows: • Edgewood blind harvestman • Monarch butterfly • Vernal pool tadpole shrimp (if assessment is of Basin Plan waterbodies only; otherwise retain) • San Francisco garter snake • California condor • San Joaquin kit fox • San Mateo thorn-mint • Tiburon Indian paintbrush • Legenere
RARE	For assessment work conducted outside of the Baylands in Basin watersheds, remove the following species from the list of special status species for RARE use assessment: • Western snowy plover • Saltmarsh common yellowthroat • California black rail • California brown pelican • California clapper rail • Black skimmer • California least tern • Salt marsh harvest mouse • Salt marsh wandering shrew Retain these species for assessment work conducted within the Baylands portions of Basin watersheds.

RARE	Revise discussion of RARE use in Assessment Framework for consistency with logic diagram. Revise RARE logic diagram to allow for decision paths when data is either old or inconclusive concerning sustainability of species population.
RARE	Biological field surveys are needed to assess habitat conditions within the watersheds for species on the assessment list.
COLD	Revise COLD logic diagram to provide decision path to a support statement where no indicator macroinvertebrate data is available for late summer.
COLD/RARE	Remove overlap between COLD and RARE assessments by assessing cold freshwater habitat-dependent species using the COLD logic diagram.
MUN	Reconsider the MUN assessment entirely. Discuss the definition of MUN use support with the Regional Board, particularly the issue of raw versus treated water.
REC-1	Revise REC-1 logic diagram to allow for three parallel assessment paths, one each based on primary, secondary, and tertiary indicators.
REC-1	Refine/replace threshold criteria in the Assessment Framework for REC-1 parameters on access, aesthetics, and water depth/flow.
REC-1	Expand on the definition of “recreation season” and “recreation location” for purposes of using the REC-1 logic diagram. If WMI stakeholders can agree on what constitutes “recreation season” for Basin waterbodies (it may differ from stream to stream and reservoir to reservoir), data can be collected and reviewed accordingly.
REC-1	The fish consumption/REC-1 issue has been addressed by the Regional Board, with an agreement reached to exclude it from the pilot assessment results as not being part of the REC-1 use. However, it should be noted that the issue of recreational sport fishing and the related consumption of caught fish is not covered under any of the other beneficial uses as they are defined in the Basin Plan and, if not considered under either REC-1 or REC-2, would not appear to be captured at all under the California system of designated uses. In light of the Clean Water Act emphasis on “fishable” waters, additional review of this should be undertaken by WMI stakeholders in concert with the Regional Board.
PFF	Reevaluate the appropriateness of using the 100-year flood as the criterion for PFF interest support. If the 100-year flood is retained as a criterion, revise the logic diagram to eliminate the distinction between current and future development. Consider using actual property damage occurrence as criterion. If shorter return interval storms are selected as assessment criteria, the development distinction should remain part of the analysis.

PFF	Reconsider the scope and purpose of the PFF assessment and make refinements to the Assessment Framework consistent with the redefinition.

1.5 Assessment Teams

Three assessment teams were established to conduct the work from the data quality/relevance review onward. This was consistent with the approach outlined in the Assessment Framework and Assessment Team Protocol document. A fourth "team" essentially consisted of WAC support personnel, including the WMI MDDB manager. This team rarely met by itself and participated in a piecemeal support fashion throughout the process. Nonetheless, their role was critical.

1.5.1 Team Roles and Makeup

The assessment teams themselves were relatively small, though numerous support scientists were brought in during the data analysis phase in order to complete the work in a timely fashion. There were no team leaders designated for the process, which meant that the challenge of ensuring that the teams remained on-task fell to the WAC assessment team coordinator. All team members were active participants throughout the process. The role of each team was to evaluate the data, develop support statements, identify limiting factors, and conduct the uncertainty analysis. While numerous questions regarding the Assessment Framework were raised by individual team members, it was continually stressed that the role of the teams was to conduct the assessment in strictest possible accordance with the Framework in order that it could be judged fairly. Instances where the teams either deviated from or made assumptions based on the Framework were described in the preceding section of this memorandum.

1.5.2 Meeting Format and Team Operating Protocol

The initial team meetings were conducted as relatively formal sessions. As the teams settled into their roles, they became working sessions rather than meetings in the traditional sense. It was initially felt that the assessment could be completed in around three meetings per team. It quickly became apparent that this was not going to be the case due to the large number of data sets that needed to be analyzed. The Assessment Team Protocol document envisioned that each team would review each data set together (one at a time) and that this review would proceed reach-by-reach up the watershed. In practice, however, this approach would likely have tripled the amount of time it took to complete the assessment.

Instead, it was decided that each team would spend half of one meeting proceeding in this manner until everyone developed a feel for the process. At that point, each individual on the team would take a stack of data sets and review them individually, consulting with other team members as he or she felt the need to. The review would be for all reaches in all watersheds that the data set was listed as being relevant to, rather than looking at data for one reach at a time. In this manner, the data quality/relevance review proceeded much more quickly. For the data analysis step, additional WAC resources were drafted to pull specific data values out of the data sets and enter them into the data analysis tables developed for each use/interest. Once this task had been completed, the assessment teams were reconvened for the data sufficiency determination and support statement development.

The scheduling of the assessment team meetings was a difficult process for all concerned. In the future, it is recommended that no attempt be made to schedule the meetings until the last preparatory task is one week from being complete (in this case, the data completeness review). This will avoid the problem of having meetings scheduled, cancelled, and rescheduled. It was also the experience of the WAC assessment team coordinator that having two team meetings per week was more than enough. Due to the intensive, day-long nature of the team meetings, one day was needed after the meetings to prepare documentation of decisions made during the meeting, update data spreadsheets, etc. After this, another day was needed to get ready for the next team's meeting. A Tuesday/Friday approach seemed to work best. It is also recommended that a team lead be designated for each assessment team. This person should be tasked with scheduling the team's meetings, off-line discussions, and developing agendas. Having one person charged with these tasks for all three teams might work if that person has no other responsibilities. It is also recommended that at least one week's time between team meetings be built into the schedule to allow team members to prepare updated materials for the next session. If multiple assessment teams are active simultaneously (as was the case in the pilot assessments), this time should be extended to two weeks. In addition, the number of sessions needed to complete the assessment should not be specified up front as it creates unnecessary pressure to move as fast as possible, possibly compromising the end result. Future meetings should be scheduled at the end of each session for as long as is needed to complete the work.

Because of the impetus for completing the assessment as quickly as possible, it proved difficult to provide stakeholders with detailed, updated materials in advance of team meetings. In any event, the meetings were viewed as working sessions, not "presentation and solicit comments/questions" sessions. Each session built off of the progress made during the previous sessions. As a result, it was felt that it was most critical to supply active assessment team members with updated materials by the start of the next session. External stakeholder review of these interim products is probably not warranted (and could significantly complicate the process). Because different stakeholders came and went and did not generally stick with the process from start to finish, distribution of interim assessment materials was limited to those stakeholders who were active in the assessment process and attended a majority of the sessions.

1.5.3 Role of Watershed Captains and Watershed Assessment Subgroup (WAS)

The watershed captains were critical to the completion of the assessment. To the extent that their schedules allowed them to actively participate, the assessment was much the better for it. Some guidance, however, should be provided for future assessments on the appropriate amount of effort to be made to accommodate varying schedules. This will always prove to be a challenge when coupled with the need to keep the assessment moving. The role the watershed captains played in providing “ground-truthing” and reality checking was invaluable and undoubtedly prevented the teams from barking up too many wrong trees. Early in the data quality and relevance review step, it became all too apparent that the watershed captains should have also been involved in the data completeness review. Their understanding of the watersheds would have prevented numerous mistakes made in assigning data sets to specific reaches; mistakes that would have to be corrected during the data quality step. The watershed captains were not only able to help guide the assessment teams by providing a context in which to place the data, but also actively assisted the teams in developing support statements and assigning uncertainties. They also identified additional data sets that should be used in the assessment. While this unanticipated development represented a significant addition to the WAC workload during the assessment and lengthened the amount of time it took to finish the work, it proved critical to being able to develop support statements for additional reaches. Approximately 40 additional data sets were identified, nearly all of them of good quality and direct relevance. The assessment teams learned that more data is not necessarily better – a little bit of good quality data is more valuable than boxes of low quality data.

1.5.4 Materials Used for Team Meetings

The materials used by the teams varied depending on the stage of the assessment underway. Generally, street maps with the reaches denoted were critical, as were lists of the data types and threshold criteria during the support statement/limiting factor stage. Rather than devoting extra resources to note- or minute-taking, decisions made by the team were entered directly into a master data sufficiency (and later, data analysis) spreadsheet that was projected on a screen for all to see.

The MDDB was not used during any of the assessment team meetings. This was largely because it had been initially used to generate the list of data to be compiled for the pilot watershed assessments. When questions arose during team meetings relating to metadata, queries in the MDDB could be run prior to the next meeting to address the issue. An additional computer was needed, however, for review of the numerous electronic data sets included in the data library. Otherwise, the data library was essentially brought into the assessment team meeting room for team members to use. The data identification numbering convention adopted in the MDDB proved a very handy tool for identifying/referring to data sets throughout the assessment process.

One suggestion would be to add some metadata to the data sufficiency and data analysis tables, such as study author, study date, and brief notes regarding the data. This can be generated using the MDDB and would have helped the teams by quickly reminding them of the subject of a particular data set without having to retrieve it from the library.

1.5.5 Data Set Review Methods

Each data set ultimately used to determine use/interest support was reviewed at least three, and sometimes four different times by either the assessment teams or the WAC support staff. For future assessments, it is recommended that each data set be reviewed only once and evaluated as follows:

Does the document contain useful information (relevant data)?

- Identify what stream reach the document contains data for
- Record key notes/values from the data
- Assess the quality of the data and its impact on the decision of support for the given beneficial use.

Adopting this approach would essentially collapse the data completeness, data quality/relevance, data analysis, and data sufficiency evaluations into one step. While the time and resource savings involved may not be significant, this approach would allow team members to thoroughly understand each data set, rather than pulling it out, putting it back, pulling it out again a week later, etc., each time for a different purpose.

1.5.6 Recommendations – Assessment Teams

- Revise assessment team diagram in Assessment Framework to more accurately depict role of data management and support "team".
- Appoint team leads for each assessment team.
- Refrain from scheduling assessment team meetings until all preparatory work is nearly complete.
- Make every opportunity feasible available for watershed captain participation in the assessment team meetings. Addressing the varying schedules of watershed captains and maintaining timely forward progress will always be a challenge for any assessment, as it was here.
- Allow at least one week between team meetings; two weeks if multiple teams are working simultaneously. Do not define in advance the number of meetings needed to accomplish the work. Instead, schedule one meeting at a time at the end of each session with the understanding that the process will continue for as long as it takes to complete the work.
- Include metadata (author, source, title, date) for each data set in data sufficiency and data analysis tables used during assessment team meetings.
- Consider combining the data completeness, data quality and relevance, data analysis, and data sufficiency reviews into one evaluation covering all subjects to eliminate multiple rounds of data set review and resulting inefficiencies.

1.6 Presentation Of Preliminary Results

The revised Consolidated Action Plan (CAP) for the assessment tasks envisioned a single focus session during which the preliminary assessment results would be presented to

WMI stakeholders. Before the start of the assessment, interest was expressed in having some of the assessment team meetings take place within the pilot watersheds. Due to the difficulty of transferring all of the 600 data sets to an alternate location, this option was shelved in favor of a set of meetings held within the pilot watersheds during which the preliminary results of the assessment for that watershed would be presented to all interested parties. These meetings would consider all uses/interests in that one watershed (as opposed to the assessment team format of reviewing one use in all three watersheds), and were thus termed “watershed integration meetings” (WIMs).

1.6.1 Watershed Integration Meeting Format

Two WIMs were held – one covered both San Francisquito and Upper Penitencia but was held within the former watershed due to the primary focus of stakeholder interest. Each meeting involved a presentation by the WAC assessment team coordinator on the background, purpose, and methodology of the assessments. Participants were provided with electronic and hard copies of the assessment results (see below). The WAC assessment team coordinator then walked through the assessment results on a reach-by-reach basis and the floor was opened for comments, questions, and other discussion amongst the group. Representatives of each assessment team were on hand at each WIM to participate in the discussion.

The purpose of these meetings was two-fold: to allow the assessment teams to obtain feedback on the assessment results (additional ground-truthing) and to allow interested parties and WMI stakeholders who hadn’t been able to attend any of the assessment team meetings the opportunity to see how the assessment had been conducted and find out the preliminary results. To these ends, the meetings seemed to be quite successful. It would probably have been better to have had them run a little longer so that the discussion could have been more detailed, but attendance was quite good. The watershed captains who had participated in the assessment team meetings were able to play a positive role by presenting their impressions of the assessment process to the other meeting participants.

1.6.2 Watershed Integration Meeting Materials

Following completion of the assessment team phase, the data analysis tables generated during the assessment (one for each use/interest) were entered into the MDDB, which was then used to generate reach-by-reach summary tables containing the assessment results for all five uses/interests. These tables were compiled by watershed and distributed prior to the appropriate WIM to all likely attendees. Additional copies were brought to the meetings. In addition, it was felt that there would be some value in providing a graphic representation of the assessment results. Some different formats were experimented with, but two sets of charts were produced and provided to WIM attendees: the first showed reach-by-reach support status and uncertainty for a given use/interest through a series of shaded and scaled bars, and the second showed the support status for all five uses/interests in each reach via a stacked/scaled bar. This allowed meeting participants to note relatively quickly reaches where the greatest level of multiple use/interest support had been found to exist. These materials will eventually be incorporated into the Watershed Assessment Report.

1.6.3 Recommendations – Presentation of Preliminary Results

- Allow additional time for watershed integration meeting discussion.

1.7 RPT's Perspective

This section summarizes lessons learned from the perspectives of the Report Preparation Team (RPT). RPT was formed to administer the development of the assessment work, and its quality management processes. This summary reflects on both the people and process factors that contributed to the pilot assessment. People factors are discussed in Sections 1.7.1 through 1.7.3 while the process factors are addressed in the remaining subsections.

1.7.1 Shared Responsibilities

The membership of RPT has evolved from a consultant/local agency-driven group to a more dynamic group. During the process of assessing the three pilot watersheds, RPT consisted of representatives from the Santa Clara Valley Water District, City of San Jose, the environmental stakeholders, San Francisco Bay Regional Water Quality Control Board, WMI Project Coordinator, and ad-hoc participants from Watershed Assessment Subgroup chairs, CLEAN South Bay, and the U.S. Environmental Protection Agency.

Contractors contributing to the assessment included the WMI Project Coordinator, the environmental representative, and URS, with funding from the CALFED, the Water District, and the cities of Palo Alto, San Jose, and Sunnyvale.

This composition reflected shared responsibilities, which translated into the ability to share the workload. This mobilized each team member to contribute actively to the work products.

Participation and input from other subgroups, such as WAS, have helped to share the workload and to keep the team on schedule.

When so many parties are funding the work, roles and responsibilities as well as resource limitations need to be clarified from the beginning of the process. Also, the management of these funds also needs to be synchronized and be carried out consistently despite the personnel changes that the process experienced.

Regulatory agency representation could be strengthened by working more with other team members side-by-side to help influence and shape the outcomes of the assessment rather than in an oversight capacity.

1.7.2 Strong Leadership from the Chair and the District

With the Core Group and Water District's management support, the Water District staff who chaired this team was able to devote the effort to bring about the changes needed to move the process forward. This dedication of staff time allowed RPT to benefit from fresh perspectives and insights, facilitation/consensus building and strong project management skills, sensitivity to stakeholder interests/politics, and an open, inclusive approach to the assessment work.

It was also important for the RPT Chair to involve the contractor firm's top management to provide the oversight and guidance needed to ensure timely and proper resource allocations for meeting the schedule.

RPT chair was instrumental in making the team effort to benefit from stakeholder resources allocated for the assessment work and from improved efficiency in utilizing these resources in the pilot assessment process.

The funding agencies need to help strengthen the leadership by communicating its respective contracting obligations and consult the chair on their respective contractor's performance. The Chair should be empowered to mobilize the resources in a more efficient and effective manner without going through too many layers of management.

1.7.3 Volunteerism

A devoted member from CLEAN South Bay exemplifies the generosity of volunteerism. Volunteerism consistently brings fresh perspectives and valuable suggestions to the process and was instrumental in helping the RPT to apply adaptive management principles in its work.

Rotating team members to work directly with volunteer critics appeared to be a productive experience. The direct exposure from all RPT members brought clarity to the dynamics of the conflicts and allowed the team to better understand the efforts others put in previously.

RPT acknowledges that it has been extremely challenging to bring effectiveness and efficiency to working with stakeholders who had repeated dissatisfaction with work products. The assessment work would move forward more efficiently if stakeholders recognized the limitations and scope of the RPT work process and redirected their efforts toward constructive comments.

1.7.4 Bring Focus to RPT

Recognizing the limited resources the team has and the urgency to conclude the assessment work, the team decided to focus on the assessment and to redirect non-assessment work to other WMI subgroups for action. This decision was supported by the Core Group and allowed the team to keep the schedule rolling.

1.7.5 Clarify Roles and Responsibilities

With any team, it is critical to clarify who is responsible for what, especially, when this project is only a fraction of each participant's workload. Once RPT found its focus, members started to clarify the roles and responsibilities for the assessment work process, and their work evolved around contributing to the deliverables. It was clear that the progress of the work depends on efforts from every member. Every member on the team took on specific tasks that contributed to assessment work products.

1.7.6 Streamline Work Processes

With responsibilities clarified, RPT members also examined the work process. They reduced meeting frequencies and the length for each meeting. Members were able to work on different tasks in between the meetings and come to meetings for collective problem solving. Time spent on writing up lengthy meeting minutes, doing work that could be done separately, and going over action items were redirected to work on actual tasks that are relevant to the deliverables. At the end of every meeting, participating members had a clear sense of what needed to be done and when, even without a detailed minutes.

They also made a conscious effort to use each other's time to efficiently, e.g., consultants, ad-hoc members or WAS co-chair were engaged only in relevant portions of the meetings. Teleconference tools were routinely available to engage interested and relevant parties to get into the discussions.

1.7.7 Simplify Work Plan and Let the Project Schedule Drive the Process

Instead of using a 20+ page consolidated action plan (CAP), RPT opted to use a one-page work plan to keep others informed of the progress or lack thereof. This tool brought transparency to RPT's work and allowed the group to examine opportunities to streamline the review cycles and made process adjustments to expedite the work process.

1.7.8 Provide An Open, Inclusive and Centralized Technical Forum

RPT members recognized the importance of getting interested Core Group members engaged throughout the process. At the monthly Core Group meeting, RPT informed the group on its progress briefly. Instead of burdening the whole Core Group with details that most of them are not interested in, RPT directed details to the RPT meetings and invited interested parties to participate. Additionally, on an on-going basis, RPT chair made a conscious effort to encourage Core Group members ad-hoc engagement in RPT meetings or virtual discussions, consistently look for opportunities to mobilize others in WMI to assist RPT, and adopted recommendations from ad-hoc members in RPT's work process.

