SAN FRANCISCO BAY BASIN (REGION 2)

WATER QUALITY CONTROL PLAN

(BASIN PLAN)

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

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Incorporating all amendments approved by the Office of Administrative Law as of January 18, 2007.

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CHAPTER 1: INTRODUCTION

1.1 THE SAN FRANCISCO BAY REGION

The San Francisco Bay Region (Region) is 4,603 square miles, roughly the size of the State of Connecticut, and characterized by its dominant feature, 1,100 square miles of the 1,600 square mile San Francisco Bay Estuary (Estuary), the largest estuary on the west coast of the United States, where fresh waters from California's Central Valley mix with the saline waters of the Pacific Ocean. The Region also includes coastal portions of Marin and San Mateo counties, from Tomales Bay in the north to Pescadero and Butano Creeks in the south.

The Estuary conveys the waters of the Sacramento and San Joaquin rivers into the Pacific Ocean. Located on the central coast of California (Figure 1-1), the Bay system functions as the only drainage outlet for waters of the Central Valley. It also marks natural topographic separation between the northern and southern coastal mountain ranges. The Region's waterways, wetlands, and bays form the centerpiece of the United States' fourth-largest metropolitan region, including all or major portions of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

Because of its highly dynamic and complex environmental conditions, the Bay system supports an extraordinarily diverse and productive ecosystem. Within each section of the Bay lie deepwater areas that are adjacent to large expanses of very shallow water. Salinity levels range from hypersaline to fresh water, and water temperature varies throughout the Bay system. These factors greatly increase the number of species that can live in the Estuary and enhance its biological stability.

The Bay system's deepwater channels, tidelands, marshlands, freshwater streams, and rivers provide a wide variety of habitats that have become increasingly vital to the survival of several plant and animal species as other estuaries are reduced in size or lost to development. These areas sustain rich communities of crabs, clams, fish, birds, and other aquatic life and serve both as important wintering sites for migrating waterfowl and as spawning areas for anadromous fish.

1.2 THE BAY SYSTEM'S SURFACE WATER & GROUNDWATER

The Sacramento and San Joaquin rivers, which enter the Bay system through the Delta at the eastern end of Suisun Bay, contribute almost all the freshwater inflow to the Bay. Many small rivers and streams also convey fresh water to the Bay system. The rate and timing of these freshwater flows are among the most important factors influencing physical, chemical, and biological conditions in the Estuary. Much of the freshwater inflow, however, is trapped upstream by the dams, canals, and reservoirs of California's water diversion projects, which provide vital water to industries, farms, homes, and businesses throughout the state. This freshwater diversion has sparked statewide controversy over possible adverse effects on the Estuary's water quality, fisheries, and ecosystem.

Flows in the Region are highly seasonal, with more than 90 percent of the annual runoff occurring during the winter rainy season between October and April. Many streams go dry during the middle or late summer. For example, the Napa River, which is least affected by

upstream regulation, clearly shows the seasonal nature of runoff. Only 4-1/2 percent of this river's average annual runoff occurs during the summer months.

Groundwater is an important component of the hydrologic system in the Region. Groundwater provides excellent natural storage, distribution, and treatment systems. Groundwater also supplies high quality water for drinking, irrigation, and industrial processing and service. As an important source of freshwater replenishment, groundwater may also discharge to surface streams, wetlands, and San Francisco Bay.

A variety of historical and ongoing industrial, urban, and agricultural activities and their associated discharges degrade groundwater quality, including industrial and agricultural chemical spills, underground and above-ground tank and sump leaks, landfill leachate, septic tank failures, and chemical seepage via shallow drainage wells and abandoned wells. In addition, saltwater intrusion directly attributed to over- pumping has degraded the purity of some groundwater aquifers.

These adverse impacts on groundwater quality often have long-term effects that are costly to remediate. Consequently, as additional discharges are identified, source removal, pollution containment, and cleanup must be undertaken as quickly as possible. Activities that may potentially pollute groundwater must be managed to ensure that groundwater quality is protected.

1.3 PROTECTING SAN FRANCISCO BAY: THE WATER BOARD

Because of its unique characteristics, the San Francisco Bay estuarine system merits special protection. The adverse effects of waste discharges must be controlled. Extensive upstream water diversions must be limited, and their effects mitigated. To address these and other water issues, the California Legislature established the State Water Resources Control Board (State Water Board) and the nine Regional Water Quality Control Boards (Regional Water Boards) in 1949. Operating under the provisions of the California Water Code (Water Code), their unique relationship couples state-level coordination and regional familiarity with local needs and conditions. Their joint actions constitute a comprehensive program for managing water quality in California, as well as for effective state administration of federal water pollution control laws.

The State Water Board administers water rights, water pollution control, and water quality functions for the state as part of the California Environmental Protection Agency (Cal/EPA). It provides policy guidance and budgetary authority to the Regional Water Boards, which conduct planning, permitting, and enforcement activities. The State Water Board shares authority for implementation of the federal Clean Water Act and the state Porter-Cologne Act with the Regional Water Boards.

The San Francisco Bay Regional Water Quality Control Board (Water Board) regulates surface water and groundwater quality in the Region. The area under the Water Board's jurisdiction comprises all of the San Francisco Bay segments extending to the mouth of the Sacramento-San Joaquin Delta (Winter Island near Pittsburg).

California's governor appoints the nine-member Water Board, whose members serve for four-year terms. Water Board members must reside or maintain a place of business within the Region and must be associated with or have special knowledge of specific activities related to water quality control. Members of the Water Board serve without pay and conduct their business at regular meetings and frequent public hearings where public participation is encouraged.

The Water Board's overall mission is to protect surface waters and groundwater in the Region. The Water Board carries out its mission by:

- Addressing Region-wide water quality concerns through the creation and triennial update of a Water Quality Control Plan (Basin Plan);
- Preparing new or revised policies addressing Region-wide water quality concerns;
- Adopting, monitoring compliance with, and enforcing waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permits;
- Providing recommendations to the State Water Board on financial assistance programs, proposals for water diversion, budget development, and other statewide programs and policies;
- Coordinating with other public agencies that are concerned with water quality control; and
- Informing and involving the public on water quality issues.

1.4 WATER QUALITY CONTROL PLAN

By law, the Water Board is required to develop, adopt (after public hearing), and implement a Basin Plan for the Region. The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the Region. The plan must include:

- A statement of beneficial water uses that the Water Board will protect;
- The water quality objectives needed to protect the designated beneficial water uses; and
- The strategies and time schedules for achieving the water quality objectives.

The Water Board first adopted a plan for waters inland from the Golden Gate in 1968. After several revisions, the first comprehensive Basin Plan for the Region was adopted by the Water Board and approved by the State Water Board in April 1975. Subsequently, major revisions were adopted in 1982, 1986, 1992, 1995, 2002, and 2004. Each proposed amendment to the Basin Plan is subject to an extensive public review process. The Water Board must then adopt the amendment, which is then subject to approval by the State Water Board. In most cases, the Office of Administrative Law and the U.S. Environmental Protection Agency (U.S. EPA) must approve the amendment as well.

The basin planning process drives the Water Board's effort to manage water quality. The Basin Plan provides a definitive program of actions designed to preserve and enhance water quality and to protect beneficial uses in a manner that will result in maximum benefit to the people of California. The Basin Plan fulfills the following needs:

- The U.S. EPA requires such a plan in order to allocate federal grants to cities and districts for construction of wastewater treatment facilities.
- The Basin Plan provides a basis for establishing priorities as to how both state and federal grants are disbursed for constructing and upgrading wastewater treatment facilities.
- The Basin Plan fulfills the requirements of the Porter-Cologne Act that call for water quality control plans in California.
- The Basin Plan, by defining the resources, services, and qualities of aquatic ecosystems to be maintained, provides a basis for the Water Board to establish or revise waste discharge requirements and for the State Water Board to establish or revise water rights permits.
- The Basin Plan establishes conditions (discharge prohibitions) that must be met at all times.
- The Basin Plan establishes or indicates water quality standards applicable to waters of the Region, as required by the federal Clean Water Act.
- The Basin Plan establishes water quality attainment strategies, including total maximum daily loads (TMDLs) required by the Clean Water Act, for pollutants and water bodies where water quality standards are not currently met.

The intent of this comprehensive planning effort is to provide positive and firm direction for future water quality control. However, adequate provision must be made for changing conditions and technology. The Water Board will review the Basin Plan at least once every three years. Unlike traditional plans, which often become obsolete within a few years after their preparation, the Basin Plan is updated as deemed necessary to maintain pace with technological, hydrological, political, and physical changes in the Region.

This Basin Plan contains water quality regulations adopted by the Water Board, and approved by the State Water Board, the Office of Administrative Law, and U.S. EPA. It also contains statewide regulations adopted by the State Water Board and other state agencies that refer to activities regulated by the Water Board. For the most recent list of statewide regulations applicable in the Region, please refer to the State Water Board's "Compendium of Current, Statewide Applicable Water Quality Regulations." Federal laws and regulations also specify water quality standards and are available at U.S. EPA's website.

1.5 WATERSHED MANAGEMENT PLANNING

In 1995, the Water Board initiated a watershed management approach to regulating water quality, expanding its primary focus from point sources of pollution to include more diffuse sources such as urban and agricultural runoff. A five-year statewide Strategic Plan was completed in 2001 and guides the water resource protection efforts by the State and Regional Water Boards. A key component of the Strategic Plan is the Watershed Management Initiative (WMI).

A watershed is the area of land drained by a stream or river system. It is where water precipitates and collects, extending from ridges down to the topographic low points where the water drains into a river, bay, ocean, or other water body. A watershed includes surface water bodies (e.g., streams, rivers, lakes, reservoirs, wetlands, and estuaries), groundwater (e.g., aquifers and

groundwater basins) and the surrounding landscape. Watershed management is a strategy for protecting water quality in all water bodies by looking at all components that make up a watershed area, including the natural environment, water supply, land uses and their effects on drainage, wastewater collection and discharges, and the ways humans interact with the water bodies.

In the Water Board's watershed management approach to water quality protection, water resource problems are identified and prioritized primarily on the basis of water quality within individual watersheds (i.e., the geographic drainage areas and groundwater basins used for management purposes). Unique solutions are developed for each watershed that consider all local conditions and pollution sources and rely on the input and involvement of local stakeholders. Major features of a watershed management approach are: targeting priority problems based on water quality information and monitoring, promoting stakeholder involvement in prioritization and management decisions, developing integrated solutions that make use of the expertise and authority of multiple agencies and organizations, and measuring success through monitoring and other collected data. The approach culminates in the creation and implementation of "watershed action plans."

The water quality of many water bodies continues to be degraded from pollutants discharged from diffuse sources, referred to as nonpoint sources, and from the cumulative impacts of multiple point sources such as drainage from urban areas, known as urban runoff. This degradation persists despite successful pollutant reduction efforts in the regulation of municipal and industrial wastewater point source discharges through the NPDES program. Watershed management represents a shift from the approach that focuses on regulation of point sources to a more regional approach that acknowledges environmental impacts from all activities, and prioritizes regulation of these activities with input from local stakeholders.

Watersheds transcend political, social, and economic boundaries. It is important to engage all affected stakeholders in designing and implementing goals for the watershed to protect water quality. Groups formed to create watershed action plans may include representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens and others. Tasks in a watershed action plan could include a wide range of actions, such as improving coordination between regulatory and permitting agencies, increasing citizen participation in watershed planning activities, improving public education on water quality and protection issues, and enforcing current regulations on a more consistent and prioritized basis.

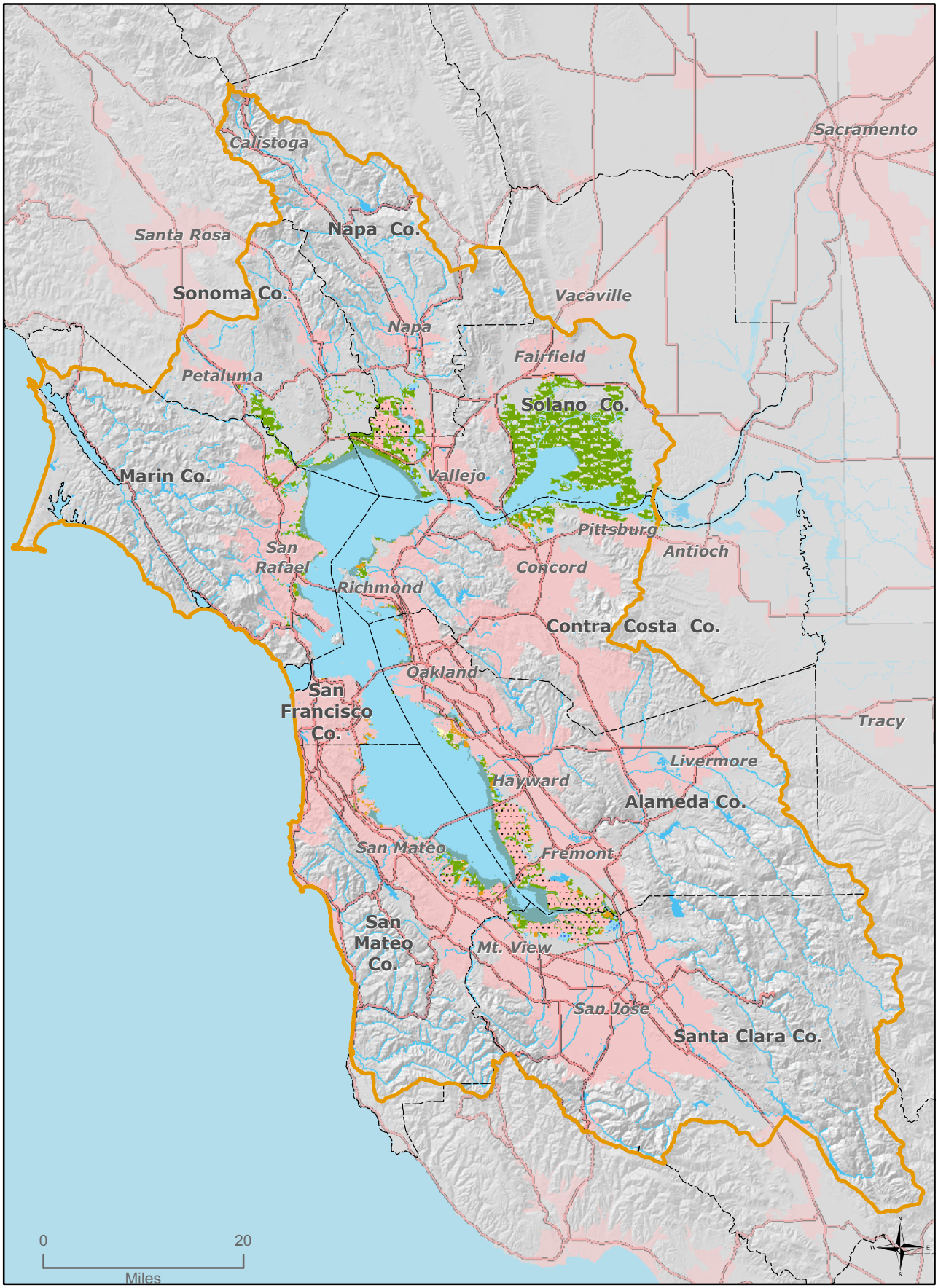
1.6 THE SAN FRANCISCO ESTUARY PROJECT

The Water Board has been an active participant in the San Francisco Estuary Project (Estuary Project), a cooperative program aimed at promoting effective, environmentally sound management of the San Francisco Bay Estuary while protecting and restoring its natural resources. In 1993, the Estuary Project reached its goal of developing a Comprehensive Conservation and Management Plan (CCMP). The CCMP addresses five critical concerns identified by the Estuary Project's broad-based advisory committees: decline of biological resources; increased pollutants; freshwater diversion and altered flow regime; dredging and waterway modification; and intensified land use.

Implementation of the CCMP's over 140 recommended actions has been ongoing since the early 1990s. The Water Board serves as lead state agency, undertaking responsibility for ensuring that CCMP actions are carried out. The Estuary Project's Public Involvement and Education Program, which seeks to inform and involve the public in Estuary issues, is currently housed at the Water Board office.

FIGURES

Figure 1-1 San Francisco Bay Basin



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CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Regional Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of surface waters, groundwaters, marshes, and mudflats presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain this goal.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Regional Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (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 hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The 2001 California Ocean Plan (see Chapter 5) prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance

of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

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.

Cold freshwater habitats generally support trout and may support the anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 OCEAN, COMMERCIAL, AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms in oceans, bays, and estuaries, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain ocean fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

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.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperatur and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRESH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

2.1.7 GROUNDWATER RECHARGE (GWR)

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. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

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 repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or 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 criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

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 provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. 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, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

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.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PROC)

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. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

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, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.16 NONCONTACT WATER RECREATION (REC2)

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. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

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. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

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.

2.1.19 WARM FRESHWATER HABITAT (WARM)

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 nonfish 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 natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

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 waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, andsedimentation, as well as 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 characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 PRESENT AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), industrial process supply (PRO), groundwater recharge (GWR), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN). The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to all of the uses supported by streams.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); ocean, commercial and sport fishing (COMM); and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

Beneficial uses of each significant water body have been identified and are organized according to the seven major hydrologic units within the Region (Figure 2-2). Table 2-1 contains the beneficial uses for water bodies that have been designated in the Region. The maps locating each water body (Figures 2-3 through 2-9) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the

Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

2.2.2 GROUNDWATER

Groundwater is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Water-bearing geologic units occur within groundwater basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term "groundwater" includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The California Department of Water Resources (DWR) evaluated the characteristics of groundwater basins in the Region and throughout the state and summarized the results in California's Groundwater, Bulletin 118 (2003). Of special importance to the Region are the 28 groundwater basins and seven sub-basins classified by DWR that produce, or potentially could produce, significant amounts of groundwater (Figures 2-10 and 2-10A-D). The Water Board maintains a GIS for all water bodies in the Region and has the capacity to present information on each basin at a much higher level of resolution than is depicted in Figures 2-10A-D.

Existing and potential beneficial uses applicable to groundwater in the Region include municipal and domestic water supply (MUN), industrial water supply (IND), industrial process supply (PRO), agricultural water supply (AGR), groundwater recharge (GWR), and freshwater replenishment to surface waters (FRESH). Table 2-2 lists the 28 identified groundwater basins and seven sub-basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Water Board, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Water Board Resolution No. 89-39, "Sources of Drinking Water," where:

- The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, μS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices (BMPs) or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or

- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

2.2.3 WETLANDS

Federal administrative law (e.g., 40 CFR Part 122.2, revised December 22, 1993) defines wetlands as waters of the United States. National waters include waters of the State of California, defined by the Porter-Cologne Act as "any water, surface or underground, including saline waters, within the boundaries of the State" (California Water Code §13050[e]). Wetland water quality control is therefore clearly within the jurisdiction of the State Water Board and Regional Water Boards.

Wetlands are further defined in 40 CFR 122.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Water Board recognizes that wetlands frequently include areas commonly referred to as saltwater marshes, freshwater marshes, open or closed brackish water marshes, mudflats, sandflats, unvegetated seasonally ponded areas, vegetated shallows, sloughs, wet meadows, playa lakes, natural ponds, vernal pools, diked baylands, seasonal wetlands, floodplains, and riparian woodlands.

Mudflats make up one of the largest and most important habitat types in the Estuary. Snails, clams, worms, and other animals convert the rich organic matter in the mud bottom to food for fish, crabs, and birds.

Mudflats generally support a variety of edible shellfish, and many species of fish rely heavily on the mudflats during at least a part of their life cycle. Additionally, San Francisco Bay mudflats are one of the most important habitats on the coast of California for millions of migrating shorebirds.

Another important characteristic of the Estuary is the fresh, brackish, and salt water marshes around the Bay's margins. These highly complex communities are recognized as vital components of the Bay system's ecology. Most marshes around the Bay have been destroyed through filling and development. The protection, preservation, and restoration of the remaining marsh communities are essential for maintaining the ecological integrity of the Estuary.

Identifying wetlands may be complicated by such factors as the seasonality of rainfall in the Region. Therefore, in identifying wetlands considered waters of the United States, the Water Board will consider such indicators as hydrology, hydrophytic plants, and/or hydric soils for the purpose of mapping and inventorying wetlands. The Water Board will, in general, rely on the federal manual for wetland delineation in the Region when issuing Clean Water Act Section 401 water quality certifications (U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual, 1987). In the rare cases where the U.S. EPA and Corps guidelines disagree on the boundaries for federal juridictional wetlands, the Water Board will rely on the wetlands delineation made by the

U.S. EPA or the California Department of Fish and Game (CDFG). For the purpose of mapping and inventorying wetlands, the Water Board will rely on the protocols and naming conventions of the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS).

Many individual wetlands provide multiple benefits depending on the wetland type and location. There are many potential beneficial uses of wetlands, including Wildlife Habitat (WILD); Preservation of Rare and Endangered Species (RARE); Shellfish Harvesting (SHELL); Water Contact Recreation (REC1); Noncontact Water Recreation (REC2); Ocean, Commercial, and Sport Fishing (COMM); Marine Habitat (MAR); Fish Migration (MIGR); Fish Spawning (SPAWN); and Estuarine Habitat (EST). Some of these general beneficial uses can be further described in terms of their component wetland function. For example, many wetlands that provide groundwater recharge (GWR) also provide flood control, pollution control, erosion control, and stream baseflow.

Table 2-3 shows how beneficial uses are associated with different wetland types. Table 2-3 lists and specifies beneficial uses for 34 significant wetland areas within the Region; generalized locations of these wetlands are shown in Figure 2-11. It should be noted that most of the wetlands listed in Table 2-3 are saltwater marshes, and that the list is not comprehensive.

The Water Board has participated in completing the Baylands Ecosystem Habitat Goals Report (1999) and the Baylands Ecosystem Species and Community Profiles (2000), which were written by scientists and managers in the Region in order to recommend sound wetland restoration strategies. Other efforts around the Bay to locate wetland sites include San Francisco Estuary Institute's (SFEI) EcoAtlas Baylands Maps (Baylands Maps) and Bay Area Wetlands Project Tracker (Wetlands Tracker), and the Wetland Tracker managed by the San Francisco Bay Joint Venture. Because of the large number of small and non-contiguous wetlands, it is not practical to delineate and specify beneficial uses of every wetland area. Therefore, beneficial uses may be determined site specifically, as needed. Chapter 4 of this Plan contains additional information on the process used to determine beneficial uses for specific wetland sites.

FIGURES

Figure 2-1: Areas of Special Biological Significance

Figure 2-2: Hydrologic Planning Areas

Figure 2-3: Marin Coastal Basin

Legend for Figures 2-3 through 2-9

Figure 2-4: San Mateo Coastal Basin

Figure 2-5: Central Basin

Figure 2-6: South Bay Basin

TABLES

Figure 2-1 Areas of Special Biological Significance

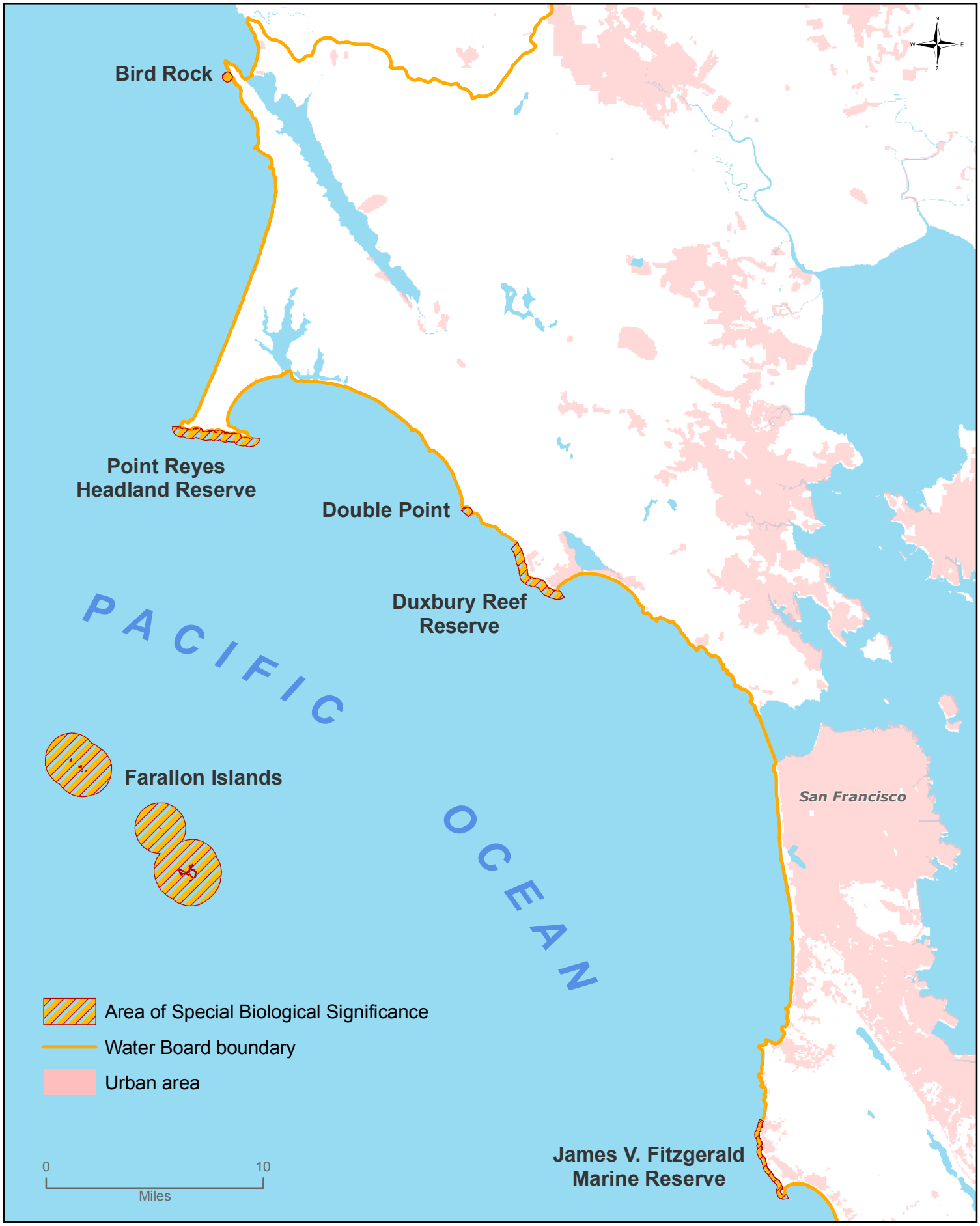
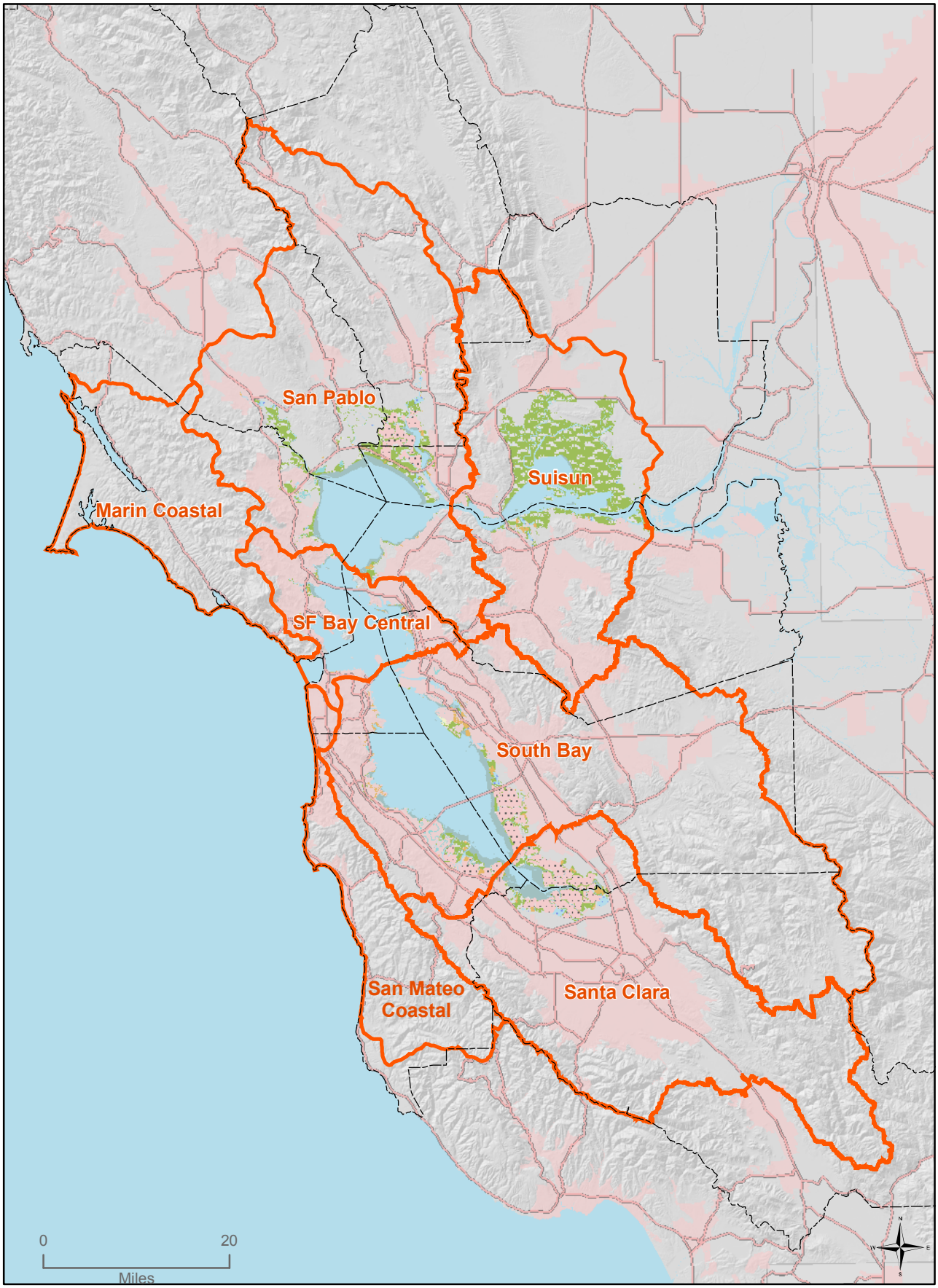


Figure 2-2 Hydrologic Planning Areas



Legend for Figures 2-3 to 2-9

Watershed boundaries


Basin boundary

Watershed boundary

Hydrologic features


Streams / creeks listed in Table 2-1


Other streams / tributaries

Bay or ocean


Lake, reservoir or other water body

Other features


County boundary


Major road or highway

Urban area

Wetlands


Marshlands


Salt pond


Tidal flats


Storage or treatment basin


Undeveloped fill

Sand dune


Other baylands

All maps are in Universal Transverse Mercator projection (Zone 10), North American Datum 1983.

<u>Map sources:</u>

Basin boundaries: California Interagency Watershed Map of 1999 (CalWater 2.2.1).

Watershed boundaries: California Interagency Watershed Map of 1999 (CalWater 2.2.1); Contra Costa County Watershed Atlas; Creek and Watershed Map of Oakland and Berkeley (Oakland Museum of California); Creek and Watershed Map of Milpitas and North San Jose (Oakland Museum of California); Creek and Watershed Map of Palo Alto and Vicinity (Oakland Museum of California); Creek and Watershed Map of Fremont and Vicinity (Oakland Museum of California); Creek and Watershed Map of the Pleasanton and Dublin Area (Oakland Museum of California).

Hydrologic features: National Hydrologic Dataset (1:24000 scale) for hydrologic unit numbers 18050001 (Suisun), 18050002 (San Pablo), 18050003 (Santa Clara), 18050004 (South Bay), 18050005 (Marin Coastal) and 18050006 (San Mateo Coastal).

Wetlands: San Francisco Estuary Institute EcoAtlas (v. 1.50b4).

County boundaries: California Spatial Information Library.

Major roads and highways: GDT 2004.

Urban areas: Association of Bay Area Governments Land Use / Land Cover dataset, 1996, land use category 1 (urban areas).

Figure 2-3 Marin Coastal Basin

Figure 2-4 San Mateo Coastal Basin

Figure 2-5 Central Basin

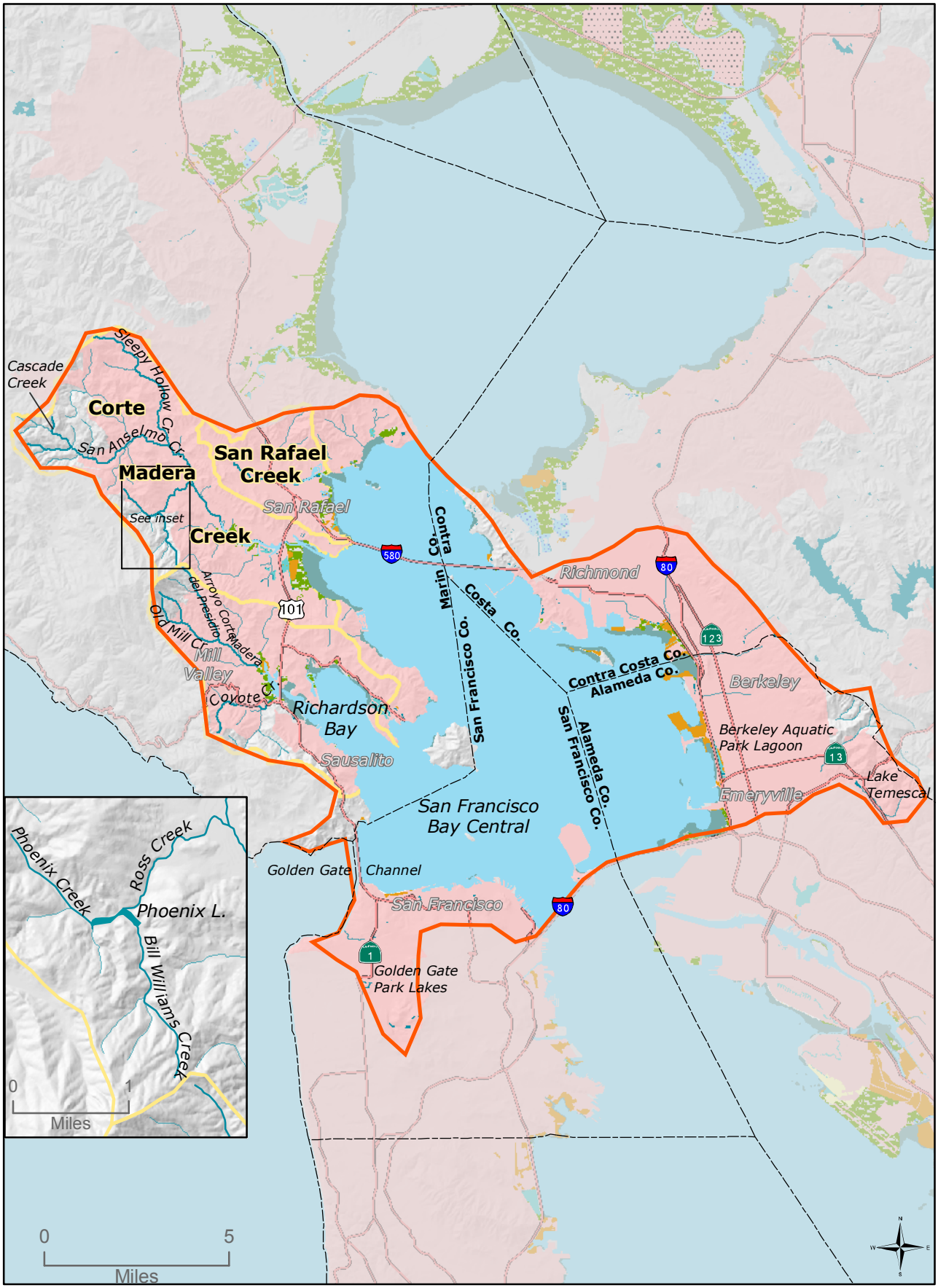


Figure 2-6 South Bay Basin

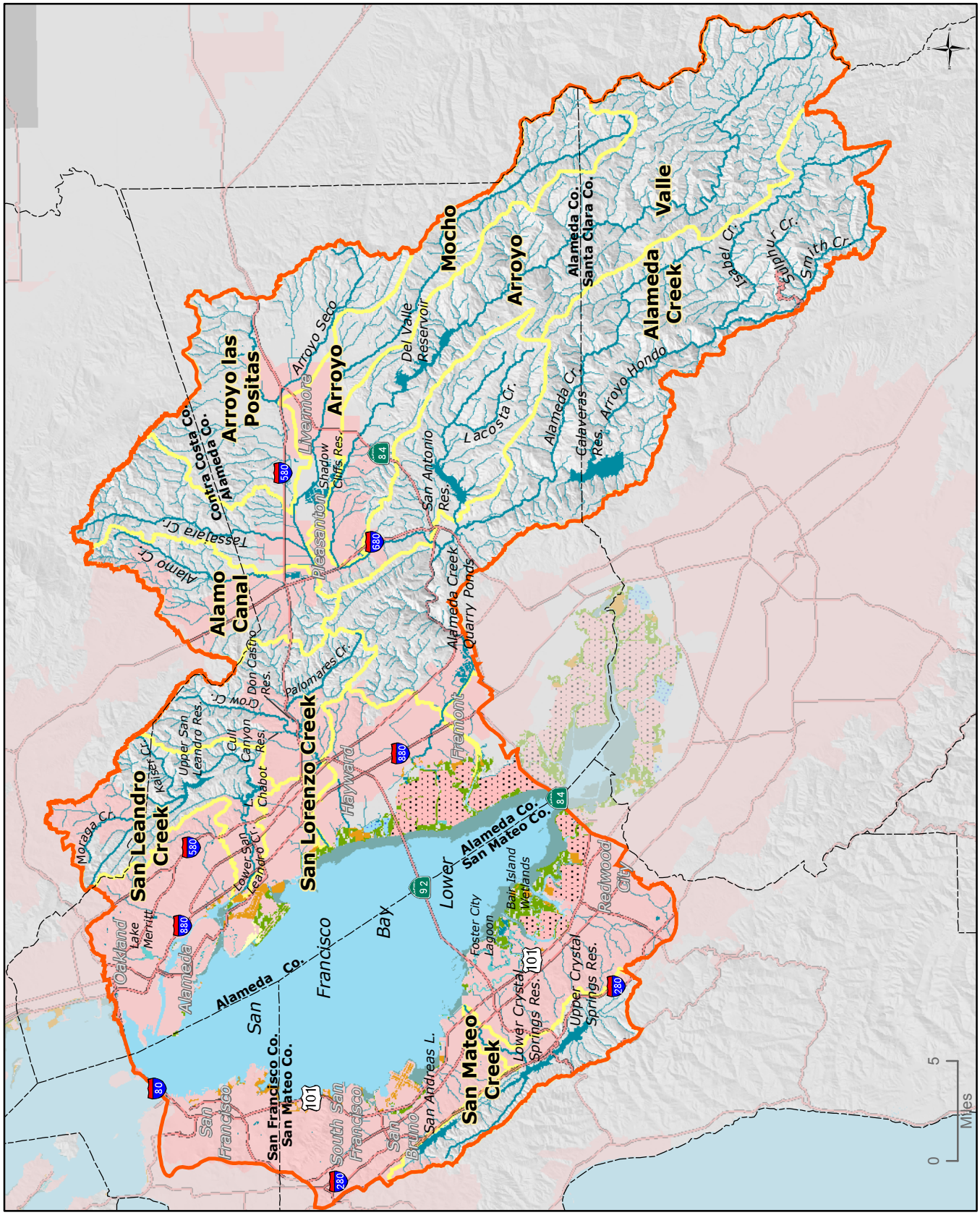


Figure 2-7 Santa Clara Basin

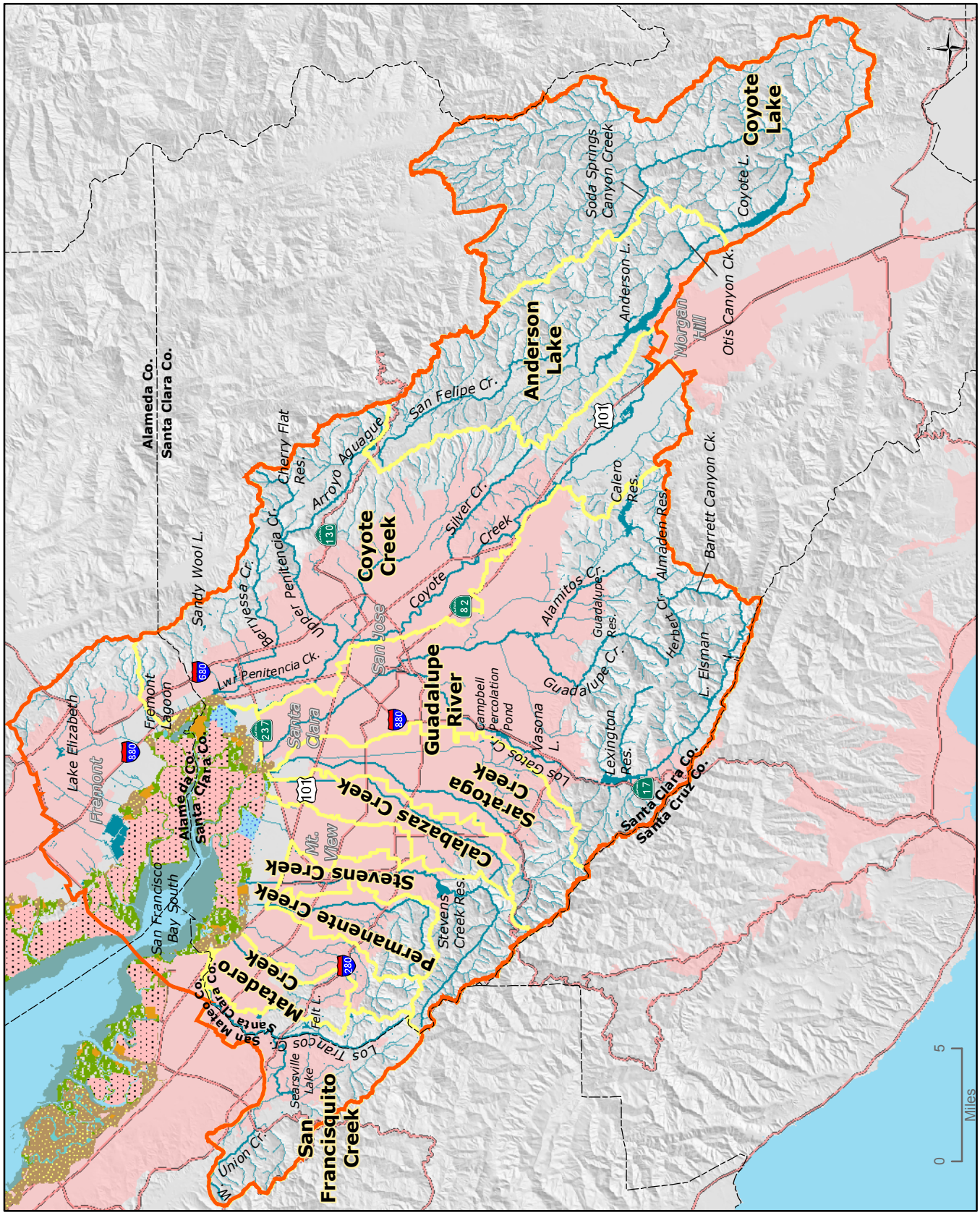


Figure 2-8 San Pablo Basin

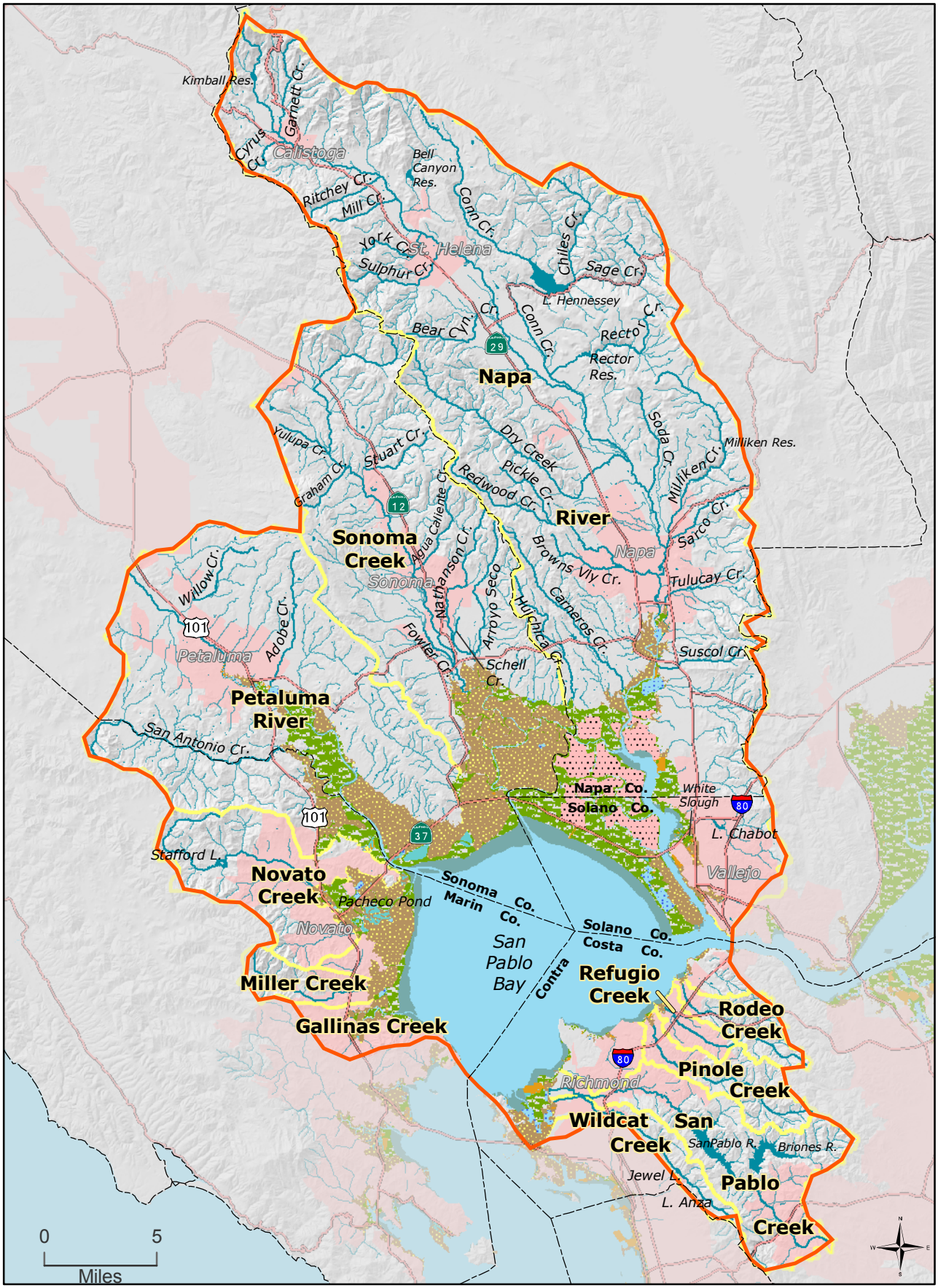


Figure 2-9 Suisun Basin

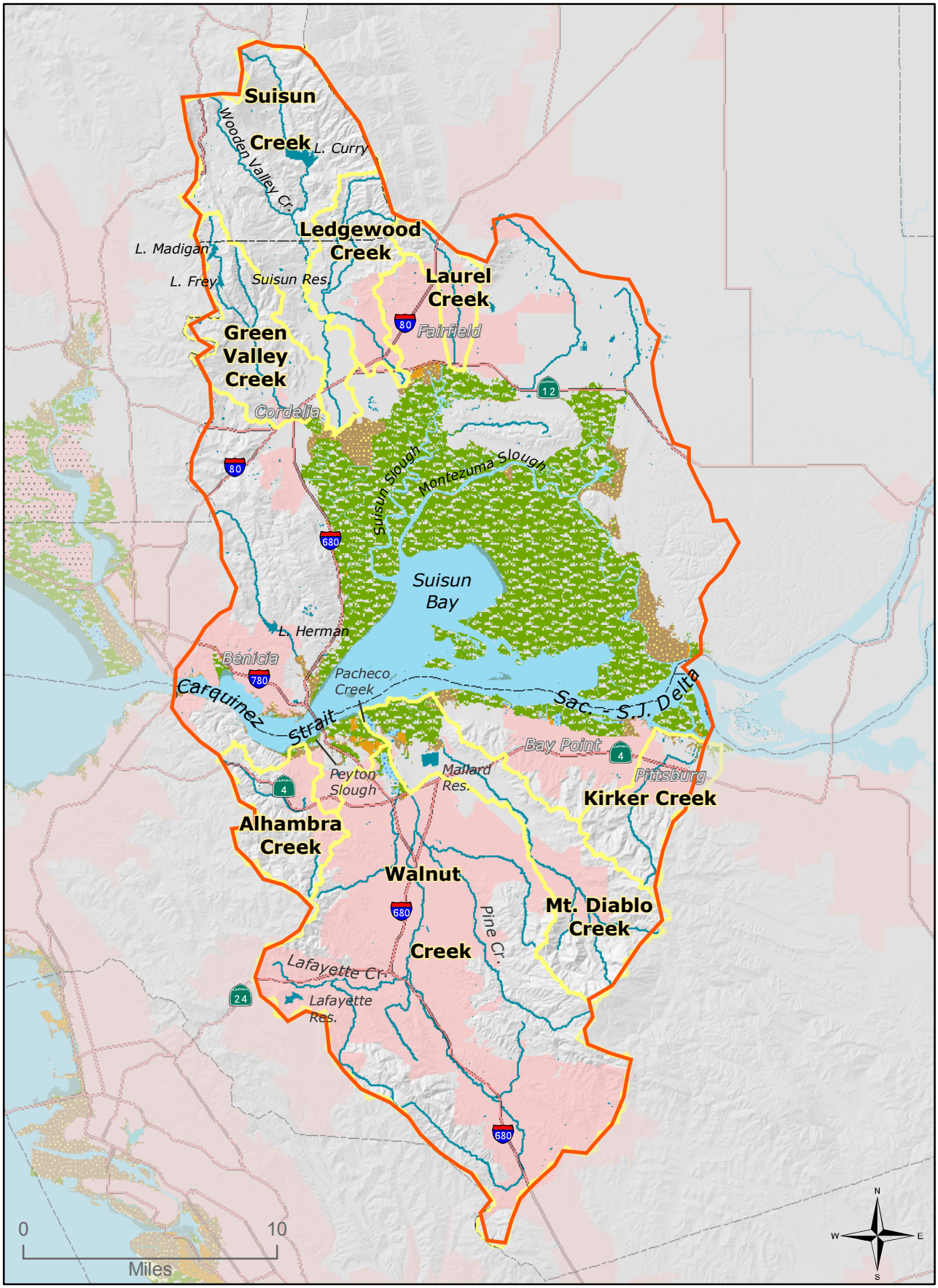
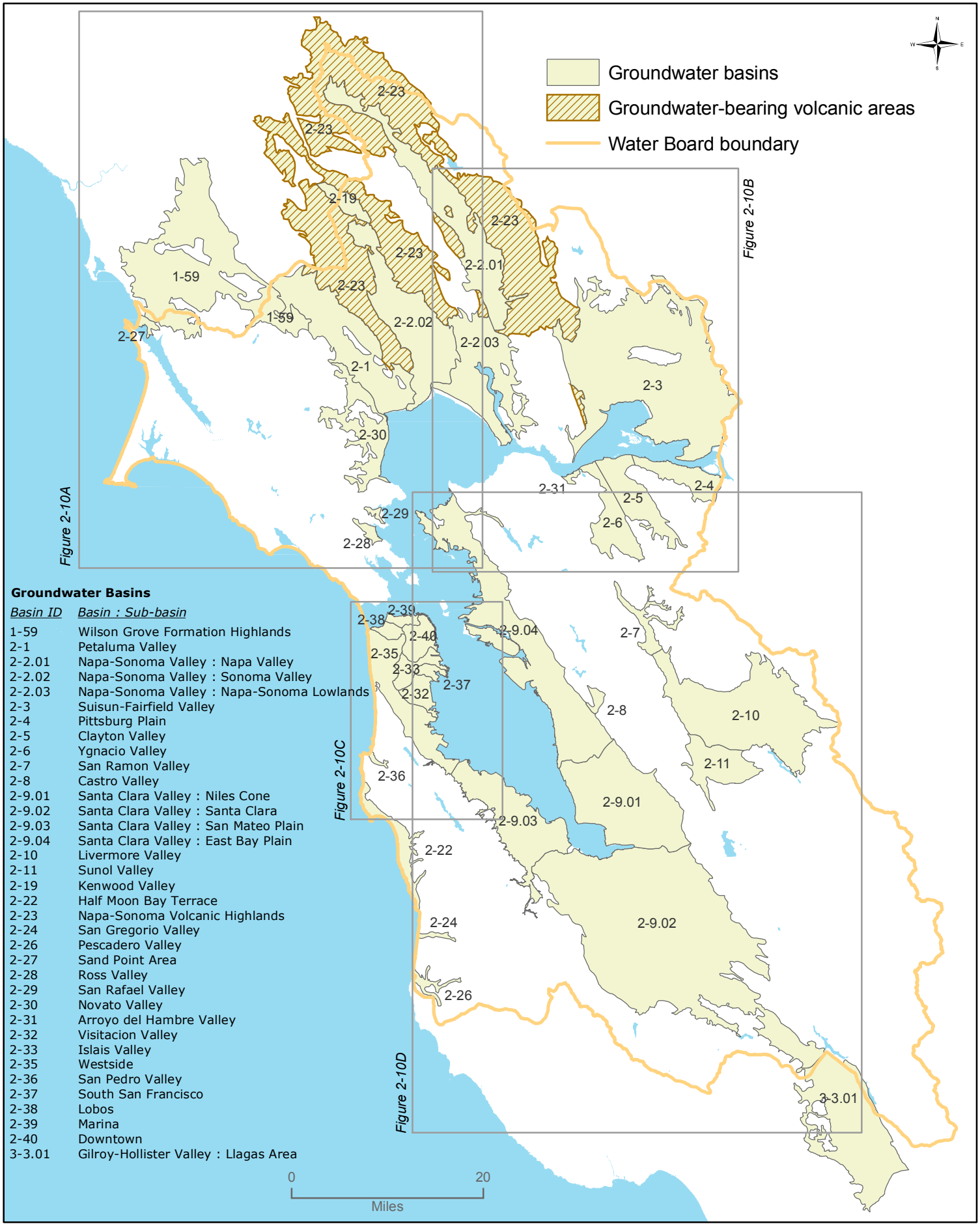


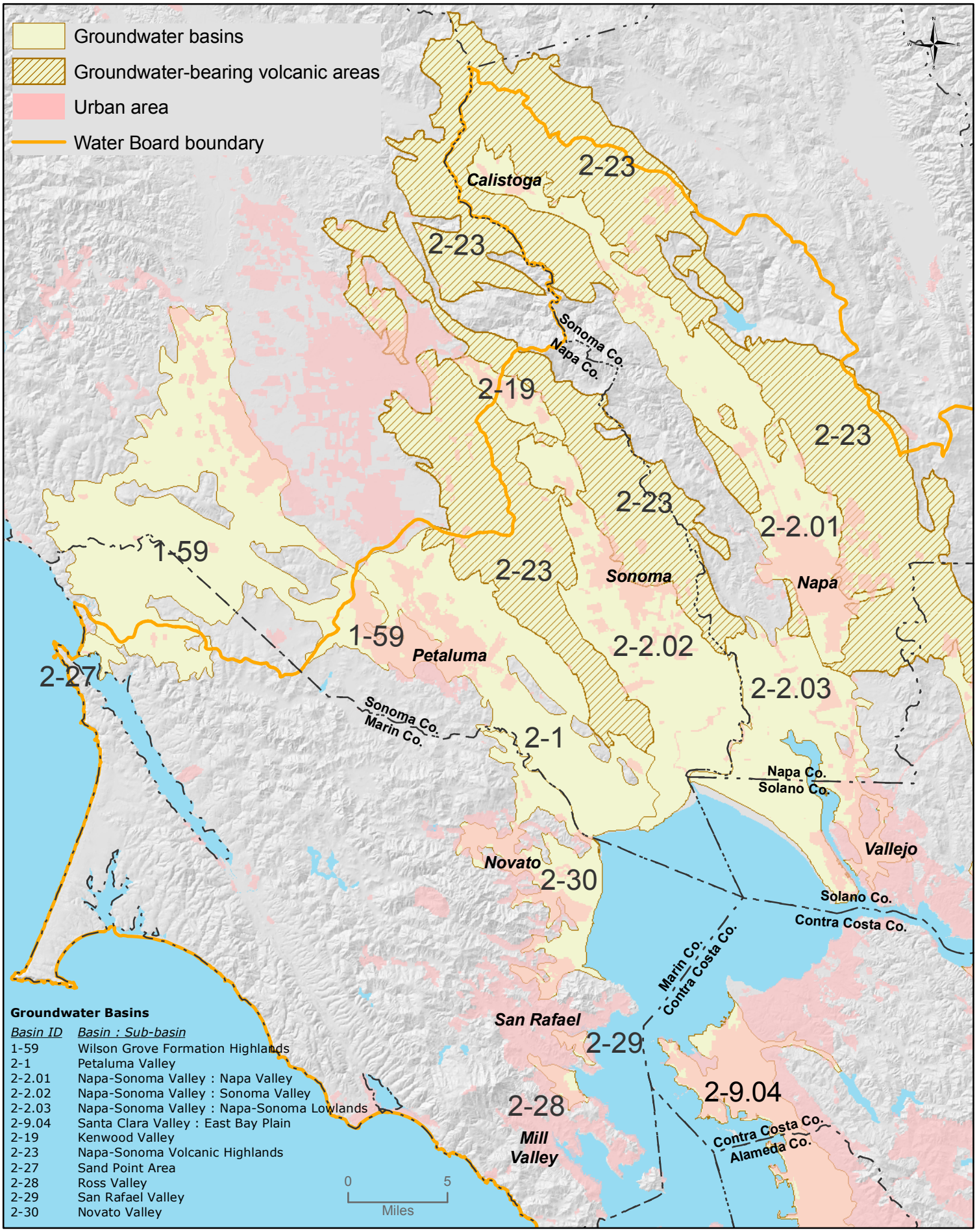
Figure 2-10 Groundwater Basins



Groundwater Basins

Basin ID	*Basin : Sub-basin*
1-59	Wilson Grove Formation Highlands
2-1	Petaluma Valley
2-2.01	Napa-Sonoma Valley : Napa Valley
2-2.02	Napa-Sonoma Valley : Sonoma Valley
2-2.03	Napa-Sonoma Valley : Napa-Sonoma Lowlands
2-3	Suisun-Fairfield Valley
2-4	Pittsburg Plain
2-5	Clayton Valley
2-6	Ygnacio Valley
2-7	San Ramon Valley
2-8	Castro Valley
2-9.01	Santa Clara Valley : Niles Cone
2-9.02	Santa Clara Valley : Santa Clara
2-9.03	Santa Clara Valley : San Mateo Plain
2-9.04	Santa Clara Valley : East Bay Plain
2-10	Livermore Valley
2-11	Sunol Valley
2-19	Kenwood Valley
2-22	Half Moon Bay Terrace
2-23	Napa-Sonoma Volcanic Highlands
2-24	San Gregorio Valley
2-26	Pescadero Valley
2-27	Sand Point Area
2-28	Ross Valley
2-29	San Rafael Valley
2-30	Novato Valley
2-31	Arroyo del Hambre Valley
2-32	Visitacion Valley
2-33	Islais Valley
2-35	Westside
2-36	San Pedro Valley
2-37	South San Francisco
2-38	Lobos
2-39	Marina
2-40	Downtown
3-3.01	Gilroy-Hollister Valley : Llagas Area

Figure 2-10A Groundwater Basins: Marin/Sonoma/Napa



Groundwater Basins

Basin ID	Basin : Sub-basin
1-59	Wilson Grove Formation Highlands
2-1	Petaluma Valley
2-2.01	Napa-Sonoma Valley : Napa Valley
2-2.02	Napa-Sonoma Valley : Sonoma Valley
2-2.03	Napa-Sonoma Valley : Napa-Sonoma Lowlands
2-9.04	Santa Clara Valley : East Bay Plain
2-19	Kenwood Valley
2-23	Napa-Sonoma Volcanic Highlands
2-27	Sand Point Area
2-28	Ross Valley
2-29	San Rafael Valley
2-30	Novato Valley

Figure 2-10B Groundwater Basins: Napa/Solano

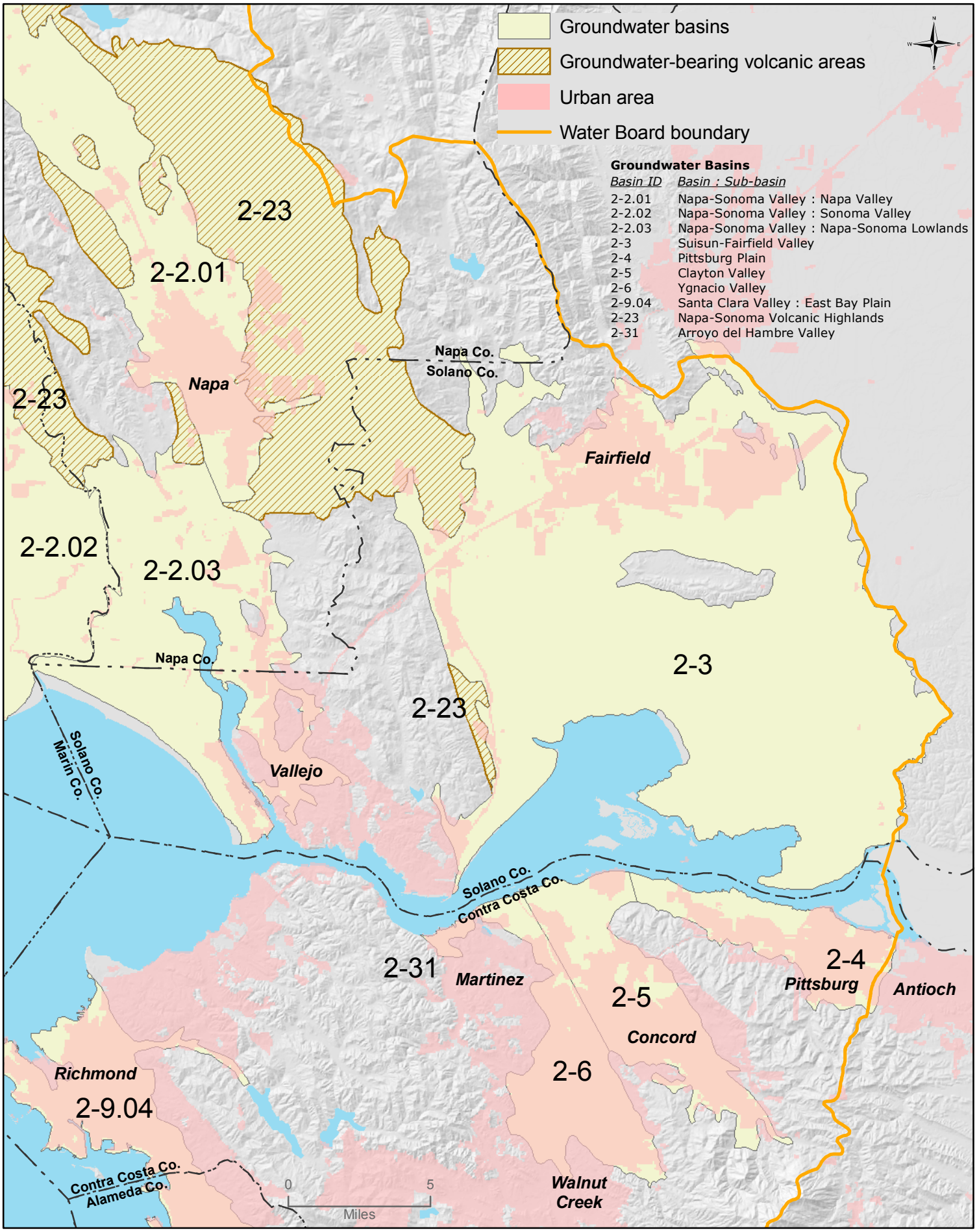


Figure 2-10C Groundwater Basins: San Francisco

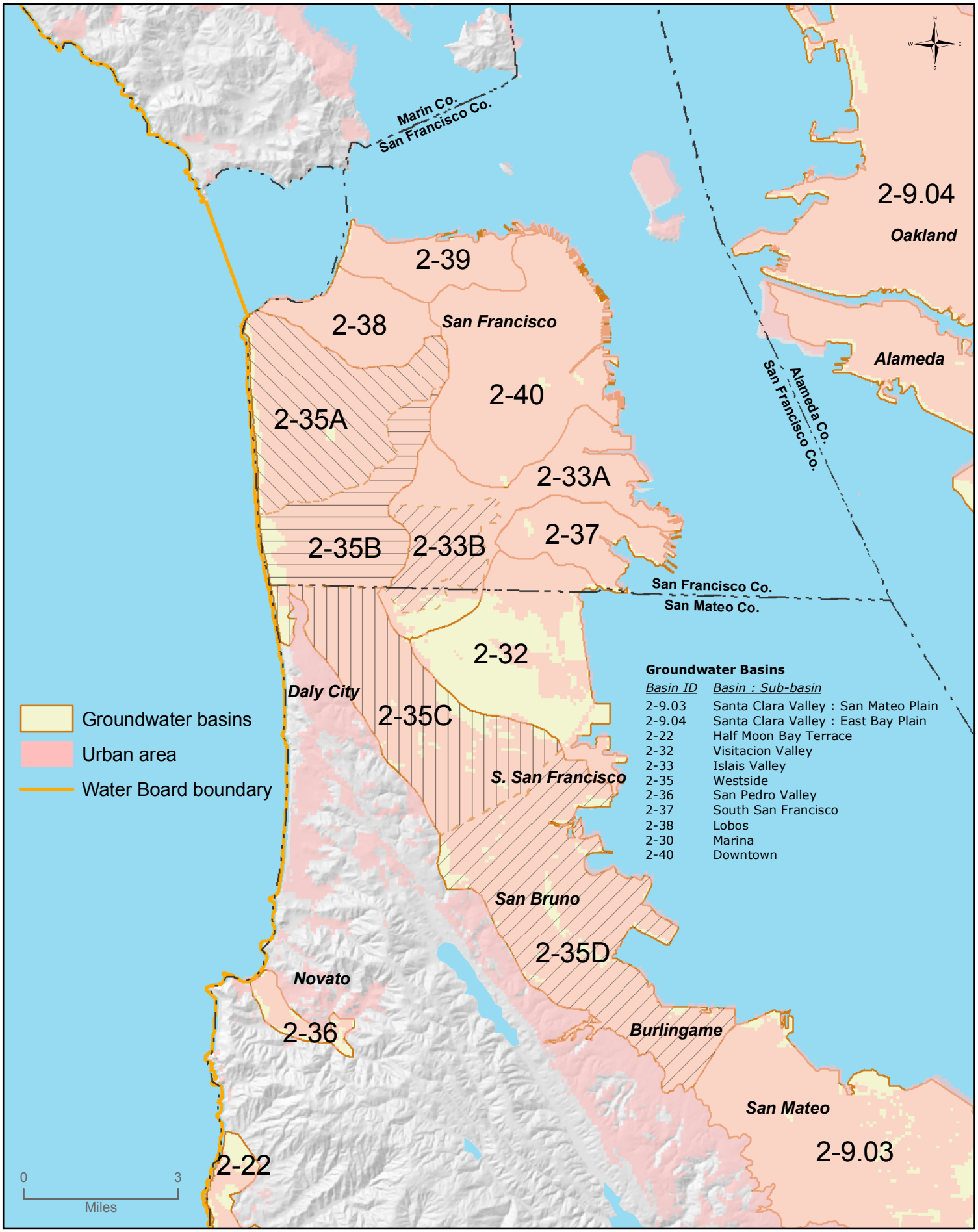


Figure 2-10D Groundwater Basins: East and South Bay

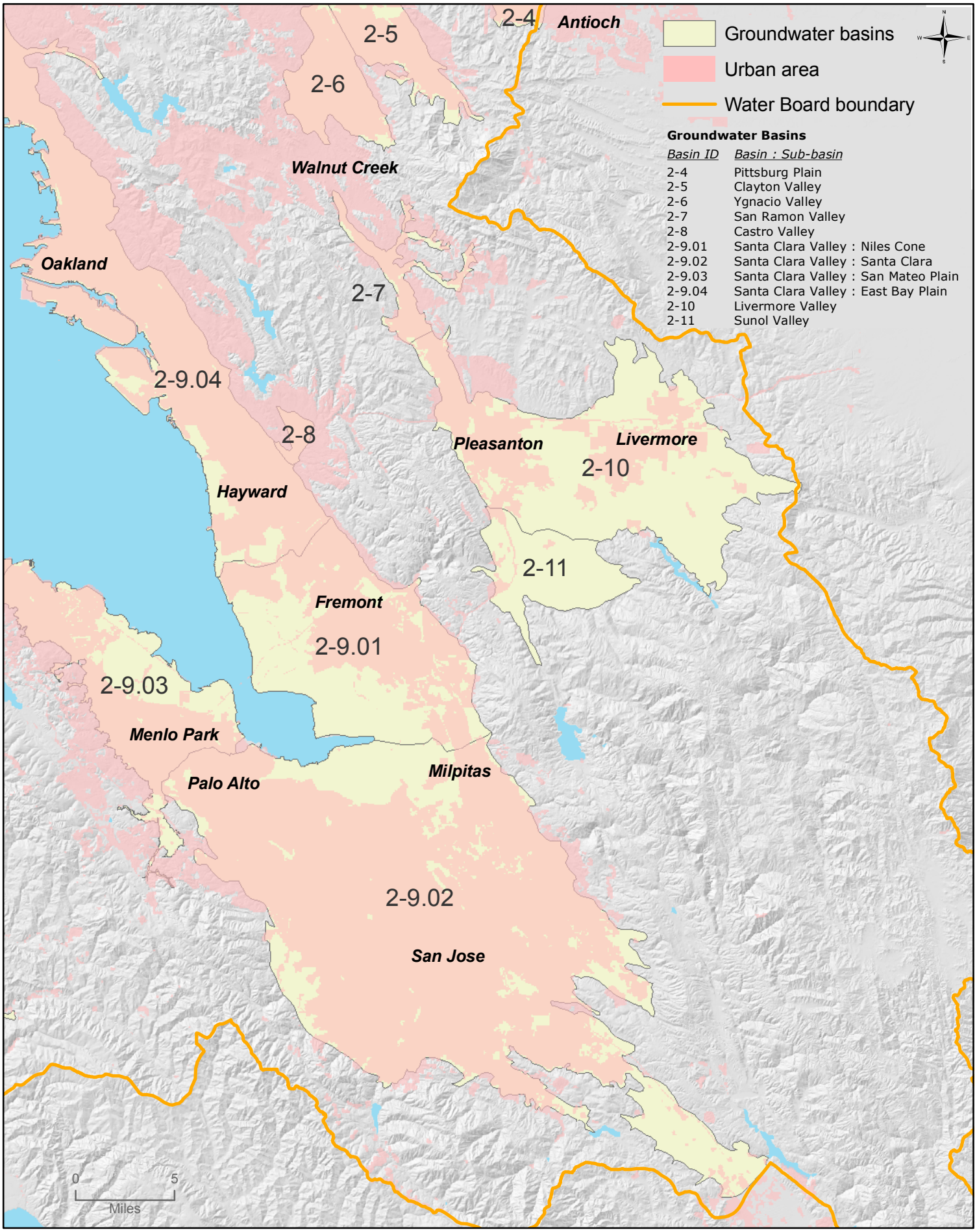


Figure 2-11 General Locations of Wetland Areas

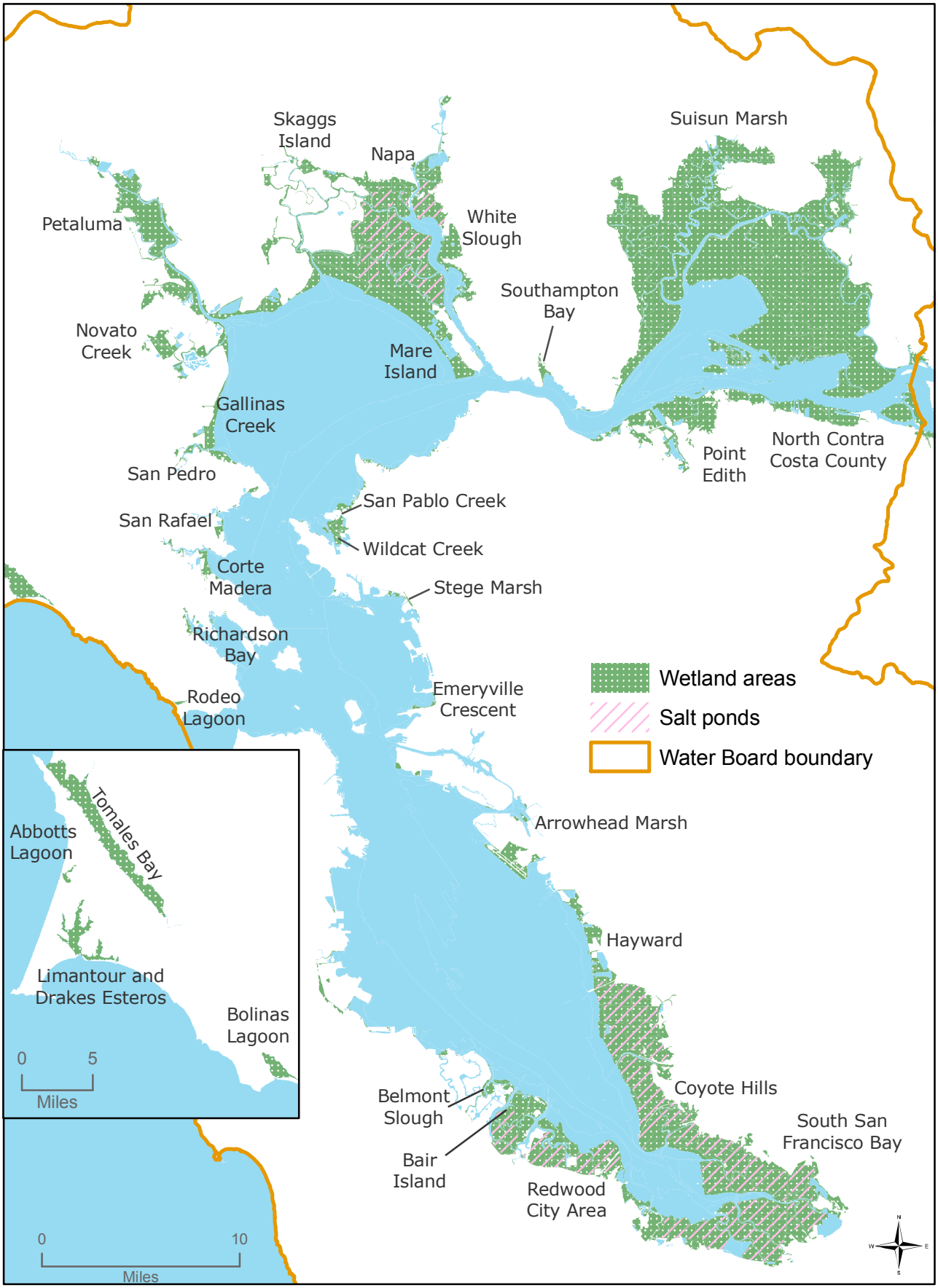


Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

MARIN COASTAL BASIN

COUNTY Waterbody	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY																			
Pacific Ocean (Marin)					E		E	E			E	E	E	E		E	E	E	E
Abbotts Lagoon											E					E	E	E	
Drakes Estero							E	E			E		E	E		E	E	E	
East Schooner Creek								E	E					E		E	P	E	
Limantour Estero							E	E			E		E	E		E	E	E	
Coast Creek								E	E					E		E	E	E	
Alamere Creek									E							E	P	E	
Crystal Lake									E					E	E	E	P	P	
Bolinas Lagoon							E	E			E	E	E	E		E	E	E	
Pine Gulch Creek		E							E			E		E	E	E		E	
Easkoot Creek																			
McKennan Gulch Creek																			
Morses Gulch Creek																			
Pike County Gulch Creek																			
Redwood Creek (Marin)	E	E	E					E	E					E	E	E	E	E	
Rodeo Lagoon									E							E	E	E	
Rodeo Creek									E		E		E	E		E	E	E	
Tomales Bay							E	E			E	E	E	E		E	E	E	
Millerton Gulch																			

