

# 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 December 31, 2010.

## **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

#### 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 temperature 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,  $\mu$ S/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

Figure 2-7: Santa Clara Basin

Figure 2-8: San Pablo Basin

Figure 2-9: Suisun Basin

Figure 2-10: Significant Groundwater Basins

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

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

#### **TABLES**

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

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

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

Table 2-4: Examples of Beneficial Uses of Wetland Areas

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

Ш ΛVN Recreational KEC-7 Ш  $\Pi$ Щ [I] Ш Щ ĮΊ Ъ Щ ĮΊ Щ Ш  $\Pi$ Щ KEC-1 Щ Щ Д 闰 Щ Д Д Щ Щ Ш  $\Pi$ Щ Wildlife MILD ĮΊ  $\Pi$ Ш Щ ΙŢ ĮΊ ĮΊ  $\Pi$ Ш Ш Щ Ш ĮΊ  $\Pi$ WARM 口 Ц 口 Ш Щ Щ Щ Ц Щ 闰 Щ (T) 闰 SPWN [I] П 口 ĮΊ 山 口  $K \forall K E$ ET. ĮΊ Ш ĮΊ Щ MICK Aquatic Life Uses MAR Ш ĮЦ Щ EZL 口 闰 口 口 [I] Щ COLD  $\Pi$ Щ SHEF [I] 闰 闰  $\Pi$ H 闰 闰 闰 COMM ĮΊ 口 H H 口 Human Consumptive Uses – **b**KOC Ш IND QMB口 **E**BSH Щ NNW ĮΊ AGR 口 Pacific Ocean (Marin) East Schooner Creek Morses Gulch Creek Pike County Gulch Creek McKennan Gulch Limantour Estero Pine Gulch Creek Abbotts Lagoon **Bolinas Lagoon** Redwood Creek Millerton Gulch MARIN COUNTY Alamere Creek Easkoot Creek Rodeo Lagoon **Drakes Estero** Tomales Bay Crystal Lake Rodeo Creek Coast Creek Waterbody (Marin) Creek COUNTY

# MARIN COASTAL BASIN

# MARIN COASTAL BASIN

| <i>COUNTY</i><br>Waterbody                                  | ЯЭV | NUM    | FRSH | GWR | ΠNI | ькос | COMM | SHET | EZL | MAR<br>MIGR | RARE |   | NMdS | WARM | MIFD | KEC-1    | KEC-7    | Λ∀N |
|---|-----|--------|------|-----|-----|------|------|------|-----|-------------|------|---|------|------|------|----------|----------|-----|
| Walker Creek<br>Laguna Lake<br>Frink Canyon Creek           |     |        |      |     |     |      |      |      | 田   | 田           | 田田   |   | 凹    | 凹    | 田    | <u>م</u> | <u>م</u> |     |
| Verde Canyon Creek<br>Salmon Creek                          |     |        |      |     |     |      |      |      |     |             |      |   |      |      |      |          |          |     |
| Soulajule Reservoir   | ב   | 피 [    | П    |     |     |      |      |      |     |             | L.   |   |      | IJ L | л г  | ਸ ।      | ਸ   1    |     |
| Laguinas Creek<br>Haggerty Gulch Creek<br>Bear Valley Creek |     | d<br>d |      |     |     |      |      |      | נו  | 4           |      |   |      | บ    | ŭ    | ц        | ជ        |     |
| Olema Creek   |     |        |      |     |     |      |      |      | ш   | 田田          | [7]  |   | Ш    | 田    | 田    | 田        | 田田       |     |
| Nicasio Reservoir   |     | Щ      | 田    |     |     |      |      |      | Ь   |             |      | Ι | E    | 田    | 田    | 田        | 田        |     |
| Nicasio Creek   |     | 田      | 田    |     |     |      |      | ,    | Ш   | 田           | [7]  |   | 田    |      | 田    | 田        | 田        |     |
| Halleck Creek   |     |        |      |     |     |      |      |      |     |             |      |   |      |      |      |          |          |     |
| Devils Gulch Creek  |     |        |      |     |     |      |      |      |     |             |      |   |      |      |      |          |          |     |
| Kent Lake   |     | 田      |      |     |     |      |      |      | 田   |             |      |   | E I  | 田    | 田    | 田        | 田        |     |
| Big Carson Creek  |     |        |      |     |     |      |      |      |     |             |      |   |      |      |      |          |          |     |
| Alpine Lake   |     | 田      |      |     |     |      |      |      | Ш   |             |      | П | E I  | 田    | 田    | 田        | 田        |     |
| Bon Tempe Lake  |     | 田      |      |     |     |      |      | , ,  | 田   |             |      | П | H    | 田    | 田    | 田        | 田        |     |
| Lake Lagunitas  |     | 田      |      |     |     |      |      | ,    | 田   |             |      | I | E    | 田    | 田    | E        | E        |     |