1.7.9 Operate on Adaptive Management Principles

Having the benefits of constructive suggestions flowing into RPT, RPT took action on implementing these ideas. Improvements made to the second Watershed Integration Meeting exemplified such an effort, and it brought great effectiveness to the team.

1.7.10 Efficiently Manage Comment/Response Process

Learning from past experience and the Coyote Watershed Workgroup, RPT clarified product review processes. It devised a strategy to diffuse conflicts, to bring efficiency to the comment/response process, bring clarity to unresolved issues, and to revitalize the integrity of the assessment work.

RPT also recognized the importance of a neutral standing in the initial screening of stakeholder comments. WMI Project Coordinator, the environmental representative, and the Watershed Assessment Subgroup (through resources provided by the City of San Jose) were able to act in that role at different phases of the work process.

The mechanism preserved the integrity of the work process and prevented change orders for consultant service fees. It was very effective and efficient for tracking, compiling, and analyzing/balancing views reflected in the comments provided by stakeholders, for ensuring that all comments were considered in the revision process.

1.8 WAS Perspectives

This section summarizes the lessons learned from the perspective of the WAS members in general and the Watershed Captains (who are members of WAS) in particular. WAS membership consists of representatives from agencies, municipalities, and non-profit groups. Watershed Captains are WAS members who have specific expertise and knowledge of the Pilot Watersheds being assessed.

The role of WAS in the SCBWMI pilot assessment was to provide opportunities for stakeholder input as the assessments were developed, to review the assessment information as prepared by the Watershed Assessment Consultant (WAC) and Report Preparation Team (RPT), and then compile comments collected while providing a tracking mechanism for responses to the comments received.

In the initial steps of the assessment process, WAS worked with the WAC to identify existing data resources, assemble available data, evaluate the quality of existing data, identify data gaps, develop and implement strategies for data acquisition and management and implement data interpretations which would lead to effective planning decisions. Once the assessment process began, there was little input from WAS until the first draft of the Watershed Assessment Report (WAR) chapters were ready to review.

As the initial drafts of the WAR became available for review and comment, WAS worked with RPT to hold four facilitated workshops to collect comments on the sections of the WAR being reviewed. Written comments from stakeholders submitted prior to the workshops, as well as those provided verbally by stakeholders attending the workshops were collected and tabulated in a response matrix table, which was documented by RPT. Through this process, WAS attempted to identify those issues that were controversial and find a way of coming to consensus as to how they should be addressed.

Section 1.8.1 describes the process of review from the WAS subgroup member perspectives. This section has two parts; one describes the comments on the overall process and the second describes specific aspects of the joint WAS/RPT workshops.

Section 1.8.2 provides comments on the assessment review process as provided from the Watershed Captain perspective. This section has two parts; one describes comments on the assessment process overall and the other focuses on the assessment team meetings.

Section1.8.3 describes general recommendations from both Watershed Captains and WAS for future assessment processes.

1.8.1 WAS Perspectives

The WAS perspectives and comments provided below are not presented in any order of significance and were collected during a discussion of the pilot assessment process held at the July 16, 2002 WAS meeting.

1.8.1.1 Overall Assessment Process

1. *Make sure the experts, people with local knowledge, and the appropriate stakeholders are more involved in the review processes and meetings.* The timeline for the review process/comment process on written products was very tight. Concerns were expressed that not all stakeholders who should have been involved in the review/ comment process were able to fully participate, due to the very short windows for review in the project timeline.

2. *Involve watershed captains earlier in the assessment process and provide them with clear direction and expectations for their roles in the assessment and review process.* Also, ensure that they have an accurate idea of the time commitment needed to participate as a watershed captain. The volunteers filling the positions of Watershed Captains changed over time from the beginning of the data collection to the final review process. WAS should have done a better job of orienting the new Watershed Captains as to what their role was and the time commitment needed to fulfill the role.

3. *Establish clear communication channels for inter-sub-group or team relations and coordination of work products.* At times it was unclear as to what products WAS was expected to provide and who were the appropriate contacts that would be providing the information. An example of this being significant WAS consultant time was spent developing Chapter 1 based on the outline provided by

RPT, only to find at a later workshop that a considerably abbreviated chapter was envisioned. In hindsight, it would have been a more efficient use of consultant time to give more clear instructions as to the needs of the chapter. Perhaps it would have been more efficient to have RPT write the chapter, since they knew what they wanted.

4. *If the WAC could offer feedback or responses through brief interim reports or communications on issues as they are brought up by commenters during the review process, then the review process may move more efficiently and smoothly.* Also, the Assessment team members (including WAS) may feel more involved in the review process. Issues were discussed at the WIMs or at the WAS-sponsored workshops, but then it seemed to be a long time before anyone saw a new version of the assessment products. There is a concern that commenters need to be able to determine if their concerns expressed about the drafts were being adequately addressed and that there would be adequate time to make that determination so as to allow for changes to the final document, as needed.

1.8.1.2 WAR Review Workshop Series

1. *The timeline for review and comment was very tight and more time was needed to do a thorough review of the completed draft documents.* WAS reviewers felt that they were only able to give the first draft of the document a cursory review, given the very short turn-around times for comment submission. Given the length of time of the data collection and assessment process on the front end of the assessment process, the time allotted for product review and comment seemed to be very compressed, by comparison.

2. *It was difficult to follow and track issues and concerns identified in the assessment review process when the work products were provided for review non-linear fashion.* The completed chapters and technical memoranda submitted for review were provided out of order and in a somewhat piecemeal manner. This made it very difficult for stakeholders to follow the assessment results and understand the whole picture. As a result, considerable time was spent in trying to go back and see if something was covered in a previously reviewed chapter or technical memorandum (TM). This made it very difficult to follow the continuity of responses to comments, track issues, and ensure that they were adequately addressed in the document.

3. *Consolidated comments and responses generated for them, at the four review workshops, were sent to the WAC after the entire review period was completed.* They should have been transmitted as soon as possible after each of the workshops. This postponement may have caused delays in the revision process for the chapters and TMs.

4. *Due to the time it has taken to see revisions to draft chapters and TMs, WAS has not been able to determine if the comments received during the workshops were*

<u>*suitably addressed.*</u> It is not clear as to whether the direction given WAC on chapters and technical memorandums during the review process was followed. The delays in receiving revisions to the chapters and TMs did not allow WAS to determine if comments were addressed until final drafts were received. This may make it more difficult to resolve remaining issues. There is also a need to ensure that all comments get recorded and printed in final documents, with specific references and linkages to resolved and unresolved issues.

1.8.2 Watershed Captain Perspectives

In the preliminary stages of the assessment process, WAS suggested the concept of "watershed captain" as a person familiar with each watershed, who could actively participate in the assessment process and work with the teams to provide a 'reality check' of the initial results. A watershed captain was designated for each of the three pilot watersheds to participate on the appropriate assessment team. The watershed captains provided an integration function to review the separate use support analyses and identified inconsistencies in the findings of WAC.

The perspectives listed in this subsection were expressed and documented primarily by Geoff Brosseau, the San Francisquito Watershed Co-Captain, and Larry Johmann, the Co-Captain for Guadalupe Watershed. Mike Will, the Captain for Upper Penitencia Watershed, also contributed his reflections on the Role of the Watershed Captain in the Assessment process. Due to resource and time constraints, perspectives were not available from Laura Young- San Francisquito Watershed Co-Captain and Terry Neudorf, Guadalupe Watershed Co-Captain.

The Watershed Captain perspectives are divided into two categories; 1) the overall assessment process, and 2) the assessment team meetings.

1.8.2.1 Overall Assessment Process

1. <u>*Conduct a pilot assessment of reaches of a pilot watershed.*</u> The idea here was that if only existing data is to be used, first conduct a trial run on the stream reach with the most data as early in the process as possible, and then revise the assessment process including tasks, schedule, and budget accordingly. Also, it would be useful to conduct WIM-type meetings as part of the trial run.
2. <u>*Design the assessment process to be based on "new" data collected expressly to answer the assessment questions and to fulfill the assessment's data requirements*</u>. This suggestion was born from the hindsight that it is not most appropriate to base the assessment framework around specific monitoring and assessment questions when using already existing data generated from various studies with different end-points in mind.
3. <u>*Perform an initial review of beneficial uses*</u>. Before developing support statements for each beneficial use in each stream reach, time should be taken to review and determine which beneficial uses should be evaluated in which stream reaches.

4. *The stakeholder interest, PFF, should not be part of the assessment effort*. This concern was raised at the time the representative uses were first selected and it was stated that this issue would be a major source of conflict when it came time to take actions to protect or improve beneficial uses. Additionally, it was felt that because there is an entire WMI subcommittee devoted specifically to this interest, PFF should not be included with the beneficial use assessment.

5. *Shellfish harvesting (SHELL) and fish consumption should not be evaluated under the umbrella of REC-1.* The objection here is not the inclusion of an evaluation of SHELL or fish consumption, but rather, not to evaluate them in conjunction with REC-1. The criteria developed for these uses/interests are felt to be inappropriate for the assessment of use support for REC-1 because fish consumption is addressed under Ocean Commercial and Sport Fishing (COMM) and not under REC1. Therefore, it is erroneous to assert that fish consumption affected by mercury contamination is relevant for a support statement for REC1. To determine if REC-1 is supported or not supported, criteria appropriate specifically for REC-1 should be evaluated. To determine if SHELL or fish consumption (COMM) are supported or not supported, criteria specific to those uses/interests need to be established for their individual support evaluations.

6. *Reconsider the MUN assessment.* One suggested approach is to conduct the assessment for this kind of beneficial use as either MUN (Municipal or Domestic Water Supply) or as GWR (Groundwater Recharge), depending on the stream or reach.

7. *Improve the Stream Segmentation process.* Some Watershed Captains believe that stream segments with significantly different physical characteristics were improperly lumped together instead of separated based on their physical differences. Because differences in the limiting factors and their causes would be more pronounced between segments with different physical properties, proper stream segmentation would enable more accurate analysis of the potential limiting factors that could be impacting the uses in those reaches. Including Watershed Captain participation earlier in the stream segmentation review process would be beneficial.

8. *Address river morphology and hydrology/hydraulics criteria to more accurately determine support/non-support and associated limiting factors.*
One Watershed Captain stated that two of the primary limiting factors for most beneficial uses is adequate river morphology and hydrology/hydraulics and because of this, these aspects of stream habitat conditions should be incorporated into future assessments.

9. *Make efforts to collect recently available data.* Make use of local groups' recent photographs and videotape footage that is publicly available. This data was supplied to the resource and regulatory agencies and was presented at local and

statewide conferences. Establish a clear process for including local knowledge in data collection efforts.

10. *Make a distinction between data classified as "Local Knowledge" and well-documented information.* Both types of data could be applied towards the beneficial use support determinations, but only if there was a clear distinction made between the two data sources.

11. *Ensure that the intended roles of each WMI Subgroup remain clear*. One Watershed Captain felt that the envisioned roles of WAS and RPT seemed to have been reversed as the assessment process began. It was felt that WAS should have been more active in the initial phases of the assessment efforts and consultant oversight work, instead of these activities being performed by RPT. Due to the limited resources available to volunteer participants the individual chose to actively participate in WAS in order to be involved with the assessment effort as much as possible. However, with the role that WAS played in the assessment process was not what the individual had originally envisioned.

1.8.2.2 Assessment Team Meetings

1. *Identify multiple Watershed Captains or engage local watershed experts at defined points earlier in the process*. By the time the results got to the WIMs, the results were not very preliminary. A lot of time and budget had been expended by that point. Since so much effort was expended on the front end of the assessment, neither the assessment teams nor the Captains had the opportunity to step back and look at the results of the overall assessment to make sure they were consistent and made sense. The Watershed Captains were specifically selected for their intimate knowledge of the pilot waterways, but ultimately this resource was not used to its full potential.

2. *Make the communication mechanisms between the WMI, the Watershed Captains, and consultant experts as institutionalized as the other WMI communication mechanisms.* Most Watershed Captains and experts were volunteers in this pilot process and thus had full time jobs that made them generally unavailable for daytime meetings. One suggestion to maximize the involvement of the Watershed Captains and other "local knowledge" experts with the WMI process is to hold assessment team meetings in the evenings or at more convenient times for the volunteer participants. Also, perhaps some regular type of communication/ reporting procedures should have been established to specifically include the Watershed Captains as the assessment moved forward.

3. *Maximize efficiency in data compilation process*. Design future assessments to have more steps appropriate for junior staff and senior consultant staff reviews to be separate from steps for expert reviews. Junior staff involved in preparation steps could be made available during the "expert steps" to address questions about

earlier steps and the senior consultant reviewer should be present to provide continuity.

4. *Once the assessment steps begin, ensure that the same support staff and scientific experts are available for each meeting*. Without the same group of people being present at each meeting, it was difficult to address issues as they came up.

5. *Ensure that sufficient copies of all relevant materials are readily available to participants in all meetings*. Not all participants have the same access to documents that may be e-mailed. Hard copies of documents may need to be provided.

1.8.3 WAS Recommendations for Future Assessment Processes

A listing of recommendations to consider for future watershed assessment processes is described below. These are not presented in any order of importance, but represent comments received at the Watershed Assessment Subgroup meeting held on July 16, 2002.

1. *Involve the Watershed Captains earlier and more often in the assessment process. Clearly define their roles and give them clear directions.* Establish clear guidelines and expectations for the role of the watershed captain, as well as the time commitment that would be needed to participate in earlier phases of the assessment process.

2. *Select a few reaches to try the assessment tools on before expanding to complete an entire subwatershed.* This would be a “Pilot test of the Pilot Watershed Assessment” type of scenario. Hopefully, trying the assessment tools on a small scale would help to determine problems and difficulties with them before applying them on a broader scale. It would also help to determine whether the questions being asked about the watershed in the assessment process could be answered using the assessment methods selected.

3. *Establish clear communication channels for inter-subgroup or team relations and coordination of work products.* At times it was unclear as to what products WAS was expected to provide and who were the appropriate contacts that would be providing the information. An example of this being significant WAS consultant time was spent developing Chapter 1 based on the outline provided by RPT, only to find at a later workshop that a considerably abbreviated chapter was envisioned. It would have been a more efficient use of consultant time to have had clear instructions as to the direction for the needs of the chapter at the time that the assignment was made. Or, perhaps it would have been more efficient to have RPT write the chapter, since they knew what they wanted for that section of the Watershed Assessment Report.

4. *Establish preliminary review points for working drafts of the chapters. Then provide a complete document, in addition to the appropriate appendices to the product to make it easier to review.* When the Chapters were provided to WAS for review and comment, they were at a very late stage in their development and it appeared to be difficult to change the direction the WAC was going in some areas. Having WAS input at an earlier stage of their development may have helped focus the direction of the chapter development better. This is similar to the comment made previously about involving the Watershed Captains at an earlier stage of the assessment process in order to help determine what preliminary issues might be and in a time frame when changes could more easily be made.

5. *Make sure adequate time and sufficient resources for a thorough review of the assessments is built in to the end of the process at the beginning.* WAS recognizes the need to keep the assessment process moving in a timely manner. However, it felt like little time was reserved for the review process of assessment products in comparison with other amounts of time allotted during beginning of the assessment process. Stakeholder review processes are notoriously lengthy at times, but they do lead to better products that will be supported by all participants. Including earlier intermediate review steps in the process may help to shorten the assessment review time needed at project end. Additionally, in future assessments, it would be ideal if subgroups could offer their perspectives on Lessons Learned for the respective component of the assessment process they were involved in, after their participation in that particular assessment component is completed and not before their participation is completed. This would allow for a comprehensive evaluation of the process, from beginning to end.

6. *Budget more time for following up the assessment work, with an analysis of "where do we go from here?"* The information learned during the process about the strengths and weaknesses of this type of assessment showed that it worked well for some things, but not for all. There is a need for an "Assessment of Watershed Assessment Methodologies" that would be accessible to interested participants and would provide a toolbox of assessment methods that could be used to understand the vagaries of the pilot assessment prior to conducting future assessments. Depending upon the questions being asked about a particular watershed, various methods, or 'tools' in such an assembled 'toolbox' would then be useful in answering assessment questions for particular watersheds.

Appendix C
Data Gaps Identified in Pilot Watershed Assessments

Tables

Appendix C
Data Gaps Identified in Pilot Watershed Assessments

1.1 Introduction

This memorandum summarizes the data gaps identified during the three pilot watershed assessments conducted for the WMI. The text of the memorandum describes the types of data gaps encountered and the steps used to identify them. Specific data gaps for each of the five beneficial uses/stakeholder interests evaluated in the pilot assessments and their presence within each of the stream reaches are presented in Tables 10 through 12 at the end of the memorandum.

1.1.1 Background and Context

The assessment process is described fully in both the Assessment Framework (TM#4g) and the Assessment Protocol. Within the pilot assessments, a data gap has been defined as the combination of an indicator (or data type), stream reach, and use/interest for which no data of sufficient quality and relevance is available. Data gaps were identified at several stages in the process. This memorandum brings each of these steps together into a complete listing of all data gaps for each set of assessment indicators.

1.1.2 Purpose of Identifying Data Gaps

The assessments conducted for the three selected watersheds (Guadalupe, San Francisquito, and Upper Penitencia) were intended by the WMI to be pilot assessments. One purpose of the pilot assessments was to determine if existing data that has been collected for the three watersheds would represent a sufficient base for the sort of rigorous analysis envisioned in the Assessment Framework. One of the criteria used in selecting the three pilot watersheds was the feeling among WMI stakeholders that these watersheds were likely to have the largest amount of historic and recent data. If the pilot assessments were to find that the data gaps in these watersheds were substantial enough to compromise confidence in the assessment results, it may not be worthwhile to conduct similar assessments in other, less data-rich watersheds until additional data collection has occurred.

1.1.3 Role of Data Gaps in Long Term Data Collection

Beyond looking at the number of data gaps, it is important to consider the types of data gaps present in the pilot watersheds. If the goal of the WMI is to fully assess the support of each use/interest with a high level of confidence, the data gaps identified in the pilot assessments will eventually need to be filled. Thus, the information in this memorandum should be the starting point for developing a long-term data collection plan. While the WMI stakeholders may choose to prioritize certain uses/interests and, therefore, certain types of data for collection, the list of data gaps produced during the pilot assessments should serve as the foundation for an understanding of the current “state of the data”.

It is important to note that additional research and study is ongoing within the Santa Clara Basin and that new data sets of potential relevance to the assessments conducted for the pilot watersheds are continually being produced. It will be critical to update and continue to maintain the metadata data base (MDDB) developed to support the pilot assessments on a routine basis so that the long-term data collection plan does not identify data needs that may no longer apply.

It is perhaps the case that the most important virtue of the pilot assessments will prove to be their value as “test cases”. The WMI should take the opportunity to apply the lessons learned during these pilots to future assessment work. The most immediate benefit of the work done on the pilot assessments is that we have gained a good understanding of the “state of the data”. This will allow the WMI stakeholders to begin developing short- and long-term data collection strategies designed to augment the data compiled for the pilot assessments.

1.1.4 Steps in Identifying Data Gaps

The process used to identify data gaps for the assessments was an iterative one. The next section of this memorandum describes each step in this process in detail. All of these steps, when grouped together, constituted the data sufficiency evaluation. A favorable determination of data sufficiency was necessary in order for the assessment team to be able to evaluate use/interest support for a given stream reach. Where data were deemed insufficient, data gaps were identified.