MARIN COASTAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Walker Creek									E			E	E	E	E	E	P	P	
Laguna Lake																			
Frink Canyon Creek																			
Verde Canyon Creek																			
Salmon Creek																			
Soulajule Reservoir		E	E												E	E	E	E	
Lagunitas Creek	E	E							E			E	E	E	E	E	E	E	
Haggerty Gulch Creek																			
Bear Valley Creek																			
Olema Creek									E			E		E	E	E	E	E	
Nicasio Reservoir		E	E						P					E	E	E	E	E	
Nicasio Creek		E	E						E			E		E		E	E	E	
Halleck Creek																			
Devils Gulch Creek																			
Kent Lake		E							E					E	E	E	E	E	
Big Carson Creek																			
Alpine Lake		E							E					E	E	E	E	E	
Bon Tempe Lake		E							E					E	E	E	E	E	
Lake Lagunitas		E							E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SAN MATEO COASTAL BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO COUNTY																			
Pacific Ocean (San Mateo, San Francisco)					E		E	E			E	E	E	E		E	E	E	E
Lake Merced		P							E					E	E	E	E	E	
San Pedro Creek		E							E			E		E	E	E		E	
San Vincente Creek	E	E							E			E	E	E		E	P	P	
Denniston Creek	E	E							E			E	E	E	E	E	E	E	
Frenchmans Creek	E								E			E	E	E	E	E	E	E	
Pilarcitos Creek	E	E							E			E	E	E	E	E	P	P	
Apanolio Creek																			
Arroyo Leon Creek																			
Mills Creek																			
Pilarcitos Lake		E							E				E	E	E	E	L	E	
Purisima Creek	E								E			E	E	E		E	E	E	
Lobitas Creek	E								E			E	E	E		E	E	E	
Tunitas Creek	E								E			E	E	E	E	E	P	P	
San Gregorio Creek	E								E			E	E	E	E	E	E	E	
Alpine Creek																			
El Corte de Madera Creek									E			P	E	P	E	E	P	E	
La Honda Creek																			
Woodruff Creek																			
Clear Creek																			
Harrington Creek																			
Bogess Creek																			
Mindego Creek																			
Pomponio Creek	E								E			E		E	E	E	P	E	
Pomponio Reservoir																			
Pescadero Creek	E	E							E			E	E	E	E	E	E	E	
Butano Creek																			
Fall Creek																			
Hoffman Creek																			

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Honsinger Creek																			
Jones Gulch Creek																			
McCormick Creek																			
Oil Creek																			
Lambert Creek																			
Peters Creek																			
Slate Creek																			
Tarwater Creek																			
Little Boulder Creek																			
Waterman Creek																			

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

CENTRAL BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
Golden Gate Channel																			
San Francisco Bay Central					E	E	E	E		E		E	E	E		E	E	E	E
Golden Gate Park Lakes															E	E		E	
MARIN COUNTY																			
San Rafael Creek									E						E	E		E	E
Corte Madera Creek									E			P	E	P	E	E	P	E	
Ross Creek																			
Cascade Creek																			
San Anselmo Creek																			
Sleepy Hollow Creek																			
Phoenix Lake		E							E					E	E	E	E	E	
Phoenix Creek																			
Bill Williams Creek																			
Richardson Bay					E		E	E		E		E	E	E		E	E	E	E
Arroyo Corte Madera del Presidio								E	E					E		E	P	E	
Old Mill Creek									E							E		E	
Coyote Creek (Marin)									E						E	E		E	
ALAMEDA COUNTY																			
Berkeley Aquatic Park Lagoon										E		E		P		E	E	E	
Lake Temescal									E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SOUTH BAY BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
San Francisco Bay Lower					E		E	E		E		E	E	P		E	E	E	E
SAN MATEO COUNTY																			
San Mateo Creek			E						P				E	E		E	P	P	
Lower Crystal Springs Reservoir		E							E				E	E	E	E		E	
Upper Crystal Springs Reservoir		E							E				E	E	E	E		E	
San Andreas Lake		E							E				E	E	E	E	L	E	
Foster City Lagoon																			
Bair Island Wetlands																			
ALAMEDA COUNTY																			
Lake Merritt										E				E		E	E	E	
Lower San Leandro Creek			E									P		P	P	E	P	P	
Lake Chabot (Alameda)		E							E					E	E	E	E	E	
Upper San Leandro Reservoir		E							E					E	E	E	L	P	
San Leandro Creek			E						E			P		P	P	E	P	P	
Kaiser Creek																			
Moraga Creek																			
San Lorenzo Creek		E	E	E					E			E		E	E	E	E	E	
Don Castro Reservoir									E					E	E	E	E	E	
Cull Canyon Reservoir									E					E	E	E	E	E	
Palomares Creek									E			E		E	E	E	E	E	
Crow Creek									E			E		E	E	E	E	E	
Alameda Creek Quarry Ponds				E					E						E		E	E	
Alameda Creek	E			E					E			E		E	E	E	E	E	
San Antonio Reservoir		E							E					E	E	E	L	E	

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Lacosta Creek																			
Arroyo de la Laguna				E					P			E		E	P	E	E	E	
Arroyo Valle		E		E					E			P		E		E	P	P	
Shadow Cliffs Reservoir									E					E	E	E	E	E	
Del Valle Reservoir		E							E					E	E	E	E	E	
Arroyo Mocho				E					P			E		E	P	E	E	E	
Tassajara Creek				E					P			E		E	P	E	E	E	
Arroyo las Positas				E					P			E		E	P	E	E	E	
Arroyo Seco (Alameda)				E					P			E		E	P	E	E	E	
Alamo Canal				E					P			E		E	P	E	E	E	
Alamo Creek				E					P			E		E	P	E	E	E	
SANTA CLARA COUNTY																			
Calaveras Reservoir		E							E					E	E	E	L	E	
Arroyo Hondo		E	E						E					E	E	E	E	E	
Isabel Creek		E	E						E					E	E	E	E	E	
Smith Creek		E	E						E					E	E	E	E	E	
Sulphur Creek (Santa Clara)		E	E						E					E	E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SANTA CLARA BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
San Francisco Bay South					E		E	E		E		E	E	P		E	E	E	E
ALAMEDA COUNTY																			
Lake Elizabeth									E					E	E	E		E	
SAN MATEO AND SANTA CLARA COUNTIES																			
San Francisquito Creek									E			E		E	E	E	P	P	
Felt Lake	E													E	E	E	E	E	
Los Trancos Creek																			
West Union Creek																			
Searsville Lake	E								E					E	E	E	E	E	
SANTA CLARA COUNTY																			
Matedero Creek									E			E		E	E	E	E	E	
Permanente Creek									E					E		E	E	E	
Stevens Creek			E						E			E		P	E	E	E	E	
Stevens Creek Reservoir		E		E					E			E		E	E	E		E	
Calabazas Creek	E			E					E						E	E	E	E	
Saratoga Creek	E		E	E					E						E	E	E	E	
Guadalupe Reservoir									E			P		P	E	E	P	E	
Los Gatos Creek		E	E	E					E			P		P	E	E		P	
Vasona Lake				E					E					E	E	E	E	E	
Lexington Reservoir		E							E					E	E	E	E	E	
Lake Elsman		E							E							E		P	
Campbell Percolation Pond				E					E					E	E	E	E	E	
Guadalupe Creek																			
Guadalupe Reservoir		E		E					E					E	E	E	E	E	
Alamitos Creek																			
Calero Reservoir		E		E										E	E	E	E	E	
Almaden Reservoir		E		E					E					E	E	E	E	E	
Herbert Creek																			

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Barrett Canyon Creek																			
Coyote Creek				E					E			E	E	E	E	E	P	E	
Lower Penitencia Creek																			
Berryessa Creek																			
Upper Penitencia Creek																			
Cherry Flat Reservoir	E	E												E	E	E	L	E	
Arroyo Aguague Creek																			
Halls Valley Reservoir														E	E	E	E	E	
Silver Creek																			
Fremont Lagoon																			
Sandy Wool Lake									E					E	E	E		E	
Cotton Wood Lake									E					E	E	E	E	E	
Anderson Lake		E		E					E					E	E	E	L	E	
San Felipe Creek									P					P	E	E	P	P	
Otis Canyon Creek																			
Coyote Lake	E	E							E					E	E	E	E	E	
Soda Springs Canyon Creek																			

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SAN PABLO BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
San Pablo Bay					E		E	E		E		E	E	E		E	E	E	E
SOLANO COUNTY																			
White Slough																			
Lake Chabot (Solano)	E	E							E					E	E	E	E	E	
Dalwick Lake																			
CONTRA COSTA COUNTY																			
Rodeo Creek														E	E	E	P	E	
Refugio Creek																			
Pinole Creek									E			E		E	E	E	P	P	
San Pablo Creek												E		E	E	E		E	
San Pablo Reservoir		E							E					E	E	E	E	E	
Briones Reservoir		E							E					E	E	E	L	P	
Wildcat Creek												E		E	E	E		E	
Jewel Lake									E						E	E	E	E	
Lake Anza									E						E	E	E	E	
MARIN COUNTY																			
Novato Creek		E							P			P	E	P	P	E	P	P	
Stafford Lake		E							E					E	E	E	E	E	
Pacheco Pond							E		E			P		P	E	E	P	P	
Miller Creek									E			E	E	E	E	E	E	E	
Gallinas Creek									E				E		E	E		E	
SONOMA COUNTY																			
Petaluma River									E	E		E	E	E	E	E	E	E	E
San Antonio Creek									E			P		P	E	E	P	P	
Willow Creek																			
Adobe Creek (Sonoma)																			
Sonoma Creek									E			E	E	E	E	E	E	E	
Fowler Creek																			
Schnell Creek																			
Arroyo Seco Creek (Sonoma)																			

SAN PABLO BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Nathanson Creek																			
Agua Caliente Creek (Sonoma)																			
Stuart Creek																			
Graham Creek																			
Yulupa Creek																			
NAPA COUNTY																			
Napa River	E	E							E			E	E	E	E	E	E	E	E
Huichica Creek																			
Carneros Creek																			
Suscol Creek																			
Tulucay Creek																			
Lake Marie	E	E							P					E	P	E	E	E	
Napa Creek																			
Browns Valley Creek																			
Redwood Creek (Napa)																			
Pickle Creek																			
Milliken Creek																			
Sarco Creek																			
Milliken Reservoir		E							E					E	E	E	L	P	
Soda Creek																			
Dry Creek (Napa)	E	E							E			E		E	E	E	E	E	
Conn Creek		E	E						E			E		E		E	E	E	
Rector Creek																			
Rector Reservoir		E							E					E	E	E	L	E	
Lake Hennessey		E							E					E	E	E	E	E	
Sage Creek		E	E						E					E	E	E	P	P	
Chiles Creek		E	E						E					E	E	E	P	P	
Bear Canyon Creek																			
Sulphur Creek (Napa)																			
York Creek									E			E		E		E	P	P	
Mill Creek (Napa)																			
Ritchey Creek																			
Bell Canyon Reservoir																			
Cyrus Creek																			

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Garnett Creek																			
Hopper Creek																			
Jericho Canyon Creek																			
Kimball Reservoir		E													E	E	E	E	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

SUISUN BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHEL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Carquinez Strait					E		E			E		E	E	E		E	E	E	E
Suisun Bay					E	E	E			E		E	E	E		E	E	E	E
Sacramento-San Joaquin Delta	E	E		E	E	E	E			E		E	E	E		E	E	E	E
SOLANO COUNTY																			
Lake Herman		E			E				E					E	E	E	E	E	
Green Valley Creek			E						E					E	E	E	E	E	
Lake Frey		E							E					E	E	E		E	
Lake Madigan	E	E							E					E	E	E		E	
Suisun Slough														E	E	E	E	E	E
Suisun Creek			E						E			E		E	E	E	P	P	
Suisun Reservoir																			
Wooden Valley Creek																			
Lake Curry		E												E	E	E	E	E	
Ledgewood Creek			E						E			E		E	E	E	E	E	
Laurel Creek (Solano)			E						E			E		E	E	E	E	E	
Montezuma Slough													E	E	E	E	E	E	E
CONTRA COSTA COUNTY																			
Peyton Slough																			
Pacheco Creek																			
Walnut Creek									E			E		E	E	E	P	P	
Pine Creek									E					E	E	E	E	E	
Lafayette Creek																			
Lafayette Reservoir		E							E					E	E	E	E	E	
Mt. Diablo Creek									E			E		E	E	E	E	E	
Mallard Reservoir	E	E			E	E								E	E	E	L	P	

E: Existing beneficial use L: Limited beneficial use P: Potential beneficial use

Table 2-2: Existing and Potential Beneficial Uses in Groundwater in Identified Basins

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
Alameda	Castro Valley	--	2-8	P	P	P	P	--
Alameda	Santa Clara Valley	Niles Cone	2-9.01	E	E	E	E	--
Alameda and Contra Costa	Santa Clara Valley	East Bay Plain	2-9.04	E	E	E	E	--
Alameda and Contra Costa	Livermore Valley	--	2-10	E	E	E	E	--
Alameda	Sunol Valley	--	2-11	E	E	E	E	--
Contra Costa	Pittsburg Plain	--	2-4	P	P	P	P	--
Contra Costa	Clayton Valley	--	2-5	E	P	P	P	--
Contra Costa	Ygnacio Valley	--	2-6	P	P	P	P	--
Contra Costa	San Ramon Valley	--	2-7	E	P	P	E	--
Contra Costa	Arroyo del Hambre Valley	--	2-31	P	P	P	P	--
Marin	Sand Point Area	--	2-27	E	P	P	P	--
Marin	Ross Valley	--	2-28	E	P	P	E	--
Marin	San Rafael Valley	--	2-29	P	P	P	P	--
Marin	Novato Valley	--	2-30	P	P	P	P	--
Napa	Napa-Sonoma Valley	Napa Valley	2-2.01	E	E	E	E	--
Napa and Solano	Napa-Sonoma Valley	Napa-Sonoma Lowlands	2-2.03	E	E	E	E	--
San Francisco and San Mateo	Visitacion Valley	--	2-32	P	E	E	P	--
San Francisco and San Mateo	Islais Valley A[7]	--	2-33A	P	E	E	P	--
San Francisco	Islais Valley B[7]	--	2-33B	P	P	P	E	--
San Francisco	South San Francisco	--	2-37	P	E	E	P	--
San Francisco and San Mateo	Westside A[7]	--	2-35A	E	P	P	E	--
San Francisco	Lobos	--	2-38	E	P	P	E	--
San Francisco	Marina	--	2-39	E	P	P	E	--
San Francisco	Downtown	--	2-40	E	P	P	E	--
San Francisco	Westside B[7]	--	2-35B	P	P	P	E	--
San Mateo	Westside C[7]	--	2-35C	E	P	P	E	--

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
San Mateo	Westside D[7]	--	2-35D	E	E	E	P	--
San Mateo	Santa Clara Valley	San Mateo Plain	2-9.03	E	E	E	P	--
San Mateo and Santa Clara	Santa Clara Valley[8]	Santa Clara	2-9.02	E	E	E	E	--
San Mateo	Half Moon Bay Terrace	--	2-22	E	P	P	E	--
San Mateo	San Gregorio Valley	--	2-24	E	P	P	E	--
San Mateo	Pescadero Valley	--	2-26	E	P	P	E	--
San Mateo	San Pedro Valley	--	2-36	P	P	P	P	--
Solano	Suisun-Fairfield Valley	--	2-3	E	E	E	E	--
Sonoma and Marin	Petaluma Valley	--	2-1	E	P	P	E	--
Sonoma	Napa-Sonoma Valley	Sonoma Valley	2-2.02	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	See RB1 Basin Plan[9]				
Sonoma	Kenwood Valley	--	2-19	E	P	P	E	--
Sonoma	Napa – Sonoma Volcanic Highlands	--	2-23	X	X	X	X	X
Santa Clara	Gilroy – Hollister Valley	Llagas Area	3-3.01	See RB3 Basin Plan[10]				

Notes:

1. Department of Water Resources (DWR) Bulletin 118 “California Groundwater”, 2003.
2. MUN = Municipal and domestic water supply.
3. PROC = Industrial process water supply.
4. IND = Industrial service water supply.
5. AGR = Agricultural water supply.
6. FRESH = Freshwater replenishment to surface water; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
7. The existing and potential beneficial uses for groundwater basins listed in the 1995 Basin Plan (Table 2-3) were assigned to the new groundwater basins based on the geographic location of the old basins compared to the new basins. The basin names, such as Westside A,

Westside B, etc., are informal names assigned by the Water Board to preserve the beneficial use designations in the 1995 Basin Plan and do not represent sub-basins identified by the Department of Water Resources.

8. The Santa Clara Valley groundwater basin/Santa Clara groundwater sub-basin is also known as Coyote Valley.
9. This groundwater basin is also located in the North Coast Region (RB1); beneficial uses of groundwater are specified in the Basin Plan for RB1.
10. This groundwater basin is also located in the Central Coast Region (RB3); beneficial uses of groundwater are specified in the Basin Plan for RB3.

E = Existing beneficial uses; based on best available information.
P = Potential beneficial uses; based on best available information.
X = This groundwater basin was not listed in the 1995 Basin Plan; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
See DWR Bulletin 118 (2003) for groundwater basin characteristics.

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

	TYPE OF WETLAND				
BENEFICIAL USE	**MARINE**	**ESTUARINE**	**RIVERINE**	**LACUSTRINE**	**PALUSTRINE**
AGR		○	○	○	○
COLD			○	○	○
COMM	○	○			
EST		○			
FRESH			○	○	○
GWR	○	○	○	○	○
IND		○	●	●	
MAR	○				
MIGR	○	○	○	○	
NAV	○	○	○	○	○
PROC					
REC-1	○	○	○	○	○
REC-2	○	○	○	○	○
SHELL	○	○	○		
SPWN	○	○	○	○	○
WARM			○	○	○
WILD	○	○	○	○	○
RARE	○	○	○	○	○

NOTE:
○ Existing beneficial use
● Potential beneficial use

Table 2-4 Examples of Beneficial Uses of Wetland Areas[a]

Basin/Marsh Area	*Wetland Types*		*Beneficial Uses*									
	Fresh	Brackish	EST	MAR	MIGR	COMM	RARE	REC1	REC2	SALT	SPWN	WILD
ALAMEDA COUNTY												
Arrowhead			●				●	●	●	●	●	●
Coyote Hills			●				●	●	●	●	●	●
Emeryville Crescent			●				●	●	●	●	●	●
Hayward			●					●	●	●	●	●
CONTRA COSTA COUNTY												
North Contra Costa		●	●				●	●	●	●	●	●
Point Edith		●	●				●		●		●	●
San Pablo Creek			●				●	●	●	●	●	●
Wildcat Creek			●				●	●	●		●	●
MARIN COUNTY												
Abbotts Lagoon				●				●	●	●		●
Bolinas Lagoon				●				●	●	●		●
Corte Madera			●				●	●	●	●	●	●
Drakes Estero								●	●	●	●	●
Gallinas Creek		●	●				●	●	●	●	●	●
Limantour Estero				●				●	●	●		●
Corte Madera Ecological Reserve			●					●	●	●		●
Novato Creek		●	●		●		●	●	●	●	●	
Richardson Bay			●				●	●	●	●	●	●
Rodeo Lagoon				●				●	●	●		●
San Pedro		●	●			●	●		●	●	●	●
San Rafael Creek		●	●				●	●	●	●		●
Tomales Bay				●	●			●	●	●	●	●
NAPA COUNTY												
Mare Island			●						●	●		●
Napa		●	●		●	●	●	●	●		●	
San Pablo Bay			●		●	●	●	●	●	●	●	●
SAN MATEO COUNTY												
Bair Island			●				●	●	●	●		●
Belmont Slough			●				●	●	●	●	●	●
Pescadero	●			●	●		●	●	●	●	●	●
Princeton		●						●	●	●		●
Redwood City Area			●				●	●	●			●
SANTA CLARA COUNTY												
South San Francisco Bay			●		●	●	●	●	●	●	●	●
SOLANO COUNTY												
Southhampton Bay			●				●	●	●	●	●	●
Suisun	●	●	●		●		●	●	●		●	●
White Slough			●		●		●	●	●	●	●	●
SONOMA COUNTY												
Petaluma		●	●		●	●	●	●	●		●	●

NOTE:
a. General locations of wetlands areas are depicted in Figure 2-11.

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CHAPTER 3: WATER QUALITY OBJECTIVES

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

3.1 WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

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 (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The state’s Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the State Water Resources Control Board in State Board Order No. 86-17.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

3.2 OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

3.3 OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

3.3.1 BACTERIA

Table 3-1 provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. Table 3-2 summarizes U.S. EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation.

3.3.2 BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

3.3.3 BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

3.3.4 COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

3.3.5 DISSOLVED OXYGEN

For all tidal waters, the following objectives shall apply:

In the Bay:

Downstream of Carquinez Bridge	5.0 mg/l minimum
Upstream of Carquinez Bridge	7.0 mg/l minimum

For nontidal waters, the following objectives shall apply:

Waters designated as:

Cold water habitat	7.0 mg/l minimum
Warm water habitat	5.0 mg/l minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/l and 7 mg/l are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

3.3.6 FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.7 OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.3.8 POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.9 pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

3.3.10 RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations (CCR), which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

3.3.11 SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

3.3.12 SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

3.3.13 SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

3.3.14 SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.15 SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

3.3.16 TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

3.3.17 TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature

3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.19 TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

3.3.20 UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/l as N):

Annual Median	0.025
Maximum, Central Bay (as depicted in Figure 2-5) and upstream	0.16
Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7):	0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.
- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.
- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

3.3.21 OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3 and 3-4.

The Regional Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Regional Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. Pending the adoption of site-specific objectives, the objectives in Tables 3-3 and 3-4 apply throughout the region. Site-specific objectives for copper and nickel, adopted for South San Francisco Bay south of the Dumbarton Bridge, are listed in Table 3-3A.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Regional Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Regional Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

3.3.22 CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Table 64431-A (Inorganic Chemicals) of Section 64431, and Table 64433.2-A (Fluoride) of Section 64433.2, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

3.4 OBJECTIVES FOR GROUNDWATER

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Water Board will establish basin- and/or site-specific numerical groundwater objectives as necessary. For example, the Water Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater. Under existing law, the Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.

3.4.1 BACTERIA

In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

3.4.2 ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., U.S. Environmental Protection Agency (U.S. EPA), the State Water Board, California Department of Health Services (DHS), U.S. Food and Drug Administration, National Academy of Sciences, California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA), U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control (DTSC), and other appropriate organizations.)

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) of Section 64431, Table 64433.2-A (Fluoride) of Section 64433.2, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwater with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Water Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwater designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwater with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwater with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

3.4.3 RADIOACTIVITY

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.4.4 TASTE AND ODOR

Groundwater designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwater designated for use as domestic or municipal supply shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.5 OBJECTIVES FOR THE DELTA

The objectives contained in the State Water Board's 1995 "Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and adjacent waters as specified in that plan.

3.6 OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall waterwastewater resource operational program developed by those agencies affected and approved by the Water Board.

TABLES

Table 3-1: Water Quality Objectives for Coliform Bacteria

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation

Table 3-3: Marine Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-3A: Water Quality Objectives for Copper and Nickel in Lower South San Francisco Bay

Table 3-4: Freshwater Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-5: Water Quality Objectives for Municipal Supply

Table 3-1: Water Quality Objectives for Coliform Bacteria[a]

Beneficial Use	Fecal Coliform (MPN/100ml)	Total Coliform (MPN/100ml
Water Contact Recreation	geometric mean < 200 90th percentile < 400	median < 240 no sample > 10,000
Shellfish Harvesting[b]	median < 14 90th percentile < 43	median < 70 90th percentile < 230[c]
Non-contact Water Recreation[d]	mean < 2000 90th percentile < 4000	
Municipal Supply:		
- Surface Water[e]	geometric mean < 20	geometric mean < 100
- Groundwater		< 1.1[f]

NOTES:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. Source: National Shellfish Sanitation Program.

c. Based on a five-tube decimal dilution test or 300 MPN/100 ml when a three-tube decimal dilution test is used.

d. Source: Report of the Committee on Water Quality Criteria, National Technical Advisory Committee, 1968.

e. Source: DOHS recommendation.

f. Based on multiple tube fermentation technique; equivalent test results based on other analytical techniques, as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21(f), revised June 10, 1992, are acceptable.

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation[1,2]
(in colonies per 100 ML)

	Fresh Water		Salt Water
	Enterococci	**E. Coli**	**Enterococci**
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:

1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012-8016. The Criteria are based on:
(a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
(b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati Ohio.

2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of production based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

Table 3-3: Marine[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

Compound	4-day Average	1-hr Average	24-hr Average
Arsenic[b, c, d]	36	69	
Cadmium[b, c, d]	9.3	42	
Chromium VI[b, c, d, e]	50	1100	
Copper[c, d, f]			
Cyanide[g]			
Lead[b, c, d]	8.1	210	
Mercury[h]	0.025	2.1	
Nickel[b, c, d]	8.2	74	
Selenium[i]			
Silver[b, c, d]		1.9	
Tributyltin[j]			
Zinc[b, c, d]	81	90	
PAHs[k]			15

NOTES:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters except for the South Bay south of Dumbarton Bridge, where the California Toxics Rule (CTR) applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 3-4) or marine objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. This objective may be met as total chromium.

f. Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 ug/l (4-day average) and 4.8 ug/l (1-hr. average). The most recent version of the CTR should be consulted before applying these values.

g. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 1.0 ug/l (4-day average) and 1.0 ug/l (1-hr. average).

h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984).

i. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

j. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

k. The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

Table 3-3A: Water Quality Objectives for Copper and Nickel in Lower South San Francisco Bay

Compound	4-day Average (CCC)[1]	1-hr Average (CMC)[2]	Extent of Applicability
Copper	6.9	10.8	Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge
Nickel	11.9	62.4[*]	Marine and Estuarine Waters Contiguous to SF Bay, South of Dumbarton Bridge

[*] Handbook of WQS, 2nd ed. 1994 in Section 3.7.6 states that the CMC = Final AcuteValue/2; 62.4 is the Final Acute Value (resident species database)/2; so the site-specific CMC is lower than the California Toxics Rule value because we are using the resident species database instead of the National Species Database.

[1] Criteria Continuous Concentration

[2] Criteria Maximum Concentration

Table 3-4: Freshwater[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

COMPOUND	4-DAY AVERAGE	1-HR AVERAGE
Arsenic[b, c, d]	150	340
Cadmium[d]	e	e
Chromium III[c, f]		
Chromium VI[b, c, d, g]	11	16
Copper[b, c, d]	9.0[h]	13[h]
Cyanide[i]		
Lead[b, c, d]	2.5[j]	65[j]
Mercury[k]	0.025	2.4
Nickel[b, c, d]	52[l]	470[l]
Selenium[m]		
Silver[b, c, d]		3.4[n]
Tributyltin[o]		
Zinc[b, c, d]	120[p]	120[p]

NOTES:

a. Freshwaters are those in which the salinity is equal to or less than 1 part per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all freshwaters except for the South Bay south of Dumbarton Bridge, where the California Toxics Rule (CTR) applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the marine (Table 3-3) and freshwater objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. These objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. The objectives for cadmium and other noted metals are expressed by formulas where H = ln (hardness) as CaCO3 in mg/l: The four-day average objective for cadmium is $e^{(0.7852\ H\ -\ 3.490)}$. This is 1.1 µg/l at a hardness of 100 mg/l as $CaCO_3$. The one-hour average objective for cadmium is $e^{(1.128\ H\ -\ 3.828)}$. This is 3.9 µg/l at a hardness of 100 mg/l as $CaCO_3$.

f. Chromium III criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 180 ug/l (4-day average) and 550

ug/l (1-hr. average). The objectives for chromium III are based on hardness. The values in this footnote assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for chromium III is $-0.860 \times e^{(0.8190H+1.561)}$. The 1-hour average for chromium III is $0.316 \times e^{(0.8190 H+3.688)}$.

g. This objective may be met as total chromium.

h. The objectives for copper are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for copper is $0.960 \times e^{(0.8545H-1.702)}$. The 1-hour average for copper is $0.960 \times e^{(0.9422H-1.700)}$.

i. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.2 ug/l (4-day average) and 22 ug/l (1-hr. average).

j. The objectives for lead are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $(1.46203 - 0.475712H) \times e^{(1.273H -4.705)}$. The 1-hour average for lead is $(1.46203 - 0.145712H) \times e^{(1.273H-1.460)}$.

k. Source: U.S. EPA Quality Criteria for Water 1986 (EPA 440/5-86-001), which established a mercury criterion of 0.012 ug/l. The Basin Plan set the objective at 0.025 based on considerations of the level of detection attainable at that time.

l. The objectives for nickel are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $0.997 \times e^{(0.8460H + 0.0584)}$. The 1-hour average objective is $0.998 \times e^{(0.8460H + 2.255)}$.

m. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

n. The objective for silver is based on hardness. The table value assumes a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objective must be calculated using the following formula where H = ln (hardness): The 1-hour average objective for silver is $0.85 \times e^{(1.72H - 6.52)}$. U.S. EPA has not developed a 4-day criterion.

o. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

p. The objectives for zinc are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for zinc is $0.986 \times e^{(0.8473 H+0.884)}$. The 1-hour average for zinc is $0.978 \times e^{(0.8473 H+ 0.884)}$.

Table 3-5: Water Quality Objectives for Municipal Supply

Parameter	Objective (in MG/L)
Physical:	
Color (units)[a]	15.0
Odor (number)[a]	3.0
Turbidity (NTU)[a]	5.0
pH[b]	6.5 - 8.0
TDS[c]	500.0
EC (mmhos/cm)[c]	900
Corrosivity	non-corrosive
Inorganic Parameters:	
Aluminum[d]	1.0[d] / 0.2[a]
Antimony[d]	0.006
Arsenic[d]	0.05
Asbestos[d]	7 MFL[e]
Barium[d]	1.0
Beryllium[d]	0.004
Chloride[c]	250.0
Cadmium[d]	0.005
Chromium[d]	0.05
Copper[a]	1.0
Cyanide[d]	0.15
Fluoride[f]	0.6 - 1.7[g]
Iron[a]	0.3
Lead[b]	0.05
Manganese[a]	0.05
Mercury[d]	0.002
Nickel[d]	0.1
Nitrate (as NO_3)[d]	45.0
Nitrate + Nitrite (as N)[d]	10.0
Nitrite (as N)[d]	1.0
Selenium[d]	0.05
Silver[b]	0.1
Sulfate[c]	250.0
Thallium[d]	0.002
Zinc[a]	5.0
Organic Parameters:	
MBAS (Foaming agents)[a]	0.5
Oil and grease[b]	none
Phenols[b]	0.001
Trihalomethanes[b]	0.1
Chlorinated Hydrocarbons:	
Endrin[h]	0.002
Lindane[h]	0.0002
Methoxychlor[h]	0.03
Toxaphene[h]	0.003
2,3,7,8-TCDD (Dioxin)[h]	3×10^{-8}
2,4-D[h]	0.07
2,4,4-TP Silvex[h]	0.05

Parameter	Objective (in MG/L)
Synthetic Organic Chemicals:	
Alachor[h]	0.002
Atrazine[h]	0.001
Bentazon[h]	0.018
Benzo(a)pyrene[h]	0.0002
Dalapon[h]	0.2
Dinoseb[h]	0.007
Diquat[h]	0.02
Endothall[h]	0.1
Ethylene dibromide[h]	0.00005
Glyphosate[h]	0.7
Heptachlor[h]	0.00001
Heptachlor epoxide[h]	0.00001
Hexachlorecyclopentadiene[h]	0.001
Molinate[h]	0.02
Oxarnyl[h]	0.05
Pentachlorophenol[h]	0.001
Picloram[h]	0.5
Polychlorinated Biphenyls[h]	0.0005
Simazine[h]	0.004
Thiobencarb[h]	0.07 / 0.001
Volatile Organic Chemicals:	
Benzene[h]	0.001
Carbon Tetrachloride[h]	0.005
1,2-Dibromo-3-chloropropane[h]	0.0002
1,2-Dichlorobenzene[h]	0.6
1,4-Dichlorobenzene[h]	0.005
1,1-Dichloroethane[h]	0.005
1,2-Dichloroethane[h]	0.0005
cis-1,2-Dichloroethlyene[h]	0.006
trans-1,2-Dichloroethylene[h]	0.01
1,1-Dichloroethylene[h]	0.006
Dichloromethane[h]	0.005
1,2-Dichloropropane[h]	0.005
1,3-Dichloropropene[h]	0.0005
Ethylbenzene[h]	0.7
Methyl-tert-butyl ether[h]	0.13 / 0.005
Monochlorobenzene[h]	0.07
Styrene[h]	0.1
1,1,2,2-Tetrachloroethane[h]	0.001
Tetrachloroethylene[h]	0.005
1,2,4-Trichlorobenzene[h]	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane[h]	0.005
Trichloroethylene[h]	0.005
Trichlorofluoromethane	0.15

Parameter	Objective (in MG/L)
Volatile Organic Chemicals (cont'd):	
1,1,2-Trichloro-1,2,2-trifluoromethane[h]	1.2
Toluene[h]	0.15
Vinyl Chloride[h]	0.0005
Xylenes (single or sum of isomers)[h]	1.750
Radioactivity:	
Combined Radium-226 and Radium-228[i]	5
Gross Alpha Particle Activity[i]	15i
Tritium[i]	20,000
Strontium-90[i]	8
Gross Beta Particle Activity[i]	50
Uranium[i]	20

NOTES:

a. Secondary Maximum Contaminant Levels as specified in Table 64449-A of Section 64449, Title 22 of the California Code of Regulations, as June 3, 2005.

b. Table III-2, 1986 Basin Plan

c. Secondary Maximum Contaminant Levels as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations, as of June 3, 2005. (Levels indicated are "recommended" levels. Table 64449-B contains a complete list of upper and short-term ranges.)

d. Maximum Contaminant Levels as specified in Table 64431-A (Inorganic Chemicals) of Section 64431, Title 22 of the California Code of Regulations, as of June 3, 2005.

e. MFL = million fibers per liter; MCL for fibers exceeding 10 um in length.

f. Flouride objectives depend on temperature.

g. A complete list of optimum and limiting concentrations is specified in Table 64433.2-A of Section 64433.2, Title 22 of the California Code of Regulations, as of June 3, 2005.

h. Maximum Contaminant Levels as specified in Table 64444-A (Organic Chemicals) of Section 64444, Title 22 of the California Code of Regulations, as of June 3, 2005.

i. Maximum Contaminant Levels as specified in Table 4 (Radioactivity) of Section 64443, Title 22 of the California Code of Regulations, as of June 3, 2005.

j. Included Radium-226 but excludes Radon and Uranium.

MG/L Milligrams per liter
pCi/L pico Curries per liter

Table 3-6: Water Quality Objectives for Agricultural Supply[a] (in mg/l)

Parameter	Threshold	Limit	Limit for Livestock Watering
Physical:			
pH	5.5-8.3	4.5-9.0	
TDS			10,000.0
EC (mmhos / cm)		0.2-3.0	
Inorganic Parameters:			
Aluminum	5.0	20.0	5.0
Arsenic	0.1	2.0	0.2
Beryllium	0.1	0.5	
Boron	0.5	2.0	5.0
Chloride	142.0	355.0	
Cadmium	0.01	0.5	0.05
Chromium	0.1	1.0	1.0
Cobalt	0.05	5.0	1.0
Copper	0.2	5.0	0.5
Flouride	1.0	15.0	2.0
Iron	5.0	20.0	
Lead	5.0	10.0	0.1
Lithium		2.5[b]	
Manganese	0.2	10.0	
Molybdenum	0.01	0.05	0.5
Nickel	0.2	2.0	
$NO_3 + NO_2$ (as N)	5.0	30[c]	100.0
Selenium		0.02	0.05
Sodium adsorption ratio (adjusted)[d]	3.0	9.0	
Vanadium	0.1	1.0	0.1
Zinc	2.0	10.0	25

NOTES:

a. For an extensive discussion of water quality for agricultural purposes, see "A Compilation of Water Quality Goals," Central Valley Regional Water Quality Control Board, May 1993.

b. For citrus irrigation, maximum 0.075 mg/l.

c. For sensitive crops. Values are actually for NO_3-N + NH_4-N.

d. Adjusted SAR = $\{ Na /[(Ca + Mg)+2]^{0.5} \}\{1 + [8.4 – pHc]\}$, where pHc is a calculated value based on total cations, Ca + Mg, and CO_3 + HCO_3, in me/l. Exact calculations of pHc can be found in "Guidelines for Interpretation of Water Quality for Agriculture" prepared by the Univ. of California Cooperative Extension.

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed Above Niles

SURFACE WATER QUALITY OBJECTIVES (ALAMEDA CREEK AND TRIBUTARIES)

TDS:	250 mg/l (90 day-arithmetic mean)
	360 mg/l (90 day-90th percentile)
	500 mg/l (daily maximum)
Chlorides:	60 mg/l (90 day-arithmetic mean)
	100 mg/l (90 day-90th percentile)
	250 mg/l (daily maximum)

GROUNDWATER QUALITY OBJECTIVES

(Concentration not to be exceeded more than 10 percent of the time during one year.)

Central Basin

TDS:	Ambient or 500 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Fringe Subbasins

TDS:	Ambient or 1000 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Upland and Highland Areas

California domestic water quality standards set forth in California Code of Regulations, Title 22 and current county standards.

Ambient water quality conditions at a proposed project area will be determined by Zone 7 of the Alameda County Flood Control and Water Conservation District at the time the project is proposed, with the cost borne by the project proponents. Ambient conditions apply to the water-bearing zone with the highest quality water.

Waters designated for use as domestic or municipal water supply shall not contain concentrations of chemicals in excess of natural concentrations or the limits specified in California Code of Regulations, Title 22, Chapter 15, particularly Tables 64431-A and 64431-B of Section 64431, Table 64444-A of Section 64444, and Table 4 of Section 64443.

CHAPTER 4: IMPLEMENTATION PLANS

INTRODUCTION

The San Francisco Bay Regional Water Quality Control Board (Water Board)'s overall mission is to protect the beneficial uses supported by the quality of the San Francisco Bay Region (Region)'s surface water and groundwater. Together, the beneficial uses described in detail in Chapter 2 define the resources, services, and qualities of aquatic ecosystems that are the ultimate goals of protecting and achieving water quality. The objectives presented in Chapter 3 present a framework for determining whether water quality is indeed supporting these beneficial uses. This chapter describes in detail the Water Board's regulatory programs and specific plans of action for meeting water quality objectives and protecting beneficial uses.

The descriptions of specific actions to be taken by local public entities and industries to comply with the policies and objectives of this Water Quality Control Plan (Basin Plan) are intended for the guidance of local officials. The Water Board will consider any proposed alternative actions that are consistent with and achieve the policies and objectives of the Basin Plan.

This chapter describes the watershed management conceptual framework for water quality control in the Region and presents each of the individual regulatory programs that form part of this comprehensive approach. These programs are organized into general categories, including surface water protection and management, groundwater protection and management, wetland protection and management, and emerging program areas. Taken together, these programs constitute an integrated, comprehensive water quality control program that is protective, efficient, and flexible.

4.1 THE WATERSHED MANAGEMENT APPROACH

In 1995, the Water Board initiated a watershed management approach to regulating water quality, expanding its primary focus from point sources of pollution to include more diffuse sources such as urban and agricultural runoff. A five-year statewide Strategic Plan, initiated in 1995 and last updated in 2001, guides the water resource protection efforts of the State and Regional Water Boards. A key component of the Strategic Plan is the Watershed Management Initiative (WMI), which promotes a watershed management approach for water quality protection as discussed in Chapter 1.

The WMI is designed to integrate various surface water and groundwater regulatory programs while promoting cooperative, collaborative efforts within a watershed that are designed to improve water quality and protect the beneficial uses of the watershed's water bodies. The WMI is also designed to focus limited funding and resources on the highest priority water quality issues identified by the Water Board in consultation with local stakeholders. The Water Board's strategy for the WMI is contained in the report titled, "San Francisco Bay Regional Water Quality Control Board Watershed Management Initiative, Integrated Plan Chapter." This report is a regularly updated planning tool for identifying priorities to be funded by existing resources, as well as priority tasks that are currently not funded. For each update, activities are planned over the next one to two years, and in some cases, over the next five years. The report also contains descriptions of regional and watershed strategies, discusses how the Water Board is structured to implement the WMI, and how the Water Board is implementing a priority-setting process. The WMI builds upon the progress made to date by the Water Board's efforts, combined with local

watershed efforts led by other entities, and it also identifies tasks to be accomplished to fully implement the WMI. Examples of local implementation of the WMI are included in Section 4.1.3 Watershed Management in Countywide Programs and Individual Watersheds.

To implement the WMI in the Region, there are three levels of watershed management: 1) region-wide, 2) countywide, and 3) in sub-watersheds. This watershed management process is flexible and recognizes the existing institutional structures that can implement watershed management to protect water quality.

Some water quality issues are managed at the region-wide level. For example, the Water Board's water quality control program focuses in part on managing the influx of toxic pollutants to the Estuary's aquatic system, described in Section 4.1.2 Toxic Pollutant Management in the San Francisco Estuary System. The goal of this program element is to limit the total amount of pollutants in the entire system to ensure protection of beneficial uses. In cases where evidence suggests beneficial uses are not protected due to specific pollutants in the system, the program described in Section 4.1.1 Water Quality Attainment Strategies Including Total Maximum Daily Loads is initiated.

Other water quality issues are managed at the countywide level. The Region includes portions of nine counties, which all include shoreline on the Bay, permitted discharges to the Bay, and watershed drainage to the Bay. These institutions are therefore well suited to organize and/or participate in a watershed management approach at the countywide level, forming stakeholder groups that include municipalities, other organizations, and members of the public. Examples are discussed in Section 4.1.3 Watershed Management in Countywide Programs and Individual Watersheds. For example, several urban runoff management programs are organized at this countywide level.

Sub-watershed level watershed management occurs within the county-wide framework, as a result of priority setting that is strongly influenced by local input.

4.1.1 WATER QUALITY ATTAINMENT STRATEGIES INCLUDING TOTAL MAXIMUM DAILY LOADS

The Water Board intends to establish Water Quality Attainment Strategies (WQAS) including Total Maximum Daily Loads (TMDLs) where necessary and appropriate to ensure attainment and maintenance of water quality standards. WQAS and TMDLs for the Region are described in Chapter 7. Section 303(d) of the federal Clean Water Act requires states to identify water bodies that are not attaining water quality standards, and to establish TMDLs for pollutants causing the impairment (non-attainment of water quality standards) of listed water bodies. As such, TMDLs are the pollutant load levels necessary to attain the applicable water quality standards. A complete TMDL refers to the process and elements associated with establishing a TMDL that include, but are not limited to, problem statement, numeric target(s), source analysis, linkage analysis, wasteload and load allocations, implementation plan, and monitoring plan.

WQAS are development and implementation actions associated with implementing (attaining) water quality standards. Complete TMDLs are WQAS, but WQAS are not limited to 303(d)-list pollutants. For example, they may be developed for pollutants for which threat of impairment

provides cause for pollution prevention actions and related activities. WQAS may contain, but not necessarily include, all or some of the complete TMDL elements.

The Water Board will establish WQAS including TMDLs at the level (the Estuary, smaller segments within the Estuary, or individual watersheds) deemed most appropriate in terms of effectiveness and efficiency relative to the applicable water quality standard, types and locations of pollutant sources, and type and scale of implementation actions.

4.1.2 TOXIC POLLUTANT MANAGEMENT IN THE ESTUARY

The Water Board's water quality programs began decades ago with a focus on controlling the discharge of point sources of pollution such as municipal sewage and industrial wastewater. Since then, highly effective waste treatment systems have been built, essentially eliminating what had been major water quality problems associated with high nutrient and organic loading. In addition, the overall influx of toxic pollutants from point sources has significantly declined as a result of these efforts. Still, certain toxic pollutants remain a great concern.

The focus of efforts to attain water quality goals has expanded accordingly. Further reductions in point source pollutant loadings are being attained through complex, innovative programs often involving numerous public agencies and private organizations. Loading from diffuse sources, such as urban and agricultural runoff, had until recently, continued largely unchecked. These sources are now generally considered to be the largest source of pollutants to aquatic systems. Water Board programs aim to reduce this diffuse pollutant loading.

4.1.2.1 NUMERIC WATER QUALITY OBJECTIVES: WASTELOAD ALLOCATIONS

The numerical objectives presented in Chapter 3 define maximum levels of individual pollutants allowed in the waters of the region. These objectives are based on extensive technical information that relates concentrations of pollutants in water to adverse effects on beneficial uses.

Assuring that pollutant concentrations throughout the whole Estuary system will meet objectives for each pollutant requires (a) information on the fate, transport, and distribution of that pollutant and (b) quantification of loading from all sources, including riverine inputs, urban and agricultural runoff, and point source discharges. When this information is available, the total amount of each pollutant that can enter the system without exceeding water quality objectives can be calculated. The maximum pollutant load can then be allocated among all sources, a process known as wasteload allocation. By considering pollutant influx from all sources, wasteload allocation supports the identification and implementation of the most effective and economically efficient means of achieving water quality objectives in the larger Estuary system.

There are three limitations to this approach. First, there are many pollutants of local concern for which objectives have not been developed and adopted. The objectives for specific toxic pollutants contained in Chapter 3 are reasonable for the purposes of interim regulation because they provide a minimum level of protection in the Estuary; however, additional objectives are necessary to fully implement the wasteload allocation approach. The Water Board will establish water quality objectives for selected pollutants as the necessary technical information becomes available and a framework for assessing economic factors is developed.

Second, the wasteload allocation approach only considers the impact of individual pollutants. Aquatic systems in the region contain mixtures of pollutants in a complex and variable water matrix. Implementation of the toxicity objective described in the following section addresses this issue.

Finally, substances that accumulate in sediment or organisms pose a more complicated problem for water quality control. The additional considerations necessary for these pollutants are described below.

4.1.2.2 TOXIC POLLUTANT ACCUMULATION: MASS-BASED STRATEGIES

Wasteload allocations based on the achievement of numeric water quality objectives will provide appropriate protection of beneficial uses for many toxic pollutants. For some pollutants, however, concentrations in water are not good indicators of their impairment of beneficial uses. Instead, wasteload allocations for such compounds are developed based on mass rather than concentration, and tissue and sediment concentrations. Typically, mass-based allocations require more extensive technical information on the fate and transport of pollutants in the system than those based on water alone.

The Water Board implements the narrative objectives regarding sediment accumulation and bioaccumulation in several ways. These are discussed in greater detail later in this chapter. In general, pollutants are identified and monitored in both discharges and the aquatic system. At a minimum, limits placed on point and nonpoint discharges take pollutant accumulation into consideration. Ultimately, the goal is to develop system-wide, mass-based wasteload allocations for appropriate substances.

4.1.2.3 SCIENTIFIC RESEARCH: ONGOING REFINEMENT OF PROGRAMS

The quantity of pollutants in the Estuary system is the result of many complex and interacting factors beyond the total amount discharged day-to-day. Levels of pollutants in water, sediments, and aquatic organisms are regularly assessed through the Regional Monitoring Program and other surveillance described in Chapter 6.

In addition, implementation of this Water Quality Control Plan involves research and investigation on processes controlling the fate, transport, and distribution of pollutants. In the past, the Water Board has supported research on Delta outflow and associated flushing, sediment movement, chemical transformations within the aquatic system, and biological effects associated with existing and projected pollutant levels.

Information resulting from ongoing scientific research and regular monitoring within the Estuary is continuously incorporated into each of the programs described in detail later in this chapter. In addition, the Water Board typically requires technical investigations in situations where water quality problems have been identified but not enough information is available to craft appropriate courses of action. As a result, programs are constantly evolving as better scientific information becomes available.

4.1.2.4 RIVERINE FLOWS, SYSTEM FLUSHING, AND POLLUTANT LOADING

4.1.2.4.1 DELTA OUTFLOW

In addition to pollution control measures, achieving water quality objectives and protecting the beneficial uses of the San Francisco Bay Estuary system (particularly fish migration and estuarine habitat) are depends on freshwater outflow from the Delta. Adequate freshwater inflow to the Bay system is necessary to control salinity, to provide mixing (particularly in the entrapment zone), to maintain proper temperature, and to flush out residual pollutants that cannot be eliminated by treatment or nonpoint source management. Except for local drainage and wastewater discharges, Delta outflow provides virtually all the freshwater inflow to San Francisco Bay. However, the availability of adequate Delta outflow to meet these needs is very uncertain because of the existing and potential upstream diversions of water and fluctuations in rainfall.

The State Board first addressed the issue of the Bay's inflow needs in the Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh in the Water Rights Decision 1485, issued in August, 1978. In these documents, the State Board established maximum salinity standards (but no corresponding flow standards for the Delta) and required the two major water diverters to conduct research and determine:

- Outflow needs in San Francisco Bay, including the ecological benefits of unregulated outflows and salinity gradients established by them; and
- The need for winter flows for long-term protection of striped bass and other aquatic organisms in the Delta.

In 1993, estuarine scientists and managers associated with the San Francisco Estuary Project recommended development of salinity standards for different parts of the year to be used in conjunction with flow standards. Specifically, they indicate that average upstream positions of the near-bottom 2 0/00 isohaline would be an appropriate index for salinity standards.

Technical evidence developed during the Estuary Project process and the State Board Bay/Delta hearings will be used to help formulate future amendments to the Basin Plan.

4.1.2.4.2 SAN LUIS DRAIN

The San Luis Drain is a proposed method of funneling agricultural runoff from the San Joaquin Valley into the Delta.

Agricultural irrigation in the San Joaquin Valley leads to high salinity concentrations in the soil, which may be harmful to crops. To alleviate this condition, tile drains have been and are being installed to carry the saline water away from the fields. However, there have been adverse environmental effects associated with this wastewater.

In 1982, the U.S. Fish and Wildlife Service discovered selenium concentrations in fish from the San Luis Drain and Kesterson Reservoir to be as much as 100 times higher than background. It also found high mortalities and deformities among newborn coots, grebes, stilts, and ducks.

There was early concern about the potential for impacts on beneficial uses in the Estuary if the Drain were completed and discharged into the Delta. In response, the Water Board prohibited the proposed discharge in 1964, unless compelling evidence that the proposed discharge would not harm beneficial uses was submitted by proponents. In 1981, the Water Board requested that the State Board take the lead role in developing, revising, renewing, and enforcing waste discharge requirements for the Drain.

Unfortunately, the problem of agricultural drainage still exists. The San Joaquin Valley Drainage Program, another state and federal interagency program, has begun to investigate further the problems associated with the drainage of agricultural lands and to develop solutions.

4.1.3 WATERSHED MANAGEMENT COUNTYWIDE PROGRAMS AND INDIVIDUAL WATERSHEDS

Protection of beneficial uses associated with the Estuary also depends upon achieving water quality goals within each of the watersheds draining to the Bay. Successful wasteload allocations depend upon limiting pollutant influx from nonpoint as well as point sources. In turn, nonpoint source control is dependent on a wide range of factors, including physical factors such as the geology and hydrological characteristics of an area; existing natural resources such as vegetation along streambanks; and a wide range of human activities.

Watershed management planning in each countywide program or individual watershed involves a series of steps. First, a detailed assessment of current conditions, including identification of existing or potential problems, is conducted. Next, the process attempts to bring together all affected stakeholders and interested parties to determine how they would manage their watershed. Finally, specific actions are taken during implementation of the countywide or local watershed action plan.

The Water Board firmly believes that watershed planning and protection efforts will not be effective unless solutions are defined and implemented at the local level. The following sections present four examples of local watershed management planning activities supported by the Water Board.

4.1.3.1 THE NAPA RIVER WATERSHED

The Water Board has initiated county-level watershed management planning efforts. The first began in the Napa River Watershed where depressed oxygen levels, high coliform levels, and sedimentation due to erosion were recurring problems in segments of the Napa River.

The Water Board initiated the planning process by preparing a complete resource evaluation in cooperation with a wide range of local public and private entities. This evaluation encompassed traditional evaluations of natural resources and also included descriptions of existing management and regulatory frameworks, funding, and tax incentive programs to support the local planning process.

The Water Board is supporting local agency staff, public officials, agricultural landowners, urban residents of Napa County, and the Napa Resource Conservation District in their efforts to define watershed management goals and specific actions that will eventually allow those goals to be

met. In 1999, the Water Board issued waste discharge requirements (WDRs) for the Napa River Flood Control Project, which has set a national standard for innovative, community-based planning to ensure a "Living River" corridor along the Napa River that protects water quality, successfully integrating flood control, water quality, and habitat protection requirements.

4.1.3.2 THE SANTA CLARA BASIN WATERSHED MANAGEMENT INITIATIVE

In 1996, the Water Board and the U.S. EPA initiated a broad stakeholder effort to encourage local stewardship in the Santa Clara basin as part of the statewide WMI. The Santa Clara basin is defined as the San Francisco Bay south of the Dumbarton Bridge and the watersheds draining to that segment of the Bay. The Santa Clara Basin Watershed Management Initiative is a broad-based stakeholder group of 32 signatories from local, state and federal public agencies, business and trade associations, and civic and environmental groups and programs. The declared purpose of this 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 in the watershed." This WMI first established a mission statement, goals, planning objectives for development of a watershed action plan, implementation objectives, and a framework for conducting a watershed assessment. The most outstanding successes of this WMI have been in sustaining organizational continuity, providing a forum for stakeholder input on regulatory actions, and producing a variety of outreach materials for the general public to assist in natural resource protection. This WMI has continued to develop its foundation by producing watershed assessments (2002), and a watershed action plan (2003), and by further developing its priorities for implementation to protect and improve water quality (2005).

4.1.3.3 THE TOMALES BAY WATERSHED

The Tomales Bay watershed in western Marin County is one of the major estuaries on the west coast of the United States. It has a diverse ecosystem and several notable tributaries, including Lagunitas Creek, which has one of the few remaining viable coho salmon runs in central California. In December 1999, the local citizens and state, federal, and local agencies formed the Tomales Bay Watershed Council. The Council produced a Stewardship Plan for the Tomales Bay watershed to ensure that water quality in Tomales Bay and its tributary streams is sufficient to support natural resources and beneficial uses. The plan also includes recommendations to restore and protect the integrity of natural habitats and native plant communities, which contribute to improved water quality. The Water Board has actively participated on the Council, working with the other agencies and interested parties to coordinate monitoring and recommend funding for grant projects for a variety of pollution prevention and restoration projects within the watershed.

4.1.3.4 THE CONTRA COSTA WATERSHED FORUM

The Contra Costa Watershed Forum (CCWF) was established as a result of a countywide Creek and Watershed Symposium in 1999. The CCWF is an open committee of approximately 50 organizations, including federal, state, and local agencies; local governments; a professional watershed research organization; local non-profit environmental and education organizations; community volunteer groups; and private citizens. The CCWF staff are from the Contra Costa County Community Development Department. This diverse group of stakeholders is united by their concern for the watersheds of Contra Costa County. Through the coordinated activities of

the CCWF, local creek and watershed groups have been sustained, and the CCWF has received grant funding for creek surveys and mapping, biological water quality (benthic macroinvertebrate) monitoring, and production of the Watershed Atlas. The Watershed Atlas compiles information on geography, hydrology, demographics, impervious surface, drainage patterns and much other information pertinent to water quality protection and evaluation, including activities of local watershed groups and restoration projects. The Water Board supports the CCWF by attendance at meetings, management of grant-funded projects, and work with CCWF staff on setting watershed priorities. These efforts are leading to water quality improvements as the citizens of Contra Costa County become more directly involved in assessing, monitoring, restoring, and protecting their watersheds.

4.2 DISCHARGE PROHIBITIONS APPLICABLE THROUGHOUT THE REGION

To protect water quality of all aquatic systems throughout the region, the discharge prohibitions listed in Table 4-1 apply. The Water Board will not allow exceptions to these prohibitions, except where noted below.

Exceptions to Prohibitions 1, 2, and 3 will be considered where:

- An inordinate burden would be placed on the discharger relative to beneficial uses protected and an equivalent level of environmental protection can be achieved by alternate means, such as an alternative discharge site, a higher level of treatment, and/or improved treatment reliability; or
- A discharge is approved as part of a reclamation project; or
- It can be demonstrated that net environmental benefits will be derived as a result of the discharge; or
- A discharge is approved as part of a groundwater clean-up project, and in accordance with Resolution No. 88-160 "Regional Board Position on the Disposal of Extracted Groundwater from Groundwater Clean-up Projects," and it has been demonstrated that neither reclamation nor discharge to a POTW is technically and economically feasible, and the discharger has provided certification of the adequacy and reliability of treatment facilities and a plan that describes procedures for proper operation and maintenance of all treatment facilities. (The Water Board recognizes the resource value of extracted and treated groundwater and urges its utilization for the highest beneficial use for which applicable water quality standards can be achieved.)

In reviewing requests for exceptions, the Water Board will consider the reliability of the discharger's system in preventing inadequately treated wastewater from being discharged to the receiving water and the environmental consequences of such discharges.

Prohibitions 1 through 5 refer to particular characteristics of concern to beneficial uses. The Water Board may consider an exception to 4 provided that any proposed reclamation project demonstrates that beneficial uses will be protected. This broad language has been and will be interpreted by the Water Board on a case-by-case basis. It should be noted that the Water Board will consider all discharges of treated sewage and other discharges where the treatment process

is subject to upset to contain particular characteristics of concern unless the discharger can demonstrate that the discharge of inadequately treated waste will be reliably prevented.

4.2.1 SUMMARY

The detailed program descriptions presented in the remainder of this chapter are focused on protecting water quality in systems ranging from small creeks to the larger Estuary.

The section on point source control focuses primarily on protecting beneficial uses in each segment of the Estuary, as well as the whole system. The section on nonpoint source control focuses primarily on individual watersheds, but also on the contributions of runoff to the larger Bay system. The section on groundwater protection and management centers on groundwater basins within each watershed. The section on emerging program areas describes resources and issues that have increasingly become the focus of Water Board activity. Often, these areas require integrated and innovative approaches that are substantially different than those that exist in established programs.

4.3 POINT SOURCE CONTROL

Surface waters in the region consist of inland surface water (freshwater lakes, rivers, and streams), estuaries, enclosed bays, and ocean waters. Historical and ongoing wasteloads contributed to the surface water bodies in the region come from upstream discharges carried into the region via Delta outflow, direct input in the forms of point and nonpoint sources, and indirect input via groundwater seepage.

A point source usually refers to waste emanating from a single, identifiable location, while a nonpoint source usually refers to waste emanating from diffuse locations. While legally considered point sources, stormwater sewer systems are discussed under the nonpoint source control because waste entering the systems is generated from diffuse sources. This section describes control measures for point source discharges. The Water Board may control either type of discharge, but approaches may differ.

Wasteloads from point sources are those that are generally associated with pollutant discharges from an identifiable location to a specific receiving water body. Major types of point sources include:

- Treated municipal sewage discharged from Publicly Owned Treatment Works (POTWs), which often consist of a combination of domestic, industrial, and commercial waste streams;
- Treated industrial wastewater resulting from industrial operations, processing, cleaning, and cooling;
- Treated groundwater from clean-up of groundwater pollution sites; and,
- Other miscellaneous types of discharges, including certain non-point sources with a physically identifiable point of discharge.

4.4 WASTE DISCHARGE PERMITTING PROGRAM

Point source discharges to surface waters are generally controlled through waste discharge requirements issued under the federal National Pollutant Discharge Elimination System (NPDES) permits. Although the NPDES program was established by the federal Clean Water Act, the permits are prepared and enforced by the Water Boards per California's delegated authority for the act.

Issued in five-year terms, an NPDES permit usually contains components such as discharge prohibitions, effluent limitations, and necessary specifications and provisions to ensure proper treatment, storage, and disposal of the waste. The permit often contains a monitoring program that establishes monitoring stations at effluent outfall and receiving waters.

Under the state's Porter-Cologne Water Quality Control Act, any person discharging or proposing to discharge waste within the region (except discharges into a community sewer system) that could affect the quality of the waters of the state is required to file a Report Of Waste Discharge (ROWD). The Water Board reviews the nature of the proposed discharge and adopts Waste Discharge Requirements (WDRs) to protect the beneficial uses of waters of the state. Waste discharge requirements could be adopted for an individual discharge, or a specific type of discharges in the form of a general permit. The Water Board may waive the requirements for filing a ROWD or issuing WDRs for a specific discharge where such a waiver is not against the public interest. NPDES requirements may not be waived.

Acceptable control measures for point source discharges must ensure compliance with NPDES permit conditions, including the discharge prohibitions (Table 4-1) and the effluent limitations provided on the following pages. In addition, control measures must satisfy water quality objectives set forth in the Basin Plan unless the Water Board judges that related economic, environmental, or social considerations merit a modification after a public hearing process has been conducted. Control measures employed must be sufficiently flexible to accommodate future changes in technology, population growth, land development, and legal requirements.

4.5 EFFLUENT LIMITATIONS

4.5.1 TECHNOLOGY- AND WATER QUALITY-BASED LIMITATIONS

The federal Clean Water Act (CWA) requires that NPDES permits include technology-based and, where appropriate, water quality-based effluent limitations. Technology-based effluent limitations are promulgated performance standards based on secondary treatment or best practicable control technology. When technology-based limitations fail to attain or maintain acceptable water quality (as measured by water quality objectives) or comply with water quality control plans, additional or more stringent effluent limitations will be required in order to attain water quality objectives. The more stringent limitations are known as water quality-based limits.

Water quality-based effluent limitations will consist of narrative requirements and, where appropriate, numerical limits for the protection of the most sensitive beneficial uses of the receiving water. Establishing numeric limits takes into account the appropriate water quality objectives, background concentrations in the receiving water, and allowable dilution credit.

In many cases, numerical water quality objectives are not available for various types of beneficial uses or for various constituents of concern. In these cases, best professional judgment will be used in deriving numerical effluent limitations that will ensure attainment and maintenance of narrative water quality objectives.