P: Potential beneficial use 

# SAN MATEO COASTAL BASIN

|   |     | Ξ       | uman C | Human Consumptive Uses | ive Use | 8    | <b>T</b> |      |      | Aquati | Aquatic Life Uses | lses     |      |      | <b>^</b> | Wildlife<br>Use | Recreational<br>Uses | tional<br>2S |     |
|---|-----|---------|--------|------------------------|---------|------|----------|------|------|--------|-------------------|----------|------|------|----------|-----------------|----------------------|--------------|-----|
| <i>COUNTY</i><br>Waterbody                  | AGR | NUM     | ЕВЗН   | СМК                    | IND     | PROC | СОММ     | SHEL | COLD | EZL    | AAM               | МІСК     | КАКЕ | NMdS | WARM     | MIFD            | KEC-1                | KEC-7        | Λ∀N |
| SAN MATEO COUNTY                            |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Pacific Ocean (San<br>Mateo, San Francisco) |     |         |        |                        | 田       |      | 田        | 田    |      |        | 凹                 | 田        | 田    | 田    |          | 田               | 田                    | 田            | 田   |
| Lake Merced                                 |     | <u></u> |        |                        |         |      |          |      | 田口   |        |                   | נו       |      | 田口   | 田口       | Щ               | 田                    | Щυ           |     |
| Sall Feuro Cicen                            | ŗ   | ع  د    |        |                        |         |      |          |      | 1 L  |        |                   | ם נ      |      | ្ន   | <u>ا</u> | ] L             | ٢                    | ء د          |     |
| San Vincente Creek                          | ЩI  | щI      |        |                        |         |      |          |      | щI   |        |                   | щ        | щ    | щI   | Ţ        | ЩI              | <u>م</u> 1           | <u>م</u> ړ   |     |
| Denniston Creek                             | IJГ | л       |        |                        |         |      |          |      | J) [ |        |                   | IJļ      | J) [ | IJГ  | J) [     | IJ[             | IJГ                  | IJГ          |     |
| Frenchmans Creek                            | ц   |         |        |                        |         |      |          |      | ц    |        |                   | נו       | 긔    | 긔    | 긔        | 긔               | 긔                    | 긔            |     |
| Pilarcitos Creek                            | 山   | 山       |        |                        |         |      |          |      | 口    |        |                   | Щ        | 田    | 田    | 山        | Щ               | Ь                    | Ь            |     |
| Apanolio Creek                              |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Arroyo Leon Creek                           |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Mills Creek                                 |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Pilarcitos Lake                             |     | 口       |        |                        |         |      |          |      | 口    |        |                   |          | Щ    | 田    | 山        | 闰               | Γ                    | Щ            |     |
| Purisima Creek                              | 山   |         |        |                        |         |      |          |      | 口    |        |                   | 田        | 田    | 田    |          | 田               | Щ                    | 田            |     |
| Lobitas Creek                               | 田   |         |        |                        |         |      |          |      | 田    |        |                   | ш        | 田田   | 田田   |          | 田               | 田                    | 田            |     |
| Tunitas Creek                               | 山   |         |        |                        |         |      |          |      | 山    |        |                   | 田        | 田    | 田    | 山        | 田               | Ь                    | Ь            |     |
| San Gregorio Creek                          | 田   |         |        |                        |         |      |          |      | 田    |        |                   | 田        | 田    | 田    | 田        | 田               | Щ                    | Щ            |     |
| Alpine Creek                                |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| El Corte de Madera                          |     |         |        |                        |         |      |          |      | ב    |        |                   |          | Ĺ    | _    | Ĺ        | ב               | <b>C</b>             | Ĺ            |     |
| Creek                                       |     |         |        |                        |         |      |          |      | ц    |        |                   | <b>L</b> | ц    | ч    | ц        | ц               | ٦,                   | ц            |     |
| La Honda Creek                              |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Woodruff Creek                              |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Clear Creek                                 |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Harrington Creek                            |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Bogess Creek                                |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Mindego Creek                               |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Pomponio Creek                              | 山   |         |        |                        |         |      |          |      | 田    |        |                   | 田        |      | 田    | 田        | E               | Ь                    | 田            |     |
| Pomponio Reservoir                          |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Pescadero Creek                             | 口   | Щ       |        |                        |         |      |          |      | 山    |        |                   | 田        | 田    | 田    | 山        | 山               | Щ                    | Щ            |     |
| Butano Creek                                |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Fall Creek                                  |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |
| Hoffman Creek                               |     |         |        |                        |         |      |          |      |      |        |                   |          |      |      |          |                 |                      |              |     |

| COUNTY<br>Waterbody  | AGR | NUM | ЕКЅН | GMK | ani | COMM | SHEL | COLD | EZL | MAR | MIGE | В∀КЕ | NMdS | MAAW | MIFD | KEC-1 | NVA<br>KEC-7 |
|----------------------|-----|-----|------|-----|-----|------|------|------|-----|-----|------|------|------|------|------|-------|--------------|
| 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