However, data gaps also exist for use/interest-stream reach combinations that were determined to have sufficient data for the analysis. This is the result of the decision made during the assessments to evaluate potential use/interest support in as many reaches as possible, even where little data existed. The bias was in favor of providing an indication to WMI stakeholders of what the available data could tell them about use/interest support in each reach rather than to provide nothing at all other than a “more data needed” statement. Thus, if even one data set was found to be relevant and of at least fair quality, the teams attempted to develop a support statement. The uncertainty level rating was used to qualify that support statement as being predicated on a relatively small amount of data. Thus, data gaps also exist in reaches where high levels of uncertainty are associated with the assessment results.

1.2 Data Sufficiency Evaluation

An important step in the assessment process is the determination of whether there is sufficient data of the optimum type to conduct the analysis. The first question in each of the Assessment Framework logic diagrams for each beneficial use and stakeholder interest is “are sufficient data available?” Alternatively stated, do data exist that will allow the use of direct indicators of beneficial use support? If so, the assessment can begin. If not, an assessment must be made of the ability of the available data to address other, less direct indicators of use/interest support. In either case, this initial question can better be answered on a segment-by-segment basis rather than by attempting to evaluate each entire stream network. It was anticipated that more information would be available for some segments of a stream than for others.

The segment-by-segment approach also allowed the teams to better evaluate where data gaps exist and the type of data that would need to be collected to reduce uncertainties in the support findings. In the context of the logic diagrams in the Assessment Framework, if there is inadequate data to evaluate each step in the decision sequence, there is a data gap.

The data sufficiency evaluation step of the assessment was conducted in four discrete parts as discussed below.

1.2.1 Data Completeness Review

The initial phase of the data sufficiency evaluation consisted of the relatively straightforward task of reviewing the compiled data sets to determine the stream reaches and beneficial uses they should be used to assess. This evaluation can be thought of as the question of data presence or absence (or availability). This initial review provided the assessment teams with a sense of data coverage for each use/interest within each watershed, but made no judgment concerning the quality of the data or its direct utility in the assessment process. Data gaps identified in this step consisted of reaches for which no data sets were available to assess a use/interest.

It should be noted that approximately 10% of the data sets initially identified as being of potential use in the assessment were not compiled and never entered the data review process. In some cases, data custodians simply did not respond to repeated letters and phone calls. In others, the data initially identified in the MDDB turned out to be unavailable from the sources listed.

1.2.2 Data Quality and Relevance Review

The second phase of the data sufficiency evaluation involved review of the compiled data for relevance and quality. This step was critical to the ultimate determination of data sufficiency, as well as for identifying data gaps and conducting the uncertainty analysis. During this process, data analysis proceeded step-wise, by data set, stream reach, and use/interest, to answer the following questions:

- do the data pertain to the preferred indicator or to a secondary indicator, was it collected in waterbodies subject to the assessment? (data relevancy)
- is the temporal array of data useful to answer questions posed by the logic diagram, was it collected in accordance with widely accepted scientific methods? (data quality)

The purpose of this step was to whittle down the list of data sets a little more by eliminating those of such poor quality or limited relevance that their use in the assessment simply couldn't be justified. More importantly, this task allowed the teams to begin to judge the relative utility of each data set for each assessment. Through this process, assessment team members noted the data sets containing the most recent, robust data and identified weaknesses of other data sets (old data, no information on sampling techniques used, etc.). This sort of relative "rating" of the data sets was an essential input to the uncertainty analysis.

Data sets were rejected for use in the assessment if they were not found to contain any data of relevance to the uses/interests based upon the Assessment Framework. Data sets deemed to be of questionable quality were not rejected outright, but were carried forward to the analysis stage in the event that no better data exists for that particular reach. Any determinations regarding use/interest support based on such data would eventually have a high degree of uncertainty associated with them.

While specific data gaps were not identified in this step, the information regarding data quality and relevance was important in establishing the amount of uncertainty associated with the assessment results. The uncertainty ratings were later used to identify data gaps.

Tables 1 through 5 present the number of data sets that were forwarded to the final data sufficiency phase for each of the five beneficial uses/stakeholder interests being evaluated. These tables integrate the results of the initial data completeness (presence or absence for each reach, use, and data type) review and the subsequent data quality and relevance review. When evaluating the information in Tables 1-5, it should be noted that numerous data sets are duplicative among the three watersheds. In a few cases, a data set was rejected for use in one watershed but retained for another. For this reason, the numbers in the table should not be added together because many of the data sets reviewed for San Francisquito, for example, are included in the data sets reviewed for Guadalupe.

Table 1. Data Completeness, Quality, and Relevance Summary for COLD Assessment

Watershed	*Data Sets Reviewed*	*Data Sets Forwarded to Analysis Step*	*Data Sets Rejected*	*Percent of Total Forwarded to Analysis*
San Francisquito	97	66	31	68%
Upper Penitencia	69	43	26	57%
Guadalupe	141	103	38	70%

Table 2. Data Completeness, Quality, and Relevance Summary for RARE Assessment

Watershed	*Data Sets Reviewed*	*Data Sets Forwarded to Analysis Step*	*Data Sets Rejected*	*Percent of Total Forwarded to Analysis*
San Francisquito	36	30	6	84%
Upper Penitencia	33	26	7	70%
Guadalupe	64	54	10	80%

Table 3. Data Completeness, Quality, and Relevance Summary for MUN Assessment

Watershed	*Data Sets Reviewed*	*Data Sets Forwarded to Analysis Step*	*Data Sets Rejected*	*Percent of Total Forwarded to Analysis*
San Francisquito	11	7	4	63%
Upper Penitencia	5	3	2	60%
Guadalupe	32	25	7	79%

Table 4. Data Completeness, Quality, and Relevance Summary for REC-1 Assessment

Watershed	*Data Sets Reviewed*	*Data Sets Forwarded to Analysis Step*	*Data Sets Rejected*	*Percent of Total Forwarded to Analysis*
San Francisquito	22	20	2	91%
Upper Penitencia	10	8	2	80%
Guadalupe	54	36	18	66%

Table 5. Data Completeness, Quality, and Relevance Summary for Protection from Flooding (PFF) Assessment

Watershed	*Data Sets Reviewed*	*Data Sets Forwarded to Analysis Step*	*Data Sets Rejected*	*Percent of Total Forwarded to Analysis*
San Francisquito	32	26	6	81%
Upper Penitencia	23	19	4	83%
Guadalupe	31	22	9	71%

1.2.3 Data Analysis

After the assessment teams completed the data quality and relevance review, it became apparent that they would need to have more specific information concerning each data set before they could really gauge the overall sufficiency of the data for the assessment. In short, they needed to have all of the data laid out in front of them. Thus, a second round of data set review took place, with the primary purpose being to extract the actual data from the data sets and enter it into a series of data analysis tables. No data gaps were specifically identified in this step of the process.

1.2.4 Data Sufficiency Determination

The data sufficiency question is expressed as:

- Does the amount of relevant, quality data for the waterbody exist to allow for objective, supportable conclusions to be drawn regarding use/interest support?

This question was addressed by the assessment teams at the start of the support statement development process, in which the teams used the logic diagrams in the Assessment Framework to arrive at use/interest support statements for each stream reach. It should be noted that the presence of quality, relevant data for a particular use/interest and stream reach did not necessarily guarantee that a finding of data sufficiency was made for that reach and use/interest. It may have been the case that a number of data sets contained data on secondary indicators that could not reliably be used as the basis for a support statement, while no data sets contained any data on primary indicators in that reach.

Prior to addressing the data sufficiency question, the assessment teams needed to determine "how much data is enough". The answer to this varied depending on the type of data, the characteristics of the waterbody it pertains to, and the nature of the use/interest being assessed. As soon as the data sufficiency determination was made for each stream reach, the assessment teams used the logic diagrams to develop support statements for reaches where a sufficient amount of quality, relevant data had been found. Wherever a determination was made that insufficient data was available to assess a given use/interest in any stream reach, a data gap was instantly identified. Tables 6 through 8 summarize the number and relative watershed proportion of reaches found to have sufficient and insufficient data for each use/interest within each of the three watersheds. Table 9 lists the specific reaches with limited data for each use. These are the reaches with enough data to use in developing a support statement, but where data limitations resulted in the support statement having a high level of uncertainty (C or D on the rating scale).

Lists of the data sets that were ultimately used in each watershed assessment are contained in Appendices 4-C, 5-C, and 6-C.

Table 6. Guadalupe Watershed Data Sufficiency Summary

	Stream Reaches With Insufficient Data To Make a Support Determination	*Miles of Stream Reaches With Insufficient Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient But Limited Data To Make a Support Determination**	*Miles of Stream Reaches With Sufficient But Limited Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient Data To Make a Support Determination***	*Miles of Stream Reaches With Sufficient Data To Make a Support Determination*	*% of watershed*
COLD	40	69.7	*48*	9	23.9	*17*	14	48.6	*35*
MUN	46	99.1	*69*	13	38.8	*28*	4	4.3	*3*
REC 1	43	91.4	*63*	16	34.8	*25*	4	16.1	*12*
PFF	28	46.4	*31*	5	0.0	*0*	30	95.9	*69*
RARE	43	78.0	*54*	9	27.8	*20*	11	36.4	*26*

*Includes uncertainty levels of 1 and 2
**Includes uncertainty levels of 3 and 4

Table 7. San Francisquito Watershed Data Sufficiency Summary

	Stream Reaches With Insufficient Data To Make a Support Determination	*Miles of Stream Reaches With Insufficient Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient But Limited Data To Make a Support Determination**	*Miles of Stream Reaches With Sufficient But Limited Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient Data To Make a Support Determination***	*Miles of Stream Reaches With Sufficient Data To Make a Support Determination*	*% of watershed*
COLD	20	25.7	*38*	4	13.3	*20*	13	*28.4*	*42*
MUN	28	42.0	*62*	7	17.9	*27*	2	*7.5*	*11*
REC 1	26	38.1	*56*	11	26.9	*40*	1	*2.4*	*4*
PFF	27	44.0	*65*	2	1.5	*2*	8	*21.9*	*33*
RARE	24	40.3	*60*	4	8.6	*13*	9	*18.4*	*27*

*Includes uncertainty levels of 1 and 2
**Includes uncertainty levels of 3 and 4

Table 8. Upper Penitencia Subwatershed Data Sufficiency Summary

	Stream Reaches With Insufficient Data To Make a Support Determination	*Miles of Stream Reaches With Insufficient Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient But Limited Data To Make a Support Determination**	*Miles of Stream Reaches With Sufficient But Limited Data To Make a Support Determination*	*% of watershed*	*Stream Reaches With Sufficient Data To Make a Support Determination***	*Miles of Stream Reaches With Sufficient Data To Make a Support Determination*	*% of watershed*
COLD	3	3.3	*19*	1	2.5	*15*	4	11.6	*66*
MUN	8	17.4	*100*	0	0.0	*0*	0	0.0	*0*
REC 1	3	3.3	*19*	2	4.2	*24*	3	9.9	*57*
PFF	2	1.4	*8*	0	0.0	*0*	6	16.0	*92*
RARE	5	9.8	*56*	0	0.0	*0*	3	7.7	*44*

*Includes uncertainty levels of 1 and 2
**Includes uncertainty levels of 3 and 4

*Table 9. Reaches with Sufficient but Limited Data by Use**

Use/Interest	Reach ID	Waterbody
COLD	UP-2A	Upper Penitencia Creek
	SF-3	San Francisquito Creek
	SF/WU-6	McGarvey Gulch
	SF/CM-1	Corte Madera Creek
	SF/LT-2	Los Trancos Creek
	GR/GC-3	Pheasant Creek
	GR/LG-2	Los Gatos Creek
	GR/LG-3	Los Gatos Creek
	GR/LG-5	Los Gatos Creek
	GR/AL/LA	Lake Almaden
	GR/AL/AR	Almaden Reservoir
	GR/AL-4	Herbert Creek
	GR/RC-1	Ross Creek
	GR/CC-1	Canoas Creek
MUN	SF-2	San Francisquito Creek
	SF-3	San Francisquito Creek
	SF-4	San Francisquito Creek
	SF/BC-1	Bear Creek
	SF/WU-1	West Union Creek
	SF/WU-2	West Union Creek
	SF/CM-1	Corte Madera Creek
	GR-4	Guadalupe River
	GR-5	Guadalupe River
	GR/GC-1	Guadalupe Creek
	GR/GC-2	Guadalupe Creek
	GR/LG-1	Los Gatos Creek
	GR/LG/VR	Vasona Reservoir
	GR/LG-2	Los Gatos Creek
	GR/LG/LR	Lexington Reservoir
	GR/LG-4	Los Gatos Creek
	GR/AL-1	Alamitos Creek
	GR/AL-2	Alamitos Creek
	GR/AL/AR	Almaden Reservoir
	GR/AC-1	Arroyo Calero
	GR/AC-4	Santa Teresa Creek
REC-1	UP-1	Upper Penitencia Creek
	UP-2	Upper Penitencia Creek
	SF-1	San Francisquito Creek
	SF-2	San Francisquito Creek
	SF-3	San Francisquito Creek
	SF-4	San Francisquito Creek
	SF-5	San Francisquito Creek
	SF/SL	Searsville Lake
	SF/BC-1	Bear Creek
	SF/WU-1	West Union Creek
	SF/WU-2	West Union Creek
	SF/CM-1	Corte Madera Creek
	SF/LT-1	Los Trancos Creek
	GR-3	Guadalupe River
	GR-4	Guadalupe River
	GR/GC-1	Guadalupe Creek
	GR/GC-2	Guadalupe Creek
	GR/GC/GR	Guadalupe Reservoir
	GR/LG-1	Los Gatos Creek
	GR/LG-2	Los Gatos Creek

Use/Interest	Reach ID	Waterbody
	GR/LG-3	Los Gatos Creek
	GR/LG/LR	Lexington Reservoir
	GR/LG-4	Los Gatos Creek
	GR/AL/LA	Lake Almaden
	GR/AL-1	Alamitos Creek
	GR/AL-2	Alamitos Creek
	GR/AL/AR	Almaden Reservoir
	GR/AC-1	Arroyo Calero
	GR/AC/CR	Calero Reservoir
PFF	SF-5 (upper portion)	San Francisquito Creek
	SF/SL	Searsville Lake
	SF/SC-2	Dennis Martin Creek
	GR/GC/GR	Guadalupe Reservoir
	GR/LG/VR	Vasona Reservoir
	GR/LG/LR	Lexington Reservoir
	GR/LG/AR	Almaden Reservoir
	GR/LG/CR	Calero Reservoir
RARE	UP-4	Upper Penitencia Creek
	SF-2	San Francisquito Creek
	SF-3	San Francisquito Creek
	SF/SL	Searsville Lake
	SF/BC-4	Bear Gulch
	GR-2	Guadalupe River
	GR/GC-2	Guadalupe Creek
	GR/LG/VR	Vasona Reservoir
	GR/LG-2	Los Gatos Creek
	GR/AL/AR	Almaden Reservoir
	GR/AC-1	Arroyo Calero
	GR/AC-2	Cherry Canyon Creek
	GR/AC-4	Santa Teresa Creek
	GR/CC-1	Canoas Creek
	GR/RC-1	Ross Creek

*Includes uncertainty levels of 1 and 2

1.3 Data Gaps

Following completion of the data sufficiency review, the assessment itself was conducted. This process resulted in the development of support statements and associated uncertainty levels for each reach/use-interest combination where a sufficient amount of data had been identified. Because the assessment teams endeavored to develop support statements for as many reaches as possible, some data of fair or poor quality was eventually used with the results being qualified with a high uncertainty level. This introduced another type of data gap: reaches/uses where either limited or fair/poor quality data were used to develop support statements. These reaches are also shown (along with their relative watershed proportion) in Tables 6-8 and are specifically listed in Table 9. These reaches were considered to be all those for which support statements having uncertainty levels of either 1 or 2 were developed.

To summarize, the reaches with data gaps identified during the pilot assessments include the following:

- reaches identified during the data completeness review for which no data sets for a particular use or interest were found to exist in the WMI data library
- reaches identified during the data quality and relevance review for which no good quality or relevant data sets for a particular use or interest were found to exist in the WMI data library
- reaches identified during the data sufficiency/support statement development (data analysis) process for which an insufficient amount of good quality, relevant data were found to exist in the WMI data library
- reaches where a sufficient amount of data existed to develop assessment results but where data limitations resulted in a high level of uncertainty (level 1 or 2) associated with the support result

Tables 10-12 contain reach-by-reach data gap summaries for each of the five uses/interests. Data gaps are categorized as either “no data” or “fair/poor quality data” for each reach/use. The former consist of instances where the type of data listed were not available in that reach. The latter consist of instances where only fair or poor quality data were available for the indicator listed and were used to develop the support statement.

The types of data listed under each use in these tables are generally grouped under the headings “primary”, “secondary”, and “tertiary” indicators corresponding to their relative importance in the logic diagrams in the Assessment Framework. The exception to this is for the MUN use where no relative weighting of indicators was used.

The data gaps listed in Tables 10-12 are also included in the reach summary tables in Appendices 4-B, 5-B, and 6-B of the report text. Maps illustrating the location of data poor reaches are contained on Figures 2-1 through 2-4 of the report.

1.3.1 Prioritizing Data Gaps

With the spatial scale of the Santa Clara Basin and the number of indicators for each of the uses/interests being assessed, it would be unreasonable to immediately embark upon data collection activities designed to fill every single data gap shown in this memorandum. The long-term data collection plan for the WMI must prioritize data collection efforts with the aim of filling the most critical data gaps for the use(s) of most interest to WMI stakeholders.

While determining the most important use/interest is beyond the scope of this memorandum, the most important indicators to collect data on can, in most cases, be identified. The primary, secondary, and tertiary indicator categories shown on the reach data gap summary tables can be used as a starting point. Primary indicators are the most direct and are critical to have data for in order to facilitate use of the logic diagrams as intended. Other indicators can be prioritized as well.

Other considerations pertaining to prioritizing data gaps for future data collection may include:

1) How long a period of monitoring is required to obtain reliable data -- short term (1 year) vs. long term (2-5 years)?

2) Is the missing data type considered essential for assessment, e.g., in terms of its Work Group A ranking?

3) What is the cost to obtain the data?

4) By how much would confidence in the reliability of the assessment result be improved if the data were obtained?

5) How does this one data gap compare to the available data for assessing the use/interest as a whole (i.e., is this a use for which there is a fairly robust data set with only a few data gaps or a use with many data gaps)?

Before time and effort is spent on filling these data gaps, however, WMI stakeholders will need to address the larger issues concerning the assessment. These issues are outlined in Appendix B and discussed in a broad context in Chapter 2. Revisions to the Assessment Framework and/or adoption of another protocol for future assessments may change the definition of the term "data gap" as it pertains to WMI assessments. The SCVURPPP is developing a database to document information relevant to NPDES permit requirements, which includes watershed assessments. This database will include the MDDB contents used for the pilot assessments and will also include a broader range of information on data types that may be relevant to watershed analyses beyond those necessary to use the WMI Assessment Framework.