4.5.2 SITE-SPECIFIC OBJECTIVES

In some cases, the Water Board may elect to develop and adopt site-specific water quality objectives. These objectives will be based on reflect site-specific conditions and comply with the Antidegradation Policy. This situation may arise when:

- It is determined that promulgated water quality standards or objectives are not protective of beneficial uses; or
- Site-specific conditions warrant less stringent effluent limits than those based on promulgated water quality standards or objectives, without compromising the beneficial uses of the receiving water.

In the above cases, the Water Board may consider developing and adopting site-specific water quality objectives for the constituent(s) of concern. These site-specific objectives will be developed to provide the same level of environmental protection as intended by national criteria, but will more accurately reflect local conditions. Such objectives are subject to approval by the State Board, Office of Administrative Law, and U.S. EPA.

There may be cases where the promulgated water quality standard or adopted objectives are practically not attainable in the receiving water due to existing high concentrations. In such circumstances, discharges shall not cause impairment of beneficial uses.

4.5.3 BEST PROFESSIONAL JUDGMENT

In developing and setting water quality-based effluent limitations for toxic pollutants, best professional judgment will involve consideration of many factors. Factors that may be considered include:

- Applicable and relevant federal laws, regulation, and guidance (specifically 40 CFR122 and 131, promulgated National Toxics Rules, U.S. EPA Water Quality Criteria, and technical guidance on water-quality based toxics control);
- State laws, regulations, policies, guidance, and Water Quality Control Plans;
- This Regional Water Quality Control Plan;
- Achievability by available technology or control strategies;
- Effectiveness of pollution prevention and source control measures; and
- Economic and social costs and benefits.

While the conditions surrounding a waste discharge may vary from case to case, all attempts will be made to ensure consistency among permits when exercising best professional judgment.

The effluent limitations described below have been established to help achieve the water quality objectives identified in Chapter 3.

Numerical effluent limitations identified in this section may not contain a complete list of pollutants that have a reasonable potential to cause an adverse impact on water quality. Inclusion of such pollutants of concern into the NPDES permit will be evaluated on a case-by-case basis.

The Water Board will consider establishing more stringent limitations as necessary to meet water quality objectives and protect beneficial uses in particularly sensitive areas. Similarly, the Water Board will consider establishing less stringent limitations, consistent with state and federal laws, for any discharge where it can be conclusively demonstrated through a comprehensive program approved by the Water Board that such limitations will not result in unacceptable adverse impacts on the beneficial uses of the receiving water. Such a comprehensive program must evaluate the impact of other, nearby discharges as well as the discharge itself.

The numerical limits identified in this section have been and will be applied on a gross rather than a net basis except for certain industrial waste discharges, which will be evaluated on a case-by-case basis.

4.5.4 DISCHARGES TO OCEAN WATERS

Within the context of this Basin Plan, ocean waters of the region are all territorial marine waters of the state west of the coastline, except enclosed bays.

All discharges to ocean waters must comply with the applicable quality requirements for waste discharges specified in the State Board's Ocean Plan and Thermal Plan.

4.5.5 DISCHARGES TO INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES

Within the context of this plan, enclosed bays are the indentations along the coast that enclose an area of marine water (such as Tomales Bay and Drake's Estero) including San Francisco Bay; estuaries extend from a bay to points upstream where there is no significant mixing or fresh water or sea water (this includes significant portions of the main San Francisco Bay and the portions of streams draining to the Bay where salt and freshwater mix); and inland surface waters are all other waterbodies within the region (freshwater rivers, streams, lakes, and reservoirs). As described in Chapter 3, effluent limits for discharge into any surface water body within the region is based on salinity. These are defined in the State Enclosed Bays and Estuaries Policy, 1974.

4.5.5.1 LIMITATIONS FOR CONVENTIONAL POLLUTANTS

Effluent limitations for conventional pollutants are contained in Table 4-2 for discharges to inland surface waters and enclosed bays and estuaries within the region.

4.5.5.2 LIMITATIONS FOR SELECTED TOXIC POLLUTANTS

Water quality-based effluent limitations for shallow water and deepwater dischargers shall be calculated according to the methodology in the “Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California (SIP).” and any amendments thereto.

The Water Board may adopt additional numerical standards for conservative constituents documented in discharges and/or documented to be of concern in receiving waters.

4.5.5.3 WHOLE EFFLUENT TOXICITY LIMITS AND CONTROL PROGRAM

The narrative water quality objective for toxicity (see Chapter 3) protects beneficial uses against mixtures of pollutants typically found in aquatic systems. This approach is used because numerical objectives for individual pollutants do not take mixtures into account and because numerical objectives exist for only a small fraction of potential pollutants of concern.

Effluent limits for acute toxicity are described below and were derived through the Effluent Toxicity Characterization Program (ETCP). A detailed description of the ETCP is presented later in this section. These limits define in specific terms how the Water Board assesses whether waters are "maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms" (the narrative objective in Chapter 3) and maintains waters free of "toxic substances in toxic amounts" (Clean Water Act).

4.5.5.3.1 ACUTE TOXICITY

The acute toxicity effluent limitation states that the survival of organisms in effluent shall be a median value of not less than 90 percent survival, and a 90 percentile value of not less than 70 percent survival using tests as specified in Table 4-4 and Table 4-5.

Compliance with the acute toxicity limitation is evaluated by measuring survival of test fishes exposed to effluent for 96 hours. Each fish species represents a single sample. Dischargers are required to conduct flow-through effluent toxicity tests, except for those that discharge intermittently and discharge less than 1.0 million gallons per day (average dry weather flow). Such small, intermittent dischargers are required to perform static renewal bioassays.

All dischargers perform toxicity tests using fish species, according to protocols approved by the U.S. EPA or State Board or published by the American Society for Testing and Materials (ASTM) or American Public Health Association. Two fish species shall be tested concurrently. These shall be the most sensitive two species determined from concurrent screening(s) of three species: three-spine stickleback, rainbow trout, and fathead minnow. Tests completed within ten days of the initial test are considered concurrent. This three-species-screening requirement can be met using either flow-through or static renewal bioassays.

The Water Board may consider allowing compliance monitoring with only one (the most sensitive, if known) fish species, if the following condition is met: The discharger can document that the acute toxicity limitation, specified above, has not been exceeded during the previous three years, or that acute toxicity has been observed in only one of two fish species.

The Water Board may modify the flow-through bioassay requirements and the specific test species requirements on a case-by-case basis for discharges of once-through cooling water or excessively saline wastes, which make the implementation of these test requirements impractical. Such changes are not intended as a reduction in the acute toxicity limitation, but rather to account for the technical difficulties of performing the tests.

In addition, for deep water discharges subject to marine effluent limitations, dischargers are not to be considered out of compliance with the acute toxicity effluent limitation under the following circumstances: the discharger documents that the only cause of acute toxicity is ammonia which rapidly decays in the receiving water, and demonstrates that ammonia in the discharge does not impact water quality or beneficial uses.

4.5.5.3.2 CHRONIC TOXICITY

Chronic toxicity effluent limits are derived for individual dischargers based upon Best Professional Judgement. Some of the factors that may be considered in the development of these limits include: allowing credit for dilution comparable to those allowed for numeric chemical-specific objectives, effluent variability, and intent to protect against consistent chronic toxicity and severe episodic toxic events.

Chronic toxicity limitations are contained in the permits of all dischargers that have completed or are currently participating in the Effluent Toxicity Characterization Program (ETCP). This includes all municipal facilities with pre-treatment programs, all major industrial facilities, and selected treated groundwater dischargers.

Monitoring requirements for chronic toxicity, such as test species, effluent sampling procedures, dilution series, monitoring frequency, dilution waters and reference toxicant testing requirements, are specified in NPDES permits on a case-by-case basis. Monitoring requirements will be based on Effluent Toxicity Characterization Program data. Test species and protocols will be selected from those listed in Table 4-5.

Dischargers with chronic toxicity limits in their permits monitoring quarterly or less frequently are required to accelerate the frequency to monthly (or as otherwise specified by the Executive Officer) when conditions such as those listed in Table 4-6 occur.

4.5.5.3.3 TOXICITY IDENTIFICATION/REDUCTION EVALUATION (TIE/TRE)

Permits shall require that if consistent toxicity is exhibited, then a chronic toxicity identification evaluation (TIE) and toxicity reduction evaluation (TRE) shall be conducted. Specific language in permits requires the development of workplans for implementing TIEs. TIEs will be initiated within 30 days of detection of persistent toxicity. The purpose of a TIE is to identify the chemical or combination of chemicals causing the observed toxicity. Every reasonable effort using currently available TIE methodologies shall be employed by the discharger. The Water Board recognizes that identification of causes of chronic toxicity may not be successful in all cases.

The purposes of a TRE are to identify the source(s) of the toxic constituents and evaluate alternative strategies for reducing or eliminating their discharge. The TRE shall include all reasonable steps to reduce toxicity to the required level. In addition, the Water Board will review chronic toxicity test results to assess acute toxicity and consider the need for an acute TIE.

Following completion of the TRE, if consistent toxicity is still exhibited in a discharge, then the discharger shall pursue all feasible waste minimization measures at a level that is acceptable to the Water Board. The discharger must document that the acceptable level of participation is maintained by submitting reports on a specified schedule to the Water Board.

A Toxicity Reduction Evaluation may again be required in situations where chronic toxicity still exists and new techniques for identifying and reducing toxicity become available. Alternatively, the cause of effluent toxicity may change, so that existing techniques will enable identification and reduction of toxicity.

Consideration of any enforcement action by the Water Board for violation of the effluent limitation will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity.

4.5.5.3.4 EFFLUENT TOXICITY CHARACTERIZATION PROGRAM

The Effluent Toxicity Characterization Program was initiated in 1986 with the goal of developing and implementing toxicity limits for each discharger based on actual characteristics of both receiving waters and waste streams. The Water Board initiated the program as a means of implementing the narrative objective prohibiting toxic effects in receiving water.

The first two phases of the program focused on developing methods for monitoring effluent toxicity (known as effluent characterization) and deriving the appropriate series of tests to ensure that each effluent and its immediate receiving waters are not toxic to aquatic organisms.

Information from these phases is used to determine whether the narrative objectives are being met in each segment of the Bay and will support the development of site-specific water quality objectives and wasteload allocations.

As the program progresses, the Water Board may: (a) Modify existing effluent limits; (b) Specify different test organisms and methods for determining compliance with toxicity effluent limits; and/or (3) Require a toxicity reduction evaluation (TRE) to determine the cost-effectiveness of controlling toxicity or reducing concentrations of specific pollutants.

This program is being implemented within the existing framework of the NPDES permitting program for municipal and industrial facilities.

The purposes of effluent characterization are to:

- Define effluent variability so that the most appropriate compliance monitoring program can be put in place for each discharge and so that adequate information can be developed to determine if treatment processes or source control modifications are necessary to comply with effluent limits;
- Define the sensitivity of different test species to different effluents so that appropriate acute toxicity effluent limits can be defined and to identify the most sensitive of a group of test organisms used for compliance monitoring; and
- Define the chronic toxicity of the effluent to different test species such that the most sensitive organism of a standard set can be defined and either used for compliance monitoring or used for development of application factors to be applied to the acute toxicity effluent limit.

Two rounds of effluent characterization have been completed by dischargers selected on the basis of the nature, volume, and location of discharge. The first round started characterization in 1988; the second round in 1991. The Water Board adopted guidance documents for each round of characterization, with modifications made to the second round from knowledge gained during the first. Status reports were issued in July, 1989, March, 1990, and July, 1991. A summary report is scheduled upon completion of the second round in 1995. The need for a third round of characterization will be evaluated at that time.

Thus far, no one test species has consistently been the most sensitive to all discharges. This strongly supports the current approach of requiring screening using several test species. Also, acute toxicity has been observed at several sites using the expanded range of test species.

Although these sites can meet existing limits with test species currently used to determine compliance (fathead minnow, trout, and stickleback), they cannot meet the limits based on more sensitive species now available.

Detailed technical guidelines for conducting toxicity tests and analyzing resulting data were compiled in "Modified Guidelines: Effluent Toxicity Characterization Program," San Francisco Bay Regional Water Quality Control Board, 1991, Resolution No. 91-083, after experience gained during the first round. This document is incorporated by reference into this plan.

4.6 CALCULATION OF WATER QUALITY-BASED EFFLUENT LIMITATIONS

4.6.1 DILUTION RATIOS

The allocation of dilution ratio depends on whether a discharge is classified as a deep water or a shallow water discharge. In order to be classified as a deep water discharge, waste must be discharged through an outfall with a diffuser and must receive a minimum initial dilution of 10:1, with generally much greater dilution. All other dischargers are classified as shallow water discharges.

4.6.1.1 DEEP WATER DISCHARGES

While it is recognized that the actual initial dilution of many deep water discharges is greater than ten, the Water Board has taken a conservative approach to calculating effluent limitations for the following reasons. First, there is concern over the effects of the cumulative mass loadings of toxic pollutants from the numerous discharges into San Francisco Bay. Limiting the allocation of dilution credits is one means of limiting mass loadings. Second, recent Water Board studies have detected toxicity in ambient waters throughout the Bay system based on laboratory toxicity tests. This calls for a cautious approach in allowing the discharge of toxic substances. Third, studies indicate that bioaccumulation of pollutants in San Francisco Bay biota is of concern to wildlife and human health. Fourth, it is difficult to either measure or predict actual dilution in the San Francisco Bay estuarine environment. In the Estuary, the direction of waste transport varies over the course of the tidal cycle, so it is difficult to determine the fraction of new water versus recirculated water mixing with the discharge. U.S. EPA has developed several models of initial dilution for discharge plumes, but none take into account transport due to tidal currents.

The Water Board will consider inclusion of an effluent limitation greater than that calculated from water quality objectives when the increase in concentration is caused by implementation of significant water reclamation or water reuse programs at the facility; the increase in the effluent limitation does not result in an increase in the mass loading; and water quality objectives will not be exceeded outside the zone of initial dilution.

4.6.1.2 SHALLOW WATER DISCHARGES

Shallow water dischargers are subject to a discharge prohibition (Table 4-1, No. 1), which is intended to protect beneficial uses in areas that receive very limited, if any, dilution. When an exception to the prohibition is granted, it is generally not appropriate to allocate dilution credits for purposes of calculating effluent limitations, because these shallow aquatic environments are often biologically sensitive or critical habitats.

However, dilution credit may be granted on a discharger-by-discharger and pollutant-by-pollutant basis based on provisions of the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California (SIP)." In making this determination, the Water Board will grant dilution credit on a pollutant-by-pollutant basis if the discharger demonstrates that an aggressive pretreatment and source control program is in place, including the following:

- Completion of a source identification study;
- Development and implementation of a source reduction plan; and
- Commitment of resources to fully implement the source control and reduction plan.

Any dilution credit granted must be consistent with the antibacksliding policy and may be granted only after very rigorous scrutiny of source control efforts and receiving water data. When dilution is granted, permits shall include provisions requiring continuing efforts at source control, targeting the substances to which the exceptions apply.

For certain low volume, short duration, or one-time discharges, the requirements of pretreatment and source control programs may not be practical. The Water Board may choose to waive such requirements for pollutants in low volume discharges determined to have no significant adverse impact on water quality.

In addition, the Water Board will consider the discharger's demonstration of compliance with water quality objectives, in accordance with the SIP. This demonstration shall address the following issues:

(a) A demonstration that the proposed effluent limitation will result in compliance with water quality objectives, including the narrative chronic toxicity objective, in the receiving water. Water quality objectives used in this demonstration are to be based on ambient salinity and hardness (for fresh waters) at the time of sampling. In addition, demonstration of compliance is to be based on the averaging period associated with each objective. Compliance with both acute and chronic chemical-specific water quality objectives shall be demonstrated. If freshwater objectives apply in the receiving waters (i.e., salinity is less than 5 parts per thousand), compliance with saltwater objectives shall also be demonstrated at the

nearest point in the receiving waters where salinity reaches 5 parts per thousand. Such a demonstration shall be based on ambient monitoring at a frequency equal to that typically required for effluent monitoring for a period of time defined in the study plan;

(b) An evaluation of worst-case conditions (in terms of tidal cycle, currents, or instream flows, as appropriate) through monitoring and/or modeling to demonstrate that water quality objectives will continue to be met, taking into account the averaging period associated with each objective; and

(c) An evaluation of the effects of mass loading resulting from allowing higher concentrations of pollutants in the discharge, in particular, the potential for accumulation of pollutants in aquatic life or sediments to levels that would impair aquatic life or threaten human health. This evaluation may include sampling of sediment and biota in the vicinity of the discharge to determine the accumulation of pollutants resulting from the current levels of discharge.

A study plan for conducting this work must be submitted to the Water Board for approval by the Executive Officer. Results of the study or studies addressing these three points shall be submitted to the Water Board. Effluent limitations based on either concentration or mass loading shall be developed for consideration by the Water Board based on study results and any other available information. The goal in setting effluent limitations shall be to ensure that water quality objectives are met in the receiving water and that mass loadings are limited to a level that provides protection of beneficial uses. In no case shall effluent limitations impair the basis upon which exception to the prohibition against discharge to shallow water was granted. Continued ambient monitoring shall also be required to ensure that water quality objectives are met.

4.6.2 FRESH WATER VS. MARINE WATER

Due to the unique estuarine environment that exists in the region, the salinity characteristics (i.e., freshwater vs. marine water) of the receiving water shall be considered in establishing water quality objectives. Freshwater effluent limitations shall apply to discharges to waters both outside the zone of tidal influence and with salinities equal to or less than 1 part per thousand at least 95 percent of the time in a normal water year. Marine effluent limitations shall apply to discharges to waters with salinities equal to or greater than 10 parts per thousand at least 95 percent of the time, except for discharges to the Pacific Ocean, which are covered by the California Ocean Plan. For discharges to waters with salinities in between these two categories, defined as estuarine, effluent limitations shall be the lower of the marine or freshwater effluent limitation, based on ambient hardness, for each substance. The use of alternative marine or freshwater criteria may be approved if scientifically defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life; or conversely, the biology of the water body is dominated by marine aquatic life.

4.6.3 BACKGROUND CONCENTRATIONS

When dilution credit is granted, the background concentration of the substance is taken into account in calculating effluent limitations so that the dilution provided by mixing with receiving waters is not overestimated. Ambient background concentration means the concentration of a substance, in the vicinity of a discharge, which is not influenced by the discharge. For the San

Francisco Estuary, it is difficult to identify a location that is not influenced by a discharge. Furthermore, background concentrations should vary within the Estuary due to changing geochemistry of the waters as they travel downstream. However, in order to simplify the calculation of effluent limitations, it is desirable to use one background concentration throughout the region.

The determination of ambient background concentration, for purposes of establishing NPDES effluent limitations for toxic pollutants, will be done in accordance with the provisions of the SIP, and amendments thereto.

4.7 IMPLEMENTATION OF EFFLUENT LIMITATIONS

In incorporating and implementing effluent limitations in NPDES permits, the following general guidance shall apply:

4.7.1. PERFORMANCE-BASED LIMITS

Where water quality objectives in the receiving water are being met, and an existing effluent limitation for a substance in a discharge is significantly lower than appropriate water quality-based limits, performance-based effluent limitations for that substance may be specified or the effluent limit revised. Any changes are subject to compliance with the state Antidegradation Policy. The performance-based effluent limitation may be either concentration- or mass-based, as appropriate.

4.7.2 SITE-SPECIFIC OBJECTIVE INCORPORATION

Once the Water Board has adopted a site-specific objective for any substance, effluent limitations shall be calculated from that objective in accordance with the methods described above.

4.7.3 AVERAGING PERIODS

For some substances there may be more than one effluent limitation with different averaging periods (e.g., daily average and 30-day average). In both cases, the effluent limitations shall apply to the mean concentration of all samples analyzed during the averaging period. If only one sample is taken during the averaging period, the effluent limitation applies to the concentration of that sample.

4.7.4 METHOD DETECTION LIMITS, PRACTICAL QUANTITATION LEVELS (PQL), AND LIMITS OF QUANTIFICATION (LOQ)

Method Detection Limits are defined in Title 40, Code of Federal Regulations, Part 136, Appendix B (revised June 30, 1986).

Practical Quantitation Level is the lowest concentration of a substance within plus or minus 20 percent of the true concentration by 75 percent of the analytical laboratories testing in a performance evaluation study. If performance data are not available, the PQL is the MDL x 5 for carcinogens and the MDL x 10 for noncarcinogens.

Limits of Quantification are ten standard deviations greater than the average measured blank values used in developing the MDL.

These terms and concepts are useful when pollutant concentrations in waters are relatively low. However, these will be taken into account in determining compliance with, rather than in the calculation of, effluent limitations.

4.7.5 SELECTION OF PARAMETERS

Effluent limits are not necessary for substances that do not pose any risk to beneficial uses or are shown not to be present in discharge. However, a discharger must demonstrate to the satisfaction of the Water Board that particular substances do not cause, or have the reasonable potential to cause or contribute to an excursion above numerical and narrative objectives. Dischargers must also demonstrate that pollutants of concern are (a) not in the waste stream, and (b) no change has occurred that may cause release of pollutants. This certification shall be supported, at a minimum, by monitoring results for such pollutants and process and treatment descriptions that demonstrate these substances are not expected to be present in the waste stream. At a minimum, this monitoring and certification is required prior to issuance and reissuance of WDRs.

The Water Board may choose to not require periodic monitoring and certification for pollutants in low volume discharges determined to have no significant adverse impact on water quality.

4.7.6 COMPLIANCE SCHEDULES

As new objectives or standards are adopted, permits will be revised accordingly. Revised permits will distinguish between effluent limitations that are met by current performance, and effluent limitations not currently attained. Immediate compliance will be required for effluent limitations that are met by current performance.

The Water Board may consider dischargers' proposals for longer compliance schedules for newly adopted objectives or standards as NPDES permit conditions for particular substances, where revised effluent limitations are not currently being met and where justified. The primary goal in setting compliance schedules is to promote the completion of source control and waste minimization measures, including water reclamation.

Justification for compliance schedules will include, at a minimum, all of the following:

(a) Submission of results of a diligent effort to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream;

(b) Documentation of source control efforts currently underway or completed, including compliance with the Pollution Prevention program described in the Basin Plan;

(c) A proposed schedule for additional source control measures or waste treatment; and

(d) A demonstration that the proposed schedule is as short as possible.

Implementation of source control measures to reduce pollutant loadings to the maximum extent practicable shall be completed as soon as possible, but in no event later than four years after new objectives or standards take effect. Implementation of any additional measures that may be required to comply with effluent limitations shall be completed as soon as possible, but in no event later than ten years after new objectives or standards take effect. The issuance of the permit containing a compliance schedule should not result in a violation of any applicable requirement of the federal Clean Water Act or the California Water Code, including any applicable Clean Water Act statutory deadlines.

4.8 STORMWATER DISCHARGES

As discussed in a later section titled "Urban Runoff Management," the Water Board has initiated a program that regulates certain municipal, industrial, and construction stormwater discharges through NPDES permits. Since both the sources of pollutants in stormwater discharges and the points of discharge are diffuse, and the methods of reducing pollutants in stormwater discharges are in the development stage, water quality-based numerical effluent limitations are not feasible at this time. Instead, stormwater permits will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. Compliance with these requirements is expected to be achieved through implementation of control measures or best management practices identified in dischargers' stormwater management plans or stormwater pollution prevention plans. Instead, stormwater permits will include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives for receiving waters. Compliance with these requirements is expected to be achieved through implementation of control measures or best management practices identified in dischargers' stormwater management plans or stormwater pollution prevention plans.

The Water Board is taking a phased approach towards attainment of water quality objectives in waters that receive stormwater discharges from urban areas and certain industrial and construction activities. The Water Board will first require entities subject to NPDES permits for stormwater discharges to complete implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the maximum extent practicable. For industrial facilities, such control measures include those representing the best available technology that is economically achievable.

NPDES permits for stormwater discharges will require completion of technically and economically feasible control measures as soon as possible. Specific schedules for implementing control measures may, at the discretion of the Water Board, be included in permits (to the extent that such schedules are authorized by state or federal laws) either by reference to a stormwater management plan or by permit conditions. In no event will these schedules extend beyond the term of the permit.

If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions which may require implementation of additional control measures. In such circumstances, the Water Board may consider dischargers' proposed schedules for identification and implementation of additional control measures designed to attain water

quality objectives. Such schedules shall be as short as practicable and will only be considered for inclusion in permits when a discharger has demonstrated the following:

(a) A diligent effort to quantify pollutant levels and the sources of the pollutant in stormwater discharges; and

(b) Documentation of completion of implementation of all technically and economically reasonable control measures.

4.9 WET WEATHER OVERFLOWS

During periods of heavy rainfall, large pulses of water enter sewerage systems. When these pulses exceed the collection, treatment, or disposal capacity of a sewerage system, overflows occur. This is especially problematic for sewer systems that combine both sanitary sewage and stormwater (Combined Sewer Systems or CSS), such as the City and County of San Francisco's system (discussed under the municipal discharger section). All other municipalities in the region operate two distinct sewer systems. Wet weather is also problematic for separate systems because more water infiltrates the pipes leading to treatment plants. This problem is commonly referred to as inflow/infiltration (I/I). In either case, pulses of water during wet weather may cause untreated or partially treated wastewater to be discharged directly to surface water bodies.

Wet weather overflows of wastewater affect three types of beneficial uses: water contact recreation, non-contact water recreation, and shellfish harvesting. The water quality characteristics that can adversely affect these beneficial uses are pathogens, oxygen-demanding pollutants, suspended and settleable solids, nutrients, toxics, and floatable matter.

4.9.1 FEDERAL COMBINED SEWER OVERFLOW CONTROL POLICY

On April 11, 1994, the U.S. EPA adopted the Combined Sewer Overflow (CSO) Control Policy (50FR 18688). This policy establishes a consistent national approach for controlling discharges from CSOs to the nation’s water. Using the NPDES permit program, the policy initiates a two-phased process with higher priority given to more environmentally sensitive areas. During the first phase, the permittee is required to implement the following 9 Minimum Controls. These constitute the technology-based requirements of the Clean Water Act as applied to combined sewer facilities (best conventional treatment (BCT) and best available treatment (BAT)). These minimum controls can reduce CSOs and their effects on receiving water quality:

(1) Conduct proper operation and regular maintenance programs for the CSS and the CSO outfalls;

(2) Maximize use of the collection system for storage;

(3) Review and modify pretreatment programs to ensure that CSO impacts are minimized;

(4) Maximize flow to the POTW for treatment;

(5) Prohibit CSOs during dry weather;

(6) Control solids and floatable materials in CSOs;

(7) Develop and implement pollution prevention programs that focus on contaminant reduction activities;

(8) Notify the public; and

(9) Monitor to effectively characterize CSO impacts and the efficacy of CSO controls.

Compliance with the minimum controls shall be as soon as practicable, but no later than January 1, 1997. The permittee is also required to initiate development of a long-term control plan to select CSO controls, based on consideration of the permittee's financial capability.

The second phase of the process involves implementation of the long-term control plan developed in the first phase. Such implementation must provide for the attainment of water quality objectives and may result in additional site-specific technology-based controls, as well as water quality-based performance standards that are established based on best professional judgement. While numeric water quality-based effluent limits are not readily established due to unpredictability of a storm event and the general lack of data, the CSO Control Policy requires immediate compliance with water quality standards expressed in the form of a narrative limitation.

The Water Board intends to implement the federal CSO Control Policy for the combined sewer overflows from the City and County of San Francisco. The City and County of San Francisco has substantially completed implementation of the long-term CSO control plan (and is thereby exempted requirements to prepare a long-term control plan).

Additionally, the following is the Water Board's recommended approach to control the seasonal degradation of water quality that results from all wet weather overflows of wastewater, including POTWs with either combined and separate sewer systems, and industrial wastewater facilities. The overflow from San Francisco's combined sewer system is addressed by the CSO Control Policy described above.

4.9.2 CONCEPTUAL APPROACH

The recommended approach to controlling wet weather overflows of wastewater that contains particular characteristics of concern to beneficial uses is a combination of designated alternative levels of maintenance (i.e., combination of treatment levels and beneficial use protection categories) and guidance for the design of overflow discharge structures. The Water Board is not endorsing any specific control measures, but is presenting a conceptual framework that allows for the evaluation of costs and benefits. This framework can be used as guidance in adopting specific control measures. As with all of its programs, the Water Board will implement this conceptual approach consistent with the national goal of "...water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water."

Maintenance and associated treatment and overflow requirements are detailed in Table 4-8. The following requirements should be met for all overflows:

(a) Outfalls achieve an initial dilution of 10:1;

(b) Overflows receive treatment to remove large visible floatable material and to protect the outfall system; and

(c) Overflow locations be removed from dead-end sloughs and channels, and from close proximity to beaches and marinas.

Exceptions to (a) and (c) will be considered where an inordinate burden would be placed on the discharger relative to beneficial uses protected, and when an equivalent level of environmental protection can be achieved by alternative means, such as an alternative discharge site, a higher level of treatment, and/or improved treatment reliability.

The conceptual approach described above will be used by the Water Board in evaluating wet weather discharge conditions where polluted stormwater or process wastewater bypasses any treatment unit or units that are used in the normal treatment of the waste stream. Evaluation of such discharges must include identification of:

- Actual capacities of the collection system, each treatment unit, and the disposal system;
- Flow return period probabilities for the specific facility location;
- Cost of providing complete storage or treatment capacity and disposal capacity for flow return periods of 1, 5, and 20 years;
- Quality of the polluted stormwater and process wastewater for flow return periods of 1, 5, and 20, years; and
- Beneficial uses that may be affected by such discharges.

4.9.3 SURFACE IMPOUNDMENT OVERFLOW PROTECTION

In providing protection of waste management units against wet weather overflows, Chapter 15 requires that surface impoundments must have sufficient freeboard to accommodate seasonal precipitation and precipitation conditions specified for each class of waste management unit. Those specified precipitation conditions are probable maximum precipitation for Class I units; and the 1000-year, 24-hour precipitation for Class II units.

To guarantee the protection of water quality, the Water Board will interpret seasonal precipitation to be the 100-year return period wet season for Class I units and the 10-year return period wet season for Class II units. The sources to be used for determining the applicable precipitation for a given return period and location are California Department of Water Resources Bulletin No. 195 (or any update by the Department), local water agency publications, or other sources approved by the Executive Officer.

4.10 DISCHARGE OF TREATED GROUNDWATER

Cleanup of groundwater pollution sites often includes groundwater extraction, and thus creates the need for proper disposal of treated groundwater. The majority of the groundwater pollution cases in the Region involve surface spills, pipeline breaks, or leakages from tanks, vaults, sumps, surface impoundments, or landfills. Toxic pollutants commonly found in groundwater range from solvents (including volatile organic compounds [VOCs] and semi-volatile organic compounds [SVOCs]), petroleum hydrocarbons, heavy metals, or a combination of these pollutants. In many cases, the treated groundwater is discharged to surface waters via storm drains. These direct discharges would normally require an exception to the prohibitions against discharge into shallow or non-tidal waters.

To address this issue, the Water Board adopted Resolution No. 88-160 (see Chapter 5 Plans and Policies). The Resolution urges dischargers of groundwater extracted from cleanup projects to recycle (reclaim) their effluent. When recycling is not technically and/or economically feasible, discharges must be piped to a publicly-owned treament works (POTW). Furthermore, as required in State Water Board Resolution 89-21 (see Chapter 5 Plans and Policies), the Water Board recognizes the resource value of the extracted and treated groundwater and urges its utilization for the highest beneficial use for which applicable water quality standards can be achieved.

The Water Board will consider granting an exception to the discharge prohibitions only if (a) it has been demonstrated that neither recycling nor discharge to a POTW is technically or economically feasible, and (b) beneficial uses of the receiving water are not adversely affected. Such an exception is based on the Water Board's recognition that discharges allowed under the exception are an integral part of a program to cleanup polluted groundwater and thereby produce an environmental benefit.

Dischargers shall demonstrate that their groundwater extraction and treatment systems and associated operation, maintenance, and monitoring plans constitute acceptable programs for minimizing the discharge of toxic substances and for complying with effluent limitations deemed necessary for protection of the beneficial uses of receiving waters.

Applications for National Pollutant Discharge Elimination System (NPDES) permits to discharge treated groundwater directly to surface waters will be evaluated on a case-by-case basis. In some cases, the applicant may qualify for the requirements of a general NPDES permit for discharge of treated groundwater. The Water Board has adopted general NPDES permits for the following two types of groundwater cleanup projects:

(a) Groundwater polluted by fuel leaks and other related wastes at service stations and similar sites (NPDES General Waste Discharge Requirements for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Fuel Leaks and Other Related Wastes at Service Stations and Similar Sites, NPDES No. CAG912002); and

(b) Groundwater polluted by VOCs (NPDES General Waste Discharge Requirements for Discharge and Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds, NPDES No. CAG912003).

These general permits are intended to streamline a common regulatory process and are not available for groundwater discharges with constituents other than fuels and VOCs. The Water Board may renew, revise, or rescind the permits if deemed appropriate. The general permits specify effulent limitations for discharges to surface water bodies, establish self-monitoring requirements, and identify trigger levels for non-routine constituents that are used to determine if additional effluent sampling and treatability studies are needed. Updates to these two general permits are considered every five years.

4.11 MUNICIPAL FACILITIES (POTWs)

Table 4-9 is a list of municipal wastewater treatment facilities (excluding wet weather facilities) within the Region that discharge directly into surface waters. Figure 4-1 shows where these facilities are located in the region. Under normal operational conditions, these POTWs provide a minimum of secondary treatment. In addition, with more than thirty percent of the total flow receives advanced treatment.

Brief discussions of the issues specific to the City and County of San Francisco, South Bay dischargers, the Fairfield-Suisun Sewer District, the Livermore-Amador Valley, and the East Bay Municipal Utilities District are presented below.

4.11.1 CITY AND COUNTY OF SAN FRANCISCO

The City and County of San Francisco collects the wastewater in a combined sewer system. That is, the domestic sewage, industrial wastewater, and stormwater runoff are all collected in the same pipes (combined sewer). Such system is subject to overloading during severe storms. Most other communities in California have a separated sewer system: one set of pipes for domestic sewage and industrial wastes and another set for stormwater.

San Francisco is near completion of the primary components of its wastewater facilities master plan. This construction program began in 1974 with the publication of the Master Plan Environmental Impact Statement and Report. The integrated wastewater control system established by the master plan has been designed to provide control and treatment for both dry weather sewage and wet weather storm flows. All dry weather flows currently receive secondary level treatment. At program completion in 1996, all wet weather flows including stormwater runoff will be captured and will receive a specified level of treatment depending on the size of the storm. Pollutant removal from stormwater will be approximately 60 percent system-wide (measured as reduction in total suspended solids).

San Francisco is one of the first municipalities in the nation to complete a comprehensive control program for a combined sewer system. The expenditures for completing the wastewater master plan is about $1.45 billion.

The Southeast Water Pollution Control Plant is a major component of San Francisco's wastewater treatment system. The plant provides secondary level treatment for all dry weather domestic and industrial wastewater from the Bayside drainage area in San Francisco (approximately 75 percent of the total citywide flow). The Oceanside plant provides similar treatment on the Westside. The storage/transports around the periphery of the city store combined sewage for treatment after the storms subside. Additionally, northeast zone storm flows receive treatment at the Northpoint wet weather treatment plant.

4.11.2 SOUTH BAY MUNICIPAL DISCHARGERS (SAN JOSE/SANTA CLARA, PALO ALTO, AND SUNNYVALE)

The South Bay municipal dischargers consist of three sewage treatment facilities: the San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Palo Alto Regional Water Quality Control Plant, and the Sunnyvale WPCP. These three plants serve all of the urban communities of Santa Clara County located in the Region. The South Bay municipal dischargers, as shown in Figure 4-1, presently discharge effluent receiving tertiary treatment (secondary plus nitrification, filtration, and disinfection) to shallow sloughs contiguous with the Bay, south of the Dumbarton Bridge.

The existing discharge locations for the Lower South SF Bay municipal wastewater dischargers are contrary to Basin Plan policy concerning discharge prohibitions (listed in Table 4-1). Exceptions to the first three of these prohibitions are discussed in Section 4.2 Discharge Prohibitions Applicable Throughout the Region.

State Water Board Order WQ 90-5 (1990) found that a net environmental benefit exception to these prohibitions could not be made for the three South Bay municipal discharges. However, the Order found that a finding of equivalent protection can be made if water quality based concentration limits for metals and revised mass loading limits for metals are placed in the dischargers' NPDES permits, if Sunnyvale and San Jose/Santa Clara continue avian botulism control programs, and if San Jose/Santa Clara implements mitigation for loss and degradation of endangered species habitat. Order WQ 90-5 also included provisions that would prevent increases in flows that would adversely impact endangered species habitats. In subsequent NPDES permit reissuances and Water Board resolutions from 1993 through 2003, the South Bay municipal dischargers met the three conditions required to support a finding of equivalent protection. The three conditions for granting the discharge prohibition must be confirmed at each NPDES permit reissuance.

4.11.3 FAIRFIELD-SUISUN SEWER DISTRICT (FSSD)

The FSSD's tertiary wastewater treatment plant has a dry weather treatment capacity of 17.5 million gallons per day (mgd), a wet weather capacity of 40 mgd, and 45 million gallons of off-line storage capacity. The District is currently treating 13 mgd (1993 dry weather data) from a service population of about 111,000. In order to comply with the Water Board's prohibition against dry weather discharges to the Suisun Marsh, FSSD operates a reclamation project in cooperation with the Solano Irrigation District. However, due to various contractual, legal and economic constraints, only about 40 percent of the treatment plant's annual effluent flow is reclaimed for agricultural irrigation. The remainder is discharged to Boynton Slough in Suisun Marsh.

The Water Board required FSSD to conduct an investigation to evaluate the discharge's impact on water quality conditions and beneficial uses of the receiving waters. This investigation was completed in 1987 and found that the discharge has some measurable local effects on water quality in Boynton Slough, but that beneficial uses are not impaired by the discharge. The study concluded that, overall and on a year-round basis, the discharge affords a net environmental benefit to Boynton Slough and the Suisun Marsh.

Given the findings of this study, the plant's high degree of operational redundancy and emergency storage capacity, and continued efforts by FSSD to maximize the use of reclaimed water, the Water Board has granted FSSD an exception to the Basin Plan prohibition. The Water Board allows, through the NPDES permit issued to FSSD, that portion of FSSD's tertiary effluent which cannot be reclaimed to be discharged to Boynton Slough on a year-round basis.

4.11.4 LIVERMORE-AMADOR VALLEY

The primary Water Board concern in the Livermore-Amador Valley (Valley) is the increase in salt loading that has occurred in the Valley's main groundwater basin. It is projected that with natural saline sources and and historical basin management practices, and with minimal water recycling, there will be a net salt loading increase from an average of 4,000 tons per year to 6,000 tons per year, resulting in a 10 milligram per liter (mg/L) per year increase in total dissolved solids (TDS) in groundwater. As a result, it has become increasingly important to develop and implement an integrated water/wastewater resource operational plan to protect the water quality and beneficial uses of the groundwater basin.

To achieve this goal, the Water Board supports local water management efforts to concurrently improve the salt balance in the main basin, to increase the local water supply, and to reduce the need for wastewater export through recycled water irrigation and groundwater recharge and other basin management practices.

4.11.4.1 SALT MANAGEMENT IN THE LIVERMORE-AMADOR VALLEY

The Livermore-Amador Valley groundwater basin is located in the middle of the Livermore-Amador Valley in eastern Alameda County and is primarily a closed groundwater basin within the Alameda Creek Watershed with multiple groundwater sub-basins of variable water quality. The Main Basin (that portion underlying the Cities of Livermore and Pleasanton) has the highest water quality, supplies most of the municipal wells in the area, and is used to store and distribute high quality imported water.

Alameda Creek and its tributaries recharge the Valley's groundwater basin and serve as channels to convey water released from the South Bay Aqueduct (SBA) to the main basin and the Niles Cone groundwater basin for artificial recharge. During dry weather, creek flow consists primarily of SBA release water.

The Alameda County Flood Control and Water Conservation District, locally known as the Zone 7 Water Agency (Zone 7), is the potable water wholesaler for most of the Valley and operates facilities to import and treat surface water from the State Water Project, groundwater wells, and distribution pipelines. Zone 7 serves as the overall water quality management planning agency

for the Livermore-Amador watershed and is responsible for managing the Valley's surface water and groundwater resources for the Valley's drinking water supply.

Dublin-San Ramon Services District (DSRSD) distributes potable water and treats wastewater in the western portion of the Valley, including parts of Contra Costa County. The City of Livermore distributes potable water to about one-fourth of Livermore and treats wastewater from the city and the adjacent national laboratories, Lawrence Livermore and Sandia National Laboratories.

The City of Livermore and DSRSD are member agencies of the Livermore-Amador Valley Water Management Agency (LAVWMA). Since 1980, wastewater has been exported from the Valley via LAVWMA-operated facilities that connect to the East Bay Dischargers Authority's (EBDA) interceptor in San Leandro. These waters are ultimately discharged through the EBDA outfall into south San Francisco Bay west of the Oakland Airport.

The current surface water quality objectives for the Alameda Creek Watershed above Niles (Table 3-7) were adopted in 1975. They were based on historic SBA water quality primarily to prevent degradation by wastewater discharges of imported SBA water being conveyed and used for groundwater recharge during dry weather periods. Wastewater discharges were terminated in 1980.

4.11.4.2 WATER RECYCLING AND VALLEY WATER - WASTEWATER MANAGEMENT

The water and wastewater agencies of the Valley have studied water recycling as an alternative to import of new water supplies and export of wastewater since the early 1970 (see Section 4.16 Water Recycling).

Zone 7, DSRSD and the City of Livermore's interests in water recycling have increased over the years due to droughts, continuing scarcity of new water supplies, institutional barriers to increasing wastewater export capacity from the Valley, and increasing public acceptance of water recycling throughout California. Technological advances and reduced costs of demineralization also now make groundwater recharge with demineralized recycled water a technically viable tool to help manage salt concentrations in the Valley.

Valley-wide water recycling is consistent with the Water Board's policy on recycled water, which states in part that disposal of wastewater to inland, estuarine, or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and water recycling (see Section 4.16 Water Recycling). As directed by California Water Code (Water Code) Sections 13511 and 13512, the Water Board strongly supports the use of recycled water to supplement existing surface water and groundwater supplies and will work with agencies to facilitate development of water recycling facilities.

The Valley water and wastewater agencies jointly sponsored the "Livermore-Amador Valley Water Recycling Study" (May 1992) that includes a comprehensive investigation of water recycling options. The study documented the Valley's hydrogeology. It also identified and analyzed potential projects throughout the Valley, including irrigation with non-demineralized effluent, groundwater recharge with demineralized effluent, and export of brine. The report

included a discussion of how water recycling could be implemented in conformance with Water Board requirements and Zone 7 policies and still manage salt loading on a Valley-wide scale.

The report also detailed a strategy for developing a water recycling program incrementally, beginning with small demonstration projects to gain experience and public acceptance and building up to large-scale projects that could contribute substantially to water supply and wastewater disposal needs in future years.

The 1992 study documented that between 19,000 and 38,000 acre-feet per year of recycled water could be beneficially reused within the Valley via irrigation and groundwater recharge. Well-established technologies and procedures exist for accomplishing such uses and could be in full compliance with Water Board requirements and the Department of Health Services's (DHS) Title 22 CCR requirements. The long-operating Orange County Water District Water Factory 21 project has served as a model for many recycled water groundwater recharge facilities.

4.11.4.3 VALLEY-WIDE SALT MANAGEMENT PLAN

As recommended in the 1992 study, the agencies jointly applied for a Master Water Reuse Permit (Master Permit) to cover proposed water recycling activities throughout the Valley. The Water Board issued the Master Permit in 1993 (Order No. 93-159). The permit specifies the various technical reports that were required to be submitted for review and approval by the Executive Officer before projects could commence operation. In this manner, the Master Permit fully addresses the regulatory requirements that projects must comply with, while facilitating the approval process.

The permit allows small-scale irrigation projects to be developed by the cooperating agencies. Before large-scale recycling projects could be approved, a long-range Valley-wide Salt Management Plan (SMP) was required to be developed and implemented. The Master Permit required further characterization of basin hydrogeology, refinement of salt balance calculations, selection of TDS policy targets and examination of alternative ways to offset natural and recycled sources of salt loadings. The SMP would need to address the water quality objectives for the Alameda Creek Watershed, which state that wastewater disposal/reuse projects be part of an "overall water-wastewater resource operational program developed by the agencies affected and approved by the Water Board."

Zone 7, in partnership with a technical advisory group composed of local water retailers and a Zone 7 citizens committee, prepared the SMP as required by the Master Permit. The development of the SMP occurred through a lengthy public process (1994 to 1999) and resulted in Water Board approval in 2004. Over the years, the scope of the SMP broadened beyond that outlined in the Master Permit to one more resembling a comprehensive watershed and water resources management plan.

The purpose of the SMP is to identify and document the long-term strategy for managing salt and mineral water quality in the Valley's groundwater basin. The primary strategy is to increase conjunctive use combined with groundwater demineralization in the western portion of the service area to fully offset current and future sources of salt loading to the Valley's Main Basin. This strategy was designed to also maintain and improve delivered water quality and to facilitate

increased use of recycled water using Zone 7 facilities to offset the associated increase in salt loading. Other strategies were identified and may be implemented through Zone 7's monthly Water Operations Plans using an adaptive management process.

4.11.4.4 GENERAL WATER REUSE PERMIT

The City of Livermore and DSRSD were approved for the General Water Reuse Requirements for Municipal Wastewater and Water Agencies, (General Water Reuse Permit, see Section 4.16 Water Recycling), to administer their current and future recycled water projects involving landscape and/or agricultural irrigation recycling water projects. The General Water Reuse Permit, which delegates the administration of domestic wastewater reuse to water recycling agencies and water agencies, replaces the Master Permit for surface irrigation projects. The General Water Reuse Permit issued to the City of Livermore and DSRSD incorporates the requirements of the approved SMP. The Master Permit will remain on record, and, if needed, will be revised to address any future groundwater recharge projects that may be planned by the two agencies.

Groundwater recharge or conveyance via ephemeral streams is an essential component of the proposed Valley-wide, year-round water recycling and groundwater quality management program. However, projects subject to NPDES requirements are not authorized under the Master Permit. The Master Permit identifies the technical reports necessary to support a future NPDES permit application. The Water Board will consider issuing a separate NPDES permit to the permittees following receipt of a complete NPDES application.

4.11.4.5 WATER BOARD SUPPORT FOR WATER QUALITY MANAGEMENT STRATEGIES PROTECTING THE LIVERMORE-AMADOR VALLEY GROUNDWATER BASINS

The Water Board supports the concept that water recycling is an essential component for planning the Valley's future water supply. Water recycling is particularly important in areas like this, that are dependent on imported water.

As demonstrated by its 2004 approval, the Water Board supports the Salt Management Plan developed by the cooperating agencies in the Valley to facilitate increased use of recycled water to offset salt loading.

The Water Board supports the export of concentrate from the demineralization of groundwater via the LAVWMA and EBDA pipelines when implemented as part of the Salt Management Plan and is protective of beneficial uses of the San Francisco Bay.

The Water Board supports the concept of transport and groundwater recharge through the Valley's ephemeral streams. Recharge of the groundwater basin may be accomplished with imported water, as is done now, or combined with high-quality recycled water under a future groundwater-recharge NPDES permit or WDRs. The year-round, dependable recycled water resource may also be appropriate for streamflow augmentation to enhance beneficial uses of the Valley's ephemeral streams.

4.11.5 EAST BAY MUNICIPAL UTILITY DISTRICT (EBMUD) AND LOCAL AGENCIES

The sewer systems of the seven local agencies in the East Bay communities (Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont, and Stege Sanitary District) have had a serious problem with infiltration/inflow (I/I) during the wet weather season. During major storms, the community's sewers receive up to 20 times more flow than in dry weather. As a result, the communities' sewers overflowed to streets, local watercourses, and the Bay, creating a risk to public health and impairing water. The seven local agencies discharging sanitary sewage deliver sewage to EBMUD's facilities, and thus, EBMUD's interceptors and treatment facilities also subject to overflows during storm events.

The Water Board approved a regional approach -- a combination of community collection system improvements and EBMUD capacity improvements - for correcting wet weather overflows. Following the Basin Plan, EBMUD and the agencies established the following priorities to correct this problem:

- Substantially reduce or eliminate community sewer overflows with high public health risks;
- Substantially reduce or eliminate other community sewer overflows; and
- Eliminate or mitigate interceptor overflows.

In 1985, the East Bay communities completed a multi-year infiltration/inflow (I/I) study, which proposed a $300 million (1985 dollars) comprehensive sewer rehabilitation and relief line program known as the East Bay Infiltration/Inflow Correction Program (ICP), it required 20 years to implement. In a 1986 enforcement order, the Water Board accepted the proposed approach and directed the ICP Program to focus on high public health problems.

In 1986, all agencies submitted Compliance Plans in response to the cease-and-desist orders issued by the Water Board. These plans set forth the design and implementation requirements of each agency's I/I Correction Program.

EBMUD's and the collection system agencies' programs are designed to handle wastewater and I/I flows for up to a 5-year wet weather event. For rainfall events that have a return frequency greater than 5 years, overflows from the sanitary collection and treatment systems may occur. This approach is consistent with the Basin Plan wet weather overflow requirements (Maintenance Level C) adopted for the I/I Correction and the Wet Weather Facilities Program.

The communities have made good progress implementing their ICP eliminating about 60 percent of the high public public health risk overflows. They have also gained a better understanding of how to implement their ICP. This experience has revealed that some of the original planning assumptions underestimated sewer rehabilitation and replacement costs. As a result, the communities revised their programs and the Cities of Alameda, Albany, Berkeley, Oakland, and Piedmont requested extensions to their compliance schedules by 5 to 10 years. In 1993, the Water Board amended its enforcement order giving extensions to some communities' compliance schedules. The amended enforcement order also contains revised compliance reporting requirements.

As part of the regional approach, EBMUD's contribution is a $145 million (1985 dollars) Wet Weather Program, designed to increase treatment capacity to match the communities' flows. The Wet Weather Program includes an expansion of the main wastewater treatment plant, new storage basins, four new remote wet weather treatment plants, new and ungraded pumping stations, and 7.5 miles of new interceptors. This program will increase EBMUD's peak transport and treatment capacity, without which community sewers would continue to overflow. It will also provide treatment for wet weather discharges and meet or exceed Basin Plan requirements.

As of 1995, EBMUD has completed the expansion of the main wastewater treatment plant, all interceptor improvements, construction of the main plant storage basin, and construction of the two principal wet weather treatment facilities (Oakport and Point Isabel). The work remaining includes two pump station improvements, a storage basin, and two wet weather treatment plants. The Wet Weather Program is scheduled for completion in 1998.

4.12 INDUSTRIAL FACILITIES

This section discusses industrial waste discharges to surface waters under the NPDES program. Other industrial waste disposal practices are discussed in a later section entitled "Hazardous and Nonhazardous Waste Disposal" under Groundwater Protection and Management.

The Water Board has permitted over 320 industrial discharges in the region. They can be separated into two general types: process-related wastewaters and groundwater from cleanup activities. There are about 50 discharges of process wastewater; of these, 15 are classified as major discharges and the rest are mostly small discharges of non-contact cooling water and/or runoff. About 270 of the 320 discharges consist solely of treated groundwater from remediation activities at solvent and/or fuel contamination sites. These are minor in flow relative to the major discharges, and are discussed in more detail in an earlier section entitled "Discharge of Treated Groundwater." Additionally, there are over 1,500 industrial facilities discharging only stormwater runoff. The regulation of these discharges is discussed in a later section entitled: "Urban Runoff Management."

The 15 major discharges are the most significant individual sources of pollutant loadings from industrial discharges. They are identified and described in Table 4-11, and their locations are shown in Figure 4-2. These industries have all installed treatment facilities that can be considered to provide "best available treatment economically achievable" (BAT), and are in compliance with available BAT standards promulgated by the U.S. EPA for each industrial classification.

The Water Board's goal for regulation of industrial discharges is to continue to move beyond treatment technology-based standards to water quality-based standards. With this shift, the industries are challenged to improve existing or develop new treatment and control technologies to achieve higher levels of protection of receiving waters' beneficial uses.

The effect of the Water Board's regulation has been to drastically reduce the pollutant loadings from industrial sources. But with the focus shifting to water quality-based standards, concerns still do exist in certain areas. For example, a major concern is discharge of selenium from oil refineries. Water quality data from the Regional Monitoring Program and other studies will be necessary to identify areas of most concern and help target future pollutant reduction efforts.

4.13 PRETREATMENT AND POLLUTION PREVENTION

The Waste Discharge Permitting Program described in Section 4.12 Industrial Facilities focuses on limiting pollutant discharge to the Bay from industrial and municipal treatment systems. In most situations, however, the overall effectiveness of treatment depends on the type and amount of pollutants that enter these POTWs or industrial treatment system. Some pollutants may cause upset to or interference with the operation of the treatment plant, sludge contamination, or harm to treatment plant workers and the public if discharged into sewer systems. In general, it is often more economical to reduce overall pollutant loading into treatment systems than to install complex and expensive technology at the plant. Both pretreatment and pollution prevention programs are key components of pollutant source control.

The goal of the pretreatment program is to protect treatment plants, worker health and safety, and the environment from the impact of discharges of certain toxic wastes (e.g., explosive and corrosive materials) into collection systems.

The pollution prevention program expands beyond the pretreatment program to include industrial, commercial, and residential sources. The goals of pollution prevention are to:

1. Reduce or eliminate the discharge of all pollutants that have been found to impact or threaten beneficial uses;

2. Focus on pollutant source reduction "upstream" of treatment plants, with an emphasis on material recycling, efficient use of chemicals, waste reduction, material and/or product substitution, and process modification; and

3. Support reduction of pollutant discharges into collection systems through water conservation, recycling, and reuse.

The combined efforts of the pretreatment and pollution prevention programs have influenced thousands of facilities in the Region to significantly reduce the amount of pollutants discharged to the Bay. Between 1986 and 1999, the loading of heavy metals discharged from 27 POTWs with pretreatment programs, were reduced by 59 percent, even though the total volume discharged from these 27 POTWs increased slightly over this period.

4.13.1 CALIFORNIA'S PRETREATMENT PROGRAM

Each POTW regulates the types of waste discharged into collection systems leading to its treatment plant. The U.S. EPA, for certain types of waste and industrial categories, sets general standards for discharge to POTWs. Each POTW receiving a large amount of industrial waste and/or with a design flow greater than 5 million gallons per day (MGD) is required to develop and implement a pretreatment program, including enforce its own local discharge limits. The goal is to both protect treatment plants and ensure that the POTW is in compliance with its own discharge permit.

The Water Board oversees the implementation of the California pretreatment program under the California Water Code and federal Clean Water Act, although U.S. EPA retains its oversight role

and is still actively involved in inspections and enforcement activities. POTW pretreatment programs must include components as specified in federal regulations and program descriptions incorporated into the NPDES permit for each POTW.

Specific monitoring and reporting requirements for the 27 POTWs in the Region with approved pretreatment programs are contained in the NPDES Permits for the POTWs. Major budgeted program tasks for the Water Board's oversight activities include pretreatment compliance inspections and audits; annual and semiannual report reviews; program modifications, particularly local limits revisions; and enforcement activities.

4.13.2 POLLUTION PREVENTION

The Water Board supports reducing toxic discharges through pollution prevention and expansion of the pretreatment program. This general approach to minimizing waste discharge is a necessary element in the implementation of the State Water Board's Mass Emission Strategy and will become increasingly important as alternative uses of wastewater are developed.

The Water Board's pollution prevention program is a two-tiered program that consists of a general and a targeted program. The first tier is a general program, requiring dischargers to focus on long-term pollution prevention and overall reduction of toxics entering collection systems. The general program is structured to allow dischargers to develop and direct pollution prevention efforts in its own service area. It also allows dischargers to reduce toxic pollutant loading to their plants and remain in compliance with their discharge permit.

The second tier is a targeted program aimed to ameliorate existing water quality problems. The goal of targeted programs is to reduce the total amount of a specific pollutant (or pollutants) discharged to specific water bodies. Targeted programs are required when numeric or narrative water quality objectives are exceeded and beneficial uses are impaired or threatened.

Both the general and targeted pollution prevention programs will take multimedia concerns into account by coordinating with other relevant regulatory programs related to air and land disposal (e.g., sludge or biosolids).

All POTWs with an approved pretreatment program and all major industrial dischargers are required to develop and implement a general pollution prevention program within their jurisdiction. Dischargers are required to develop and implement a targeted program under the circumstances described in Section 4.13.2.4 Targeted Pollution Prevention for POTWs.

Presently, dischargers with required pollution prevention programs submit mid-year progress reports and/or a comprehensive annual report, which discusses progress and accomplishments along with program changes, and future program goals, developments and effectiveness measures. With forthcoming data needs for watershed permits, reporting formats will be standardized to improve comparability between programs.

4.13.2.1 GENERAL POLLUTION PREVENTION PRIORITIES

The following are the Water Board's priorities for the pollution prevention program in the coming years:

Encourage continued region-wide leadership across all pollution prevention programs through cross-program and cross media coordination, watershed based problem solving, and adaptability to new concerns through collaboration and partnerships.
Develop strategies to measure effectiveness of pollution prevention efforts over the long and short term.
Recognize and promote excellence through pollution prevention awards to programs that demonstrate resourcefulness, effectiveness, innovation, wide outreach (business, residential, and educational), and that take action to promote region-wide solutions.

4.13.2.2 POLLUTION PREVENTION PROGRAM HISTORY

In 1988, the Water Board began requiring "source control" programs from the three South Bay POTWs. In 1992, the Water Board required the remaining POTWs with pretreatment programs to develop and implement Waste Minimization Programs. Specifically, this included targeted programs for POTWs to reduce pollutants that exceeded water quality criteria, general programs for the remaining POTWs, and waste minimization audits for select industrial facilities discharging directly to surface waters. In 1993, the "Waste Minimization Program" was changed to "Pollution Prevention Program."

The Water Board formed the Bay Area Pollution Prevention Group (BAPPG) in 1990 and continues to support its significant successes in reducing pollution through product and chemical bans, targeted initiatives to reduce heavy metals, and regional technology transfer, outreach, and resource sharing.

In 2000, the state legislature enacted Water Code Section 13263.3 on pollution prevention programs. Also in 2000, the Policy for Implementation of Toxic Standards from Inland Surface Waters, Enclosed Bays and Estuaries of California (State Implementation Plan, or SIP) became effective, which addresses pollutant minimization programs.

In 2003, the Water Board adopted Resolution No. R2-2003-0096 promoting collaboration between the Bay Area Clean Water Agencies (BACWA) and the Water Board. It established 11 guiding principles for developing tools and guidance for POTW pollution prevention programs to balance program flexibility and program effectiveness. The products developed from this effort include a guidance document for pollution prevention program managers seeking to improve outreach and effectiveness of their programs, "Pollution Prevention Guidance and Tools for POTWs" (April 2005).

4.13.2.3 GENERAL POLLUTION PREVENTION PROGRAMS FOR POTWs

The general program is designed to allow individual POTWs to develop and direct long-term pollution prevention efforts according to local needs and is more flexible than targeted programs. General programs should contain the following elements:

Pretreatment program review and enhancement should include a general review of opportunities for incorporating waste reduction goals into inspections, enforcement, and permitting (such as increased inspection, improved process flow measurements, etc.) In addition, previously unregulated types of industrial and commercial facilities that discharge pollutants of concern to the POTW should be identified. Each general program should include provisions for two additional categories of discharge that are not covered under the federal regulations (such as waste oil disposal, household products, car and truck washing operations, medical and dental facilities, etc.).
Prioritize the need for and conduct audits of industrial users. The criteria for prioritization should include discharge of pollutants of concern, volume of flow, industrial user compliance, and opportunities for waste reduction.
Periodic analysis of the waste discharge to determine which pollutants are currently problems and/or which pollutants may pose problems in the future.
Identify sources of all pollutants of concern.
Identify and implement tasks to reduce the sources of pollutants of concern.
Design and conduct public education programs aimed at changing public behavior through educating the public about a pollutant, its sources, its impact to beneficial uses, how it is released into the environment, and where appropriate, options for safer product use, substitution, and product disposal (e.g., household hazardous waste management). Such efforts include advertising outreach and household hazardous waste programs. Current regional successes include product bans and advertising campaigns in English, Spanish, and Chinese. Successful outreach results in changing behaviors that lead to changes in purchasing behavior, or the way a toxic product is used, recycled, or disposed.
Coordination with other programs involving recycling, reuse, and source reduction of toxic chemicals. This includes programs involving other media, such as air, hazardous waste, and land disposal. This might include developing programs for joint inspections and sharing in enforcement activities.
An effectiveness monitoring program specifically designed to measure the success or effectiveness of specific pollution prevention activities, as well as overall successes achieved in reducing toxic loads to the receiving watershed where possible, as well as to air, or land via sludge disposal. Such evaluations of program effectiveness are conducted on a regular basis.

4.13.2.4 TARGETED POLLUTION PREVENTION PROGRAMS FOR POTWs

The purpose of targeted pollution prevention programs is to reduce the total amount of specific toxic pollutants being discharged to POTWs. Targeted programs are more intensive versions of the general programs and are focused only on one or a select number of pollutants.

Specifically, targeted programs are required for POTWs when any of the following conditions exist:

a. When numeric or narrative water quality objectives are exceeded and beneficial uses are impaired or threatened;
b. Are required as part of a TMDL or site specific objective (SSO) implementation plan;
c. Are required under the SIP when there are effluent limit compliance problems; or
d. As authorized under the Water Code Section 13263.3.

The Water Board may, at its discretion, require dischargers to implement pollution prevention plans consistent with Water Code Section 13263.3 and the SIP.

In those areas of a watershed or the Estuary identified as exceding water quality objectives or having impaired beneficial uses, dischargers that are significant contributors to the water quality problem will be identified and will be required to participate in a targeted waste minimization (pollution prevention) program. In addition to general program elements, a targeted pollution prevention program involves quantifying the sources to the POTW of the targeted pollutants in question. It may also be necessary to conduct further monitoring of the targeted pollutants in the receiving water, sediment, and biota by identified dischargers to POTW systems and/or POTWs at and near their discharge locations in order to more precisely determine associated effects.

A targeted program must also initiate reductions in pollutant loading through a control strategy designed to achieve the goal of maintaining concentrations of reportable priority pollutants in the effluent at or below the effluent limit, focusing on the most effective and economic control measures first. These reductions may be achievable through focused public outreach, implementation of Best Management Practices (BMPs), technical information transfer regarding effective management techniques, or installation of appropriate technologies.

The targeted program shall include all elements of the general program, expanding where appropriate to maximize the reduction of the targeted pollutants.

Targeted programs may also require other options such as performance-based effluent concentration limits and mass limitations for the pollutants of concern, in order to attain water quality objectives in the receiving water body.

4.13.2.5 DIRECT INDUSTRIAL DISCHARGER POLLUTION PREVENTION PROGRAM

Industrial entities discharging directly to receiving waters instead of public sewer systems are also subject to similar pollution prevention requirements. Overall source reduction and recycling of hazardous wastes, including audits, planning, and reporting to the Department of Toxic Substance Control (DTSC) is required under the Hazardous Waste Source Reduction and Management Review Act of 1989 (Title 23, CCR, Ch 31). Rather than require separate pollution prevention programs, major dischargers were asked to submit copies of the required pollution prevention reports (those sections specifically addressing liquid waste and reduction of pollutants discharged to water) to the Water Board. These dischargers submitted initial plans for pollution prevention, including detailed descriptions of tasks and schedules, in 1992.

In the event that existing pollution prevention reports do not adequately address reduction of toxic pollutants in effluent, the Water Board will require additional information.

In cases where water quality problems exist or where beneficial uses are impaired or threatened by direct industrial dischargers, focused pollution prevention programs similar to POTW targeted programs will also be required. In cases where Water Board staff determines that independent audits, as opposed to audits conducted by the involved companies, the issue will be brought before the Water Board. The effort should result in the reduction or elimination of specific pollutants of concern.

4.14 URBAN RUNOFF MANAGEMENT

During periods of rain, water flushes sediment and pollutants from urbanized parts of the Estuary (Figure 4-3) into storm drain systems. These drains discharge directly to surface waters within the region, except in San Francisco where stormwater is mixed with sewage and directed to the treatment plant.

Urban runoff contributes significant quantities of total suspended solids, heavy metals, petroleum hydrocarbons, and other pollutants to the waters of the region. The impacts of pollutants in urban runoff on aquatic systems are many and varied. For example, small soil particles washed into streams can smother spawning grounds and marsh habitat. Lead and petroleum hydrocarbons washed off from roadways and parking lots may cause toxic responses in aquatic life and exemplify another kind of threat. The US EPA found levels of cadmium, copper, lead, and zinc in urban runoff exceeded freshwater acute aquatic life criteria in 9 to 50 percent of samples taken across the country. The chronic criteria for these metals, beryllium, cyanide, mercury, and silver were exceeded in at least 10 percent of the samples. In the San Francisco Bay Region, the Association of Bay Area Governments (ABAG) has found consistently high levels of hydrocarbons in urban runoff.

The Water Board's urban runoff management program focuses on reducing pollutant transport through stormwater drain systems into surface waters. In general, measures that will effectively limit storm drain pollutant discharge will also limit direct runoff of pollutants into creeks, streams, and lakes.

The program is structured around the municipalities and local agencies responsible for maintaining storm drain systems, and three classes of activities that are responsible for significant amounts of pollutant influx to those public storm drain systems: highways under the jurisdiction of the California Department of Transportation (Caltrans), industrial activities, and construction on areas larger than 5 acres.

Within each of these program areas, the Water Board's urban runoff management approach emphasizes general, long-term planning to avoid any increases in pollutant loading, and more structured, intensive approaches when existing water quality problems require immediate action.

A large part of the Water Board's work in managing urban runoff involves supporting local planning and investigation. The program includes:

- Organizing local ad hoc task forces within each hydrologic sub-region (see maps in Chapter 2) to facilitate investigations and design of appropriate control strategies. These task forces include representatives from local government, point source dischargers, local industries, the Water Board, and U.S. EPA.
- Developing cooperative investigation and control strategies utilizing the expertise and resources of point source dischargers in each of the receiving water segments.
- Supporting research by the San Francisco Estuary Institute, ABAG, U.S. EPA, and others entities to better define the impacts of urban runoff discharges.

- Participating on the State Water Board Stormwater Quality Task Force and the development and implementation of a statewide urban stormwater best management practices manual.
- Working with other agencies such as the Bay Area Air Quality Management District and the Metropolitan Transportation Commission to ensure that transportation related strategies and plans will reduce the impact on receiving waters from transportation system runoff discharges.

4.14.1 MANAGEMENT OF POLLUTANT DISCHARGE FROM STORM DRAINS

The Water Board's strategy for managing pollutants and sediment in urban runoff entering and being discharged public storm drain systems is two-tiered. All cities and counties are encouraged to develop and implement voluntary programs aimed at pollution prevention throughout the region (Baseline Control Program). Selected cites and counties, by virtue of the amount of pollutants being discharged from their storm drain system, impact of those discharges on receiving waters, or population, are required to develop pollution prevention programs and take steps to reduce runoff into drain systems (Comprehensive Control Program).

The first major step in addressing pollutant loading to public storm drains was to compile basic information on existing systems. A Board survey of local agencies owning or responsible for storm drain systems and flood control agencies had limited and often dated information on the storm drain systems that they own or manage. In addition, flow and water quality data for storm drain system discharge were virtually nonexistent. The survey also found that current management of storm drain systems is primarily focused on flood control, with storm drainage inlets, lines, and catch basins scheduled for cleaning annually or on an as-needed basis for flood prevention purposes.

4.14.1.1 BASELINE CONTROL PROGRAM

All local agencies, including special districts, in the cities and counties in the region (see Table 4-11) that own or have maintenance responsibility for storm drain systems should develop and implement a baseline control program.

The goal of the baseline control programs is to prevent any increase in pollutants entering these systems. To a large extent, this goal can be achieved by including consideration of pollutant runoff into storm drain systems in the course of local planning efforts and encouraging "good practice" techniques.

Components of baseline control programs should include: review and update of operation and maintenance programs for storm drain systems; development and adoption of ordinances or other planning procedures (such as CEQA review) to avoid and control pollutant and sediment loading to runoff as part of the normal design and construction of new and significant redevelopment (both during construction and after construction is completed); and education measures to inform the public, commercial entities, and industries on the proper use and disposal of materials and waste and correct practices of urban runoff control. Baseline control programs should also include surveillance, monitoring, and enforcement activities to ensure and document implementation.

Similarly, flood control agencies should consider the impact of their projects on receiving waters. Flood management projects, facilities, or operations should be designed, operated, and maintained to reduce the amount of pollutants in stormwater discharges as well as achieving flood control objectives.

The Water Board will support and encourage the development and implementation of baseline control programs in cooperation with cities and counties. Board staff may provide technical guidance and support, facilitate ad-hoc working groups including people with expertise and experience in POTW pollution prevention programs and local hazardous waste management, and participate in development of model ordinances.

The programs should be coordinated with POTW and industrial pollution prevention programs and local hazardous materials management programs.