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| Recre  | n             | [-;          |
| Wildlife   | Use           | 'n           |
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| e Uses   | <b>\</b>      |              |
| sumptive Uses  | <b>\</b>      | IM<br>OC     |
| an Consumptive Uses  | <b>\</b>      | IM<br>OC     |
| - Human Consumptive Uses                                     | <b>\</b>      | IM<br>OC     |
| Human Consumptive Uses                                       | <b>\</b>      | IW<br>C<br>D |
| ← Human Consumptive Uses                                     | •             | IIW O O H    |
| ← Human Consumptive Uses — — — — — — — — — — — — — — — — — — | <b>\</b>      | IM           |
| ← Human Consumptive Uses —                                   | <b>+</b>      | IM           |
| ← Human Consumptive Uses —                                   | <b>\</b>      | IM           |

| Waterbody SAN FRANCISCO COUNTY GE MUST AGE |     |      | J    |      |      |          |          |      |      | J    |      |       |       |     |
|--|-----|------|------|------|------|----------|----------|------|------|------|------|-------|-------|-----|
| AN FRANCISCO COUNTY olden Gate Channel an Francisco Bay                        | IND | ЬКОС | COMM | SHEL | COLD | EST      | MAR      | KARE | NMdS | WARM | MILD | KEC-1 | KEC-7 | ΛVN |
| iolden Gate Channel<br>an Francisco Bay  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| an Francisco Bay   |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| ( entra  | 田   | 田    | 田    | 田    |      | 田        | 山        | 田    | 田    |      | Щ    | 田     | 田     | 山   |
| Golden Gate Park   |     |      |      |      |      |          |          |      |      | ļ    | ļ    |       | ļ     |     |
| Lakes  |     |      |      |      |      |          |          |      |      | Ţ    | IJ   |       | IJ    |     |
| MARIN COUNTY   |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| San Rafael Creek   |     |      |      |      | 田    |          |          |      |      | 田    | 田    |       | 田     | 田   |
| Corte Madera Creek   |     |      |      |      | 田    |          | Ь        | 山    | Ь    | Щ    | 田    | Ь     | 田     |     |
| Ross Creek   |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Cascade Creek  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| San Anselmo Creek  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Sleepy Hollow Creek  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Phoenix Lake E   |     |      |      |      | 田    |          |          |      | 田    | 田    | 田    | 田     | 田     |     |
| Phoenix Creek  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Bill Williams Creek  |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Richardson Bay   | E   |      | 田    | 田    |      | 田        | 田        | 山    | Ш    |      | 田    | 田     | 田     | 山   |
| Arroyo Corte Madera  |     |      |      | Ţ    | Ţ    |          |          |      | Ţ    |      | Ţ    | Д     | Ţ     |     |
| del Presidio   |     |      |      | 1    | 1    |          |          |      | 1    |      | 1    | 1     | 1     |     |
| Old Mill Creek   |     |      |      |      | ப    |          |          |      |      |      | Э    |       | 山     |     |
| Coyote Creek (Marin)   |     |      |      |      | 田    |          |          |      |      | 闰    | Э    |       | ப     |     |
| ALAMEDA COUNTY   |     |      |      |      |      |          |          |      |      |      |      |       |       |     |
| Berkeley Aquatic Park  |     |      |      |      |      | Li<br>Li | <u> </u> |      | ٥    |      | ם    | נן    | נן    |     |
| Lagoon   |     |      |      |      |      | <u> </u> | 1        |      | 4    |      | 1    | 1     | 1     |     |
| Lake Temescal  |     |      |      |      | E    |          |          |      | E    | E    | E    | E     | E     |     |