Assuming that the Assessment Framework remains substantially the same, recommendations for top priority data collection are presented in Sections 4.4, 5.4, and 6.4 of the report text. In general, the "middle group" of reaches – those with enough data to make support statements for a use but not enough to make confident support statements – would benefit most from data collection activity. These are the reaches listed in Table 9.

Table 10. Guadalupe Watershed Data Gaps by Reach

GR-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	Dissolved oxygen	turbidity	fecal coliform	historic flooding occurrence information	
	TSS	dioxin	e-coli		
	Turbidity	MTBE	**Secondary Indicators**		
	Channel substrate	TDS	aesthetics		
	Bankfull, stage, discharge and width		dioxin		
	Width to depth ratio		selenium		
	Special status species				
	Instream spawning and rearing habitat				
	water depth				
	physical physical barriers to migration				
	copper				
	chlorpyrifos				
	dioxin				
	dieldrin				
	diazinon				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	stream shading				
	DDT				
	PCB				
	chlordane				
	mercury				
	selenium				
	riparian vegetation				
	streambank erosion potential				
	altered channel materials and dimensions				

GR-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	turbidity	turbidity	fecal coliform	historic flooding occurrence information	
	special status species	dioxin	e-coli		
	stream type	MTBE	**Secondary Indicators**		
	water depth	TDS	Chlordane		
	TSS	chlordane	DDT		
	Width to depth ratio	chlorpyrifos	Dieldrin		
	bankfull, stage, disharge and width	DDT	Dioxin		
	shaded riverine aquatic habitat	diazinon	PCB		
	channel substrate	dieldrin	Selenium		
	chlordane	nitrate			
	copper	PCB			
	chlorpyrifos	selenium			
	DDT	mercury			
	diazinon	nickel			
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA			**Secondary Indicators**		**Primary Indicators**
			Aesthetics		assemblages of special status species
			channel depth		**Secondary Indicators**
					habitat requirements

GR-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	dioxin	**Primary Indicators**	**Secondary Indicators**	
	TSS	MTBE	e-coli	historic flooding occurrence information	
	turbidity	TDS	**Secondary Indicators**		
	stream type	chlordane	Dioxin		
	streambank erosion potential	chlorpyrifos	PCB		
	channel substrate	dieldrin	Selenium		
	width to depth ratio	PCB			
	bankfull, stage, disharge and width	nickel			
	shaded riverine aquatic habitat				
	water depth				
	special status species				
	altered channel materials and dimensions				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		turbidity	**Primary Indicators**		
		nitrate	fecal coliform		
		nitrite	**Secondary Indicators**		
		copper	Copper		
		nickel	Mercury		
		fecal coliform	Nickel		
		mercury	Chlordane		
		diazinon	DDT		
		DDT	Dieldrin		
		selenium	**Tertiary Indicators**		
			Aesthetics		
			flow (depth)		

GR-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	water depth	chlordane	e-coli	historic flooding occurrence information	
	stream **type**	chlorpyrifos	fecal coliform		
	bankfull, stage, disharge and width	DDT	**Secondary Indicators**		
	shaded riverine aquatic habitat	diazinon	Chlordane		
	channel substrate	dieldrin	DDT		
	streambank erosion potential	dioxin	Dieldrin		
	width to depth ratio	MTBE	Dioxin		
	altered channel materials and dimensions	nitrate	PCB		
	special status species	PCB	Access		
	chlordane				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
FAIR/POOR QUALITY DATA		turbidity			
		copper			
		selenium			
		mercury			
		nickel			

GR-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	chlorpyrifos	**Primary Indicators**	**Secondary Indicators**	
	TSS	DDT	e-coli	historical flooding occurrence data	
	turbidity	dieldrin	**Secondary Indicators**		
	water depth	dioxin	DDT		
	stream type	MTBE	Dieldrin		
	channel substrate	PCB	Dioxin		
	streambank erosion potential	selenium	PCB		
	width to depth ratio	TDS			
	bankfull , stage, discharge, width				
	special status species				
	shaded riverine aquatic habitat				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		turbidity	**Primary Indicators**		
		nitrate	fecal coliform		
		nitrite	**Secondary Indicators**		
		copper	Aesthetics		
		nickel	flow (depth)		
		fecal coliform	Copper		
		mercury	Mercury		
		diazinon	Nickel		
		chlordane	Chlordane		

GR/GC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	TSS	chlordane	fecal coliform	historic flooding occurrence information	
	bankfull, stage, disharge and width	copper	e-coli		
	altered channel materials and dimensions	chlorpyrifos	**Secondary Indicators**		
	shaded riverine aquatic habitat	DDT	Chlordane		
	turbidity	diazinon	Copper		
	water depth	dieldrin	DDT		
	dissolved oxygen	dioxin	Dieldrin		
	stream type	MTBE	Dioxin		
	channel substrate	nitrate	PCB		
	streambank erosion potential	PCB	Nickel		
	width to depth ratio	selenium			
	special status species	mercury			
	chlordane	nickel			
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		TDS	**Secondary Indicators**		**Primary Indicators**
		turbidity	Mercury		assemblages of special status species
			Tertiary Indicators		**Secondary Indicators**
			flow (depth)		habitat requirements
			Aesthetics		

GR/GC-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	chlorpyrifos	**Secondary Indicators**	**Secondary Indicators**	
	turbidity	dieldrin	Dioxin	historic flooding occurrence information	
	special status species	dioxin	PCB		
	stream type	MTBE	**Tertiary Indicators**		
	water depth	nitrate	Access		
	TSS	PCB			
	Width to depth ratio	selenium			
	bankfull, stage, disharge and width				
	shaded riverine aquatic habitat				
	channel substrate				
	dissolved oxygen				
	streambank erosion potential				
	altered channel materials and dimensions				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		TDS			**Primary Indicators**
		turbidity			assemblages of special status species
		copper			**Secondary Indicators**
		fecal coliform			habitat requirements
		DDT			
		mercury			
		chlordane			
		diazinon			
		nickel			

GR/GC-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	Secondary Indicators	chlordane	e.coli		**Secondary Indicators**
	dissolved oxygen	copper	**Secondary Indicators**		habitat requirements
	TSS	chlorpyrifos	Chlordane		
	turbidity	DDT	Copper		
	stream type	diazinon	DDT		
	channel substrate	dieldrin	Dieldrin		
	streambank erosion potential	dioxin	Dioxin		
	width to depth ratio	MTBE	PCB		
	bankfull, stage, discharge, width	nitrate	Mercury		
	altered channel materials and dimensions	PCB	Nickel		
	special status species	selenium	**Tertiary Indicators**		
	shaded riverine aquatic habitat	mercury	Aesthetics		
	riparian vegetation	nickel	water depth (flow)		
	water depths and velocities	TDS	Access		
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY	**Primary Indicators**				
	fish assemblage				
	Secondary Indicators				
	instream rearing habitat				
	temperature				
	physical barriers to migration				

GR/GC-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/GC/GR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	chlorpyrifos	**Secondary Indicators**	**Primary Indicators**	
	macroinvertebrates	DDT	DDT	estimated estimated 100-yr flood flow	
	fish assemblage	dieldrin	Dioxin	design channel capacity	
	Secondary Indicators	dioxin	PCB		
	TSS	MTBE	Nickel		
	turbidity	PCB	**Tertiary Indicators**		
	stream type	selenium	Aesthetics		
	channel substrate	nickel	water depth (flow)		
	streambank erosion potential	TDS	Access		
	width to depth ratio				
	bankfull, stage, discharge, width				
	altered channel materials and dimensions				
	special status species				
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	**Primary Indicators**
				historic flooding occurrence information	assemblages of special status species
					Secondary Indicators
					habitat requirements

GR/GC-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	turbidity	fecal coliform	historic flooding occurrence information	habitat requirements
	TSS	chlordane	e.coli		
	turbidity	copper	**Secondary Indicators**		
	stream type	chlorpyrifos	DDT		
	channel substrate	DDT	Dioxin		
	streambank erosion potential	diazinon	PCB		
	width to depth ratio	dieldrin	Nickel		
	bankfull, stage, discharge, width	dioxin	**Tertiary Indicators**		
	altered channel materials and dimensions	MTBE	Aesthetics		
	special status species	nitrate	water depth (flow)		
	shaded riverine aquatic habitat	PCB	Access		
	riparian vegetation	selenium			
	water depths and velocities	mercury			
	instream rearing habitat	nickel			
	instream spawning habitat	TDS			
	dissolved oxygen				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA			**Tertiary Indicators**		
			water depth (flow)		

GR/GC-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				

FAIR/POOR QUALITY DATA	Secondary Indicators				
	physical barriers to migration				

GR/GC-7	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				

FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/GC-8	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/GC-9	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/LG-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	turbidity	chlordane	e.coli	historic flooding occurrence information	
	stream type	copper	**Secondary Indicators**		
	channel substrate	chlorpyrifos	chlordane		
	streambank erosion potential	DDT	dieldrin		
	width to depth ratio	diazinon	dioxin		
	bankfull, stage, discharge, width	dieldrin	PCB		
	special status species	dioxin	**Tertiary Indicators**		
	shaded riverine aquatic habitat	MTBE	access		
	water depth	nitrate			
	chlordane	PCB			
	chlorpyrifos	selenium			
	DDT	mercury			
	diazinon	nickel			
	dioxin				
	dieldrin				
	PCB				
	selenium				
	mercury				
FAIR/POOR QUALITY DATA	**Primary Indicators**	TDS			
	fish assemblage	turbidity			
	macroinvertebrates				
	Secondary Indicators				
	riparian vegetation				
	temperature				
	altered channel materials and dimensions				
	flow				
	instream rearing habitat				
	nickel				
	copper				
	TSS				
	dissolved oxygen				
	physical barriers to migration				

GR/LG/VR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	chlordane	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	copper	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	chlorpyrifos	e.coli	design channel capacity	
	Secondary Indicators	DDT	**Secondary Indicators**		
	dissolved oxygen	diazinon	chlordane		
	TSS	dieldrin	copper		
	turbidity	dioxin	DDT		
	stream type	MTBE	dieldrin		
	channel substrate	PCB	dioxin		
	streambank erosion potential	selenium	PCB		
	width to depth ratio	mercury	mercury		
	bankfull, stage, discharge, width	nickel	nickel		
	altered channel materials and dimensions	TDS	**Tertiary Indicators**		
	special status species		aesthetics		
	shaded riverine aquatic habitat		water depth (flow)		
	riparian vegetation		access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				

FAIR/POOR QUALITY DATA	**Secondary Indicators**	nitrate		**Secondary Indicators**	
	physical barriers to migration	fecal coliform		historic flooding occurrence information	
		turbidity			

GR/LG-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	fish assemblage	chlordane	e.coli	historic flooding occurrence information	habitat requirements
		copper	**Secondary Indicators**		
	Secondary Indicators	chlorpyrifos	chlordane		
	dissolved oxygen	DDT	DDT		
	TSS	diazinon	dieldrin		
	turbidity	dieldrin	dioxin		
	stream type	dioxin	PCB		
	channel substrate	MTBE	**Tertiary Indicators**		
	streambank erosion potential	nitrate	aesthetics		
	width to depth ratio	PCB	access		
	bankfull, stage, discharge, width	selenium			
	altered channel materials and dimensions	mercury			
	special status species	nickel			
	shaded riverine aquatic habitat				
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**	TDS	**Primary Indicators**		
	macroinvertebrates	turbidity	fecal coliform		
	Secondary Indicators		**Secondary Indicators**		
	riparian vegetation		copper		

GR/LG-2	COLD	MUN	REC	PFF	RARE
	temperature		nickel		
	physical barriers to migration		mercury		
			Tertiary Indicators		
			water depth (flow)		

GR/LG-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	fish assemblage	chlordane	e.coli	historic flooding occurrence information	habitat requirements
	Secondary Indicators	copper	fecal coliform		
	dissolved oxygen	chlorpyrifos	**Secondary Indicators**		
	TSS	DDT	chlordane		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	**Tertiary Indicators**		
	bankfull, stage, discharge, width	PCB	aesthetics		
	altered channel materials and dimensions	selenium	access		
	special status species	mercury			
	shaded riverine aquatic habitat	nickel			
	water depths and velocities	TDS			
	instream rearing habitat	turbidity			
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				**Primary Indicators**
	macroinvertebrates				assemblages of special status species
	Secondary Indicators				
	riparian vegetation				

GR/LG-3	COLD	MUN	REC	PFF	RARE
	temperature				
	physical barriers to migration				

GR/LG/LR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	chlordane	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	fish assemblage	copper	e.coli	estimated 100-yr flood flow	habitat requirements
	macroinvertebrates	chlorpyrifos	**Secondary Indicators**	design channel capacity	
	Secondary Indicators	DDT	chlordane		
	TSS	diazinon	DDT		
	turbidity	dieldrin	dieldrin		
	stream type	dioxin	dioxin		
	channel substrate	MTBE	PCB		
	streambank erosion potential	PCB	copper		
	width to depth ratio	selenium	**Tertiary Indicators**		
	bankfull, stage, discharge, width	TDS	aesthetics		
	altered channel materials and dimensions	turbidity	access		
	special status species		water depth (flow)		
	shaded riverine aquatic habitat				
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**		**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	dissolved oxygen		fecal coliform	historic flooding occurrence information	assemblages of special status species

	temperature		**Secondary Indicators**		
	physical barriers to migration		mercury		
			nickel		

GR/LG-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	chlordane	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	TSS	copper	e.coli	historic flooding occurrence information	habitat requirements
	turbidity	chlorpyrifos	**Secondary Indicators**		
	stream type	DDT	chlordane		
	channel substrate	diazinon	DDT		
	streambank erosion potential	dieldrin	dieldrin		
	width to depth ratio	dioxin	dioxin		
	bankfull, stage, discharge, width	MTBE	PCB		
	altered channel materials and dimensions	PCB	copper		
	special status species	selenium	**Tertiary Indicators**		
	shaded riverine aquatic habitat	TDS	aesthetics		
	water depths and velocities	turbidity	access		
	instream rearing habitat	nitrate	water depth (flow)		
	instream spawning habitat				
	dissolved oxygen				
	temperature				
	riparian vegetation				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		mercury	**Primary Indicators**		
		fecal coliform	fecal coliform		
		nickel	**Secondary Indicators**		
			mercury		
			nickel		

GR/LG/LE	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	Turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	Chlordane	e.coli	design channel capacity	
	Secondary Indicators	Copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	Chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	Diazinon	DDT		
	stream type	Dieldrin	dieldrin		
	channel substrate	Dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	Nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	Selenium	**Tertiary Indicators**		
	special status species	Mercury	aesthetics		
	shaded riverine aquatic habitat	Nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					assemblages of special status species

GR/LG/WR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	chlordane	**Secondary Indicators**	
	TSS	DDT	copper	historic flooding occurrence information	
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					assemblages of special status species

GR/LG-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	dissolved oxygen	Turbidity	fecal coliform	historic flooding occurrence information	habitat requirements
	TSS	Chlordane	e.coli		
	turbidity	Copper	**Secondary Indicators**		
	stream type	Chlorpyrifos	chlordane		
	channel substrate	DDT	copper		
	streambank erosion potential	Diazinon	DDT		
	width to depth ratio	Dieldrin	dieldrin		
	bankfull, stage, discharge, width	Dioxin	dioxin		
	altered channel materials and dimensions	MTBE	PCB		
	special status species	Nitrate	mercury		
	shaded riverine aquatic habitat	PCB	nickel		
	riparian vegetation	Selenium	**Tertiary Indicators**		
	water depths and velocities	Mercury	aesthetics		
	temperature	Nickel	water depth (flow)		
	chlordane	TDS	access		
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				**Primary Indicators**
	fish assemblage				assemblages of special status species
	macroinvertebrates				
	Secondary Indicators				
	instream rearing habitat				
	physical barriers to migration				

GR/LG-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	Turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	Chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	Copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	Chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	Diazinon	DDT		
	stream type	Dieldrin	dieldrin		
	channel substrate	Dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	Nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	Selenium	**Tertiary Indicators**		
	special status species	Mercury	aesthetics		
	shaded riverine aquatic habitat	Nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-7	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	Turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	Chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	Copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	Chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	Diazinon	DDT		
	stream type	Dieldrin	dieldrin		
	channel substrate	Dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	Nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	Selenium	**Tertiary Indicators**		
	special status species	Mercury	aesthetics		
	shaded riverine aquatic habitat	Nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG/LA	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/LG-8	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		habitat requirements
	dissolved oxygen	chlorpyrifos	chlordane		
	TSS	DDT	copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/LG-9	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-10	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-11	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-12	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-13	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	Secondary Indicators	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	dissolved oxygen	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	TSS	chlorpyrifos	Chlordane	historic flooding occurrence information	
	turbidity	DDT	Copper		
	stream type	diazinon	DDT		
	channel substrate	dieldrin	Dieldrin		
	streambank erosion potential	dioxin	Dioxin		
	width to depth ratio	MTBE	PCB		
	bankfull, stage, discharge, width	nitrate	Mercury		
	altered channel materials and dimensions	PCB	Nickel		
	special status species	selenium	**Tertiary Indicators**		
	shaded riverine aquatic habitat	mercury	Aesthetics		
	riparian vegetation	nickel	water depth (flow)		
	water depths and velocities	TDS	Access		
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/LG-14	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-15	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-16	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-17	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-18	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/LG-19	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/LG-20	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Primary Indicators**
	physical barriers to migration				assemblages of special status species

GR/AL/LA	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	e.coli	estimated 100-yr flood flow	assemblages of special status species
	Secondary Indicators	chlordane	**Secondary Indicators**	design channel capacity	
	TSS	copper	Chlordane		
	turbidity	chlorpyrifos	Copper	**Secondary Indicators**	**Secondary Indicators**
	stream type	DDT	DDT	historic flooding occurrence information	habitat requirements
	channel substrate	diazinon	Dieldrin		
	streambank erosion potential	dieldrin	Dioxin		
	width to depth ratio	dioxin	PCB		
	bankfull, stage, discharge, width	MTBE	Mercury		
	altered channel materials and dimensions	nitrate	Nickel		
	special status species	PCB	**Tertiary Indicators**		
	shaded riverine aquatic habitat	selenium	Aesthetics		
	riparian vegetation	mercury	water depth (flow)		
	water depths and velocities	nickel	Access		
	instream rearing habitat	TDS			
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**		**Primary Indicators**		
	fish assemblage		fecal coliform		

	Secondary Indicators				
	Temperature				
	dissolved oxygen				
	turbidity				

GR/AL-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	TSS	chlordane	e.coli	historic flooding occurrence information	
	turbidity	copper	fecal coliform		
	stream type	chlorpyrifos	**Secondary Indicators**		
	channel substrate	DDT	Chlordane		
	streambank erosion potential	diazinon	Copper		
	width to depth ratio	dieldrin	DDT		
	bankfull, stage, discharge, width	dioxin	Dieldrin		
	altered channel materials and dimensions	MTBE	Dioxin		
	special status species	nitrate	PCB		
	shaded riverine aquatic habitat	PCB	Nickel		
	dissolved oxygen	selenium	**Tertiary Indicators**		
	water depth	mercury	Access		
	chlordane	nickel			
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	nickel				
FAIR/POOR QUALITY DATA		TDS			
		turbidity			

GR/AL-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	TSS	chlordane	e.coli	historic flooding occurrence information	
	turbidity	copper	fecal coliform		
	stream type	chlorpyrifos	**Secondary Indicators**		
	channel substrate	DDT	Chlordane		
	streambank erosion potential	diazinon	DDT		
	width to depth ratio	dieldrin	Dieldrin		
	bankfull, stage, discharge, width	dioxin	Dioxin		
	altered channel materials and dimensions	MTBE	PCB		
	special status species	nitrate	**Tertiary Indicators**		
	shaded riverine aquatic habitat	PCB	Access		
	dissolved oxygen	selenium			
	water depth	mercury			
	chlordane	nickel			
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	nickel				
FAIR/POOR QUALITY DATA		TDS	**Secondary Indicators**		
		turbidity	Mercury		
			Nickel		
			Copper		
			Tertiary Indicators		
			water depth (flow)		
			Aesthetics		

GR/AL/AR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	chlordane	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	copper	e.coli	estimated 100-yr flood flow	habitat requirements
	Secondary Indicators	chlorpyrifos	fecal coliform	design channel capacity	
	TSS	DDT	**Secondary Indicators**		
	turbidity	diazinon	Chlordane		
	stream type	dieldrin	DDT		
	channel substrate	dioxin	Dieldrin		
	streambank erosion potential	PCB	Dioxin		
	width to depth ratio	selenium	PCB		
	bankfull, stage, discharge, width	mercury	copper		
	altered channel materials and dimensions	nickel	Nickel		
	special status species		**Tertiary Indicators**		
	shaded riverine aquatic habitat		water depth (flow)		
	dissolved oxygen		Aesthetics		
	water depth and velocity				
	instream rearing habitat				
	riparian vegetation				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**	TDS	**Secondary Indicators**	**Secondary Indicators**	**Primary Indicators**
	fish assemblage	fecal coliform	Mercury	historic flooding occurrence information	assemblage of special status species
	Secondary Indicators	MTBE	**Tertiary Indicators**		
	temperature	nitrate	Access		

GR/AL/AR	COLD	MUN	REC	PFF	RARE
	dissolved oxygen				
	physical barriers to migration				

GR/AL-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	chlordane	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	copper	e.coli	design channel capacity	
	Secondary Indicators	chlorpyrifos	**Secondary Indicators**		
	dissolved oxygen	DDT	Chlordane	**Secondary Indicators**	
	TSS	diazinon	Copper	historic flooding occurrence information	
	turbidity	dieldrin	DDT		
	stream type	dioxin	Dieldrin		
	channel substrate	MTBE	Dioxin		
	streambank erosion potential	nitrate	PCB		
	width to depth ratio	PCB	Mercury		
	bankfull, stage, discharge, width	selenium	Nickel		
	altered channel materials and dimensions	mercury	**Tertiary Indicators**		
	special status species	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	water depth (flow)		
	water depths and velocities		Access		
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**	turbidity			**Primary Indicators**

GR/AL-3	COLD	MUN	REC	PFF	RARE
	physical barriers to migration				assemblages of special status species
	riparian vegetation				

GR/AL-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	TSS	chlordane	fecal coliform	historic flooding occurrence information	habitat requirements
	turbidity	copper	e.coli		
	stream type	chlorpyrifos	**Secondary Indicators**		
	channel substrate	DDT	Chlordane		
	streambank erosion potential	diazinon	Copper		
	width to depth ratio	dieldrin	DDT		
	bankfull, stage, discharge, width	dioxin	Dieldrin		
	altered channel materials and dimensions	MTBE	Dioxin		
	special status species	nitrate	PCB		
	shaded riverine aquatic habitat	PCB	Mercury		
	water depths and velocities	selenium	Nickel		
	instream rearing habitat	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	chlordane	TDS	water depth (flow)		
	copper	turbidity	Access		
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					assemblages of special status species

GR/AL-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	fish assemblage	turbidity	fecal coliform	historic flooding occurrence information	habitat requirements
		chlordane	e.coli		
	Secondary Indicators	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	temperature	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				**Primary Indicators**
	macroinvertebrates				assemblages of special status species

GR/AL-5	COLD	MUN	REC	PFF	RARE
	Secondary Indicators				
	physical barriers to migration				
	riparian vegetation				

GR/AL-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	macroinvertebrates	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	water depths and velocities	TDS	Access		
	instream rearing habitat				
	instream spawning habitat				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Primary Indicators**
	physical barriers to migration				assemblages of special status species
	riparian vegetation				
	temperature				

GR/AL-7	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Primary Indicators**
	physical barriers to migration				assemblages of special status species

GR/AL-8	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	chlordane	historic flooding occurrence information	
	TSS	DDT	copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	dieldrin		
	channel substrate	dioxin	dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	mercury		
	bankfull, stage, discharge, width	PCB	nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Primary Indicators**
	physical barriers to migration				assemblages of special status species

GR/AL-9	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		
	Secondary Indicators	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Secondary Indicators**
					habitat requirements

GR/AL-10	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	Access		
	riparian vegetation	TDS			
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

GR/AL-11	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		
	Secondary Indicators	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Secondary Indicators**
					habitat requirements

GR/AL-12	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	Chlordane	**Secondary Indicators**	
	TSS	DDT	Copper	historic flooding occurrence information	
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Secondary Indicators**
					habitat requirements

GR/AC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	TSS	chlordane	fecal coliform	historic flooding occurrence information	
	turbidity	chlorpyrifos	e.coli		
	stream type	DDT	**Secondary Indicators**		
	channel substrate	diazinon	Chlordane		
	streambank erosion potential	dieldrin	Copper		
	width to depth ratio	dioxin	DDT		
	bankfull, stage, discharge, width	MTBE	Dieldrin		
	altered channel materials and dimensions	nitrate	Dioxin		
	special status species	PCB	PCB		
	shaded riverine aquatic habitat		**Tertiary Indicators**		
	altered channel materials and dimensions		Access		
	special status species				
	water depths				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		TDS			**Primary Indicators**
		turbidity			assemblages of special status species
		selenium			**Secondary Indicators**
		mercury			habitat requirements
		nickel			
		copper			

GR/AC/CR	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	chlordane	**Primary Indicators**	**Primary Indicators**	
	macroinvertebrates	copper	fecal coliform	estimated 100-yr flood flow	
	Secondary Indicators	chlorpyrifos	e.coli	design channel capacity	
	dissolved oxygen	DDT	**Secondary Indicators**		
	TSS	diazinon	Chlordane		
	turbidity	dieldrin	Copper		
	stream type	dioxin	DDT		
	channel substrate	PCB	Dieldrin		
	width to depth ratio	selenium	Dioxin		
	bankfull, stage, discharge, width	mercury	PCB		
	altered channel materials and dimensions	nickel	Nickel		
	special status species	TDS	**Tertiary Indicators**		
	shaded riverine aquatic habitat		Aesthetics		
	riparian vegetation		water depth (flow)		
	water depths and velocities				
	instream rearing habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**		**Secondary Indicators**	**Secondary Indicators**	
	fish assemblage		Mercury	historic flooding occurrence information	
	Secondary Indicators		**Tertiary Indicators**	100-yr flood zones	
	streambank erosion potential		Access		
	physical barriers to migration				

GR/AC-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100-yr flood flow	habitat requirements
	Secondary Indicators	chlordane	e.coli	design channel capacity	
	dissolved oxygen	copper	**Secondary Indicators**	**Secondary Indicators**	
	TSS	chlorpyrifos	Chlordane	historic flooding occurrence information	
	turbidity	DDT	Copper		
	stream type	diazinon	DDT		
	channel substrate	dieldrin	Dieldrin		
	streambank erosion potential	dioxin	Dioxin		
	width to depth ratio	MTBE	PCB		
	bankfull, stage, discharge, width	nitrate	Mercury		
	altered channel materials and dimensions	PCB	Nickel		
	special status species	selenium	**Tertiary Indicators**		
	shaded riverine aquatic habitat	mercury	Aesthetics		
	riparian vegetation	nickel	water depth (flow)		
	water depths and velocities	TDS	Access		
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				**Primary Indicators**
	macroinvertebrates				assemblages of special status species

GR/AC-2	COLD	MUN	REC	PFF	RARE
	Secondary Indicators				
	physical barriers to migration				

GR/AC-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Secondary Indicators**
					habitat requirements

GR/AC-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	estimated 100-yr flood flow	assemblages of special status species
	fish assemblage	chlordane	e.coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	Chlordane	historic flooding occurrence information	
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Secondary Indicators**
	physical barriers to migration				habitat requirements

GR/RC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	
	Secondary Indicators	chlordane	e.coli		
	dissolved oxygen	copper	**Secondary Indicators**		
	TSS	chlorpyrifos	Chlordane		
	stream type	DDT	Copper		
	channel substrate	diazinon	DDT		
	streambank erosion potential	dieldrin	Dieldrin		
	width to depth ratio	dioxin	Dioxin		
	bankfull, stage, discharge, width	MTBE	PCB		
	altered channel materials and dimensions	nitrate	Mercury		
	special status species	PCB	Nickel		
	shaded riverine aquatic habitat	selenium	**Tertiary Indicators**		
	water depths	mercury	Access		
	temperature	nickel			
	chlordane	TDS			
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				**Primary Indicators**
	fish assemblage				assemblages of special status species
	Secondary Indicators				**Secondary Indicators**
	physical barriers to migration				habitat requirements
	flow				
	instream rearing habitat				

GR/RC-1	COLD	MUN	REC	PFF	RARE
	stream cover				
	turbidity				
	riparian vegetation				

GR/RC-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	dissolved oxygen	chlorpyrifos	Chlordane		habitat requirements
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

GR/RC-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Secondary Indicators**	**Primary Indicators**
	macroinvertebrates	turbidity	fecal coliform	historic flooding occurrence information	assemblages of special status species
	fish assemblage	chlordane	e.coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		habitat requirements
	dissolved oxygen	chlorpyrifos	Chlordane		
	TSS	DDT	Copper		
	turbidity	diazinon	DDT		
	stream type	dieldrin	Dieldrin		
	channel substrate	dioxin	Dioxin		
	streambank erosion potential	MTBE	PCB		
	width to depth ratio	nitrate	Mercury		
	bankfull, stage, discharge, width	PCB	Nickel		
	altered channel materials and dimensions	selenium	**Tertiary Indicators**		
	special status species	mercury	Aesthetics		
	shaded riverine aquatic habitat	nickel	water depth (flow)		
	riparian vegetation	TDS	Access		
	water depths and velocities				
	instream rearing habitat				
	instream spawning habitat				
	temperature				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

Table 11. San Francisquito Watershed Data Gaps by Reach

SF-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary indicators**	fecal coliform	**Primary Indicators**		**Secondary indicators**
	TSS	turbidity	fecal coliform		habitat requirements for individual special status species
	bankfull, stage, discharge and width	chlordane	e-coli		
	shaded riverine aquatic habitat	copper			
	chlordane	chlorpyrifos			
	copper	DDT			
	chlorpyrifos	diazinon			
	DDT	dieldrin			
	diazinon	dioxin			
	dieldrin	MTBE			
	dioxin	nitrate			
	PCB	PCB			
	selenium	selenium			
	mercury	mercury			
	nickel	nickel			
		TDS			
FAIR/POOR QUALITY DATA	**Primary Indicators**		**Secondary Indicators**		
	fish Assemblage		Chlordane		
	macroinvertebrates		Copper		
			DDT		
	Secondary Indicators		Dieldrin		
	temperature		Dioxin		
	dissolved oxygen		PCB		
	turbidity		Mercury		
	channel substrate		Nickel		
	altered channel materials and dimensions		**Tertiary Indicators**		
	water depths and velocities		water depth		

SF-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	turbidity	**Primary Indicators**		**Primary Indicators**
	macroinvertebrate data	chlordane	Fecal coliform		assemblages of special status species
	Secondary Indicators	copper	e-coli		
	TSS	chlorpyrifos			
	width to depth ratio	diazinon	**Secondary Indicators**		
	bankfull, stage, disharge and width	dioxin	Chlordane		
	shaded riverine aquatic habitat	MTBE	Copper		
	water depths and velocities	nitrate	DDT		
	chlordane	PCB	Dieldrin		
	copper	selenium	Dioxin		
	chlorpyrifos	nickel	PCB		
	DDT	TDS	Mercury		
	diazinon		Nickel		
	dieldrin		**Tertiary Indicators**		
	dioxin		Water depth		
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	temperature				
	dissolved ocygen				
	turbidity				
	altered channel materials and dimensions				

SF-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform (wet weather)	**Primary Indicators**		**Secondary Indicators**
	TSS	turbidity	fecal coliform		habitat requirements
	bankfull, stage, disharge and width	chlordane	e-coli		
	altered channel materials and dimensions	copper	**Secondary Indicators**		
	shaded riverine aquatic habitat	chlorpyrifos	Chlordane		
	chlordane	DDT (wet weather)	Copper		
	copper	diazinon	DDT		
	chlorpyrifos	dieldrin (wet weather)	Dieldrin		
	DDT	dioxin	Dioxin		
	diazinon	MTBE	PCB		
	dieldrin	nitrate	Mercury		
	dioxin	PCB	Nickel		
	PCB	selenium	**Tertiary Indicators**		
	selenium	mercury	water depth		
	mercury	nickel			
	nickel	TDS			
	temperature				
	dissolved oxygen				
	turbidity				
FAIR/POOR QUALITY DATA	**Secondary Indicators**		**Secondary Indicators**		**Primary Indicators**
	temperature		water depth		assemblages of special status species
	dissolved oxygen				
	turbidity				

SF-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**		**Secondary Indicators**
	TSS	chlordane	fecal coliform		habitat requirements for individual special status species
	altered channel nmaterial	DDT	e coli		
	shaded riverine aquatic habitat	diazinon	**Secondary Indicators**		
	chlordane	dieldrin	Aesthetics		
	copper	dioxin	Chlordane (watrer and sediment)		
	chlorpyrifos	MTBE	dieldrin (water and sediment)		
	DDT	PCB	dioxin (water and sediment)		
	diazinon		PCB (water and sediment)		
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**		**Secondary Indicators**		
	temperature		copper (water and sediment)		
	instream spawning habitat		mercury (water and sediment)		
			nickel (water and sediment)		

SF-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	chlordane	**Primary Indicators**	**Primary Indicators**	**Secondary Indicators**
	TSS	dioxin	fecal coliform	channel capacity	habitat requirments for individual special status species
	width to depth ratio	MTBE	e-coli	estimated 100 year flood flow	
	altered channel material	PCB	**Secondary Indicators**	**Secondary Indicators**	
	instream spawning habitat		Chlordane	historical flooding	
	instream rearing habitat		DDT		
	chlordane		Dieldrin		
	DDT		Dioxin		
	dieldrin		PCB		
	dioxin		Selenium		
	selenium				
FAIR/POOR QUALITY DATA	**Secondary Indicators**		**Secondary Indicators**		
	turbidity		Access		
	physical barriers to migration		Copper		
			Mercury		
			Nickel		
			Tertiary Indicators		
			Aesthetics		
			Flow		
			Access		

SL/SL	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	water depth		
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	
				historic flooding occurrence information	

SF/SL-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special stautus species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/LL	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/BC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	
	macroinvertebrate data		fecal coliform	estimated 100 year flood flow	
		chlordane	E. coli	design channel capacity	
	Secondary Indicators	DDT	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	diazinon	DDT (water and sediment)	historic flooding occurrence information	
	TSS	dieldrin	dieldrin (water and sediment)		
	turbidity	dioxin	dioxin (water and sediment)		
	stream type	MTBE	PCB (water and sediment)		
	channel substrate	PCB	selenium (water and sediment)		
	streambank erosion potential	selenium	**Tertiary Indicators**		
	width to depth ratio		Aesthetics		
	bankfull, stage, discharge and width		water depth		
	altered channel materials				
	instream spawning habitat				
	instream rearing habitat				
	shaded riverine aquatic habitat				
	riparian vegetation				
	diazinon				
	chlordane				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA		turbidity	**Secondary Indicators**		
		copper	mercury (water and sediment)		
		chlorpyrifos	nickel (water)		
		nitrate			
		mercury			
		nickel			
		TDS			

SF/BC-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
		chlordane	E. coli	design channel capacity	special stautus species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/BC-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	
	Secondary Indicators	chlordane	E. coli	design channel capacity	
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Access		
	shaded riverine aquatic habitat	TDS			
	riparian vegetation				
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/BC-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Access		
	shaded riverine aquatic habitat	TDS			
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				

FAIR/POOR QUALITY DATA					**Secondary Indicators**
					habitat requirments for individual special status species
					special status species

SF/WU-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	
	Secondary Indicators	chlordane	E. coli	design channel capacity	
	temperature	DDT	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	dieldrin	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	dioxin			
	turbidity	MTBE	DDT (water and sediment)		
	stream type	PCB	dieldrin (water and sediment)		
	channel substrate	TDS	dioxin (water and sediment)		
	streambank erosion potential		PCB (water and sediment)		
	width to depth ratio		selenium (water and sediment)		
	bankfull, stage, discharge and width				
	altered channel materials		**Tertiary Indicators**		
	instream spawning habitat		water depth		
	instream rearing habitat				
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	chlordane				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
FAIR/POOR QUALITY DATA	**Primary Indicators**	nitrate			
	fishh assemblage	copper			
		chlorpyrifos			
		diazinon			

SF/WU-1	COLD	MUN	REC	PFF	RARE
		selenium			
		mercury			
		nickel			

SF/WU-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	chlordane	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	copper	E. coli	design channel capacity	special status species
	temperature	chlorpyrifos	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	DDT	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	diazinon	copper (water)		
	turbidity	dieldrin	DDT (water and sediment)		
	stream type	dioxin	dieldrin (water and sediment)		
	channel substrate	MTBE	dioxin (water and sediment)		
	streambank erosion potential	nitrate	PCB (water and sediment)		
	width to depth ratio	PCB	selenium (water and sediment)		
	bankfull, stage, discharge and width	selenium	mercury (water and sediment)		
	altered channel materials	mercury	nickel (water)		
	instream spawning habitat	nickel			
	instream rearing habitat				
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	chlordane				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
FAIR/POOR QUALITY DATA	**Primary Indicators**	TDS	**Tertiary Indicators**		
	fish assemblage	turbidity	Aesthetics		
	Secondary Indicators		water depth		
	nickel		Access		
	copper				

SF/WU-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	special status species
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				
	fish assemblage				

SF/WU-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	special status species
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				
	fish assemblage				

SF/WU-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	special status species
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Access		
	shaded riverine aquatic habitat	TDS			
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**		**Tertiary Indicators**		
	fish assemblage		Aesthetics		
			water depth		

SF/WU-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	special status species
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				
	fish assemblage				

SF/CM-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	temperature		fecal coliform	estimated 100 year flood flow	assemblages of special status species
	dissolved oxygen	chlordane	E. coli		special status species
	TSS	DDT	**Secondary Indicators**	**Secondary Indicators**	
	turbidity	dieldrin	chlordane (water and sediment)	historic flooding occurrence information	
	stream type	dioxin	DDT (water and sediment)		
	channel substrate	MTBE	dieldrin (water and sediment)		
	streambank erosion potential	PCB	dioxin (water and sediment)		
	width to depth ratio		PCB (water and sediment)		
	bankfull, stage, discharge and width		selenium (water and sediment)		
	altered channel materials		mercury (sediment)		
	instream spawning habitat				
	instream rearing habitat		**Tertiary Indicators**		
	shaded riverine aquatic habitat		Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
FAIR/POOR QUALITY DATA	**Primary Indicators**	turbidity	**Secondary Indicators**	**Primary Indicators**	
	fish assemblage	copper	copper (water)	design channel capacity	
	macro-invertebrate data	chlorpyrifos	mercury (water)		
		diazinon	nickel (water)		
	Secondary Indicators	nitrate	**Tertiary Indicators**		
	nickel	selenium	Aesthetics		
	copper	mercury			
		nickel			
		TDS			

SF/CM-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	temperature	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	dissolved oxygen	chlordane	E. coli	design channel capacity	special status species
	TSS	copper	**Secondary Indicators**	**Secondary Indicators**	
	turbidity	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	stream type	DDT	copper (water)		
	channel substrate	diazinon	DDT (water and sediment)		
	streambank erosion potential	dieldrin	dieldrin (water and sediment)		
	width to depth ratio	dioxin	dioxin (water and sediment)		
	bankfull, stage, discharge and width	MTBE	PCB (water and sediment)		
	altered channel materials	nitrate	selenium (water and sediment)		
	instream spawning habitat	PCB	mercury (water and sediment)		
	instream rearing habitat	selenium	nickel (water)		
	shaded riverine aquatic habitat	mercury	**Tertiary Indicators**		
	riparian vegetation	nickel	Aesthetics		
	water depths and velocities	TDS	Access		
	physical barriers to migration		water depth		
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				
	fish assemblage				
	macro-invertebrate data				

SF/CM-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**		
	temperature	chlorpyrifos	chlordane (water and sediment)		
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	
				historic flooding occurrence information	

SF/CM-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	streambank erosion potential				

SF/CM-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	streambank erosion potential				

SF/CM-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	streambank erosion potential				

SF/CM-7	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	Assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	streambank erosion potential				

SF/AC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	macro-invertebrate data	turbidity	fecal coliform	estimated 100 year flood flow	Assemblages of special status species
	Secondary Indicators	chlordane	E. coli	design channel capacity	special status species
	temperature	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	Aesthetics		
	shaded riverine aquatic habitat	TDS	Access		
	riparian vegetation		water depth		
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**				
	fish assemblage				

SF/SC-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual specia status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/SC-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	Assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual specia status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	
				historic flooding occurrence information	

SF/SC-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	
				historic flooding occurrence information	

SF/SC-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA				**Secondary Indicators**	
				historic flooding occurrence information	

SF/SC-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/LT-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	
	fish assemblage	chlordane	fecal coliform	estimated 100 year flood flow	
		DDT	E. coli		
	Secondary Indicators	dieldrin	**Secondary Indicators**		
	TSS	dioxin	chlordane (water and sediment)		
	turbidity	MTBE	copper (water)		
	width to depth ratio	PCB	DDT (water and sediment)		
	bankfull, stage, discharge and width	TDS	dieldrin (water and sediment)		
	instream spawning habitat		dioxin (water and sediment)		
	instream rearing habitat		PCB (water and sediment)		
	chlordane		selenium (water and sediment)		
	copper		mercury sediment)		
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**	turbidity	**Secondary Indicators**	**Secondary Indicators**	
	dissolved oxygen	copper	mercury (water)	historic flooding occurrence information	
	shaded riverine aquatic habitat	chlorpyrifos	nickel (water)		
	riparian vegetation	diazinon			
		nitrate	**Tertiary Indicators**		
		selenium	Aesthetics		
		mercury	Access		
		nickel	water depth		

SF/LT-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	temperature	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	dissolved oxygen	chlordane	E. coli	design channel capacity	**Secondary Indicators**
	TSS	copper	**Secondary Indicators**		habitat requirments for individual special status species
	turbidity	chlorpyrifos	chlordane (water and sediment)		
	stream type	DDT	copper (water)		
	channel substrate	diazinon	DDT (water and sediment)		
	streambank erosion potential	dieldrin	dieldrin (water and sediment)		
	width to depth ratio	dioxin	dioxin (water and sediment)		
	bankfull, stage, discharge and width	MTBE	PCB (water and sediment)		
	altered channel materials	nitrate	selenium (water and sediment)		
	instream rearing habitat	PCB	mercury (water and sediment)		
	riparian vegetation	selenium	nickel (water)		
	water depths and velocities	mercury	**Tertiary Indicators**		
	physical barriers to migration	nickel	Aesthetics		
	chlordane	TDS	Access		
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Primary Indicators**		**Tertiary Indicators**	**Secondary Indicators**	
	fish assemblage		water depth	historic flooding occurrence information	

SF/LT-2	COLD	MUN	REC	PFF	RARE
	macro-invertebrate data				
	Secondary Indicators				
	instream spawning habitat				
	shaded riverine aquatic habitat				

SF/LT-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**		**Primary Indicators**
	fish assemblage	turbidity	fecal coliform		assemblages of special status species
	macro-invertebrate data	chlordane	E. coli		special status species
	Secondary Indicators	copper	**Secondary Indicators**		**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)		habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA			**Tertiary Indicators**		
			water depth		

SF/FL-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					

SF/FL-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat				
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA			**Tertiary Indicators**		
			water depth		

SF/FL	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	special status species
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	**Secondary Indicators**
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	habitat requirments for individual special status species
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	physical barriers to migration				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				
	physical barriers to migration				

Table 12. Upper Penitencia Subwatershed Data Gaps by Reach

UP-1	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**		**Primary Indicators**
	dissolved oxygen	turbidity	fecal coliform		Assemblages of special status species
	TSS	chlordane	E. coli		
	turbidity	copper	**Secondary Indicators**		**Secondary Indicators**
	stream type	chlorpyrifos	chlordane (water and sediment)		Habitat requirements for individual special status species
	channel substrate	DDT	copper (water)		
	streambank erosion potential	diazinon	DDT (water and sediment)		
	width to depth ratio	dieldrin	dieldrin (water and sediment)		
	bankfull, stage, discharge and width	dioxin	dioxin (water and sediment)		
	altered channel materials	MTBE	PCB (water and sediment)		
	instream spawning habitat	nitrate	selenium (water and sediment)		
	instream rearing habitat	PCB	mercury (water and sediment)		
	shaded riverine aquatic habitat	selenium	nickel (water)		
	riparian vegetation	mercury	**Tertiary Indicators**		
	water depths and velocities	nickel	aesthetics		
	physical barriers to migration	TDS	access		
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA			**Tertiary Indicators**		**Primary Indicators**
			water depth		Special status species

UP-2	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	
		turbidity	fecal coliform	Estimated 100 year flood flow	
	dissolved oxygen	chlordane	E. coli	Design channel capacity	
	TSS	copper	**Secondary Indicators**	**Secondary Indicators**	
	turbidity	chlorpyrifos	chlordane (water and sediment)	Historic flooding occurrence information	
	stream type	DDT	copper (water)		
	channel substrate	diazinon	DDT (water and sediment)		
	streambank erosion potential	dieldrin	dieldrin (water and sediment)		
	width to depth ratio	dioxin	dioxin (water and sediment)		
	bankfull, stage, discharge and width	MTBE	PCB (water and sediment)		
	altered channel materials	nitrate	selenium (water and sediment)		
	instream spawning habitat	PCB	mercury (water and sediment)		
	instream rearing habitat	selenium	nickel (water)		
	shaded riverine aquatic habitat	mercury	**Tertiary Indicators**		
	water depths and velocities	nickel	aesthetics		
	chlordane	TDS	access		
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					assemblages of special status species
					special status species
					Secondary Indicators
					habitat requirments for individual special status species

UP-3	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**		**Secondary Indicators**
	temperature	turbidity	fecal coliform		Habitat requirments for individual special status species
	dissolved oxygen	chlordane	E. coli		
	TSS	copper	**Secondary Indicators**		
	turbidity	chlorpyrifos	chlordane (water and sediment)		
	stream type	DDT	copper (water)		
	channel substrate	diazinon	DDT (water and sediment)		
	streambank erosion potential	dieldrin	dieldrin (water and sediment)		
	width to depth ratio	dioxin	dioxin (water and sediment)		
	bankfull, stage, discharge and width	MTBE	PCB (water and sediment)		
	instream spawning habitat	nitrate	selenium (water and sediment)		
	instream rearing habitat	PCB	mercury (water and sediment)		
	shaded riverine aquatic habitat	selenium	nickel (water)		
	chlordane	mercury	**Tertiary Indicators**		
	copper	nickel	aesthetics		
	chlorpyrifos	TDS			
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					Assemblages of special status species
					Special status species

UP-4	COLD	MUN	REC	PFF	RARE
NO DATA	**Secondary Indicators**	fecal coliform	**Primary Indicators**		
	temperature	turbidity	fecal coliform		
	dissolved oxygen	chlordane	E. coli		
	TSS	copper	**Secondary Indicators**		
	turbidity	chlorpyrifos	chlordane (water and sediment)		
	stream type	DDT	copper (water)		
	channel substrate	diazinon	DDT (water and sediment)		
	streambank erosion potential	dieldrin	dieldrin (water and sediment)		
	width to depth ratio	dioxin	dioxin (water and sediment)		
	bankfull, stage, discharge and width	MTBE	PCB (water and sediment)		
	altered channel materials	nitrate	selenium (water and sediment)		
	instream spawning habitat	PCB	mercury (water and sediment)		
	instream rearing habitat	selenium	nickel (water)		
	shaded riverine aquatic habitat	mercury	**Tertiary Indicators**		
	riparian vegetation	nickel	aesthetics		
	water depths and velocities	TDS			
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					assemblages of special status species
					special status species
					Secondary Indicators
					habitat requirments for individual special status species

UP-5	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirments for individual special status species
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	aesthetics		
	instream rearing habitat	TDS	access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				

UP-5	**COLD**	**MUN**	**REC**	**PFF**	**RARE**
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					special status species

UP/CF	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**		**Primary Indicators**
	fish assemblage	turbidity	fecal coliform		Assemblages of special status species
	macro-invertebrate data	chlordane	E. coli		**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**		Habitat requirements for individual special status species
	temperature	chlorpyrifos	chlordane (water and sediment)		
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	aesthetics		
	instream rearing habitat	TDS	access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				

UP/CF	COLD	MUN	REC	PFF	RARE
	PCB				
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA					**Primary Indicators**
					Special status species

UP-6	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**		**Secondary Indicators**
	macro-invertebrate data	turbidity	fecal coliform		Habitat requirments for individual special status species
	Secondary Indicators	chlordane	E. coli		
	temperature	copper	**Secondary Indicators**		
	dissolved oxygen	chlorpyrifos	chlordane (water and sediment)		
	TSS	DDT	copper (water)		
	turbidity	diazinon	DDT (water and sediment)		
	stream type	dieldrin	dieldrin (water and sediment)		
	channel substrate	dioxin	dioxin (water and sediment)		
	streambank erosion potential	MTBE	PCB (water and sediment)		
	width to depth ratio	nitrate	selenium (water and sediment)		
	bankfull, stage, discharge and width	PCB	mercury (water and sediment)		
	altered channel materials	selenium	nickel (water)		
	instream spawning habitat	mercury	**Tertiary Indicators**		
	instream rearing habitat	nickel	aesthetics		
	shaded riverine aquatic habitat	TDS			
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				
	selenium				
	mercury				
	nickel				

FAIR/POOR QUALITY DATA	**Primary Indicators**		**Tertiary Indicators**		**Primary Indicators**
	fish assemblage		Access		assemblages of special status species
	Secondary Indicators		water depth		special status species
	riparian vegetation				

UP-7	COLD	MUN	REC	PFF	RARE
NO DATA	**Primary Indicators**	fecal coliform	**Primary Indicators**	**Primary Indicators**	**Primary Indicators**
	fish assemblage	turbidity	fecal coliform	estimated 100 year flood flow	Assemblages of special status species
	macro-invertebrate data	chlordane	E. coli	design channel capacity	**Secondary Indicators**
	Secondary Indicators	copper	**Secondary Indicators**	**Secondary Indicators**	habitat requirments for individual special status species
	temperature	chlorpyrifos	chlordane (water and sediment)	historic flooding occurrence information	
	dissolved oxygen	DDT	copper (water)		
	TSS	diazinon	DDT (water and sediment)		
	turbidity	dieldrin	dieldrin (water and sediment)		
	stream type	dioxin	dioxin (water and sediment)		
	channel substrate	MTBE	PCB (water and sediment)		
	streambank erosion potential	nitrate	selenium (water and sediment)		
	width to depth ratio	PCB	mercury (water and sediment)		
	bankfull, stage, discharge and width	selenium	nickel (water)		
	altered channel materials	mercury	**Tertiary Indicators**		
	instream spawning habitat	nickel	Aesthetics		
	instream rearing habitat	TDS	Access		
	shaded riverine aquatic habitat		water depth		
	riparian vegetation				
	water depths and velocities				
	chlordane				
	copper				
	chlorpyrifos				
	DDT				
	diazinon				
	dieldrin				
	dioxin				
	PCB				

UP-7	COLD	MUN	REC	PFF	RARE
	selenium				
	mercury				
	nickel				
FAIR/POOR QUALITY DATA	**Secondary Indicators**				**Primary Indicators**
	physical barriers to migration				special status species

Appendix D
Limiting Factors Analysis

Tables

Appendix D
Limiting Factors Analysis

1.1 Introduction

This memorandum summarizes the limiting factors that were identified during the pilot assessments and lists suspected or possible causes contributing to the limiting factors for reaches/uses where sufficient data were available for making a relatively confident finding of use support.

The memorandum also describes the types of limiting factors identified for each of the five beneficial uses/stakeholder interests studied in the pilot assessments and the most likely cause(s) for each limiting factor. Specific limiting factors within each stream reach and their suspected cause, where identifiable, are presented in more detail in Tables 2-6 at the end of the memorandum.

For the COLD and RARE uses, the limiting factors identified during the pilot assessments are supplemented by conclusions taken from the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) data. While a small portion of this data was used in the assessment (fish habitat mapping, streamflow, and stream temperature), most of the FAHCE project's conclusions concerning limiting factors and habitat quality are contained in the documents that were not available at the time of the pilot assessments. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

Local knowledge comments supplied by WMI stakeholders are not referenced in this memorandum but are instead contained in the waterbody-by-waterbody discussion of the assessment results in Sections 4.3, 5.3, and 6.3 of the main report. This information is also included in the reach summary tables in Appendices 4-B, 5-B, and 6-B in the main report.

For more detail concerning the implications of these limiting factors and appropriate next steps for analysis, please see Chapter 2 of the main report.

1.2 Limiting Factors

Limiting factors are simply defined as whatever is preventing a use/interest from being supported in a stream or stream reach. Within the context of the WMI's Assessment Framework and the pilot assessments, limiting factors were identified wherever a use/interest was not found to be fully supported within a specific stream reach. The limiting factors consist of the indicator(s) that did not meet the threshold criteria specified in the Assessment Framework based on the available data.

1.3 Suspected Causes and Uncertainty

The potential causes of a limiting factor may vary considerably from reach to reach within a stream, or they may be similar. Some causes are relatively easy to identify or hypothesize, others are more difficult. Given the nature of the pilot assessments and the inconsistent availability of data for every use/interest in every stream reach, the assessment teams did not feel comfortable identifying potential causes for limiting factors where the conclusions regarding use/interest support were made with high levels of uncertainty (uncertainty rating of C or D). The rationale here was that additional data should first be collected to determine whether or not the use/interest in question is being fully supported (in other words, to verify the findings of the pilot assessment) before any attempt is made to identify the cause of potential non- or partial support.

Thus, only stream reaches where a use/interest was found to be less than fully supported with a high level of certainty (uncertainty rating of A or B) were examined for the purpose of listing potential/suspected causes for the limiting factors. These reaches are listed in Table 1. It should also be emphasized that the suspected causes outlined in this memo will, in most cases, need validation through the collection and review of additional data. An approach for accomplishing this is outlined in Section 1.5 of this memorandum.

1.4 Limiting Factors and Suspected Causes by Use/Interest

A general description of the limiting factors and suspected causes identified during the pilot assessments is presented below, segregated by use/interest. For additional detail on each stream reach, please see Tables 2 through 6 at the end of this document. A more detailed discussion of limiting factors, including situations where the factors appear to be natural and not human-caused, is provided in Sections 4.3, 5.3, and 6.3 of the main report. Pertinent conclusions from a preliminary review of the FAHCE data (not used in the pilot assessments) are listed in this section where relevant. However, local knowledge comments from WMI stakeholders are not included here but are instead presented in the main report (Chapters 4-6).

1.4.1 Cold Freshwater Habitat (COLD)

In general, stream hydrology, morphology, stability, and water flows are the prime factors that can limit the ability of a waterbody to support the COLD use. If these factors are not within acceptable ranges then habitat, macroinvertebrates, velocities and temperature will be adversely affected.