In addition, the Water Board will focus its surveillance, monitoring, and enforcement activities on and review Environmental Impact Reports on new development and significant redevelopment and focus its surveillance, monitoring, and enforcement activities to support implementation of effective baseline control programs. The effectiveness of a municipality's baseline control program will also be considered when issuing NPDES permits for construction activities pursuant to the Water Board's Construction Activity Control Program.

The Water Board requires the local agencies, special districts, and municipalities listed in Table 4-11 to submit annual reports (pursuant to Section 13225(c) of the California Water Code) describing their baseline control programs. These reports are due on September 1 of each year and should describe:

- Operation and maintenance activities associated with the storm drain system;
- Master planning procedures and documentation of activities associated with control;
- A list of all new development and significant redevelopment projects with documentation that urban runoff control measures have been required and are being implemented;
- Documentation of educational measures;
- Documentation of surveillance, monitoring, and enforcement activities; and
- A qualitative evaluation of program effectiveness, including, but not limited to, program accomplishments, funds expended, staff hours utilized, an overall evaluation, and plans for the upcoming year.

To the extent that voluntary implementation of baseline control programs is not realized, the Water Board will act, where necessary, to require individual local agencies to investigate specific runoff discharges, quantify pollutant loads, and identify and implement control strategies for pollutant runoff into storm drains. Where necessary, require individual local agencies to file a Report of Waste Discharge or NPDES permit application for the implementation of baseline control programs.

Cities and counties should review and revise their planning procedures and develop or revise comprehensive master plans to assure that increases in pollutant loading associated with newly developed and significantly redeveloped areas are, to the maximum extent practicable, limited.

Areas that are in the process of development, or redevelopment offer the greatest potential for utilizing the full range of structural and non-structural control measures to limit increases in pollutant loads. Comprehensive planning must be used to incorporate these measures in the process of developing. Cities and counties should fully utilize their authority under CEQA to assure implementation of control measures at all proposed development and significant redevelopment projects.

4.14.1.2 COMPREHENSIVE CONTROL PROGRAM

The goal of the Water Board's comprehensive control program is to remediate existing water quality problems and prevent new problems associated with urban runoff. To achieve this, the program focuses on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Water Board's comprehensive program is designed to be consistent with federal regulations (40 CFR 122-124) and is implemented by issuing NPDES permits to owners and operators of large storm drain systems and systems discharging significant amounts of pollutants. The conditions of each NPDES stormwater permit require that entities responsible for the systems develop and implement comprehensive control programs.

The regulations authorize the issuance of system-wide or jurisdiction-wide permits and they effectively prohibit non-stormwater discharges to storm drains. They also require listed municipalities to implement control measures to reduce pollutants in urban stormwater runoff discharges to the maximum extent practicable. The Water Board will, where necessary, require stormwater discharge permits for discharges not cited in the regulations which are a significant contributor of pollutants to waters of the region.

The comprehensive urban runoff control program includes all elements of the baseline control program designed to prevent increases in pollutant loading. To reduce current pollutant loading to the maximum extent practicable, the program also includes:

- Characterization of urban runoff discharges to the extent necessary to support program development;
- Elimination of illicit connections and illegal dumping into storm drains;
- Development and implementation of measures to reduce pollutant runoff associated with the application of pesticides, herbicides, and fertilizer;
- Development and implementation of measures to operate and maintain public highways in a manner that reduces pollutants in runoff; and
- Effective pollution reduction measures may include educational activities such as painting signs on storm drain inlets and regulation of activities such as application of pesticides in public right-of-ways.

Each NPDES stormwater permit issued by the Water Board will require an annual report evaluating the effectiveness of its comprehensive urban runoff control program. At a minimum, quantitative monitoring, a detailed accounting of program accomplishments (including funds expended and staff hours utilized), an overall evaluation of the program, and plans and schedules for the upcoming year shall be used to assess effectiveness.

The Water Board's urban runoff control program is still relatively new. Table 4-11 lists the entities in each area that have implemented comprehensive control programs. In addition, there is a need to develop and implement similar programs in the urban and rapidly developing areas of Solano County and the cities of San Rafael, Novato, Petaluma, Napa, and Benicia, and the Ports of Oakland, Richmond, and San Francisco. Urban runoff discharges from these areas are considered significant sources of pollutants to waters of the region and may be causing or threatening to cause violation of water quality objectives. The Water Board intends to consider similar action for these at a later time. The City and County of San Francisco is not permitted under the storm water program because it has a combined (sanitary and storm) sewer system operating in accordance with existing NPDES permits.

The Water Board will conduct surveillance activities and provide overall direction to verify and oversee implementation of urban runoff control programs. Technical guidance for prevention activities, the identification, assignment, and implementation of control measures, and monitoring will be developed.

4.14.2 HIGHWAY RUNOFF CONTROL PROGRAM

An essential component of reducing pollutant loading to storm drain systems involves managing runoff from public roads. While many roads fall under the jurisdiction of entities responsible for storm drain systems, public highways are controlled by the California Department of Transportation (Caltrans). In order to ensure that all public highways are maintained to reduce pollutant runoff, the Water Board issued a stormwater NPDES permit to Caltrans in August, 1994. The permit requires implementation of a highway Stormwater Management Plan which addresses the design, construction, and maintenance of highway facilities relative to reducing pollutant runoff discharges to the maximum extent practicable.

The highway runoff management plan shall include litter control, management of pesticide/herbicide use, reducing direct discharges, reducing runoff velocity, grassed channels, curb elimination, catch basin maintenance, appropriate street cleaning, establishing and maintaining vegetation, infiltration practices, and detention/retention practices. In addition, the plan must include monitoring the effectiveness of control measures, runoff water quality, and pollutant loads. When possible, Caltrans is expected to coordinate with existing agencies and programs related to the reduction of pollutants in highway runoff.

4.14.3 INDUSTRIAL ACTIVITY CONTROL PROGRAM

Industrial stormwater sources are subject to best available technology (BAT) economically-based standards. Federal regulations require stormwater permits for any site where industrial activity takes place (or has in the past), and materials are exposed to stormwater. The definitions of industrial activities subject to these permits (provisions of Title 40 Code of Federal Regulation, Part 122.26, revised December 18, 1992) are incorporated by reference into this plan. This incorporation by reference is prospective including future changes as they take effect. The Water Board will require an NPDES permit for the discharge of stormwater from all industrial facilities where such activities occur. These permits apply to the discharge from any system used to collect and convey stormwater at industrial sites. These sites include, but are not limited to, industrial plant yards, access roads and rail lines, material and refuse handling areas, storage areas (including tank farms) and areas where significant amounts of materials remain from past

activity. Permits are issued both to privately and publicly (federal, state, and municipal) owned facilities.

The Water Board's permitting strategy for industrial facilities is based on a four-tier set of priorities for issuing permits. At a minimum, all permits will require compliance with all local agency requirements. General permits for industrial facilities will not be less stringent than individual permits.

4.14.3.1 TIER I: GENERAL PERMITTING

The majority of stormwater discharges associated with industrial activity in the region will be covered under a general permit issued by the State Water Board in November, 1991.

4.14.3.2 TIER II: SPECIFIC WATERSHED PERMITTING

In some watersheds, water quality has been impacted by stormwater discharges from facilities associated with industrial activity. Facilities within these watersheds will be targeted for individual stormwater permits or regulation under watershed-specific general permits. The Water Board issued a general permit for industrial activity in the portion of Santa Clara County that drains to South San Francisco Bay to support the county's comprehensive control program and will consider a similar general permit for Alameda County at a later time.

4.14.3.3 TIER III: INDUSTRY-SPECIFIC PERMITTING

Specific industrial categories will be targeted for individual or industry-specific general permits. For example, the Water Board issued a general permit for storm water discharges from boatyards in August 1992. The use of general permits is intended to alleviate the administrative burden of issuing storm water permit for individual industrial facilities. In some cases, such as large U.S. Department of Defense facilities, individual sites or classes of sites may be significant sources of pollutants, and individual permit(s) specific to these classes of sites are warranted.

The Water Board considers stormwater discharges from automotive operations, including gas stations, auto repair shops, auto body shops, dealerships, and mobile fleet-washing businesses to be significant sources of pollutants to waters in the region. Local agencies implementing comprehensive control programs are addressing these discharges through ordinances as part of their comprehensive control programs. The effectiveness of local measures will be assessed before the Water Board considers permitting these under a separate industrial permit.

4.14.3.4 TIER IV: FACILITY-SPECIFIC PERMITTING

A variety of factors will be used to target specific facilities for individual permits, such as amount and characteristics of runoff, size of facility, and contribution to existing water quality problems. Permitted individual facilities will be required to identify "hot areas" where runoff may contact pollutants; activities that may release pollutants to runoff; segregate stormwater discharges from the "hot areas;" and identify and implement control measures for "hot areas." In addition, permittees will be required to eliminate all non-stormwater discharges to storm drain systems unless authorized by an NPDES permit or determined not to be a source of pollutants requiring an NPDES permit.

4.14.4 CONSTRUCTION ACTIVITY CONTROL PROGRAM

The Water Board will require an NPDES permit for the discharge of stormwater from construction activities involving disturbance of five acres or greater total land area or are part of a larger common plan of development that disturbs greater than five acres of total land area. The majority of construction activity discharges in the region will be permitted under a general permit issued by the State Water Board in 1992. Permit conditions address pollutant and waste discharges occurring during construction activities and the discharge of pollutants in runoff after construction is completed. Permit conditions are consistent with the Water Board's erosion and sediment control policy (Resolution No. 80-5) and consistent with local agency ordinance and regulatory programs. The intent of the permit is not to supersede local programs, but rather to complement local requirements. This will require local agencies to effectively address construction activities through their early planning, CEQA processes, and implementation of development control measures as part of their baseline or comprehensive control programs.

4.15 AGRICULTURAL WASTEWATER MANAGEMENT

Agricultural wastewaters and the effect of agricultural operations must be considered in terms of land use practices and controls developed in the agricultural element of land use plans. The activities of primary importance to water quality in this basin are animal confinement and irrigation practices. Agricultural pesticide use and limits on fertilizer application are not specifically considered because of the limited applicability in this region.

4.15.1 ANIMAL CONFINEMENT OPERATIONS

Animal confinement operations such as kennels, horse stables, poultry ranches, and dairies, raise or shelter animals in high densities. Wastes from such facilities can contain significant amounts of pathogens, oxygen-depleting organic matter, nitrogen compounds, and other suspended and dissolved solids. In addition, erosion is also a common problem associated with these facilities. Runoff of storm or wash water can carry waste and sediment and degrade receiving surface waters. Groundwaters can also be degraded when water containing these wastes percolates into aquifers. The risk of water quality degradation increases during the rainy season when animal waste containment and treatment ponds are often overloaded.

Minimum design and management standards for the protection of water quality from confined animal operations are promulgated in Title 23, California Code of Regulations, Chapter 15, Article 6. These regulations prohibit the discharge of facility wash water, animal wastes, and stormwater runoff from animal confinement areas into waters of the state. They also specify minimum design and waste management standards including:

- Collection of all wastewaters;
- Retention of water within manured areas during a 25-year, 24 hour storm;
- Use of paving or impermeable soils in manure storage areas; and
- Application of manures and wastewaters on land at reasonable rates.

The Water Board has the authority to enforce these regulations through Waste Discharge Requirements.

Facilities such as the dairies located in Marin and Sonoma counties and horse boarding stables are typical of animal confinement operations within the region.

4.15.1.1 DAIRY WASTE MANAGEMENT

Much of the land within the Tomales Bay, Petaluma River, Napa, and Sonoma Valley watersheds is used for agricultural purposes. Within these watersheds, a significant number of livestock are housed and grazed.

Animal waste can cause water quality problems through runoff into surface and groundwaters of the state. Stockpiled manure, washwater, and stormwater runoff from corrals, pens, and other animal confinement areas are potential sources of water pollution due to their high bacteria levels (the coliform group used as indicators), ammonia, nitrate and suspended solids. Detergents, disinfectants, and other biocides commonly used may also contribute to the toxicity of animal wastes. These constituents can be extremely deleterious to fish and other forms of aquatic life. High bacterial levels have had an adverse impact on shellfish resources in the region (i.e., commercial shellfish harvesting in Tomales Bay).

Problems facing the dairy industry include manure containment during the rainy season, appropriate manure dispersal on pasture land, and implementation of range management practices aimed at water quality protection. The availability of ample farm and pastureland is therefore extremely important in managing animal waste.

Since the 1970s, the cooperative relationship between the Water Board and the dairy industry has been an important aspect of dairy waste control. That relationship has been instrumental in the construction of dairy waste handling, treatment, and disposal facilities in the late 1970s. However, proper waste control management is just as important as the physical facility. Management techniques include routing wash water and drainage to impervious holding and storage areas, constructing manure storage areas controlling both subsurface infiltration and runoff, stormwater overflow protection for retention basins, and applying manures and wastewater on land at reasonable rates for maximum plant uptake of nitrogen.

Poor practices that have led to water quality problems in the past include: inadequate maintenance and operation of facilities; overloading treatment and storage facilities; increase of herd size without commensurate additions to waste handling facilities; poor range management practices; and simple neglect of seasonal waste management responsibilities.

4.15.1.2 DAIRY WASTE REGULATION

Both the regulation and the support services for the dairy industry involve several federal, state, and local agencies. Each has its particular role and mission, but all share the goal of protecting the beneficial uses of state waters while assisting dairies in complying with regulations while conducting their day-to-day business. The following agencies play a direct role in dairy waste management and regulation:

REGULATORY

- California Regional Water Quality Control Board
- California Department of Fish and Game

SUPPORT SERVICES

- Agricultural Stabilization and Conservation Services
- U.S. Department of Agriculture — Soil Conservation Service
- University of California Cooperative Extension Farm Advisor
- County Farm Bureaus
- Resource Conservation Districts

To address dairy waste management concerns, dairy operators in Marin and Sonoma Counties have formed a Dairy Waste Committee. The Dairy Waste Committee supports dairy operators in their efforts to solve waste control problems and locate technical and financial assistance. The Committee serves as a vehicle through which the Water Boards and California Department of Fish and Game can disseminate information on water quality regulations and requirements. This committee does and will continue to play an important role in any successful waste control program.

Additionally, the Southern Sonoma and Marin County Resource Conservation Districts (RCDs) have a cooperative, voluntary program in which a farmer agrees to use the land within its capabilities, develop a conservation plan, and apply conservation practices to meet objectives and technical standards of the RCDs. In turn, the RCD agrees to furnish the farmer with information and technical assistance in order to carry out the conservation plan.

WATER BOARD PROGRAM

PERMITTING/WAIVER OF PERMITS

Generally, discharges are subject to Waste Discharge Requirements (WDRs) issued by the Water Board. However, the Water Board may waive WDRs where such a waiver is not against the public interest and still assures the protection of beneficial uses of state waters. For the present, the Water Board has been waiving WDRs for dairies where proper waste control facilities are in place and management practices are in conformance with the California Code of Regulations - Title 23, Article 3, Chapter 15 (Discharge of Waste to Land).

CONTINUING WASTE CONTROL PLANNING

In 1990, the State Water Board established a Dairy Waste Task Force to look at the dairy industry statewide and develop standards for dairy regulation. The main emphasis has been on developing better communication and guidance materials for the industry; developing a dairy survey form to help the Water Boards determine if a dairy qualifies for a waiver from WDRs; determining the number and location of dairies; develop more uniform WDRs; and preparing an outreach program aimed at the dairy industry, local government, and the public.

The Water Board directs the Executive Officer to continue the following staff activities:

- Work with the dairy industry through the local dairy waste committees, County Farm Bureaus, RCDs, and other local/state agencies in obtaining cooperative correction of dairy waste problems.
- Recommend adoption of WDRs in those cases where water quality objectives for waters within an agricultural watershed are consistently exceeded, or where corrective action is unsuccessful in eliminating either the short- or long-term water quality problems or threats. The Water Board may choose to take enforcement action through the issuance of a Clean-up and Abatement Order or assess monetary penalties in those cases where dairy practices have resulted in or threaten to cause a condition of pollution or nuisance in surface waters through the issuance of Administrative Civil Liability or referral to the California Attorney General's Office.
- Monitor the compliance of dairy waste management programs with regional goals and implement the recommendations of the State Dairy Waste Task Force.

4.15.2 IRRIGATION OPERATIONS

An increase in the concentration of soluble salts contained in percolating irrigation water is an unavoidable result of consumptive use of water. Salt management within soils and groundwater is considered separate from water management, but is closely related to drainage control and wastewater operations. For irrigated agriculture to continue in the future, acceptable levels of salts in soils and groundwaters must be controlled.

Maintenance of a favorable salt balance, that being a reasonable balance between the import and export of salts from individual basins, must be considered to control increases in mineral content. This is especially applicable for the Livermore and Santa Clara Valley groundwater basins.

The ultimate consequences of regulatory action for irrigation operations must be carefully assessed. The "no-degradation" concept in connection with salt levels is not appropriate in all circumstances.

A concept of minimal degradation might be considered in some areas. It would need to be coupled with management of the surface and underground water supplies in order to assure acceptable degradation effects. If minimal degradation is considered, it can be offset by either recharge and replenishment of groundwater basins with higher quality water that will furnish dilution to the added salts, or by drainage of degraded waters at a sufficient rate to maintain low salts and salts leaving the basin. To aid recharge and dilution operations, additional winter runoff can be stored in surface reservoirs for subsequent use with either surface stream or groundwater basin quantity/quality management.

4.16 WATER RECYCLING

Per Water Code Section 13050, recycled water means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource. To date in this Region, disposal of most municipal and industrial wastewater has primarily involved discharges into the Region's watersheds and the Estuary. With growing awareness of the impacts of toxic discharges, drought, future urbanization, and growth on the local aquatic habitat, there is an increasing need to look

for other sources of water. Increasingly, conservation and water recycling (formerly referred to as reclamation) will be needed to deal with these long-term water issues. The Water Board recognizes that people of the Region are interested in developing the capacity to conserve and recycle water to supplement existing water supplies, meet future water requirements, and restore the Region's watersheds and Estuary. Disposal of wastewater to inland, estuarine or coastal waters is not considered a permanent solution where the potential exists for conservation, water recycling, and reuse.

The Constitution of California, Article X, declares that, "...because of the conditions prevailing in the state, the general welfare requires that the water resources of the state be put to beneficial use to the fullest extent to which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare." In other words, when suitable recycled water is available, it should be used to supplement existing water supplies used for agricultural, industrial, municipal, and environmental purposes.

The Water Board also recognizes and supports the concept that water reuse is an essential component for planning future water supply, especially in areas dependent on imported water. This includes projects that use recycled water to increase the local water supply, to improve the salt balance in the groundwater basin, or to reduce the need for wastewater export through recycled water irrigation and groundwater recharge with imported water or with high-quality recycled water. The year-round, dependable recycled water resource may also be appropriate for stream flow augmentation to enhance beneficial uses of streams.

State Water Board Resolution 77-1, adopted in 1977, requires the State and Regional Water Boards to encourage water recycling projects for beneficial use using wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds. The resolution also specifies using recycled water to replace or supplement the use of fresh water or better quality water, and to preserve, restore, or enhance in-stream beneficial uses, including fish, wildlife, recreation and aesthetics associated with any surface water or wetlands.

4.16.1 WATER RECYCLING AND REUSE PROGRAM

Before a wastewater producer can obtain an increase in connections and discharge flows under the Water Board's NPDES program, it must demonstrate that a maximum effort has been made to develop and implement a credible and effective water recycling program. This program must be integrated with a source control program (Pretreatment and Pollution Prevention Program (Section 4.13 Pretreatment and Pollution Prevention)) and a water conservation program.

All water recycling projects involve three components: 1) treatment of wastewater to produce water of quality suitable for the intended reuse; 2) distribution, which may also include storage, to convey the treated water to the place(s) of use; and 3) the end use, reuse. The most common types of reuse involve discharges to land for irrigation of landscape plants or crops, but reuse may also include non-discharge uses such as for cooling water or toilet flushing. Each of these components is subject to various design and operational requirements specified in the Water

Recycling Criteria (WRC) codified at Title 22, CCR, Division 4, Chapter 3, which were extensively revised and updated by Department of Health Services (DHS) from 1993 to 2001.

The Water Board in conjunction with DHS implements the WRC. DHS and the State Water Board have entered into a Memorandum of Agreement (MOA) on Use of Reclaimed Water. The intent of the MOA is to insure that there is coordination among DHS, the State Water Board and the Regional Water Boards to implement the recycled water program.

The Water Board is the permitting agency for water recycling projects through issuance of water recycling requirements, also called Water Reuse Requirements (WRRs). The WRRs require a discharger proposing a new water-recycling project to prepare an engineering report describing the project, for review and approval by DHS. The Water Board may then prescribe WRRs for the project based on recommendations from DHS. WRRs include relevant specifications from the WRC and other applicable requirements based on Water Board plans and policies, such as effluent limits and operation, and monitoring and reporting requirements. WRRs may be issued for discrete single-facility reuse projects or for large-scale projects such as municipality-based reuse programs involving multiple types and places of reuse.

In 1996, in order to facilitate water recycling and reuse in the Region, the Water Board adopted the General Water Reuse Requirements for Municipal Wastewater and Water Agencies, Water Board Order No. 96-011 (General Water Reuse Permit). This permit is applicable to producers, distributors, and users of non-potable recycled municipal wastewater throughout the Region. The intent of the General Water Reuse Permit is to streamline the permitting process and delegate, to the fullest extent possible, the responsibility of administrating water reuse programs to local agencies. Regulation under the General Water Reuse Permit requires submittal of a Notice of Intent (NOI) to the Water Board and written authorization from the Water Board's Executive Officer.

Under the General Water Reuse Permit, water recycling and reuse have expanded rapidly throughout the Region. It is estimated that twenty wastewater or water distribution agencies in the Region will be operating under the General Water Reuse Permit by 2007.

In 2001, the State Legislature established the California Recycled Water Task Force (Task Force). The mission of the Task Force was to evaluate the current framework of state and local rules, regulations, ordinances, and permits to identify opportunities for and obstacles to the safe use of recycled water in California. The Task Force consisted of representatives from federal, state, and local agencies, private entities, environmental organizations, universities, and public-interest groups. The Task Force identified and adopted recommendations to address obstacles, impediments, and opportunities for California to increase its recycled water usage as described in the report "Water Recycling 2030, Recommendations of California's Recycled Water Task Force."

4.16.2 INTERAGENCY WATER RECYCLING PROGRAM AND COORDINATION

Implementation of water recycling projects requires the involvement, approval, and support of a number of agencies, including state and local health departments, the Water Board, local POTWs and water districts, and land use planning agencies. Interagency coordination must be a priority of all parties involved in water recycling. Failure to coordinate activities can result in the inability

to carry out water recycling projects in a timely, consistent, and cost-effective manner. The Water Board seeks cooperation and participation of professionals from the water recycling industry and the water, health, and regulatory agencies to assure the development of criteria that are both attainable and appropriate. To facilitate inter-/intra-regional recycling projects, interagency coordination is necessary when the wastewater agency produces recycled water outside of an interested water purveyor's service area. Effective communication and cooperation between agencies regarding distribution and service is vital and should begin early in the planning process. This will assure the water purveyor that there will be no duplication of service, enable interagency agreement on project development and implementation, and help avoid any unnecessary delays that could jeopardize a project.

Several regional water-recycling programs have been initiated in the Region to facilitate water reuse in contiguous areas. This has heralded a new way to implement water-recycling projects by focusing agencies toward regional collaboration, irrespective of jurisdictional boundaries. This has the effect of integrating water and wastewater planning to concurrently solve water supply and wastewater discharge problems, and will lead to more efficient water recycling projects by taking advantage of economics of scale. One such program is the South Bay Recycling Program in Santa Clara County. In addition, the North Bay Watershed Association was created, “to help regulated local and regional public agencies work cooperatively on water resource issues that impact areas beyond traditional boundaries in order to promote stewardship of the North Bay Watershed (Marin, Sonoma and Napa Counties).” The coordination and integration of water reuse activities in the North Bay is an important component of the Association’s functions.

4.17 MUNICIPAL WASTEWATER SLUDGE MANAGEMENT

One particular type of solid waste is wastewater sludge, a by-product of wastewater treatment. Raw sludge usually contains 93 to 99.5 percent water, with the balance being solids that were present in the wastewater and that were added to or cultured by wastewater treatment processes. Most POTWs treat the sludge prior to ultimate use or disposal. Normally this treatment consists of dewatering and/or digestion. In some cases, such as at the Palo Alto treatment plant, the sludge is incinerated.

Treated and untreated sludges often contain high concentrations of toxic metals and often contain significant amounts of toxic organic pollutants and pathogens. The storage and disposal of municipal sludges on land can result in degradation of ground and surface water if not properly performed. Therefore, sludge handling and disposal must be regulated.

On February 19, 1993, the U.S. EPA promulgated national standards regulating the use or disposal of non-hazardous sewage sludge (40 CFR Part 503, et.seq.). Part 503 regulations primarily affect sewage sludge (also known as "biosolids") use and disposal by incineration, surface disposal, and land application (including distribution and marketing). Part 503 regulations also establish pollutant limits, operational and maintenance practices, monitoring frequency, recordkeeping, and reporting requirements. The federal definition of sewage sludge includes domestic septage (from septic tanks, cesspool, portable toilet, etc.). Disposal in a municipal solid waste landfill (MSWLF) is not considered surface disposal. Thus, the MSWLF is not regulated by the national sewage sludge program.

The State of California has neither requested nor been granted the delegation of the federal sewage sludge management program at this time. Therefore, U.S. EPA will be responsible for implementation and enforcement of the national rule. Under the rule, facilities that must apply for a permit include the generators, treaters and disposers of sewage sludge. Nevertheless, 40 CFR Part 503 has, for the most part, been written to be self-implementing. This means that anyone who uses or disposes of sewage sludge regulated by 40 CFR Part 503 must comply with all the provisions of the rule, whether or not a permit has been issued.

State regulations of the handling and disposal of sludge are contained in Chapter 15 and DTSC standards for hazardous waste management. Prior to promulgation of the national rule, sewage sludge facilities were regulated by the Water Board through the issuance of site-specific waste discharge requirements. The Water Board may continue to regulate certain sewage sludge facilities when believed to be necessary for the protection of water quality.

4.18 ON-SITE WASTEWATER TREATMENT AND DISPERSAL SYSTEMS

As the population of the Region increases, demand for new development increases. In many cases, new development is within areas served by municipal sewer systems. However development is also occurring in outlying areas not served by existing sewerage agencies. In those instances, new discrete sewerage systems are being proposed. These are primarily onsite wastewater treatment and dispersal systems (onsite systems or septic systems) serving individual homes, but include community systems serving multiple residences. Today there are more than 110,000 onsite systems throughout the Region, and approximately 1,000 new systems are approved each year.

In response to these development pressures, the Water Board adopted a Policy on Discrete Sewerage Facilities in 1978. The policy set forth the actions the Water Board will take with respect to proposals for individual or community sewerage systems serving new development. An important provision of the policy required the development of guidelines for acceptable onsite system practices. The Water Board's policy and guidelines are presented below.

4.18.1 POLICY ON DISCRETE SEWERAGE FACILITIES

This policy enumerates the following principles, which apply to all wastewater discharges:

- The system must be designed and constructed so as to be capable of preventing pollution or contamination of the waters of the state or creating nuisance for the life of the development;
- The system must be operated, maintained, and monitored so as to continually prevent pollution or contamination of the waters of the state and the creation of a nuisance;
- The responsibility for both of the above must be clearly and legally assumed by a public entity with the financial and legal capability to assure that the system provides protection to the quality of the waters of the state for the life of the development.

The policy also makes the following requests of city and county governments:

- That the use of new discrete sewerage systems be prohibited where existing community sewerage systems are reasonably available;
- That the use of individual onsite systems for any subdivision of land be prohibited unless the governing body having jurisdiction determines that the use of the systems is in the best public interest and that the existing quality of the waters of the state is maintained consistent with the State Water Board's Resolution 68-16; and
- That the cumulative impacts of individual system discharges be considered as part of the approval process for development.

Finally, the policy also requires that a public entity assume legal authority and responsibility for new community wastewater treatment and dispersal systems. Community systems are defined as collection sewers plus treatment facilities serving multiple discharges under separate ownership. The policy requires local governments, during the development approval process, to consider either the formation of a new government entity or an existing public entity to assume this responsibility.

4.18.2 ONSITE SYSTEM GUIDELINES

Since the early 1960s, the Water Board, pursuant to Section 13296 of the Water Code, adopted waivers for reporting certain septic system discharges in all the Region's counties except San Francisco. In its policy, the Water Board required the development of individual system guidelines concentrating mainly on septic systems. These guidelines provided information on system design and construction, operation and maintenance, and the conduct of cumulative impact studies.

In 1979, the Water Board adopted Resolution No. 79-5: Minimum Guidelines for the Control of Individual Wastewater Treatment and Disposal Systems (Minimum Guidelines). These guidelines include recommended practices for onsite system design, construction, operation and maintenance, and cumulative impact assessments, along with supporting rationale. The guidelines focus on the most common and conventional type of onsite systems, a septic tank followed by gravity-flow discharges into a subsurface soil absorption system, but underlying principles remain applicable to all types of onsite systems.

4.18.3 ALTERNATIVE ON-SITE SYSTEMS

The conventional onsite system, when properly constructed and operated, has long been a reliable and acceptable method of providing onsite sewage management. However, there are widespread conditions throughout the Region that preclude the use of conventional systems, including high groundwater, shallow or poor quality soil, or steep slopes. In recent years, there has been active interest and research in the development of alternative methods of onsite wastewater management to accommodate these limiting conditions. Alternative methods currently in use include additional treatment prior to soil discharge such as by a sand filter, or improved methods of dispersal into native soil such as by pressurized distribution throughout the soil absorption system, or via an engineered above-grade mound unit.

While alternative methods can afford improved practices, the use of alternative systems is not without limitations. The site and soil conditions that preclude conventional practices remain and must be appropriately addressed, since all onsite systems ultimately rely on soil absorption of all

or most of the wastewater generated. Most alternative systems require a high degree of design expertise, which increases the danger of faulty design or installation and complicates the review of various proposals. Furthermore, given that alternative systems are primarily used in areas of existing site or soil limitations, in the event of failure, options for replacement will be few, and corrections difficult to achieve. Finally, most alternative systems require a far more intensive and sophisticated level of management than conventional systems, including inspection, monitoring and maintenance by qualified service providers, and increased regulatory oversight, as well as careful use and operation by the homeowner.

Recognizing the need for a position on alternative systems, the Water Board adopted the following statement in the 1979 Minimum Guidelines:

"The Water Board Executive Officer may authorize the Health Officer to approve alternative systems when all of the following conditions are met:

a. Where the Health Officer has approved the system pursuant to criteria approved by the Water Board Executive Officer;
b. Where the Health Officer has informed the Water Board Executive Officer of the proposal to use the alternative system and the finding made in (a) above; and
c. Where a public entity assumes responsibility of the inspection, monitoring and enforcing the maintenance of the system through:

(i) Provision of the commitment and the necessary legal powers to inspect, monitor, and when necessary to abate/repair the system; and

(ii) Provision of a program for funding to accomplish (i) above."

The fundamental point is that the Water Board will allow the use of alternative systems only if adequate design review, system management, and means for failure correction are assured, and a county or some other public agency assumes ultimate responsibility for these actions.

The Water Board may authorize local agencies to approve and permit alternative on-site systems, provided the local regulatory program is found to be acceptable and in accordance with the Water Board's position on alternative systems discussed above. An acceptable program should include a) siting and design criteria for the types of alternative systems being approved, b) procedures for on-going inspection, monitoring, and evaluation of these systems, and c) appropriate local regulations for implementation and enforcement of the program. Authorization may be granted through a conditional waiver adopted by the Water Board and will typically include a Memorandum of Understanding (MOU) between the Water Board and the local agency. Typically, that agency will be the county environmental health department. The MOU provides a means for identifying the responsibilities of both the Water Board and the local agency, applicable criteria for siting, design, construction, operation, maintenance and monitoring, and procedures for implementing the program.

Alternative onsite system designs proposed for approval in a local agency program should be substantiated by suitable reference materials demonstrating successful performance under site and soil conditions similar to the local conditions, including previous field or research facility

testing and documentation of applicable design, installation and use criteria. System designs that have not been fully proven under proposed conditions will be considered experimental and treated with caution. In general, experimental systems will require more careful siting and design review and, if approved, intensive monitoring and inspection to ensure adequate system operation and performance. Experimental systems are generally approved only for limited use, until successful performance has been demonstrated and documented, and acceptable design, installation and use criteria determined.

4.18.4 GRAYWATER SYSTEMS

Graywater systems are a special group of onsite systems that are used to manage only isolated domestic wastewaters that have not come in contact with toilet wastes. In 1997, the California Building Standards Commission approved revised California Graywater Standards. These standards were developed by the California Department of Water Resources (DWR), are codified at Title 24, CCR, Part 5, Appendix G, and apply to all graywater systems statewide.

The standards specify the means by which certain non-toilet wastewaters may be collected, filtered, and discharged into onsite subsurface irrigation systems. Allowable sources of graywater include showers, tubs, bathroom sinks and laundry water. Discharged graywater may only be used for subsurface landscape irrigation. The standards apply to both residential and commercial buildings.

Cities and counties have authority to develop policies and procedures for the implementation of graywater programs. In developing these, consultation with the Water Board and local water districts can ensure that potential impacts on local water quality are taken into consideration.

4.19 EROSION AND SEDIMENT CONTROL

Current estimates of annual sediment inflow to San Francisco Bay are 5.9 million cubic yards with 3.9 million cubic yards contributed through the Delta and 2.0 million cubic yards from Bay Area tributary streams. By the year 2000, ABAG has estimated that approximately 322,500 acres of land area will be converted to urban use. This is a 73 percent increase above the 1975 urbanized land area. This increase in urbanized land use can be expected to be the future source of much of the sediment that will reach the rivers, streams and channels and ultimately the Bay system each year.

Soil erosion and related water quality impacts may result from a wide variety of causes including construction, hillside cultivation, non-maintained roads, timber harvesting, improper hiking/ biking trail use, and off-road vehicles.

Natural erosion processes are accelerated when existing protective cover is removed before, during, and following construction and agricultural activities. Studies relate that erosion on land where construction activities are taking place is about 10 times greater than on land in cultivated row crops, 200 times greater than on pasture land, and 2,000 time greater than on timber land that has not been logged.

The exposure of the soil mantle to falling rain, overland and channelized flow, and the impact of equipment moving over the site results in the increased movement and loss of soil.

Damage from erosion and sedimentation can be categorized in the following ways:

- Damage to construction sites;
- Damage to stream channels;
- Damage to water quality/beneficial uses;
- Damage to public and private property; and
- Damage to agricultural lands.

In most cases, the adverse results of human activities can be reduced and in some instances eliminated through the use of both structural and non-structural measures of various types that are properly employed at the appropriate time. The high cost of lost resources, resource replenishment and after-the-fact repair and maintenance make both pre-project erosion control planning and preventive maintenance necessary. The goals of and the program for erosion and sediment control are summarized below.

GOAL

The goal of the Water Board's Erosion and Sediment Control Program is to reduce and prevent accelerated (human-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired, or threatened with impairment, by sediment.

This goal is to be attained through implementation of proper soil management practices. Voluntary implementation is encouraged, but enforcement authority will be exercised where beneficial uses of water are clearly threatened by poor soil management practices.

PROGRAM

In May of 1980, the Water Board adopted two separate items to alert local governments to the Water Board's concern on erosion control problems related to construction activities. The first item was a statement of intent (Resolution No. 80-5) regarding erosion control which stated that the Water Board:

- Recognizes that water quality problems are associated with construction related activities;
- Recognizes ABAG's progress in developing erosion and sediment control regulatory programs and assistance to local governments to implement these programs;
- Recognizes local governments power to adopt and implement these programs;
- Intends to strengthen its position with regard to regulation of sediment and erosion control problems especially with regard to construction activities; and
- Intends to take appropriate enforcement action pursuant to the California Water Code in cases where land development or other construction activity causes or threatens to cause adverse water quality impacts associated with erosion problems and intends to consider, during enforcement actions, whether local government negligently contributed to the problem due to failure to adopt and/or effectively enforce erosion control programs.

The second item was a memorandum of understanding negotiated with the Council of Bay Area Resource Conservation Districts that is intended to provide the following:

- Assessment, control and monitoring of potential and existing soil erosion related water quality problems;
- Improvement of coordination between the Resource Conservation Districts and the Water Board; and
- Monitoring of local government progress on the adoption and implementation of erosion and sediment control ordinances.

The Water Board has recognized and encouraged the efforts that ABAG has made since mid-1980 in working with local Bay Area governments to improve their ordinance and regulatory programs on erosion and sediment control. ABAG's 1995 Manual of Standards for Erosion and Sediment Control Measures, which provides specific guidance to local governments, is an important tool for improving erosion and sediment control.

The Water Board intends to follow the guidelines listed below in regulating erosion and sedimentation for the protection of beneficial uses of water.

1. Local units of government with land use planning authority should have the lead role in controlling land use activities that cause erosion and may, as necessary, impose further conditions, restrictions, or limitations on waste disposal or other activities that might degrade the quality of waters of the state.

2. Best Management Practices (BMPs) should be implemented to reduce erosion and sedimentation and minimize adverse effects on water quality. A BMP is a practice or combination of practices determined to be the most effective and practicable means to prevent or reduce erosion and sediment related water quality degradation. Examples of control measures are contained in the Manual of Standards for Erosion and Sediment Control Measures. Further technical guidance can be obtained from the Resource Conservation Districts.

3. Local governments should develop an effective erosion and sediment control ordinance and regulatory program. An effective ordinance and regulatory program must:

- Be at least comparable to the model ordinances in ABAG's Manual of Standards for Erosion and Sediment Control Measures;
- State that water quality protection is an explicit goal of the ordinance;
- Require preparation of erosion and sediment control plans consistent with the Manual of Standards with specific attention to both off-site and on-site impacts;
- Provide for installation of approved control measures no later than October 15 of each year; and
- Have provisions for site inspections with follow up at appropriate times, posting of financial assurances for implementation of control measures, and an enforcement program to assure compliance with the ordinance.

4. All persons proposing alterations to land (over five acres) are required to file a Report of Waste Discharge and/or and Erosion Control Plan with the Water Board. A statewide general NPDES permit aimed at minimizing erosion from the proposed activities has been issued.

In addition, the Water Board may find that any water quality problems caused by erosion and sedimentation for such a project were due to the negligent lack of an adequate erosion control ordinance and enforcement program by the local permitting agency. Such a finding of negligence could subject a permitting agency to liability for indemnification to a developer if civil monetary remedies are recovered by the state.

5. The Water Board may take enforcement action pursuant to the California Water Code to require the responsible persons (including local permitting agencies) to clean up and abate water quality problems caused by erosion and sedimentation in the event that the local permitting agency fails to take the necessary corrective action.

4.20 DREDGING AND DISPOSAL OF DREDGED SEDIMENT

Dredging and dredged sediment disposal in the San Francisco Bay Area is an ongoing activity because of continual shoaling which impedes navigation and other water dependent activities. Large volumes of sediment are transported in the waters of the Sacramento and San Joaquin Rivers which drain the Central Valley. The average annual sediment load to the San Francisco Bay system from these two rivers is estimated to be eight million cubic yards. Of this amount, some four million cubic yards is transported out of the Bay through the Golden Gate. The remaining four million cubic yards is circulated and/or deposited in the Bay. In addition, some two and one-half million cubic yards are deposited into the Bay from local watersheds.

Annual maintenance dredging of shipping channels, harbors and marinas in the San Francisco Bay results in disposal of between two and eight million cubic yards of dredged material at in-bay disposal sites. There are currently three designated disposal sites for use by the Corps, the Navy and other dredgers. Additionally, the Corps disposes of material from several projects at designated sites in Suisun Bay and on the San Francisco Bar (west of the Golden Gate). All aquatic dredged material disposal sites are operated as "dispersive" sites, that is material disposed at the sites is intended to disperse and be carried by currents out to sea.

4.20.1 REGULATORY FRAMEWORK

The Corps of Engineers issues federal permits for dredging projects pursuant to Section 404 of the Clean Water Act. As a part of this permitting process, the dredging permit applicant must seek water quality certification from the State of California, in accordance with Section 401 of the Clean Water Act. Currently the applicant must contact the Water Board for 401 certification. The Water Board may waive certification, or it may recommend to the Executive Director of the State Water Resources Control Board that Certification be granted or denied. Water quality certifications often contain conditions that the permittee must meet during the term of the permit. For example, Certifications often contain conditions requiring periodic testing of the dredged material, or avoidance of sensitive ecological areas and spawning grounds. The San Francisco Bay Conservation and Development Commission (BCDC) also regulates dredging and disposal under the provisions of the McAteer-Petris Act.

4.20.2 ENVIRONMENTAL IMPACTS OF DREDGING AND DISPOSAL IN THE AQUATIC ENVIRONMENT

During the late 1980s and continuing to the present, concern over the potential impacts of dredged sediment disposal in San Francisco Bay has increased substantially, forcing regulatory agencies to reexamine their dredging policies. The Water Board, during their triennial review of the Basin Plan in 1986, stated their intention to update and revise the Water Board's dredged sediment disposal policy for San Francisco Bay. During the triennial review, the Water Board recognized that periodic dredging is necessary to maintain the beneficial use presented by navigation and other water dependent activities. The Water Board also stated their intention to institute a more rigorous testing program to determine the suitability of dredged sediment for unconfined aquatic disposal in San Francisco Bay.

Most dredging and dredge material disposal operations cause localized and ephemeral impacts with related biological consequences (Table 4-12). In August, 1980, the Water Board adopted a general policy for the regulation of dredge sediment disposal. Many concerns have been raised about the adequacy of the Corps' regional procedures to identify potential pollution conditions. One area of concern is implicit in the guidelines and protocol, for testing of sediment for ocean disposal. The current ocean disposal criteria (pursuant to the Marine, Protection, Research and Sanctuaries Act) are more stringent than the inland criteria (governed under the Clean Water Act). In the 1980s it was determined that the Alcatraz disposal site was accumulating significant amounts of material, with the depth of the site going from the original 110 feet to 30 feet. The mounding at the disposal site ultimately became a threat to navigation. The Corps eventually dredged the Alcatraz site to increase the depth, redistributing the material within the disposal area several times between 1984 and 1986.

In September of 1988, Water Board staff circulated and presented an issue paper entitled "A Review of Issues and Policies Related to Dredge Spoil Disposal in San Francisco Bay." The issue paper discussed the major environmental concerns posed by dredged sediment disposal in San Francisco Bay, namely: (1) mounding at the Alcatraz disposal site which posed a navigational hazard and has the potential to alter circulation patterns in the Bay; (2) the disposal of increasingly large amounts of material has the potential to alter benthic and shoreline habitats and to increase water column turbidity; and (3) the resuspension of dredged sediments may increase contaminant bioavailability. The issue paper presented a range of alternative strategies for the Water Board to consider. Public and agency testimony was received by the Water Board during hearings on September 15, 1988 and October 19, 1988. Agencies testifying included the Corps, U.S. Environmental Protection Agency (USEPA), and California Department of Fish and Game (CDFG). In the issue paper, Water Board staff recommended that the Water Board consider adopting quantity and quality limits for the disposal of dredged sediment at unconfined aquatic disposal sites within San Francisco Bay.

Additionally, the Water Board and the Corps took steps to prevent further "mounding" at the region's single largest disposal site, the Alcatraz site. In 1989, the Water Board adopted volume targets which served to prevent over-filling of the region's three aquatic disposal sites. BCDC also revised its policies to restrict in-bay disposal. Land disposal avoids many of the potential adverse impacts in aquatic systems. A different set of potential environmental impacts is associated with land disposal but also the opportunity for creating environmental benefits.

4.20.3 DREDGING STUDY PROGRAMS

4.20.3.1 DREDGE MANAGEMENT PROGRAM

In the late 1980s, the Corps of Engineers undertook a series of local dredging studies as a part of the Dredged Management Program (DMP). Additionally, the Corps nationally undertook a Demonstration Program, to examine the environmental impacts from various dredged material disposal practices. The goal of these programs was to examine: 1) factors associated with aquatic disposal practices, 2) the characteristics of dredged material, 3) alternative methods of disposal and 4) dredging technology. However, because the DMP was conducted internally; was not consensus-based; and did not fully involve other state and federal agencies, environmental groups and the dredging community; concern and conflict continued to surround dredging in San Francisco Bay. One particularly notable instance of continued conflict was a 1989 protest and blockade of the aquatic disposal sites by environmental and fishing interests. In the fall of 1989 and early 1990, the Corps undertook a new approach to studying environmental issues surrounding dredging and disposal site management.

4.20.3.2 LONG-TERM MANAGEMENT STRATEGY (LTMS)

The new approach, called the Long Term Management Strategy (LTMS) for dredged material, was designed as a cooperative process based on active participation by state and federal permitting agencies. The lead LTMS agencies share four basic goals related to the fact that dredging is important both economically and environmentally (Table 4-13). The LTMS structure is a pyramid form with technical committees at the base, and appointed state and federal agency administrators at the top (Table 4-14). Three staff-level committees, or "workgroups" were charged with addressing technical issues and managing environmental studies. The Corps of Engineers, San Francisco District, was charged with general coordination, contracting and administrative functions. Later in the process, a fourth committee was formed to carry out various LTMS implementation tasks. The implementation committee has been primarily concerned with permit coordination and streamlining, but has also attempted to address inequities in upland disposal site financing, upland/non-tidal site acquisition and changes to Federal dredging policy. Above the technical and implementation committees is the Management Committee, represented by management executives from five key LTMS agencies. The Management Committee, in turn, takes direction from the Executive Committee. The Executive Committee consists of the chairpersons of the Water Board and BCDC, the USEPA Regional Administrator, the State Dredging Coordinator (Governor Appointed), and the commander of the South Pacific Division, Corps of Engineers. Broad public input is gained via the Policy Review Committee, which meets quarterly to review the work and progress of LTMS.

4.20.3.3 THE LTMS PROCESS

The LTMS process allows participation by resource agencies, environmental groups and the maritime industry. In 1990, the LTMS Study Plan was approved by the participating agencies. The Study Plan outlined in general, the LTMS process and which scientific fields were pertinent and in which areas there existed "gaps" in knowledge. Technical work groups were established order to take responsibility for examining issues in the arenas of: 1) deep ocean disposal, 2) in-bay aquatic disposal, and 3) upland/non-aquatic disposal and re-use. Staff at the Water Board, BCDC and USEPA were appointed to chair the three work groups (Table 4-14). Each committee

was budgeted funds by the Corps in order to carry out approved studies. Throughout the LTMS process, the Corps has retained responsibility for contract management, budgets, and other administrative duties. For the first several years of the program, the In-bay studies work-group also served as a part of the San Francisco Estuary Project, as it was also designated as the subcommittee on "Dredging and Waterway Modification."

The LTMS process has resulted in new findings regarding sediment toxicity testing and transport; the development of new testing procedures; and new approaches to disposal of dredged material. Additionally, the LTMS participants continue to work toward better disposal site management, and, perhaps more importantly, an increased level of coordination and cooperation between those involved with dredging. Participating federal and state permitting and resources agencies receive technical and policy input from dredging, environmental and fishing communities through the LTMS structure.

4.20.3.4 OCEAN STUDIES

The Ocean Studies Work Group, funded through LTMS, provided input on U.S. EPA' s study and designation of a deep ocean disposal site for dredged material. The group oversaw studies in the areas of sediment transport modeling, benthic ecology and environmental risk. The results of various technical studies were compiled in an Environmental Impact Statement (EIS) in which five disposal sites were considered.

U.S. EPA completed an EIS on ocean disposal in August of 1993. Concurrent and following work on the EIS, U.S. EPA, with input from LTMS, moved closer to disposal site use by completing a Site Management and Monitoring Plan. The designated deep ocean disposal site is located about 58 miles offshore, beyond the boundaries of the California National Marine Sanctuaries, in waters which are 6,000 to 9,000 feet deep. The site was formally designated by U.S. EPA on August 11, 1994 (59 Federal Register Section 41243 et seq.) It is expected that the ocean site will be used for disposal of dredged material from large new work and maintenance dredging projects.

4.20.3.5 IN-BAY STUDIES

In-bay disposal studies were undertaken to address several key areas of concern. Following the general terms of the LTMS Study Plan, the In-bay work group examined key environmental concerns in the following areas:

- Physical effects of disposal, including turbidity;
- Physical processes including fate and transport of material from the disposal sites using numerical modeling;
- Toxicological issues, including release of contaminants during disposal, and ecological fate of contaminants;
- Non-treatment effects in sediment toxicity tests;
- Bioaccumulation;
- Methods to reduce the need for dredging; and
- Sampling and analysis methods for sediment testing.

Most of the LTMS in-bay studies were completed by the end of 1994; however, several documents remain in draft form.

4.20.3.6 UPLAND AND NON-TIDAL/REUSE STUDIES

The Upland Studies Program focused on the evaluation of the potential for upland disposal and the use of dredged material as a resource. The group conducted planning-level feasibility studies of potential sites in the San Francisco Bay and Delta. Studies examined the engineering, biological and hydrological aspects of wetland restoration using dredged material; as well as, various regulatory and planning issues surrounding upland reuse. Other issues studied by the group included: remedial technologies for treating contaminated sediments, an analysis of seasonal and tidal wetlands in the North Bay and a feasibility study of potential sediment rehandling sites.

The LTMS technical studies have added to our information base and have filled some of the "data gaps" that were originally identified in the LTMS Study Plan. In many cases, LTMS studies have confirmed our conceptual views and hypotheses about how the Estuary and the ecosystem functions.

4.20.4 WETLAND RESTORATION USING DREDGED MATERIAL

While the Water Board remains concerned about the impacts of both polluted and clean sediments on the San Francisco Estuary, much of the sediment disposed of in the Region is not polluted and could be used in beneficial ways (termed "reuse"). One of these uses involves the restoration of tidal marshes in areas which were once part of the Bay. These areas, known as diked historic baylands, were once open to the tides and were thriving salt marsh and mudflat ecosystems (further discussion under "Wetlands Protection and Management" section). Decades of land "reclamation," first initiated in the 1800s resulted in diked agricultural lands, the land surface of which have subsided for a variety of reasons.

In order to foster growth of marsh vegetation, and proper slough channel formation, the new marsh must be built near mean high tide. In many cases it will be beneficial to place a layer of sediment across the site so as to raise the elevation of the land surface to a point near the mean tide line. LTMS studies have examined the environmental, engineering and economic considerations that are involved in restoring certain sites. The studies commissioned by LTMS have shown that, given current laws and policies, placement of dredged sediment at wetland restoration projects may cost more than traditional in-Bay disposal, but less than ocean disposal.

4.20.4.1 SONOMA BAYLANDS

One such example of this concept is the Sonoma Baylands Wetlands Demonstration Project. The Sonoma Baylands property, which was formerly used for hay production, was acquired by the Sonoma Land Trust for preservation as undeveloped open space. The Sonoma Baylands project was managed by the State Coastal Conservancy which facilitated a partnership between the Corps and the Port of Oakland. Federal legislation was necessary to allow the Corps to direct the construction of the project. The Corps began filling the site with dredged sediment in the fall, 1995, with completion expected in late 1996. The 322-acre Sonoma Baylands site will require some two and a half million cubic yards of sediment prior to contact with tidal waters. The Water Board has issued a permit for the construction of Sonoma Baylands, regulating the placement of dredged sediment and run-off water from the site. Tidal marsh vegetation is expected to be established within five years of construction.

4.20.4.2 MONTEZUMA WETLANDS RESTORATION PROJECT

The Montezuma Wetlands Restoration Project is planned on an even larger scale. The Montezuma project site is located on northern boundary of Suisun Bay at Collinsville. The site, which is adjacent to the Suisun Marsh reserve, is currently used for sheep ranching and commercial pheasant hunting. The Montezuma project involves the restoration of approximately 1,800 acres of diked historic baylands to tidal action. Like, the Sonoma Baylands site, dredged sediment would be placed at Montezuma in order to account for the heavily subsidence that has occurred at the site. In some areas, up to a seven-foot thick layer of sediment would be necessary to bring the site to a proper elevation for wetland creation. Because the Montezuma site has subsided so much, the quantity of material that potentially will be placed there is in the range of 20 million cubic yards. Montezuma project is currently undergoing CEQA review.

4.20.5 WATER BOARD POLICIES ON DREDGING AND DREDGED SEDIMENT DISPOSAL

4.20.5.1 NEED FOR REGIONAL AND LOCAL MONITORING

The Water Board recognizes that the continued disposal of maintenance work will require a demonstration that there are no significant or irreversible impacts occurring from the disposal of maintenance dredged material in San Francisco Bay. The Corps' and other major dredgers' active participation in environmental studies, as well as testing and monitoring programs is absolutely necessary in order to find solutions to the dredging problems in the region.

4.20.5.2 MATERIAL DISPOSAL RESTRICTION

Materials disposed of at approved aquatic dredged material disposal sites shall be restricted to dredged sediment. Disposal of rock, timber, general refuse and other materials shall be prohibited.

4.20.5.3 VOLUME TARGETS

Volume targets for each disposal site were developed based on understandings of sediment dynamics and historical information regarding disposal volumes (Table 4-16). An examination of disposal patterns at all aquatic disposal sites in San Francisco Bay revealed that the Carquinez Straits area may be influenced by wet weather events. The volume targets for the Carquinez Straits disposal site are 3.0 million cubic yards for wet and above normal years and 2.0 million cubic yards for all other year classification.

In addition, the Water Board establishes a volume target of 0.2 million cubic yards per year for the Suisun Bay Channel disposal site and restricts its use to Corps maintenance dredging. The San Francisco Bar site is used for disposal of material from the bar channel. The use of the San Francisco Bar disposal site is regulated under the Marine Research, Sanctuaries and Protection Act.

4.20.5.4 VOLUME TARGET IMPLEMENTATION

The Water Board will consider denial of water quality certification for any project proposing to place material at a disposal site for which the annual or monthly volume target has been

exceeded. Small project proponents may apply for an exemption to monthly or annual volume targets and new work disposal in San Francisco Bay. A small project is defined as a facility or project whose design depth does not exceed 12 feet Mean Lower Low Water (MLLW). The project proponent must demonstrate:

a. That the additional burden placed upon the applicant would be inordinate relative to the beneficial uses protected; and
b. That the proposed discharge is less than 20,000 cubic yards in one year and not to exceed 50,000 cubic yards over five years.

4.20.5.5 USE OF TESTING GUIDELINES

The Water Board's Executive Officer will continue to require technical data according to Public Notice 93-2, "Testing Guidelines for Dredged Material Disposal at San Francisco Bay Sites," or subsequent guidelines. In June of 1994, the Corps of Engineers and USEPA published the draft Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. (Draft), Inland Testing Manual (ITM). The ITM is intended to provide comprehensive guidance to dredging applicants on sampling and testing of sediment. The ITM outlines a tiered approach to sediment testing, similar to the existing Ocean Disposal Testing Manual, or "Green Book", which was written by the federal government for ocean disposal (pursuant to MPRSA).

The Water Board is working in cooperation with other LTMS agencies to develop a regional implementation manual which will detail how the ITM will be implemented in the San Francisco Bay Area. The ITM was intended to only address testing of material for aquatic disposal and does not provide protocol for upland disposal. Disposal of dredged material in other environments for beneficial re-use, e.g. wetland restoration, landfill daily cover, and levee bolstering will be subject to guidance provided by the Water Board.

The Executive Officer, following consultation with other agencies, will periodically review and update all testing procedures. The Executive Officer may require additional data collection beyond the tiered-testing procedures on a case-by-case basis.

4.20.5.6 APPLICABILITY OF WASTE DISCHARGE REQUIREMENTS

The Water Board will consider issuing waste discharge requirements for individual dredging projects unless the Executive Officer has waived such requirements in accordance with Resolution No. 83-3, which is incorporated by reference into this plan (see Chapter 5).

4.20.5.7 DREDGING WINDOWS

The Water Board will restrict dredging or dredge disposal activities during certain periods ("windows") in order to protect the beneficial uses of San Francisco Bay. These beneficial uses include water contact recreation, ocean commercial and sport fishing, marine habitat, fish migration, fish spawning, shellfish harvesting, and estuarine habitat. These restrictions may include but are not limited to:

a. Dredging activities from December through February in selected sites along the waterfront where Pacific Herring are known to spawn; and

b. Disposal activities at the Carquinez Straits site during spring and fall in order to protect Striped Bass and Salmon migrations.

4.20.5.8 IMPACTS AT DREDGE SITE

The Water Board may require additional documentation and inspections during dredging activities in order to ensure that dredgers minimize impacts at the dredging location. Water Quality Certifications or waste discharge requirements may contain additional conditions to address barge overflow and other impacts at the dredging site. Permit conditions may include:

- Special reporting procedures for the hydraulic pumping of dredged material into transport scows prior to disposal (marina slip applications);
- Time limit on the overflow from hopper-type hydraulic dredges in order to obtain an economical load; or
- Precautions to minimize overflow and spillage from the dredging vessel when in-route to the authorized disposal site. (Appreciable loss during transit shall be considered unauthorized disposal, or "short dumping" and such occurrences are subject to enforcement by the Water Board or other applicable state or federal agencies.)

4.20.5.9 POLICY ON LAND AND OCEAN DISPOSAL

The Water Board shall continue to encourage land and ocean disposal alternatives whenever practical. Water Board staff have determined that there should be a high priority placed on disposing of dredged sandy material upland. At a minimum, incentives should be developed to limit disposal of any such material with a market value to upland uses. Staff may condition Certifications so as to encourage upland re-use of high-value sediments.

4.20.5.10 POLICY ON DREDGED MATERIAL DISPOSAL PERMIT COORDINATION

The Water Board will implement these measures through its issuance of Waste Discharge Requirements, Water Quality Certification under Section 401 of the Clean Water Act or other orders. In addition, the Water Board will may require pre- and post-dredge surveys to determine disposal volumes and compliance with permit conditions. In order to better manage data and reduce paper files, Water Board staff will be requesting that applicants submit testing and other project data in a specific electronic format. The Water Board has been an active participant in efforts to improve the overall dredging permit process and the procedures. The goal of this effort is to provide the public with uniform testing and disposal guidelines, joint permit actions, a streamlined permit application process and more uniform permit enforcement. Staff are working with other state and federal agencies to implement a combined state-federal dredging permit process. The process is generally based on the Washington State "Dredged Material Management Office," a part of the Puget Sound Dredged Disposal Analysis program (PSDDA) which regulates dredging and disposal in the Seattle and Tacoma regions.

4.20.5.11 CURRENT CORPS OF ENGINEER'S POLICY ON VOLUME OF MATERIAL DISPOSED OF AT THE ALCATRAZ DISPOSAL SITE

On February, 1, 1993, the Corps of Engineers released a proposed policy, as Public Notice 93-3, which further limited allowable monthly disposal volumes at the Alcatraz disposal site (SF-11).

The Corps stated that the "existing maximum volume targets have been determined to be inadequate to maintain the site for continued dredged material disposal." The Corps' change in policy in the Public Notice reduces monthly volume limits for the Alcatraz site below what has been adopted by the Board (table). However, the Corps' policy does not address annual limits, it reserves exclusive use of the site for Corps-maintained projects if deemed necessary, and it allows other dredgers to dispose of material at the San Pablo Bay site (SF-10), when and if the Alcatraz site has reached capacity. Of course, the Corps may change their policy independently of the Water Board and other agencies.

4.21 MINES AND MINERAL PRODUCERS

The Water Board oversees water quality problems associated with over 150 inactive and active mining and mineral producers in the Region, as described below.

4.21.1 INACTIVE SITES

Over 50 abandoned or inactive mines have been identified within the Region (Table 4-16 and Figure 4-5). The mineral resources extracted include mercury, magnesite, megnesium salts, manganese, pyrite, coal, copper, silver, and gold. A large percentage of the mining activities took place from 1890-1930, although some areas were mined as recently as 1971. The size of these mines varies from relatively small surface mines of less than half an acre to the world's second largest mercury mine, the New Almaden District, located in Santa Clara County.

Water quality problems associated with mining activities can be divided into three categories:

- Erosion and sediment discharges from surface mines and ore tailings piles;
- Acid or otherwise toxic aqueous discharge from underground mines, ore tailings, slag, or other mining processes; and
- Atmospheric deposition, such as releases from stacks carried downwind from mine sites.

Problems of erosion and sediment discharged from mined areas may be intensified due to the fact that sediment from ore-rich areas typically contain high concentrations of metals. Biological processes which take place in lake and stream bottom sediments may allow for these pollutants to be released in a form that more readily bioaccumulates in the food chain.

Water quality and aquatic toxicity monitoring data suggests that the beneficial uses of a number of water supply reservoirs, creeks, and streams in the Region have been impacted as a result of past mining activities. Threatened beneficial uses of lakes, streams, bays and marshes due to mining activities so far identified in the Region include: fish migration, fish spawning, shellfish harvesting, wildlife habitat, preservation of rare and endangered species, cold and warm freshwater habitat, and water contact recreation. In response to these findings, the Water Board conducted surveys to locate abandoned and operating mines in the Region. The results of the surveys are compiled in the 1998 report titled, "San Francisco Bay Regional Water Quality Control Board Mines Report."

In many cases, the adverse results of previous surface mining activities can be reduced, and in some cases eliminated, through appropriate erosion and sediment control practices. The U.S.

Natural Resource Conservation Service (NRCS, formerly Soil Conservation Service) has developed a Resource Management System for Surface Mined Areas. This management system references practices and treatment alternatives needed to address the following:

- Erosion control practices that route surface water run-off at non-erosive velocities and reduce soil movement by wind or water to within acceptable limits;
- Maintenance of adequate water quality and quantity for planned uses and to meet federal, state, and local requirements;
- Pollution control to meet federal, state, and local regulations; and
- A system of planned access and/or conveyance that is within local regulations and meets the needs for the intended use.

In 1980, a memorandum of understanding (MOU) was negotiated with the Council of Bay Area Resource Conservation Districts in order to provide for assessment and monitoring of potential and existing soil erosion-related water quality problems, and identification of control measures. It was agreed that local units of government should have the lead role in controlling land use activities that cause erosion. Controls measures include the implementation of BMPs. The Resource Management System for Surface Mined Areas developed by NRCS specifically references BMPs determined to be the most effective and practicable means of preventing or reducing erosion and sediment-related water quality degradation resulting from surface mining activities.

4.21.2 ACTIVE SITES

There are approximately 100 active quarries and mineral producers within the Region. The primary commodities produced include clay, salt, sand and gravel, shale, and crushed stone. Water quality problems associated with active mineral production generally consist of erosion and sediment discharge into nearby surface water bodies and wildlife habitat destruction.

Mining activities are in part regulated under the Surface Mining and Reclamation Act of 1975. This Act requires all mine operators to submit a reclamation plan to the California Geological Survey (formerly California Department of Conservation, Division of Mines and Geology) and the recognized lead local agency for the area in which the mining is taking place. Recognized lead local agencies for the Region include county planning and public works departments. Additionally, some local planning departments regulate mining activities through the issuance of conditional land use permits. The goal of each reclamation plan is to assure that mined lands are reclaimed to a usable condition that is readily adaptable for alternate land uses and creates no danger to public health and safety. The current permitting process places very little emphasis on the need to protect beneficial uses of surface and groundwater.

Under Title 23, CCR, Chapter 15, Article 7, the Water Board has the authority to regulate mining activities that result in a waste discharge to land through the use of WDRs. Additionally, the federal NPDES stormwater regulations (40 CFR Parts 122, 123, and 124) require active and inactive mining operations to obtain NPDES permit coverage for the discharge of stormwater polluted by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products.

4.21.3 MINING PROGRAM GOAL

The Water Board's goal for its mining program is to restore and protect beneficial uses of receiving waters now impaired, or threatened with impairment, resulting from past or present mining activities. This goal will be attained by the coordinated effort of the Water Board, NRCS, the Council of Bay Area Resource Conservation Districts, the California Geological Survey, and lead local government agencies through the implementation of a mineral production and mining management program.

4.21.4 MINING PROGRAM DESCRIPTION

1. The Water Board intends to continue to work closely with Resource Conservation Districts and NRCS to identify all existing and abandoned mines and mineral production sites in the Region. Responsible parties will be identified. If needed, potential funding alternatives for cleanup activities will also be identified. Sites will be prioritized based on existing and potential impacts to water quality and size.

2. The Water Board will require an NPDES permit for the discharge of polluted stormwater from active and inactive mining operations, as defined in NPDES stormwater regulations. The Water Board will consider issuing individual permits or a general permit for such discharges, or will otherwise allow coverage under the State Water Board general permit for stormwater discharges associated with industrial activity as described in Section 4.14 Urban Runoff Management, Industrial Activity Control Program. Requirements of the notice of intent to be covered under the general permit(s) and the schedule for submittal will be established in the permit(s).

3. The responsible party or operator of each site discharging, or potentially discharging waste to land shall be required to submit a Report of Waste Discharge to the Water Board. Submittal of a Report of Discharge will be requested by the Water Board pursuant to the Water Code Section 13267. Requests will be made on a site-by-site basis and based on priority. A Report of Waste Discharge shall consist of a "Site Closure Plan" and an "Operation and Management Plan" for active sites, as described below:

- Each plan shall be designed to ensure short- and long-term protection of beneficial uses of receiving waters.
- The "Closure Plan" shall address site restoration and long-term maintenance and monitoring, which may include a financial guarantee to ensure that adequate funds are available for proper site closure.
- The "Operation and Management Plan" shall address stormwater runoff and erosion control measures and practices.
- Each plan will be evaluated in regard to potential impacts to beneficial uses of receiving waters. WDRs will be issued or conditionally waived at the discretion of the Water Board based on the threat to water quality and the effectiveness of identified and implemented control measures and the effectiveness of local agency oversight.

4.22 VESSEL WASTES

The discharge of wastes from pleasure, commercial, and military vessels has been a water quality concern of the Water Board since 1968 when Resolution No. 665 was adopted, which suggested

that the federal government regulate waste discharges from vessels. In 1970 the Water Board adopted Resolutions 70-1 and 70-65 on vessel wastes. The first urged BCDC to condition marina permits for new or expanded marinas to include pumpout facilities, dockside sewers, and restroom facilities. Resolution 70-65 recommended that vessel wastes be controlled in such a manner through legislative action.

In 1982, the Water Board conducted a study that found high levels of coliform in the vicinity of several marinas in Marin County's Richardson Bay. Subsequently, the Water Board adopted a prohibition against discharge of any kind into Richardson Bay. A regional agency was formed to implement and enforce this prohibition.

There is an ongoing effort to construct, renovate, and improve pumpout facilities at marinas and ports around the region. The goal of these efforts is to increase the accessibility of these facilities to boaters and reduce pollution from vessel wastes.

4.23 WETLAND PROTECTION AND MANAGEMENT

Wetlands and related habitats comprise some of the Region's most valuable natural resources. Wetlands provide critical habitats for hundreds of species of fish, birds, and other wildlife; offer open space; and provide many recreational opportunities. Wetlands also serve to enhance water quality, through such natural functions as flood control and erosion control, stream bank stabilization, and filtration and purification of surface water.

The Water Board will refer to the following for guidance when permitting or otherwise acting on wetland issues:

- Governor's Executive Order W-59-93 (signed August 23, 1993; also known as the California Wetlands Conservation Policy, or the "No Net Loss" policy);
- Senate Concurrent Resolution No. 28; and
- Water Code Section 13142.5 (applies to coastal marine wetlands).

The goals of the California Wetlands Conservation Policy include ensuring "no overall net loss," achieve a "long-term net gain in the quantity, quality, and permanence of wetlands acreage and values ...", and reducing "procedural complexity in the administration of state and federal wetlands conservation programs."

Senate Concurrent Resolution No. 28 states, "It is the intent of the legislature to preserve, protect, restore, and enhance California's wetlands and the multiple resources which depend on them for the benefit of the people of the state."

Water Code Section 13142.5 states, "Highest priority shall be given to improving or eliminating discharges that adversely affect ... wetlands, estuaries, and other biologically sensitive sites."

The Water Board may also refer to the Estuary Project's Comprehensive Conservation and Management Plan (June, 1994) for recommendations on how to effectively participate in a Region-wide, multiple-agency wetlands management program.

4.23.1 BAYLANDS ECOSYSTEM HABITAT GOALS

Consistent with the California Wetlands Conservation Policy, the Water Board participated in the preparation of two planning documents for wetland restoration around the Estuary: Baylands Ecosystem Habitat Goals (1999) and Baylands Ecosystem Species and Community Profiles (2000), together known as the Habitat Goals reports. The Habitat Goals reports provide a starting point for coordinating and integrating wetland planning and regulatory activities around the Estuary. The Habitat Goals reports identify and specify the beneficial uses and/or functions of existing wetlands and suggest wetland habitat goals for the baylands,defined in the Habitat Goals reports as shallow water habitats around the San Francisco Bay between maximum and minimum elevations of the tides. The baylands ecosystem includes the baylands, adjacent habitats, and their associated plants and animals. The boundaries of the ecosystem vary with the bayward and landward movements of fish and wildlife that depend upon the baylands for survival. The Habitat Goals reports were the non-regulatory component of a conceptual regional wetlands management plan from the mid-1990's.

4.23.2 DETERMINATION OF APPLICABLE BENEFICIAL USES FOR WETLANDS

Beneficial uses of water are defined in Chapter 2 Beneficial Uses and are applicable throughout the Region. Chapter 2 also identifies and specifies the beneficial uses of 34 significant marshes within the Region (Table 2-3). Chapter 2 indicates that the listing is not comprehensive and that beneficial uses may be determined site-specifically. In making those site-specific determinations, the Water Board will consider the Habitat Goals reports, which provide a technical assessment of wetlands in the Region and their existing and potential beneficial uses. In addition to the wetland areas identified in Chapter 2, the Habitat Goals reports identified additional wetlands in the Region as having important habitat functions. Because of the large number of small and non-contiguous wetlands within the Region, it is not practical to specify beneficial uses for every wetland area. Therefore, beneficial uses will frequently be specified as needed for a particular site. This section provides guidance on how beneficial uses will be determined for wetlands within the Region.

Information contained in the Habitat Goals reports, the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS), and in the scientific literature regarding the location and areal extent of different wetland types will be used as initial references for any necessary beneficial use designation. The NWI is the updated version of the USFWS's Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, et al. 1979), which is incorporated by reference into this plan, and was previously used by the Water Board to identify specific wetland systems and their locations. The updated NWI or other appropriate methods will continue to be used to locate and identify wetlands in the Region. A matrix of the potential beneficial uses that may be supported by each USFWS wetland system type is presented in Table 2-4.

It should be noted that, while the Habitat Goals reports and USFWS's NWI wetlands classification system are useful tools for helping to establish beneficial uses for a wetland site, it is not suggested that these tools be used to formally delineate wetlands.

4.23.3 HYDROLOGY

Hydrology is a major factor affecting the beneficial uses of wetlands. To protect the beneficial uses and water quality of wetlands from impacts due to hydrologic modifications, the Water Board will carefully review proposed water diversions and transfers (including groundwater pumping proposals) and require or recommend control measures and/or mitigation as necessary and applicable.

4.23.4 WETLAND FILL

The beneficial uses of wetlands are frequently affected by diking and filling. Pursuant to Section 404 of the Clean Water Act, discharge of fill material to waters of the United States must be performed in conformance with a permit obtained from the U.S. Army Corps of Engineers (Corps) prior to commencement of the fill activity. Under Section 401 of the Clean Water Act, the state must certify that any permit issued by the Corps pursuant to Section 404 will comply with water quality standards established by the state (e.g., Basin Plans or statewide plans), or can deny such certification, with or without prejudice. In California, the State and Regional Water Boards are charged with implementing Section 401. California's Section 401 regulations are at Title 23, CCR, Division 3, Chap 28, Sections 3830-3869. Pursuant to these regulations, the Water Board and/or the Water Board's Executive Officer have the authority to issue or deny Section 401 water quality certification. The certification may be issued with or without conditions to protect water quality.

The Water Board has independent authority under the Water Code to regulate discharges of waste to wetlands (waters of the state) that would adversely affect the beneficial uses of those wetlands through waste discharge requirements or other orders. The Water Board may choose to exercise its independent authority under the Water Code in situations where there is a conflict between the state and the Corps, such as over a jurisdictional determination or in instances where the Corps may not have jurisdiction. In situations where there is a conflict between the state and the Corps, such as over a jurisdictional determination or in instances where the Corps may not have jurisdiction, the Water Board may choose to exercise its independent authority under the Water Code.

The regulation of "isolated" waters determined not to be waters of the U.S. is one such instance where the Corps does not have jurisdiction. The U. S. Supreme Court, in its 2001 decision in Solid Waste Agency of Northern Cook County v. U. S. Army Corps of Engineers (the "SWANCC decision") determined that certain isolated, non-navigable waters are not waters of the U.S., but are the province of the states to regulate. The Water Code provides the State and Regional Water Boards clear authority to regulate such isolated, non-navigable waters of the state, including wetlands. To address the impacts of the SWANCC decision on the waters of the state, the State Water Board issued Order No. 2004-0004-DWQ in 2004, General WDRs for dredged or fill discharges to waters deemed by the Corps to be outside of federal jurisdiction. It is the intent of these General WDRs to regulate a subset of the discharges that have been determined not to fall within federal jurisdiction, particularly those projects involving impacts to small acreage or linear feet and those involving a small volume of dredged material.

Order No. 2004-004-DWQ does not address all instances where the Water Board may need to exercise its independent authority under the Water Code. In such instances, dischargers and/or

affected parties will be notified with 60 days of the Water Board's determination and be required to file a report of waste discharge.

For proposed fill activities deemed to require mitigation, the Water Board will require the applicant to locate the mitigation project within the same section of the Region, wherever feasible. The Water Board will evaluate both the project and the proposed mitigation together to ensure that there will be no net loss of wetland acreage and no net loss of wetland functions. The Water Board may consider such sources as the Habitat Goals reports, the Estuary Project's Comprehensive Conservation and Management Plan, or other approved watershed management plans when determining appropriate "out-of-kind" mitigation.

The Water Board uses the U.S. EPA's Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredge or Fill Material," dated December 24, 1980, which is incorporated by reference into this plan, in determining the circumstances under which wetlands filling may be permitted.

In general, it is preferable to avoid wetland disturbance. When this is not possible, disturbance should be minimized. Mitigation for lost wetland acreage and functions through restoration or creation should only be considered after disturbance has been minimized.

Complete mitigation projects should be assessed using established wetland compliance and ecological assessment methods, such as the Wetland Ecological Assessment (WEA) and the California Rapid Assessment Method (CRAM).

4.24 OIL SPILLS

Oil spills can cause severe and extensive damage to the environment. Fortunately, the petroleum industry has been improving its safety record in oil transfer operations - the step in petroleum handling where spills are most likely to occur. The volume of oil spilled during transfer operations has decreased since 1975.

This improvement is due to:

- U.S. Coast Guard regulations for oil transfer operations;
- State Lands Commission guidelines for petroleum facility operations manuals;
- High clean-up costs and public concern associated with oil spills; and
- Water Board, California Department of Fish and Game, and U.S. Coast Guard enforcement actions against parties responsible for spills.

The Water Board considered adopting a policy requiring specific improvements in oil transfer operations, but due to the industry's improved performance, the Water Board is holding the adoption of such a policy in abeyance while continuing to monitor the industry's performance. The Water Board recognizes that additional regulation is unnecessary if the petroleum industry maintains its improved record.

4.25 GROUNDWATER PROTECTION AND MANAGEMENT

Per State Water Board Resolution No. 88-63, almost all the Region's groundwater is considered to be an existing or a potential source of drinking water. With limited resources, the Water Board must concentrate its groundwater protection and management efforts on the most important groundwater basins. DWR has identified 28 individual groundwater basins and seven sub-basins in the Region that serve, or could serve, as sources of high quality drinking water.

Increased demands on these groundwater resources have become evident in the rapidly developing Region. Years of drought and decades of discoveries of groundwater pollution have resulted in impacts or impairment to portions of these basins. Some municipal, domestic, industrial, and agricultural supply wells have been taken out of service due to the presence of pollution. Some of the basins have also been affected by over-pumping, resulting in land subsidence and saltwater intrusion.

Such pressures on groundwater resources require that comprehensive environmental planning and management practices be developed and implemented for each individual basin by all concerned and affected parties. The Water Board will foster this concept with the following groundwater protection and management goals for the Region.

1) Identify and update beneficial uses and water quality objectives for each groundwater basin.

Water quality objectives must maintain the existing high quality of groundwater, protect its beneficial uses, and protect human health and the environment. The Water Board's program to identify and update objectives is described in Section 4.25.1 Application of Water Quality Objectives.

2) Regulate activities that impact or have the potential to impact the beneficial uses of groundwater of the Region.

Federal, state, and local groundwater protection and remediation programs that will result in the overall maintenance or improvement of groundwater quality must be implemented Region-wide in a consistent manner. When a potential threat or problem is discovered, containment and clean-up efforts must be undertaken as quickly as possible to limit groundwater pollution. Where activities that could affect the beneficial uses of groundwater are not regulated by other federal, state, or local programs, the Water Board will consider regulation depending upon the threat to beneficial uses and availability of Water Board resources. The overall requirements for site cleanup and closure, setting cleanup levels, and future groundwater management strategies are described in Section 4.25.2 Requirements for Site Investigation, Cleanup and Site Closure. The Water Board's programs for cleanup of polluted sites are described in Section 4.25.3 Regulation of Potential Pollution Sources.

3) Prevent future impacts to the groundwater resource through local and regional planning, management, education, and monitoring.

Groundwater is an integral component of a watershed's hydrologic system. A comprehensive watershed management approach is necessary to protect groundwater resources. The Water

Board's program for broadening its information base on groundwater resources and individual protection needs of basins is described in Section 4.25.4 Groundwater Protection Programs. Groundwater monitoring efforts by state and local agencies are described in Chapter 6 Surveillance and Monitoring.

Local water, fire, planning and health departments are actively involved with their own groundwater protection programs. These programs include: salt water intrusion and land subsidence control, wellhead protection, groundwater recharge area preservation, hazardous material storage and management ordinances, Local Oversight Programs and non-Local Oversight Programs for cleanup of leaking underground fuel tanks, potential conduit well destruction, and well permitting and inspection. For some agencies, maintaining funding for protection programs is an ongoing challenge. Through numerous regional projects, the Water Board is evaluating the groundwater protection needs in specific basins, and thus will provide additional support for local agency efforts.

4.25.1 APPLICATION OF WATER QUALITY OBJECTIVES

Water quality objectives apply to all groundwater, rather than at a wellhead or at a point of consumption. The maintenance of the existing high quality of groundwater (i.e., "background") is the primary objective, which defines the lowest concentration limit that the Water Board requires for groundwater protection. The Water Board also has narrative and numeric water quality objectives for bacteria, chemical constituents, radioactivity, and taste and odor (see Chapter 3). These objectives define the upper concentration limit that the Water Board considers protective of beneficial uses. The lower and upper concentration limits define the range that the Water Board considers for clean-up levels of polluted groundwater. Establishment of cleanup levels is discussed in Section 4.25.2 Requirements for Site Investigation, Cleanup and Site Closure.

Numerical limits that implement all applicable water quality objectives include Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs), and are only acceptable as the upper end of a concentration range to protect the beneficial uses of municipal and domestic drinking water sources.

Ideally, the Water Board would establish numerical groundwater objectives for all constituents. However, the Water Board is limited in its ability and resources to independently establish numerical objectives for groundwater. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., State Water Board, U.S. EPA, DHS, Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA), Cal/EPA's Department of Toxic Substances Control (DTSC), etc.) to provide the numerical criteria for Water Board consideration as groundwater objectives.

The Central Valley Water Board summarized water quality standards and criteria from a variety of sources in “A Compilation of Water Quality Goals”. This report contains an extensive compendium of numerical water quality limits from the literature for over 800 chemical constituents and water quality parameters.

In practice, the Water Board uses water quality objectives for groundwater somewhat differently from those for surface water. For groundwater, the Water Board's emphasis is the regulation of sites where water quality objectives are not being met, clean-up is required and/or under way, and no further waste discharges will be allowed in the future. In contrast, surface water discharges regulated by the Water Board are usually for ongoing discharges regulated to meet water quality objectives in receiving waters.

In a typical situation, the Water Board must identify and establish site- and basin-specific groundwater beneficial uses and standards for the cleanup of groundwater polluted by numerous and extensive spills and leaks of toxic chemicals (e.g., organic solvents, fuels, metals, etc.).

Very few waste discharges to land are allowed by the Water Board and those that are permitted (e.g., landfills, industrial waste disposal, above-ground soil treatment, etc.) are closely regulated under the requirements of existing laws and regulations in order to maintain and protect groundwater quality objectives. An additional category of discharges to land is the numerous individual domestic waste disposal systems (e.g., onsite dispersal systems) that are permitted and regulated by the counties. The Water Board waives regulation based upon the fact that the counties' regulation of the systems complies with applicable Water Board requirements.

Groundwater objectives for individual basins may be developed in the future. As the Water Board completes projects that provide more detailed delineation of beneficial uses within basins, revised objectives may be developed for portions of groundwater basins that have unique protection needs. Examples of Water Board projects completed in the Region are described in "Section 4.25.5 Groundwater Protection Studies."

4.25.2 REQUIREMENTS FOR SITE INVESTIGATION, CLEANUP AND SITE CLOSURE

This section describes the regulatory requirements and their applications for investigation, cleanup, and closure at sites impacted by soil and groundwater pollution.

4.25.2.1 STATE WATER BOARD POLICIES FOR GROUNDWATER CLEANUP

ANTIDEGRADATION POLICY

The "Statement of Policy with Respect to Maintaining High Quality of Waters in California," known as the Antidegradation Policy (State Water Board Resolution No. 68-16), requires the continued maintenance of existing high quality waters. It provides conditions under which a change in water quality is allowable. A change must:

- Be consistent with maximum benefit to the people of the state;
- Not unreasonably affect present and anticipated beneficial uses of water; and
- Not result in water quality less than that prescribed in water quality control plans or policies.

However, in cases where unauthorized releases have polluted groundwater, restoring groundwater quality to background concentrations is often technically impractical. In those situations, groundwater should be restored to attain applicable beneficial uses.

SOURCES OF DRINKING WATER POLICY

This policy, adopted by the State Water Board in 1988 (Resolution No. 88-63), established state policy that all surface and ground water in the state are considered suitable, or potentially suitable, for municipal or domestic supply (MUN) and should be designated for this use, with certain exceptions. The exceptions for groundwater are:

- The groundwater's TDS exceeds 3,000 mg/L (5,000 microSiemens per centimeter (μS/cm), electrical conductivity), and it is not reasonably expected by the Water Boards to supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use through implementation of BMPs or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or
- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR), Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.

POLICIES AND PROCEDURES FOR INVESTIGATION AND CLEANUP AND ABATEMENT OF DISCHARGES

State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation, Cleanup and Abatement of Discharges Under Water Code Section 13304" contains the policies and procedures that all Water Boards shall follow to oversee and regulate investigations and cleanup and abatement activities resulting from all types of discharge or threat of discharge subject to Water Code Section 13304. Therefore, the five program areas described below follow the same policies and procedures outlined in Resolution No. 92-49 for determining:

- When an investigation is required;
- The scope of phased investigations necessary to define the nature and extent of contamination or pollution;
- Cost-effective procedures to detect, cleanup or abate contamination; and
- Reasonable schedules for investigation, cleanup, abatement, or any other remedial action at a site.

State Water Board Resolution No. 92-49 requires that the Water Board ensure that the discharger is aware of and considers minimum cleanup and abatement methods. The minimum methods that the discharger should be aware of and consider, to the extent that they may be applicable to the discharge or threat thereof, are:

- Source removal and/or isolation;
- In-place treatment of soil or water, including bioremediation, aeration, and fixation;
- Excavation or extraction of soil, water, or gas for on-site or off-site treatment techniques including bioremediation; thermal destruction; aeration; sorption; precipitation, flocculation and sedimentation; filtration; fixation; and evaporation; and,
- Excavation or extraction of soil, water, or gas for appropriate recycling, reuse, or disposal.

State Water Board Resolution No. 92-49 was amended in 1996 with Resolution No. 96-79, Containment Zone Policy. Per the revised resolution, it is not the intent of the State Water Board or the Regional Water Boards to allow dischargers, whose actions have caused, permitted, or threaten to cause or permit conditions of pollution, to avoid responsibilities for cleanup. However, in some cases, attainment of applicable water quality objectives for groundwater cannot reasonably be achieved. In these cases, the State Water Board determines that establishment of a containment zone is appropriate and consistent with the maximum benefit to the people of the state if applicable requirements contained in the policy are satisfied.

STATE WATER BOARD DECISIONS

In addition to State Water Board policies that specify requirements for investigation and cleanup of groundwater, State Water Board precedential orders on petitions provide guidance and direction to the nine Regional Water Boards with respect to cleanup orders. State Water Board decisions affecting site cleanup fall into three general categories: naming responsible parties, setting cleanup standards, and closing low-risk cases.

4.25.2.2 ELEMENTS OF GROUNDWATER CLEANUP AND SITE CLOSURE

State Water Board Resolution No. 92-49 outlines the five basic elements of a site investigation. Any or all elements of an investigation may proceed concurrently, rather than sequentially, in order to expedite cleanup and abatement of a discharge, provided that the overall cleanup goals and abatement are not compromised. State Water Board Resolution No. 92-49 investigation components are as follows:

Preliminary site assessment to confirm the discharge and the identity of the dischargers; to identify affected or threatened waters of the state and their beneficial uses; and to develop preliminary information on the nature and vertical and horizontal extent, of the discharge;
Soil and water investigation to determine the source, nature, and extent of the discharge with sufficient detail to provide the basis for decisions regarding subsequent clean-up and abatement actions, if any are determined by the Regional Water Board to be necessary;
Proposal and selection of clean-up action to evaluate feasible and effective cleanup and abatement actions and to develop preferred clean-up and abatement alternatives;
Implementation of clean-up and abatement action to implement the selected alternative and to monitor in order to verify progress; and
Monitoring to confirm short- and long-term effectiveness of cleanup and abatement.

The following additional requirements for site cleanup and closure may also apply, as described below.

"Cleanup Complete" Determinations – The Water Board provides no further action (NFA) confirmations and no-further-active-cleanup confirmations to responsible parties when no further active cleanup is needed. For petroleum-impacted sites, the Water Board provides a case closure letter as part of the case closure summary report.

Public Participation – The Water Board will provide opportunities for public participation in the oversight process so that the public is informed and has the opportunity to comment. The level of effort is tailored to site-specific conditions, depending on site complexity and public interest. The level of public participation effort at a particular site is based on the potential threat to human health, water quality, and the environment; the degree of public concern or interest in site cleanup; and any environmental justice factors associated with the site.

Electronic Data Reporting – The State Water Board maintains a web-based geographic information system (GIS) program that provides the public and regulators with online access to environmental data. The State Water Board adopted regulations that require electronic submittal of information for groundwater cleanup programs (Title 23, CCR, Division 3, Chapter 30). For several years, parties responsible for cleanup of leaking underground fuel tanks (LUFT) have been required to submit groundwater analytical data, the surveyed locations of monitoring wells, and certain other data to the State Water Board database over the Internet. As of 2005, all groundwater cleanup programs are required to submit these items as well as a portable data format (PDF) copy of reports.

Compliance Monitoring – Monitoring reports are required periodically that describe the status of the cleanup activities and monitoring results. The Water Board will conduct site inspections to ensure the responsible party is complying with Water Board enforcement directives.

Deed Restriction - A deed restriction (land use covenant) may be required to facilitate the remediation of past environmental contamination and to protect human health and the environment by reducing the risk of exposure to residual hazardous materials. Water Code Section 13307.1 requires that deed restrictions be mandated for sites that are not cleaned up to "unrestricted use", and that the restrictions be recorded and run with the land to prohibit sensitive uses such as homes, schools, or day care facilities. Underground storage tank (UST) sites are exempted from this requirement because of the sheer numbers and the small size of most of these sites. Site conditions are tracked in the statewide database developed by the State Water Board (Section 4.25.2.2 Electronic Data Reporting).

Liability Relief Tools – Several tools are available to municipalities, landowners, developers and responsible parties for seeking relief from contamination liability. The Polanco Act, California Land Environmental Restoration and Reuse Act, and California Land Reuse and Revitalization Act provide liability relief and help redevelopment agencies, cities and counties to guide and pursue redevelopment of Brownfield sites (Section 4.25.3.1 Brownfields).

4.25.2.3 SETTING CLEANUP LEVELS

The Water Board approves soil and groundwater clean-up levels for polluted sites. Per State Board Resolution No. 92-49, the basis for Water Board decisions regarding investigation, and cleanup and abatement includes: (1) site-specific characteristics; (2) applicable state and federal

statutes and regulations; (3) applicable water quality control plans adopted by the State and Regional Water Boards, including beneficial uses, water quality objectives, and implementation plans; (4) State and Regional Water Board policies, including State Water Board Resolutions No. 68-16 (Antidegradation Policy) and No. 88-63 (Sources of Drinking Water Policy); and (5) relevant standards, criteria, and advisories adopted by other state and federal agencies.

State Water Board Resolution No. 92-49 directs the Regional Water Boards to ensure that dischargers are required to cleanup and abate the effect of discharges. This cleanup and abatement shall be done in a manner that promotes attainment of either background water quality, or the best water quality that is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved: beneficial and detrimental, economic and social, tangible and intangible. Any alternative cleanup levels less stringent than background shall:

- Be consistent with maximum benefit to the people of the state;
- Not unreasonably affect present and anticipated beneficial uses of such water; and
- Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

GROUNDWATER CLEAN-UP LEVELS

The overall clean-up level established for a waterbody is based upon the most sensitive beneficial use identified. In all cases, the Water Board first considers high quality or naturally occurring "background" concentration objectives as the clean-up levels for polluted groundwater and the factors listed above under "Setting Cleanup Levels." For groundwaters with a beneficial use of municipal and domestic supply, cleanup levels are set no higher than:

- MCLs or adopted SMCLs, whichever is more restrictive, or
- A more stringent level (i.e., below MCLs) based upon a site-specific risk assessment. Clean-up levels must be set to maintain the excess upperbound lifetime cancer risk to an individual of less than 1 in 10,000 (10^{-4}) or a cumulative toxicological effect as measured by the Hazard Index of less than one. For all sites performing risk assessments, an alternative with an excess cancer risk of 1 in 1,000,000 (10^{-6}) or less must also be considered.

The Water Board determines excess cancer risks and the Hazard Index following the procedures described in the U.S. EPA's Risk Assessment Guidance for Superfund, Volume I, Parts A dated August 1989, B dated December 1991, and C dated December 1991, which are incorporated by reference into this plan. The Water Board may modify the U.S. EPA's approach based on OEHHA's guidelines or more current site- or pollutant-specific information.

Groundwater clean-up levels are approved on a case-by-case basis by the Water Board. The Executive Officer or a local agency may approve clean-up levels as appropriately established by the Water Board. Proposed final clean-up levels are based on a discharger-developed feasibility study of clean-up alternatives that compares effectiveness, cost, time to achieve clean-up standards, and a risk assessment to determine impacts on beneficial uses, human health, and the environment. Clean-up levels must also take into account the mobility, toxicity, and volume of

pollutants. Feasibility studies of cleanup alternatives may include the guidance provided by Subpart E of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300); Section 25356.1(c) of the California Health and Safety Code; CERCLA; the State Water Board's Resolutions Nos. 68-16 and 92-49; and the Water Board Resolution No. 88-160.

SOIL CLEANUP LEVELS

Soil pollution can present a health risk and a threat to water quality. The Water Board sets soil clean-up levels for the unsaturated zone based on these threats. Guidance from the U.S. EPA, DTSC, and OEHHA are considered when determining cleanup levels. Cleanup levels must be protective of human health for existing and likely future land use based on properly adopted land use designations in general plans, zoning, and other mechanisms. In addition, if it is unreasonable to cleanup soils to background concentration levels, the Water Board may:

- Allow residual pollutants to remain in soil at concentrations such that:

Any residual mobile constituents generated would not cause groundwater to exceed applicable groundwater quality objectives, and
Health risks from surface or subsurface exposure are within acceptable guidelines.

- Require follow-up groundwater monitoring to verify that groundwater is not polluted by chemicals remaining in the soil. Follow-up groundwater monitoring may not be required where residual soil pollutants are not expected to impact groundwater.
- Require measures to ensure that soils with residual pollutants are covered and managed to minimize pollution of surface waters and/or exposure to the public.
- Implement applicable provisions of CCR Title 27 where significant amounts of wastes remain on-site. This may include, but is not limited to, subsurface barriers, pollutant immobilization, toxicity reduction, and financial assurances.

In order for a discharger to make site-specific recommendations for soil clean-up levels above background, the fate and transport of leachate can be modeled by the discharger using site-specific factors and appropriate models. Assumptions for minimal leachate dilution, as proposed by the discharger, may be considered by the Water Board if deemed reasonable.

4.25.3 PROGRAM AREAS

Sites with identified pollution problems are managed through five program areas: (1) Spills, Leaks, Investigations, and Cleanups (SLIC) Program; (2) UST Program; (3) Landfill Program, (4) Department of Defense/Department of Energy (DoD/DoE) Program and (5) Above-ground Petroleum Storage Tank Program. Requirements for site investigation and remediation of groundwater under these programs are described in Section 4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure.

4.25.3.1 SPILLS, LEAKS, INVESTIGATION, AND CLEANUP PROGRAM (SLIC)

The SLIC program focuses on unauthorized releases of pollutants to soil, surface water, and groundwater. Sites that are managed within the SLIC program include sites with pollution from recent or historical surface spills, subsurface releases (e.g., pipelines, sumps, etc.), and all other unauthorized discharges that pollute or threaten to pollute surface or groundwater. The SLIC program also includes groundwater cleanup at Brownfields, refineries, and other large industrial

facilities. There is some overlap with the UST program as many SLIC cases also have leaking underground tanks.

The Water Board identified many historical releases in the 1980s. New releases are identified through discharger reports, complaints to the Water Board, the Water Board's own surveillance, "due diligence" reports for proposed property transfer or redevelopment, and local agency reports.

There are variety of different pollutants at SLIC sites, including chlorinated solvents, fuels and non-chlorinated solvents, SVOCs, inorganic constituents and metals, polychlorinated biphenols (PCBs), and pesticides. Persistent and mobile constituents, such as chlorinated solvents, tend to cause more serious pollution problems, while immobile constituents, such as metals, and biodegradable constituents, such as fuels, tend to be less serious. Two other factors can increase case complexity: multiple dischargers on a site (such as a current owner, past owner, and past operator) and commingled groundwater plumes, where contaminants from two or more source sites have merged. In both cases, dischargers may argue against being named in cleanup orders or may demand that other parties be named as well.

The Water Code provides authority for the Water Board to require investigation and cleanup of sites with unauthorized pollutant releases. Water Code Section 13267 allows the Water Board to require technical reports from suspected dischargers. Water Code Section 13304 authorizes the Water Board to issue "cleanup and abatement" orders requiring a discharger to cleanup and abate waste, "where the discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance." The Water Board coined the term "site cleanup requirements" (SCRs) to describe Water Code Section 13304 orders where soil or groundwater cleanup would take many years to complete and the dischargers are cooperating.

The Water Board also complies with any requirements in the state Health and Safety Code and the federal Superfund law for authority at federal Superfund sites where the Water Board is the lead agency.

SLIC COST RECOVERY PROGRAM

Water Code Section 13304 authorizes the Regional Water Boards to recover costs for oversight of site cleanup at sites where a discharge of waste has occurred and that discharge creates, or threatens to create, a condition of pollution or nuisance. The Water Board was instrumental in establishing the State Water Board's SLIC cost recovery program. Cost recovery was initially established in the early 1990s with the agreement of Bay Area petroleum refineries to reimburse the state for oversight of groundwater and soil remediation. Shortly thereafter the State Water Board organized a pilot program to expand the cost recovery program to other SLIC sites. During this period the legislature amended this section of the Water Code to strengthen the ability of the Regional Water Boards to recover staff oversight costs.

In 1993, the State Water Board established a unified SLIC cost recovery program. Program funding came initially from the General Fund but later switched to the State Water Board's Cleanup and Abatement Account (revolving fund mechanism). The net cost of this program to

the state is a small fraction of this amount because dischargers repay almost all of the staff oversight costs.

In general, SLIC sites should be enrolled in the SLIC cost recovery program because there is very limited program funding for oversight of non-cost recovery sites. Exceptions include de minimus sites (e.g., sites where oversight can be completed with minimal staff effort), and under special circumstances (e.g., sites with significant potential threat to human health or water quality where there are limited funds available for remedial action).

FEDERAL SITES

Superfund Sites – The federal Superfund program was created in 1980 when Congress enacted CERCLA, known as Superfund. CERCLA was amended in 1986 with the Superfund Amendments and Reauthorization Act (SARA). The Water Board is the lead regulatory oversight agency for 16 federal Superfund sites in the South Bay. The Superfund program was designed to address the most seriously contaminated hazardous waste sites in the country. The Water Board previously had a U.S. EPA grant to oversee the 16 federal Superfund sites. Currently the sites are all enrolled in the Water Board's cost recovery program and are managed similar to SLIC cases while still ensuring that U.S. EPA's requirements, as defined in the National Contingency Plan, are met. The Water Board has adopted final SCRs for all 16 sites, and all 16 sites have implemented long-term remediation projects.

RCRA Sites – Six sites originally proposed as federal Superfund sites were subsequently dropped because cleanup could be required under Resource Conservation and Recovery Act (RCRA). As with the Superfund sites, the Water Board has adopted final SCRs for all sites in compliance with RCRA requirements, and all six sites have implemented long-term remediation projects. There are also about 20 RCRA “analogous” sites. These are sites where Water Board oversight has included extra steps to assure that oversight is analogous to the state and federal RCRA requirements. The Water Board has adopted SCRs for all “analogous” sites, and most have implemented long-term remediation.

BROWNFIELDS

The Water Board is one of several agencies with a role in the Brownfield cleanup and redevelopment process. Brownfields are properties that are contaminated, or thought to be contaminated, and are underutilized due to perceived remediation costs and liability concerns. The Water Board directly oversees investigation and cleanup at Brownfield sites. Other stakeholders in the process include: local redevelopment agencies (who designate redevelopment areas and often acquire and assist in redevelop of Brownfield sites), local governments (who must approve redevelopment proposals), developers and non-profits (who make redevelopment proposals), lenders, and community members.

BROWNFIELD REGULATIONS

There are several key federal and state environmental laws that have fostered Brownfield development, as described below.

Federal Legislation

The Small Business Liability Relief and Brownfields Revitalization Act (Brownfield Law) signed into law in 2002 contains three subtitles dealing with funding and liability for assessing and cleaning up contaminated properties. Subtitle A codified and expanded U.S. EPA's current Brownfield program by authorizing funding for assessment and cleanup of Brownfield sites. Subtitle B exempted contiguous property owners and prospective purchasers from Superfund liability, and clarified the extent of appropriate environmental inquiry for innocent landowners. "Innocent landowners" are those who hold property with contamination on it, but did not contribute to the pollution. Subtitle C authorized funding for State response programs and limited U.S. EPA's Superfund enforcement authority at sites cleaned up under a State response program.

This law is important because it provides liability relief for innocent landowners and purchasers as long as they meet certain requirements. Many redevelopment deals have stalled previously because there was no clear-cut mechanism for providing liability relief to innocent purchasers who were willing to perform the cleanup, but unwilling to take on the long-term liability associated with the site.

State Legislation

The Polanco Redevelopment Act of 1990 (Polanco) outlines the processes for redevelopment agencies to follow when cleaning up a hazardous substance release in a redevelopment project area. It also provides immunity from liability for redevelopment agencies and subsequent property purchasers for sites cleaned up under a plan approved by the Water Board (or DTSC). The Polanco process has become a widely used tool by redevelopment agencies to guide and pursue redevelopment of Brownfields. Redevelopment agencies requesting approval of their cleanup plans under the provisions of Polanco are required to reimburse oversight costs to the agencies.

The California Land Environmental Restoration and Reuse Act of 2001 was enacted to enable cities and counties to direct or conduct investigation and remediation at Brownfield sites that are outside of redevelopment areas to help return Brownfields to productive uses. It requires Cal/EPA to provide a variety of data related to Brownfield cleanups, and to develop a set of screening values for hazardous substances commonly found at Brownfield sites. A centerpiece of the legislation was its requirement that Cal/EPA develop statewide screening levels, based on environmental screening levels developed at this Water Board (Section 4.25.2.3 Setting Cleanup Levels).

The California Land Reuse and Revitalization Act of 2004 (CLRRA) is intended to bring California into conformity with the federal statutes concerning liability relief for innocent landowners, perspective (bona fide) purchasers, and contiguous property owners in urban areas. It allows for risk-based cleanups at Brownfield sites. Participants who seek immunity must enter into an agreement with the agency that includes the preparation and implementation of a site assessment plan, and if necessary, a response plan. A certificate of completion is issued upon determining that all response actions have been completed in accordance with the agency approval process.

BROWNFIELD GRANTS AND LIABILITY RELIEF TOOLS

Brownfield Grants

The U.S. EPA provides two types of Brownfield grants to states for the purpose of promoting Brownfield redevelopment, and to local agencies and non-profits to jump-start specific Brownfield redevelopment projects. The Water Board has worked closely with several cities in the Region to encourage Brownfield site cleanup and redevelopment, including writing letters of support for project-specific U.S. EPA grants. Between 1996 and 2005, U.S. EPA has awarded Brownfield grants totaling $9 million within the Region. The City of Oakland alone has received over $2 million in grants. Other recipient jurisdictions include: Emeryville, East Palo Alto, Richmond, San Francisco, Livermore, Alameda County, Contra Costa County, San Pablo, Petaluma, San Jose, and Union City.

Cal/EPA's Brownfield Initiative

In 2004, Cal/EPA announced a Brownfield initiative aimed at improving the way Cal/EPA agencies coordinate their regulatory activities at Brownfield sites. The initiative includes an ambitious implementation plan to:

- Foster partnerships with Brownfield stakeholders;
- Develop an inventory of Brownfield sites in California;
- Provide liability relief to Brownfield owners and buyers; and
- Pursue necessary funding and resources for Brownfield cleanup.

The initiative also directed the State Water Board, Regional Water Boards, and DTSC to complete a MOA. The MOA was signed in 2005 and contains the following elements:

- Limit oversight to a single lead agency at any given site;
- Establish procedures for identifying the appropriate lead agency;
- Establish a uniform site assessment procedure to be used by both agencies;
- Require that cleanups address the issues and concerns of both agencies;
- Allow the lead agency to gain the advice and expertise of the other agency as appropriate;
- Ensure ample opportunities for public input and involvement;
- Establish target timeframes for completing investigation and cleanup; and
- Establish regular coordinating meetings.

California State Liability Relief Tools

Several tools are available to municipalities, landowners, developers and responsible parties for seeking relief from contamination liability. Polanco, the California Land Environmental Restoration and Reuse Act, and CLLRA provide liability relief and help redevelopment agencies, cities and counties to guide and pursue redevelopment of Brownfields. Prospective purchaser agreements (PPA) are agreements to protect purchasers from being named as a discharger for pre-existing pollution. The buyer must provide something in return, such as an agreement to provide reasonable access for site cleanup and monitoring.

The Water Board may issue “comfort letters” to buyers of polluted property or owners of off-site properties affected by migrating groundwater pollution to mollify buyers or lenders about the potential liability they face. Letters to offsite owners typically promise not to enforce against them as long as they provide reasonable access. Letters to onsite buyers typically promise not to enforce against them as long as they provide reasonable access and the current responsible parties continue to perform necessary cleanup work.

4.25.3.2 UNDERGROUND STORAGE TANK PROGRAM

A UST is defined by law as "any one or combination of tanks, including pipes connected thereto, that is used for the storage of hazardous substances and that is substantially or totally beneath the surface of the ground" (certain exceptions apply). The purpose of the UST Program is to protect public health and safety and the environment from releases of petroleum and other hazardous substances from tanks. State regulations regarding underground tank construction, monitoring, repair, closure, release reporting, and corrective action are contained within CCR Title 23, Chapter 16.

Implementation of the UST Program is unique, as the Health and Safety Code Division 20, Chapters 6.7 and 6.75, gives local agencies the authority to oversee investigation and cleanup of UST leak sites. The Corrective Action regulations (CCR, Title 23, Chapter 16, Article 11) use the term "regulatory agency" in recognition of the fact that local agencies have the option to oversee site investigation and cleanup, in addition to their statutory mandate to oversee leak reporting and tank closure.

Some local agencies also provide oversight for underground fuel storage tank cases under a Local Oversight Program (LOP) contract with the State Water Board. Most oversight charges are billed to responsible parties. Some LOPs, known as Local Implementing Agencies (LIAs), have independent authority under UST laws to require investigations and cleanup. The Water Board still retains its Water Code authority to approve case closure. However, the Water Board has authorized a few local agencies to close fuel leak cases where groundwater has not been polluted, and future groundwater impacts are not expected.

Additionally, a few other local agencies have funded their own (non-LOP) oversight programs and have developed guidance documents based upon State and Regional Water Board guidance. In many areas throughout the Region the local agency has opted not to assume the lead position for fuel leak cases. Consequently, the Water Board is the lead agency for fuel leak sites in those areas.

CASE DETERMINATION

Certified Unified Permitting Agencies (CUPAs) permit and regulate UST operations including leak prevention and inspections. When a release occurs, the Water Board is generally notified of the release via a copy of an Unauthorized Release Form (URF). This form is tailored so as its notification hierarchy complies with Proposition 65 notification requirements.

If the release is fuel based, and the CUPA happens to also be an LOP agency or an agency that has an agreement with the Water Board for fuel UST cleanup oversight, it will oversee cleanup

operations from that point. All of this Region's LOP agencies are part of a CUPA. The same holds true in the case of our LIA agencies, with the exception of the Alameda County Water District (ACWD).

If the release is solvent based, the Water Board will provide oversight for cleanup. Exceptions may be found for those situations for which DTSC is the lead agency because the tank is on a site that is under DTSC lead, such as the solvent UST being located within a RCRA site, or by mutual agency agreement.

WATER BOARD LEAD UST SITES

The Water Board oversees cases for all of Contra Costa County, Marin County, and various cases within the LOP and LIA jurisdictions.

The Water Board having the lead in UST cases is the result of one or more of the following: 1) solvents or solvents commingled with fuels are the pollutant of concern; 2) the petroleum discharge is from something other than a UST under the Local Oversight Program or not necessarily under UST regulation such as sumps, spills, or agricultural tanks; 3) complex technical or policy issues; 4) conflict of interest issues in which the local agency is the responsible party, there is inappropriate political pressure on the case, or for which the agency requests Water Board lead; 5) cases given to the Water Board as part of the Site Designation Process (AB 2061); 6) the local agency is unable, unwilling, and/or unavailable to provide proper oversight; 7) part of the site is within a larger facility currently under Water Board oversight; and 8) historical precedent.

Local Oversight Program (LOP) Agencies

Although the LOP agency contracts with the State Water Board, the Water Board provides technical guidance and enforcement support as needed. Upon determination by the LOP agency that a case is ready for closure, the LOP agency submits a closure package to Water Board for review. If the Water Board concurs or fails to act within 30 days, the closure is deemed approved and the LOP agency issues the closure letter.

The following agencies are LOPs in the Region, as of 2005:

- Alameda County Health Care Services, Department of Environmental Health
- Napa County Department of Environmental Management
- San Francisco Department of Public Health, Bureau of Environmental Health Management
- San Mateo County Department of Health Services, Office of Environmental Health
- Santa Clara County Department of Environmental Health
- Solano County Department of Environmental Management
- Sonoma County Department of Health Services, Environmental Health Division

Local Implementing Agencies (LIAs)

The Water Board provides technical and enforcement assistance to the LIAs, as necessary. However, these agencies essentially perform the same technical oversight duties (report requests, report review, etc.) that the Water Board would be expected to perform when overseeing case cleanups.

As part of this Region's case closure protocol with the LIA agencies, the Water Board reviews the LIA's case closure recommendation and case closure summary package (although in some cases the Water Board may prepare the summary package for the agency). If the Water Board concurs with the agency's recommendation, the Water Board issues the closure letter.

The following agencies are LIAs in the Region, as of 2005:

- Alameda County Water District
- City of Berkeley Toxics Management Program
- City of Hayward Fire Department
- City of San Leandro

UST PROGRAM BACKGROUND

In 1995, the State Water Board commissioned the Lawrence Livermore National Laboratory (LLNL) and the University of California to conduct a review of the regulatory framework and cleanup process applied to LUFTs. The study titled, "Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks (LUFTs)" concluded that fuel hydrocarbons have limited impact on human health, the environment, or California's groundwater resources, and recommended applying a modified ASTM risk-based corrective action (RBCA) process for closing leaking UST sites (ASTM E1739-95, 2002). A risk-based approach to leaking UST cleanups has been widely applied following this recommendation.

In the mid 1990's, methyl tert-butyl ether (MtBE) was recognized as a major threat to groundwater resources. MtBE had been added to gasoline sold in California since 1979 until January 1, 2004, first as an octane booster, and later as an oxygenate comprising up to 11 percent by volume. MtBE prioritization guidelines were developed based on a risk-based approach, and the expedited site assessment has been used to cleanup high threat MtBE sites (Expedited Site Assessment Tools for UST Sites (EPA 510-B-97-001, 1997)).

In 1998, the State Water Board commissioned LLNL to study the impacts of MtBE on groundwater in California. LLNL concluded that MtBE is a frequent and widespread contaminant in shallow groundwater throughout California and that MtBE plumes are more mobile than benzene, toluene, ethylbenzene, and xylenes (BTEX) plumes (An Evaluation of MTBE Impacts to California Groundwater Resources, 1998). Guidelines were developed by the State Water Board for investigation and cleanup of MtBE and other ether-based oxygenates (Guidelines for Investigation and Cleanup of MtBE and Other Ether-Based Oxygenates, 2001).

Since 1998 several studies have been conducted that evaluated the occurrence of MtBE releases at UST sites. These studies indicated that effectiveness of the existing UST leak detection systems has been limited, and that MtBE has impacted the majority of the UST sites (Report on MtBE Monitoring at Operating UST Facilities in Santa Clara County, 2004).

UST CLEANUP FUND

Federal and state laws require every owner and operator of a petroleum UST to maintain financial responsibility to pay for any damages arising from their tank operations. The Barry Keene Underground Storage Tank Cleanup Fund Act of 1989 (Cleanup Fund) was created by the California Legislature, and is administered by the State Water Board, to provide a means for petroleum UST owners and operators to meet the federal and state requirements. The Cleanup Fund also assists a large number of small businesses and individuals by providing reimbursement for unexpected and catastrophic expenses associated with the cleanup of leaking petroleum USTs.

If a leak occurs, responsible parties or their representative must notify the appropriate Water Board or county agency and submit an unauthorized release form (URF). The Cleanup Fund can only reimburse costs after the site investigation and cleanup of the tank release has been reported to the Water Board or county regulatory agency.

4.25.3.3 LANDFILL PROGRAM

Discharges of solid, semisolid, and liquid wastes to landfills, waste piles, surface impoundments, and land treatment facilities can create sources of pollution affecting the quality of waters of the state. Low-concentration liquid waste discharges can be assimilated by receiving waters, if the concentration of pollutants in the waste is regulated (i.e., treated wastewater from municipal or industrial facilities). Conversely, discharges of wastes to waste management units require long-term containment or active treatment in order to prevent waste or waste constituents from migrating to and impairing the beneficial uses of waters of the state. Pollutants from such discharges may continue to affect water quality long after the discharger has stopped discharging new wastes at a site, either because of undetermined releases from the site or because pollutants from the site have accumulated in underlying soils and are migrating to groundwater.

Landfills for disposal of municipal or industrial solid waste (solid waste disposal sites) are the major categories of waste management units located in the Region. The Water Board issues WDRs to ensure that these discharges are properly contained to protect the Region's water resources from degradation and to ensure that the dischargers undertake effective monitoring to verify continued compliance with requirements.

These discharges, and the waste management units at which the wastes are discharged, are subject to concurrent regulation by other state and local agencies responsible for land-use planning, solid waste management, and hazardous waste management. Local enforcement agencies (LEAs) implement the state's solid waste management laws and local ordinances governing the siting, design, and operation of solid waste disposal facilities (usually landfills) with the concurrence of the California Integrated Waste Management Board (CIWMB). The CIWMB also has direct responsibility for review and approval of plans for closure and post-closure maintenance of solid waste landfills. DTSC issues permits for all hazardous waste. The State Water Board, Regional Water Boards, the CIWMB, and DTSC have entered into a Memorandum of Understanding to coordinate their respective roles in the concurrent regulation of these discharges.

Oversight costs for sites in the landfill program at the Water Board and CIWMB are primarily funded through waste discharge permit fees and landfill waste tipping fees.

The Water Board regulates landfills receiving municipal solid wastes (MSW) and facilities receiving classified, nonhazardous, and industrial wastes of various types. Figure 4-6 shows the active and inactive municipal solid waste landfill sites within the Region as of 2005. The Water Board regulates these sites closely, but the required monitoring has revealed water quality problems at some sites that the respective owners or operators are addressing through appropriate remedial measures. As a result of federal laws in the area of hazardous waste regulation, more effort is being devoted to regulation of the onsite treatment, storage, and disposal of hazardous waste.

WASTE REGULATIONS

In 1997, the State revised and strengthened the laws and regulations governing the discharges of both hazardous and nonhazardous solid waste. The primary purpose of the regulations is to: 1) assure the protection of human health and the environment, 2) ensure waste is properly contained or cleaned-up as appropriate, and 3) protect surface water and groundwater from the discharge of waste to land. The primary regulation used by the Water Board in regulating nonhazardous waste treatment, storage, and disposal is the combined State Water Board and CIWMB regulations contained in CCR Title 27, Division 2 of the Solid Waste Regulations, formerly CCR Title 23, Division 3, Chapter 15. Title 27 includes very specific siting, construction, monitoring, and closure requirements for all existing and new nonhazardous waste treatment, storage, and disposal facilities. Title 27 also contains a provision requiring operators to provide assurances of financial responsibility for: landfill closure activities; post closure monitoring and maintenance; and corrective action for landfill releases. Title 27 establishes detailed technical criteria for establishing water quality protection standards, monitoring programs, and corrective action programs for releases from waste management units.

Title 27 defines three types of nonhazardous waste: 1) designated wastes; 2) nonhazardous solid waste; and 3) inert waste, as described below.

Unlike other waste classifications, designated waste is defined in Water Code Section 13173 (and in Title 27) as follows:

"Designated waste," means either of the following:

Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.
Nonhazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

Title 27 Section 20220 defines nonhazardous solid waste as waste normally associated with domestic, agricultural, and commercial activities. In addition to the regulations under Title 27, landfills that receive nonhazardous solid waste are subject to the State Water Board's special

regulations for municipal solid waste landfills (State Water Board Resolution No. 93-62), which adapt federal municipal solid waste landfill standards to the state's landfill regulation scheme.

Title 27 Section 20230 defines inert waste as that subset of nonhazardous solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste. The Water Board regulates inert waste landfills outside of its Title 27 authority and only to the extent necessary to protect water quality from siltation and other indirect effects.

The Water Board regulates discharges of designated waste and nonhazardous solid waste pursuant to the regulations in Title 27; regulates discharges of municipal solid waste pursuant to both the Title 27 regulations and State Water Board Resolution No. 93-62; and regulates discharges of inert wastes only as necessary to protect water quality (e.g., to prevent sediment discharges to surface waters or to assure that such relatively unregulated units receive only inert waste).

Hazardous waste is defined by DTSC in CCR Title 22, Division 4.5, Chapter 11. Disposal of hazardous waste and hazardous waste sites located in the Region are regulated by DTSC.

The Water Board has been regulating nonhazardous solid waste facilities since the mid-1970's, and in some instances since to the early 1950's. Many of the small, older facilities have closed, and waste is now being disposed of at large regional nonhazardous solid waste facilities. The Water Board reviews and revises WDRs at active nonhazardous waste sites, and at closed sites, and assures consistency with the current regulations. These actions include defining the levels of designated wastes (see below), requiring the discharger to establish and operate groundwater monitoring systems capable of identifying whether water quality objectives are being violated, establishing corrective evaluation monitoring (investigation) and corrective action programs where standards are violated, and reviewing and overseeing the development and implementation of facility closure plans. Active landfills are also subject to construction and industrial stormwater NPDES permit requirements (Section 4.14 Urban Runoff Management).

To implement Title 27 at nonhazardous solid waste facilities, the Water Board must define designated wastes. Many wastes which are not hazardous still contain constituents of water quality concern that could become soluble in a nonhazardous solid waste facility and produce leachates and gases that could pose a threat to beneficial uses of state waters. Furthermore, a waste (e.g., salty solids) that might be a designated waste at a landfill that overlies potable water would not be a designated waste at one that overlies groundwater with non-potable water at comparable concentrations (i.e., salty solids are not a threat to salty groundwater).

The criteria for determining if a nonhazardous waste is a designated waste are based on water quality objectives in the vicinity of the site, the containment features of the solid waste facility, and the solubility/mobility of the waste constituents. Therefore, all owners and operators of active nonhazardous municipal solid waste facilities in the Region who wish to receive wastes other than municipal solid waste or inert wastes must propose waste constituent concentration criteria above which wastes will be considered designated waste and therefore, not suitable for disposal at their site. In determining whether a nonhazardous waste is designated waste, the Water Board will consider all relevant and scientifically valid evidence, including relevant and

scientifically valid numerical criteria and guidelines developed and/or published by other sources, such as the Central Valley Water Board's report, "Designated Level Methodology for Waste Classification and Cleanup Level Determination," or an equivalent methodology acceptable to the Executive Officer.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

The state implements federally authorized regulations that are equivalent to those promulgated by the U.S. EPA under Subtitle C of RCRA -- Hazardous Waste Regulations for Treatment, Storage, and Disposal. In 1992, U.S. EPA formally delegated RCRA Subtitle C program implementation authority to DTSC. As described above, regulation of hazardous waste discharges is also included in CCR Title 23, Chapter 15. Chapter 15 monitoring requirements were amended in 1997 to be equivalent to RCRA requirements in regard to the discharge of hazardous waste to land.

The U.S. EPA promulgated federal regulations, as required by Subtitle D of the federal RCRA statute, applicable to municipal solid waste landfills (40 CFR 257 and 258). These regulations are self-implementing. The CIWMB and the State Water Board are jointly responsible for implementing the state program, which the U.S. EPA has approved as being equivalent. The Regional Water Boards implement the water quality aspects of the state program. The LEAs and the CIWMB implement the public health and safety aspects of the state program.

TOXIC PITS CLEANUP ACT

The Toxic Pits Cleanup Act of 1984 (TPCA) required that all impoundments containing liquid hazardous wastes or free liquids containing hazardous waste be retrofitted with a liner/leachate collection system or be dried out by July 1, 1988, and subsequently closed. In 1985, there were 26 sites in the Region with ponds subject to TPCA. As of 2005, one site is permitted to operate its ponds under TPCA's exemption requirement but is not accepting waste and is seeking closure. The remaining 25 sites have been closed.

BAYFRONT LANDFILL EXPANSIONS INTO WETLANDS

A significant issue that the Water Board has addressed is the expansion of existing Bayfront landfills into wetland areas. The Water Board, in a few cases, allowed modest expansions (and undesirable loss of wetlands) to allow local governments time to develop other disposal options. However, these expansions were only approved because there was a demonstrated immediate public need. One expansion permit was appealed to the State Water Board, which clearly indicated that the Water Board should disapprove future such expansions into wetlands, and that local governments must complete the necessary planning to avoid this problem. Given the State Water Board’s position and the wetland provisions contained elsewhere in this Basin Plan, the Water Board will not approve further expansions of Bayfront landfills into wetlands.

4.25.3.4 DEPARTMENT OF DEFENSE AND DEPARTMENT OF ENERGY PROGRAM

The goal of the DoD/DoE program is the investigation and cleanup of pollution at federal military sites. DoD sites include active and inactive military bases and formerly utilized defense

(FUDs) sites. DoE sites include active federal energy agency sites. DoD and DoE sites in the Region as of 2005 are shown on Figure 4-7. An adjunct to cleanup, particularly with respect to DoD sites, is the return of these sites to productive, civilian use.

Investigation and cleanup at these sites follows the CERCLA process. For DoD sites, the DoD has elected to follow the CERCLA process even if the sites are not listed as "Superfund" sites. This process follows a rigorous sequence of document preparation and agency approvals including completion of the formal Preliminary Assessment, Site Investigation, Remedial Investigation, and Feasibility Study, all leading to a Record of Decision (ROD) on an acceptable Remedial Action Plan (RAP).

Groundwater cleanup must also adhere to the requirements of the Basin Plan and existing state law (the Water Code), relevant regulations (e.g., Title 27; Title 23, Chapter 16, etc.), and policies set forth by State Water Board Resolution Nos. 68-16, 88-63, and 92-49.

Under the Base Realignment and Closure Act of 1990 (amended 2005), the DoD has been conducting environmental investigation and cleanup at each of these sites with oversight from the Water Board and other agencies. There is considerable state and federal interest in moving these latter types of DoD sites into economically productive uses, in part to offset the negative economic impact of base closures on the local community or to invigorate the often depressed economies of local communities located near these sites. Progress has been slow in many cases due to competition for limited DoD cleanup funds, the complexities of the sites themselves, and uncertainty about the planned reuse. Cities have recently been pursuing "early transfers" that allow them to receive the military property prior to completion of cleanup. Local governments have contracted with developers and environmental firms to perform an integrated cleanup and redevelopment.

Closed military bases that are transferred to a local entity before the cleanup is complete may be subject to a land use covenant (LUC) issued by the Water Board to ensure the site cleanup is completed. The Water Board may issue SCRs per Water Code Section 13304 to allow investigation and cleanup after the military property is transferred. For additional regulatory tools, see Section 4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure.

For the DoE program, all of the sites currently within the Region are active and are not expected to fall within public hands for the foreseeable future. Cleanup is ongoing at these sites. Contamination generally consists of discharges of solvents, petroleum hydrocarbons, PCBs, and/or metals to both soil and groundwater. In some cases, radionuclides have also been released. DoE has regulatory authority over radionuclide discharges, although the Water Board provides input into the investigation and cleanup activities related to them.

Federal funding for both the DoD and DoE programs covers all costs associated with Water Board and State Water Board staff oversight. The state signed a Cooperative Agreement with the Department of Defense (Defense-State Memorandum of Agreement, DSMOA)). In the Cooperative Agreement, DTSC acts as the state's agent. Both the State Water Board and the Regional Water Boards coordinate with DTSC to allocate agency responsibility and funding and establish procedures under which site investigation and cleanup will proceed, decisions will be

made, and disputes will be resolved. For the DoE program, a grant has been established which describes and funds Water Board oversight at DoE sites.

4.25.3.5 ABOVEGROUND PETROLEUM STORAGE ACT

The state's Aboveground Petroleum Storage Act was enacted in 1989 and amended in 1991. The Act became effective on January 1, 1990.

The purpose of this Act is to protect the public and the environment from the serious threat of spillage of millions of gallons of petroleum-derived chemicals stored in thousands of aboveground storage tanks. The Act requires that the Water Board inspect aboveground petroleum storage tanks used for crude oil and its fractions for their compliance with the federally required Spill Prevention, Control, and Countermeasure Plan (SPCCP). In the event that a release occurs that threatens surface or groundwater, the Act allows the state to recover reasonable costs incurred in the oversight and regulation of the cleanup. The Water Board oversees sites where releases from aboveground storage tanks have impacted groundwater under the SLIC cost recovery program.

4.25.4 GROUNDWATER PROTECTION STUDIES

The intimate ties among the land, surface water, groundwater, the Estuary, and human activity must be acknowledged in order to promote wise, balanced, and sustainable use of water resources. In this regard, the Water Board will encourage planning and management by supplying tools and information that will provide an integrated environmental management approach to problem solving. It also must be recognized that groundwater quality and quantity are inextricably linked. Because an informed and involved citizenry is crucial to realizing groundwater protection, policies and plans should encourage and promote research, education, and public involvement as an integral part of any protection program.

4.25.4.1 GROUNDWATER PROTECTION AND BENEFICIAL USE STUDIES

Water Board staff, with contributions from local agencies, evaluated existing groundwater protection programs and beneficial uses of groundwater in the Napa River Watershed (1996), San Francisco and Northern San Mateo Counties (1996), East Bay Plain, Alameda and Contra Costa Counties (1999), and South San Francisco Bay Basin, Alameda, San Mateo, and Santa Clara Counties (2003). Extensive research was conducted and numerous references were compiled to prepare these groundwater studies. In general, each study included the following goals:

- Describe the hydrogeology and groundwater use for the groundwater basins;
- Identify major threats to groundwater and groundwater protection programs;
- Identify locations where groundwater is vulnerable to contamination;
- Identify locations where groundwater monitoring is needed;
- Use GIS to compile complex data sets to use as a decision-making tool for groundwater protection;
- Refine beneficial use designations for some groundwater basins;
- Identify inactive well locations;
- Describe groundwater extraction for municipal, agricultural, and industrial water supply;

- Summarize statewide initiatives for groundwater protection and data sharing; and
- Evaluate special problem areas that are typically not addressed by groundwater protection programs.

The results of these groundwater protection studies identified several key groundwater protection issues that are summarized in Section 4.26 Emerging Program Areas. The reports are available at the Water Board website.

4.25.4.2 STATE WATER BOARD GROUNDWATER PROTECTION PLANNING CONTRACT

At the Water Board's request, the State Water Board funded a contract with the University of California at Berkeley to develop a regional groundwater protection plan. The project focused on several significant groundwater basins: Santa Clara Valley, Niles Cone, Livermore Valley, San Mateo Plain, and Half Moon Bay Terrace (Table 2-2). The vulnerability to pollution of each of the basins was determined using the U.S. EPA's DRASTIC Index Method (U.S. EPA Project No. 600/2-87-035, April 1987) on a GIS. The project was completed in 1994 by the Center for Environmental Design Research, University of California at Berkeley.

4.25.4.3 INTEGRATED ENVIRONMENTAL MANAGEMENT PROJECT

In 1987, the U.S. EPA completed the Integrated Environmental Management Plan (IEMP). This innovative study conducted in Santa Clara County sought to improve public health and environmental protection by integrating approaches for hazardous material management for land, air, and water. The IEMP's Drinking Water Subcommittee developed recommendations to address the question “How clean is clean?” The committee wrote, ".... because contamination and clean-up impacts vary significantly in different sites and different hydrogeologic zones, the Water Board should continue to develop and standardize a process for clean-up decision making, rather than establish across-the-board clean-up levels." The recommendations from this study were applied to developing site-specific cleanup levels.

4.25.4.4 GROUNDWATER RESOURCE STUDY

A basin-wide approach for implementing and prioritizing groundwater cleanup was recommended in a series of reports titled "San Francisco Bay Region Groundwater Resource Study" (1987). The reports were a cooperative effort by the Water Board and the University of California at Berkeley, School of Public Health, and Department of Landscape Architecture. The ten volume series covered eight high priority groundwater basins: Niles Cone, Livermore and Sunol Valley, Ygnacio/Pittsburg/Clayton/San Ramon Basins, Suisun/Fairfield Basin, Napa Valley, Sonoma Valley, and San Mateo Basin. The Water Board used the results of this study to prioritize its workload in addressing polluted sites.

4.25.4.5 SHALLOW DRAINAGE WELLS

The California Water Code, Section 13710, defines the term "well" or "water well" to mean any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. The definition does not include (a) oil, gas, and geothermal wells, or (b) construction dewatering wells and hillside stabilization dewatering wells. Therefore, all shallow drainage wells (also known as dry wells, infiltration basins, and

shallow injection wells) used for the purpose of disposing of stormwater or surface runoff are covered under this definition. The purpose of this Basin Plan section is to clarify the Water Board's position in regard to the construction, usage, and regulatory permitting aspects of shallow drainage wells.

In 1951, the Water Board adopted Resolution No. 81, "Statement of Policy on Sewer and Drainage Wells", which is incorporated by reference into this plan. This resolution states that the Water Board disapproves of the construction and use of wells for disposal of effluent from septic tanks and surface runoff from streets and highways except where such wells discharge into a formation that at no time will contain groundwater fit for domestic, agricultural, or industrial use. At the same time, the Water Board recognized that these wells already existed in the Region and that immediate abandonment may be impractical. Therefore no new installations were to be permitted, more satisfactory drainage methods were to be substituted for existing installations at the earliest practicable date, and the Water Board was to consider the matter of prescribing requirements for the discharge in granting any exceptions to the prohibition. After review of Water Board files, it does not appear as if any exceptions to the resolution were officially granted.

The Federal Underground Injection Control Program was established in 1984 with the adoption of the Safe Drinking Water Act. In California, the U. S. EPA is the lead agency in charge of administering the program. Under this program, wells used to dispose of surface water runoff are classified as Class V injection wells. The owner or operator of any existing Class V well is required to submit information on each well, including the nature and type of discharge and operating status. U.S. EPA is conducting a well inventory statewide to identify Class V wells.

There are a number of applicable state regulations pertaining to the construction and use of shallow drainage wells. AB2182 (Chapter 1131, Section 4458) of the California Health and Safety Code, passed in 1961, prohibits the use of drainage wells for the disposal of sewer water unless authorized by the Water Board. The Water Code (Chapter 10, Sections 13700 – 13806) defines the terms "well" and "water well" and states that any person who intends to dig, bore, or drill such a well must file a notice of intent with DWR or the designated local enforcement agency. A detailed report of completion must then be filed after construction. If the Water Board finds that standards of water well construction, maintenance, abandonment, and destruction are needed in any area to protect beneficial uses of groundwater, it shall determine the area to be involved and so report to each affected county and city in the area. Each such affected county shall, within 120 days of receipt of the report, adopt an ordinance establishing standards of water well construction, maintenance, abandonment, and destruction for the designated area. To date, standards and siting criteria for shallow drainage wells are non-existent in the Region and subsequently not included in the well-permitting process.

The Water Board issues NPDES permits for stormwater discharges to surface water for certain industrial and construction activities and to the larger municipalities in the Region (Section 4.14 Urban Runoff Management). The permits require the implementation of control measures to reduce pollutant loading, along with water quality monitoring to assure that the waters being discharged will not impact the beneficial uses of receiving waters. The discharge of industrial waste into the sanitary sewer system is now closely regulated under a pretreatment program. Likewise, the discharge of stormwater to the subsurface must also be regulated to assure the protection of groundwater supplies. Standards for shallow drainage well construction,

maintenance, abandonment, destruction and siting criteria are needed throughout the Region. Land-use decisions, such as stormwater structural controls and well construction permitting, are most often made by local government agencies, including water districts, planning, and building departments. Many of these agencies are not aware of the Water Board's Resolution No. 81, or the rationale behind it.

GOAL

The goal of the Shallow Drainage Program is to eliminate the unregulated construction and use of shallow drainage wells in areas where municipal, domestic, agricultural, and industrial groundwater supplies are threatened.

This goal is to be attained by a coordinated effort on the part of U.S. EPA, the Water Board, DWR, and local government agencies to implement a shallow drainage well control program.

PROGRAM

The Water Board prohibits the unauthorized construction and use of shallow drainage wells. The shallow drainage well control program shall consist of two main elements: 1) locating existing wells; and 2) regulating the construction and use of existing and new wells.

Locating existing wells
U.S. EPA, the Water Board, and local government agencies will need to work together to identify all existing shallow drainage wells.
Regulating existing wells and new wells
Continued use of existing wells or construction of new wells may be authorized by a local enforcing agency through its well-permitting process. The Water Board will work with DWR and each city, county, and local water supply and flood control agency on developing standards for adoption by ordinance for the construction, maintenance, abandonment, and destruction of shallow drainage wells. Additionally, it must be demonstrated that the use of the well will not result in a discharge that may pose a threat to municipal, domestic, agricultural, and industrial groundwater supplies. If this cannot be adequately demonstrated, the well must be permanently closed. Closure of each well must be done in compliance with U.S. EPA Class V injection well closure guidelines and applicable local agency guidelines or regulations.

4.26 EMERGING PROGRAM AREAS

There are several aspects of protecting beneficial uses associated with aquatic systems and groundwater protection that have emerged as critical issues in recent years. This section presents a prospective view of emerging program areas that have increasingly become the focus of Water Board activity. Each involves both an integration of approaches used in current Water Board programs as well as innovative solutions.

4.26.1 WETLAND RESTORATION

As documented in the Habitat Goals reports, a large percentage of historic tidal marsh and mudflats around the Estuary have been diked, drained, and/or filled to serve various human

purposes. Current planning efforts by multiple agencies recognize the importance of restoring wetland functions to the Estuary to protect and enhance beneficial uses. The Estuary Project's Comprehensive Conservation and Management Plan (June 1994) proposes several goals for wetland management in the Estuary, and recommends large-scale restoration of salt ponds and other former wetlands in order to support sustainable populations of fish and wildlife as well as other benefits associated with wetlands. The Habitat Goals reports provide guidance to the Water Board and indicates where wetland restoration potential exists around the Estuary.

The Water Board participates in a number of wetland restoration projects in the Region, both in a regulatory role regarding proposed wetland fill and/or discharges, and in the role of an interested party or stakeholder, recognizing the multiple benefits of wetland restoration for water quality and beneficial uses. Major restoration projects underway include former salt ponds adjacent to South San Francisco Bay and San Pablo Bay, former DoD sites such as Hamilton Field in Marin County, and the Bair Island Ecological Reserve in South San Francisco Bay. While these projects are expected to have a positive impact on water quality and beneficial uses, certain challenges must be addressed, such as minimizing uptake of mercury into the food web, meeting water quality objectives for salinity and dissolved oxygen in discharges from ponds (impounded bay waters), protecting existing tidal mudflats, and controlling harmful invasive species such as Spartina alterniflora cordgrass and its hybrids.

4.26.2 DESALINATION

San Francisco Bay has only recently been identified as a potential drinking water source, and this has become an emerging program area for the Water Board. Producing drinking water from saltwater results in a concentrated brine stream that must be managed to protect water quality. In the late 1990s, some water supply agencies in the Region began investigating the feasibility of producing drinking water from the Estuary using desalination technology. As of 2005, several sites are being screened for potential desalination facilities by various agencies, and in 2005 the Water Board issued an NPDES permit to one pilot plant for the Marin Municipal Water District in the City of San Rafael.

Desalination plants are in operation throughout the world, with facilities most common in the Middle East, the Caribbean and Florida. To date, only a limited number of desalination plants have been built along the California coast, primarily because the cost of desalination is generally higher than the costs of other water supply alternatives available in California (e.g., water transfers and groundwater pumping). However, as drought conditions occur and concern over water availability increases, desalination projects are being proposed at numerous locations in the state.

Desalination plants produce liquid wastes that may contain all or some of the following constituents: high salt concentrations, chemicals used to clean plant equipment and used during pretreatment, and toxic metals (which are most likely to be present if the discharge water was in contact with metallic materials used in construction of the plant facilities). Potential alternatives for disposal of liquid waste include discharge into waters of the state, combination with other discharges (e.g., power plant cooling water or sewage treatment plant effluent) before discharge, discharge into a sewer for treatment in a sewage treatment plant, or drying and disposal in a landfill. Desalination plants also produce a small amount of solid waste (e.g., spent pretreatment filters and solid particles that are filtered out in the pretreatment process).

If water supply agencies implement desalination to augment supplies along with waste management practices that protect beneficial uses, the Water Board will consider amending the Basin Plan to designate the municipal and domestic supply (MUN) beneficial use for applicable marine or estuarine areas of the Region.

4.26.3 EMERGING TOXIC POLLUTANTS OF CONCERN

As noted in Section 4.1.2.1 Numeric Water Quality Objectives, Wasteload Allocations, there are pollutants of local concern for which water quality objectives have not been developed and adopted. Both regulatory and research surveillance programs periodically detect pollutants that are persisting in the aquatic environment, which may or may not have published guidelines for protecting beneficial uses. Such pollutants may be inducing toxicity or exhibiting bioaccumulation in the food web. The Regional Monitoring Program for the San Francisco Bay, described in Section 6.1 Regional Monitoring Program, includes studies to anticipate potential water quality problems by identifying previously unmonitored and/or unknown pollutants. It is through such efforts that the potential pollutant problems of the future can be identified and addressed before they become environmentally and economically costly "legacy" pollutants, such as mercury, PCBs, and chlorinated pesticides such as dichloro-diphenyl-trichloroethane (DDT). Absent regulatory objectives or published guidelines, the Water Board will encourage source identification and control of pollutants found in the Region's waters that exhibit characteristics of concern, such as detectable and/or increasing levels in tissues of the Estuary's organisms, as in the case of polybrominated diphenyl ethers (PBDEs). The Water Board will establish water quality objectives for selected pollutants as the necessary technical information becomes available.

Groundwater quality has been impacted by several emerging contaminants and by previously known contaminants that have undergone increased regulatory concern. Emerging contaminants, including N-nitrosodimethylamine (NDMA), disinfection byproducts such as trihalomethanes, haloacetic acids, bromate, and chlorite, endocrine disruptors, and pharmaceutically active compounds, may be present in sanitary wastewater, recycled water, imported water, and any other water source that receives sanitary wastewater. Emerging contaminants may pose a threat to groundwater quality when such waters are used for artificial recharge or are otherwise intentionally infiltrated. Other contaminants of concern affecting groundwater quality that are of concern include nitrate, total dissolved solids, perchlorate, solvent stabilizers (such as 1,4-dioxane), arsenic, and hexavalent chromium.

4.26.4 GROUNDWATER PROTECTION ISSUES

Groundwater protection studies conducted by Water Board staff identified several key groundwater protection issues and are summarized below.

4.26.4.1 VERTICAL CONDUITS

Vertical conduits can provide pathways for the migration of surface pollution or shallow groundwater pollution into deeper water bearing zones. Pollutants that enter groundwater through vertical conduits circumvent the natural migration process, which protects groundwater by filtering and other natural attenuation processes. Numerous agricultural and domestic wells installed in the Region have been abandoned or covered by subsequent development.

Identification and proper destruction of these potential conduits is critical to include in any groundwater protection program.

4.26.4.2 HORIZONTAL CONDUITS/SANITARY SEWER LEAKS TO GROUNDWATER

Horizontal conduits also serve to spread contamination by providing preferential pathways for migration of contaminants and contaminated groundwater. Storm drain systems and their construction backfill can be significant pathways for migration of contaminated shallow groundwater to water bodies where the storm drains discharge. Similar protocols should be followed for investigating horizontal conduits as for vertical conduits. A horizontal conduit study should be conducted at all sites where releases of toxic or hazardous materials are documented and before development or new construction begins at sites where toxic or hazardous materials have been used or stored. This is particularly important at or near dry cleaners or other operations where chlorinated solvents have been used.