# **NISAB YAB HTUO2**

|                                    | <b>↓</b> |     | Human | Consum | Human Consumptive Uses | es   |      | <b>A</b> | — A6 | quatic L | Aquatic Life Uses |      |      | <b>†</b> | Wildlife<br>Use | Recres<br>Us | Recreational<br>Uses |     |
|------------------------------------|----------|-----|-------|--------|------------------------|------|------|----------|------|----------|-------------------|------|------|----------|-----------------|--------------|----------------------|-----|
| COUNTY<br>Waterbody                | ADA      | NUM | ЕВЗН  | GMK    | IND                    | ькос | COWM | SHEL     | EZL  | MAR      | MIGK              | KARE | NMdS | WARM     | MIFD            | KEC-1        | KEC-7                | ΛVN |
| SAN FRANCISCO COUNTY               |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| San Francisco Bay<br>Lower         |          |     |       |        | 田                      |      | 田    | 田        | 田    |          | 田                 | 山    | Ь    |          | 田               | 田            | 田                    | 田   |
| SAN MATEO COUNTY                   |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| San Mateo Creek                    |          |     | 田     |        |                        |      |      |          | Ы    |          |                   | 田    | Ш    |          | 田               | Ы            | Ы                    |     |
| Lower Crystal Springs<br>Reservoir |          | 田   |       |        |                        |      |      |          | 田    |          |                   | 田    | 田    | 田        | 闰               |              | 田                    |     |
| Upper Crystal Springs<br>Reservoir |          | 田   |       |        |                        |      |      |          | 田    |          |                   | 口    | 田    | 田        | 田               |              | 田                    |     |
| San Andreas Lake                   |          | 田   |       |        |                        |      |      |          | 田    |          |                   | 田    | 田    | 田        | 田               | 1            | 田                    |     |
| Foster City Lagoon                 |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| Bair Island Wetlands               |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| ALAMEDA COUNTY                     |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| Lake Merritt                       |          |     |       |        |                        |      |      |          | 田田   |          |                   |      | Щ    |          | 田               | ш            | ш                    |     |
| Lower San Leandro                  |          |     | 口     |        |                        |      |      |          |      |          | Ь                 |      | Ь    | Ь        | 田               | Ь            | Ь                    |     |
| Creek<br>Lake Chahot (Alameda)     |          | Ţ   |       |        |                        |      |      |          | Ţ    |          | 1                 |      | Ţ    | Ĺ        | l [I            | Ţ            | Ĺ                    |     |
| Timese Con I conduct               |          | ונ  |       |        |                        |      |      |          | 1    |          |                   |      | וּ   | ונ       | וב              | וֹב          | וְ                   |     |
| Upper San Leandro<br>Reservoir     |          | 田   |       |        |                        |      |      |          | 田    |          |                   |      | 田    | 田        | 田               | Γ            | Ь                    |     |
| San Leandro Creek                  |          |     | 田     |        |                        |      |      |          | 田    |          | Ь                 |      | Ь    | Ь        | 田               | Ь            | Ь                    |     |
| Kaiser Creek                       |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| Moraga Creek                       |          |     |       |        |                        |      |      |          |      |          |                   |      |      |          |                 |              |                      |     |
| San Lorenzo Creek                  |          | 山   | 山     | 山      |                        |      |      |          | Ш    |          | 山                 |      | 山    | 山        | Щ               | ப            | Щ                    |     |
| Don Castro Reservoir               |          |     |       |        |                        |      |      |          | 田    |          |                   |      | 山    | 山        | Щ               | ப            | Щ                    |     |
| Cull Canyon Reservoir              |          |     |       |        |                        |      |      |          | ш    |          |                   |      | 田    | 田        | 田               | ш            | Ш                    |     |
| Palomares Creek                    |          |     |       |        |                        |      |      |          | 田    |          | 田                 |      | 田    | 田        | 田               | Щ            | Щ                    |     |
| Crow Creek                         |          |     |       |        |                        |      |      |          | 田    |          | 田                 |      | Щ    | 田        | Ξ               | Щ            | Э                    |     |
| Alameda Creek Quarry<br>Ponds      |          |     |       | 田      |                        |      |      |          | Щ    |          |                   |      |      | 田        |                 | 田            | 闰                    |     |
| Alameda Creek                      | 田        |     |       | 田      |                        |      |      |          | 田    |          | 田                 |      | 山    | 田        | 田               | 田            | 山                    |     |
| San Antonio Reservoir              |          | 田   |       |        |                        |      |      |          | 田    |          |                   |      | П    | 田        | 田               | _<br>_       | ш                    |     |