Table 1. Stream Reaches with Less Than Full Support of a Use/Interest (High Certainty)

Guadalupe Watershed	Level of Support	Partial Support w/ Certainty (i.e. ≥ 3)		Potential Support w/ Certainty (i.e. ≥ 3)		Non-Support w/ Certainty (i.e. ≥ 3)	
Support and Uncertainty Ratings for COLD	Quantity/ Reach Number	7	Guadalupe River (GR-5) Guadalupe Creek (GR/GC-1) Los Gatos Creek (GR/LG-1) Moody Gulch (GR/LG-13) Alamitos Creek (GR/AL-1 and GR/AL-2) Arroyo Calero (GR/AC-1)	4	Guadalupe River (GR-1 to 4)	0	
Support and Uncertainty Ratings for MUN	Quantity/ Reach Number	1	Guadalupe Reservoir (GR/GC/GR)	0		3	Guadalupe River (GR-1 and GR-3) Calero Reservoir (GR/AC/CR)
Support and Uncertainty Ratings for REC-1	Quantity/ Reach Number	0		0		3	Guadalupe River (GR-1 to 2 and GR-5)
Support and Uncertainty Ratings for PFF	Quantity/ Reach Number	0		0		9	Guadalupe River (GR-1 to 5) Los Gatos Creek (GR/LG-1) Randol Creek (GR/AL-11) Canoas Creek (GR/CC-1) Ross Creek (GR/RC-1)
Support and Uncertainty Ratings for RARE	Quantity/ Reach Number	0		3	Guadalupe Creek (GR/GC-1) Los Gatos Creek (GR/LG-1 and GR/LG-4)	0	

Table 1 (cont'd). Stream Reaches with Less Than Full Support of a Use/Interest (High Certainty)

San Francisquito Watershed	**Level of Support**	**Partial Support w/ Certainty (i.e. ≥ 3)**		**Potential Support w/ Certainty (i.e. ≥ 3)**		**Non-Support w/ Certainty (i.e. ≥ 3)**	
Support and Uncertainty Ratings for COLD	Quantity/ Reach Number	7	San Francisquito Creek (SF-4) Bear Creek (SF/BC-1) Dry Creek (SF/BC-2) Bear Gulch (SF/BC-3 and 4) West Union Creek (SF/WU-1 and 2) Squealer Gulch (SF/WU-5)	0		3	San Francisquito Creek (SF-2) Appletree Gulch (SF/WU-3) Tripp Gulch (SF/WU-4)
Support and Uncertainty Ratings for MUN	Quantity/ Reach Number	0		0		2	San Francisquito Creek (SF-5) Los Trancos Creek (SF/LT-1)
Support and Uncertainty Ratings for REC-1	Quantity/ Reach Number	0		0		1	Squealer Gulch (SF/WU-5)
Support and Uncertainty Ratings for PFF	Quantity/ Reach Number	2	Corte Madera Creek (SF/CM-1) Sausal Creek (SF/SC-1)	0		4	San Francisquito Creek (SF-1 to 3) Buckeye Creek (SF/LT-3)
Support and Uncertainty Ratings for RARE	Quantity/ Reach Number	0		0		0	
Upper Penitencia Watershed	**Level of Support**	**Partial Support w/ Certainty (i.e. ≥ 3)**		**Potential Support w/ Certainty (i.e. ≥ 3)**		**Non-Support w/ Certainty (i.e. ≥ 3)**	
Support and Uncertainty Ratings for COLD	Quantity/ Reach Number	2	Upper Penitencia Creek (UP-2) Arroyo Aguague (UP-6)	1	Upper Penitencia Creek (UP-1)	0	
Support and Uncertainty Ratings for MUN	Quantity/ Reach Number	0		0		0	
Support and Uncertainty Ratings for REC-1	Quantity/ Reach Number	1	Arroyo Aguague (UP-6)	0		0	
Support and Uncertainty Ratings for PFF	Quantity/ Reach Number	0		0		2	Upper Penitencia Creek (UP-1 and 2)
Support and Uncertainty Ratings for RARE	Quantity/ Reach Number	0		0		0	

The primary factors noted in the pilot assessment limiting the availability of cold freshwater habitat in the stream reaches listed in Table 2 are the lack of indicator macroinvertebrates and low or non-existent summer streamflow. Temperatures too high to sustain cold freshwater species were also noted in several reaches. The causes of these factors are interrelated. A lack of water supply to a reach will result in the gradual loss of replenishing flow. After water percolates into the channel bed, disconnected pools in locations where the substrate is impermeable will remain. The summer sun will raise the temperature in these pools to levels unsuitable for cold water-dependent species. Habitat for the indicator macroinvertebrates (cased caddis flied and stoneflies) is also eliminated through this same process.

The cause of the lack of summer streamflow, however, was not always clear from the data. In some cases, such as Dry Creek (SF/BC-2) and Appletree Gulch (SF/WU-3) in the San Francisquito watershed, the streams are naturally ephemeral and thus would not likely ever be able to fully support the beneficial use. These are examples of situations where one of the limiting factors is natural, rather than human-caused.

Isolating specific causes contributing to the limiting factors in each reach is beyond the scope of the type of planning level assessment (based only on review of existing data with no field verification) performed in the three pilot watersheds. However, subsequent to completion of the pilot assessment, a significant new data set became available from the FAHCE process. Due to the significance of this information, some of the key conclusions of the FAHCE project regarding limiting factors affecting the COLD use are described in Section 4.3 of the main report under each individual waterbody and are highlighted in Table 2. This additional data was not used to modify the pilot assessment results in any way but should eventually be incorporated into future reach-specific assessment work undertaken by WMI stakeholders.

The FAHCE investigations placed a greater emphasis on specific habitat requirements than did the pilot assessment approach and was targeted at habitat for anadromous steelhead, rather than cold freshwater species in general. Rather than placing primary importance on the presence or absence of cold water dependent fish and macroinvertebrate species, the FAHCE process focused on the suitability and quality of the habitat. FAHCE collected data and developed its conclusions based on the existing habitat. Their charge was not to re-engineer the entire watershed, but rather optimize the management of existing resources. The study area for the FAHCE Limiting Factors Analysis didn't extend into the tidally influenced zone of the stream as water supply operations have minimal impact in this reach. The WMI Assessment Framework and FAHCE did not share the same criteria for cold freshwater habitat suitability. The WMI adopted a more liberal criteria that allows more habitat to be described as suitable for coldwater resources. FAHCE had to accept the criteria that was set by the National Marine Fisheries Service and the California Department of Fish and Game.

From the information available, it appears that the FAHCE process has collected data on Upper Penitencia Creek (all reaches except UP-5), the mainstem Guadalupe River (reaches GR-1 through GR-5), Guadalupe Creek (GR/GC-1 through GR/GC-3 and

GR/GC-8), Alamitos Creek (GR/AL-1 through GR/AL-2), and Arroyo Calero (GR/AC-1). General conclusions reached by the FAHCE investigators include the following:

- SCVWD facilities and operations, including changes in hydrologic conditions resulting from reservoir storage and operation, channel modifications for water conveyance, groundwater recharge, and flood control, represent a significant factor limiting habitat for various salmonid life stages.

- SCVWD and San Jose Water Company reservoirs and dams are impassable barriers limiting the upstream migration of salmonids within the Guadalupe watershed. This loss of access to suitable upstream spawning and juvenile rearing areas within the upper reaches of the Guadalupe watershed is a significant factor limiting the availability of habitat for salmonids.

- SCVWD operations put more water in streams than occurs naturally during summer. Upper Penitencia, Los Gatos, Guadalupe, Calero and Alamitos all are naturally ephemeral or intermittent streams and currently have greater stream flow as a result of District operations during the summer.

- A total of 46 passage barriers within the Guadalupe River watershed were identified as limits to habitat availability and quality for salmonids. These barriers include natural structures and constructed structures.

- Seasonal hydrology (naturally low summer flow and high storm flows resulting from urban runoff) and instream flow variation due to reservoir operation both limit migration opportunities for adult and juvenile steelhead and Chinook salmon in the Guadalupe River watershed.

- Reservoir operations, including storage and release of cold water during summer months, affect salmonid habitat both positively and adversely through the reduction and elevation of water temperatures downstream and the increase in streamflow during summer months.

- The availability of suitable spawning gravels in reaches downstream of the reservoirs is low and the quality of the gravels has been adversely affected by the deposition of fine silt and sand. The availability of instream cover is relatively low, as is stream channel habitat diversity and complexity. Causes for this include urban development, land use practices, channel modifications, and reservoir operations.

- The seasonal and geographic distribution of water temperature conditions within the watersheds is identified as a significant factor limiting habitat availability and quality for juvenile steelhead rearing. Factors to blame for this include the magnitude of instream flow, solar radiation and atmospheric temperature in conjunction with degree of channel shading, channel depth and width, and flow velocity.

The findings of the FAHCE investigators are referenced for the appropriate reaches in Table 2. However, the FAHCE effort represents part of the next step in the overall WMI assessment process in that it involves field data collection and a closer examination of changing stream characteristics within each reach. For more detail on the implications of the FAHCE data for future WMI assessment work, see Chapter 2 of the main report.

1.4.2 Municipal and Domestic Water Supply (MUN)

Data gaps represented a significant impediment to the confident identification of limiting factors affecting the suitability of streams in the pilot watersheds for use as municipal or domestic water supply. In reaches where the assessment team felt it had enough good data to determine the level of use support and where the criteria were exceeded, the limiting factors varied from reach to reach. Turbidity and/or TDS were common limiting factors, as was fecal coliform count. Without additional data collection, however, it is difficult to isolate the cause(s) of these exceedances. As noted in Table 3, urban runoff and channel erosion are likely contributors.

1.4.3 Water Contact Recreation (REC-1)

Limiting factors affecting support of water contact recreation within the three watersheds were quite varied. In some reaches where data on the primary and secondary indicators were available (fecal coliform count and other water quality constituents), exceedances of the criteria for these indicators represent the limiting factor. As with the MUN use, it is difficult without additional data collection to isolate the cause(s) of these exceedances. As noted in Table 4, urban runoff and channel erosion, as well as legacy contamination from historic mining are likely contributors. For the other reaches, however, limitations concerning access to the stream and aesthetic problems (trash, water clarity, streamflow) form the limiting factor. The list of possible causes for these conditions can only be speculated at within the context of this study. For example, while trash is common in urban stream corridors, the data used in the assessment does not allow for a more specific source to be identified.

1.4.4 Protection From Flooding (PFF)

As defined by the Assessment Framework, a stream reach is considered to support this interest if it can safely convey the 100-year flow without causing property damage. Therefore, the limiting factor for reaches that cannot perform this function is a lack of adequate channel capacity, combined with the encroachment of urban/residential land uses into the stream's floodplain. At the planning level of the pilot assessments, it is difficult to probe deeper into the specific cause for the lack of adequate channel capacity without collecting field information and performing some modeling. The details regarding specific sections of each reach that were found to be undersized are contained in Table 5.

Stream channels do not naturally have capacity to convey the 100-year flow. This type of event is so infrequent that stream channels do not develop in such a manner that these flows can be conveyed within the channel margins. Overbank flooding within the larger floodplain is expected to occur during these events. Properly functioning stream channels reach the bankfull stage every 1.2 to 1.5 years. Higher flows cause inundation of the flood prone area. This flooding is normally beneficial as it relieves river energy, preventing downstream erosion and rejuvenates the soil in the flooded area.

In urbanized watersheds, however, channels are modified and engineered with the goal of having the capacity to convey the 100-year flow without causing property damage. Depending on the land use characteristics of the watershed, however, this may or may not be feasible. For example, it is often the case that urban development has already occurred in such a manner that there is no way to easily modify the channel to provide for the needed flood capacity. This type of floodplain encroachment is common in older residential neighborhoods, mainly along sections of San Francisquito Creek.

Alternatively, the channel may simply not have been modified yet. This is the case in sections of the mainstem Guadalupe River, where the SCVWD and U.S. Army Corps of Engineers have not yet completed a major flood control project designed to provide 100-year flow capacity.

Finally, the channel may in fact have been engineered to carry the required capacity but, due to lack of maintenance or storm damage associated with the 100-year rainfall, is unable to convey the flood flow due to channel obstructions (downed trees, slugs of sediment, debris, etc.). This can reduce the effective capacity of the channel, resulting in the same type of overbank flooding that might have occurred prior to the completion of channel modification work.

1.4.5 Preservation of Rare and Endangered Species (RARE)

Without conducting detailed habitat surveys within the pilot watersheds for the species on the WMI’s special status species list, it is difficult to identify the factors limiting their presence. The data that were available consisted primarily of species observations. Detailed species habitat surveys of recent vintage were not present in the data compiled for the assessments. Even the species observation data was so temporally and geographically scattered that there were very few reaches (three) where the assessment team was able to reach a relatively certain determination regarding use support. Since species observation information does not provide much insight into habitat quality, the assessment team did not identify any limiting factors for these reaches. Where applicable, conclusions concerning species habitat from the data sets reviewed for the assessment are included in Table 6.

General factors limiting the availability of suitable habitat for all of the species on the WMI’s special status species list common to all three pilot watersheds can be listed, but reach or stream specific conclusions concerning use support, limiting factors, and potential causes of the limiting factors are best determined through field survey work. These factors include stream hydrology, morphology, stability, and water flows. If these factors are not within acceptable ranges then habitat (including riparian areas) will be adversely affected.

The FAHCE effort has collected data pertaining to anadromous steelhead and Chinook salmon within the Upper Penitencia and Guadalupe watersheds. This information is presented in Table 2 under the discussion of COLD limiting factors.

1.5 Use of Limiting Factors Analysis – Next Steps

WMI stakeholders are interested in how best to use the limiting factors identified by the assessment teams during the pilot assessments to formulate watershed management actions. While there is a strong desire to begin to translate the assessment results into tangible steps toward watershed improvement, caution should be exercised in doing so.

It is important to remember that the pilot assessments were conducted without any field verification. The only field reconnaissance conducted was for the purpose of delineating stream reaches. While the conclusions reached by the assessment teams are valid representations of the compiled data, the gaps in the available data are very real and represent formidable obstacles to the formulation of specific management actions for many of the streams and reservoirs in the pilot watersheds. Even where relatively few data gaps were noted and the uncertainty level assigned to a support statement was low, the assessment results should be field-checked prior to being used as the basis for management decisions. In many reaches, the "local knowledge" supplied by watershed captains and other WMI stakeholders (shown on the reach summary tables in Appendices 4-B, 5-B, and 6-B and described in the text of those chapters) may be a sufficient form of ground-truthing for the assessment results. In other reaches, however, this type of information has not been available.

In order to outline a possible "stepping stone" between the pilot assessments and management recommendations, stream reach/beneficial use (and stakeholder interest) combinations can be divided into some basic categories based on the assessment conclusions:

1. Reaches/uses with a support statement, low uncertainty, limiting factors and suspected causes identified (except in cases of full support)

2. Reaches/uses with a support statement, high uncertainty, and limiting factors identified (except in cases of full support)

3. Reaches/uses with no support statement due to significant data gaps

4. Reaches/uses with a statement of full support but with either high or low uncertainty

Each of these categories can be further divided into “a” and “b” subcategories based on the amount of “local knowledge” available and/or recent, current, or planned data collection efforts pertaining to the reach/use. For example, the GR-5 (Guadalupe River)/COLD assessment results can be supplemented with both “local knowledge” from WMI stakeholders and the new data generated by the FAHCE effort. This might be placed in a Category 1a given that a support statement was developed with low uncertainty and limiting factors and suspected causes were identified. However, the GR/LG-13 (Moody Gulch)/COLD assessment results cannot be supplemented with any “local knowledge” or additional data. Therefore, this reach might be placed in a Category 1b, indicating that no other supplemental information is available or data gathering activities planned. A similar approach can be taken for Categories 2 and 3.

The utility of separating each of these categories into two sub-categories is that it may serve as an aid in prioritizing reaches/uses for initial data collection. The WMI may wish to consider different “next steps” for different categories. Given the desire of WMI stakeholders to begin identifying management actions as quickly as possible, the highest priority should be placed on Category 1 and 4 reaches/uses.

In reviewing Categories 1a and 1b, the WMI could critically evaluate the quality (relevance, scientific reliability, etc.) and quantity of supplemental information currently available for each Category 1a reach/use. In addition, where future studies or data collection efforts are planned for a Category 1a reach/use, the WMI could work with those funding or conducting the work to determine if the data being collected will provide the sort of field confirmation necessary to ground-truth the assessment results. Opportunities for collaborative effort can be identified as well. Where the WMI determines that this supplemental information will be sufficient to confirm the assessment results, confirm the limiting factors, and pinpoint suspected causes more clearly, no further work would be needed. When completely available, the supplemental information can be evaluated against the assessment results, the results modified (where appropriate), and management actions identified. Where the WMI determines that this supplemental information will not provide the necessary certainty, the reach/use could be moved into Category 1b.

Category 1b reaches/uses would be the target of WMI-sponsored field assessments to ground-truth the pilot assessment results. The NRCS’s Stream Visual Assessment Protocol (SVAP) (or a version of it modified to fit the characteristics of the pilot watersheds and the indicators required by the Assessment Framework) could be used as a relatively fast method of performing this work. The SVAP integrates physical, chemical, and biological factors and, while not as rigorous as a complete geomorphic study would be, can be used as input to future work of this nature. Other protocols should also be reviewed for potential applicability to this exercise.

A similar approach can be taken for Categories 2 and 3. For Categories 2a and 3a, the WMI should determine if the supplemental information will fill the critical data gaps identified during the pilot assessments and also provide for ground-truthing of the assessment results. If not, reaches/uses can be moved into Categories 2b and 3b. Because of the more significant data gaps present in these categories, the SVAP or similar protocol may not be the best solution. Targeted data collection efforts identified in a long-term data collection plan would likely be necessary to fill the data gaps. The SVAP could be a component of this effort, but would probably not be sufficient by itself to provide the information needed to develop certain support statements and identify limiting factors and their probable causes.

This approach is not inconsistent with refining the Assessment Framework for future assessments. Framework refinement can proceed in tandem with the tasks outlined above, although if certain uses/interests are to be dropped from the assessment, this decision should be made before work on the above tasks begins.

Additional discussion on this topic is contained in Chapter 2 of the main report.

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Upper Penitencia	Upper Penitencia Creek	UP-1	Potentially/Seasonally Supported	B	High summer temperatures and low or no summer stream flow	Augmented summer streamflow (as releases from off-channel percolation ponds and Cherry Flat Reservoir) usually does not extend downstream to this reach. Winter and spring streamflow is variable and may be too warm for Chinook spawning and rearing due to relatively open channel; however, more temperature data is needed to fully determine this. FAHCE information notes that habitat is constrained by urban influences, including a limited flood plain and ongoing human disturbance.
Upper Penitencia	Upper Penitencia Creek	UP-2	Reach is split into three sub-reaches for COLD assessment: UP-2A: non-support; UP-2B: partial support; UP-2C: full support	UP-CA: C; UP-CB: B; UP-CC: A	UP-2B: high summer temperatures exceed criteria, summer flow variability affects presence of juvenile steelhead	UP-2B: Nobel Ave. diversion to Dorel Rd. -- pools present during some summers; partial support with steelhead sometimes present. Augmented summer streamflow tends to peter out in this stretch, though pools may remain. Low flow causes elevation in stream temperatures.
Upper Penitencia	Arroyo Aguague	UP-6	Partial Support	B	Low summer streamflows in lower portion of reach	Probably meets criteria for full support, but insect data lacking. Summer streamflows are low, but relatively persistent upstream in the reach as seepage in the Calaveras Fault zone. Flow present upstream even during 1976-77 drought. FAHCE information notes that fish passage is difficult due to small boulder cascades.

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Guadalupe River	GR-1	Potential/Seasonal Support	B	Exceeds Chinook and steelhead temperature criteria; indicator macroinvertebrate criteria are not met based on limited sampling	Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. FAHCE information notes that habitat is typified by long, deep, slackwater pools separated by an occasional short run or riffle. Baseflow velocities are very low and water quality poor. Lack of food production areas and no food transport are probably major factors limiting production.
Guadalupe	Guadalupe River	GR-2	Potential/Seasonal Support	B	Indicator macroinvertebrate criteria are not met; no records of summer steelhead rearing during 1985-94 sampling; exceeds summer temperature criteria at 3 of 4 sites in reach	Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that habitat is typified by long, deep,

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
						slackwater pools separated by an occasional short run or riffle. Baseflow velocities are very low and water quality poor. Lack of food production areas and no food transport are probably major factors limiting production.
Guadalupe	Guadalupe River	GR-3	Potential/Seasonal Support	B	Indicator macroinvertebrate criteria are not met in late summer; no records of summer steelhead rearing during 1985-94 sampling	Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no rearing habitat.
Guadalupe	Guadalupe River	GR-4	Potential/Seasonal Support	B	Indicator macroinvertebrate criteria are not met in late summer; no records of summer steelhead rearing during 1985-94 sampling	Relatively high, but variable, water temperatures in winter, spring and summer; exceeds temperature criteria, but may support Chinook rearing in some years. Spring and summer streamflows dependent upon regulated releases from upstream reservoirs for groundwater percolation, and presently required release to the reach is only 1 cfs (reach is downstream of percolation recharge zone). Channel is largely lightly shaded, resulting in water warming during sunny periods. No winter or spring sampling data to indicate whether successful Chinook spawning and rearing occur in reach. However, Chinook smolts have been produced in some

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
						years from somewhere in the Guadalupe River or in Los Gatos Creek, despite failure to meet temperature criteria in the Guadalupe River. Conditions may also be suitable for Chinook spawning in the reach in some years. During wet periods (1995-1999) cool groundwater inflows may be present. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no rearing habitat.
Guadalupe	Guadalupe River	GR-5	Partial Support and Potential/Seasonal Support	B	Indicator macroinvertebrate criteria are not met in late summer	Similar to reaches GR-1-4, in that summer streamflows depend upon releases from upstream reservoirs for groundwater percolation. However, the reach is within the recharge zone and streamflows are higher within this reach, but flows rapidly decline and temperatures increase downstream within this reach; suitable fast-water feeding habitat is scarce within the reach, so summer steelhead rearing is usually limited, but variable among years. The reach is lightly shaded and the channel is generally wide. Winter water temperatures exceed Chinook spawning and rearing criteria, but successful spawning and rearing may occur in some years. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach serves primarily as a migration corridor for steelhead and has poor to no rearing habitat.
Guadalupe	Los Gatos Creek	GR/LG-1	Partial Support and Potential Seasonal Support	B	Low streamflows and high temperatures; indicator macroinvertebrates not present in late summer (1998)	Spring and summer streamflows dependent upon releases from Lexington and Vasona reservoirs, with substantial water heating through the percolation zones upstream of Meridian Avenue. Some augmentation from groundwater in wet periods (1995-1999). Low streamflows and high water temperatures restrict summer steelhead rearing to scarce fast-water habitats. Winter and spring water temperatures are likely to exceed Chinook spawning and rearing criteria, due to limited shading in portions of reach; however, temperature data and winter/spring fish sampling data are absent. High storm flows resulting from urban runoff may degrade habitat.

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Moody Gulch	GR/LG-13	Partial Support	B	None identified	Probably fully supported, at least during wet years, but insect data are absent.
Guadalupe	Guadalupe Creek	GR/GC-1	Partial Support	A	Temperature and streamflow conditions decline downstream within reach; upper portion of reach meets criteria in wet years; limited temperature data exceeds criteria	Releases from Guadalupe Reservoir and Trans-Valley Pipeline for percolation support summer streamflow, but flow declines and temperatures increase within the reach. Amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. Upper half of the reach, with higher flows and lower temperatures is likely to be suitable, but lower half of reach may usually be too warm and slow. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that the riparian zone in this reach is very sparse, the channel incised, and the substrate compacted leading to a fair to poor rating for salmonid habitat.
Guadalupe	Alamitos Creek	GR/AL-1	Partial Support	A	Indicator macroinvertebrates not present at 2 of 3 locations in late summer	Releases from Almaden and Calero Reservoirs for percolation provide summer streamflow, but flows decline and temperatures increase within the reach. Fast-water feeding habitat declines downstream within the reach. Channel is less shaded downstream within the reach increasing temperature effects. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for salmonids.
Guadalupe	Alamitos Creek	GR/AL-2	Partial Support	A	Indicator macroinvertebrates not present in late summer 1998; older data indicates they are present; mercury exceeds criteria; turbidity exceeds criteria in limited sampling	Releases from Almaden Reservoir for percolation in downstream reaches maintain relatively high and cool streamflows for most of summer in most years. Outlet structures require periodic maintenance and reservoir draining, which may impact availability of streamflow and could affect indicator macroinvertebrate presence. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
						and relatively good complex shelter for salmonids.
Guadalupe	Arroyo Calero	GR/AC-1	Partial Support	A	Indicator macroinvertebrates not present at 3 of 4 sites in reach in 1998	Stream substrate is dominated by fine sediment and summer streamflows are relatively turbid, which may affect insect abundance and presence of intolerant species. Summer streamflows depend upon releases from Calero Reservoir for groundwater percolation, primarily downstream of the reach. Releases vary seasonally and among years due to reservoir storage. Summer temperatures are relatively cool, but increase downstream within the reach. High storm flows resulting from urban runoff may degrade habitat. FAHCE information notes that this reach contains a suitable combination of pools, riffles, and runs with good quality habitat and relatively good complex shelter for salmonids.
San Francisquito	San Francisquito Creek	SF-2	Non Support	A	Stream goes dry in most summers – reach is ephemeral; poor spawning habitat; barriers to fish migration	Low streamflows from upstream are lost to percolation and riparian vegetation use before they get to this reach in summer.
San Francisquito	San Francisquito Creek	SF-4	Partial Support	B	Low streamflows and scarce riffles inhibit insect production within this reach	Low streamflows in reach, which decline or are absent in the lower portion of the reach. Substrate quality and stream gradient decline downstream within the reach, reducing riffle quantity and quality. Groundwater pumping may be aggravating naturally dry watershed conditions.
San Francisquito	Bear Creek	SF/BC-1	Partial Support	A	Low summer streamflows and the presence of a fish passage barrier	Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
						watershed.
San Francisquito	Dry Creek	SF/BC-2	Partial Support	A	Reach is ephemeral; barriers	Small, dry watershed, with substrate dominated by sand. Unlikely to support significant steelhead rearing, though some juvenile presence has been noted, even in wet years due to lack of surface flow by fall. This is a case where the limiting factors are primarily natural.
San Francisquito	Bear Gulch	SF/BC-3	Partial Support	A	Low summer stream flow	Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed. Major diversion for domestic water upstream reduces streamflows.
San Francisquito	Bear Gulch	SF/BC-4	Partial Support	B	None identified	Cool, relatively abundant summer streamflows. Probably fully supports use.
San Francisquito	West Union Creek	SF/WU-1	Partial Support	B	Low summer streamflows; possible barriers	Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed.
San Francisquito	West Union Creek	SF/WU-2	Partial Support	B	Low summer streamflows; possible barriers	Low summer streamflows, with portions of the channel intermittent in drier years. Channel is well-shaded, and summer water temperatures should be cool. Private groundwater pumping may be impacting summer streamflows in a naturally relatively dry watershed.
San Francisquito	Appletree Gulch	SF/WU-3	Non Support	A	Reach is ephemeral	Naturally small, dry watershed. Winter streamflow only. Limiting factors are primarily natural.
San Francisquito	Tripp Gulch	SF/WU-4	Non Support	A	Reach is ephemeral	Naturally small, dry watershed. Winter streamflow only. Limiting factors are primarily natural.

Table 2. List of Limiting Factors and Suspected Causes by Stream Reach for Cold Freshwater Habitat Use (COLD)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
San Francisquito	Squealer Gulch	SF/WU-5	Partial Support	A	Low summer streamflows; natural barriers present in upper part of reach	Small spring-fed stream, which presently sustains flows throughout year. Suitable for small juvenile steelhead. California giant salamanders present in the steeper, fishless portions of the stream.

Table 3. List of Limiting Factors and Suspected Causes by Stream Reach for Municipal and Domestic Water Supply (MUN)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Guadalupe River	GR-1	Non Support	B	DDT exceeds criteria	Uncertain
Guadalupe	Guadalupe River	GR-3	Non Support	B	Fecal coliform exceeds criteria; some DDT, turbidity, mercury, and nickel samples also exceed criteria	Natural sources and urban runoff may contribute to nickel. Historic mining waste in stream contributes to elevated concentrations of mercury in water samples. Uncertain regarding fecal coliform and turbidity.
Guadalupe	Guadalupe Reservoir	GR/GC/GR	Partial Support	B	Several turbidity samples exceed criteria during winter/spring months	Uncertain
Guadalupe	Calero Reservoir	GR/AC/CR	Non Support	B	Fecal coliform, MTBE, turbidity	MTBE due to use of personal watercraft on reservoir; uncertain regarding fecal coliform and turbidity. It should be noted that MTBE has not exceeded the criterion since the SCVWD developed an MTBE management strategy with the County Parks Dept.
San Francisquito	San Francisquito Creek	SF-5	Non Support	B	TDS in summer; turbidity in winter; fecal coliform, DDT, dieldrin	High TDS due to groundwater sources to streams in summer. Turbidity due to erosion (stream or rill) during winter storms. Uncertain regarding fecal coliform, DDT, and dieldrin.
San Francisquito	Los Trancos Creek	SF/LT-1	Non Support	B	TDS in summer; turbidity in winter	High TDS possibly due to groundwater sources to streams during summer. High turbidity possibly due to local geologic conditions (faulting), which contribute to increased erosion during wet weather.

Table 4. List of Limiting Factors and Suspected Causes by Stream Reach for Water Contact Recreation (REC-1)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Upper Penitencia	Arroyo Aguague	UP-6	Seasonal Support for tertiary indicator in lower portion of reach (within Alum Rock Park); Non Support for tertiary indicator in upper portion of reach; no support statement is able to be made for primary and secondary indicators	B	Low summer flow in lower end of reach; access is not available above the confluence with Upper Penitencia Creek	Natural infiltration of already low summer streamflows as water moves through reach causes low/no flow at lower end; private property and rugged, steep topography discourages access to this reach.
Guadalupe	Guadalupe River	GR-1	Non Support based on secondary indicators; Partial Support based on tertiary indicators; no support statement is able to be made for primary indicators	B	Copper, nickel, PCBs, DDT, mercury, chlordane, dieldrin all exceed criteria either in water, sediment, or both; access is poor in lower part of reach and some trash problems have been noted	Historic mining waste in stream contributes to mercury; copper, nickel, and PCB exceedances possibly linked to historic urban stormwater discharges and/or illicit direct discharge to stream; chlordane and dieldrin are components of commonly used pesticides/herbicides and is present in urban stormwater; uncertain regarding DDT; trash is common in urban stream corridors; uncertain regarding access.
Guadalupe	Guadalupe River	GR-2	Non Support based on secondary indicators; Partial Support based on tertiary indicators; no support statement is able to be made based on primary indicators	B	Copper, nickel, mercury exceed criteria for water and sediment based on limited data; aesthetics may be a problem	Historic mining waste in stream contributes to mercury; copper, nickel exceedances possibly linked to historic urban stormwater discharges and/or illicit direct discharge to stream; trash is common in urban stream corridors; algae is product of excessive nutrient inputs, possibly yard or landscaping waste from upstream or detergents and human or animal waste.
Guadalupe	Guadalupe River	GR-5	Non Support (primary indicator meets criteria during recreation season, some secondary indicators exceed relevant criteria, tertiary indicators do not appear to meet criteria)	B	Fecal coliform exceeds criteria during winter; mercury, chlordane exceed criteria based on limited sampling; aesthetics appear to be poor throughout reach (water clarity, trash do not meet criteria)	Historic mining waste in stream contributes to mercury; uncertain regarding fecal coliform; chlordane is a component of commonly used pesticides/herbicides and is present in urban stormwater; trash is common in urban stream corridors; uncertain regarding water clarity (possible illicit discharges/spills).

Table 4. List of Limiting Factors and Suspected Causes by Stream Reach for Water Contact Recreation (REC-1)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
San Francisquito	Squealer Gulch	SF/WU-5	Non Support for tertiary indicator (aesthetics); no support statement is able to be made for primary and secondary indicators	B	Debris located in the stream channel; upper portion of reach has no summer streamflow	Debris (car body) in stream channel (illegal dumping); streamflow is naturally ephemeral in upper portion of reach.

Table 5. List of Limiting Factors and Suspected Causes by Stream Reach for Protection From Flooding (PFF)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Upper Penitencia	Upper Penitencia Creek	UP-1	Non Support	A	Channel does not have adequate capacity to convey expected 100-year flow in one segment of this reach; land uses adjacent to the stream consist of urban industrial and commercial	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban industrial and commercial developments into the natural channel floodplain. Problem segment is from SCVWD stationing 2300 to 4750.
Upper Penitencia	Upper Penitencia Creek	UP-2	Non Support	A	Channel does not have adequate capacity to convey expected 100-year flow in one segment of this reach; land uses adjacent to the stream consist of urban residential	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban residential developments into the natural channel floodplain. Problem segment is from downstream of Capitol Ave to upstream of Piedmont Road (11750 to 17200); segment downstream of Jackson Ave is only slightly undersized for 1% flow.
Guadalupe	Guadalupe River	GR-1	Non Support	A	Channel is unable to convey the 100- year flood	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).
Guadalupe	Guadalupe River	GR-2	Non Support	A	Channel is unable to convey the 100- year flood	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).
Guadalupe	Guadalupe River	GR-3	Non Support	A	Channel is unable to convey the 100-year flow in two segments; land uses adjacent to the stream in these segments consist of urban commercial	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) Encroachment of urban commercial development into the natural channel floodplain. Problem segments are: Hedding to Taylor (SCVWD stationing #59450 to 61450) and Hobson to Coleman (62200 to 63600). Only Contract 1 of the Flood Control Project is completed to date. Therefore, this reach of the river cannot be considered "protected" from large flood events such as the 100-year flood until all portions of the project are completed. Once all the portions are completed the support status of this reach can be changed from "Non-Support" to "Full Support".

Table 5. List of Limiting Factors and Suspected Causes by Stream Reach for Protection From Flooding (PFF)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Guadalupe River	GR-4	Non Support	A	Channel is unable to convey the 100-year flow in one segment; land uses adjacent to the stream in this segment consist of urban commercial and residential	(a) Creek does not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segment is upstream of Auzerais Street (70000 to 71500).
Guadalupe	Guadalupe River	GR-5	Non Support	A	Channel is unable to convey the 100-year flow in three segments; land uses adjacent to the stream in these segments consist of urban commercial and residential	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segments are: 78000 (at WPRR), 82700 (Malone), 90800 (Capital Expwy).
Guadalupe	Los Gatos Creek	GR/LG-1	Non Support	A	Channel cannot convey the expected 100-year flow in two specific segments of this reach; land uses adjacent to the channel in these segments consist of urban residential and/or commercial uses	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban and industrial developments into the natural channel floodplain. Problem segments are: 0 to 1800 (lower part of reach) and 37000 to 39650.
Guadalupe	Randol Creek	GR/AL-11	Non Support	A	Channel does not have adequate capacity to convey expected 100-year flows along most of this reach; land uses adjacent to the channel within the flood zone in this reach consist of urban residential (most of this reach is culverted)	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential developments into the natural channel floodplain. Problem segments are: from 79 to 2150 and from 2651 to 2875.
Guadalupe	Canoas Creek	GR/CC-1	Non-Support	A	Channel does not have adequate capacity to convey expected 100-year flows; land uses adjacent to the channel in these areas consist of urban residential and commercial	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential and commercial developments into the natural channel floodplain. Problem segments are from 1650 to 29555 and from 29615 to 39000; however, reach is only slightly undersized.

Table 5. List of Limiting Factors and Suspected Causes by Stream Reach for Protection From Flooding (PFF)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Ross Creek	GR/RC-1	Non Support	A	Channel does not have adequate capacity to convey expected 100-year flows in three specific segments of this reach; land uses adjacent to the channel in these areas consist of urban residential and commercial	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban residential and commercial developments into the natural channel floodplain. Problem segments are from 4411 to 5580, from 8564 to 9503, and from 12710 to 15549.
San Francisquito	San Francisquito Creek	SF-1	Non Support	A	This reach overtopped in the February 2-3, 1998 flood event, which was equivalent to a 100-year event.	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).
San Francisquito	San Francisquito Creek	SF-2	Non Support	A	Not able to convey 100-year flood flows	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is disconnection of main channel from natural floodplain (levees, urban development, etc.).
San Francisquito	San Francisquito Creek	SF-3	Non Support	A	Adequate channel capacity to convey the expected 100-year flow does not exist within two sections of this reach; land uses adjacent to the stream within the flood zone consist of urban commercial and residential	(a) Creek may not have sufficient channel capacity to convey flood flows and/or (b) encroachment of urban commercial and residential development into the natural channel floodplain. Problem segments are from Chaucer to Middlefield (SCVWD stationing #17700 to 22075) and Middlefield to Waverley (22175 to 25400).
San Francisquito	Corte Madera Creek	SF/CM-1	Partial Support	B	Inadequate capacity to convey flows at Cooper's Corner on Family Farm Road overcrossing	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is residential/urban encroachment into stream channel or an undersized stream crossing. Data indicates that the channel can likely convey large flows without overbank flow except in the specific location described above.

Table 5. List of Limiting Factors and Suspected Causes by Stream Reach for Protection From Flooding (PFF)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
San Francisquito	Sausal Creek	SF/SC-1	Partial Support	B	Inadequate capacity to convey flows at Family Farm Road overcrossing	Creek does not have sufficient flow capacity in the main channel to convey major flood flows; probable cause is residential/urban encroachment into stream channel or an undersized stream crossing; the lower end of this reach drains into a large willow swamp at the upstream end of Searsville Lake, which could cause floodwaters to back up through the creek over to Portola Road. Data indicates that the channel can likely convey large flows without overbank flow except in the specific location described above.
San Francisquito	Buckeye Creek	SF/LT-3	Non Support	B	Culvert at Los Trancos Woods Road is likely undersized	Stakeholder comment: There has been historical flood and erosion damage along Buckeye Creek through the City of Palo Alto's Foothills Park; Personal communication with SCVWD on March 13, 2002: The creek flows though an 18' culvert outside the park boundary at Los Trancos Woods Road, which is unlikely to have enough flow capacity for large storm events such as the 100-year flood event; Historical evidence has suggested that the road section at this location has flooded many times during large storm events.

Table 6. List of Limiting Factors and Suspected Causes by Stream Reach for Preservation of Rare and Endangered Species (RARE)

Watershed	Waterbody	Reach ID	Support Status	Level of Certainty	Limiting Factors	Suspected Causes
Guadalupe	Guadalupe Creek	GR/GC-1	Potential Support	B	None identified; data was inconclusive	Potential support based on habitat conditions for yellow warbler, red legged frog (and double crested cormorant if included); data contains sightings of several special status species but few repeat occurrences. Red-legged frog not thought to be present due to lack of suitable habitat and presence of aquatic predators. Habitat is marginal for salmonids as flow declines and temperatures increase within the reach. The amount and quality of fast-water feeding habitat therefore declines with the reach, and conditions change with year to year variation in the amount of releases. Upper half of the reach, with higher flows and lower temperatures is likely to be suitable, but lower half of reach may usually be too warm and slow. Data did not allow limiting factors specific to this reach affecting other special status species to be identified.
Guadalupe	Los Gatos Creek	GR/LG-1	Potential Support	B	None identified; data was inconclusive	Potential support based on yellow warbler, western pond turtle, and red-legged frog, a salmonid redd (nest), and double crested cormorant observations. Low streamflows and high water temperatures restrict summer steelhead rearing to scarce fast-water habitats. Winter and spring water temperatures are likely to exceed Chinook spawning and rearing criteria, due to limited shading in portions of reach. Data did not allow limiting factors specific to this reach affecting other special status species to be identified.
Guadalupe	Los Gatos Creek	GR/LG-4	Potential Support	B	None identified; data was inconclusive	Potential support based on CA red-legged frog and western pond turtle observations. Data did not allow limiting factors specific to this reach affecting other special status species to be identified.