Sanitary sewer lines may also allow pollutants to migrate to groundwater. Exfiltration is leakage from sanitary sewer lines into the subsurface and, in most cases, into surrounding groundwater. This phenomenon usually occurs in areas where the water table is below the sewer line. Leaking sewer lines can introduce pathogens into surrounding groundwater. Of more significance are chemicals transported in sewer lines that are released and migrate to and affect both shallow and deeper aquifers. The most significant historical impacts of leaking sewer lines are often associated with dry cleaning operations and the use of chlorinated solvents in electronics industries, such as wafer fabricators, plating shops, and printed circuit board shops.

4.26.4.3 GROUNDWATER SURFACE WATER INTERACTIONS

Nearly all surface water features (streams, lakes, reservoirs, wetlands, and estuaries) interact with groundwater. Several issues have been identified that simultaneously affect the quality and quantity of surface water and groundwater due to the dynamic relationship between the two. The effects of these issues on water quality and quantity must be understood in order to develop effective water resource management strategies. These issues include the effect of surface water diversion and groundwater withdrawal on creek and riparian habitat, water quality, surface water infiltration to groundwater (e.g., recharge and stormwater infiltration), groundwater discharge to surface water (e.g., plume discharges), and changing land use (as it affects runoff and recharge).

4.26.4.4 SALTWATER INTRUSION

Saltwater from San Francisco Bay and adjacent salt ponds has intruded freshwater-bearing aquifers in the Niles Cone, Santa Clara Valley, and San Mateo Plain basins. In both the Niles Cone and Santa Clara Valley basins, local agencies have implemented measures to prevent saltwater intrusion. The threat of saltwater intrusion in the Niles Cone is primarily due to the basin's proximity to San Francisco Bay and the large system of salt ponds that operate along the Bay's margin. In Santa Clara County, land subsidence, resulting from historical pumping that lowered the water table, has caused the lower reaches of streams and rivers to be invaded by saline tidal waters, increasing salinity in shallow groundwater. Land subsidence is no long occurring in Santa Clara Valley.

4.26.4.5 TRACKING INSTITUTIONAL CONTROLS

Due to the difficulty of accomplishing rapid cleanup at most sites, it is usually necessary to manage site contamination to avoid or minimize exposure pending attainment of cleanup standards. Risk management measures include engineering controls (such as slurry walls or engineered caps) and institutional controls (such as notifications to site occupants or deed restrictions prohibiting sensitive land uses). Because risk management measures usually need to remain effective for many years, their effective implementation needs to be tracked and enforced. At issue is how best to do this. The solution will involve some combination of oversight by the Water Board or other cleanup oversight agency, the local permitting agency, and the discharger.

4.26.5 SEDIMENT

Sediments in the larger Estuary are both sources and sinks of pollutants. Under the Bay Protection and Toxic Cleanup Program in 1999, The Water Board completed a detailed assessment of (a) the levels of pollutants in sediment throughout the Bay, and (b) the risks and benefits of cleaning or otherwise managing existing hot spots.

Pollutant transport associated with sediments is also the subject of numerous studies, many of which are supported by the Water Board. The dynamics of sediment movement, uptake of pollutants through the benthic food web, measurement of pollutant levels on suspended material, and food web models associated with TMDL projects are examples of such studies.

Finally, the environmental effects associated with the disposal or reuse of Estuary sediments have been extensively investigated within the context of the Water Board's dredging management program. As part of this effort, the Water Board has supported detailed research on developing sediment toxicity tests and sediment quality objectives.

4.26.6 NATIONAL “PORTFIELDS” INITIATIVE

The U.S. EPA, National Oceanic and Atmospheric Administration (NOAA), and a number of other federal agencies announced the “Portfields” initiative in 2003. This effort is a renewed focus on revitalizing the nation’s port communities to protect the coastal environment and restore or maintain economic vitality. Many waterfront areas have suffered as waterfront-manufacturing industries changed their interests or went abroad. Abandoned properties with perceived contamination can prevent redevelopment, and local communities lose jobs and other economic benefit. Businesses that are today seeking viable waterfront lands for manufacturing, shipping, and tourism can benefit from Portfields revitalization projects. There are significant waterfront industrial areas in the Region that have undergone redevelopment, such as the Port of Oakland and Mission Bay, and more are expected as federal agencies direct funding to Brownfield project proponents in port areas.

4.26.7 HYDROMODIFICATION

Hydromodification is a general term that encompasses effects of projects on the natural hydrologic, geochemical and physical functions of streams and wetlands that maintain or enhance water quality. Regional Water Boards use this term to describe an alteration away from a natural state of stream flows or the beds or banks of rivers, streams, or creeks, including

ephemeral streams, which results in hydrogeomorphic changes. Protecting beneficial uses within the Region consistent with the federal Clean Water Act and the Porter-Cologne Act requires careful consideration of projects that result in hydrogeomorphic changes and related adverse impacts to the water quality and beneficial uses of waters of the State.

An increasing number of Water Board regulatory actions pertain to the proposed hydromodification of stream and river systems in the Region. These actions include water quality certifications or waste discharge requirements for projects that apply for Clean Water Act Section 401 Certification, total maximum daily loads (TMDLs) for sediments and nutrients in some of the Region's streams, and requirements for municipal stormwater management programs to develop Hydromodification Management Plans. Additionally, many of the grants for clean water awarded under voter-approved bond measures and managed by Water Board staff involve restoration proposals on various components of stream systems. To ensure protection of streams through its regulatory and grant programs, and increase efficiency of the application process, Water Board staff developed a technical reference circular (Circular) in 2003, entitled, "A Primer on Stream and River Protection for the Regulator and Program Manager." The purpose of the Circular is to help various agency staff and permit applicants recognize the linkages between water quality and the good physical conditions of stream channels. The Water Board will consider amending the water quality standards and implementation program to clarify the dependence of water quality and beneficial uses on the functions and physical characteristics of water bodies.

FIGURES

TABLES

Figure 4-1 Publicly Owned Treatment Works Outfalls

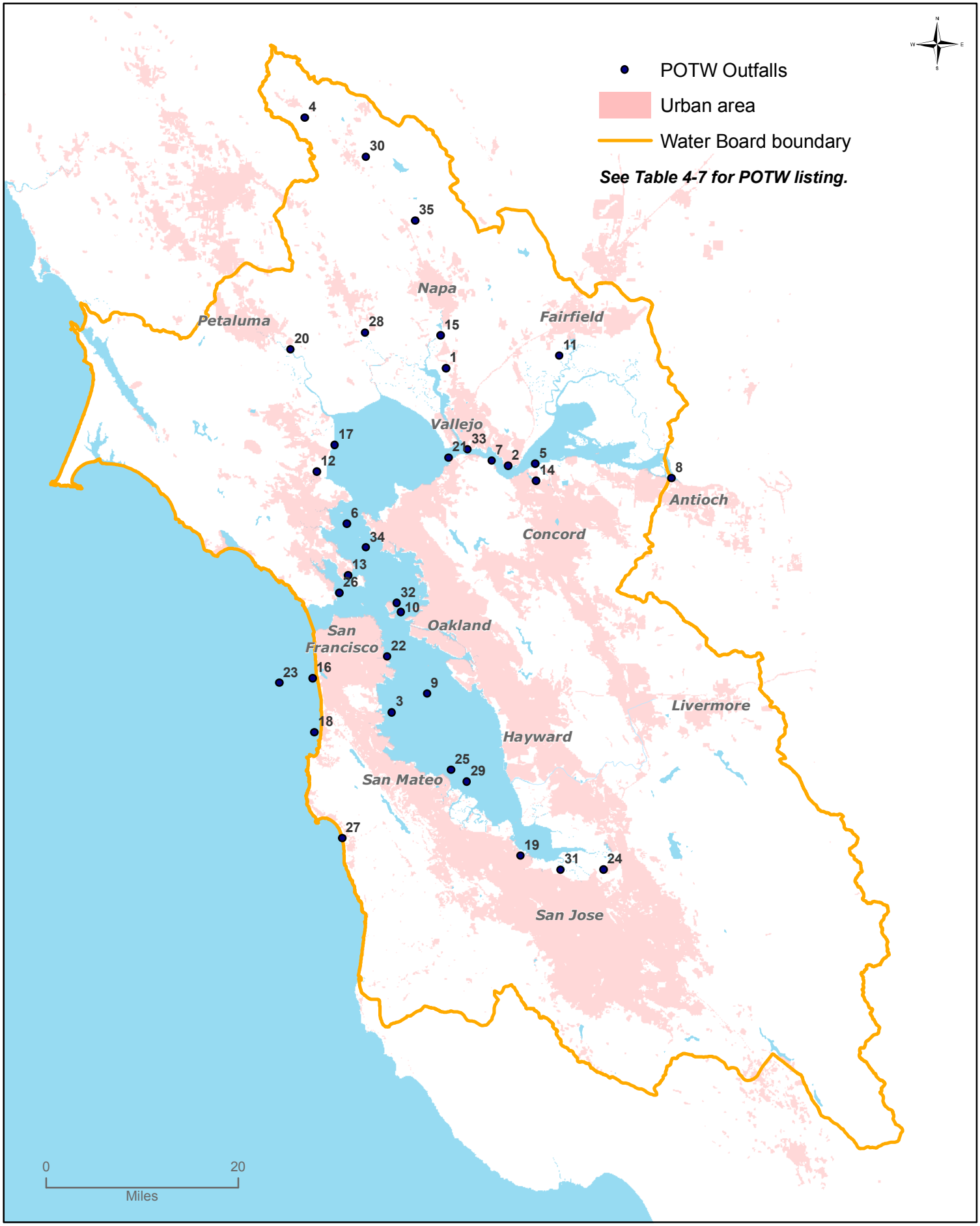

Figure 4-2 Major Industrial Discharge Outfalls

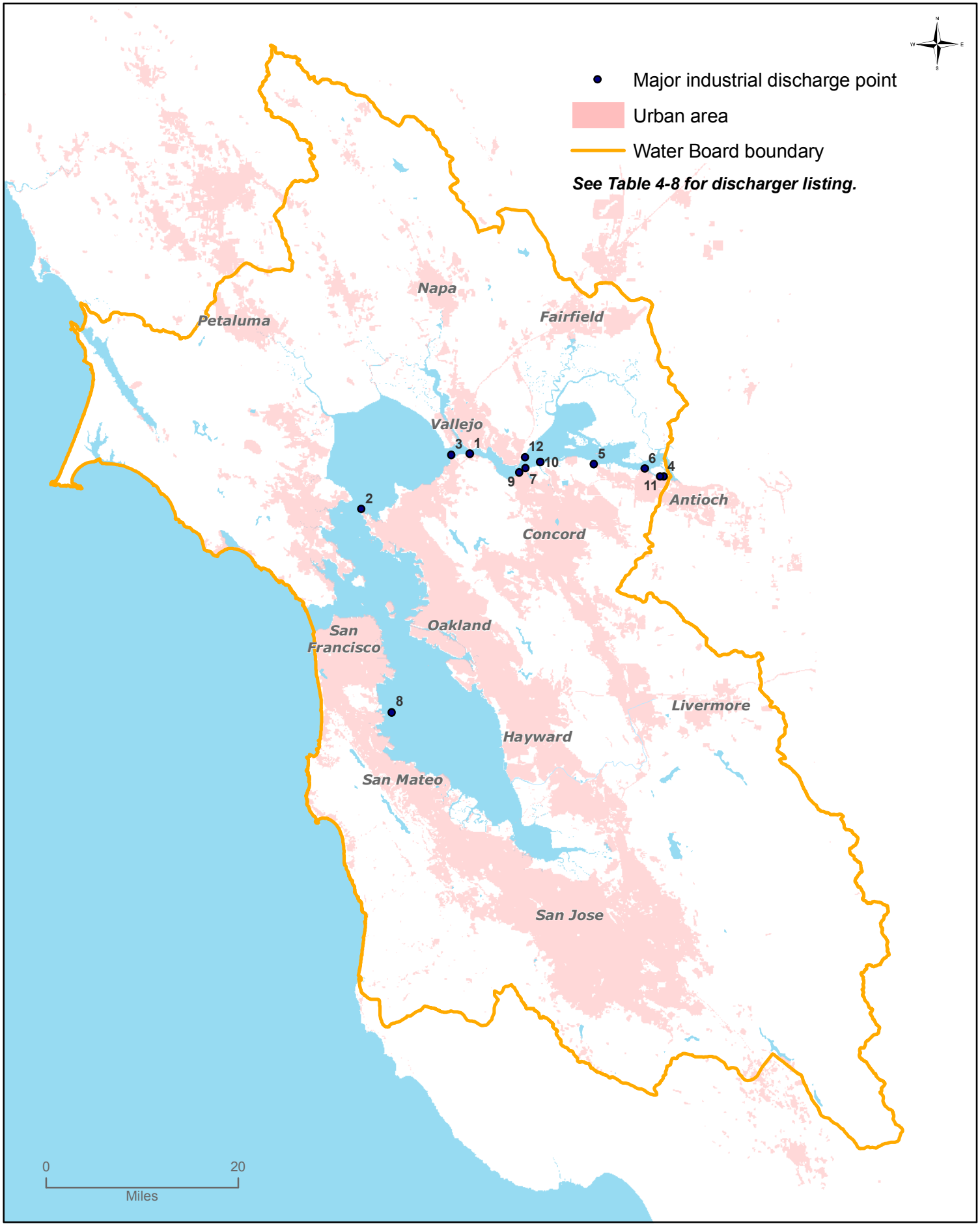

Figure 4-3 Urban Areas in the SF Bay Basin

Figure 4-4 Dredged Material Disposal and Beneficial Reuse Sites

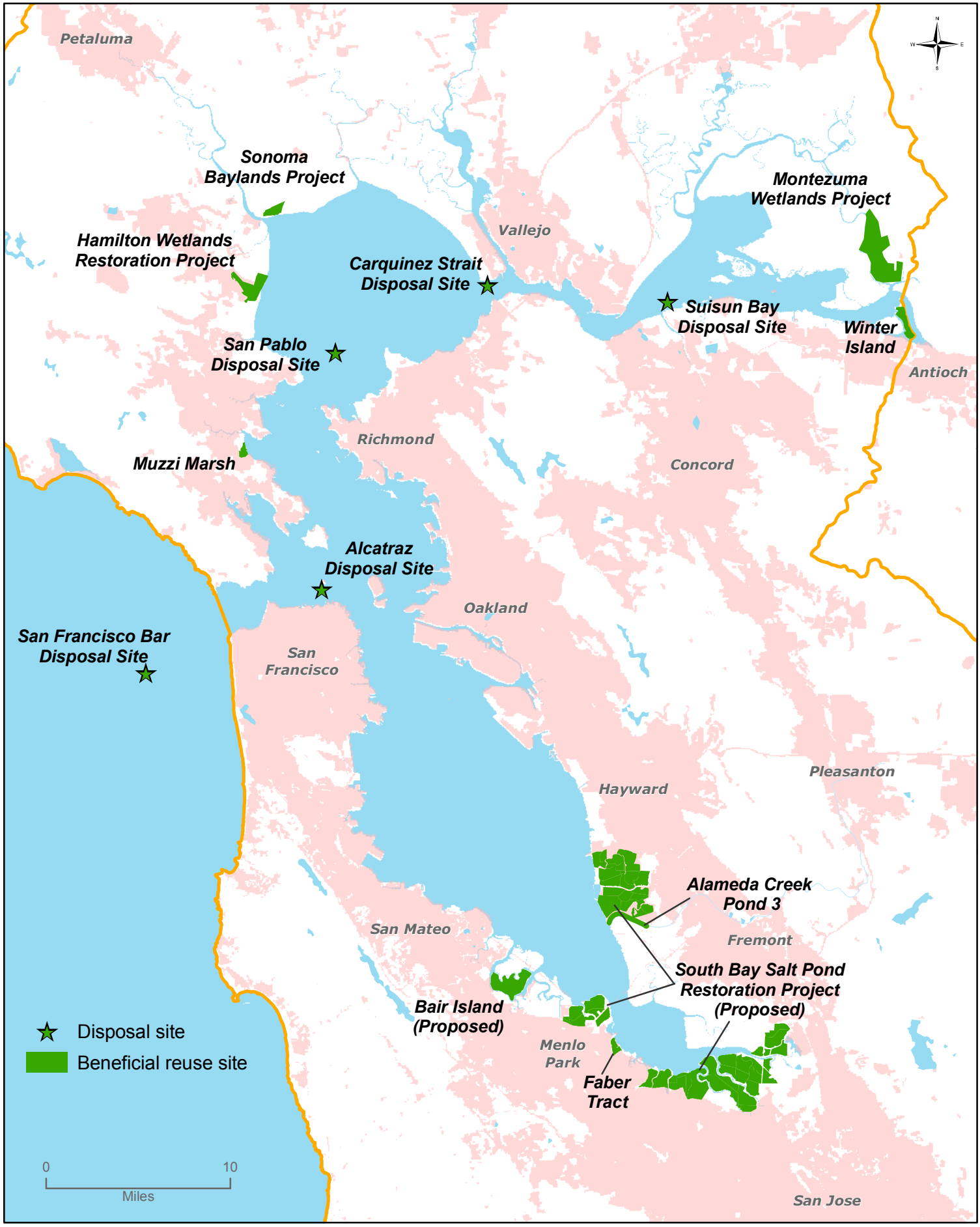

Figure 4-5 Inactive Mine Sites

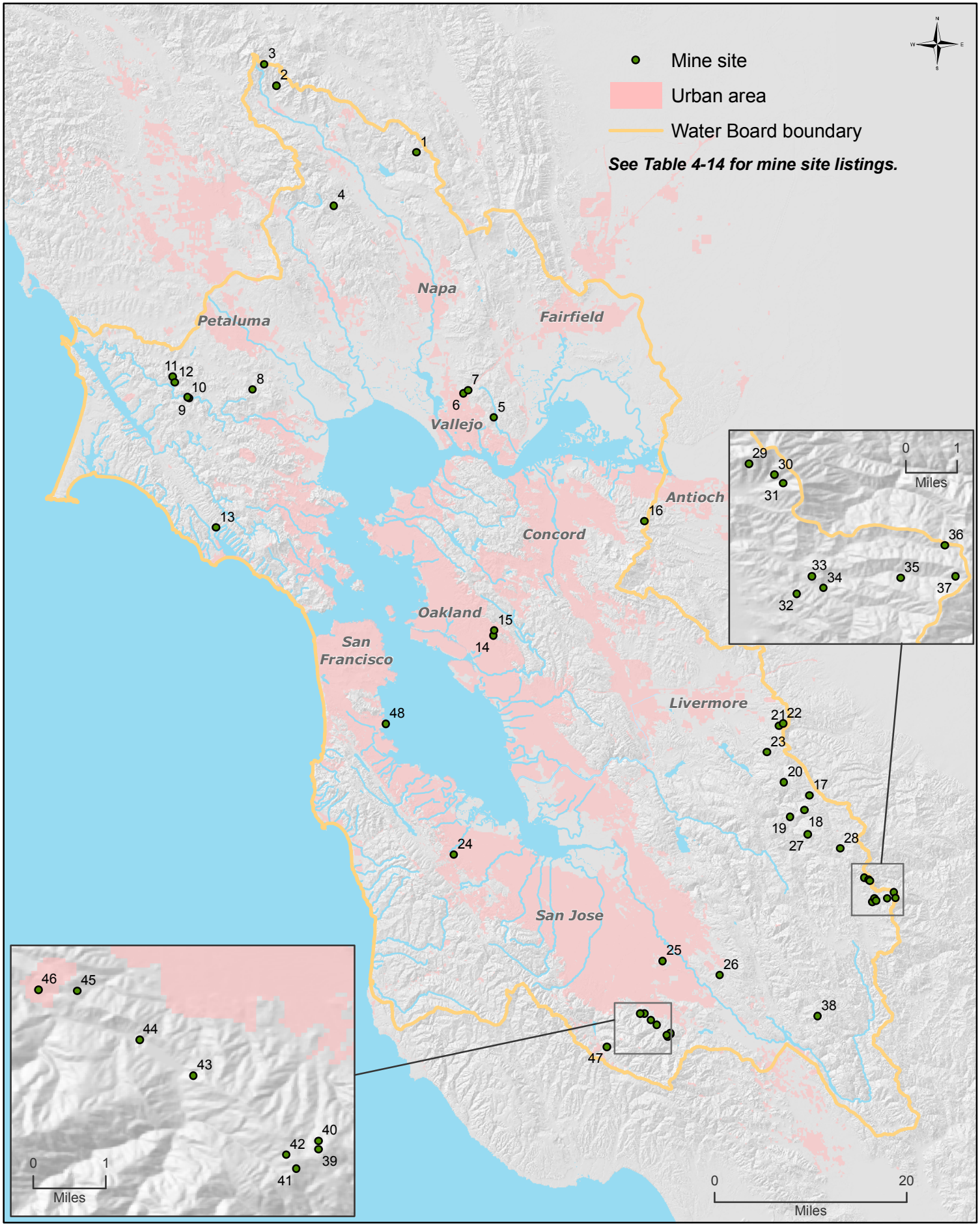

Figure 4-6 Municipal Solid Waste Landfill Sites

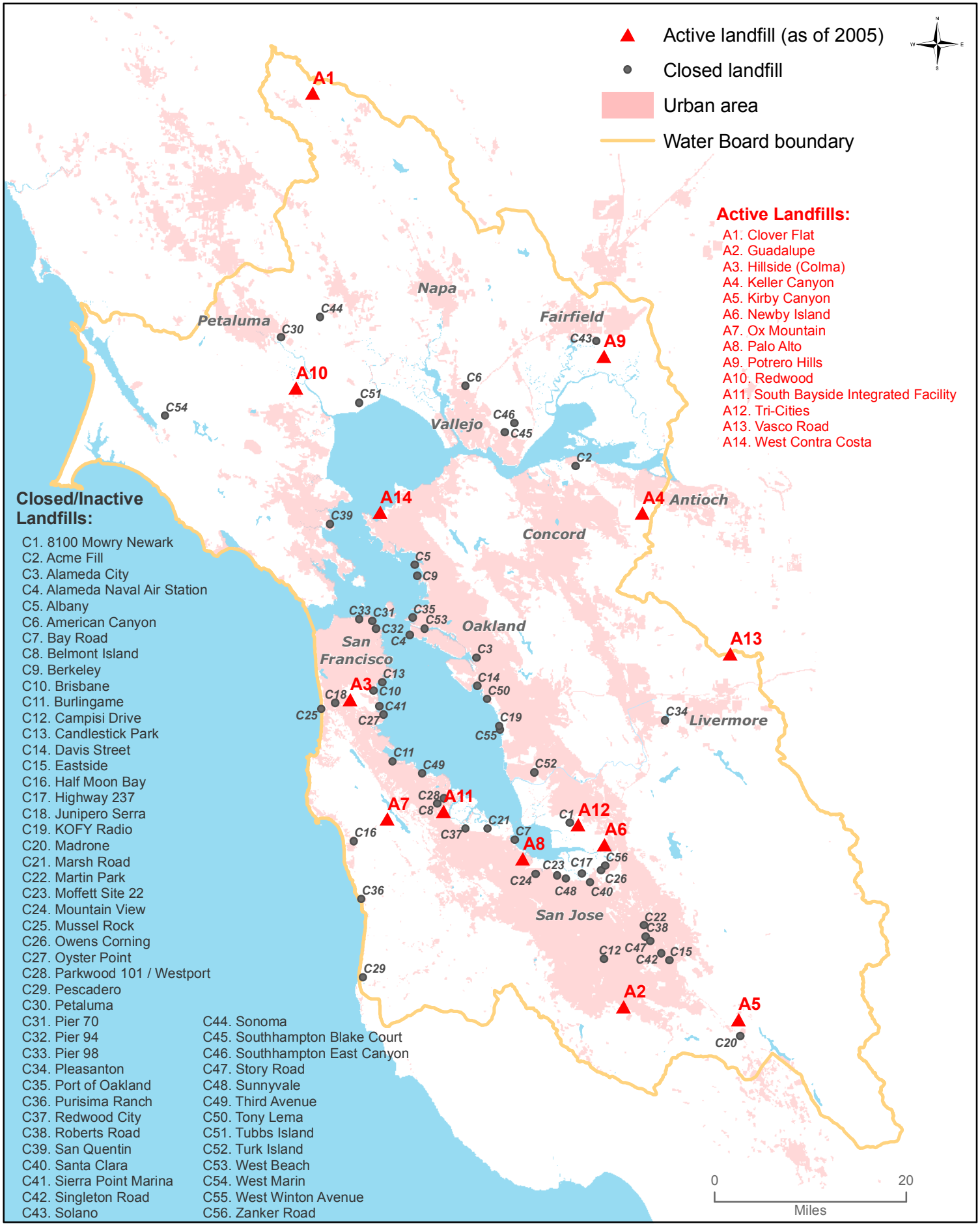

Figure 4-7 Department of Defense and Department of Energy Sites

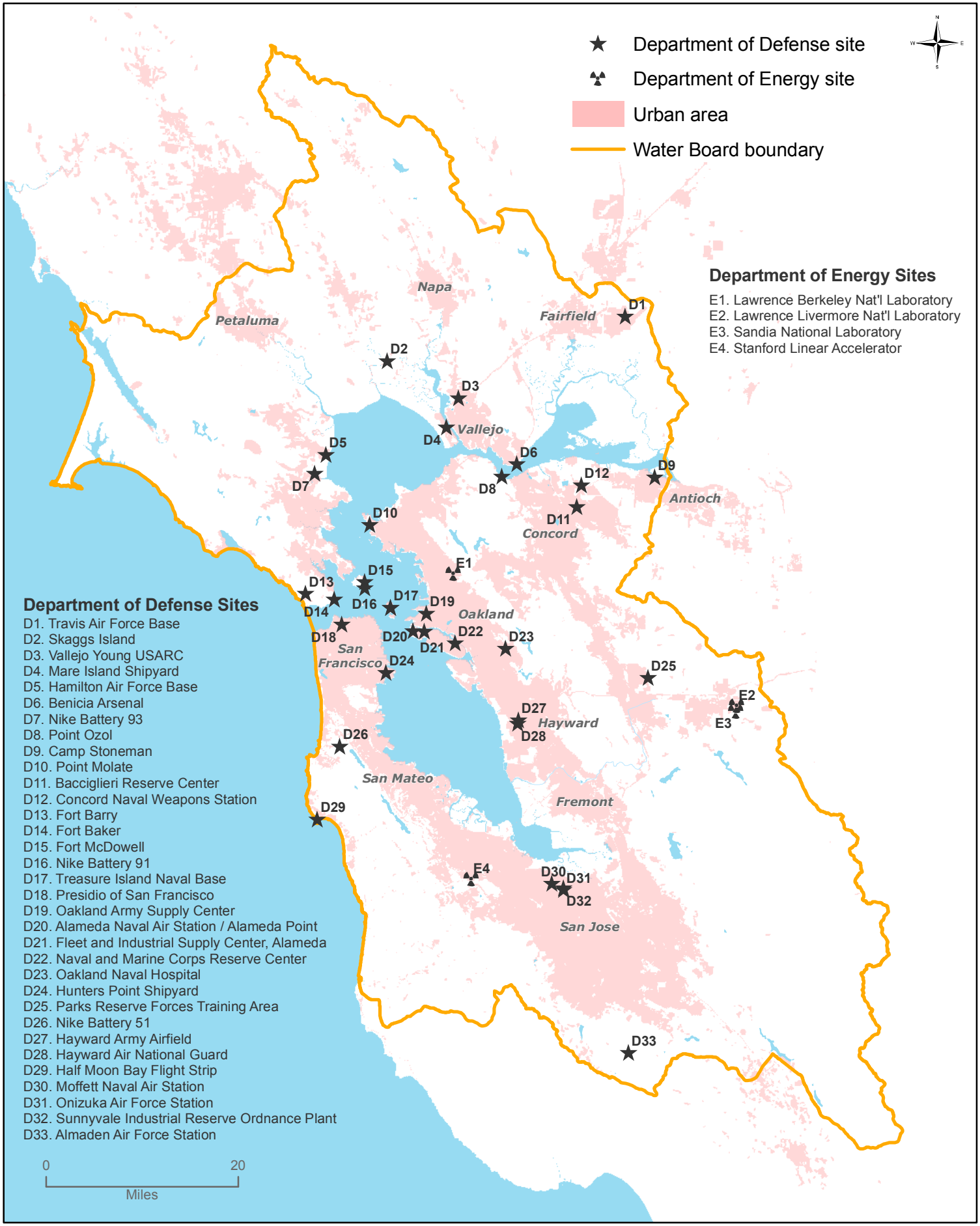

Table 4-1: Discharge Prohibitions

IT SHALL BE PROHIBITED TO DISHCARGE:	DISCUSSION
1. Any wastewater which has particular characteristics of concern to beneficial uses at any point at which the wastewater does not receive a minimum initial dilution of at least 10:1, or into any nontidal water, dead-end slough, similar confined waters, or any immediate tributaries thereof.	Waste discharges will contain some levels of pollutants regardless of treatment. This prohibition will require that these pollutants, when of concern to beneficial uses, be discharged away from areas such as nontidal waters and dead-end sloughs. This prohibition will (a) provide an added degree of protection from the continuous effects of waste discharge, (b) provide a buffer against the effects of abnormal discharges caused by temporary plant upsets or malfunctions, (c) minimize public contact with undiluted wastes, and (d) reduce the visual (aesthetic) impact of waste discharges.
2. Any wastewater which has particular characteristics of concern to beneficial uses to San Francisco Bay south of the Dumbarton Bridge.	This prohibition is consistent with the 1974 Bays & Estuaries Policy. This area is one that has experienced chronic water quality problems.
3. Any wastewater which has particular characteristics of concern to beneficial uses to Suisun Marsh during the dry weather period of the year. Local irrigation return water is excepted in quantities and qualities consistent with good irrigation practices.	The threat of high concentrations of toxicants, biostimulants, and oxygen-demanding substances in Suisun Marsh, an area of low assimilative capacity, great ecological sensitivity and value, and poor dispersion by tidal or freshwater flushing, necessitates such protection for the Marsh for the critical portion of the year when freshwater flows are nonexistent.
4. Any wastewater which has particular characteristics of concern to beneficial uses to Alameda Creek when no natural flow occurs.	The threat of dissolved solids, stable organics, and other pollutant accumulation in the groundwater of the basins recharged with waters of Alameda Creek is critical in the dry weather period when wastewater could account for much of the water percolating to the basin.
5. Any wastewater which has particular characteristics of concern to beneficial uses to Tomales Bay, Drakes Estero, Limantour Estero, Bolinas Lagoon, or Richardson Bay (between Sausalito Point and Peninsula Point).	Tomales Bay, Drakes Estero, and Limantour Estero are nearly pristine bodies of water and of great value for wildlife habitat and as recreational and scientific study areas. Bolinas Lagoon and Richardson Bay both have poor dispersion capability and low assimilative capacity. They have experienced high coliform, nutrient, and algal concentrations. This prohibition will provide protection for the intensive recreational beneficial uses of these water bodies.

6. All conservative toxic and deleterious substances, above those levels which can be achieved by a program acceptable to the Regional Board, to waters of the Basin.	The intent of the prohibition is to minimize the discharge of persistent toxicants into waters, thus protecting aquatic life and public water supplies. The prohibition recognizes that these substances can be most economically reduced at their source.
7. Rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.	The prohibition is intended primarily to protect recreational uses, including boating and navigation. Floating rubbish can also impair suitability of waters for industrial cooling and other diversions by endangering pumps. This prohibition is in conformance with the Bays and Estuaries Policy.
8. Floating oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity or discoloration in surface waters.	The prohibition is intended to protect birds and other wildlife from the possible toxic effects of floating oil or oil deposits. Waterfowl and shorebirds in particular can be affected through coating of feathers and loss of thermal insulation. This prohibition is also intended to prevent visual nuisance that would be caused by floating oil or by its deposition on shore or on structures and to protect recreational uses which would be impaired by oil deposited on boats, other equipment, or persons.
9. Silt, sand, clay, or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity or discoloration in surface waters or to unreasonably affect or threaten to affect beneficial uses.	This is in conformance with the Bays and Estuaries Policy. The intent of this prohibition is to prevent damage to the aquatic biota by bottom deposits which can smother non-motile life forms, destroy spawning areas, and, if putrescible, can locally deplete dissolved oxygen and cause odors. The prohibition would also prevent discoloration and/or turbidity that can be caused by silt and earth. As one measure of compliance with this prohibition, design and maintenance of erosion and sediment control structures should comply with accepted engineering practices as identified in ABAG's *Manual of Standards for Erosion and Sediment Control Measures*. Turbidity or discoloration caused by dredging is covered by the Regional Board's policy on dredging (see section under nonpoint source control).

10. Sludges of municipal or industrial waste origin and sludge digester supernatant, centrate, or filtrate directly to surface waters without adequate treatment in conformance with waste discharge requirements.	The intent of this prohibition is to preclude a major potential source of bottom deposits, which could smother aquatic biota and cause localized dissolved oxygen depletion. Some sludges contain floatable material which would cause visual nuisance. Some industrial sludges contain persistent toxic matter. If discharged without adequate treatment, digester supernatant, centrate, and filtrate are generally septic and would cause odors, discoloration, and dissolved oxygen depletion.
11. Biocides of a persistent or cumulative form which have particular characteristics of concern to beneficial uses when applied where direct or indirect discharge to water is threatened except where net environmental benefit can be demonstrated to the satisfaction of the Regional Board. A management plan for the use and control of biocides in these cases must be approved by the Regional Board.	It is the intent of this prohibition to prevent, as much as practicable, the entrance into the aquatic environment of persistent and/or cumulative biocides (pesticides, herbicides, copper, etc.). This is necessary to minimize the toxic effects of these substances on the aquatic biota.
12. Radiological, chemical, or biological warfare agents or high level radioactive waste.	The intent of the prohibition is to protect human and aquatic life from the adverse effects of these materials.
13. Oil or any residuary product of petroleum to the waters of the state, except in accordance with waste discharge requirements or other provisions of Division 7, California Water Code.	Discharge of oil or residuary products of petroleum is also prohibited under the Fish and Game Code.
14. Sewage-bearing wastewater to individual leaching or percolation systems in the Stinson Beach area of Marin County, the Glen Ellen area of Sonoma County, and the Emerald Lake Hills and Oak Knoll Manor areas of San Mateo County, as specified in Regional Board Resolutions (Chapter 5) and sections in this chapter on groundwater protection and on-site wastewater systems.	The intent of this prohibition is to prevent degradation of groundwater from septic systems in these areas.
15. Raw sewage or any waste failing to meet waste discharge requirements to any waters of the Basin.	The intent of this prohibition is to protect the public and the aquatic environment from the effects of raw or inadequately treated waste discharges.
16. Waste that is not a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas.	The intent of this prohibition is to protect the relatively pristine nature of these special areas.

17. Waste so as to alter the total dissolved solids or salinity of waters of the state to adversely affect beneficial uses, particularly fish migration and estuarine habitat.	The intent of this prohibition is to prohibit the discharge of excessively salty water to streams and the Bay-Delta system.
18. Sewage, whether treated or untreated, from any vessel into that portion of Richardson Bay bounded by the shore and by a line bearing 257 degrees from Peninsula Point to the shore at Sausalito, in Marin County.	The intent of this prohibition is to prevent high bacteriological counts in Richardson Bay due to significant sewage discharges from vessels.

Table 4-2: Effluent Limitations for Conventional Pollutants

(All units in MG/L, except as otherwise noted)

PARAMETERS	30-DAY AVERAGE	7-DAY AVERAGE	DAILY MAXIMUM	INSTANTANEOUS LIMIT	SEVEN-SAMPLE MEDIUM	FIVE-SAMPLE MEDIUM
Biochemical Oxygen Demand (BOD5)[a,b]	30	45				
Suspended Solids (SS)[a]	30	45				
85% removal of BOD5 and SS[a,c]						
Total Coliform Organisms[a,d] (in MPN/100ml)						
- Shallow Water Discharge[e] (in immediate vicinity of public contact or shellfish harvesting)			240		2.2	
- Deep Water Discharge			10,000			240
pH[f] (in pH units)						
- Shallow Water Discharge				6.5-8.5		
- Deep Water Discharge				6.0-9.0		
Residual Chlorine[f] (free chlorine plus chloramines)				0.0		
Settleable Matter[f,g] (in ml/l-hr)	0.1		0.2			
Oil & Grease[f]	10		20			

NOTES:

a. These effluent limitations apply to all sewage treatment facilities that discharge to inland surface waters and enclosed bays and estuaries. The Board may also apply some of these limitations selectively to certain other non-sewage discharges, but they will not be used to preempt Effluent Guideline Limitations established pursuant to Sections 301, 302, 304, or 306 of the federal Water Pollution Control Act, as amended. (Such Effluent Guideline Limitations are included in NPDES permits for particular industries.)

b. The federal regulation allows the parameter BOD to be substituted with Carbonaceous BOD at levels that shall not exceed 25 mg/l as a 30-day average, nor 40 mg/l as a 7-day average.

c. The arithmetic mean of the biochemical oxygen demand (5-day, 20^{o}C) and suspended solids values, by weight, for effluent samples collected in any month shall not exceed 15 percent of the arithmetic mean of the respective values, by weight, for simultaneous influent samples.

d. (1) The Regional Board may consider substituting total coliform organisms limitations with fecal coliform organisms limitations provided that it can be conclusively demonstrated through a program approved by the Regional Board that such substitution will not result in unacceptable adverse impacts on the beneficial uses of the receiving water.

(2) The Regional board may consider establishing less stringent requirements for any discharges during wet weather.

e. Exceptions to these requirements may be granted by the Regional Board where it is demonstrated that beneficial uses will not be compromised by such an exception. Discharges receiving such exceptions shall not exceed a five-sample median of 23 MPN/100 ml nor a maximum of 240 MPN/100 ml during dry weather.

f. These effluent limitations apply to all treatment facilities.

g. Discharges from sedimentation and similar cases should generally not contain more than 1.0 ml/l-hr of settleable matter. Design and maintenance of erosion and sediment control structures shall comply with accepted engineering practices as identified in the Association of Bay Area Government's (ABAG's) *Manual of Standards for Erosion and Sediment Control Measures*.

Table 4-3: Acute Toxicity Effluent Limits

Discharge/Monitoring Type	At Least 90% Survival	At Least 70% Survival
Continuous discharge / weekly or monthly tests	11-sample[a] median	11-sample 90th percentile[b]
Continuous discharge / quarterly or annual tests	3-sample[c] median	Single-sample maximum
Intermittent discharge	--	Single-sample maximum

NOTES:

a. 11-sample median is defined as follows: If five or more of the past ten or fewer samples show less than 90 percent survival, then survival of less than 90 percent on the next sample represents a violation of the effluent limitation.

b. 90th percentile is defined as follows: If one or more of the past ten or fewer samples show less than 70 percent survival, then survival of less than 70 percent on the next sample represents a violation of the effluent limitation.

c. 3-sample median is defined as follows: If one of the past two or fewer samples shows less than 90 percent survival, then survival of less than 90 percent on the next sample represents a violation of the effluent limitation.

Table 4-4: Critical Life Stage Toxicity Test Species and Protocols[a]

SPECIES	BIOLOGICAL EFFECTS EVALUATED	CALIFORNIA RESIDENT	LAB VS. WILD STOCK
FRESHWATER			
Ceriodaphnia sp. (Crustacean)	survival, reproduction	N	Lab
Pimephales promelas (Fathead minnow)	survival, growth	Y	Lab
Selenastrum capricornutum (unicellular algae)	cell division rate	N	Lab
MARINE			
Mysidopsis bahia (Crustacean)	survival, growth, fecundity	N	Lab
Molluscs Mytilus edulis (mussel) Crassostrea gigas (oyster) Halotis rufescens (abalone)	embryo development, survival	Y	Wild or Field-cultured
Echinoderms Strongylocentrotus purpuratus, S. franciscanus (urchins) Dendraster excentricus (sand dollar)	fertilization success	Y	Wild
Diatom Plants Skeletonema costatum Thalassiosira pseudonana	cell division rate	Y	Lab
Macrocystis pyrifera (giant kelp)	percent germination, germ tube length	Y	Wild
Champia parvula (red algae)	number of cystocarps	N	Lab
MARINE/BRACKISH			
Menidia berylina	survival, larval growth	Y	Lab

Notes:
a. All technical references and discussion are contained in "Modified Guidelines: Effluent Toxicity Characterization Program," September 1991, San Francisco Bay Regional Water Quality Control Board.

Table 4-5: Conditions that Require Monthly Monitoring of Toxicity Levels

Discharger Monitoring Frequency	Shallow Water Dischargers	Deep Water Dischargers
Quarterly		
Three-sample median[a]	> 1 TU_C	> 10 TU_C
Single-sample maximum	> 2 TU_C	> 20 TU_C
Semi-annually or annually		
Single-sample maximum	> 1 TU_C	> 10 TU_C

NOTES:
a. Exceedance of the three-sample median is defined as follows: If one of the past two or fewer samples shows greater than the toxicity threshold listed above, then a chronic toxicity value greater than the threshold on the next sample represents an exceedance.

Table 4-6: Controlling Wet-weather Overflows

Levels of Water Quality Protection	Appropriate Level of Treatment
A Complete protection for areas where the aquatic environment should be free of any identifiable risk from the discharge of untreated waste (i.e., shellfish beds for year-round harvesting).	Secondary treatment up to 20-year recurrence interval; above 20-year overflows allowed.
B Areas that do not need complete year-round protection, such as shellfish beds for dry-weather harvesting, public beaches, and other water contact areas.	Secondary treatment for all flows up to two-year recurrence interval; primary treatment up to 20-year recurrence interval; above 20-year overflows allowed.
C Areas where water quality or aquatic productivity may be limited due to the pollution effects of a dense human population or other urban activities that are largely uncontrollable. Such areas may include some shipyards and harbors.	Secondary treatment to half-year recurrence interval; primary treatment to five-year recurrence interval; above five-year overflows allowed.

Table 4-7: Publicly Owned Treatment Works (POTWs)

POTW Facility Name	Outfall Location[a]	Flow[b] (MGD)	Treatment Level	Discharge Point Latitude	Discharge Point Longitude	Comment
City of American Canyon	1	2.5	Advanced	38 11 11	122 16 27	
City of Benecia	2	4.5	Secondary	38 02 30	122 09 03	
City of Burlingame	3	5.5	Secondary	37 39 55	122 21 41	Discharge through North Bayside outfall
City of Calistoga	4	0.84	Advanced	38 33 34	122 33 28	With dry weather reclamation
Central Contra Costa S.D.	5	53.8	Secondary	38 02 44	122 05 55	
Central Marin Sanitation A.G.	6	10	Secondary	37 56 54	122 27 23	
Contra Costa Co. S.D. No. 5	7	0.025	Secondary	38 02 55	122 10 56	
Delta Diablo S.D.	8	16.5	Secondary	38 01 40	121 50 14	
East Bay Dischargers Authority (EBDA)	9	77.1	Secondary	37 41 40	122 17 42	Common outfall for EBDA and LAVWMA
- City of Hayward			Secondary			EBDA member (16.5 mgd)
- Oro Loma S.D.			Secondary			EBDA member (20 mgd)
- City of San Leandro			Secondary			EBDA member (7.6 mgd)
- Union S.D.			Secondary			EBDA member (33 mgd)
East Bay MUD	10	120	Secondary	37 49 02	122 20 55	
Fairfield Suisun Sewer Dist.	11	17.5	Secondary	38 12 33	122 03 24	With dry weather reclamation
Las Gallinas Valley S.D.	12	2.92	Secondary	38 01 32	122 30 58	
Livermore-Amador Valley WMA (LAVWMA)	9	20	Secondary			Discharge to EBDA outfall
Dublin/San Ramon S.D.			Secondary			LAVWMA member (11.5 mgd)
City of Livermore			Secondary			LAVWMA member (5.25 mgd)

POTW Facility Name	Outfall Location[a]	Flow[b] (MGD)	Treatment Level	Discharge Point Latitude	Discharge Point Longitude	Comment
Marin Co. S.D. #5	13	0.98	Secondary	37 52 12	112 27 05	
City of Millbrae	3	3.0	Secondary	37 39 55	122 21 41	Discharge thru North Bayside outfall
Mountain View S.D.	14	2.4	Secondary	38 01 12	122 05 47	
Napa S.D.	15	15.4	Advanced	38 14 09	122 17 10	W/dry weather reclamation
N. San Mateo Co. S.D.	16	8.0	Secondary	37 42 48	122 30 50	
Novato S.D.	17	6.55	Secondary	39 04 00	122 29 00	
City of Pacifica	18	3.3	Advanced	37 36 53	122 29 16	
City of Palo Alto	19	39	Advanced	37 27 11	122 06 36	
City of Petaluma	20	5.2	Secondary	38 12 33	122 34 22	W/dry weather reclamation
Cities of Pinole & Hercules	21	4.06	Secondary	38 03 06	122 15 55	Share outfall w/ Rodeo
Rodeo S.D.	21	1.14	Secondary	38 03 06	122 15 55	Share outfall w/ Pinole/Hercules
City & Co. of S.F., Southeast	22	85.4	Secondary	37 44 58	122 22 22	
City & Co. of S.F., Oceanside	23	43	Secondary	37 42 18	122 34 39	
City & Co. of S.F., Int. Airport	3	2.2	Secondary	37 39 55	122 21 41	Discharge through North Bayside outfall
San Jose/Santa Clara WPCP	24	167	Advanced	37 26 06	121 57 08	
City of San Mateo	25	13.6	Advanced	37 34 50	122 14 45	
Sausalito-Marin City S.D.	26	1.8	Secondary	37 50 37	122 28 03	
Sewer Authority Mid-Coastside	27	4.0	Secondary	37 28 23	122 27 00	
Sewerage Agency of So. Marin	13	3.6	Secondary	37 52 12	121 27 05	

POTW Facility Name	Outfall Location[a]	Flow[b] (MGD)	Treatment Level	Discharge Point Latitude	Discharge Point Longitude	Comment
Sonoma Valley County S.D.	28	3.0	Secondary	38 14 14	122 25 51	W/dry weather reclamation
So. Bayside System Authority	29	29	Secondary	37 33 48	122 12 55	
So. S.F./San Bruno WQCP	3	13	Secondary	37 39 55	122 21 41	
City of St. Helena	30	0.5	Secondary	38 30 10	122 26 15	W/dry weather reclamation
City of Sunnyvale	31	29.5	Advanced	37 26 00	122 02 00	
U.S. Navy Treasure Island	32	2.0	Secondary	37 49 50	122 21 25	As part of base closure will be transferred to City & Co. of S.F.
Vallejo Sanitation & Flood Control	33	15.5	Secondary	38 03 53	122 13 42	W/dry weather reclamation
West County Agency, WCA	34	28.5	Secondary	37 54 47	122 25 06	WCA common outfall
City of Richmond			Secondary			WCA member (16 mgd)
West County Wastewater Dist.			Secondary			WCA member (12.5 mgd)
Town of Yountville	35	0.55	Advanced	38 24 30	122 20 25	W/dry weather reclamation

NOTES:
a. Figure 4-1 shows corresponding outfall locations.
b. Dry weather flow as identified in current permits. MGD is million gallons per day.

Table 4-8: Major Industrial Discharge Outfalls

Industrial Discharger	Outfall Location	Industrial Category	Treatment	Discharge Point Latitude	Discharge Point Longitude
C & H Sugar	1	Sugar refining	Activated sludge	30 03 30	122 13 28
Chevron Chemical	2	Chemical manufacting	Pond	37 58 15	122 25 45
Chevron U.S.A.	2	Petroleum refining	Activated sludge / wetland	37 58 15	122 25 45
ConocoPhilips	3	Petroleum refining	Activated sludge / pond / carbon	38 03 22	122 15 36
Dow Chemical Co.	4	Chemical manufacturing	Neutralization / activated carbon	38 01 48	121 51 07
General Chemical Corp. Bay Point Works	5	Chemical manufacturing	Neutralization / pond	38 02 48	121 59 10
Pittsburg Power Plants	6	Steam electric power	Filtration	38 02 30	121 53 20
Rhodia, Inc.	7	Sulfuric acid regeneration	Neutralization / pond	38 02 18	122 07 01
San Francisco Int'l Airport	8	Various	Physical / chemical		
Shell Oil Company	9	Petroleum refining	Activated sludge / carbon	38 01 56	122 07 44
Tesoro Refining	10	Petroleum refining	Pond / RBC / carbon	38 02 54	122 05 22
USS-Posco Industries	11	Steel finishing	Physical / chemical	38 01 48	121 51 32
Valero Refining Co.	12	Petroleum refining	Activated sludge / carbon	38 03 18	122 07 07

Table 4-9: Status of Urban Runoff Control Programs

MUNICIPALITIES CONDUCTING BASELINE CONTROL PROGRAMS

CITIES		COUNTIES
Belvedere	Petaluma	Marin
Benecia	Ross	Napa
Calistoga	San Anselmo	Solano
Corte Madera	San Rafael	Sonoma
Fairfax	Sausalito	
Larkspur	Sonoma	
Mill Valley	St. Helena	
Napa	Tiburon	
Novato	Yountville	

ENTITIES CONDUCTING COMPREHENSIVE CONTROL PROGRAMS

LOCALE	PERMITTED ENTITY	COMPLETE CHARACTERIZATION OF STORMWATER QUALITY AND RUNOFF POLLUTANT LOADING?	DATE PERMITTED
Santa Clara County	Santa Clara Valley Nonpoint Source Pollution Control Program	Yes	1990
Alameda County	Alameda County Urban Runoff Clean Water Program	Yes	1991
San Mateo County	San Mateo County Stormwater Pollution Prevention Program	Yes	1993
Contra Costa County	Contra Costa Clean Water Program	Yes	1993
Vallejo	City of Vallejo	No	Applied in 1994
Suisun City	City of Suisun City	No	Applied in 1994
Fairfield	City of Fairfield	No	Applied in 1994

Table 4-10: Potential Consequences and Impacts of Dredging and Dredged Material Disposal

Consequences	Impacts
Bottom disturbance	Mastication of sediment-inhabiting organisms; smothering of organisms living in or on the bottom; habitat disruption
Suspended solids loading	Abrasion and clogging of gills (fish and clams); impaired respiration, feeding, and excretory functions; reduced water pumping rates (clams); retarded egg development and reduced growth and survival of larvae
Dissolved oxygen reduction	Reduced efficiency of oxygen uptake by aquatic organisms; increased stress on organisms resulting in reduced ability to meet environmental and biological demands
Mobilization of toxicants adsorbed to sediments	Uptake and accumulation by aquatic organisms
Release of biostimulatory substances (nitrogen, phosphorus, ammonia)	Stimulation of algal growth; ammonia toxicity

Table 4-11: Goals of the Long Term Management Strategy

1) Maintain those channels in the SF Bay Estuary which are necessary for navigation, in an environmentally and economically sound manner and eliminate unnecessary dredging activities in the region.
2) Conduct dredged material disposal activities in the most environmentally sound manner.
3) Maximize the use of dredged material as a resource.
4) Establish a cooperative permitting framework for dredging permit applications.

Table 4-12: LTMS Participants

EXECUTIVE COMMITTEE

- Corps of Engineers, South Pacific Division, Commander
- U.S. EPA, Region IX, Regional Administrator
- State Dredging Coordinator
- San Francisco Bay Conservation and Development Commission, Chairperson
- San Francisco Bay Regional Water Quality Control Board, Chairperson

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MANAGEMENT COMMITTEE

- Corps of Engineers, San Francisco District, District Engineer
- Corps of Engineers, San Francisco District, LTMS Program Manager
- U.S. EPA, Region IX, Regional Administrator
- San Francisco Bay Conservation and Development Commission, Executive Director
- San Francisco Bay Regional Water Quality Control Board, Executive Officer
- State Water Resources Control Board, Executive Director

POLICY REVIEW COMMITTEE

- Other state and federal agencies with an interest in San Francisco Bay Area dredging (e.g., U.S. Navy, California State Department of Boating and Waterways, State Lands Commission)
- Bay Area ports and marinas
- Environmental and fishing organizations
- Development interests and other interested parties

WORK GROUPS

- Staff of RWQCB Chair of In-bay studies
- Staff of BCDC Chair of Upland/Non-aquatic and Reuse studies
- Staff of U.S. EPA Chair of Ocean Studies
- Varying levels of participation by the organizations listed above

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IMPLEMENTATION COMMITTEE

Ad-hoc leadership and varying levels of participation by the organizations listed above

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TECHNICAL/SCIENCE ADVISORY PANEL

Semi-annual meetings of panel by five experts in the areas of:

- Physical processes,
- Chemistry,
- Benthic community analysis,
- Sediment toxicology, and
- A representative of the Corps of Engineers' national laboratory.

Table 4-13: Dredged Material Volume Targets

ANNUAL
The following volume targets shall be utilized each calendar year (i.e., January to December) at each aquatic disposal site:

Alcatraz Island (SF-11)	4.0 million cubic yards
San Pablo Bay (SF-10)	0.5 million cubic yards
Carquinez Strats (SF-9)	2.0 million cubic yards (Normal Water Year)[a] 3.0 million cubic yards (Wet Water Year)

MONTHLY
The following volume targets shall be utilized on a monthly basis at each aquatic disposal site:

Alcatraz Island (SF-11)	October – April	1.0 million cubic yards
	May – September	0.3 million cubic yards
San Pablo Bay (SF-10)	Any month	0.5 million cubic yards
Carquinez Strats (SF-9)	Any month	1.0 million cubic yards

NOTES:

a. Water year classifications are designated by the California Department of Water Resources (DWR). The DWR water year begins on October 1 and is based on unimpaired flows as defined in the State Water Board's Water Rights Decision 1485.

Table 4-14: Inactive Mine Sites

Number	Mine Name	Associated Material
1	Snowflake	magnesite
2	Palisade	mercury
3	Silverado	mercury
4	La Joya	mercury
5	Hastings	mercury
6	St. John's	mercury
7	Borges	mercury
8	H. Corda	mercury
9	Cycle	mercury
10	Franciscan	mercury
11	Chileno Valley	mercury
12	Gambonini	mercury
13	Union Gulch	copper
14	Leona Heights	pyrite
15	Alma	pyrite
16	Black Diamond	coal
17	Buckhorn	manganese
18	Man Ridge	manganese
19	Section 14	coal
20	Newman	chromite
21	Livermore Coal	coal
22	Pendarin	coal
23	Camp 9	manganese
24	Challenge	mercury
25	Hillsdale	mercury
26	Silver Creek	mercury
27	Winegar	manganese
28	Fable Manganese	manganese
29	Western	magnesite
30,31	Maltby	magnesite
32	Keller	magnesite
33	Queenbee No. 1	manganese
34	Blackhorse	manganese
35	Black Eagle	manganese
36	Jones Group	manganese
37	Mexican Deposits	manganese
38	Pine Ridge	manganese
39	April	mercury
40	Cristobal	mercury
41	San Francisco	mercury
42	San Pedro Pit	mercury
43	Enriquita	mercury
44	San Mateo	mercury
45	Senator	mercury
46	Guadalupe Mines	mercury
47	Hooker Creek	copper
48	Marine Magnes Div.	magnesium salts

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CHAPTER 5: PLANS AND POLICIES

In addition to the Water Quality Control Plan (Basin Plan), many other plans and policies direct San Francisco Bay Regional Water Quality Control Board (Water Board) actions or clarify the Water Board's intent. The following pages describe numerous State Water Resources Control Board (State Water Board) plans and policies and Water Board policies.

All of these policies may be revised periodically. Contact the State Water Board and the Water Board for further information.

5.1 STATE WATER BOARD PLANS AND POLICIES

STATE AND REGIONAL WATER BOARDS WATER QUALITY COORDINATING COMMITTEE — RESOLUTION NO. 68-1

By adopting the Resolution, the Water Board approved a State and Regional Water Boards Coordinating Committee for the purpose of (1) coordinating and exchanging technical and administrative information; (2) augmenting staff support to the Water Quality Advisory Committee of the State Water Board; and (3) recommending action to be taken on water quality programs.

ANTIDEGRADATION POLICY — RESOLUTION NO. 68-16

The "Statement of Policy with Respect to Maintaining High Quality of Waters in California," known as the Antidegradation Policy, adopted in 1968, requires the continued maintenance of existing high quality waters. It provides conditions under which a change in water quality is allowable. A change must:

- Be consistent with maximum benefit to the people of the State,
- Not unreasonably affect present and anticipated potential beneficial uses of water, and
- Not result in water quality less than that prescribed in water quality control plans or policies.

STATE POLICY FOR WATER QUALITY CONTROL

The "State Policy for Water Quality Control", adopted in 1972, declares the State Water Board's intent to protect water quality through the implementation of water resources management programs. It serves as the general basis for subsequent water quality control policies.

POLICY REGARDING WATER RECLAMATION — RESOLUTION NO. 77-1

This resolution adopted in 1977 requires the State and Regional Water Boards to encourage water recycling projects for beneficial use using wastewaters that would otherwise be discharged to marine or brackish receiving waters or evaporation ponds. The resolution also specifies using recycled water to replace or supplement the use of fresh water or better water quality water, and to preserve, restore, or enhance in-stream beneficial uses, including fish, wildlife, recreation and esthetics associated with any surface water or wetlands.

BAYS AND ESTUARIES POLICY — RESOLUTION NOS. 74-43 AND 95-84

The "Water Quality Control Policy for the Enclosed Bays and Estuaries of California" (Bays and Estuaries Policy), adopted in 1974 and amended in 1995, provides water quality principles and guidelines for the prevention of water quality degradation and the protection of beneficial uses of waters.

THERMAL PLAN (1975)

The "Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (known as the Thermal Plan), adopted in 1972 and amended in 1975, specifies water quality objectives, effluent quality limits, and discharge prohibitions related to elevated temperature waste discharges to interstate waters, enclosed bays, and estuaries.

POWERPLANT COOLING POLICY — RESOLUTION NO. 75-58

The "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling" (Powerplant Cooling Policy), adopted in 1975, specifies the State Water Board's position on powerplant cooling, specifying that fresh inland waters should be used for cooling only when other alternatives are environmentally undesirable or economically unsound.

POLICY ON DISPOSAL OF SHREDDER WASTE — RESOLUTION NO. 87-22

In 1987, the State Water Board adopted this policy that describes specific conditions to be enforced by the Regional Water Boards with regards to disposal of mechanically destructed car bodies, old appliances, or other similar castoffs at landfills.

POLICY REGARDING THE UNDERGROUND STORAGE TANK PILOT PROGRAM — RESOLUTION NO. 88-23

This policy adopted in 1988 implements a pilot program to fund oversight of remedial actions at leaking underground storage tank sites, in cooperation with the Department of Health Services.

SOURCES OF DRINKING WATER POLICY — RESOLUTION NO. 88-63

This policy, adopted by the State Water Board in 1988 and incorporated into the Basin Plan in 1989 (Water Board Order No. 89-039), established state policy that all surface and groundwater in the state are considered suitable, or potentially suitable, for municipal or domestic supply (MUN) and should be designated for this use, with certain exceptions.

NONPOINT SOURCE MANAGEMENT PLAN — RESOLUTION NO. 88-123

The "Nonpoint Source Management Plan" adopted in 1988 outlines the objectives and framework for implementing source control programs, with an emphasis on voluntary Best Management Practices and cooperation with local governments and other agencies.

RESOURCE VALUE OF TREATED GROUNDWATER — RESOLUTION NO. 89-21

The State Water Board, in approving the Water Board's guidelines for the disposal of extracted groundwater from groundwater clean-up projects, urges the Water Board to recognize the resource value of treated groundwater and to maximize its utilization for the highest beneficial uses for which applicable water quality standards can be achieved.

OCEAN PLAN — RESOLUTION NO. 90-27

The "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) adopted in 1990 establishes beneficial uses and water quality objectives for waters of the Pacific Ocean adjacent to the California coast outside of enclosed bays, estuaries, and coastal lagoons. The Ocean Plan prescribes effluent quality requirements and management principles for waste discharge and specifies certain waste discharge prohibitions.

POLLUTANT POLICY FOR SAN FRANCISCO BAY AND THE DELTA — RESOLUTION NO. 90-67

In 1990, the State Water Board adopted the "Pollutant Policy Document," which identifies and characterizes the pollutants of greatest concern in the Bay-Delta Estuary. This policy requires implementation of a mass emission strategy; a monitoring and assessment program; and strategies for discharges from boat yards, drydock facilities, and dredge disposal practices. In 1990, the Water Board passed a resolution directing implementation of the Pollutant Policy.

POLICIES AND PROCEDURES FOR INVESTIGATION AND CLEANUP AND ABATEMENT OF DISCHARGES — RESOLUTION NOS. 92-49 AND 96-79

This policy defines the goal of pollution cleanup and abatement as achieving the best quality of water that is reasonable. In certain cases where it is not reasonable to restore water quality to background levels, case-by-case clean-up levels may be specified, subject to the water quality provisions of the Basin Plan, beneficial uses of the waters, and maximum benefit to the people of the state. The State Water Board may determine that establishment of a containment zone is appropriate and consistent with the maximum benefit to the people of the State if applicable requirements contained in the Policy are satisfied.

DEPARTMENT OF DEFENSE AND STATE MEMORANDUM OF AGREEMENT 1992

In 1992, the State signed a cooperative agreement with the Department of Defense, Defense-State Memorandum of Agreement (DSMOA). The Deparment of Toxic Substances Control (DTSC) acts as the State's agent. Both the State and Regional Water Boards coordinate with DTSC to allocate agency responsibility and funding and establish procedures under which site investigation and cleanup will proceed, decisions will be made, and disputes will be resolved.

CALIFORNIA WETLANDS CONSERVATION POLICY (EXECUTIVE ORDER W-59-93)

This policy, adopted in 1993, established state guidelines for wetlands conservation. The primary goal is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage in California.

POLICY FOR REGULATION OF DISCHARGES OF MUNICIPAL SOLID WASTE — RESOLUTION NO. 93-62

Adopted in 1993, this policy directs the Regional Water Boards to amend waste discharge requirements for municipal solid waste landfills to incorporate pertinent provisions of the federal "Subtitle D" regulations under the Resource Conservation and Recovery Act (RCRA).

DELTA PLAN — RESOLUTION NO. 95-24

The "Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh" (Delta Plan), adopted in 1978, and Water Rights Decision No. 1485 designate beneficial uses and establish water quality (salinity) and flow standards to protect the beneficial uses in State waters from the large scale water operations under the State Water Project and Central Valley Project. In 1991, the State Water Board adopted the Water Quality Control Plan for Salinity, which supersedes the 1978 Delta Plan. The 1991 Plan does not establish Delta outflow standards.

In 1995, the State Water Board adopted Resolution No. 95-24 updating the 1991 Delta Plan. The Bay-Delta Plan protects the same beneficial uses that were protected by the 1991 Plan. The definitions of the beneficial uses, however, were changed non-substantively to ensure consistency with the State Water Board's policy.

MEMORANDUM OF AGREEMENT (MOA) BETWEEN THE DEPARTMENT OF HEALTH SERVICES AND THE STATE WATER BOARD ON USE OF RECLAIMED WATER (1996)

This MOA is intended to assure that the respective authority of DHS, the State Water Board, and the Regional Water Boards relative to use of recycled water will be exercised in a coordinated and cohesive manner to eliminate overlap of activities, duplication of effort, gaps in regulation, and inconsistency of action. It provides an important coordination role in the Water Board's recycled water regulation and resulted in the Water Board developing its General Water Reuse Permit (Order 96-011) and recycled water program.

POLICY FOR THE IMPLEMENTATION OF TOXICS STANDARDS FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA (SIP) — RESOLUTION NOS. 2000-0015 AND 2000-0030

The State Water Board adopted the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan, or SIP) in 2000. U.S. EPA subsequently approved all aspects of the SIP, except the TMDL Compliance Schedule provision. The SIP contains implementation provisions for 126 priority toxic pollutant criteria found within the National Toxics Rule, the California Toxics Rule and for priority pollutant objectives found in Basin Plans. The SIP applies to discharges of toxic pollutants and allows for a standardized approach for permitting, maintaining statewide consistency.

THE WATER QUALITY ENFORCEMENT POLICY — RESOLUTION NO. 2002-0040

The primary goal of the Enforcement Policy, adopted in 2002, is to create a framework for identifying and investigating instances of noncompliance, for taking enforcement actions that are appropriate in relation to the nature and severity of the violation, and for prioritizing enforcement resources to achieve maximum environmental benefits.

COOPERATIVE AGREEMENT WITH DEPARTMENT OF NAVY FOR REGULATORY OVERSIGHT AT NAVAL FACILITIES — RESOLUTION NO. 2003-0043

The Department of Navy and the State Water Board agreed to remove the remaining Navy facilities from the DSMOA and place those facilities into the Navy Cost Recovery program.

POLICY FOR IMPLEMENATATION AND ENFORCEMENT OF THE NONPOINT SOURCE POLLUTION CONTROL PROGRAM (2004)

This policy adopted in 2004 is designed to assist all responsible and/or interested parties in understanding how the State's nonpoint source pollution (NPS) water quality requirements will be implemented and enforced.

WATER QUALITY CONTROL POLICY FOR DEVELOPING CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST — RESOLUTION NO. 2004-0063

This policy adopted in 2004 describes the process by which the State and Regional Water Boards will comply with the listing requirements of Section 303(d) of the federal Clean Water Act. The objective of the policy is to establish a standardized approach for developing California's Section 303(d) water body list in order to achieve water quality standards and maintain beneficial uses in California's surface waters.

MEMORANDUM OF AGREEMENT BETWEEN DTSC, STATE WATER BOARD, WATER BOARDS, AND CAL/EPA FOR THE OVERSIGHT OF INVESTIGATION AND CLEANUP ACTIVITIES AT BROWNFIELD SITES (2005)

The purpose of the Brownfield Memorandum of Agreement (MOA) is to improve coordination between the Department of Toxic Substances Control (DTSC), the State Water Board and the Regional Water Boards regarding the oversight of cleanup activities at Brownfield sites. The MOA was developed in 2005 to ensure effective and expeditious cleanup of Brownfield sites in a manner that is protective of both public health and safety and the environment.

5.2 WATER BOARD PLANS AND POLICIES

Plans and policies adopted by the Water Board are classified under the following headings for easy reference.

Resolutions adopted prior to the revsion date of the 1995 Basin Plan are superceded unless specifically incorporated by reference into the plan. A discussion of each of the current Water Board Policies is under the appropriate heading.

- Cooperative Agreements
- Regional Monitoring, Data Use, and the Aquatic Habitat Program
- Discharger Reporting and Responsibilities
- Delta Planning
- Dredging
- Nonpoint source pollution
- Onsite Waste Dispersal and Waste Discharge
- Shellfish

- Vessel Wastes
- Water Recycling
- Wetlands
- Groundwater

5.2.1 COOPERATIVE AGREEMENTS

Many different local, state, and federal agencies oversee activities that affect the beneficial uses of the Region. To ensure that these activities are coordinated to the greatest possible degree, the Water Board enters into formal cooperative agreements. These agreements indicate the specific issue area of concern to both agencies and may also describe processes by which coordination will take place. Agreements regarding general coordination are listed below. Others are listed under specific issue areas.

MEMORANDUM OF UNDERSTANDING WITH THE DEPARTMENT OF FISH AND GAME — 1966

The Water Board has no means to conduct surveillance of ocean waters within its jurisdiction. Under the terms of this MOU, the Department of Fish and Game (DFG) agrees to notify the Water Board of any suspected violations of the Water Board's requirements for ocean disposal.

COORDINATION WITH THE SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC)

In 1966, the Water Board stated its intent to cooperate with the San Francisco Bay Conservation and Development Commission (BCDC) to the fullest extent necessary to ensure the protection of the San Francisco Bay shoreline and water quality (Resolution No. 737). In 1970, the Water Board urged BCDC to (1) require wastes resulting from projects permitted by BCDC to be connected to existing sewer lines; and (2) disapprove or temporarily withhold approval of any project that would cause added waste loading on a community sewerage system that is not meeting Board waste discharge requirements (Resolution No. 70-19).

LOCAL AGENCY FORMATION COMMISSIONS — RESOLUTION NO. 73-17

This Resolution describes actions that the Water Board and these commissions could take that would result in a coordinated effort to prevent and abate pollution.

MEMORANDUM OF UNDERSTANDING BETWEEN THE DEPARTMENT OF FISH AND GAME, STATE ATTORNEY GENERAL'S OFFICE, AND THE WATER BOARD ON NEGOTIATED SETTLEMENTS OF OIL SPILLS TO SAN FRANCISCO BAY FROM VESSELS TO SHORE FACILITIES DURING TRANSFER OPERATIONS

Due to the high frequency of oil spill events during the late 1970s, a MOU was developed between the Department of Fish and Game, the State Attorney General's Office and the Water Board to expedite enforcement of such spills. The MOU outlined a negotiated settlement process that emphasized industry preventative measures, a cleanup plan, and operational changes. In 1980 the Water Board contracted for a study and report to recommend technically feasible operational standards at marine transfer facilities in San Francisco Bay. The resulting 1980 report titled "Oil Pollution Prevention and Control in the San Francisco Bay Area" was instrumental in

changing the oil industry's operational procedures and a 90% reduction in oil transfer incidents over a two-year period.

MEMORANDUM OF UNDERSTANDING WITH THE COUNCIL OF BAY AREA RESOURCE CONSERVATION DISTRICTS (RCDS) — 1980

The purpose of this MOU is to combine the erosion control expertise of the Resource Conservation Districts (RCDs) with the regulatory authority of the Water Board to enforce erosion control measures. This action will increase the Water Board's ability to identify and correct erosion control problems associated with construction or agricultural activities.

WATER QUALITY MANAGEMENT: MOU WITH BCDC, STATE BOARD, AND THE WATER BOARD — NO. 87-154

This MOU specifies a coordination process for the three agencies to implement water quality goals mandated by State and federal legislation and states the Water Board's support in concept for legislation that would require a project applicant to obtain all discretionary approvals from the Water Board before filing its BCDC permit application.

POLICY TO PROMOTE COLLABORATION BETWEEN BAY AREA CLEAN WATER AGENCIES AND THE WATER BOARD ON POLLUTION PREVENTION — RESOLUTION NO. 2003-096

The Water Board and the Bay Area Clean Water Agencies (BACWA) agreed to pollution prevention guidelines and guiding principals in order to implement the requirements of Water Code Section 13263.3 and the Policy for Implementation of Toxic Substances for Inland Surface Waters, Enclosed Bays, and Estuaries (State Implementation Plan).

5.2.2 REGIONAL MONITORING, DATA USE, AND THE AQUATIC HABITAT PROGRAM

USE OF DATA COLLECTED BY THE AQUATIC HABITAT PROGRAM—RESOLUTION NO. 82-1

This resolution states how data collected by the Aquatic Habitat Program will be used and describes the Water Board's intent to seek the assistance of the University of California in data quality control and interpretation. Possible uses of data include: (a) revising water quality objectives; (b) relaxing or tightening effluent requirements; (c) enforcement action; (d) dissemination of information to the public; (e) determining sources of pollution; and (f) determining assimilative capacities of receiving waters.

MODIFIED GUIDELINES FOR THE EFFLUENT TOXICITY CHARACTERIZATION PROGRAM—RESOLUTION NO. 91-083

This resolution modifies the requirements of the Effluent Toxicity Characterization Program (adopted as a Basin Plan amendment in 1986) to make them more cost effective and responsive to the region's biomonitoring needs after several years' experience with the program.

REGIONAL MONITORING PROGRAM—RESOLUTION 92-043

In this resolution, the Water Board endorses the development and implementation of a comprehensive, Estuarywide monitoring program that will regularly collect information on concentrations of pollutants in water, sediment, and biota.

5.2.3 DISCHARGER REPORTING AND RESPONSIBILITIES

RESPONSIBILITY OF DISCHARGERS FILING TECHNICAL REPORTS—RESOLUTION NO. 67-3

This resolution requires those dischargers filing technical reports to submit a letter of transmittal signed by the discharger's senior administrative officer with reports involving formal time schedules and cease-and-desist orders.

SELF-MONITORING REPORTS—RESOLUTION NO. 73-16

With this resolution, the Water Board specified the format and requirements for filing self-monitoring reports.

CONTINGENCY PLANS—RESOLUTION 74-10

By adopting this resolution, the Water Board required dischargers to develop and implement contingency plans to assure continuous operation of facilities for the collection, treatment, and disposal of wastes.

WAIVING WASTE DISCHARGE REQUIREMENTS FOR SPECIFIC TYPES OF DISCHARGE—RESOLUTION NO. 83-3

The Water Board waived the requirement of filing report of waste discharge for specific types of waste discharge that have a relatively insignificant adverse effect on water quality.

5.2.4 DELTA PLANNING

SAN LUIS DRAIN—RESOLUTION NOS. 535 (1964) AND 81-1

The Water Board prohibits discharge by the proposed drain until evidence that the discharge would not threaten beneficial uses is submitted by the dischargers. The resolution (No. 535) also directs the staff to determine the beneficial uses of the proposed receiving waters and the conditions necessary for their protection. In 1981 (No. 81-1), the Board requested that the State Water Board, in close coordination with the Water Board, assume the lead role in the development, revision, renewal, and enforcement of waste discharge requirements for the proposed San Luis Drain.

PERIPHERAL CANAL—RESOLUTION NO. 80-6

In 1980, the Board expressed its concern regarding the adverse impacts on water quality of certain projects authorized by Senate Bill 200 and endorsed protective measures for the Delta, Suisun Bay, and San Francisco Bay.

5.2.5 DREDGING

REGULATION OF DREDGING SEDIMENT DISPOSAL—RESOLUTION NO. 80-10

This resolution acknowledges the U.S. Army Corps of Engineers' implementation of new procedures for evaluating dredged material. The Water Board agreed that the Corps should be responsible for the administration of the new procedures for evaluating discharges of dredged materials. The Water Board reserved the right to act to protect water quality, if necessary. The resolution also gave the Water Board's Executive Officer considerable discretion regarding additional water quality and sediment testing requirements, as well as monitoring for dredged sediment disposal impact.

DELEGATION OF AUTHORITY TO WAIVE CERTIFICATION FOR SMALL DREDGING PROJECTS—RESOLUTION NO. 87-53

In 1987, the Water Board delegated authority to the Executive Officer to waive water quality certification for activities involving the excavation and disposal of 50,000 cubic yards or fewer of San Francisco Bay sediments and the filling of two acres or fewer of wetlands.

POLICY ON DISPOSAL OF DREDGED MATERIAL AND NEW PROJECTS—RESOLUTION NO. 89-130

In 1989, the Water Board placed a limit on new dredging work, established annual and monthly targets for the volume of dredged material disposed of at designated sites, and restricted the disposal of dredged material to certain times of the year in order to protect migrating fish. The State Water Board subsequently modified the limits on new dredging (Resolution No. 90-10).

SCREENING CRITERIA AND TESTING REQUIREMENTS FOR USE OF SEDIMENT FOR WETLAND CREATION AND OTHER UPLAND USES—RESOLUTION NO. 92-145

In this resolution, the Water Board established screening criteria to be used to evaluate the appropriateness of using dredged material for beneficial purposes.

TESTING GUIDELINES FOR DREDGED MATERIAL DISPOSAL AT BAY AREA SITES—RESOLUTION NO. 93-009

The Water Board endorsed a set of testing guidelines developed in cooperation with the U.S. Army Corps of Engineers, U.S. EPA, and the Bay Conservation and Development Commission. To implement these guidelines, the Water Board also directed staff to work towards establishing a coordinated agency permit process for maintenance dredging permit applications.

5.2.6 NONPOINT SOURCE POLLUTION

CONTROL OF WATER POLLUTION FROM CONSTRUCTION OF DAMS—1953

The Water Board adopted this motion to reduce the possibility of erosion during the construction of dams. For small projects not likely to cause erosion problems, the motion recommends that the Executive Officer send a letter to the responsible person advising him or her to take appropriate

precautionary actions. For larger projects, the responsible person is required to submit a report of waste discharge.

SURFACE RUNOFF—RESOLUTION NO. 78-5

In this resolution, the Water Board acknowledges surface runoff as a significant source of pollution in the San Francisco Bay Basin and resolves to take appropriate actions (e.g., best management practices) to reduce pollution loads from surface water runoff.

EROSION CONTROL FROM CONSTRUCTION ACTIVITIES—RESOLUTION NO. 80-5

The Water Board, in this resolution, recognizes the seriousness of impacts on beneficial uses related to construction activities. The Water Board identifies local governments as having the responsibility for controlling erosion from development activities and for adopting and administering erosion control ordinances. The Water Board also stated its intent to monitor the progress of local governments in their adoption and implementation of effective erosion control programs.

DAIRY WASTES—RESOLUTION NOS. 74-11 AND 77-5

In 1974, the Water Board passed Resolution No. 74-11, which prohibits the discharge of manure into a watercourse subject to flooding. This requirement augmented the State Water Board's "Minimum Guidelines for Animal Waste Management." Full compliance was initially scheduled to occur by September 1977, but was extended to 1978 for dairies outside the Tomales Bay and Walker Creek watersheds because of a severe drought (77-5).

INDUSTRIAL STORM WATER DISCHARGES—RESOLUTION NO. 92-118

In this resolution, the Water Board authorized additional monitoring and reporting requirements for dischargers holding industrial stormwater NPDES permits in cases where the watershed is known to be adversely impacted by storm water discharges, the pollution potential of the discharge cannot be assessed with the minimum information, or more information will lead to more effective control mechanisms.

LIABILITY FOR PARTIES ENGAGED IN ABANDONED MINE REMEDIATION—RESOLUTION NO. 93-078

In 1993, the Water Board expressed concern regarding the incentives for cleaning up mines thought to be responsible for roughly 60% of copper loading to the Delta.

5.2.7 ONSITE WASTE DISPERSAL AND WASTE DISCHARGE

The Water Board's policy on small waste discharge systems has evolved considerably as the Bay Area has become more developed. The following section summarizes a series of resolutions regarding conditions under which the Water Board would waive waste discharge reporting requirements. Generally, this waiver is only granted when a county or other government entity has an active permitting and monitoring program comparable to the Water Board's.

SEPTIC, LEACHING, AND SMALL COMMUNITY SYSTEMS—RESOLUTION NO. 81 (1951)

This resolution stated the Water Board's objection to the construction and use of wells for septic effluent disposal or street runoff, except when such wells discharge into geologic formations that at no time contained water suitable for domestic, agricultural, or industrial use.

WAIVER OF REQUIREMENT TO REPORT WASTE DISCHARGE FOR SYSTEMS REGULATED BY COUNTY AND LOCAL AGENCIES

In 1963 and 1964, the Water Board waived its regulatory authority over waste discharge reporting for family dwellings using discrete systems, as long as they were already regulated by local health departments and met certain conditions. In the same resolutions, the Water Board also urged local planning and legislative bodies to require connection to sewer systems for all new development whenever feasible. Resolutions were adopted for Alameda County (No. 512; 1963), Contra Costa County (No. 583; 1964), Napa County (No. 596; 1964), San Mateo County (No. 597; 1964), Solano County (No. 598; 1964), Sonoma County (No. 599; 1964), and Santa Clara County (No. 600; 1964). The Solano County waiver (Res. 598) was later amended by Resolution No. 75-12 in 1975, which indicated that the waiver would not apply to planned unit development with minimum lot sizes smaller than 2.5 acres and by Resolution 83-1 (1983).

The Water Board's general policy on discrete sewerage facilities was later amended by Resolution Nos. 78-14 (1978) and 79-5 (1979). The first described specific actions that would be taken by the Water Board when it was presented with a proposal for new discrete sewerage systems and what specific requests it would make of local governments. In 79-5, the Water Board set minimum guidelines for determining the adequacy of local ordinances for controlling individual wastewater treatment and disposal systems.

In 1980, the Water Board (Resolution No. 80-9) requested that the County of Alameda correct deficiencies in its individual waste treatment and disposal systems program, acting under policies adopted in the Alameda County waiver (Res. 512) and discrete sewerage policies (Res. 78-14 and 79-5). In 1981, the Water Board rescinded Resolution No. 597 and reissued a policy (Resolution No. 81-9) on waiving reporting of discharges from individual wastewater treatment and disposal systems in San Mateo County. The Contra Costa County Waiver was amended in 1983 (Res. 83-2), and the Marin County Waiver in 1984 (Res. 84-12).

SEWER AND ONSITE SEWER DISPOSAL IN BOLINAS — RESOLUTION NOS. 85-007 AND 87-091

The Water Board indicated its support of a moratorium on new sewer connections and new onsite sewage disposal systems adopted by Marin County Board of Supervisors.

SPECIFIC PROHIBITIONS OF ONSITE DISPOSAL SYSTEMS FOR STINSON BEACH AND GLEN ELLEN (RESOLUTION NOS. 73-13 AND 73-14) AND EMERALD LAKE HILLS (RESOLUTION NO. 76-7)

These resolutions prohibited waste discharges to onsite disposal systems in the Stinson Beach (Marin County), Glen Ellen (Sonoma County), and Emerald Lake Hills and Oak Knoll Manor (San Mateo County) areas, with some exceptions to the prohibition. Resolution No. 73-13 has since been amended or clarified in Resolution Nos. 73-18, 74-5, 74-6, 77-2, 78-1, and 81-5.

Resolution No. 78-1 conditionally amended the prohibition of discharge outlined in 73-13 by allowing the discharge of waste to individual leaching or percolation systems where such discharges are regulated by the Stinson Beach County Water District.

CITY OF NOVATO — RESOLUTION NO. 87-155

In this resolution, the Water Board stated its policy regarding a waiver of waste discharge reporting requirements from individual wastewater treatment systems in the City of Novato.

MEMORANDUM OF UNDERSTANDING WITH NAPA COUNTY REGARDING WINERY PROCESS TREATMENT AND DISPOSAL — 1982 (UPDATED IN 1992)

Under this agreement, the Water Board approved Napa County's program for monitoring winery onsite disposal.

5.2.8 SHELLFISH

POLICY STATEMENT WITH RESPECT TO THE IMPLEMENTATION OF TIME SCHEDULES FOR FACILITIES TO PROTECT SHELLFISH — RESOLUTION NO. 74-14

In this resolution the Water Board directed the Executive Officer to determine whether or not dischargers were providing or would be providing adequate protection to allow for sport harvesting of shellfish. The Water Board also stated its intent to adopt a time schedule for protection (in conformance with staff guidelines).

SHELLFISH PROGRAM — RESOLUTION NOS. 78-8 AND 83-10

The first resolution directs the Executive Officer to develop and implement a program to determine the feasibility of opening shellfish beds for recreational use. The second resolution describes a phased shellfish protection program in which discharge limits for dry-season runoff to Anza Lagoon and other South Bay sites would be considered. In addition, the Water Board urged BCDC to consider ways to eliminate or minimize potential dry season runoff from planned projects and directed review of discharger self-monitoring studies to determine when additional data are necessary to avoid effects on shellfish beds.

DESIGNATION OF TOMALES BAY UNDER THE 1993 SHELLFISH PROTECTION ACT — RESOLUTION NO. 94-018

In this resolution, the Water Board identified Tomales Bay as an area where commercial shellfishery is threatened and authorized the formation of a technical advisory committee to investigate and develop a remediation strategy.

5.2.9 VESSEL WASTES

VESSEL SEWAGE DISCHARGE POLICY — RESOLUTION NO. 665 (1965)

The Water Board, in this resolution, expressed concern over the discharge of untreated sewage from certain vessels over which it does not have jurisdiction. The Board suggested that the discharge of vessel wastes be regulated by the federal government.

URGING BCDC TO REQUIRE SHORESIDE VESSEL WASTE FACILITIES — RESOLUTION NO. 70-1 (1970)

This resolution urged BCDC to require applicants for new or expanded marinas or port facilities to provide the following as permit conditions: (l) dockside sewers; (2) pump‗out facilities at marinas with disposal to shoreside sewage facilities; and (3) adequate restroom facilities.

VESSEL WASTE DISCHARGES TO SAN FRANCISCO BAY — RESOLUTION NO. 70-65

Three recommendations were made in this resolution: (1) that owners of marinas provide dockside sewerage facilities and that owners of vessels with sanitary facilities install holding tanks; (2) that the State Water Board request the federal government to prohibit discharges of vessel wastes; and (3) that the legislature adopt legislation that would require waste holding tanks on vessels with sanitary facilities to transport the wastes to treatment plants.

VESSEL WASTE DISCHARGE INTO RICHARDSON BAY — RESOLUTION NO. 91-118

In this resolution, the Water Board found that the Richardson Bay Regional Agency's Implementation Plan and associated local ordinances will provide a mechanism for enforcing the prohibition against vessel waste discharge in the area.

5.2.10 WATER RECYCLING

WATER REUSE STUDY — RESOLUTION NO. 79-2

In this resolution, the Water Board stated its position regarding Phase II of the San Francisco Bay Area Water Reuse Study. The Water Board acknowledged the importance of using recycled water to meet California's future water supply needs and commented on the economics of the delivery of recycled water to users.

5.2.11 WETLANDS

USE OF WASTEWATER TO CREATE, RESTORE, AND ENHANCE MARSHLANDS — RESOLUTION NOS. 77-1 AND 94-086

These resolutions describe the Water Board's policy regarding the use of wastewater to create, restore, maintain, and enhance marshlands. In general, the policy supports the use of wastewater to support new wetland habitat, under the condition that beneficial uses established are fully protected.

USE OF CONSTRUCTED WETLANDS FOR URBAN RUNOFF POLLUTION CONTROL — RESOLUTION NO. 94-102

In this resolution, the Water Board expressed support for the construction of new wetland areas for the purpose of reducing pollutant loading from urban runoff, under certain conditions.

5.2.12 GROUNDWATER

DISPOSAL OF EXTRACTED GROUNDWATER FROM CLEAN-UP PROJECTS — RESOLUTION NO. 88-160

In this resolution, the Water Board established priorities for the disposal of water extracted from groundwater cleanup sites. The first priority is to reclaim effluents to the extent reclamation is technically and economically feasible. If this is not possible, then discharge to a municipal treatment plant was determined to be in the public interest. If neither reclamation nor discharge to a municipal plant is feasible, the Board will issue NPDES permits authorizing discharge from these sites.

CHAPTER 6: SURVEILLANCE AND MONITORING

6.1 REGIONAL MONITORING PROGRAM

The effectiveness of a water quality control program requires information supplied by comprehensive surveillance and monitoring of water, sediment, aquatic resources, and the human activities that have the potential to impact beneficial uses. The following section describes the monitoring programs that together provide high quality, comprehensive scientific information on water quality in the Region. The Water Board uses information produced by the programs described below to satisfy the requirements of Sections 104, 106, 208, 301, 303, 304, 307, 308, 314, and 402 of the federal Clean Water Act and applicable portions of the state's Porter-Cologne Water Quality Control Act.

The Regional Monitoring Program forms the core of water quality, sediment quality, and tissue (including bivalves and fish) monitoring in the Estuary. Historically, water quality in the Region was tracked by Water Board and State Water Board research and monitoring programs and numerous studies carried out by other interested state, federal, and local agencies.

From 1989 to 1992, the Water Board developed and implemented pilot programs for the San Francisco Estuary Regional Monitoring Program (RMP), through the Bay Protection and Toxic Cleanup Program (BPTCP) and U.S. EPA grants. In 1993, the RMP was formally established to provide integrated, comprehensive, and systematic information on water quality in the Region. Its goal is to evaluate the effectiveness of the Water Board's water quality program in meeting Basin Plan objectives, including protection of beneficial uses in the Estuary.

The Regional Monitoring Program's specific objectives are to:

1. Describe the distribution and trends of pollutant concentrations in the Estuary;
2. Project future contaminant status and trends using best understanding of ecosystem processes and human activities;
3. Describe sources, pathways, and loading of pollutants entering the Estuary;
4. Measure pollution exposure and effects on selected parts of the Estuary ecosystem (including humans);
5. Compare monitoring information to relevant benchmarks, such as total maximum daily load (TMDL) targets, tissue screening levels, water quality objectives, and sediment quality objectives; and
6. Effectively communicate information from a range of sources to present a more complete picture of the sources, distribution, fate, and effects of pollutants and beneficial use attainment or impairment in the Estuary ecosystem.

Every five years, an outside group of scientific experts reviews the RMP to assure it is fulfilling its objectives and providing useful and timely information regarding the Estuary. In 2002, the RMP status and trends component was revised to incorporate probabilistic monitoring. The 2002-2004 sample locations shown in Figure 6-1 were selected according to a probabilistic design. Each year sites are randomly selected and will be in different locations than shown in Figure 6-1. The list of parameters is presented in Table 6-1.

The RMP participants, including dredgers, stormwater agencies, and municipal and industrial dischargers that hold Water Board permits for waste discharge into the Estuary, fund the RMP as a requirement of their permits. The San Francisco Estuary Institute (SFEI), an independent nonprofit organization, administers and manages the program under a Memorandum of Understanding with the Water Board.

The RMP, through SFEI, produces an Annual Monitoring Report that summarizes the current state of the Estuary with regard to pollution, a summary report (Pulse of the Estuary), a quarterly newsletter, technical reports that document specific studies and synthesize information from diverse sources, and journal publications that disseminate RMP results to the world's scientific community.

6.2 SURFACE WATER AMBIENT MONITORING PROGRAM

In January 2000, the Surface Water Ambient Monitoring Program (SWAMP) was proposed in a Report to the Legislature to integrate existing water quality monitoring activities of the State and Regional Water Boards, and to coordinate with other monitoring programs. Water Code Section 13192 required the State Water Board to assess and report on the state monitoring programs and prepare a proposal for a comprehensive monitoring program. Water Code Section 13191 requires the State Water Board to convene an Advisory Group to assist in the evaluation of program structure and effectiveness, as it relates to the implementation of the requirements of Clean Water Act Section 303(d), applicable federal regulation, and monitoring and assessment programs.

Ambient monitoring refers to any activity in which information about the status of the physical, chemical and biological characteristics of the environment is collected to answer specific questions about the status and trends in those characteristics. For the purposes of SWAMP, ambient monitoring refers to these activities as they relate to the characteristics of water quality.

SWAMP is a statewide monitoring effort designed to assess the conditions of surface waters throughout the state of California. The State Water Board administers the program. Responsibility for implementation of monitoring activities resides with the nine Regional Water Boards that have jurisdiction over their specific geographical areas of the state.

In the Region, SWAMP is targeted to water bodies not monitored by the RMP. The numerous water bodies of the Region are listed in Table 2-1. SWAMP includes physical, chemical, and biological monitoring. SWAMP's focus is on water quality assessment in watersheds. SWAMP is intended to fulfill water quality assessment reporting requirements under Clean Water Act Section 305(b), and to support Clean Water Act Section 303(d) impairment decisions in cases where there is adequate information available to meet data requirements in the State Water Board's 303(d) Listing Policy, established in September 2004. The 305b and 303d requirements for the Estuary are met through the RMP, described in Section 6.1 Regional Monitoring Program.

In 1976, the state initiated the State Mussel Watch and State Toxic Substances Monitoring Programs to regularly monitor the concentration of pollutants in the tissue of aquatic organisms. Tissue levels reflect exposure over much longer periods of time than instantaneous water column samples and provide a field-based estimate for exposure of people, fish, and wildlife to pollutants in the food chain.

The Mussel Watch Program uses resident and transplanted bivalves to monitor pollutant levels at coastal reference stations and selected sites in bays and estuaries to confirm potential toxic substance pollution. The location of bivalve sampling stations in the Region are summarized in Figure 6-2 and Table 6-2. Periodic monitoring of bivalve tissue conducted by the National Mussel Watch administered by the National Oceanic and Atmospheric Association (NOAA) and international surveys complements information from the State Mussel Watch Program.

The Toxic Substances Monitoring Program used resident fish and other aquatic organisms to monitor pollutant levels in freshwater systems throughout the state. The location and sampling history of Toxic Substances Monitoring stations in the region are summarized in Figure 6-3 and Table 6-3.

The State Mussel Watch and State Substances Monitoring Programs have been incorporated into SWAMP. The Toxicity Testing Program and Coast Fish Contamination Program have also been incorporated into SWAMP.

6.3 SACRAMENTO-SAN JOAQUIN RIVERS AND NORTHERN SAN FRANCISCO BAY ESTUARY WATER QUALITY SURVEILLANCE

Water flowing into the San Francisco Estuary from the Sacramento and San Joaquin rivers is regularly monitored by numerous agencies and programs, including the Sacramento Coordinated Water Quality Monitoring Program (in the Sacramento metropolitan area), the Department of Water Resources, the Central Valley Regional Water Quality Control Board, and the Interagency Ecological Studies Program. Conventional water quality parameters, water and suspended material chemistry, and toxicity are sampled at a network of stations located throughout the Delta and into San Pablo Bay. In addition, phytoplankton, benthic community, and beneficial use surveys are regularly conducted in this area.

The primary goals of these efforts are to: (a) assure riverine water quality meets applicable standards; (b) identify changes in water quality potentially related to the operation of the State Water Project; and (c) develop technical information that can be used to estimate mass loading of pollutants to the Estuary from riverine sources.

6.4 GROUNDWATER MONITORING NETWORKS

Groundwater monitoring networks are established in several basins in the Region. At present, there are monitoring networks in the Livermore-Amador Valley by Zone 7, Niles Cone by the Alameda County Water District (ACWD), Santa Clara Valley by the Santa Clara Valley Water District (SCVWD), Half Moon Bay Terrace by the Coastside County Water District and the Montara Water and Sanitation District), San Francisco's Westside Basin by the San Francisco Public Utilities District (SFPUC), and Napa Valley by the Napa Valley Flood Control and Water Conservation District. In order to find out the most current status of these networks, local water management agencies should be contacted directly.

In addition, the U.S. Geological Survey (USGS) and the Department of Water Resources (DWR) maintain regional monitoring networks. Typically, monitoring is conducted at least

annually for general mineral quality and water levels. This well data may be of use to determine the general potability of groundwater and the status of sea water intrusion control.

The Water Board is integrating the locations of monitoring well networks into its groundwater geographic information system. The water quality data generated from the networks will assist Water Board staff in the refinement of beneficial use designations for groundwater basins.

The State Water Board has contracted the USGS and Lawrence Livermore National Laboratory (LLNL) to implement the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The primary objective of the GAMA Program is to comprehensively assess statewide groundwater quality and gain an understanding about contamination risk to specific groundwater resources. The Groundwater Quality Monitoring Act of 2001 (Sections 10780-10782.3 of the Water Code) resulted in a publicly accepted plan to monitor and assess the quality of all priority groundwater basins that account for over 90 percent of all groundwater used in the state. The plan prioritizes groundwater basins assessment based on groundwater use.

The GAMA Program monitors groundwater from public supply wells for a broad suite of chemicals at very low detection limits, including exotic chemicals such as wastewater chemicals and pharmaceuticals. Monitoring and assessments for priority groundwater basins will be completed every ten years, with trend monitoring every three years. Monitoring reports for data collected in the Region are available at the State Water Board website.

6.5 COMPLIANCE MONITORING

A second component of the state's water quality surveillance and monitoring program relates specifically to discharges of pollutants at individual point and nonpoint sources. All entities holding Water Board discharge permits must conduct regular sampling and analysis of waste released to surface and groundwaters. They must also analyze material to be dredged. The specific chemical and physical parameters, types (i.e., toxicity tests, bioaccumulation studies, waste stream sampling, etc.), frequency, and other information requirements are determined on a case-by-case basis according to the nature of the discharge and potential environmental effects. Each permit issued by the Water Board describes the specific compliance monitoring requirements for that permit holder. Monitoring data collected by point source dischargers and nonpoint pollution control programs are used to:

- Determine compliance with and provide documentation to support enforcement of permit conditions;
- Support derivation of effluent limitations and wasteload allocations; and
- Provide information needed to relate receiving water quality to mass emissions of pollutants by dischargers.

Self-monitoring data are often supplemented by information obtained by Water Board staff during site inspections (including waste analyses) and through special studies, such as those characterizing the variability of the discharge, pollutant levels in nearby receiving water and biota, and characterization of pollutant loads attributable to urban runoff.

6.6 COMPLAINT INVESTIGATION

The Water Board encourages members of the public to alert it to pollutant discharge or nuisances that may impact water quality. Staff respond to each complaint, document the observed conditions, and take any necessary follow-up actions to institute appropriate corrective measures.

6.7 BIENNIAL WATER QUALITY INVENTORY

The Water Board prepares a biennial report on water quality (as required under Section 305(b) of the Clean Water Act, PL 92-500). This report includes (a) a description of the water quality of major navigable waters in the state during the preceding years; (b) an analysis of the extent to which significant navigable waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allow recreational activities in and on the water; (c) an analysis of the extent to which elimination of the discharge of pollutants is being employed or will be needed; and (d) an estimate of the environmental impact and the economic and social costs necessary to achieve the "no discharge" objective of PL 92-500, the economic and social benefits of such achievement, and an estimate of the date of such achievement. Recommendations as to the programs that must be undertaken are provided, along with estimates of the cost.

6.8 OTHER MONITORING PROGRAMS

In addition to the state's surveillance and monitoring program, several other agencies in the Bay Area monitor water quality, including local city and county offices, federal agencies, and water supply districts. Local universities also conduct research and monitoring activities. All of these programs provide additional information and data that enhance the state's efforts.

FIGURES

TABLES

Figure 6-1 Regional Monitoring Program Sampling Stations: 2002-2004

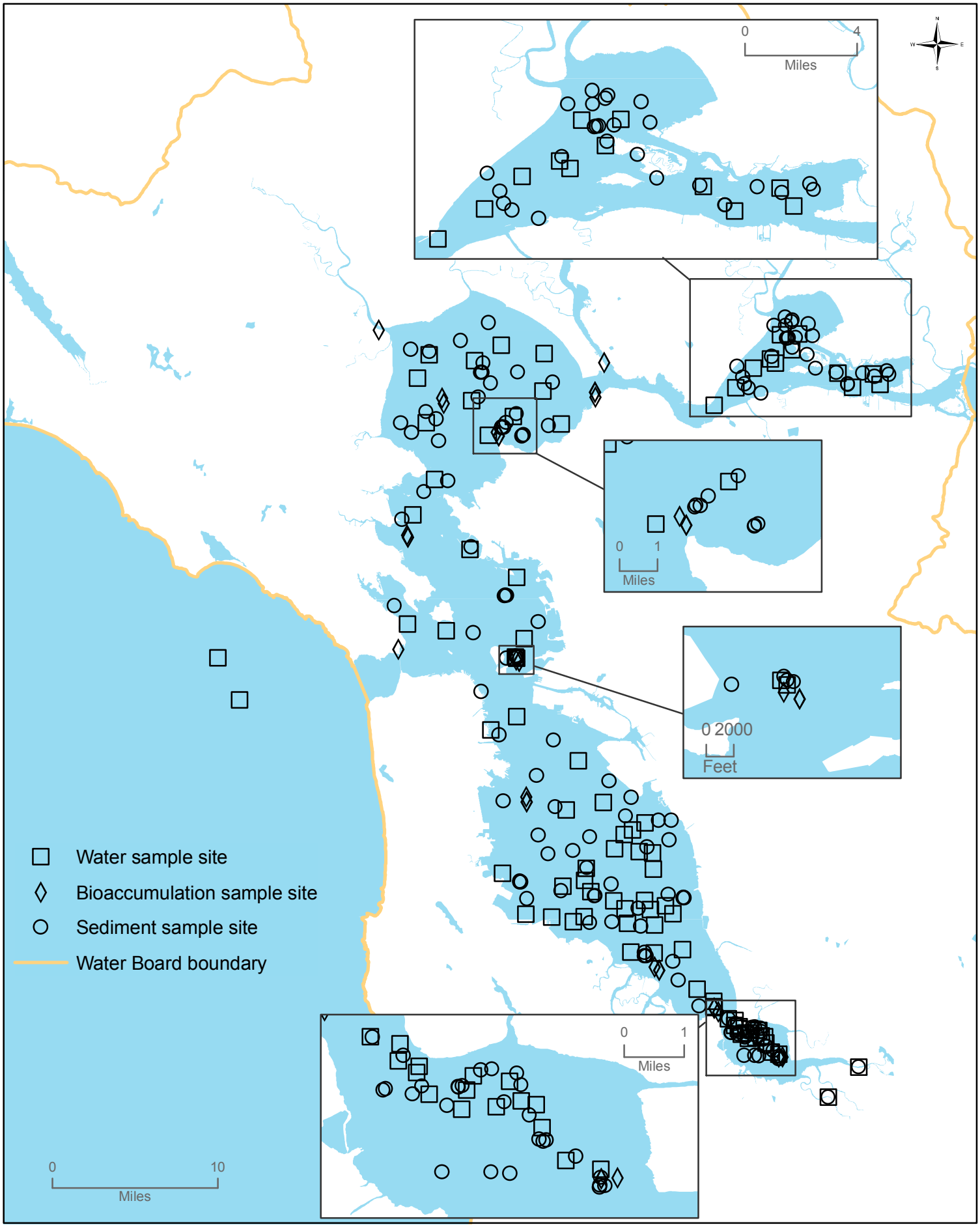

Figure 6-2 State Mussel Watch Program Monitoring Network

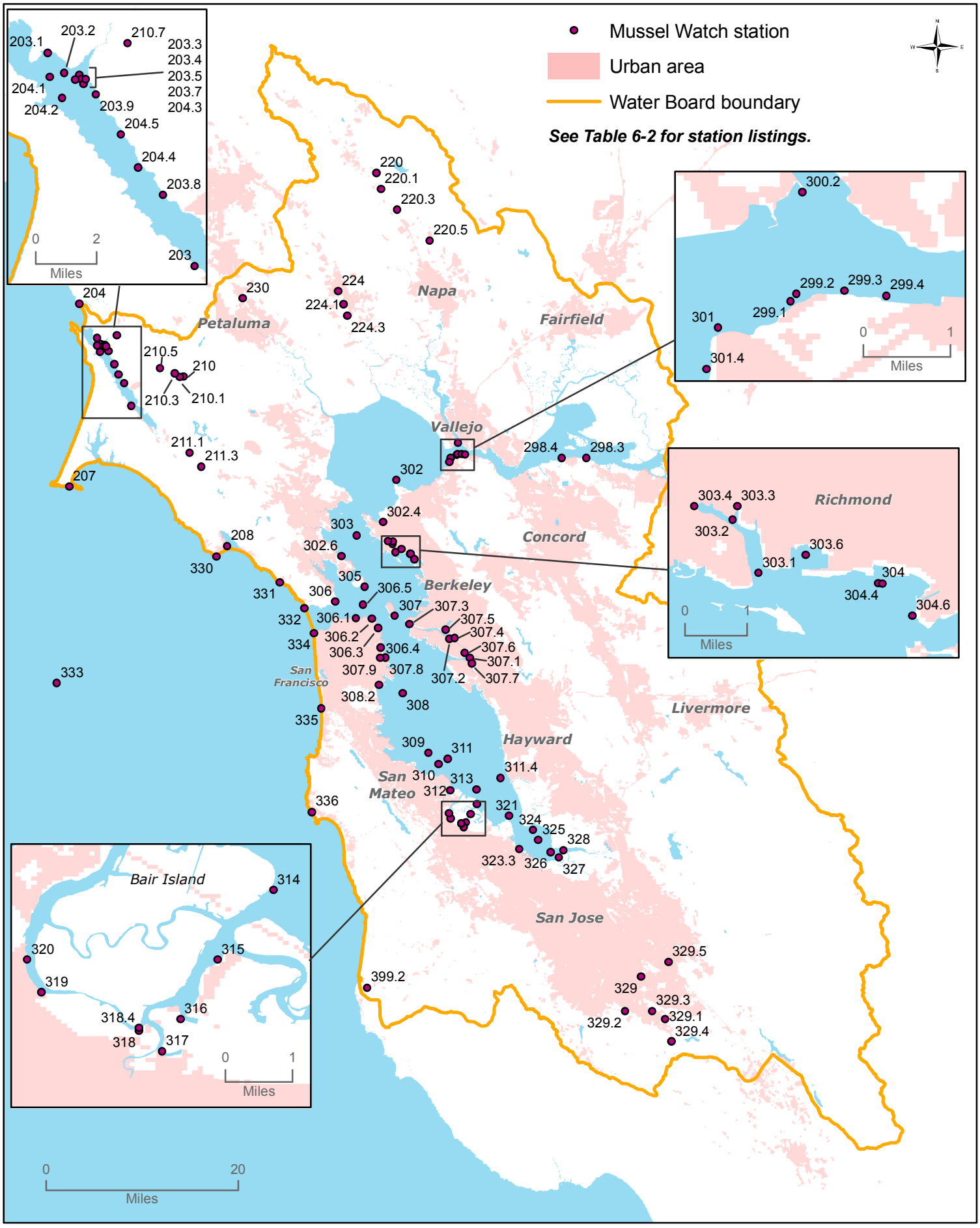

Figure 6-3 Toxic Substances Monitoring Network

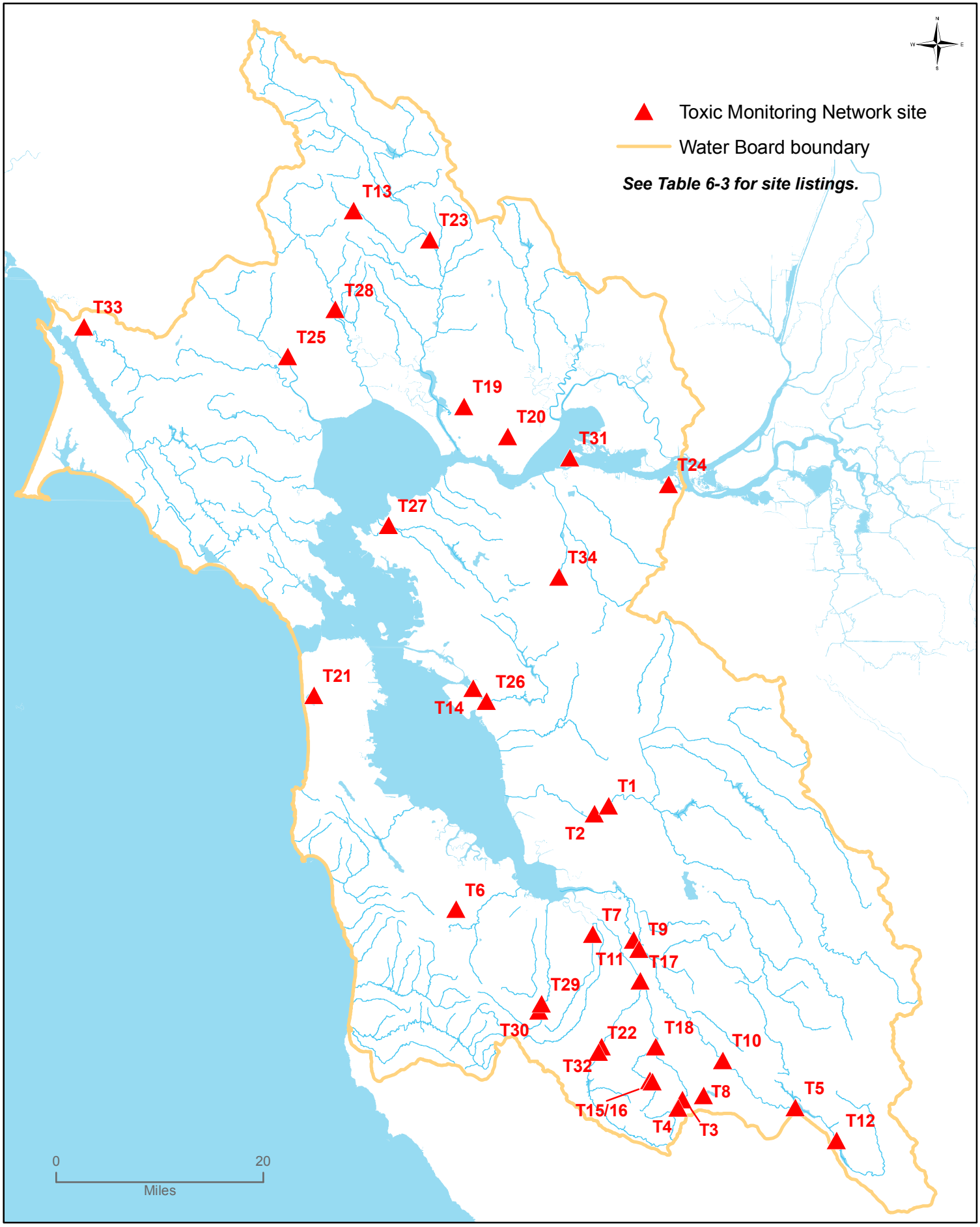

Table 6-1 Parameters Analyzed for in the Regional Monitoring Program

Conventional Water Quality Parameters
Conductivity
Dissolved Ammonia
Dissolved Nitrate
Dissolved Nitrite
Dissolved Organic Carbon
Particulate Organic Carbon
Dissolved Oxygen
Dissolved Phosphates
Dissolved Silicates
Hardness (when salinity is < 5 parts per thousand)
pH
Phaeophytin
Salinity
Temperature
Total Chlorophyll-*a*
Total Suspended Solids

Sediment Quality Parameters
% clay (< 4 µm)
% silt (4 µm–62 µm)
% sand (2 mm > 62 µm)
% gravel (> 2 mm)
% solids
Depth
Hydrogen Sulfide *(QAQC measurements)*
pH (porewater, interstitial sediment)
Total Ammonia *(QAQC measurements)*
Total Organic Carbon
Total Sulfide *(QAQC measurements)*
Total Nitrogen

Bivalve Tissue Parameters
% Lipid
% Moisture
Bivalve Percent Survival
Growth - Change in Internal Shell Volume (mean, std. dev)
Dry Flesh Weight (mean and std error)

Toxicity Tests—Water and Sediment
Episodic Aquatic Toxicity – (*Ceriodaphnia, Menidia,* Mysid) % Survival
Sediment Toxicity – (Amphipod) % Survival
Sediment Toxicity – (Bivalve) % Normal Development

Table 6-1: Parameters Analyzed for in the Regional Monitoring Program (cont.) – p.2

Trace elements analyzed in water, sediment, and tissue samples:
Target Method Detection Limits (MDLs) are in parentheses following the reporting units.

	Water (Dissolved and Total)	**Sediment** (dry weight)
Lab(s)	BRL/UCSCDET	BRL/CCSF/ UCSCDET
Aluminum (Al)*	-	mg/kg (200)
Arsenic (As)	µg/L (0.1)	mg/kg (0.2)
Cadmium (Cd)*	µg/L(0.001)	mg/kg (0.001)
Cobalt (Co)*	µg/L(0.001)	
Copper (Cu)*	µg/L (0.01)	mg/kg (2)
Iron (Fe)*	µg/L(10)	mg/kg (200)
Lead (Pb)*	µg/L (0.001)	mg/kg (0.5)
Manganese (Mn)*	µg/L (0.01)	mg/kg (20)
Mercury (Hg)	µg/L (.0001)	mg/kg (0.00001)
Methylmercury (MeHg)	ng/L (0.005)	µg/kg (0.005)
Nickel (Ni)*	µg/L (0.01)	mg/kg (5)
Selenium (Se)	µg/L (0.02)	mg/kg (0.01)
Silver (Ag)*	µg/L (0.0001)	mg/kg (0.001)
Zinc (Zn)*	µg/L (0.005)	mg/kg (5)

- Parameter is not sampled for the matrix.
* Near-total instead of total concentrations are reported for water. Near-total metals are extracted with a weak acid (pH < 2) for a minimum of one month, resulting in measurements that approximate bioavailability of these metals to Estuary organisms.

Trace organic parameters (lab; reporting units) – in water (AXYS & CDFG; pg/L), sediment (EBMUD; µg/kg), and bivalve tissue (CDFG-WPCL; µg/kg) samples:
Organochlorines analyzed by GC-ECD will be determined using two columns of differing polarity.

Polynuclear Aromatic Hydrocarbons (PAHs)
(Target MDLs: water – 200 pg/L, sediment and tissue – 5 µg/kg; water PAHs reported in ng/L)

1-Methylnaphthalene
2,3,5-Trimethylnaphthalene
2,6-Dimethylnaphthalene
2-Methylnaphthalene
Biphenyl
Naphthalene
1-Methylphenanthrene
Acenaphthene
Acenaphthylene
Anthracene
Fluorene
Phenanthrene
Benz(a)anthracene
Chrysene
Fluoranthene
Pyrene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(e)pyrene
Benzo(k)fluoranthene
Dibenz(a,h)anthracene
Perylene
Benzo(ghi)perylene
Indeno(1,2,3-cd)pyrene
Dibenzothiophene

Alkylated PAHs
C1-Chrysenes
C2-Chrysenes
C3-Chrysenes
C4-Chrysenes
C1-Dibenzothiophenes
C2-Dibenzothiophenes
C3-Dibenzothiophenes
C1-Fluoranthene/Pyrenes
C1-Fluorenes
C2-Fluorenes
C3-Fluorenes
C1-Naphthalenes
C2-Naphthalenes
C3-Naphthalenes
C4-Naphthalenes
C1-Phenanthrene/Anthracenes
C2-Phenanthrene/Anthracenes
C3-Phenanthrene/Anthracenes
C4-Phenanthrene/Anthracenes

SYNTHETIC BIOCIDES
(Target MDLs: water – 2 pg/L, sediment and tissue – 1 µg/kg)

Cyclopentadienes
Aldrin
Dieldrin
Endrin

Chlordanes
alpha-Chlordane
cis-Nonachlor
gamma-Chlordane
Heptachlor
Heptachlor Epoxide
Oxychlordane
trans-Nonachlor

Dichloro-diphenyl-trichloroethane (DDTs)
o,p'-DDD
o,p'-DDE
o,p'-DDT
p,p'-DDD
p,p'-DDE
p,p'-DDT

Hexachlorcylohexane (HCH)
alpha-HCH
beta-HCH
delta-HCH
gamma-HCH

Other Synthetic Biocides
Chlorpyrifos (water only; CDFG-WPCL)
Dacthal (water only)
Diazinon (water only; CDFG-WPCL)
Endosulfan I (water only)
Endosulfan II (water only)
Endosulfan Sulfate (water only)
Hexachlorobenzene
Mirex
Oxadiazon (water only)

OTHER SYNTHETIC COMPOUNDS
[1]New analytes added in 2002.
[2]Not required by RMP but are expected to be analyze in the 2002 RMP samples.

Polychlorinated Biphenyls (PCB) Congeners (IUPAC numbers)
(Target MDLs: water – 2 pg/L, sediment and tissue – 1 µg/kg)
8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, 203

Polybrominated Diphenyl Ethers[1]
(BDE-IUPAC No., Compound Name)
(Target MDLs: water – 1 pg/L, sediment and tissue – 1 µg/kg).

BDE 7 [2,4-DiBDE]
BDE 8 [2,4'-DiBDE]
BDE 10 [2,6-DiBDE]
BDE 11 [3,3'-DiBDE]
BDE 12 [3,4-DiBDE]
BDE 13 [3,4'-DiBDE]
BDE 15 [4,4'-DiBDE]
BDE 17 [2,2',4-triBDE]
BDE 25 [2,3',4-triBDE]
BDE 28 [2,4,4'-triBDE]
BDE 30 [2,4,6-triBDE]
BDE 32 [2,4',6-triBDE]
BDE 33 [2',3,4-triBDE]
BDE 35 [3,3',4-triBDE]
BDE 37 [3,4,4'-triBDE]
BDE 47 [2,2',4,4'-tetraBDE]
BDE 49 [2,2',4,5'-tetraBDE]
BDE 51 [2,2',4,6'-tetraBDE]
BDE 66 [2,3',4,4'-tetraBDE]
BDE 71 [2,3',4',6-tetraBDE]
BDE 75 [2,4,4',6-tetraBDE]
BDE 77 [3,3',4,4',-tetraBDE]
BDE 82 [2,2',3,3',4-pentaBDE]
BDE 85 [2,2',3,4,4'-pentaBDE]
BDE 99 [2,2',4,4'5-pentaBDE]
BDE 100 [2,2',4,4',6-pentaBDE]
BDE 105 [2,3,3',4,4',-pentaBDE]
BDE 116 [2,3,4,5,6-pentaBDE]
BDE 119 [2,3',4,4',6-pentaBDE]
BDE 120 [2,3',4,5,5'-PeBDE
BDE 126 [3,3',4,4',5-PeBDE]
BDE 128 [2,2',3,3',4,4'-hexaBDE]
BDE 138 [2,2',3,4,4',5'-hexaBDE]
BDE 140 [2,2', 3,4,4',6'-hexaBDE]
BDE 153 [2,2',4,4',5,5'-hexaBDE]
BDE 154 [2,2',4,4',5,6'-hexaBDE]

Table 6-1: Parameters Analyzed for in the Regional Monitoring Program (cont.) – p.4

Trace organic parameters (lab; reporting units) – in water (AXYS & CDFG; pg/L), sediment (EBMUD; µg/kg), and bivalve tissue (CDFG-WPCL; µg/kg) samples:

Organochlorines analyzed by GC-ECD will be determined using two columns of differing polarity.

Polynuclear Aromatic Hydrocarbons (PAHs) (Target MDLs: water – 200 pg/L, sediment and tissue – 5 µg/kg; water PAHs reported in ng/L)	**SYNTHETIC BIOCIDES** (Target MDLs: water – 2 pg/L, sediment and tissue – 1 µg/kg)	**OTHER SYNTHETIC COMPOUNDS** [1]New analytes added in 2002. [2]Not required by RMP but are expected to be analyze in the 2002 RMP samples.
		BDE 155 [2,2',4,4',6,6'-hexaBDE]
		BDE 166 [2,3,4,4',5,6'-hexaBDE]
		BDE 181 [2,2',3,4,4',5,6'-heptaBDE]
		BDE 183 [2,2',3,4,4',5',6-heptaBDE]
		BDE 190 [2,3,3',4,4',5,6-heptaBDE]
		BDE 203 [2,2',3,4,4',5,5',6]
		BDE 206 [2,2',3,3'4,4',5,5',6]
		BDE 209 [2,2',3,3',4,4',5,5',6,6'-decaBDE]

Table 6-2: Mussel Watch Program Monitoring Network

STATION NUMBER	STATION NAME	LATITUDE	LONGITUDE	SAMPLING HISTORY
203.0	Tomales Bay / Shell Beach	38 07 03	122 52 25	1979-1982, 1991-1992, 1997-2000
203.1	Tomales Bay / Vincent Landing	38 13 08	122 56 39	1997-2000
203.2	Tomales Bay / Walker Ck Mouth #5	38 12 34	122 56 08	1999-2000
203.3	Tomales Bay / Walker Ck Mouth #1	38 12 30	122 55 43	1997-2000
203.4	Tomales Bay / Walker Ck Mouth #4	38 12 23	122 55 41	1998-2000
203.5	Tomales Bay / Walker Ck Mouth #2	38 12 22	122 55 51	1997-2000
203.7	Tomales Bay / Walker Ck Mouth #3	38 12 15	122 55 39	1997, 1999-2000
203.8	Tomales Bay / Marshall	38 09 05	122 53 19	1998-2000
203.9	Tomales Bay / Nicks Cove	38 11 57	122 55 16	1997-1998
204.0	Estero De San Antonio	38 16 11	122 58 47	1993
204.1	Tomales Bay / HP	38 12 27	122 56 34	2000
204.2	Tomales Bay / Hog Island	38 11 51	122 56 12	2000
204.3	Tomales Bay / Hamlet	38 12 23	122 55 35	1999-2000
204.4	Tomales Bay / Audubon	38 09 52	122 54 02	1999-2000
204.5	Tomales Bay / McDonald	38 10 48	122 54 33	2000
207.0	Point Reyes	37 59 35	122 59 16	1978-1979, 1991
208.0	Bolinas	37 54 37	122 41 00	1980-1981
210.0	Salmon Creek / Marshall-Petaluma Rd Brid	38 09 52	122 46 32	1999
210.1	Walker Creek / Mine Creek	38 09 47	122 46 57	1997
210.3	Walker Creek / Mid Stream	38 10 08	122 47 35	1997
210.5	Walker Creek / USGS Stream Gauge	38 10 32	122 49 15	1998
210.7	Walker Creek / Hwy 1	38 13 25	122 54 23	1998-1999
211.1	Lagunitas Creek / Bridge #1	38 02 59	122 45 36	1997
211.3	Lagunitas Creek / Bridge #2	38 01 45	122 44 14	1997
220.0	Napa River / Tubbs Ln.	38 28 47	122 24 56	1998
220.1	Napa River / Larkmead Ln.	38 27 20	122 24 23	1998
220.3	Napa River / Pope St.	38 25 31	122 22 25	1998
220.5	Napa River / Yountville Cross Rd.	38 22 46	122 18 37	1998
224.0	Sonoma Creek / Agua Caliente Rd.	38 17 58	122 29 01	1998
224.1	Sonoma Creek / Petaluma Rd.	38 16 49	122 28 23	1998
224.3	Sonoma Creek / Watmaugh Rd.	38 15 46	122 27 53	1998
230.0	Petaluma River / Ely Rd	38 17 06	122 40 02	1999
298.3	Concord Naval Weapons Station / Pier 4	38 03 25	122 00 01	1988
298.4	Concord Naval Weapons Station / Seal Isl	38 03 21	122 02 50	1988
299.1	Selby Slag 4	38 03 25	122 14 52	1988, 1996
299.2	Selby Slag 5	38 03 29	122 14 48	1988
299.3	Selby Slag 6	38 03 31	122 14 19	1988
299.4	Selby Slag 7	38 03 28	122 13 54	1988
300.2	Mare Island	38 04 30	122 14 45	1985-1989
301.0	Davis Point	38 03 09	122 15 36	1980, 1983, 1988
301.4	Union Oil Outfall	38 02 44	122 15 43	1988-1989
302.0	Point Pinole	38 00 60	122 21 48	1980-1993, 1995
302.4	Castro Cove Bridge	37 57 10	122 23 09	1988-1990
302.6	Paradise Cove	37 53 58	122 27 52	1996
303.0	Richmond/San Rafael Bridge	37 55 55	122 26 08	1980-1993
303.1	Santa Fe Channel / Mouth	37 54 30	122 21 40	1986, 1991
303.2	Lauritzen Canal / Mouth	37 55 15	122 21 60	1985-1988

STATION NUMBER	STATION NAME	LATITUDE	LONGITUDE	SAMPLING HISTORY
303.3	Lauritzen Canal / End	37 55 26	122 21 58	1986-1988, 1991
303.4	Santa Fe Channel / End	37 55 26	122 22 32	1985-1987, 1991
303.6	Richmond Inner Harbor Basin	37 54 45	122 20 60	1985-1989
304.0	Staufer's	37 54 21	122 20 00	1982
304.4	Serl Intake	37 54 21	122 19 55	1991
304.6	Point Isabel	37 53 54	122 19 31	1988
305.0	San Francisco Bay / Angel Island	37 51 17	122 25 03	1980-1983
306.0	San Francisco Bay / Fort Baker	37 49 51	122 28 26	1981, 1983, 1991-1993, 1999-2000
306.1	Gashouse Cove / Laguna St	37 48 23	122 25 57	1996
306.2	Sansome St. / Pier 31	37 48 23	122 24 10	1996
306.3	Howard St. / Pier 14	37 47 35	122 23 26	1996
306.4	Central Basin / Outer	37 45 47	122 23 05	1996
306.5	Alcatraz Island	37 49 40	122 25 13	1989
307.0	San Francisco Bay / Treasure Island	37 48 42	122 21 33	1979-1993, 1997
307.1	San Leandro Bay / Damon Channel	37 45 03	122 12 49	1999
307.2	Alameda Yacht Harbor	37 46 45	122 15 15	1985-1989
307.3	Oakland Inner Harbor / West	37 47 59	122 19 53	1986-1987
307.4	Oakland Inner Harbor / Embarcadero Cove	37 46 50	122 14 40	1985-1989, 1991-1993
307.5	Lake Merritt	37 47 34	122 15 43	1992-1993
307.6	Oakland Back Harbor	37 45 30	122 13 25	1985-1988, 1999
307.7	San Leandro Bay/Elmhurst Ch	37 44 34	122 12 35	1999
307.8	San Francisco Outfall	37 44 55	122 22 30	1989
307.9	San Francisco / Islais Channel	37 44 51	122 23 05	1987-1988
308.0	San Francisco Bay / Hunter's Point	37 41 42	122 20 27	1981-1983, 1991-1993, 1995, 1997
308.2	Hunter's Point Shipyard	37 42 25	122 23 10	1988-1989
309.0	San Mateo Bridge / 8B	37 36 21	122 17 20	1980-1987, 1991-1993, 1995, 1997
310.0	San Mateo Bridge / 8A	37 35 21	122 16 08	1982
311.0	San Mateo Old Bridge	37 35 52	122 15 08	1982
311.4	North / South Bay	37 34 16	122 08 59	1996
312.0	Belmont Slough	37 32 60	122 14 47	1982
313.0	San Francisco Bay near Redwood Creek	37 33 09	122 11 45	1981-1985, 1991-1993, 1995, 1997
314.0	Redwood Creek / Channel Marker 10	37 31 49	122 11 38	1982
315.0	Redwood Creek / Towers	37 30 55	122 12 22	1982-1983
316.0	Redwood Creek / Tradewinds	37 30 09	122 12 49	1980, 1982-1983
317.0	Redwood City / STP Outfall	37 29 44	122 13 03	1983
318.0	Redwood Creek / Pete's Marina	37 30 00	122 13 24	1983
318.4	Redwood Creek / Bair Island	37 30 02	122 13 23	1987
319.0	Redwood Creek / Pulgas	37 30 30	122 14 37	1983
320.0	San Francisco Airport	37 30 55	122 14 50	1983
321.0	Dumbarton Bridge / Channel Marker 14	37 30 50	122 07 58	1980-1989, 1991-1992, 1995, 1997
323.3	Palo Alto Outfall	37 27 51	122 06 42	1989-1990
324.0	Newark Slough	37 29 36	122 05 11	1982
325.0	Channel Marker 17	37 28 41	122 04 32	1982
326.0	Palo Alto / Channel Marker 8	37 27 38	122 03 06	1982-1983, 1991-1993
327.0	Palo Alto / Yacht Club	37 27 09	122 02 10	1982

STATION NUMBER	STATION NAME	LATITUDE	LONGITUDE	SAMPLING HISTORY
328.0	Alviso Slough	37 27 49	122 01 40	1982
329.0	Guadalupe Creek / Almaden Expressway	37 16 31	121 52 33	1997
329.1	Arroyo Calero / Harry Rd.	37 12 42	121 49 41	1998
329.2	Guadalupe Creek / Hicks Road	37 13 22	121 54 16	1997-1998
329.3	Alamitos Creek / Bubbling Well Pl.	37 13 25	121 51 10	1998
329.4	Alamitos Creek / Almanden Road	37 10 44	121 48 57	1997-1998
329.5	Guadalupe River / Capitol Expressway	37 17 53	121 49 25	1998
330.0	Duxbury Reef	37 53 38	122 42 09	1980-1981
331.0	Muir Beach	37 51 28	122 34 50	1980
332.0	Point Bonita	37 49 11	122 31 53	1980
333.0	Farallon Islands	37 41 45	123 00 00	1978-1980
334.0	Cliff House	37 46 57	122 30 46	1980
335.0	Pacifica	37 40 09	122 29 41	1980
336.0	J. Fitzgerald	37 30 45	122 30 30	1978-1981, 1991, 1998-2000
399.2	Pescadero Creek	37 14 57	122 23 40	1988-1989

Table 6-3: Toxic Substances Monitoring Network

STATION NUMBER	STATION NAME	LATITUDE	LONGITUDE
204.30.11	Alameda Creek / Niles Canyon Road	37 34 58	121 57 47
204.30.00	Alameda Creek / Shinn Pit	37 34 17	121 59 15
205.40.17	Alamitos Creek d/s Almaden Reservoir	37 10 27	121 49 23
205.40.18	Almaden Reservoir	37 9 45	121 49 48
205.30.30	Anderson Reservoir	37 9 58	121 37 30
205.50.08	Bear Gulch Reservoir	37 26 0	122 13 40
205.50.07	Calabazas Creek d/s Tasman Drive	37 24 10	121 59 10
205.40.16	Calero Reservoir	37 10 50	121 47 10
205.30.08	Coyote Creek / Brokaw Road	37 23 0	121 54 15
205.30.18	Coyote Creek / Percolation Pond	37 13 48	121 45 12
205.30.07	Coyote Creek u/s Montague Expressway	37 23 45	121 54 50
205.30.37	Coyote Reservoir	37 7 15	121 33 5
206.50.24	Dry Creek	38 24 22	122 26 22
204.20.00	Elmhurst Creek / Mouth	37 44 35	122 12 23
205.40.13	Guadalupe Creek d/s Guadalupe Reservoir	37 12 0	121 52 50
205.40.14	Guadalupe Reservoir	37 11 53	121 52 34
205.50.09	Guadalupe River / Howard Street	37 20 20	121 54 5
205.40.08	Guadalupe River / Percolation Pond	37 14 50	121 52 19
206.50.03	Lake Chabot / Solano County	38 8 11	122 14 5
207.21.03	Lake Herman	38 5 45	122 9 20
202.10.01	Lake Merced	37 43 38	122 29 15
205.40.02	Los Gatos Creek	37 14 17	121 58 18
206.50.14	Napa River / Napa	38 22 6	122 18 8
207.10.12	New York Slough	38 2 1	121 52 7
206.30.07	Petaluma River / Lakeville	38 11 59	122 33 0
204.20.01	San Leandro Creek / Highway 880 Bridge	37 43 31	122 10 56
206.60.01	San Pablo Creek	37 58 3	122 21 46
206.40.08	Sonoma Creek	38 16 3	122 28 2
205.50.94	Stevens Creek	37 18 15	122 14 24
205.50.10	Stevens Creek Reservoir	37 17 38	122 4 41
207.10.90	Suisun Bay	38 4 5	122 2 40
205.40.01	Vasona Lake	37 14 45	121 58 0
201.12.01	Walker Creek	38 14 0	122 54 47
207.32.06	Walnut Creek	37 54 3	122 3 33

CHAPTER 7: WATER QUALITY ATTAINMENT STRATEGIES INCLUDING TOTAL MAXIMUM DAILY LOADS

Water Quality Attainment Strategies (WQAS) including Total Maximum Daily Loads (TMDLs) deemed necessary and appropriate to ensure attainment and maintenance of water quality standards in the Region are presented herein this chapter.

7.1 A WATER QUALITY ATTAINMENT STRATEGY TO SUPPORT COPPER AND NICKEL SITE-SPECIFIC OBJECTIVES SOUTH OF THE DUMBARTON BRIDGE

The Water Quality Attainment Strategy (WQAS) for copper and nickel in San Francisco Bay south of the Dumbarton Bridge (Lower South SF Bay) is designed to prevent water quality degradation and ensure the ongoing maintenance of the site-specific objectives both for copper and nickel in Lower South SF Bay. This section describes the details of the WQAS and how the Water Board will use its regulatory authority to implement this strategy.

The four elements of the WQAS for copper and nickel in Lower South SF Bay are:

- Current control measures/actions to minimize copper and nickel releases (from municipal wastewater treatment plants and urban runoff programs) to Lower South SF Bay;
- Statistically-based water quality "triggers" and a receiving water monitoring program that would initiate additional control measures/actions if the "triggers" are met;
- A proactive framework for addressing increases to future copper and nickel concentrations in Lower South SF Bay, if they occur; and
- Metal translators that will be used to compute copper and nickel effluent limits for the municipal wastewater treatment plants discharging to Lower South SF Bay.

Except for the specification of metal translators, all actions and monitoring obligations described in this section have been required by the National Pollutant Discharge Elimination System (NPDES) permits for the three municipal wastewater dischargers and the municipal urban runoff (stormwater) dischargers in Lower South SF Bay since October 2000 and March 2001, respectively.

7.1.1 BACKGROUND

Lower South SF Bay has been listed as impaired due to point source discharges of generic metals since 1990 (Clean Water Act §304(l) listing) and most recently for copper and nickel from point and urban runoff sources in the State's 1998 list required by Clean Water Act §303(d). The primary reason for the copper and nickel impairment listings had been that ambient water concentrations of dissolved copper and nickel exceeded Basin Plan water quality objectives or US EPA national water quality criteria for the protection of aquatic life. Despite significant reductions in wastewater loadings over the past two decades, ambient concentrations at stations monitored through the San Francisco Estuary Regional Monitoring Program for Trace Substances

(RMP) or the City of San Jose monitoring program still approach or exceed the previously-applicable federal criteria or water quality objectives in Lower South SF Bay. The Water Board has now adopted site-specific water quality objectives. As discussed below, it is likely that these new objectives are being attained.

7.1.1.1 SOURCES

The external sources of copper and nickel to Lower South SF Bay include a minor contribution from atmospheric deposition and substantial discharges from tributaries/urban runoff and municipal wastewater. The dischargers responsible for the urban runoff discharges are the Santa Clara Valley Water District, County of Santa Clara, City of Campbell, City of Cupertino, City of Los Altos, Town of Los Altos Hills, Town of Los Gatos, City of Milpitas, City of Monte Sereno, City of Mountain View, City of Palo Alto, City of San Jose, City of Santa Clara, City of Saratoga, and City of Sunnyvale. These cities have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program. The municipal wastewater dischargers are the Cities of San Jose and Santa Clara, Sunnyvale, and Palo Alto. Each of these cities owns and operates a wastewater treatment plant (Publicly-Owned Treatment Works or POTW) that discharges into the Lower South Bay.

On an annual basis, about 1100 kilograms (kg) of copper and 1500 kg of nickel enters Lower South SF Bay from POTWs. From tributaries, roughly 3800 kg copper and 6000 kg nickel enters this Bay segment each year. During the dry season (June-November), POTW loading is dominant, and tributary loading is dominant during the wet season (December-May). Substantial amounts of copper (about 1.9 million kg) and nickel (about 50 million kg) already existing in the sediments of Lower South SF Bay can also contribute to water concentrations when the sediments are resuspended by waves, winds, tides, and currents. The metals deposited in the sediments consist of those deposited historically (higher than current levels) and those currently deposited metals. The historical and current external loadings have elevated the total copper and possibly the total nickel concentrations of Lower South SF Bay sediments above what they would be in the absence of anthropogenic sources.

7.1.1.2 STAKEHOLDER INVOLVEMENT

The stakeholder group recognized by the Water Board to assist in developing watershed-based programs to address both short and long-term water quality issues in Lower South SF Bay is the Santa Clara Basin Watershed Management Initiative (SCBWMI). The SCBWMI, formed in 1996, is a collaborative effort of representatives from business and industrial sectors, professional and trade organizations, civic, environmental, resource conservation and agricultural groups, regional and local public agencies, resource agencies, and the general public. These groups have joined forces to address all sources of pollution that threaten the water bodies draining into the Lower South Bay. A major aim of the SCBWMI is to coordinate existing watershed activities on a basin-wide scale, ensuring that environmental protection efforts are addressed efficiently and cost-effectively. The Water Board will continue to recognize and rely on the leadership of the SCBWMI to ensure the ongoing success of the WQAS.

A working subgroup of the SCBWMI, the Bay Monitoring and Modeling Subgroup, took the lead to address the water quality issues and to provide the basic strategy and information necessary to address both the water quality technical and related regulatory questions. In 1998, the Copper

and Nickel TMDL Work Group (Workgroup) was formed by the SCBWMI to provide guidance for the development of the TMDLs for copper and nickel in Lower South SF Bay. A broad group of stakeholders was represented on the Workgroup including several environmental groups, local wastewater dischargers, local public agencies responsible for the urban runoff program, state and federal regulators, industry and local business representatives, and national organizations such as the Copper Development Association.

7.1.2 OVERVIEW OF THE TMDL PROJECT FOR COPPER AND NICKEL IN LOWER SOUTH BAY

In 1996, the State Water Board included the South San Francisco Bay on the §303(d) impaired water body list as a high priority impaired water body. In 1998, the list was updated and specifically identified copper, nickel, mercury and selenium as the metal pollutants of concern. The listing triggered the Clean Water Act §303(d) mandate for the State of California, specifically the Water Board, to establish TMDLs for these pollutants of concern. To address NPDES permit issues for its wastewater treatment plant, the City of San Jose and other local municipalities took the lead in providing funding for the development of the copper and nickel TMDLs for Lower South Bay, and other Lower South Bay communities contributed to related SCBWMI activities.

The TMDL effort focused on:

1. Conducting an Impairment Assessment to determine if ambient concentrations of copper and nickel were negatively impacting the designated beneficial uses of Lower South Bay;
2. Developing a range of scientifically defensible water quality objectives for copper and nickel;
3. Developing a conceptual model of copper and nickel cycling to evaluate attainment of the range of objectives; and
4. Characterizing sources and identifying pollution prevention and control actions.

The Workgroup oversaw the preparation and review of several technical reports. These reports provide the basis of the conclusions and recommendations of the Workgroup regarding the effects of ambient concentrations of copper and nickel on the beneficial uses of Lower South Bay.

7.1.3 IMPAIRMENT ASSESSMENT AND SITE-SPECIFIC OBJECTIVES

The Impairment Assessment Report was finalized in June 2000 to present new information and to re-evaluate the determination that the beneficial uses of Lower South Bay were impaired due to ambient concentrations of copper and nickel. Specifically, the goals of the assessment were to:

- Compile and evaluate data on ambient concentrations and toxicity information for copper and nickel in Lower South Bay;
- Identify, evaluate and select indicators of beneficial use impairment. The categories of parameters and criteria considered included toxicity (acute and chronic), biological (biota composition, health, abundance, and physical habitat vs. a reference site), chemical (numeric values), and physical (capacity to support uses);
- Develop endpoints for the selected indicators that can be used to assess the existence of impairment and compare these values to ambient concentrations in Lower South Bay. The intent of this assessment was to provide policy makers, regulators, and other

stakeholders with the best technical laboratory and ambient information currently available to compare with known threshold impact levels on selected indicators;
- Assess the level of certainty with which it can be shown ambient concentrations of copper and nickel are or are not resulting in beneficial use impairment; and
- Recommend numeric values for site-specific objectives (SSOs) for dissolved copper and nickel in Lower South Bay in lieu of TMDL development upon finding that the Lower South Bay is not impaired due to these metals.