# **NISAB YAB HTUOS**

| Λ∀N                 |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
|---------------------|---------------|---------------------|--------------|---------------|-----------|---------------------|--------------|-----------------|--------------------|-----------------------|-------------|-------------|--------------------|---------------------|--------------|--------------|-------------|--------------------------------|
|                     |               | רדו                 | •            | ,,            | ,         | [ ד                 | רדו          | [7]             | רדו                | [+]                   | ודו         | רדו         |                    | [7]                 | [+]          | רדו          | רדו         | [7]                            |
| KEC-7               |               | 田                   |              | Ţ             | -         |                     | Щ            |                 |                    | Щ                     | 田田          | щ           |                    | l <sup>m</sup>      | Щ            | щ            | 田           | 田                              |
| KEC-1               |               | 田                   | Ь            | Ι             | 1         | 田                   | 田            | 田               | 田                  | 山                     | 田           | 田           |                    | Γ                   | П            | 田            | 田田          | 田                              |
| MIFD                |               | 田                   | 田            | ĮΊ            | 1         | 田                   | 田            | 田田              | 田                  | 田                     | 田田          | 田           |                    | 田田                  | П            | 田            | 田田          | 田                              |
|                     |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| WARM                |               | Ь                   |              | Ţ             | 1         | Щ                   | Ь            | Ь               | Ь                  | Ь                     | Ь           | Ь           |                    | 田                   | 田            | 田            | Ш           | 田                              |
| NMdS                |               | 田                   | 田            | Ĺ             | 1         | Щ                   | 田            | 田               | Щ                  | ப                     | Ш           | 田           |                    | 田                   | Щ            | 田            | 田           | 田                              |
| ВАКЕ                |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| MIGK                |               | 田                   | Ь            |               |           |                     | 田            | Ш               | Щ                  | 山                     | Ш           | 田           |                    |                     |              |              |             |                                |
| МАК                 |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| EST                 |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| COLD                |               | Ь                   | 田            | Ţ             | 1         | 田                   | Ь            | Ь               | Ь                  | Ь                     | Ь           | Ь           |                    | 田                   | 田            | 田            | 田           | 田                              |
| SHEL                |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| СОММ                |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| ьвос                |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| IND                 |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
| СМК                 |               | ப                   | ப            |               |           |                     | ப            | Ш               | Щ                  | Щ                     | 田           | ப           |                    |                     |              |              |             |                                |
| ЕВЗН                |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     | 田            | 田            | 田           | 田                              |
| NUM                 |               |                     | 田            |               |           | 山                   |              |                 |                    |                       |             |             |                    | 田                   | 口            | 田            | 田           | 田                              |
| AGR                 |               |                     |              |               |           |                     |              |                 |                    |                       |             |             |                    |                     |              |              |             |                                |
|                     |               |                     |              |               |           |                     |              |                 |                    | la)                   |             |             |                    |                     |              |              |             |                                |
|                     |               | guna                |              |               |           | 'oir                |              |                 | 38                 | ame                   |             |             | UNT                | /oir                |              |              |             | santa                          |
|                     | ək            | Lag                 | o)           | Ĭŝ            |           | eserv               | ho           | eek             | osita              | (A)                   | -           | 7           | 4 CO               | eser                | op           |              |             | ek (S                          |
| ,<br>ody            | Cre           | de la               | Vall         | Clif          | voir      | le Re               | Moc          | ra Cı           | las F              | Secc                  | Cana        | Cree        | LAR                | as R                | Hon          | reek         | reek        | Cre                            |
| COUNTY<br>Waterbody | Lacosta Creek | Arroyo de la Laguna | Arroyo Valle | Shadow Cliffs | Reservoir | Del Valle Reservoir | Arroyo Mocho | Tassajara Creek | Arroyo las Positas | Arroyo Seco (Alameda) | Alamo Canal | Alamo Creek | SANTA CLARA COUNTY | Calaveras Reservoir | Arroyo Hondo | Isabel Creek | Smith Creek | Sulphur Creek (Santa<br>Clara) |
| CO Wa               | Lac           | Arr                 | Arr          | Sh            | Ľ         | De                  | Arr          | Tas             | Arr                | Arr                   | Ala         | Ala         | SAN                | Cal                 | Arr          | Isal         | Sm          | Sul                            |

P: Potential beneficial use 

| NISAB      | CLAKA        | ATNAS         |
|------------|--------------|---------------|
| 14 I 3 V A | V (I V I . ) | V _ I I V _ 3 |

|                        | ΛVN                        | ш                          |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
|------------------------|----------------------------|----------------------------|----------------|----------------|------------------------------------|------------------------|-----------|-------------------|------------------|-----------------|--------------------|----------------|------------------|---------------|---------------|-----------|-----------------|----------------|---------------------|-----------------|-------------|---------------------|-------------|----------------------|------|-----------------|---------------------|----------------|------------------|------------------------------------|
| al                     |                            |                            |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             | _                    |      |                 |                     |                |                  |                                    |
| Recreational<br>Uses   | KEC-7                      | 田田                         |                | 田田             |                                    | ا<br>ا                 | Щ         |                   |                  | 田               |                    | Щ              | 山                | Щ             | Ţ             | 4         | Щ               | Щ              | 田田                  | Ь               | Щ           | 田                   | Д           | Ί                    | 1    |                 | IJ                  |                | 山                | Щ                                  |
| Reci                   | KEC-1                      | 田田                         |                |                |                                    | Д                      | Щ         |                   |                  | 田               |                    | Щ              | Щ                | Ξ             |               |           | Щ               | H              | Ь                   |                 | Щ           | 田                   |             | Ţ                    | נ    |                 | IJ                  |                | 山                | П                                  |
| Wildlife<br>Use        | MIFD                       | 田                          |                | 田              |                                    | Щ                      | Э         |                   |                  | 田               |                    | 田              | 田                | Ξ             | Ή             | 1         | 田               | E              | 田                   | 田               | 田           | 田                   | 田           | Ί                    | נ    |                 | Э                   |                | Щ                | Щ                                  |
| <b>↑</b>               | WARM                       |                            |                | 田              |                                    | 田                      | Щ         |                   |                  | 田               |                    | 口              |                  | 田             | Ţ             | 1         | 山               | 口              | 田                   | 田               | 田           | 田                   |             | Ţ                    | נ    |                 | IJ                  |                | 田                | П                                  |
|                        | NMdS                       | Ы                          |                | 田田             |                                    | 田                      | Щ         |                   |                  | 田               |                    | Щ              | Щ                | Ь             | Ţ             | 1         |                 |                | Ь                   | Ь               | 田           | 田                   |             | ſΊ                   | ۱ ا  |                 | П                   |                | 山                | П                                  |
|                        | KARE                       | 田                          |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| ses                    | MIGK                       | 田                          |                |                |                                    | 田                      |           |                   |                  |                 |                    | 口              |                  | 田             | Ţ             | 1         |                 |                | Ь                   | Ь               |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| : Life U               | МАК                        |                            |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| Aquatic Life Uses      | EZL                        | 凹                          |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
|                        | COLD                       |                            |                | 田田             |                                    | 田                      |           |                   |                  | 田               |                    | 山              | 田                | 田             | Ţ             | נ         | 田               | 田              | 田                   | 田               | 田           | 田                   | Щ           | ſΙ                   | נ    |                 | Щ                   |                |                  | 山                                  |
|                        | SHEL                       | 田                          |                | ,              |                                    |                        |           |                   |                  | ,               |                    |                |                  |               | ,             | ,         |                 |                |                     |                 |             |                     |             | ·                    | '    |                 | •                   |                |                  |                                    |
|                        |                            |                            |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| •                      | COWW                       | Щ                          |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| e Uses                 | PROC                       |                            |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| umptiv                 | IND                        | 田田                         |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               |               |           |                 |                |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| Human Consumptive Uses | GWR                        |                            |                |                |                                    |                        |           |                   |                  |                 |                    |                |                  |               | ĮΊ            | ו         | 山               | 山              |                     | 山               | 田           |                     |             | Ţ                    | נ    |                 | Л                   |                | 山                | П                                  |
| Huma                   | ЕВЗН                       |                            |                |                | TIES                               |                        |           |                   |                  |                 |                    |                |                  | 田             |               |           |                 | П              |                     | П               |             |                     |             |                      |      |                 |                     |                |                  |                                    |
|                        | NUM                        |                            |                |                | COUN                               |                        |           |                   |                  |                 |                    |                |                  |               | ſΙ            | ב         |                 |                |                     | Ш               |             | 田                   | 田           |                      |      |                 | ТÌ                  |                | 山                | П                                  |
| <b>↓</b>               | AGR                        |                            |                |                | ARA (                              |                        | Щ         |                   |                  | 田               |                    |                |                  |               |               |           | 山               | 田              |                     |                 |             |                     |             |                      |      |                 |                     |                |                  |                                    |
| ·                      | <i>COUNTY</i><br>Waterbody | San Francisco Bay<br>South | ALAMEDA COUNTY | Lake Elizabeth | SAN MATEO AND SANTA CLARA COUNTIES | San Francisquito Creek | Felt Lake | Los Trancos Creek | West Union Creek | Searsville Lake | SANTA CLARA COUNTY | Matedero Creek | Permanente Creek | Stevens Creek | Stevens Creek | Reservoir | Calabazas Creek | Saratoga Creek | Guadalupe Reservoir | Los Gatos Creek | Vasona Lake | Lexington Reservoir | Lake Elsman | Campbell Percolation | Pond | Guadalupe Creek | Guadalupe Reservoir | Alamitos Creek | Calero Reservoir | Almaden Reservoir<br>Herhert Creek |

