2003-2004 Annual Review of Municipal Stormwater Programs
with Focus on Monitoring
Contra Costa Clean Water Program
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The Contra Costa Clean Water Program (the Program, or CCCWP) consists of seventeen permittees[1], which are: Contra Costa County Public Works/Flood Control, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez, Moraga, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek. The Program's current permit (its second iteration) was due to expire in July 2004, and has been administratively extended until the new region-wide permit is adopted.

To be consistent with the review of the other countywide programs, Board staff reviewed the Monitoring component of CCCWP's 2003-04 Annual Report. Results of our review are summarized below. In addition, we evaluated the overall effectiveness of CCCWP permittees' reporting—that discussion follows the section on Monitoring.

Water Quality Monitoring

The Program continues to implement the Contra Costa Monitoring and Assessment Plan (CCMAP), a **tiered monitoring approach** that includes an initial characterization of watersheds and sub-watersheds through the implementation of **screening level monitoring** of benthic macroinvertebrates (aquatic insects that live in the bottom parts of creeks), and **more detailed investigative monitoring** of chemical parameters in selected sites. The Program also participates in conducting and/or contributes towards **special monitoring studies,** and **regional monitoring.**

Unique to the CCMAP is the organized training and utilization of citizen volunteers to collect quality data, which is then analyzed and made available to the Program, its permittees, and the general public. The goal is for citizens to continue to collect quality data in a watershed, after the Program has rotated its focus to a new watershed. Thereby, the number of creeks sampled each year increases, and annual data collection continues in each creek where the CCMAP has initiated sampling.

To screen for watershed "health", the Program conducts Benthic Macroinvertebrate (BMI) bioassessments using the California Stream Bioassessment Protocol (CSBP), which is the same protocol being used by other stormwater programs in the Bay Region, and we appreciate the Program's participation in creating this consistency. BMI assessments consist of sampling a stretch of creek for the aquatic invertebrate species living there, and then sorting and counting those species to come up with "metrics" that can be categorized into four main types of information:

- Richness (reflects diversity);
- Composition (reflects the relative contribution of individual type of animal to the total community at the sample site);

[1] Within the SF Bay Water Board's jurisdiction (a portion of Contra Costa County is regulated by our sister agency, the Central Valley Water Board).

- Tolerance/Intolerance (reflects the relative sensitivity of the benthic community to disturbance); and
- Functional Feeding Groups (shows balance of bottom detritus feeders, filter feeders, predators, etc.)

These metrics are also compiled (into a sum of normalized means) to create an overall measurement, a "BMI Ranking Score" for each site (the higher the BMI Ranking Score, the better the overall health of the invertebrate community at that location of creek).

It is important to understand that BMI data is relative—for it to mean anything, it has to be interpreted in the context of other sample sites—within the same watershed, or within a greater regional context. The CCCWP is actively cooperating with other stormwater programs in the Bay Region to develop the large regional data set (estimated completion, 2005) needed to evaluate the overall relative health of their sampling sites. In the mean time, the only specific comparisons that can be made are between sampling sites located in the same watershed. To gain an initial idea of whether the health of the BMI communities sampled was predominantly affected by the physical habitat versus the chemical quality of the water, CCCWP also sampled each site for:

Physical Characteristics

- Riffle Characteristics,
- Percent canopy,
- Substrate complexity,
- Substrate consolidation,
- Stream gradient,
- Stream flow

Chemical Characteristics

- Time of day,
- Water temperature,
- Specific conductance,
- pH, and
- Dissolved oxygen.

A total of 33 sites were sampled in FY 2003/2004 (for relative locations in the County, see map, "Figure 1.1"), including eleven (11) sites in Las Trampas Creek watershed, eleven (11) sites in Lower Marsh Creek watershed, five (5) sites in Rodeo Creek watershed, five (5) sites in Refugio Creek watershed, and one (1) site in Edwards Creek watershed. Sites were selected based on land use, comparability to other creeks in the County, and the presence of active and stable citizen groups (who can carry on sampling in future years). Sampling has been conducted annually in Alhambra Creek since 2001, and additional watersheds have been sampled each year since. The results from Alhambra Creek and Marsh/Mallory Creeks are particularly notable, and are discussed below.

Alhambra Creek

Alhambra Creek is notable because the continually collected data from 2001 to present allows for not only a spatial analysis of data results, but trends from year to year. Also, in 2003 for the first time, citizen volunteers collected the Alhambra Creek BMI samples, whereas a professional biologist collected the data in all the other watersheds.

The overall BMI Ranking Scores, years 2001-2003, for the Alhambra Creek sampling sites are compiled in "Figure 5-3". The locations of the 2003 Alhambra Creek sampling sites are depicted in "Figure 1-2". Overall, at the Alhambra Creek sampling sites, there was an overall decline in BMI ranking scores between 2001 and 2003. This trend was common to nearly all watersheds in the County sampled in the same period, and may therefore be the result of natural variation in BMI communities and index period.

While specific sampling sites have varied between data collection years, a notable spatial trend appears for all three years of data: the creek is better in health at upper Alhambra Creek watershed tributary sampling stations (Arroyo Del Hambre (ADH) - 3, Franklin Creek (FC) - 2), and worse in the lower stretches of the tributaries and the mainstem Alhambra Creek (ADH-1, FC-1.5, and Alhambra Creek (AC)-2.7).

In an attempt to understand what might be causing a decrease in creek health in the lower reach sampling stations, follow-up investigative monitoring was conducted in the Alhambra Creek watershed in 2003/04. Composite samples were analyzed for conventional water quality parameters (i.e., temperature, pH, dissolved oxygen, conductivity, nutrients, chloride, sulfate, chlorophyll-a, alkalinity and hardness) and organophosphate pesticides (e.g., diazinon and chlorpyrifos). Water collected from grab samples were used to conduct three-species freshwater toxicity tests to determine the effects of pollutants on aquatic biota. Results will be available and discussed in the Program's 2004/05 Annual Report.

Marsh Creek and Mallory Creek

The Upper Marsh Creek and Mallory Creek (a tributary to Kellogg Creek) are located on the eastern slope of Mount Diablo, in predominantly protected lands with light recreational uses. Most of the creeks in Contra Costa County are located in areas of ranching, residential development, and commercial or industrial activities. The Marsh and Mallory Creek watersheds were chosen for their potential to provide regional reference conditions. The 2003 data collected shows Upper Marsh Creek and Mallory Creek to be the healthiest (see "Figure 5-4"), in comparison to all other watersheds, verifying them to be good potential reference sites for other creeks in the County. These two watersheds are sufficiently different from each other (in physical characteristics) to provide two separate examples of relatively undisturbed conditions. Mallory Creek is smaller, intermittent, warmer, and has smaller substrate than Upper Marsh Creek.

The CCCWP has made good strides in the development of its CCMAP monitoring program, and has provided a leadership role in the development of a BMI Bay Region regional index. However, CCCWP has not yet achieved full functionality of its CCMAP program: the ability to assess which areas of its creeks are impacted, identify the sources of the impact, and then take the necessary measures to address the sources. The first milestone towards achieving full functionality would be the development of the regional BMI reference data set. The next hurdle will be successful implementation of follow-up investigative monitoring at sample sites with poor BMI health, followed with effective measures by CCCWP permittees for those watersheds that are impacted.

Special Monitoring Study

In FY 03-04, one special monitoring study was conducted by the Program: the Contra Costa County Golf Course Study, designed to (1) determine if organic fertilizers are superior to inorganic fertilizers in reducing nutrient concentrations in runoff form golf courses; and, (2) investigate potential aquatic toxicity-related effects of pesticides applied on golf courses. Results from the golf course study should be available in the 2004-05 Annual Report.

Regional Monitoring Activities

The Program also contributed funding and staff time to regional monitoring efforts, including the Regional Monitoring Program for Trace Substances (RMP), designed to monitor the concentrations of toxic trace elements and organic contaminants in the San Francisco Bay Estuary; the Clean Estuary Partnership (CEP), the BASMAA Regional Monitoring Strategy, and has played a leadership role in the Bay Area Macroinvertebrate Bioassessment Information (BAMBI) Network.

Unable to Determine Monitoring Compliance

In spite of the above-mentioned activities, the Program's 2003-04 Annual Report lacks data evaluation and a summary of what the Program has learned from its monitoring efforts, and therefore, Board staff is unable to determine the Program's monitoring compliance at this time. In our December 22, 2004, Annual Report review letter, we asked the Program to answer, by February 28, 2005, such questions as: With its monitoring activities, was it able to determine whether it reduced pollutants—and how was that accomplished, measured, and tracked? Have any of the 15 special studies undertaken since program inception resulted in any specific BMPs being implemented, or management actions being taken? What information gathered in regional monitoring activities is applicable to Contra Costa County? Board staff is still waiting for a response from the Program on these questions.

Overall Reporting Effectiveness Assessment

The second focus of staff's review of the CCCWP 2003-04 Annual Report was the **demonstration of effectiveness** of permittees' stormwater control activities. We have seen improvements in reporting over the past few years—in 2001, the annual report for nearly all CCCWP permittees consisted of bullets on a very long checklist, and in 2003-04, the typical report includes extensive discussion, substantiating attachments, and the setting of goals and reporting of accomplishments. Now, as we enter the next phase of our stormwater permits, we need to ask the question, **how does a stormwater program demonstrate that the actions it takes are *effective* in preventing, reducing, and eliminating stormwater pollution?**

We are not the first water board to ask this question. In 2003, in response to a similar question from its water board, the San Diego stormwater permittees produced a document titled, "A Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs" (the Framework). In the Framework, the San Diego permittees established six different types of stormwater effectiveness reporting:

Type 1. Compliance with Activity-Based Permit Requirements
Type 2. Changes in Knowledge / Awareness
Type 3. Behavorial Change / BMP Implementation
Type 4. Load Reductions
Type 5. Changes in Discharge Quality
Type 6. Changes in Receiving Water Quality

To set the stage for the upcoming region-wide permitting discussion, Board staff reviewed the CCCWP Annual Report to see which of the above types of stormwater effectiveness permittees are currently reporting, and whether potential exists for reporting at additional levels. One out of the five program components was reviewed, per permittee.

Review Summary

Nearly all permittees reported Type 1—Compliance with Activity-Based Permit Requirements, regardless of program component. Overall results are summarized in the below table, indicating the types reported (by one or more permittee); as well as the specific potential (for one or more permittee) to report a type, with modest modifications to data collection and tracking strategies.

Program Component	Permittees Reviewed	Compliance with Activity-Based Permit Requirements	Changes in Knowledge / Awareness	Behavorial Change / BMP Implementation	Load Reductions	Changes in Discharge Quality	Changes in Receiving Water Quality
New and Redevelopment	*Clayton, El Cerrito, Moraga, Pinole*	Reported	Reported	Reported	*Potential*		
Public Education and Industrial Outreach	*Clayton, Hercules, Pleasant Hill*	Reported	*Potential*	*Potential*			
Industrial / Commercial Inspections	*Concord, Orinda, San Pablo*	Reported	Reported	Reported	Reported	*Potential*	*Potential*
Illicit Discharge Control Activities	*Danville, Lafayette, Richmond, Walnut Creek*	Reported	*Potential*	Reported	*Potential*	*Potential*	*Potential*
Municipal Maintenance Activities	*County, Martinez, Pittsburg, San Ramon*	Reported	Reported	Reported	Reported	Reported	

We hope that our review provides a good starting point for discussion of how to best structure the upcoming permit requirements to maximize reporting of program effectiveness, on as many of the above levels as possible.

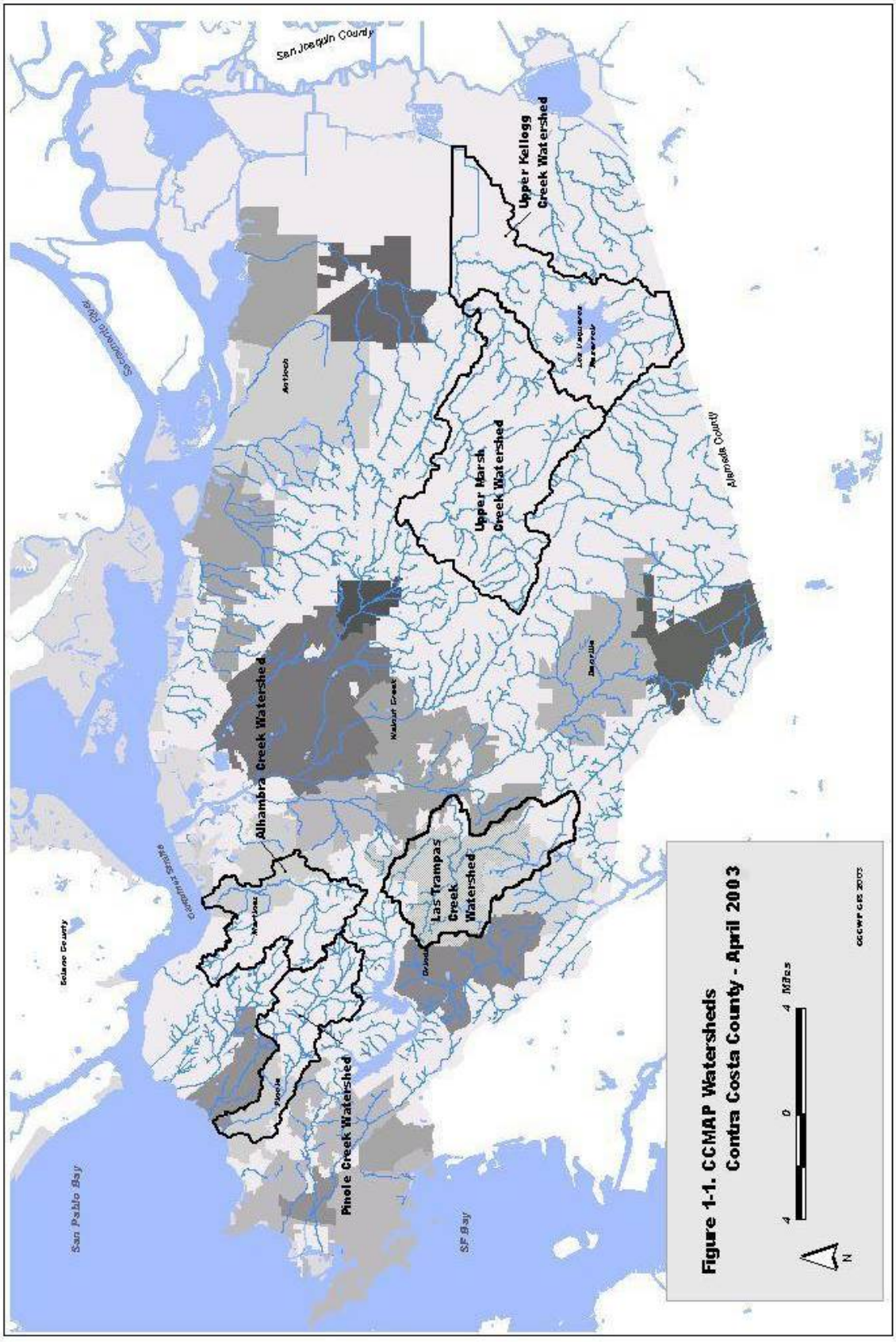
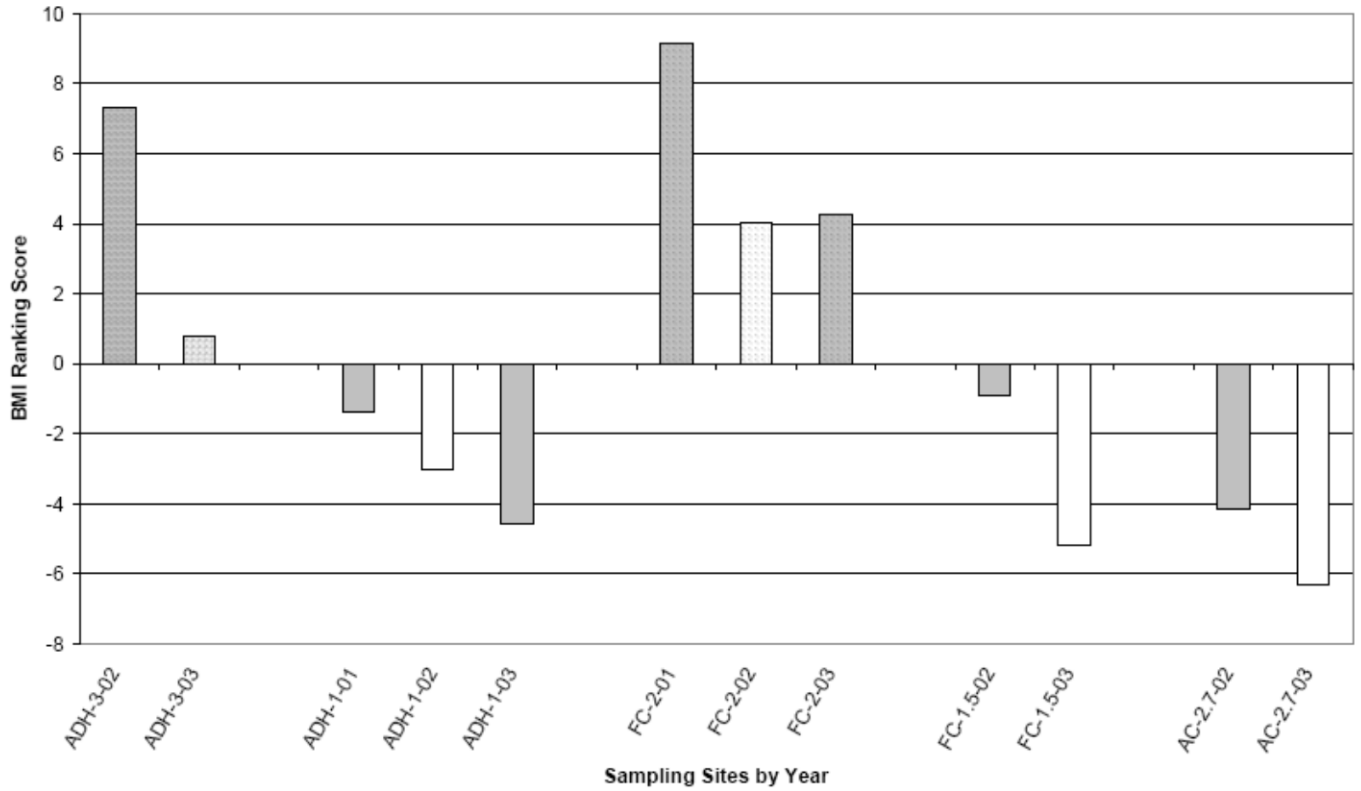

San Joaquin County
Upper Kellogg Creek Watershed
Upper Marsh Creek Watershed
Alhambra Creek Watershed
Las Trampas Creek Watershed
Pinole Creek Watershed
Alameda County
Contra Costa County
San Pablo Bay
SF Bay
Figure 1-1. CCMAP Watersheds
Contra Costa County - April 2003
4 0 4 Miles
N

Figure 5-3. Benthic Macroinvertebrate Ranking Scores for the Alhambra Creek Watershed Sampling Sites, Contra Costa County, 2001-2003



Legend.
ADH – Arroyo del Hambre (tributary to Alhambra Creek)
FC – Franklin Creek (tributary to Alhambra Creek)
AC – Alhambra Creek

Upper Watershed sampling sites:	ADH – 3, FC – 2
Middle Watershed sampling sites:	ADH – 1, FC – 1.5
Lower Watershed sampling site:	AC – 2.7

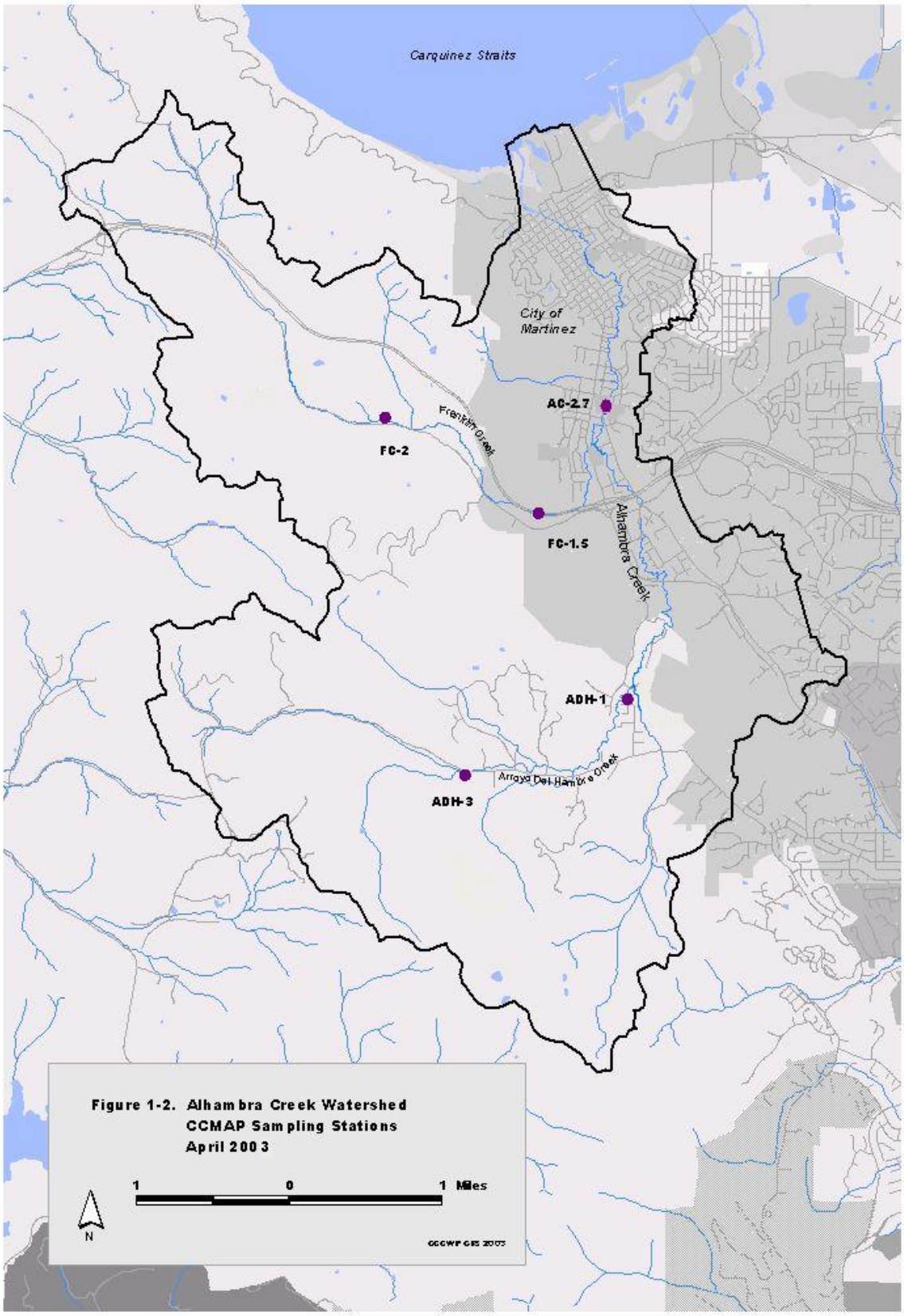

Carquinez Straits
City of Martinez
AC-2.7
FC-2
Franklin Creek
FC-1.5
Alhambra Creek
ADH-1
ADH-3
Arroyo Del Hambre Creek
Figure 1-2. Alhambra Creek Watershed
CCMAP Sampling Stations
April 2003
1
0
1 Miles
N
CCCWP GIS 2003

Figure 5-4. BMI Community Ranking Scores Calculated from the Mean Metrics of each Watershed, Contra Costa County, April-May, 2003