The final results of the impairment assessment indicated that impairment to beneficial uses of Lower South Bay due to ambient copper and nickel concentrations is unlikely. There are several lines of evidence to support the finding for each metal, and these are discussed at length in the Impairment Assessment Report. One important factor in the impairment decision was the recognition that the chemical features of Lower South Bay reduce the toxicity and bioavailability of copper and nickel. These chemical features include binding of copper and nickel by dissolved organic compounds and the abundance of dissolved metals like manganese and iron that compete with copper and nickel for receptor sites on aquatic organisms.

From the established ranges of acute and chronic values of copper and nickel site-specific objectives developed through the Impairment Assessement Report, the Water Board selected specific values for copper and nickel that it deemed protective of beneficial uses and incorporated them into Chapter 3 of this Basin Plan. The acute and chronic site-specific water quality objectives in Lower South Bay for dissolved copper are 10.8 μg/L and 6.9 μg/L, respectively. The acute and chronic site-specific water quality objectives in Lower South Bay for dissolved nickel are 62.4 μg/L and 11.9 μg/L, respectively.

While the conclusions of the Impairment Assessment Report are scientifically sound, like most statements about complex environmental systems, its conclusions on the lack of impairment have some degree of uncertainty. The existence of these uncertainties underscores the need for continued monitoring and studies that are described below. The four primary areas of uncertainty are the toxicity of copper to phytoplankton, copper and nickel cycling in Lower South Bay, sediment toxicity, and uncertainties in loading estimates.

7.1.4 IMPLEMENTATION PLAN

This section discusses the actions that will be taken to maintain the copper and nickel site-specific objectives. The underlying goal of these actions is to ensure that ambient levels do not increase due to increases in loading of copper and nickel to Lower South Bay. Except for the specification of metal translators, all actions and monitoring obligations described in this section are already required in the NPDES permits for the three municipal wastewater dischargers and the municipal urban runoff (stormwater) dischargers in Lower South Bay. Other non-regulatory, collaborative actions discussed here will be implemented via the SCBWMI and its participants on a voluntary basis.

7.1.4.1 MONITORING PROGRAM

Fundamental to the monitoring program is the concept of a water quality indicator. An indicator is a measurable quantity that is so strongly associated with particular environmental conditions that the value of the measurable quantity can be used to indicate the existence and maintenance

of these conditions. The indicators used in the monitoring program to support the site-specific objectives are dissolved copper and nickel concentrations in Lower South Bay. The monitoring program described here has been required by the NPDES permits for the three municipal wastewater dischargers since October 2000. (Order No. 00-108). The monitoring program consists of monthly dissolved copper and nickel measurements at the ten stations shown in Table 7-1. As of the adoption of this WQAS, the municipal wastewater dischargers defined dissolved metal as those metal constituents that pass through a 0.45 micron (μm) filter prior to chemical analysis. Any changes to this operational definition of dissolved metal or details of the monitoring program will be addressed through amendments to the NPDES permits.

The purpose of the monitoring component of the WQAS is to assess ambient conditions compared to the specific trigger levels described below. The ambient data collected through the WQAS monitoring program may be considered along with other ambient monitoring data to determine whether additional controls are necessary.

7.1.4.2 TRIGGER VALUES

The NPDES permits for municipal wastewater and stormwater dischargers contain a series of trigger values and corresponding actions that are required to be taken by the dischargers if the triggers are reached. For copper, an increase in dry season dissolved copper concentration of 0.8 μg/L can be reliably detected despite inherent variability, and this specific increase is used to define the copper trigger levels. The copper Phase I trigger is reached and copper-specific Phase I actions will be conducted if the average dry season dissolved copper concentration at stations SB3, SB4, SB5, SB7, SB8, SB9 increases from 3.2 μg/L (overall dry season mean from indicator stations during the period June 1997 to November 1998) to 4.0 μg/L. The copper Phase II trigger is reached and Phase II actions will be conducted if the dry season mean concentration of the indicator stations increases further to 4.4 μg/L. This 0.4 μg/L change can still be detected with reasonable statistical certainty to justify the more aggressive Phase II actions.

For nickel, an increase in dry season dissolved concentration of 2.0 μg/L can be reliably detected despite inherent variability, and this increase is used to define the trigger levels for nickel. The nickel Phase I trigger is reached and Phase I actions will be conducted if the average dry season dissolved nickel concentration at stations SB3, SB6, SB7, SB8, SB9, SB10 increases from 4.0 μg/L (overall dry season mean from indicator stations during the period June 1997 to November 1998) to 6.0 μg/L. The nickel Phase II trigger is reached and Phase II actions will be conducted if the dry season mean dissolved concentration from the indicator stations increases another 2.0 μg/L to 8.0 μg/L. Note that the copper and nickel Phase I and Phase II triggers are well below the site-specific objectives for these metals and reaching the triggers indicates a negative trend in water quality but not impairment of beneficial uses.

The Executive Officer will review the monitoring program results annually and determine whether the trigger values have been reached. The Executive Officer will report findings to the Water Board and will notify interested agencies and interested persons of these findings and will provide them with an opportunity to submit their views and recommendations concerning the findings either in written form or at a public hearing.

If the trigger values for ambient copper and nickel concentrations have not been exceeded, the monitoring program will continue to provide information for the next review period. The Water Board shall evaluate performance of the monitoring program during the annual review to determine if the necessary information is being provided.

7.1.4.3 BASELINE ACTIONS

These actions are already being implemented through the NPDES permits and will continue until the Water Board directs otherwise through the permitting process. These actions include: 1) pollution prevention and control actions by public agencies; 2) actions to conduct or track special studies that address specific technical areas of uncertainty (the toxicity of copper to phytoplankton, copper and nickel cycling in Lower South Bay, sediment toxicity, and uncertainties in loading estimates); and 3) planning-type studies to track, evaluate, and/or develop additional indicators and associated triggers (i.e., indicators for growth, development, or increased use or discharge of copper and nickel in the watershed).

BASELINE ACTIONS CONDUCTED BY MUNICIPAL WASTEWATER DISCHARGERS

Baseline actions applicable to municipal wastewater dischargers are actions associated with implementation of reasonable treatment, source control, and pollution prevention measures to limit discharges of copper and/or nickel.

In the consideration of the site-specific objectives for copper and nickel, the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (State Implementation Plan, or SIP) requires that dischargers demonstrate that they are implementing reasonable treatment, source control, and pollution prevention measures for these metals. The Water Board found that continuation of baseline actions satisfies this requirement as long as the copper and nickel trigger levels are not reached in Lower South Bay. Pollution prevention and minimization are a significant part of these dischargers' efforts to limit the discharges of copper and nickel. These dischargers have approved Pretreatment Programs and have established Pollution Prevention Programs under the requirements specified by the Water Board in their NPDES permits.

These findings and specific baseline actions are already being implemented through the NPDES permits for these dischargers (Order No. 00-108, October 2000). The municipal wastewater dischargers are required by their permits to maintain these baseline actions and review and report to the Water Board on their implementation on an annual basis. Modifications to the current baseline actions may be considered through the permit process, provided that these dischargers demonstrate to the Water Board that such modifications are consistent with maintaining reasonable treatment, source control, and pollution prevention measures.

BASELINE ACTIONS CONDUCTED BY URBAN RUNOFF (MUNICIPAL STORMWATER) DISCHARGERS

The Urban Runoff Management requirements (see Section 4.14 Urban Runoff Management) and specific copper and nickel baseline actions have been required by the NPDES permit for the Santa Clara Valley Urban Runoff Pollution Prevention Program and its dischargers since March 2001

(Order No. 01-024). These requirements include actions associated with implementation of controls to reduce copper and/or nickel in discharges to the maximum extent practicable, actions associated with prohibiting discharges other than stormwater to storm drain systems and waterways, and actions associated with monitoring to evaluate effectiveness of controls, identify sources of pollutants, and to measure or estimate pollutant concentrations and loads. On an annual basis, these dischargers are required to describe the controls that they are implementing and any additional controls that will be implemented. These dischargers are required to provide to the Water Board detailed descriptions of activities in each fiscal year in annual workplans and associated evaluations and results in annual reports. Modifications to the current baseline actions may be considered through the NPDES permit, provided that the Dischargers demonstrate to Water Board that such modifications are consistent with maintaining programs that control copper and nickel discharges to the maximum extent practicable in accordance with the requirements of the Water Board's Comprehensive Control Program for Urban Runoff Management and the Clean Water Act. As long as Lower South Bay ambient concentrations of copper and nickel remain below the established Phase I trigger levels, the Water Board has determined that the baseline actions applicable to urban runoff (municipal stormwater) dischargers satisfy the copper- and nickel-specific requirements of the Comprehensive Control Program for Urban Runoff Management and federal regulations (40 CFR 122.26).

BASELINE ACTIONS CONDUCTED BY SANTA CLARA BASIN WATERSHED MANAGEMENT INITIATIVE

As described above, the SCBWMI is a collaborative, stakeholder-participation forum that seeks integration of regulatory and watershed management actions that affect Lower South SF Bay and its tributaries. In addition to the actions required in the NPDES permits for the three municipal wastewater dischargers and the municipal urban runoff dischargers, there are other non-regulatory, collaborative actions that the SCBWMI and participants have committed to implement. These collaborative actions are described in attachments to the NPDES permit for the SCVURPPP and include: establishing a forum on transportation issues and impervious surfaces and for reviewing the appropriateness of transportation control measures with a view toward reducing traffic congestion; implementing measures to improve classification and assessment of watersheds; establishing an environmental clearinghouse of information related to tracking and disseminating new scientific information related to copper toxicity, loadings, fate and transport, and impairment of aquatic ecosystems; and planning-type studies to track, evaluate, and/or develop additional indicators to use and future potential indicators and triggers (i.e., indicators for growth, development, or increased use or discharge of copper and nickel in the watershed). In addition, the SCBWMI serves as a stakeholder participation forum to track, review, and evaluate the baseline actions required by the NPDES permits.

7.1.4.4 PHASE I ACTIONS

Phase I actions are already specified in the NPDES permits for municipal wastewater and stormwater dischargers. These actions are implemented when the mean value of selected monitoring parameters exceeds specified Phase I water quality triggers. The exceedance of the Phase I trigger indicates a negative trend in water quality and not impairment. Phase I actions consist of both specific remedial actions and planning for implementation of future actions if the Phase II triggers are exceeded.

If the Phase I copper or nickel triggers are exceeded, the Regional Board will consider execution of Phase I and Baseline actions as satisfying both the SIP requirement that municipal wastewater dischargers are implementing reasonable treatment, source control, and pollution prevention measures for copper and nickel and the Basin Plan requirement that municipal stormwater dischargers are implementing controls to reduce copper and/or nickel in discharges to the maximum extent practicable. Within 90 days after the determination of Phase I trigger exceedance, the Regional Board expects both the municipal wastewater and municipal stormwater dischargers to submit, for Executive Officer concurrence, their proposed Phase I plans with implementation schedules to implement additional measures to limit their relative cause or contribution to the exceedance. This submittal should, at a minimum, include evaluation of the Phase I actions and development of a Phase II plan. If the submittal is not received within 90 days of the determination of Phase I trigger exceedance or is not being implemented in accordance with the dischargers' implementation schedule following the Executive Officer's concurrence, the Regional Board may consider enforcement action to enforce the terms of the dischargers' permits.

7.1.4.5 PHASE II ACTIONS

Phase II actions are already specified in the NPDES permits for municipal wastewater and stormwater dischargers. Phase II actions are implemented when the mean value of selected monitoring parameters exceeds specified Phase II water quality triggers. Phase II actions are intended to reduce controllable sources further to maintain compliance with the site-specific water quality objectives.

If the Phase II copper or nickel triggers are exceeded, the Regional Board will consider execution of Phase II, Phase I and Baseline actions as satisfying both the SIP requirement that municipal wastewater dischargers are implementing reasonable treatment, source control, and pollution prevention measures for copper and nickel and the Basin Plan and Clean Water Act requirement that municipal stormwater dischargers are implementing controls to reduce copper and/or nickel in discharges to the maximum extent practicable. Within 90 days after the determination of Phase II trigger exceedance, the Regional Board expects the dischargers to submit, for Executive Officer concurrence, the proposed Phase II plans with implementation schedules to implement additional measures to limit their relative cause or contribution to the exceedance. If the submittal is not received within 90 days of the determination of Phase II trigger exceedance or is not being implemented in accordance with the dischargers' implementation schedule upon the Executive Officer's concurrence, the Regional Board may consider enforcement action to enforce the terms of the dischargers' permits.

7.1.4.6 METAL TRANSLATORS APPLICABLE TO LOWER SOUTH SF BAY MUNICIPAL WASTEWATER DISCHARGERS

An important regulatory element of the WQAS is the specification of metal translators applicable to the three Lower South SF Bay municipal wastewater dischargers. When the NPDES permits are re-issued, concentration-based effluent limits for these three facilities will be calculated from the chronic copper and nickel SSOs. Water quality objectives for copper and nickel are expressed as dissolved metal concentrations. Effluent limits for the POTWs are expressed as total metal concentrations and must be calculated according to the procedure outlined in the SIP. Therefore,

for metals like copper and nickel, the calculation of the effluent limit requires the use of a ratio of total to dissolved metal called the metal translator.

Analyses of data from 12 monitoring stations in Lower South SF Bay (Dumbarton to sloughs) collected from February 1997 to August 2000 and including dissolved and total copper and nickel, total suspended solids (TSS), and tidal data, showed a strong TSS dependence. The statistical analyses explored relationships between translator values and TSS, tide, site, and season. Linear regression with log-transformed dissolved fraction (translator) and TSS data provided the best regression fit. The best-fit regression line and its 95% confidence intervals provided the basis for translator values for copper and nickel.

U.S. EPA guidance (U.S. EPA Office of Water, June 1996. The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion. EPA 823-B-96-007) states that, when there is a relationship between the translator and TSS, regression equations should be used to develop translator values using representative TSS values the for the site under consideration. There is a fairly wide variation in TSS, and the guidance on translator development suggests using a representative TSS value. In Lower South SF Bay, a median TSS value may not account for the higher translator values and dissolved metal levels that result during high TSS episodes. For this reason, copper and nickel translators computed from 95% confidence interval TSS values were used to develop the POTW effluent limits. A copper translator of 0.53, and a nickel translator of 0.44 resulted from this procedure. Using the 95% confidence interval translator provides an additional measure of beneficial use protection in that effluent limits, expressed at total metal, will be lower using a higher value for metal translators. These translators shall be used to compute copper and nickel effluent limits for POTWs discharging to the Lower South SF Bay when NPDES permits for Lower South SF municipal wastewater dischargers are reissued.

7.2 TOMALES BAY WATERSHED PATHOGENS TMDL

The overall goal of the Tomales Bay Watershed Pathogens Total Maximum Daily Load (TMDL) is to ensure protection of water contact recreational uses and Bay shellfish harvesting, thereby minimizing human exposure to disease-causing pathogens. The following sections establish a density-based pathogens TMDL for Tomales Bay and its tributaries, and actions and monitoring necessary to implement theTMDL. The TMDL defines allowable density-based water quality bacteria concentrations and prohibits the discharge of human waste. The associated implementation plan specifies the actions necessary to protect and restore beneficial uses. This TMDL strives to achieve a balance that allows human activities including agriculture, recreation, commercial fishing and aquaculture, and residential use to coexist and also restores and protects water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to pathogens will be periodically reviewed and the TMDL may be adapted as warranted.

In addition to pathogens, animal and human waste contain nutrients that pose a threat to aquatic ecosystem beneficial uses. Tomales Bay, Walker Creek, and Lagunitas Creek are listed as impaired by excess nutrients. Human and animal wastes may also contain other harmful constituents such as steroids and pharmaceuticals. In addition to protecting pathogen-impaired

beneficial uses such as shellfish harvesting, water contact recreation, and non-contact water recreation, by eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect aquatic ecosystem beneficial uses such as marine habitat, estuarine habitat, cold and warm freshwater habitat, and wildlife habitat from other harmful constituents found in human and animal waste.

7.2.1 PROBLEM STATEMENT

Monitoring results for Tomales Bay and its main tributaries (Lagunitas, Walker, and Olema creeks) indicate that these waters exceed bacteria water quality objectives for shellfish harvesting and recreational waters (Table 3-1) and, as such, are impaired by pathogens. The presence of pathogens is inferred from high concentrations of fecal coliform bacteria (a commonly used indicator of human pathogenic organisms). Pathogen pollution is adversely affecting existing beneficial uses, which include shellfish harvesting (i.e., sport and commercial oyster, clam, and mussel harvesting), water contact recreation (i.e., swimming, fishing) and non-contact water recreation (i.e., boating, kayaking).

This TMDL addresses the following pathogen-impaired water bodies in the Tomales Bay Watershed:

- Tomales Bay
- Lagunitas Creek
- Walker Creek
- Olema Creek

7.2.2 SOURCES

If not properly managed, the following Tomales Bay Watershed sources have the potential to discharge pathogens to surface waters: on-site sewage disposal systems (OSDSs), small wastewater treatment facilities and sewage holding ponds, boat discharges, grazing lands, dairies, equestrian facilities, and municipal runoff. Pathogens sources are identified based on elevated coliform bacteria levels downstream of identified land uses or facilities and from documentation of inadequately treated human waste discharges.

- The Walker Creek watershed is dominated by grazing lands. Coliform bacteria levels and coliform loads from the Walker Creek watershed are extremely high during storm periods and a significant coliform source to Tomales Bay.
- High coliform levels detected in storm drains indicate that municipal runoff is a pathogens source.
- High coliform levels and loads downstream of residential homes and equestrian facilities suggest that failing septic systems, municipal runoff, and equestrian facilities are coliform sources.
- The Water Board regulates ten small wastewater treatment facilities and sewage holding ponds and prohibits direct discharges from these facilities into Tomales Bay or its tributaries. Four facilities have holding ponds and are permitted to discharge treated effluent to irrigation fields in the dry season. The other six wastewater treatment facilities utilize leach fields for dispersing treated effluent. Accidental malfunctions, including the breaching of ponds, a break in a sewage line, or land application when soil is saturated or

it is raining, could result in discharge of untreated or partially treated effluent. Therefore, these facilities are considered potential sources.

In addition to the above sources, warm-blooded mammals and birds that reside in the watershed and Bay produce coliform bacteria. During non-storm periods Tomales Bay coliform levels are typically below the water quality objectives for shellfish harvesting waters, indicating that in-Bay wildlife such as seals and birds are not significant sources. Approximately 30% of the lands draining to Tomales Bay are open space forested lands. Water quality monitoring of a watershed on the western shoreline of Tomales Bay with minimal human influences suggests that waters draining open space areas are below tributary bacteria water quality objectives and therefore terrestrial wildlife are nota significant source.

7.2.3 NUMERIC TARGETS

Table 7-2 contains the numeric water quality targets for the Tomales Bay Watershed Pathogens TMDL. The coliform bacteria targets are based on fecal coliform bacteria concentrations aimed at protecting shellfish harvesting and contact and non-contact water recreation beneficial uses. These density-based numeric targets define bacterial densities associated with minimal risk to humans and are the same as the water quality objectives contained in Table 3-1. The Tomales Bay targets are intended to protect the most sensitive beneficial use, shellfish harvesting. The tributary targets are intended to protect recreational uses. An additional numeric target for Tomales Bay is expressed as the number of days commercial shellfish growing areas are subjected to harvest closures due to elevated water column bacteria densities. Consistent with the definition of "threatened conditions" in the California Shellfish Protection Act, Tomales Bay shellfish growing areas shall not be closed for harvest for more than 30 days per calendar year. The California Department of Health Services requires shellfish growing areas to close for harvesting when 24-hour and 10-day rainfall totals exceed established thresholds. Rainfall thresholds are established based on the relationship between rainfall and observed fecal coliformlevels in Bay waters and shellfish.

In addition, no human waste (raw sewage or inadequately treated waste) shall be discharged to Tomales Bay or its tributaries. The no human waste discharge target is consistent with Discharge Prohibitions 5 and 15, contained in Table 4-1. This target is necessary because human waste is a significant source of pathogenic organisms, including viruses; and attainment of fecal coliform targets alone may not sufficiently protect human health. The coliform bacteria targets, in combination with the human waste discharge prohibitions and the shellfish harvesting closure targets, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

7.2.4 TOTAL MAXIMUM DAILY LOAD

Table 7-3 lists the Tomales Bay Watershed Pathogens TMDL. The TMDL consists of the density-based coliform bacteria TMDL targets. The TMDL ensures protection of water contact recreational uses and Bay shellfish harvesting, thereby minimizing human exposure to disease causing pathogens.

7.2.5 LOAD ALLOCATIONS

TMDL targets are an interpretation of water quality standards, whereas TMDL allocations specify the amount (or concentration) of a pollutant that can be discharged to a waterbody such that standards are attained in both the receiving waterbody and all downstream waters. Table 7-4A presents density-based load allocations for Tomales Bay watersheds pathogens source categories that implement tributary targets, and Table 7-4B presents allocations to major tributaries, where they discharge to Tomales Bay, and implement the Bay targets. Load allocations to the tributaries reflect the highest fecal coliform concentrations that can be discharged while still attaining and maintaining the Bay shellfish harvesting water quality objectives. All entities in a watershed are responsible for meeting their source category allocation (Table 7-4A) and the applicable geographic-based allocations (Table 7-4B).

Discharging entities will not be held responsible for uncontrollable coliform discharges originating from wildlife. If wildlife contributions are determined to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program. The discharge of human waste is prohibited. All sources of human waste have an allocation of zero. Nonpoint source runoff containing coliform bacteria of animal and wildlife origin, at levels that do not result in exceedances of water objectives, does not constitute wastewater with particular characteristics of concern to beneficial uses. Therefore, animal- and wildlife-associated discharges, in compliance with the conditions of this TMDL, do not constitute a violation of applicable discharge prohibitions.

7.2.6 IMPLEMENTATION PLAN

The Tomales Bay Watershed Pathogens TMDL Implementation Plan builds upon previous and ongoing successful efforts to reduce pathogen loads in Tomales Bay and its tributaries. The plan requires actions consistent with the California Water Code (CWC 13000 et seq.), the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369), the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program[1], and human waste discharge prohibitions (Prohibitions 5 and 15, Table 4-1).

This plan specifies required implementation measures (Table 7-5) for each of the source categories (Table 7-4). These implementation measures include evaluation of operating practices, development of comprehensive site-specific pathogens control measures and an implementation schedule for such management measures, and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or, if designated, through third parties. These progress reports will serve as documentation that source reduction measures are being implemented. While third parties may provide valuable assistance to TMDL implementation, the discharger is the entity responsible for complying with the specified regulations and regulatory controls. Responsible parties within each source category are required to implement the measures as specified in Table 7-5. The numeric targets and load allocations are not directly enforceable. For purpose of demonstrating attainment of applicable allocations, responsible parties will only be responsible for compliance with specified implementation measures and applicable waste discharge requirements or waiver conditions.

[1] State Water Resources Control Board. 2004. *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Prevention Control Program.*

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges are regulated under waste discharge requirements (WDRs), waiver of waste discharge requirements, Basin Plan prohibitions, or some combination of these tools. Table 7-6 describes the method that will be used to regulate dischargers in each source category. The Water Board has established conditions for waiving WDRs for dairies. The Water Board intends to work with stakeholders to develop similar waiver conditions for grazing lands and equestrian facilities by 2009.

7.2.6.1 AGRICULTURAL WATER QUALITY CONTROL PROGRAM COSTS

The implementation measures for grazing lands and dairies constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of the program is estimated herein. The total program implementation cost for these agricultural sources is estimated to range between $900,000 – $2 million per year over the next 10 years. The estimated cost will be shared by Tomales Bay watershed grazing lands operators (approximately 150). This estimate includes the cost of implementing animal waste control and grazing management measures and is based on costs associated with technical assistance and evaluation, installation of water troughs, and cattle control fencing along all streams. The program cost estimate may be high as it does not account for implementation actions already underway or areas that may not require fencing. Besides fencing, other acceptable methods of managing livestock access to streams are not included in this cost estimate due to variability in costs and site specific applicability. Potential financing sources include federal and state water quality grants and federal agricultural grants.

7.2.6.2 EVALUATION AND MONITORING

Dischargers, stakeholders, and Water Board staff will conduct water quality monitoring to evaluate fecal coliform concentration trends in Tomales Bay and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7-2) and load allocations (Table 7-4).

In 2009 and approximately every five years after the adoption of the TMDL, the Water Board will evaluate site specific, sub-watershed specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7-5. In evaluating compliance with the trackable implementation measures, the Water Board will consider the level of participation of each source category as well as individual dischargers (as documented by Water Board staff or third parties).

If a discharger demonstrates that all implementation measures have been undertaken or that it is infeasible to meet their allocation due to wildlife contributions, the Water Board will consider revising allocations as appropriate. If source control actions are fully implemented throughout the Watershed and the TMDL targets are not met, the Water Board may consider re-evaluating or revising the TMDL and allocations. If, on the other hand, the required actions are not fully implemented, or are partially implemented, the Water Board may consider regulatory or enforcement action against parties or individual dischargers not in compliance.

The California Department of Health Services, working in consultation with the Shellfish Technical Advisory Committee, is encouraged to periodically evaluate, beginning in 2009,

shellfish harvest closure guidelines and the relationship between precipitation, runoff, coliform levels, and water quality exceedances.

In order to assess water quality improvements and obtain additional information for further refinement of the TMDL, Water Board staff and stakeholders will collaborate in monitoring efforts. The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets;
- Evaluate spatial and temporal water quality trends in the Bay and its tributaries;
- Further identify significant pathogens source areas;
- Evaluate coliform levels and loadings to the Bay at the terminus of major tributaries.
- Collect sufficient data to calibrate and validate the Bay hydrodynamic model to observed coliform levels; and
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of implementation actions.

Table 7-7 outlines the locations, constituents, sampling frequency, analytical methods, and the sampling entities for a baseline water quality monitoring program. Additional monitoring will be conducted as needed if funds are available. The Water Board, in coordination with the sampling entities and interested third parties, such as National Park Service, California Department of Health Services, commercial shellfish growers, the Inverness Public Utility District, and the Salmon Protection and Watershed Network will implement this long-term water quality monitoring program. All water quality monitoring (including Quality Assurance and Quality Control procedures) will be performed pursuant to the State Water Board's Quality Assurance Management Plan for the Surface Water Ambient Monitoring Program.

7.2.6.3 ADAPTIVE IMPLEMENTATION

Approximately every five years, the Water Board will review the Tomales Bay Watershed Pathogens TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Tomales Bay Watershed is also impaired. At a minimum, the following questions will be used to conduct the reviews. Additional questions will be developed in collaboration with stakeholders during each review.

1. Are the Bay and the tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the pollutant loads for the various source categories (including naturally occurring background pathogen contributions and the contribution from open space lands), how have these loads changed over time, how do they vary seasonally, and how might source control measures be modified to improve load reduction?

3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?
4. The allocations assume a conservative bacterial die-off rate of 0.02 per hour. This value is based on rates reported for San Francisco Bay in 1970. If bacterial die-off is found to be higher, higher allocations may be considered. What are bacterial die-off rates in the water column and stream sediments? Do they vary by season? What are bacteria transport times from sources to the Bay?
5. How does estuarine mixing and dilution of tributary waters vary by flow and season?
6. What is the relationship between precipitation, runoff, tributary loads, Bay coliform levels, and water quality exceedances and shellfish harvesting closures?
7. Are there bacteria in Tomales Bay sediments that enter the water column during storm events? If yes, how should this process be accounted for?

If it is demonstrated that all reasonable and feasible source control measures have been implemented for a sufficient period of time and TMDL targets are still not being met, the Water Board will reevaluate water quality standards, TMDL targets and allocations as appropriate.

7.3 WATER QUALITY ATTAINMENT STRATEGY AND TMDL FOR DIAZINON AND PESTICIDE-RELATED TOXICITY IN URBAN CREEKS

The following sections establish a water quality attainment strategy and TMDL for diazinon and pesticide-related toxicity in the Region's urban creeks, including actions and monitoring necessary to implement the strategy. The term "pesticides," as used here, refers to substances (or mixtures of substances) intended for defoliating plants, regulating plant growth, or preventing, destroying, repelling, or mitigating pests that may infest or be detrimental to vegetation, humans, animals, or households, or be present in any agricultural or nonagricultural environment. The term "urban creeks," as used here, refers to freshwater streams that flow through urban areas, including incorporated cities and towns and unincorporated areas with similar land use intensities. This strategy applies to all San Francisco Bay Region urban creeks.

The numeric targets, allocations, and implementation plan described below are intended to ensure that urban creeks meet applicable water quality standards established to protect and support beneficial uses. This strategy will also reduce pesticide concentrations in the Bay resulting from urban creek flows. The effectiveness of the implementation actions, the monitoring undertaken to track progress toward meeting the targets, and the most current scientific understanding pertaining to pesticide-related toxicity will be periodically reviewed, and the strategy will be adapted as necessary to reflect changing conditions and information.

7.3.1 PROBLEM STATEMENT

In 1998, a number of the Region's urban creeks were placed on the 303(d) list of impaired waters due to toxicity attributed to diazinon. In the early 1990s, many urban creek water samples collected from selected creeks throughout the Region were toxic to aquatic organisms. Studies found that pesticides, particularly diazinon, caused the toxicity. The 303(d) listings were based on observed toxicity, diazinon detections, and similarities among the Region's urban pesticide use profiles.

When pesticide-related toxicity occurs in urban creek water, creeks do not meet the narrative toxicity objective. When pesticide-related toxicity occurs in sediment, the creeks also do not meet the narrative sediment objective. Likewise, when creek water or sediment is toxic, creeks do not meet the narrative population and community ecology objective. Urban creek waters that fail to meet these objectives are not protective of cold and warm freshwater habitats.

Although U.S. EPA phased out urban diazinon applications at the end of 2004, other pesticides may now pose potential water quality and sediment quality concerns because they are used as diazinon replacements and because pesticide regulatory programs, as currently implemented, allow pesticides to be used in ways that threaten water quality.

7.3.2 NUMERIC TARGETS

The numeric targets below interpret the applicable narrative objectives in terms of quantitatively measurable water quality parameters. Meeting these pesticide-related toxicity and diazinon concentration targets will protect cold and warm freshwater habitats. These targets shall be met at all urban creek locations, including those near storm drain outfalls where urban runoff enters receiving waters.

7.3.2.1 PESTICIDE-RELATED TOXICITY

The toxicity targets are expressed in terms of acute toxic units (TU_a) and chronic toxic units (TU_c). The targets are as follows: pesticide-related acute and chronic toxicity in urban creek water and sediment, as determined through standard toxicity tests, shall not exceed 1.0 TU_a or 1.0 TU_c, where $TU_a = 100/NOAEC$ and $TU_c = 100/NOEC$. "NOAEC" refers to the "no observed adverse effect concentration," which is the highest tested concentration of a sample that causes no observable adverse effect (i.e., mortality) to exposed organisms during an acute toxicity test. For purposes of this strategy, "NOEC" refers to the "no observable effect concentration," which is the highest tested concentration of a sample that causes no observable effect to exposed organisms during a chronic toxicity test. NOAEC and NOEC are both expressed as the percentage of a sample in a test container (e.g., an undiluted sample has a concentration of 100%). In both cases, an observable effect must be statistically significant. For purposes of this strategy, an undiluted ambient water or sediment sample that does not exhibit an acute or chronic toxic effect that is significantly different from control samples on a statistical basis shall be assumed to meet the relevant target.

The above definitions of TU_a and TU_c apply only to ambient conditions in the context of this diazinon and pesticide-related toxicity strategy. If toxicity exists in urban creeks but pesticides do not cause or contribute to the toxicity, these targets do not apply. Moreover, the numeric toxicity targets do not limit the Water Board's authority to evaluate attainment of the narrative objectives through other appropriate means.

7.3.2.2 DIAZINON

The diazinon concentration target is as follows: diazinon concentrations in urban creeks shall not exceed 100 ng/l as a one-hour average. The target addresses both acute and chronic diazinon-related toxicity.

7.3.3 SOURCES

Pesticides, including diazinon, enter urban creeks through urban runoff. Most urban runoff flows through storm drains owned and operated by the Region's municipalities, industrial dischargers, large institutions (e.g., campuses), construction dischargers, and the California Department of Transportation (Caltrans). Urban runoff contains pesticides as a result of pesticides being manufactured, formulated into products, and sold through distributors and retailers to businesses and individuals who apply them for structural pest control, landscape maintenance, agricultural, and other pest management purposes. Factors that affect pesticide concentrations in urban creeks include the amount used, the chemical and physical properties of the pesticide and its product formulation, the sites of use (e.g., landscaping, turf, or paved surfaces), and irrigation practices and precipitation. In the San Francisco Bay Region, ants are the most common pest problem for which pesticides are used. Argentine ants are an introduced species. Pesticide use by structural pest control professionals and use of products sold over-the-counter can be among the greatest contributors of pesticides in urban runoff.

7.3.4 TOTAL MAXIMUM DAILY LOAD

The assimilative capacity of the Region's urban creeks for diazinon and pesticide-related toxicity is the amount of diazinon and pesticide-related toxicity they can receive without exceeding water quality standards. For urban creeks to assimilate diazinon and other pesticide discharges and meet water quality standards, the targets must be met. Rather than establishing a mass-based TMDL to attain the targets, this TMDL is expressed in concentration units. The TMDL is equal to the targets.

The targets rely on a conservative approach that provides an implicit margin of safety to account for any lack of knowledge concerning the relationship between the allocations and water quality. Weather and seasons affect creek flows and pesticide loads, concentrations, and toxicity. By expressing the targets in terms of toxicity and diazinon concentrations, the inherent pesticide mass loads automatically reflect seasonal and other critical conditions as creek conditions change.

7.3.5 ALLOCATIONS

The TMDL is allocated to all urban runoff, including urban runoff associated with municipal separate storm sewer systems, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations, and are the same as the numeric targets and the TMDL.

7.3.6 IMPLEMENTATION

The cornerstone of this strategy is pollution prevention. Pesticide-related toxicity in the Region's urban creeks is to be eliminated and prevented by using pest management alternatives that protect water quality and by not using pesticides that threaten water quality. This can best be accomplished through the rigorous application of integrated pest management techniques and the use of less toxic pest control methods. The term "integrated pest management," as used here, refers to a process that includes setting action thresholds, monitoring and identifying pests, preventing pests, and controlling pests when necessary. Integrated pest management meets the following conditions:

- Pest control practices focus on long-term pest prevention through a combination of techniques, such as biological control, habitat manipulation, and modification of cultural practices;
- Pesticides are used only after monitoring indicates that they are needed;
- Treatments are made with the goal of removing only the target pest; and
- Pesticides are selected to minimize risks to human health, beneficial and non-target organisms, and the environment, including risks to aquatic habitats.

The term "less toxic pest control," as used here, refers to the use of pest control strategies selected to minimize the potential for pesticide-related toxicity in water and sediment. Strategy implementation will focus on three areas: (1) regulatory programs, (2) education and outreach, and (3) research and monitoring. Regulatory programs will prevent pollution by using existing regulatory tools to ensure that pesticides are not applied in a manner that results in discharges that threaten urban creek uses. Education and outreach programs will focus on decreasing demand for pesticides that threaten water quality, while increasing awareness of alternatives that pose less risk to water quality. Research will fill existing information gaps, and monitoring will be used to measure implementation progress and success. The actions described below are intended to address these strategic goals.

When pesticide-related toxicity occurs in urban creeks, many entities share responsibility for the discharge, and therefore many entities share responsibility for implementing actions to ensure that pesticide-related toxicity does not threaten water quality. Although the allocations apply to all urban runoff, responsibility for attaining the allocations is not the sole responsibility of urban runoff management agencies, whose authority to regulate pesticide use is constrained. Actions to be implemented by regulatory agencies, urban runoff management agencies, and other entities are listed below. The agencies with the broadest authorities to oversee pesticide use and pesticide discharges include U.S. EPA, the California Department of Pesticide Regulation, and the Water Board. Regulatory and non-regulatory actions are needed to ensure that pesticide use does not result in discharges that cause or contribute to toxicity in urban creeks. Implementing these actions is expected to ensure attainment of the allocations. Many entities are already implementing these actions. Actions that can be required through NPDES permits are already in some permits and shall be incorporated into all applicable NPDES permits when the permits are reissued or by other regulatory actions if appropriate. Voluntary actions should commence immediately, and inter-agency coordination is already underway.

7.3.6.1 WATER BOARD ACTIONS

The role of the Water Board is to encourage, monitor, and enforce implementation actions, and to lead by example. The Water Board will implement the following actions related to regulatory programs:

- Track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and share monitoring and research data with U.S. EPA;
- When necessary, request that U.S. EPA coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act;
- Encourage U.S. EPA to fully address urban water quality concerns within its pesticide registration process;

- Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and the Structural Pest Control Board to ensure that pesticide applications result in discharges that comply with water quality standards;
- Interpret water quality standards for the California Department of Pesticide Regulation and County Agricultural Commissioners, and assemble available information (such as monitoring data) to assist the California Department of Pesticide Regulation and County Agricultural Commissioners in taking actions necessary to protect water quality; and
- Use authorities (e.g., through permits or waste discharge requirements) to require implementation of best management practices and control measures to minimize pesticide discharges to urban creeks.

The Water Board will implement the following actions related to outreach and education:

- Encourage integrated pest management and less toxic pest management practices;
- Encourage grant funding for activities likely to reduce pesticide discharges, promote less toxic pest management practices, or otherwise further the goals of this implementation plan; and
- Encourage pilot demonstration projects that show promise for reducing pesticide discharges throughout the Region.

The Water Board will implement the following actions related to research, monitoring, and overall program coordination:

- Promote and support studies to address critical data needs (see Adaptive Implementation, below); and
- Assist municipalities and others implementing this strategy by convening stakeholder forums to coordinate implementation.

7.3.6.2 U.S. ENVIRONMENTAL PROTECTION AGENCY ACTIONS

U.S. EPA is responsible for implementing the Federal Insecticide, Fungicide, and Rodenticide Act and the Clean Water Act. U.S. EPA is therefore responsible for ensuring that both federal pesticide laws and water quality laws are implemented. U.S. EPA should exercise its authorities to ensure that foreseeable pesticide applications do not cause or contribute to water column or sediment toxicity in the Region's waters. Because some pesticides pose water quality risks, U.S. EPA should implement the following actions:

- Continue internal coordination efforts to ensure that pesticide applications and resulting discharges comply with water quality standards and avoid water quality impairment (i.e., restrict uses or application practices to manage risks);
- Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control; and
- Complete studies to address critical data needs (see Adaptive Implementation, below).

7.3.6.3 CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION ACTIONS

Like the Water Board, the California Department of Pesticide Regulation is part of the California Environmental Protection Agency. It regulates pesticide product sales and use within California

pursuant to the California Food and Agricultural Code. When the California Department of Pesticide Regulation evaluates whether to register a pesticide product, it must give special attention to the potential for environmental damage, including interference with attainment of water quality standards. The California Department of Pesticide Regulation is mandated to protect water quality from environmentally harmful pesticide materials, which should include pesticides used such that their runoff violates water quality standards. The California Department of Pesticide Regulation should also recognize pesticides used such that their runoff poses a reasonable potential to violate water quality standards to be potentially harmful and take preventive action to address foreseeable risks. The Water Board will assist the California Department of Pesticide Regulation in identifying pesticides that could harm water quality.

The California Department of Pesticide Regulation must endeavor to mitigate adverse effects of pesticides that endanger the environment, such as existing or reasonably foreseeable pesticiderelated violations of water quality standards. If a pesticide product has a demonstrated serious uncontrollable adverse effect, mitigation may include canceling its registration. Mitigation is also warranted to avoid existing and reasonably foreseeable serious uncontrolled adverse effects. The Water Board will notify the California Department of Pesticide Regulation whenever it obtains information concerning actual or potential water quality standard violations so the California Department of Pesticide Regulation can implement appropriate protective actions.

To be effective, this strategy relies on the California Department of Pesticide Regulation to use its authorities in concert with the Water Board. Consistent with its authorities, the California Department of Pesticide Regulation should implement the following actions:

- Work with the Water Board to identify pesticides applied in urban areas in such a manner that runoff does or could cause or contribute to water quality standard violations;
- Condition registrations, as appropriate, to require registrants to provide information necessary to determine the potential for their products to cause or contribute to water quality standard violations and to implement actions necessary to prevent violations;
- Continue and enhance efforts to evaluate the potential for registered pesticide products to cause or contribute to water quality standard violations (the California Department of Pesticide Regulation need not wait for the Water Board to evaluate potential water quality effects);
- Implement actions to eliminate pesticide-related water quality standard violations caused by registered pesticides;
- Implement actions to prevent potential pesticide-related water quality standard violations before they occur;
- Notify U.S. EPA of potential deficiencies in product labels for products that threaten water quality;
- Continue and enhance education and outreach programs to encourage integrated pest management and less toxic pest control (work with County Agricultural Commissioners, urban runoff management agencies, and the University of California Statewide Integrated Pest Management Program to coordinate activities);
- Continue and enhance efforts to prevent the introduction of new exotic pests to the Region; and

- Complete studies to address critical data needs (see Adaptive Implementation, below).

7.3.6.4 COLLABORATION WITHIN THE CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

As sister agencies within the California Environmental Protection Agency, the Water Board and the California Department of Pesticide Regulation should coordinate pesticide and water quality regulation in the Region. In 1997, the California Department of Pesticide Regulation and the State Water Resources Control Board entered into a management agency agreement. The California Department of Pesticide Regulation agreed to ensure that compliance with numeric and narrative water quality objectives is achieved. The State and Regional Water Boards retained responsibility for interpreting compliance with narrative water quality objectives. In light of the agreement, the Water Board and the California Department of Pesticide Regulation should work together to eliminate recurrences of water quality standard violations and prevent potential future violations. In consultation with the California Department of Pesticide Regulation, the Water Board will implement the following actions:

- Gather and review available information to identify pesticides most likely to run off into urban creeks and cause or contribute to water quality standard violations;
- Identify evaluation criteria that can be used to discern whether water quality standards are met (e.g., water quality objectives, targets, monitoring benchmarks, or other criteria);
- Evaluate available information to determine whether water quality standards are met and, if so, whether circumstances suggest that future violations are likely; and
- Notify the California Department of Pesticide Regulation and County Agricultural Commissioners if water quality standard violations exist or are likely to exist in the future due to pesticide discharges, thereby enabling these agencies to implement appropriate actions and assisting them in ensuring that their regulatory programs adequately protect water quality.

In consultation with the Water Board, the California Department of Pesticide Regulation should implement the following actions:

- When available information is insufficient to conclude whether water quality standards are met, work with the Water Board to identify information needed to evaluate the potential for pesticide discharges to cause or contribute to water quality standard violations;
- Obtain information necessary to determine whether water quality standards are or are likely to be met from pesticide product registrants, U.S. EPA, and other sources (conservative [i.e., protective] assumptions may be used to fill information gaps);
- Evaluate whether water quality standards are likely to be met (e.g., consider pesticide use, toxicity, application sites and techniques, runoff potential, and environmental persistence; estimate foreseeable water and sediment pesticide concentrations; and consider Water Board evaluation criteria);
- When pesticide discharges are or are likely to cause or contribute to water quality standard violations, identify and evaluate possible corrective actions (using the Water Board's evaluation criteria) and implement those needed to ensure that water quality standards will be met; and

- When available information suggests that pesticide discharges appear likely to cause or contribute to water quality standard violations in the future (assuming standards are currently met), identify and evaluate possible preventive actions and, commensurate with the weight of the evidence, implement those actions needed to ensure that water quality standards will be met.

Sometimes, a pesticide-by-pesticide approach may be counterproductive, particularly if existing pesticide problems are likely to be replaced by new pesticide problems. As appropriate, the California Department of Pesticide Regulation may evaluate several pesticides at once if related to a specific application method, application site of concern, or other shared factor.

During adaptive implementation reviews (see "Adaptive Implementation," below), the Water Board will consider the extent to which inter-agency collaboration is sufficient to address water quality concerns. If necessary, the Water Board will notify the California Department of Pesticide Regulation of deficiencies and could consider the need to use its own regulatory authorities to control pesticide discharges.

7.3.6.5 COUNTY AGRICULTURAL COMMISSIONERS ACTIONS

County Agricultural Commissioners are the local enforcement agents for the California Department of Pesticide Regulation. They provide local enforcement of applicable pesticide laws and, when necessary to address local circumstances (e.g., localized toxicity in an urban creek), can adopt local regulations (subject to California Department of Pesticide Regulation approval) that govern the conduct of pest control operations and the records and reports of those operations. County Agricultural Commissioners should implement the following actions:

- Continue and enhance enforcement related to illegal sale or use of pesticides, including pesticides sold over-the-counter;
- Continue to enforce the phase out of diazinon products and any new regulations affecting pesticide applications and their water quality risks;
- Continue and enhance efforts to prevent the introduction of new exotic pests to the Region;
- Provide outreach and training to pest control licensees regarding water quality issues as part of pest control business license registration and inspection programs; and
- Work with the California Department of Pesticide Regulation, urban runoff management agencies, and the University of California Statewide Integrated Pest Management Program to coordinate education and outreach programs to minimize pesticide discharges.

7.3.6.6 STRUCTURAL PEST CONTROL BOARD ACTIONS

The Structural Pest Control Board is responsible for licensing structural pest control professionals. The Structural Pest Control Board requires training and examinations to maintain a license to practice structural pest control, and regulates the advertising practices of structural pest control businesses. The Structural Pest Control Board should implement the following actions:

- Through licensing and other authorities, work to ensure that structural pest control practices result in discharges that comply with water quality standards;

- Work to develop a mechanism through which consumers can determine which structural pest control providers offer services most likely to protect water quality; and
- Work to enhance initial and continuing integrated pest management training for structural pest control licensees.

7.3.6.7 UNIVERSITY OF CALIFORNIA ACTIONS

The University of California Statewide Integrated Pest Management Program promotes pest management education and outreach throughout California. The University of California should implement the following actions:

- Continue and enhance educational efforts targeting urban pesticide users to promote integrated pest management and less toxic pest management practices;
- Continue to encourage and support efforts to identify and improve new less toxic pest management strategies for the urban environment;
- Continue to serve as a resource for information on alternative pest management practices that protect water quality and develop publications others can use to support outreach activities;
- Continue to train University of California Master Gardeners to help disseminate information about integrated pest management and pest management alternatives that protect water quality; and
- Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and urban runoff management agencies to coordinate education and outreach programs to minimize pesticide discharges.

7.3.6.8 URBAN RUNOFF MANAGEMENT AGENCIES AND SIMILAR ENTITIES ACTIONS

NPDES permits for urban runoff management agencies and similar entities responsible for controlling urban runoff (e.g., industrial facilities, construction sites, California Department of Transportation facilities, universities, and military installations) shall require implementation of best management practices and control measures. Requirements in each NPDES permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pesticides in urban runoff. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on Best Available Technology Economically Achievable. All permits shall remain consistent with the section of this chapter titled "Surface Water Protection and Management—Point Source Control - Stormwater Discharges." These requirements shall be included in permits no later than five years after the effective date of this strategy. If these requirements prove inadequate to meet the targets and allocations, the Water Board will require additional control measures or call for additional actions by others until the targets and allocations are attained.

The following general requirements shall be implemented through NPDES permits issued or reissued for urban runoff discharges:

1. Reduce reliance on pesticides that threaten water quality by adopting and implementing policies, procedures, or ordinances that minimize the use of pesticides that threaten water quality in the discharger's operations and on the discharger's property;
2. Track progress by periodically reviewing the discharger's pesticide use and pesticide use by its hired contractors;
3. Train the discharger's employees to use integrated pest management techniques and require that they rigorously adhere to integrated pest management practices;
4. Require the discharger's contractors to practice integrated pest management; and
5. Study the effectiveness of the control measures implemented, evaluate attainment of the targets, identify effective actions to be taken in the future, and report conclusions to the Water Board.

The following education and outreach requirements shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

1. Undertake targeted outreach programs to encourage communities within a discharger's jurisdiction to reduce their reliance on pesticides that threaten water quality, focusing efforts on those most likely to use pesticides that threaten water quality;
2. Work with the California Department of Pesticide Regulation, County Agricultural Commissioners, and the University of California Statewide Integrated Pest Management Program to coordinate education and outreach programs to minimize pesticide discharges.
3. Encourage public and private landscape irrigation management that minimizes pesticide runoff; and
4. Facilitate appropriate pesticide waste disposal, and conduct education and outreach to promote appropriate disposal.

The following monitoring and reporting requirements shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

1. Monitor diazinon and other pesticides discharged in urban runoff that pose potential water quality threats to urban creeks; monitor toxicity in both water and sediment; and implement alternative monitoring mechanisms, if appropriate, to indirectly evaluate water quality as described below (see Monitoring, below);
2. Disseminate monitoring data to appropriate regulatory agencies; and
3. Contribute to studies to address critical data needs (see Adaptive Implementation, below).

The following requirements related to regulatory programs shall also be implemented through NPDES permits issued or reissued for urban runoff discharges:

1. Track U.S. EPA pesticide evaluation and registration activities as they relate to surface water quality and, when necessary, encourage U.S. EPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Clean Water Act and to accommodate water quality concerns within its pesticide registration process;
2. Assemble and submit information (such as monitoring data) as needed to assist the California Department of Pesticide Regulation and County Agricultural Commissioners

in ensuring that pesticide applications within the Region comply with water quality standards; and
3. Report violations of pesticide regulations (e.g., illegal handing) to County Agricultural Commissioners.

The actions above may be implemented by individual urban runoff management entities, jointly by two or more entities acting in concert, or cooperatively through a regional approach, as appropriate.

NPDES permits issued or reissued for industrial, construction, and California Department of Transportation facilities shall implement the general requirements and education and outreach requirements listed above and monitoring requirements as appropriate.

7.3.6.9 PRIVATE ENTITIES ACTIONS

Most pesticides do not occur naturally in the environment; they are manufactured. Pesticide manufacturers and formulators sell products to distributors and retailers, who sell them to the pesticide users who apply them. These private entities should implement the following actions to prevent pesticide-related toxicity in urban creeks:

- Pesticide manufacturers and formulators should minimize potential pesticide discharges by developing and marketing products designed to avoid discharges that exceed water quality standards. (Many manufacturers successfully market such products.) They should also undertake studies to address critical data needs (see Adaptive Implementation, below);
- Distributors and retailers should offer point-of-sale information on less toxic alternatives. They should also offer and promote less toxic alternatives to customers;
- Pest control advisors should recommend integrated pest management strategies so pesticides that could threaten water quality are used only as a last resort; and
- Pesticide users (e.g., private citizens, professional pesticide applicators, school districts, transit districts, and mosquito abatement and vector control districts) should adopt integrated pest management and less toxic pest control techniques so pesticide applications do not contribute to pesticide runoff and toxicity in urban creeks.

7.3.7 MONITORING

Monitoring is needed to demonstrate target attainment and to track and evaluate the effectiveness of strategy implementation. Diazinon monitoring needs to demonstrate that diazinon concentrations meet the target. When the concentrations consistently drop below the target, such monitoring may no longer be needed. However, because other pesticides will continue to be applied in urban areas, the need to monitor for water and sediment toxicity—and sometimes specific pesticides—will likely remain well after achieving the diazinon concentration target.

A number of programs monitor pesticide concentrations and toxicity in the Region's waters, including the Water Board's Surface Water Ambient Monitoring Program, the California Department of Pesticide Regulation's Surface Water Protection Program, and the Regional Monitoring Program for Trace Substances. Municipal storm water NPDES permits may also

require dischargers to characterize their discharges and receiving waters. This can involve monitoring toxicity and specific pollutants, like diazinon, in storm drain systems and urban creeks.

7.3.7.1 MONITORING REQUIREMENTS

Monitoring requirements shall be implemented through NPDES permits issued or reissued for urban runoff discharges. Urban runoff management agencies shall undertake monitoring efforts related to pesticides and toxicity. They shall design and implement a monitoring program to answer the following questions:

- Is the diazinon concentration target being met?
- Are the toxicity targets being met?
- Is toxicity observed in urban creeks caused by a pesticide?
- Is urban runoff the source of any observed toxicity in urban creeks?
- How does observed pesticide-related toxicity in urban creeks (or pesticide concentrations contributing to such toxicity) vary in time and magnitude across urban creek watersheds, and what types of pest control practices contribute to such toxicity?
- Are actions already being taken to reduce pesticide discharges sufficient to meet the targets, and if not, what should be done differently?

The monitoring program may be developed by individual urban runoff management agencies, jointly by two or more agencies acting in concert, or cooperatively through a regional approach. Designing the program shall involve characterizing watersheds, selecting representative creeks, identifying sample locations, developing sampling plans, and selecting appropriate analytical tests of water and sediment. Chemical and toxicity tests shall be conducted on urban creek water and sediment. At a minimum, tests shall be used to measure the following:

- Water column toxicity;
- Sediment toxicity;
- Diazinon concentrations in water (until the diazinon concentration target is met consistently); and
- Concentrations of other pesticides that pose potential water quality and sediment quality threats, as feasible.

Sampling frequency, timing, and number of samples shall be adequate to answer the monitoring questions above and any others set forth for the monitoring program.

Additional types of monitoring tools may be used to support and optimize conventional water and sediment monitoring. For example, monitoring in storm drain systems or near application sites may be useful in selecting creek sampling strategies because pesticide concentrations are easier to detect nearer to the pesticide application site. Efforts to monitor parameters that can serve as surrogates or indicators of pesticide-related water quality conditions may moderate the need for more comprehensive water quality monitoring. While some toxicity and pollutant monitoring will always be necessary, extensive monitoring will be less important if other information is collected that can be used to evaluate the potential for toxicity or specific pollutants to occur in water. Alternative monitoring information can also help focus water

quality monitoring efforts and mitigation actions. Such monitoring could include reviewing pesticide sales and use data for the Region, pesticide fate and transport data, and public attitudes regarding pesticides and water quality. If undertaken, such monitoring may seek to answer the following questions:

- What pesticides pose the greatest water quality risks?
- How is the use of such pesticides changing?
- Are existing actions effective in reducing pesticide discharges that threaten water quality?
- What approach is best for monitoring toxicity and pesticides in urban creek water and sediment?

7.3.7.2 MONITORING BENCHMARKS

To determine whether measured or predicted pesticide concentrations in water are cause for concern, monitoring benchmarks are needed. Ideally, water quality criteria would be used; however, water quality criteria do not exist for most pesticides. In the absence of water quality criteria, a monitoring benchmark may be calculated as follows. Such a monitoring benchmark is not a water quality objective unless adopted as such by the Water Board. Where valid tests have determined four-day LC_{50} values for aquatic organisms (the concentration that kills one half of the test organisms), a monitoring benchmark may be calculated by dividing the lowest LC_{50} value measured by the appropriate benchmark factor from Table 7-8 (typically 14 or less for a registered pesticide).

Monitoring Benchmark = Lowest LC_{50} ÷ Benchmark Factor

Where multiple LC_{50} measurements are available, the lowest "genus mean acute value" may be used in place of the lowest LC_{50}. The term "genus mean acute value," as used here, refers to the geometric mean of the available "species mean acute values" within a genus. The term "species mean acute value," as used here, refers to the geometric mean of available four-day LC_{50} values for each species. Other available information regarding the pesticide (such as its potential for sub-lethal effects) may also be considered to determine if lower monitoring benchmarks are appropriate to reflect attainment of the narrative objectives. Table 7-8 is not intended for deriving monitoring benchmarks for sediment tests.

When monitoring data demonstrate that pesticide concentrations exceed monitoring benchmarks, the information will be considered during periodic reviews undertaken as part of adaptive implementation (see below). When pesticide concentrations exceed monitoring benchmarks, the Water Board may consider such information in determining compliance with the narrative toxicity, sediment, and population and community ecology objectives. The Water Board may also seek additional toxicity data to derive water quality criteria. The Water Board may inform other regulatory agencies (e.g., the California Department of Pesticide Regulation) about the potential threat to water quality and seek action to prevent water quality impairment.

7.3.8 ADAPTIVE IMPLEMENTATION

Adaptive implementation entails taking immediate actions commensurate with available information, reviewing new information as it becomes available, and modifying actions as

necessary based on the new information. Taking immediate action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Table 7-9 lists specific actions the Water Board will use to track its progress and an implementation timeframe. If the Water Board determines that expected actions by responsible parties are not occurring or are not sufficient to attain allocations and targets, the Water Board will consider appropriate response actions to improve implementation or otherwise consider revisions to the strategy.

7.3.8.1 PERIODIC REVIEW

The Water Board will review this strategy approximately every five years. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. If any modifications are needed, they will be incorporated into the Basin Plan. At a minimum, the following focusing questions will be used to conduct the reviews. Additional focusing questions will be developed in collaboration with stakeholders during each review.

1. Are changes in urban creek conditions moving toward improvements in water quality (e.g., toward target attainment)?
2. If it is unclear whether there is progress, how should monitoring efforts be modified to measure trends?
3. If there has not been adequate progress, how might the implementation actions or allocations be modified to improve progress?
4. Is there new information that suggests the need to modify the targets, allocations, or implementation actions?
5. If so, how should the strategy be modified?

During the periodic reviews, the Water Board will consider newly available information regarding such topics as market trends, monitoring results, tools for risk evaluation, outreach effectiveness, and regulatory actions.

7.3.8.2 ADDITIONAL SOURCES

As the strategy is implemented, additional sources of pesticide-related toxicity may emerge, either as the result of a new discharge or a new pesticide being applied. In such situations, the allocations for additional sources shall be the same as those for the existing sources unless the Water Board finds these allocations to be inappropriate or chooses to refine the strategy in some other manner.

7.3.8.3 CRITICAL DATA NEEDS

Various types of information and tools are needed to adequately evaluate the risks associated with pesticide runoff. To the extent possible, the pesticide industry should shoulder the burden of collecting this information and developing appropriate tools. At times, however, the citizens of the Region (as represented by the Water Boards, the urban runoff management agencies, and others) should lead by example. Therefore, the pesticide industry should undertake and others should support and promote the following actions:

- Conduct surveillance monitoring of surface waters and sediment and publicly report the results;
- Develop publicly available and commercially viable analytical methods to detect ecologically relevant concentrations of pesticides that pose water quality risks;
- Develop procedures that can be used to identify potential causes of toxicity in water and sediment (e.g., Toxicity Identification Evaluation procedures);
- Complete publicly available studies that characterize the fate and transport of pesticides applied in urban areas;
- Develop and adopt evaluation methods (e.g., quantitative fate and transport models) for urban pesticide applications, including applications to impervious surfaces; and
- Complete publicly available studies to support the development of water quality criteria for pesticides in water and sediment.

TABLES

Table 7-1: Monitoring Stations for Copper and Nickel in Lower South San Francisco Bay

SBS Site ID	Reference Location	Longitude	Latitude	RMP Site ID
SB01	Channel Marker #14	37° 30.782'	122° 8.036'	BA30
SB02	Channel Marker #16	37° 29.595'	122° 5.243'	BA20
SB03	Channel Marker #20	37° 27.437'	122° 3.033'	BA10
SB04	Coyote Creek Railroad Bridge	37° 27.600'	121° 58.540'	C-3-0
SB05	Coyote Creek at Guadalupe River confluence	37° 27.875'	122° 1.406'	NA
SB06	Between Channel Markers #17 & #18	37° 28.390'	122° 4.180'	NA
SB07	Mouth of Mowry Slough	37° 29.499'	122° 3.110'	NA
SB08	Mouth of Newark Slough	37° 30.066'	122° 5.231'	NA
SB09	North of Cooley Landing	37° 28.959'	122° 7.068'	NA
SB10	Old Palo Alto Yacht Club Channel Mouth	37° 28.087'	122° 5.846'	NA
SB11	Standish Dam in Coyote Creek	37° 27.150'	121° 55.501'	BW10
SB12	Alviso Yacht Club Dock	37° 25.574'	121° 58.778'	BW15

Table 7-2: Water Quality Targets[a] for Tomales Bay and Its Tributaries

Zero discharge of human waste

Shellfish harvest closures < 30 days/year

Coliform Bacteria Levels
(Expressed as Most Probable Number [MPN] of fecal coliforms per 100 mL of water)

Tomales Bay

Median < 14 [b] and 90th percentile < 43 [c]

Tomales Bay Tributaries

Log mean <200 [b] and 90th percentile < 400 [c]

NOTES:

a. These targets are applicable year-round.

b. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

c. No more than 10% of total samples during any 30-day period may exceed this number.

Table 7-3: Total Maximum Daily Load of Pathogens Indicators for Tomales Bay and Its Tributaries

Waterbody	Indicator Parameter	TMDL (Most Probable Number (MPN) of fecal coliforms per 100 mL of water)
Tomales Bay	Fecal coliform	median < 14[a] 90th percentile < 43[b]
Major Tributaries: Walker Creek Lagunitas Creek Olema Creek	Fecal coliform	log mean < 200[a] 90th percentile < 400[b]

NOTES:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. No more than 10% of total samples during any 30-day period may exceed this number.

Table 7-4A: Density-Based Pollutant Wasteload and Load Allocations[a] for Dischargers of Pathogens in Tomales Bay Watershed

Categorical Pollutant Source	Wasteload and Load Allocations Fecal Coliform (MPN/100 mL)		
	For Direct Discharges to the Bay		For Discharges to Major Tomales Bay Tributaries
	Median[b]	90th Percentile[c]	Log Mean[b]
Onsite Sewage Disposal Systems	0	0	0
Small Wastewater Treatment Facilities	0	0	0
Boat Discharges	0	0	N/A
Grazing Lands	<14	<43	< 200
Dairies	<14	<43	< 200
Equestrian Facilities	<14	<43	< 200
Municipal Runoff	<14	<43	< 200
Open space lands (terrestrial wildlife) [d]	<14	<43	< 200
In-Bay Background (marine wildlife) [d]	<14	<43	N/A

NOTES:

a. These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit.
b. Based on a minimum of five consecutive samples equally spaced over a 30-day period.
c. No more than 10% of total samples during any 30-day period may exceed this number.
d. Open space lands and the Bay contain wildlife and are therefore recognized as potential source areas. These areas are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

Table 7-4B: Density-Based Pollutant Wasteload and Load Allocations for Tomales Bay Tributaries

Tributary	Allocation Fecal Coliform (MPN/100 mL) Log Mean
Walker Creek at Highway 1 Bridge	95[a]
Lagunitas Creek at Green Bridge	95[a]

NOTE:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

Table 7-5: Trackable Implementation Measures for the Tomales Bay Watershed Pathogens Total Maximum Daily Load

Source Category	Action	Implementing Party	Completion Dates
On-Site Sewage Disposal Systems (OSDS)	Submit to the Executive Officer for approval a plan and implementation schedule to evaluate OSDS performance for the Tomales Bay watershed and to bring identified OSDS up to County's repair standards.	Marin County, Community Development Agency	January 2007
	Report progress on implementation of OSDS evaluation and repair program.	Marin County, Community Development Agency	Starting January 2011 and biennially thereafter
Small Wastewater Treatment Facilities	Comply with applicable Waste Discharge Requirements (WDRs).	Small wastewater treatment facilities	As specified in the applicable WDRs
	Inspect and evaluate all permitted WDR facilities and update WDRs as warranted.	Water Board staff	January 2009
	Report progress on inspection and evaluation of WDR facilities.	Water Board staff	No less than once every five years starting in January 2009

Source Category	Action	Implementing Party	Completion Dates
Boat Discharges	In coordination with interested stakeholders in Tomales Bay, determine the adequacy of on-shore restroom facilities and boater disposal/pump out facilities, and prepare a schedule for a determination of Pumpout Facility Need and Public Hearing Notification, as appropriate.	Regional Water Board	January 2009
	Water Board will coordinate with participating agencies and rely on their interests and authorities to develop and implement a Tomales Bay boating management plan that includes: evaluation of existing moorings and water quality impacts; permitting and enforcement procedures to ensure compliance with applicable mooring requirements and to ensure no sewage discharge from boats.	Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board,-Gulf of the Farallones National Marine Sanctuary.	January 2009
	Report progress on implementation of boating management plan.	As specified in the Boating Management Plan: Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary	As specified in the Boating Management Plan
	Comply with boating management plan for Tomales Bay.	Boaters	As specified in the Boating Management Plan

Source Category	Action	Implementing Party	Completion Dates
Grazing Lands[1]	Submit a Report of Waste Discharge[2] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific grazing management measures to reduce animal waste runoff; and a schedule to implement identified management measures.	Dairies and ranchers (landowners and leasees). These Reports may be submitted individually or jointly or through a third party.	January 2009
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Dairies and ranchers (landowners and leasees)	As specified in applicable WDRs or waiver of WDRs
	Report progress on implementation of grazing-management measures that reduce animal waste runoff.	Dairies and ranchers (landowners and leasees). These reports may be submitted individually or jointly or through a third party.	As specified in applicable WDRs or waiver of WDRs
Dairies[3]	Comply with applicable Waiver of Waste Discharge Requirements (WDRs) for confined animal facilities or requirements specified in applicable individual WDRs.	Dairies (landowners and leasees)	As specified in applicable WDRs or waiver of WDRs

[1] Grazing lands include all land areas grazed by livestock such as ranchlands, riparian areas, and pasturelands. Confined animal facilities which are already regulated under existing WDRs or waiver of WDRs and are excluded from this requirement.
[2] WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.
[3] These implementation actions for Dairies are for the confined animal portions of the facilities and do not include the grazing areas. Implementation actions for grazing lands associated with dairies are included under Grazing lands.

Source Category	Action	Implementing Party	Completion Dates
Equestrian Facilities	Submit a Report of Waste Discharge[2] to the Water Board that provides the following: a description of the facility; identification of necessary site-specific management measures to reduce animal waste runoff; and a schedule for implementation of identified management measures.	Equestrian facilities. These Reports may be submitted individually or jointly or through a third party.	January 2009
	Comply with applicable Waste Discharge Requirements (WDRs) or waiver of WDRs.	Equestrian facilities	As specified in applicable WDRs or waiver of WDRs.
	Report progress on implementation of management measures that reduce animal waste runoff.	Equestrian facilities. These reports may be submitted individually or jointly or through a third party.	As specified in applicable WDRs or waiver of WDRs
Municipal Runoff	Submit to Water Board for approval a stormwater management plan (that includes management measures to reduce pathogens runoff and a schedule for implementation of identified management measures.	Marin County, Stormwater Pollution Prevention Program	January 2009
	Report progress on implementation of pathogens-reduction measures.	Marin County, Stormwater Pollution Prevention Program	As specified in approved stormwater management plan

Table 7-6: Regulatory Framework for Discharges by Source Category

Source Category	Regulatory Tool
On-site Sewage Disposal Systems (OSDS)	Waiver[a] of Waste Discharge Requirements Prohibition of Human Waste Discharge
Small Wastewater Treatment Facilities	Individual Waste Discharge Requirements Prohibition of Human Waste Discharge
Boat Discharges	Prohibition of Human Waste Discharge
Grazing Lands	Waiver[a] of Waste Discharge Requirements
Dairies	Waiver[a] of Waste Discharge Requirements or Individual WDRs, as appropriate
Equestrian Facilities	Waiver[a] of Waste Discharge Requirements
Municipal Runoff	NPDES Permit

NOTE:

a. Water Board retains the option of requiring individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.

Table 7-7: Baseline Water Quality Monitoring Program

Constituent	Location	Frequency	Sampling Entities
Tomales Bay			
Fecal coliform[a]	California Department of Health Services designated primary water quality monitoring stations	Weekly for five weeks beginning in January; Monthly March – December Weekly for five weeks during summer months	Shellfish growers
Tributaries			
Fecal coliform Stream Flow	Olema Creek (tributary to Lagunitas)	Weekly for five weeks beginning in January; Monthly March - December Weekly for five weeks during summer months	National Park Service
Fecal coliform	West Shore tributaries	Same as above	Inverness Public Utilities District
Fecal coliform	East Shore tributaries	Same as above	Water Board
Fecal coliform Stream Flow	Lagunitas Creek	Same as above	Water Board, Salmon Protection and Watershed Network
Fecal coliform Stream Flow	Walker Creek	Same as above	Water Board

NOTE:

a. *E. coli* monitoring may be used in the future to assess general water quality trends and exceedances. If *E. coli* is used, a Tomales Bay specific correlation factor linking fecal coliform and *E. coli* levels will need to be established.

Table 7-8: Benchmark Factors

Number of Data Requirements Satisfied [a]	Benchmark Factor [b]
2	16
3	14
4	14
5	12
6	10
7	8

NOTES:

a. U.S. EPA water quality criteria guidelines require data for at least eight taxonomic families to derive water quality criteria.

b. These values apply only when both daphnid and salmonid toxicity data are available. U.S. EPA typically requires such data to register a pesticide.

Table 7-9: Water Board Implementation Measure Tracking

Action	Schedule
Summarize pesticide regulatory activities as they relate to water quality, and identify opportunities to advise pesticide regulatory oversight agencies regarding future actions	Annually
Summarize research and monitoring data for pesticide regulatory oversight agencies and others, and determine where to focus future monitoring efforts based on critical data needs	Annually
Describe urban pesticide use trends and identify pesticides likely to affect water quality	Annually
Notify pesticide regulatory oversight agencies if water quality standard violations exist or are likely to exist in the future due to pesticide discharges	At least annually
Identify waters impaired by pesticide-related toxicity and waters where there is a potential for impairment	Biannually
Meet or correspond with pesticide regulatory oversight agencies regarding their roles in protecting water quality	At least annually
Place required actions in NPDES stormwater permits	No later than five years from effective date of strategy
Report implementation status to Water Board	Annually