# SANTA CLARA BASIN

## NISAB OJBA9 NAS

|                          | <b>+</b> |     | - Huma | Human Consumptive Uses | ımptive | Uses — |      | $\uparrow$ |      | Aquat | Aquatic Life Uses | Jses — |      |      | •    | Wildlife<br>Use | Recreational<br>Uses | reational<br>Uses |     |
|--------------------------|----------|-----|--------|------------------------|---------|--------|------|------------|------|-------|-------------------|--------|------|------|------|-----------------|----------------------|-------------------|-----|
| COUNTY<br>Waterbody      | AGR      | NUM | ЕВЗН   | GWR                    | IND     | ьвос   | COMM | SHEL       | COLD | EZL   | МАК               | MIGK   | КАКЕ | NMdS | MARM | MIFD            | KEC-1                | KEC-7             | Λ∀N |
| San Pablo Bay            |          |     |        |                        | 田       |        | 田    | 田          |      | 田     |                   | 田      | 田    | 田    |      | 田               | 田                    | 田                 | 田   |
| SOLANO COUNTY            |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| White Slough             | 江        | 江   |        |                        |         |        |      |            | 江    |       |                   |        |      | 江    | 江    | ഥ               | 江                    | 江                 |     |
| Dalwick Lake             | 1        | 1   |        |                        |         |        |      |            | 1    |       |                   |        |      | 1    | 1    | 1               | 1                    | 1                 |     |
| CONTRA COSTA COUNTY      |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Rodeo Creek              |          |     |        |                        |         |        |      |            |      |       |                   |        |      | 田    | 田    | 田               | Ь                    | 田田                |     |
| Refugio Creek            |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Pinole Creek             |          |     |        |                        |         |        |      |            | 田    |       |                   | 田      |      | 田    | 田    | E               | Ь                    | Ь                 |     |
| San Pablo Creek          |          |     |        |                        |         |        |      |            |      |       |                   | 田      |      | 田    | 田    | 田               |                      | ш                 |     |
| San Pablo Reservoir      |          | 山   |        |                        |         |        |      |            | 山    |       |                   |        |      | 田    | 山    | 田               | Щ                    | Щ                 |     |
| <b>Briones Reservoir</b> |          | 山   |        |                        |         |        |      |            | 田    |       |                   |        |      | 田    | 田    | E               | П                    | Ь                 |     |
| Wildcat Creek            |          |     |        |                        |         |        |      |            |      |       |                   | 田      |      | 田    | 田    | 田               |                      | ப                 |     |
| Jewel Lake               |          |     |        |                        |         |        |      |            | 山    |       |                   |        |      |      | 山    | 田               | Щ                    | Щ                 |     |
| Lake Anza                |          |     |        |                        |         |        |      |            | 田    |       |                   |        |      |      | 田    | 田               | П                    | П                 |     |
| MARIN COUNTY             |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Novato Creek             |          | 田   |        |                        |         |        |      |            | Ь    |       |                   | Ь      | 田    | Ь    | Ь    | 田               | Ь                    | Ь                 |     |
| Stafford Lake            |          | 口   |        |                        |         |        |      |            | 山    |       |                   |        |      | 山    | 山    | 田               | Щ                    | Щ                 |     |
| Pacheco Pond             |          |     |        |                        |         |        | 田    |            | 田    |       |                   | Ь      |      | Ь    | 田    | 田               | Ь                    | Ь                 |     |
| Miller Creek             |          |     |        |                        |         |        |      |            | 田    |       |                   | 田      | 田    | 田    | 田    | 田               | 田                    | 田                 |     |
| Gallinas Creek           |          |     |        |                        |         |        |      |            | 山    |       |                   |        | 田    |      | 山    | 田               |                      | ш                 |     |
| SONOMA COUNTY            |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Petaluma River           |          |     |        |                        |         |        |      |            | 田    | 田     |                   | 田      | 田    | 田    | 山    | 山               | 山                    | 山                 | 田   |
| San Antonio Creek        |          |     |        |                        |         |        |      |            | 山    |       |                   | Ь      |      | Ь    | 山    | 田               | Ь                    | Ь                 |     |
| Willow Creek             |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Adobe Creek (Sonoma)     |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Sonoma Creek             |          |     |        |                        |         |        |      |            | Щ    |       |                   | Щ      | 田    | 田    | 田    | 田               | Щ                    | П                 |     |
| Fowler Creek             |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Schnell Creek            |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| Arroyo Seco Creek        |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |
| (Sonoma)                 |          |     |        |                        |         |        |      |            |      |       |                   |        |      |      |      |                 |                      |                   |     |

# NISAB OJBA9 NAS

| COUNTY<br>Waterbody                       | AGR | FRSH | GWR | IND | PROC | COMM | SHEF | COLD | ЯАМ | MIGK | KARE | NMdS | WARM | MILD | KEC-1 | KEC-7 | $\Lambda \forall N$ |
|---|-----|------|-----|-----|------|------|------|------|-----|------|------|------|------|------|-------|-------|---------------------|
| Nathanson Creek                           | ,   |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Agua Caliente Creek                       |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| (Sonoma)<br>Stuart Creek                  |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Graham Creek                              |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Yulupa Creek                              |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| NAPA COUNTY                               |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Napa River                                | EE  | נדו  |     |     |      |      |      | 田    |     | 田    | 田    | 田    | 田    | 田    | 田     | 山     | 田                   |
| Huichica Creek                            |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Carneros Creek                            |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Suscol Creek                              |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Tulucay Creek                             |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Lake Marie                                | EE  | [7]  |     |     |      |      |      | Ь    |     |      |      | 田    | Ь    | E    | 田     | 田     |                     |
| Napa Creek                                |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Browns Valley Creek                       |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Redwood Creek (Napa)                      |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Pickle Creek                              |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Milliken Creek                            |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Sarco Creek                               |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Milliken Reservoir                        | 田   | רדו  |     |     |      |      |      | 田    |     |      |      | 田    | 田    | 田    | Г     | Ь     |                     |
| Soda Creek                                |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Dry Creek (Napa)                          | EE  | [7]  |     |     |      |      |      | 田    |     | 田    |      | 田    | 田    | 田    | 田     | 田     |                     |
| Conn Creek                                | H   | 田田   |     |     |      |      |      | 田    |     | 田    |      | 田    |      | 田    | 田     | 田     |                     |
| Rector Creek                              |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Rector Reservoir                          | E   | [7]  |     |     |      |      |      | 田    |     |      |      | 田    | 田    | 田    | Γ     | 田     |                     |
| Lake Hennessey                            | 田   | רדו  |     |     |      |      |      | 田    |     |      |      | 田    | 闰    | 田    | 田     | 田     |                     |
| Sage Creek                                | Щ   | 田田   |     |     |      |      |      | 田    |     |      |      | Щ    | Щ    | Щ    | Ь     | Ь     |                     |
| Chiles Creek                              | 田   |      |     |     |      |      |      | 山    |     |      |      | 口    | 口    | 田    | Ь     | Ь     |                     |
| Bear Canyon Creek<br>Sulphur Creek (Napa) |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| York Creek                                |     |      |     |     |      |      |      | 田    |     | 田    |      | 田    |      | Щ    | Ь     | Ь     |                     |
| Mill Creek (Napa)                         |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Ritchey Creek                             |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Bell Canyon Reservoir                     |     |      |     |     |      |      |      |      |     |      |      |      |      |      |       |       |                     |
| Cyrus Creek                               |     |      |     |     | 7    |      |      |      |     |      |      |      |      |      |       |       |                     |

| COUNTY<br>Waterbody           | AGR | NUM | ЕВЗН | GMK | IND | ькос | COWM | SHEL | COLD | EZL | MAR | MIGE | В∀КЕ | NMdS | MARM | MIPD | KEC-1 | KEC-7 | ΛVN |
|-------------------------------|-----|-----|------|-----|-----|------|------|------|------|-----|-----|------|------|------|------|------|-------|-------|-----|
| Garnett Creek<br>Hopper Creek |     |     |      |     |     |      |      | ,    |      |     |     |      |      |      |      |      |       |       |     |
| Jericho Canyon Creek          |     |     |      |     |     |      |      |      |      |     |     |      |      |      |      |      |       |       |     |
| Kimball Reservoir             |     | 山   |      |     |     |      |      |      |      |     |     |      |      |      | 山    | Щ    | Щ     | Щ     |     |

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

|                                 | ,   |     |      | 1   | •   | ·    |      | <b>.</b> |      | . Aquati | Aquatic Life Uses | Jses — |      |      | <b>↑</b> | Wildlife<br>Use | Recre<br>U | Recreational<br>Uses |     |
|---------------------------------|-----|-----|------|-----|-----|------|------|----------|------|----------|-------------------|--------|------|------|----------|-----------------|------------|----------------------|-----|
| COUNTY<br>Waterbody             | AGR | NUM | FRSH | GMK | IND | ькос | СОММ | SHEL     | COLD | EZL      | MAR               | MIGE   | КАКЕ | NMdS | MARM     | MILD            | KEC-1      | KEC-7                | ΛVN |
| Carquinez Strait                |     |     |      |     | 田   |      | 田    |          |      | 田        |                   | 田      | 田    | 田    |          | 田               | 田          | 田                    | 田   |
| Suisun Bay                      |     |     |      |     | 田   | 田    | 田    |          |      | ப        |                   | 田      | 田    | 田    |          | 田               | 口          | 闰                    | Щ   |
| Sacramento-San<br>Joaquin Delta | 田   | 田   |      | 田   | 田   | 田    | 田    |          |      | 田        |                   | 田      | 田    | 田    |          | 囝               | 田          | 田                    | 田   |
| SOLANO COUNTY                   |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Lake Herman                     |     | 田   |      |     | 田田  |      |      |          | 山    |          |                   |        |      | 田    | 田        | 田               | ш          | ш                    |     |
| Green Valley Creek              |     |     | 田    |     |     |      |      |          | 山    |          |                   |        |      | 田    | 田        | 田               | Щ          | Щ                    |     |
| Lake Frey                       |     | 田   |      |     |     |      |      |          | 田    |          |                   |        |      | 田    | 田        | Щ               |            | 闰                    |     |
| Lake Madigan                    | 田   | 田   |      |     |     |      |      |          | 田    |          |                   |        |      | 田    | 田        | 田               |            | Ш                    |     |
| Suisun Slough                   |     |     |      |     |     |      |      |          |      |          |                   |        |      | 田    | 田        | Щ               | Щ          | 闰                    | Щ   |
| Suisun Creek                    |     |     | 田    |     |     |      |      |          | 田    |          |                   | 田      |      | 田    | 田        | Ξ               | Ь          | Ь                    |     |
| Suisun Reservoir                |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Wooden Valley Creek             |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Lake Curry                      |     | 田   |      |     |     |      |      |          |      |          |                   |        |      | 田    | 田        | 田               | Щ          | Э                    |     |
| Ledgewood Creek                 |     |     | 田    |     |     |      |      |          | 田    |          |                   | 田      |      | 田    | 田        | 田               | Щ          | Щ                    |     |
| Laurel Creek (Solano)           |     |     | 口    |     |     |      |      |          | Щ    |          |                   | Щ      |      | 口    | 田        | 田               | П          | П                    |     |
| Montezuma Slough                |     |     |      |     |     |      |      |          |      |          |                   |        | 田    | 田    | 田        | 山               | Щ          | Щ                    | 闰   |
| CONTRA COSTA COUNTY             |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Peyton Slough                   |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Pacheco Creek                   |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Walnut Creek                    |     |     |      |     |     |      |      |          | 山    |          |                   | 田      |      | 田    | 田        | 山               | Ь          | Ь                    |     |
| Pine Creek                      |     |     |      |     |     |      |      |          | 田    |          |                   |        |      | 田    | 田        | 田               | ш          | Ш                    |     |
| Lafayette Creek                 |     |     |      |     |     |      |      |          |      |          |                   |        |      |      |          |                 |            |                      |     |
| Lafayette Reservoir             |     | 田   |      |     |     |      |      |          | 田    |          |                   |        |      | 田    | 田        | 田               | Щ          | 闰                    |     |
| Mt. Diablo Creek                |     |     |      |     |     |      |      |          | 田    |          |                   | 田      |      | 田    | 田        | 田               | Ш          | