Surface Water Ambient Monitoring Program (SWAMP)
Annual Workplan
2004-2005

San Francisco Bay Regional Water Quality Control Board
November 2004

I. Introduction

This is the fifth year of the San Francisco Bay Regional Water Quality Control Board's SWAMP activities. These monitoring efforts are designed to address the "site-specific" component of SWAMP as presented in Section VI of the report to the Legislature entitled: *Proposal for a comprehensive ambient surface water quality monitoring program*. Unfortunately, that plan was budgeted at over 20 times of what has been appropriated. Therefore, the proposals in that plan have had to be modified.

Currently, regional SWAMP activities are designed to answer the questions: 1) Is it safe to eat the fish?, 2) Is it safe to swim in the water? and 3) Is aquatic life protected?. This workplan includes:

- a description of how the regional Water Board's program complies with the Governor's Action Plan, the SWRCB's Strategic Plan and the U.S. EPA Partnership agreement;
- a revised 5-year plan including goals and objectives and how we plan to achieve them;
- a workplan for 2004-05 including goals and objectives and how we plan to achieve them;
- the regional monitoring design;
- a table that describes coordination within the agency;
- a table that describes our collaboration with other agencies working in the 2004-05 watersheds, and
- a study design to fill data gaps in fish tissue studies in reservoirs.

II. Compliance with Governor's Action Plan, SWRCB Strategic Plan and U.S. EPA Partnership Agreement

Monitoring conducted by SWAMP addresses a number of the priority goals outlined in the Governor's Action Plan, the State Water Resources Control Board's Strategic Plan, and the U.S. EPA Partnership Agreement. Key elements of these plans are identified in Table 1. Although many of these issues are overlapping, a summary of how some of the major issues in each document are being addressed will be presented separately.

Table 1. Summary of Major Issues in the Governor's Action Plan, the State Board's Strategic Plan, and the U.S. EPA Partnership Agreement that the Regional SWAMP is Addressing

Governor's Action Plan

Protect California's Water Supply and Water Quality

Action 2 – "Making sure that existing permitting fees are targeted toward resource management."
Action 3 – "Protect the State's groundwater, surface water, and coastline…".
Ground Water Implementation Actions
Surface Water Implementation Actions
1 Develop a Nonpoint Source Implemetation and Enforcement Policy (NPS Policy)
2 Implement Surface Water Ambient Monitoring Program (SWAMP)
Action 4 – "Direct State agencies to promote enhanced storm water mitigation techniques…".
Action 5 – "Direct all relevant state agencies to fill any gaps in wetlands protection…".

Action 7 – "Implement programs and policies to restore salmon and other important fish populations."

Action 10 – "Promote practices that help farmers reduce their pollution…"

SWRCB Strategic Plan

Goal #1: The Boards' organizations are effective, innovative and responsive
Goal #2: Surface waters are safe for drinking, fishing, swimming, and support healthy ecosystems and other beneficial uses

Goal #5: Individuals and other stakeholders support our efforts and understand their role in contributing to water quality
Goal #6: Water quality is comprehensively measured to evaluate protection and restoration efforts

USEPA Partnership Agreement

Water Quality Standards/Basin Planning
Water Quality Standards
Basin Planning
Policy for Implementation of Toxics Standards for Inland Surface Waters
Bioassessment and adoption of biocriteria
Monitoring/Assessment
Surface Water Ambient Monitoring Program
Quality Assurance Management Planning
Clean Water Act 305(b) Reporting
Nonpoint Source (NPS)
Non-Point Source Plan Implementation
Clean Water Act 319 Reporting
Total Maximum Daily Load (TMDL)
Clean Water Act 303(d) Listing
TMDL Guidelines
National Pollutant Discharge Elimination System (NPDES) Stormwater Permits
NPDES Wastewater Permits
Pretreatment
Compliance/Enforcement Actions
Concentrated Animal Feeding Operations (CAFO)
Data Management
Quality Assurance/Quality Control (QA/QC)

Improve Efficiency
Target Critical Problems
Address Concerns of the Public

Governor's Action Plan –SWAMP is funded through permitting fees addressing Action #2 of the Governor's Action Plan in ensuring that these fees are used for resource management. Action #3 is to implement SWAMP. As originally designed, this Region's SWAMP prioritized watersheds with high resource value and/or potential endangerment from pollution or development. Data from the SF Bay Water Board's SWAMP monitoring program and information from interpretive reports will further assist in identifying endangered watersheds in the region and will be linked with other programs that will result in the protection of surface waters in the region from various sources of pollution including stormwater (Action #4). SWAMP monitoring of surface waters that drain in to wetlands such as Suisun Marsh and Bolinas Lagoon will lead to wetland protection by identifying areas that need water quality improvements (Action #5). SWAMP will also be able to identify streams where water quality is not of sufficient quality to support important fish populations and lead to 303(d) listing with subsequent protective measures so that these populations can be restored (Action #7). The Governor's Action Plan also calls for the establishment of EPIC indicators. The SF Bay Water Board is working with the counties in the region to develop a bioassessment index, through the Bay Area Macrobenthic Invertebrate Network (BAMBI), which could be used as a biological indicator of the health of surface waters for the EPIC program.

SWRCB's Strategic Plan – SWAMP monitoring in this Region provides information necessary for evaluating and addressing Goal #2 (Surface waters are safe for drinking, fishing, swimming, and support healthy ecosystems and other beneficial uses) and #6 (Water quality is comprehensively measured to evaluate protection and restoration efforts) of the SWRCB's Strategic Plan. Further, this workplan identifies several operating principals that are key to promoting and achieving the vision and mission of the Strategic Plan, including internal and external coordination/collaboration activities and collecting the best scientific data possible. Monitoring conducted will be coordinated, comprehensive and non-duplicative. Water quality data collected will increase the amount of quantitative data and information about water quality conditions. Interpretive final reports will translate quantitative data into useful information regarding the status of water quality into readable reports useful for decision makers and other interested stakeholders.

U.S. EPA Partnership Agreement – Under the Monitoring and Assessment section of the agreement this Region will implement SWAMP. This Region will use the Quality Assurance Management Plan (QAMP) in its monitoring activities to develop data that can be used for 303(d) listing and the 305(b) report. This Region has helped to develop and continues to use standardized ambient data formats that will facilitate the exchange of data between the Regional Water Board, the SWRCB and the USEPA and facilitate the compilation of data into a centralized data system. Since it's inception in 1993 staff of the Regional Water Board have been working on the San Francisco Estuary Regional Monitoring

Program (RMP) and use the lessons learned in that program in developing the Regional SWAMP workplan. In addition, data from SWAMP is shared with the RMP so that both programs can be as integrated and coordinated as possible. We use the RMP to evaluate water quality in the San Francisco Bay Estuary, while SWAMP funds are used to assess water quality in watersheds in the region. By developing scientifically sound monitoring data and interpretive reports the most critical problems can be targeted and addressed including many of the source and non-point source issues mentioned in the agreement. Bioassessment data collected in SWAMP will be used to develop biocriteria so that this tool can be used to better regulate water quality problems. Through the use of scientifically sound monitoring data the most critical water quality problems can be identified and addressed allowing resources to be used more efficiently.

III. LONG-TERM (5-YEAR) PLAN

A. Goal and Objectives

Goal – The goal of the SWAMP funded program in the San Francisco Bay Region is to monitor and assess water quality in all of the watersheds in the region to determine whether beneficial uses are protected.

Objectives –
1. Measure environmental stressors (pollutants or other water quality parameters), biological effects (e.g., toxicity tests), and ecological indicators (e.g., benthic community analysis) to evaluate whether beneficial uses are being protected.
2. Use a design that allows for evaluation of spatial and temporal trends in the watersheds of the region.
3. Identify minimally disturbed reference conditions.
4. Determine if impacts are associated with specific land uses and/or water management.
5. Use standard sampling protocols, SWAMP QAMP procedures and the SWAMP database to provide statewide consistency and availability of data.
6. Evaluate monitoring tools in watersheds in order to develop a program that uses the best environmental indicators to achieve the goal of the program.
7. Generate data and associated information for the development of indices to evaluate ecological indicators (e.g., IBIs for macroinvertebrates).
8. Use a rotating watershed approach to collect data in each hydrologic unit at least once every 5 years.

B. Method to achieve objectives

Objective #1 - Measure environmental stressors (pollutants or other water quality parameters), biological effects (e.g., toxicity tests), and ecological indicators (e.g., benthic community analysis) to evaluate whether beneficial uses are being protected.– Our monitoring program includes measuring environmental stressors (pollutants and other water quality measurements such as temperature and dissolved oxygen),

biological effects (EPA 3 species aquatic toxicity tests and Hyalella sediment toxicity tests), and ecological indicators (macrobenthic community analysis). These monitoring parameters are associated with the evaluation of specific beneficial uses. The beneficial uses we are concentrating on evaluating in this program relate to human health and aquatic life. To evaluate beneficial uses related to human health we evaluate water contact (REC-1) and noncontact recreation (REC-2) and fish consumption (COMM). To evaluate water contact (REC-1) we measure fecal coliforms and E. coli at places where there is water contact and/or there are potential sources of pathogens. To evaluate noncontact recreation we measure bacteriological indicators and also conduct trash assessments with a methodology that was developed in this region. To evaluate whether fish are safe to eat by humans we conduct studies to measure contaminants in fish in reservoirs and coastal areas. We use the RMP to evaluate fish contamination in the SF Estuary. We have written a report on contaminants in fish in Tomales Bay and 10 reservoirs in the region (*Chemical Concentrations in Fish Tissues from Selected Reservoirs and Coastal Areas: San Francisco Bay Region*), worked with OEHHA to develop advisories and coordinated with the County Health Departments and responsible parties to develop information in appropriate languages to convey clear and consistent information to the public.

To evaluate beneficial uses associated with aquatic life such as Cold Freshwater Habitat (COLD), Estuarine Habitat (EST), Marine Habitat (MAR), Fish Migration (MIGR), Preservation of Rare and Endangered Species (RARE), Fish Spawning (SPWN), Warm Freshwater Habitat (WARM) and Wildlife Habitat (WILD) we measure contaminant concentrations, nutrients, temperature, dissolved oxygen, conductivity and pH, conduct toxicity tests, evaluate macroinvertebrate communities and assess physical habitats. Dynamic parameters such as temperature, dissolved oxygen, pH and conductivity are measured at 15-minute intervals using data sondes deployed for a week. Some of these parameters, such as nutrients and conductivity, can also be used to evaluate Municipal and Domestic Supply (MUN) although the utilities that supply water have extensive monitoring programs and data that can be used for assessments.

Objective #2 – <u>Use a design that allows for evaluation of spatial and temporal trends in the watersheds of the region. -</u> To evaluate spatial trends we distribute sampling stations fairly evenly throughout a watershed and at all major confluences. We commonly use a paired watershed design to compare watersheds and use a rotating watershed approach to spatially cover the watersheds in the region. To evaluate intra-annual temporal variability we take contaminant, toxicity and nutrient samples during the wet, spring (declining hydrograph) and dry seasons. We measure temperature, pH, conductivity and dissolved oxygen with continuous monitoring probes over a week long period four times a year in each watershed, concentrating on the dry season. We evaluate trash four times a year to determine where the trash is coming from (runoff or dumping) and how much accumulates over a particular length of time. To evaluate inter-annual variability we use a rotating watershed approach, and we work with local agencies and citizens groups to conduct follow up monitoring on watersheds we have

monitored. This year we will be starting to deploy HOBO temps for continuous monitoring of temperature in watersheds we have monitored in year one of the program. From 1999 to 2002 staff from the Water Board used separate funding to conduct a special study on inter-annual variability in Wildcat and San Leandro Creeks. This data will be incorporated in to the interpretive report we are writing this year on these watersheds.

Objective #3 - Identify minimally disturbed reference conditions. Each year we identify and sample at stations that are minimally disturbed and can represent different ecoregions within our region. In 2004 we will analyze benthic macroinvertebrate samples collected from chosen reference sites in various ecoregions. Reference site data are particularly important to evaluate benthic macroinvertebrate data and for the development of an Index of Biological Integrity (IBI), a potential numeric biocriterion.

Objective #4 – Determine if impacts are associated with specific land uses and/or water management. - Our sampling design is deterministic. We locate sampling stations above and below particular land uses such as agriculture, industrial areas, golf courses and areas of hydromodification to test hypotheses on the impact of these land uses on water quality. We also locate sampling stations at major tributary confluences to evaluate water quality at the lower portion of major catchments and sub-watersheds.

Objective #5 - Use standard sampling protocols, SWAMP QAMP procedures and the SWAMP database to provide statewide consistency and availability of data . - We use standard sampling protocols, SWAMP QAMP procedures and have data entered in to the SWAMP database to provide statewide consistency and availability of data. We also encourage monitoring partners (stormwater programs, volunteers) to use SWAMP methods, sampling design and the QAMP so that this data can be incorporated in to the SWAMP database. Projects funded through our grant programs that include water quality monitoring are required to be consistent with SWAMP.

Objective #6 – Evaluate monitoring tools in watersheds in order to develop a program that uses the best environmental indicators to achieve the goal of the program . - The first monitoring protocol that we have developed is a methodology for trash assessment. We have developed a protocol that has been tested for variability and sensitivity using different assessment teams. This protocol is now considered part of the standard procedures in our region. We are encouraging stormwater agencies and community monitoring groups to use this protocol.

Objective #7 - Generate data and associated information for the development of indices to evaluate ecological indicators (e.g., IBIs for macroinvertebrates). - We have sampled benthic macroinvertebrates at reference sites and at various ecoregions in our region for the development of IBIs. We are currently coordinating through the Bay Area Macrobenthic Invertebrate Network (BAMBI) to include other macroinvertebrate monitoring in our evaluations. These evaluations are leading to draft indices based on ecoregion and land use. In the future we plan to develop objectives in our Basin Plan for biological integrity.

Objective #8 – Use a rotating watershed approach to collect data in each hydrologic unit at least once every 5 years . - We are using a rotating watershed approach. Our plans for monitoring specific watersheds in various hydrologic units so that we collect data in each hydrologic unit at least once every 5 years is illustrated in the following table. This objective is becoming more difficult to achieve with funding cutbacks in the program. Based on a 5-year review that will take place this year in coordination with the development of our interpretive report, we may change our study design to measure less parameters less frequently but cover a larger spatial area each year. The seven selection criteria for prioritizing watersheds include:

1. EXISTING LOCAL EFFORTS. Build on existing watershed monitoring and assessment efforts, including citizen monitoring.
2. SENSITIVE AQUATIC RESOURCES. Focus in areas with sensitive aquatic resources or species, such as habitat for the federally listed threatened species steelhead.
3. PRE-PROJECT INFORMATION. Collect pre-project ambient data in areas proposed for urbanization, stream restoration, or hydromodification.
4. WATERBODIES WITH LIMITED INFORMATION. Initiate monitoring in areas that have little or no current water quality and habitat information.
5. MONITOR IN ALL ECOREGIONS. Fill information gaps in certain ecoregions, for instance with stream bioassessment data to support biocriteria development or geomorphic data to support physical criteria development.
6. PAIRED WATERSHEDS. Monitor paired watersheds, with similar drainage area, land use, geology, vegetation, and climate for cross-comparison and testing of the ability to extrapolate findings from one watershed to another.
7. GEOGRAPHIC BALANCE. The prioritized list of watersheds should be balanced geographically and by ecoregion, in order to capture the full range of stream types in the region and to recognize watershed management efforts in all parts of the region.
8. HYDROLOGIC UNITS. Collect data in each hydrologic unit at least once every 5 years. There are 7 hydrologic units in this region.

The prioritization of these waterbodies may change if the information on which the prioritization was based changes. For instance, if a stormwater agency plans to monitor in a watershed that we planned to monitor we will encourage them to use SWAMP protocols and the QAMP but will probably postpone monitoring that watershed. Many of the watersheds that are planned farther in the future have current monitoring programs or have recently had extensive monitoring. The number of watersheds that have been planned to be monitored each year in this table will only be achieved if our budget is increased at least back to 2003-04 levels or our design is changed.

PLANNING WATERSHEDS

PRIORITY LISTING AND ORDER OF ROTATING BASIN MONITORING STRATEGY

NO.	PLANNING WATERSHED	STATUS	COUNTY	HYDROLOGIC UNIT	POTENTIAL REFERENCE SITES?
1	Walker Creek	Completed 2000-01	Marin	201	Yes
2	Lagunitas Creek	Completed 2000-01	Marin	201	Yes
3	Suisun Creek	Completed 2000-01	Napa/ Solano	207	No
4	Arroyo de las Positas	Completed 2000-01	Alameda/ Contra Costa	204	No
5	Wildcat/San Pablo Creeks	Completed 2000-01	Contra Costa/ Alameda	206	Yes
6	San Leandro Creek	Completed 2000-01	Alameda/ Contra Costa	204	Yes
7	San Gregorio Creek	Completed 2001-02	San Mateo	202	Yes
8	Pescadero/ Butano Creeks	Completed 2001-02	San Mateo	202	Yes
9	Stevens/ Permanente Creeks	Completed 2001-02	Santa Clara	205	Yes
10	San Mateo Creek	Completed 2002-03	San Mateo	204	Yes
11	Petaluma River	Completed 2002-03	Sonoma/ Marin	206	No
12	Mt. Diablo/ Kirker Creeks	Completed 2002-03	Contra Costa	207	Yes
13	Oakland Creeks	Planned for 2003-04 funding, implemented 2004-05	Alameda	204	No
14	Berkeley/ Richmond/El Cerrito	Planned for 2003-04 funding, implemented 2004-2005	Alameda/ Contra Costa/ San Francisco	203	No
15	Arroyo Mocho	Planned for 2003-04 funding, implemented 2004-2005	Alameda	204	Yes
16	San Francisco Creeks	Planned for 2004-2005	San Francisco	203/204	Maybe
17	South Marin Coastal Creeks	Planned for 2004-05	Marin	201	Yes

NO.	PLANNING WATERSHED	STATUS	COUNTY	HYDROLOGIC UNIT	POTENTIAL REFERENCE SITES?
18	Laguna Creek	Planned for 2005-06	Alameda	205	No
19	Green Valley/ W. Suisun	Planned for 2005-06	Solano	207	Maybe
20	Ledgewood/ Laurel Creeks	Planned for 2005-06	Solano	207	No
21	Guadalupe River	Planned for 2006-07	Santa Clara	205	Maybe
22	Los Gatos Creek	Planned for 2006-07	Santa Clara	205	Maybe
23	Pilarcitos Creek	Planned for 2006-07	San Mateo	202	Yes
24	Napa River	Planned for 2007-08	Napa	206	Yes
25	Napa River Estuary	Planned for 2007-08	Napa	206	Maybe
26	South Marin Bayside	Planned for 2007-08	Marin	203	Yes
27	Upper Walnut Creek	Planned for 2008-09	Contra Costa	207	Yes
28	Lower Walnut Creek	Planned for 2008-09	Contra Costa	207	No
29	San Francisquito Creek	Planned for 2008-09	Santa Clara/ San Mateo	205	Yes
30	Point Reyes Coastal Creeks	Planned for 2009-10	Marin	201	Yes
31	Mid San Mateo Coastal Creeks	Planned for 2009-10	San Mateo	202	Yes
32	Arroyo del Valle	Planned for 2009-10	Alameda	204	Yes
33	Palo Alto Creeks	Planned for 2010-11	Santa Clara	205	Yes
34	San Tomas/ Calabazas Creeks	Planned for 2010-11	Santa Clara	205	Yes
35	North San Mateo Bayside	Planned for 2010-11	San Mateo	204	No
36	Lower Alameda Creek	Planned for 2011-12	Alameda	204	No
37	Upper Alameda Creek	Planned for 2011-12	Alameda/ Santa Clara	204	Yes
38	Arroyo de la Laguna	Planned for 2011-12	Alameda/ Contra Costa	204	Maybe

NO.	PLANNING WATERSHED	STATUS	COUNTY	HYDROLOGIC UNIT	POTENTIAL REFERENCE SITES?
39	Northwest Contra Costa Creeks	Planned for 2012-13	Contra Costa	206	Yes
40	Sonoma Creek	Planned for 2012-13	Sonoma	206	Yes
41	Tomales Bay Creeks	Planned for 2012-13	Marin	201	Yes
42	North San Mateo Coastal Creeks	Planned for 2013-14	San Mateo/ San Francisco	202	Yes
43	South San Mateo Bayside	Planned for 2013-14	San Mateo	204	No
44	Alhambra Creek	Planned for 2013-14	Contra Costa	207	Yes
45	San Lorenzo Creek	Planned for 2014-15	Alameda	204	Yes
46	North Marin Bayside	Planned for 2014-15	Marin	206	Yes
47	Upper Coyote Creek	Planned for 2015-16	Santa Clara	205	Yes
48	Lower Coyote Creek	Planned for 2015-16	Santa Clara	205	Maybe

C. Deliverables Due Date – Samples will be collected in the fiscal year listed in the table above (except for 2003-04 since there was no contract that year). All samples will be collected within the 3 hydrologic cycles specified in the sampling design (see monitoring design). A field report will be due 1 month after sampling. Analytical data for metals and inorganics in water will be due 120 days after sampling. Analytical data for organics in water and all sediment and tissue data will be due 6 months after sampling. Draft toxicity test data will be due 30 days after sampling and final data will be due in 60 days. Bioassessment data will be due 9 months after sampling. All data collected under the Fish and Game contract will be incorporated in to the SWAMP database 1 month after final data is received. We plan to write an interpretive watershed report every 2 years. The first report, which includes years 2000-2001 and 2001-2002 watersheds, is planned to be released after peer review in February 2005. Reports were not written earlier because funding constraints held up sample analysis, QA and database entry. This problem has been addressed with SWAMP funds from 2004-05.

IV. 2004-05 Annual Workplan

A. Goal and Objectives

Goal

The goal of the SWAMP funded program in the San Francisco Bay Region is to monitor and assess water quality in all of the watersheds in the region to determine whether beneficial uses are protected.

Objectives

1. Monitor watersheds in South Coastal Marin and San Francisco, as well as watersheds that were planned for 2003-04.
2. Write two interpretive reports. One report will be on contaminants in fish in Tomales Bay and 10 reservoirs in the region. The other report will interpret data from the watersheds monitored in years one and two of the program.
3. Conduct a study to fill data gaps by sampling fish and measuring chemical concentrations in fish tissues in reservoirs already sampled but with an incomplete dataset.
4. Conduct a study to evaluate benthic macroinvertebrate data from reference sites in various ecoregions in the Region for the development of an Index of Biological Integrity (IBI).
5. Monitor temperature over an 8-month period in year one watersheds to evaluate temporal variability and to obtain data that covers a longer time period than was previously measured.

B. Method to achieve objectives

1. Monitor watersheds in South Coastal Marin and San Francisco, as well as watersheds that were planned for 2003-2004.– We have conducted reconnaissance and are obtaining permits to monitor South Coastal Marin and San Francisco watersheds in 2004-2005. Waterbodies in South Coastal Marin watersheds include Pine Gulch, Morses Gulch, McKinnan Gulch, Audubon Canyon, Easkoot, Webb, Redwood, Tennessee Valley and Rodeo Creeks and Bolinas and Rodeo Lagoons. Waterbodies in San Francisco watersheds include Presidio watersheds, Islais/Glen Canyon creeks and Lake Merced. Monitoring of these watersheds will start in April 2005. Since there was no contract to conduct monitoring in 2003-04 all watersheds planned to be monitored in 2003-04 will be monitored in 2004-05 starting in January 2005. These watersheds include urban waterbodies in Richmond, El Cerrito, Berkeley, and Oakland. Waterbodies include Baxter, Cerrito, Codornices, Strawberry, Temescal, Sausal, Glen Echo/Trestle Glen, Arroyo Viejo and Lion creeks. Arroyo Mocho, which is more rural, will also be monitored (see 2003-04 workplan).

2. Write two interpretive reports. One report will be on contaminants in fish in Tomales Bay and 10 reservoirs in the region. The other report will interpret data from the watersheds monitored in years one and two of the program. – On

October 14, 2004 we issued the draft report *Chemical Concentrations in Fish Tissues from Selected Reservoirs and Coastal Areas: San Francisco Bay Region*. This report analyzed fish tissue data from 11 waterbodies in the Region including Tomales Bay, Bon Tempe, Nicasio and Soulejule Reservoirs in Marin County; San Pablo and Lafayette Reservoirs in Contra Costa County; Lake Chabot, Shadow Cliffs and Del Valle Reservoirs in Alameda County; and Stevens Creek and Anderson Reservoirs in Santa Clara County. To prepare for the release of the report Water Board staff had a series of meetings with the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Health Services (DHS) all County Health Departments that had waterbodies on this list and water purveyors responsible for the reservoirs. We jointly developed a strategy to inform the public about this information in a clear and consistent manner. OEHHA issued fish consumption advisories for all reservoirs. They had previously issued an advisory for Tomales Bay. The Regional Water Board and OEHHA issued a press release the day the report was made public. The County Health Departments worked with responsible parties to make the advisories available to the public in English and six other languages and to develop fact sheets.

The second report is an interpretive report of water quality data from SWAMP watersheds sampled in years one and two (2000-01 and 2001-02) of SWAMP. These watersheds include Lagunitas, Walker, Wildcat/San Pablo, San Leandro, Suisun, Arroyo de las Positas, Stevens/Permanente, San Gregorio and Pescadero/Butano. We plan to issue this report after a peer review in February 2005.

3. Conduct a study to fill data gaps by sampling fish and measuring chemical concentrations in fish tissues in reservoirs already sampled but with an incomplete data set.- Regional Water Board staff consulted with OEHHA staff to develop a study design to fill data gaps in the reservoir data set for fish contamination. The study design is complete and is included in Appendix I. Sampling started in November 2004 and will continue in spring 2005. This data will allow OEHHA to develop more complete and final fish consumption advisories for all of the reservoirs.

4. Conduct a study to evaluate benthic macroinvertebrate data from reference sites in various ecoregions in the Region for the development of an Index of Biological Integrity (IBI). Nine benthic macroinvertebrate samples have been collected from reference sites representing various ecoregions in the Region. These samples will be analyzed and used to help to develop an IBI in coordination with BAMBI.

5. Monitor temperature over an 8-month period in year one watersheds to evaluate temporal variability and to obtain data that covers a longer time period than was previously measured. We will be using HOBO temps which will measure temperature continuously over an 8-month period in year one SWAMP

watersheds. In evaluating watershed data for the interpretive report we found that temperature and dissolved oxygen were the two parameters that most often exceeded water quality objectives/guidelines. By measuring temperature over an 8-month period we will be better able to determine whether temperature could be affecting salmonids in these watersheds. Using HOBO temps are also a cost effective method of evaluating temporal variability.

C. <u>Monitoring Plan</u>

Since the San Francisco Estuary Regional Monitoring Program (RMP) performs ongoing monitoring of San Francisco Estuary water quality, the Regional Water Board has decided to use SWAMP funds to concentrate on monitoring water quality in watersheds in the region. In previous years the Toxic Substances Monitoring Program funds have been used to measure contaminants in fish from reservoirs where people fish and consume the fish. Coastal Fish Contamination Program funds have been used to measure contaminants in fish that people consume in Tomales Bay and the ocean waters of the region. At this time the future and potential statewide objectives of these programs is undetermined.

The San Francisco Bay Region uses Fish and Game as our primary contractor through the state master contract. Regional Board staff conducts the background research on watersheds, establishes partnerships within watersheds, conducts reconnaissance, develops the study design, establishes access and obtains permits. In addition, Regional Board staff conducts continuous water quality monitoring by deploying probes, bacteriological monitoring and trash assessments.

At previous funding levels we had been monitoring three planning watersheds a year. However, due to funding cutbacks and an increase in cost to fund students to conduct in-house activities we will be monitoring one rural planning watershed and one urban watershed in 2004-05. With 2004-2005 funds we will be monitoring waterbodies along the rural south Marin coast. These waterbodies include Pine Gulch, Morses Gulch, McKinnan Gulch, Audubon Canyon, Easkoot, Webb, Redwood, Tennessee Valley and Rodeo Creeks , as well as Bolinas and Rodeo Lagoons. In addition, in San Francisco we will be monitoring Presidio creeks, Islais/Glen Canyon Creek and Lake Merced. A deterministic study design is used to select stations. Stations are selected that are at confluences (to determine the influence of a tributary), to identify potential reference conditions in areas of low impact land use, where there is previous data indicating a potential impact, to evaluate the potential impact of particular land uses and to determine if beneficial uses are being protected (i.e., water contact). Other reasons for station selection include locations of restoration projects and other monitoring efforts. Stations are also selected to create an even distribution of sampling locations throughout the watershed, so that data from adjacent stations can be compared to suggest future detailed monitoring to identify sources of water quality impact or improvement. In Rodeo and Bolinas lagoons stations will be selected based on previous data particularly relating to temperature, nutrients and dissolved oxygen.

A Tier 1 assessment is conducted at all stations in creeks. Tier 1 assessments include conducting rapid bioassessments with concurrent measurement of basic water quality parameters and visual physical habitat assessments. Rapid bioassessments occur in the spring. Continuous monitoring devices measuring temperature, pH, conductivity, and dissolved oxygen are deployed throughout the watersheds for one week intervals about 4 times per year. Tier 1 is designed to obtain better spatial coverage in determining the basic water quality of the watershed, to identify reference sites and to complement the evaluation of tier 2 sites where potential impacts are being evaluated.

Tier 2 of the design was developed to answer basic questions concerning protection of beneficial uses and potential impacts of land use and water management. Tier 2 stations are a subset of the tier 1 stations. At tier 2 stations samples will be collected during three hydrologic cycles. The 3 hydrologic cycles are the wet season (January - March), decreasing hydrograph /spring (April - May) and the dry season (June - July). Regardless of calendar month, the prevailing seasonal conditions will determine monitoring events. Additional samples and parameters to be evaluated in Tier 2 will depend on the beneficial uses or land uses at or above a site or on previous data indicating a potential impact. In evaluating potential impacts on aquatic life a triad approach is used with water column chemistry, toxicity tests and tier 1 bioassessments. Toxicity/chemistry samples will be collected synoptically during all 3 hydrologic cycles. These samples will be collected during the wet, spring, and dry seasons at the same time the conventional water quality samples are collected. Conventional water quality parameters include chlorophyll, ammonia, nitrate/nitrite, total nitrogen (by TKN), phosphate, alkalinity, hardness, total and dissolved organic carbon (TOC/DOC), total suspended solids (TSS), total dissolved solids (TDS-salinity) and major cations and anions. At the bottom of each watershed in the non-tidal area we establish one station, the integrator station, which will integrate the contaminant conditions in the waterbody and determine which contaminants from that waterbody flow into the receiving waters. At these stations, sediment samples will be collected for toxicity analysis, using *Hyalella*, grain size analysis and sediment chemistry. Sediment sampling will be concurrent with water sampling and occur in the spring season. Monitoring in Bolinas and Rodeo Lagoons will concentrate on temperature, dissolved oxygen, nutrients and chlorophyll.

Regional Water Board staff will collect samples for fecal coliforms and E.coli at stations where there is water contact recreation and/or there are potential sewage inputs. These pathogen indicators require five samples within 30 days to compare to objectives listed in the Basin Plan. Trash assessments are conducted by Regional Board staff four times a year, before and after the dry season and before and after the wet season. Assessments are conducted to determine how much trash and what kind of trash is in a watershed, whether trash accumulates due to runoff or dumping and how much trash accumulates over wet and dry time periods.

In evaluating previous SWAMP data, temperature and dissolved oxygen are the two parameters that most frequently exceed objectives/guidelines. For the first time HOBO temps will be placed in watersheds previously sampled to evaluate inter-annual

variability. Long-term (8 month) deployment of temperature probes also allows for a more complete evaluation of whether temperature could affect salmonids in creeks.

D. Deliverable(s) due date - Due to the inability to get the Fish and Game Master Contract in place before July 2004, we will be sampling 04-05 watersheds and 03-04 watersheds (see 2003-04 Workplan) at the same time. 2003-04 wet weather sampling will begin in January 2005. 2004-05 sampling will start in spring 2005. Spring sampling in 03-04 and 04-05 watersheds will take place in April/May 2005 and dry season sampling will take place in June/July 2005. Sampling dependant on Regional Water Board staff, which includes continuous monitoring, bacteriological monitoring and trash assessment has been completed for 03-04 watersheds. Regional Water Board staff will start to monitor these parameters in 04-05 watersheds in January 2005. Due dates for deliverables will be as described under the 5-year plan.

V. INTRA-AGENCY COORDINATION ACTIVITIES

Agency Group	Monitoring Program Description	Available Data Format	Using SWAMP QAPP	Data SWAMP compatible	Data used for 303(d) & 305(b)
Stormwater monitoring/permits	Region 2 is requiring monitoring consistent with SWAMP in Phase I stormwater permits that are being renewed. SWAMP staff coordinates with Watershed staff, that writes the permits, as well as the stormwater agencies and through the BASMAA (Bay Area Stormwater Management Agencies Association) Monitoring Committee. Marin and San Francisco County, where 2004-05 SWAMP monitoring is taking place, are under a Phase II permit that doesn't require monitoring. Marin County has been conducting monitoring similar to SWAMP for several years, however, none of this monitoring is in the area SWAMP is sampling during 2004 -05.	Data currently being collected and future data under Phase I permits will be consistent with SWAMP format. Some of the data previously collected is in an electronic form that would be SWAMP compatible.	X	X	X
TMDLs	SWAMP, 303(d) list development and TMDL development are in the same Division at Region 2. Monthly meetings are held where coordination and consistency are discussed. SWAMP staff coordinates with individual TMDL project managers on consistency with SWAMP in developing individual study designs. There are no TMDLs being developed for SWAMP 2004 - 05 watersheds.	Data currently being collected and future data will be consistent with SWAMP format or linked through other monitoring programs such as the San Francisco Estuary Regional Monitoring Program (RMP)		X	X
Grant Projects	A training has been conducted for Regional Board staff managing grant contracts and grant contractors on how to develop a QAPP, a monitoring plan and data management consistent with SWAMP. More trainings are planned. Monthly QA meetings for Regional Board staff and contractors are currently being held. There are currently no grant projects in the area to be monitored by SWAMP in 2004 - 05.	Data that will be collected in the future will be consistent with SWAMP format.	X	X	X
401 Certifications for Restoration Projects	SWAMP will be coordinating with the staff of the Watershed Division that has written 401 certifications for restoration projects in the area to be monitored by SWAMP in 2004-05 so that future monitoring of restoration projects will be coordinated with SWAMP. These projects include Big Lagoon and Banducci Salmonid Habitat Restoration on Redwood Cr., Easkoot Cr. Restoration, and Haypress Dam Restoration in Tennessee Valley.	Future data will be consistent with SWAMP format.		X	

IV. INTER-AGENCY COORDINATION ACTIVITIES

Agency/ Organization	Watershed	Monitoring Activities	Coordination Status
Federal			
National Park Service (NPS)	Table Rock, Webb, Redwood, Green Gulch, Tennessee Valley, Gerbode Valley, Rodeo Lagoon	Analysis of USGS water quality data in the Marin Headlands Golden Gate National Recreation Area (GGNRA), 1986-88. Provides baseline hydrologic data for eight stations (metals, temperature, pH, specific conductance, fecal coliforms, nutrients and organics; not flow).	Report acquired. Data will be used for comparison.
NPS	Redwood, Tennessee Valley, and Rodeo Creeks	Monitoring water quality in Redwood, Tennessee Valley, and Rodeo Creeks below stables on national park land (coliform bacteria, ammonia, total phosphorus, orthophosphate, nitrate, specific conductance, pH, total suspended solids, temperature, DO, copper, MBAS, and flow) since 1998 to protect Coho, trout, shrimp, and frogs.	Data sharing.
NPS and Parks Association	Lobos Creek	Dune restoration of endangered plant habitat next to Lobos Creek as mitigation for Richmond transport tunnel (city sewer system).	Consider restoration in data analysis. Information sharing and site access.
NPS	Pine, McKinnan, and Morses Gulches, and Easkoot Creek	Benthic macroinvertebrate sampling on Pine, McKinnan, and Morses Gulches, and Easkoot Creek. Monitoring flow in Pine Gulch. (2004, in progress)	Shared sites and data.
NPS (GGNRA)	Wilkins, Morses, McKinnan, and Stinson Gulches, and Easkoot Creek	Stream habitat, water quality, macroinvertebrate and fish monitoring, with references to historic data for tributaries on the east side of Bolinas Lagoon (1995 -2000).	Report acquired and available online. Data will be used for comparison.
NPS	Redwood Creek	Stream habitat and benthic macroinvertebrate sampling on Redwood Creek. (1995)	Report (2002) acquired and available online. Data will be used for comparison.
NPS	Redwood Creek	Sediment Budget for Redwood Creek, 2004. Flow, profile, and sediment data for 2003-2004.	Reports acquired. Consideration of data in data analysis.

Agency/ Organization	Watershed	Monitoring Activities	Coordination Status
Federal			
NPS and USGS	Redwood Creek	Big Lagoon small mammal survey	Report acquired and available online.
NPS (GGNRA)	Redwood Creek	Big Lagoon Restoration on Redwood Creek at Muir Beach; Many reports (1994, 2000, 2002, 2003) include water quality (DO, temperature, nutrients, flow), aquatic insects, fish, and bird data.	Reports acquired and available online. Data will be used for comparison.
Presidio Trust (NPS and GGNRA)	Mountain Lake	Mountain Lake Enhancement Project. No monitoring but plan includes dredging of Mtn Lake to remove nutrients and lower temperature. General restoration of lake also. See Mountain Lake Research Project below for monitoring in connection with this project.	Effects of project to be considered in data analysis.
Coho and Steelhead Restoration Project (CSRP)	Pine Gulch, Redwood Creek	CSRP (a 5-year collaboration of NPS, GGNRA, and MUWO) monitored trends in fish abundance and distribution and collects baseline watershed and habitat data in Lagunitas, Pine Gulch, and Redwood Creeks. NPS fish monitoring is ongoing.	Report (1997-2001) acquired and available online.
US Army Corps of Engineers (USACOE)	Bolinas Lagoon	Reconnaissance study in 1997, feasibility study in 1998, and Draft Feasibility Report and Draft EIR/EIS for the Bolinas Lagoon Ecosystem Restoration Project in 2002; the Corps is conducting additional sediment transport studies in the lagoon.	Reports acquired and available online; conclusions under review by MCOSD.
Gulf of the Farallones National Marine Sanctuary (GFNMS)	Bolinas Lagoon	GFNMS issues permits for any studies done in Bolinas Lagoon and helps manage the restoration, which is under GFNMS jurisdiction as an Area of Special Biological Significance.	Permit application requested.
NPS/The Presidio Trust and the San Francisco Public Utility Commission (SFPUC)	Lobos Creek	Lobos Creek is monitored for bacteria by the Presidio Trust. Analysis is conducted by the SFPUC. Continual monitoring of Lobos Creek intake for bacteria, nutrients, and temperature to meet DHS standards for drinking water.	Current data available online.

Agency/ Organization	Watershed	Monitoring Activities	Coordination Status
State			
California Department of Fish and Game (CDFG)	Redwood, Webb, Rodeo, Tennessee Valley	Stream surveys for Redwood Creek (1946, 1956, 1976), Webb Creek (1946, 1951), Tennessee Valley Creek (1946), Rodeo Creek (1946), Lake survey Rodeo Lagoon (1953).	Data acquired and available online. Used for historical reference.
California Department of Parks and Recreation (CDPR), Marin District	Lone Tree Creek, Redwood Creek	Decommissioning of ridgeline fire roads in Mt. Tamalpais watershed to reduce erosion: Coastal Fire Road in Redwood Creek watershed done in 2004, Lone Tree Fire Road planned for 2005.	Consider restoration in data analysis. Information sharing and possible site access.
CalTrans	Lone Tree Creek	ABA Consultants collected side-scan and bathymetry data for surveys conducted in 1993-1996 to monitor impact of CalTrans deposit from Lone Tree landslide.	Data available online. Impact of slide considered in data analysis.
Local			
Marin County Open Space District (MCOSD)	Bolinas Lagoon	For the Bolinas Lagoon Ecosystem Restoration, MCOSD, with the aid of a Technical Review Group, is conducting sediment coring to construct a sediment budget including a watershed component to help determine if the USACOE dredging intervention is warranted. Many reports document lagoon habitat. Report in progress due Feb 2005.	Information sharing. Reports acquired and available online.
Muir Beach Community Service District (MBCSD)	Redwood Creek	Monitors Redwood Creek flow to track effect of well pumping; test coliform only in distributed water; their adaptive management plan (in collaboration with NOAA, NPS, CDFG, and State Parks) proposes monitoring DO and temperature.	Site access and information sharing
Stinson Beach County Water District (SBCWD)	Easkoot Creek	Hydrologic Survey of groundwater levels and flow confirmed that Easkoot Creek intercepts groundwater and conveys it to Bolinas Lagoon; Nitrate loading analysis, ammonia, MBAS, and total and fecal coliform testing included. Summarizes Onsite Wastewater Management Program (OWMP) in quarterly reports submitted to SFB-RWQCB;	Hydrologic Survey (1998) acquired and available online. Information sharing.
San Francisco Public Utility Commission (SFPUC)	Lobos Creek at Baker Beach	Lobos Creek is monitored at Baker Beach for pathogens (total coliform bacteria) 3 times per week by the SFPUC.	Information sharing.

Agency/ Organization	Watershed	Monitoring Activities	Coordination Status
University			
University of California Berkeley (UCB)	Rodeo, Tennessee Valley, Redwood, and Stinson Creeks, and Pine Gulch	Water quality study (1998) on Rodeo, Tennessee Valley, Redwood, and Stinson Creeks, and Pine Gulch. (Data includes coliforms, TSS, ammonia, pH, DO, temperature, nutrients, and conductivity.)	Data acquired, considered in site selection and data analysis.
University of California Berkeley (UCB)	Lone Tree Creek, Webb Creek	Study on landslide at Lone Tree Creek (1982); Sediment budget on Lone Tree Creek. Webb Creek benthic macroinvertebrate sampling by graduate students.	Reports requested. Data will be used for comparison.
University of San Francisco: Institute of Chemical Biology	Rodeo Valley, Tennessee Valley, Redwood Creek, Mountain Lake	Rodeo Valley/ Tennessee Valley/Redwood Creek Water Quality Monitoring Report. Mountain Lake also monitored. October 1996-March 1997. Flow, temperature, DO, turbidity, SC, pH, TSS, NH3, orthophosphate, nitrate, and coliform bacteria.	Report acquired and available online from KRIS database. Data acquired from NPS, will be used for comparison.
Volunteer and Private			
Audubon Canyon Ranch (ACR)	Pike County Gulch, Garden Club, Audubon/Picher Canyon, Volunteer Canyon	Monitors and protects egret and heron rookeries along northeast Bolinas Lagoon watersheds.	Site access and information sharing.
Pine Gulch Creek Association	Pine Gulch	Commercial farmers monitor flow of Pine Gulch to determine effects of their diversions.	Contacts and information coordinated through NPS.
Point Reyes Bird Observatory (PRBO)	Bolinas Lagoon	Waterbird censuses in Bolinas Lagoon since 1971 to monitor change in habitat, confirming accelerated sedimentation and to be used as a comparison benchmark for any proposed restoration.	Consider census in data analysis. Information sharing.
Point Reyes Bird Observatory (PRBO)	Bolinas Lagoon	Trophic relationships between shorebirds and their prey (1983).	Consider invertebrate data if Bolinas Lagoon monitoring is permitted. Information sharing.
Point Reyes Bird Observatory (PRBO)	Pine Gulch	Palomarin Long-Term Demographic Monitoring of Landbirds includes daily census on Pine Gulch.	Consider census in data analysis. Information sharing.

Agency/ Organization	Watershed	Monitoring Activities	Coordination Status
Volunteer and Private			
Green Gulch Zen Center (GGZC)	Redwood Creek, Green Gulch	GGZC uses Green Gulch for farm irrigation and holding ponds; is concerned about *Egeria densa* infestation, septic leakage into Big Lagoon from horse pasture; implements best management practices.	Site access and information sharing.
Friends of Mountain Lake Park	Lobos Creek	Partners with GGNRA, Presidio Trust, NPS, and Cal Academy. Involved with Mountain Lake projects listed here including The Mountain Lake Enhancement Project.	Not applicable

Appendix I

Region 2 Study Design for Bioaccumulation Study

Reservoir	Species	Number of Composites	Organic analysis (PCBs and pesticides)	Hg analysis
Lexington Reservoir	Channel Catfish	3	2	3
	Carp	3	2	3
	Sunfish	3	2	3
	LMB		2	
	Trout	3	2	3
Lake Chabot	CCF	2	2	2
	Sunfish	1	1	1
	Trout	3	2	3
	Hatchery CCF *	2	2	2
Shadow Cliffs Reservoir	LMB	3	2	3
	CCF	3	2	3
	Carp	3	2	3
	Trout	3	2	3
Lafayette Reservoir	CCF	2	2	2
	Goldfish	2	2	
	Blackfish	3	2	3
	Trout	3	2	3
Bon Tempe	LMB	3	2	3
	CCF	3	2	3
	Trout	3	2	3
Anderson Reservoir	CCF	3	2	3
	Trout	3	2	3

LMB – Large mouth bass
CCF – Channel catfish
Sunfish – Redear Sunfish

* If funds are available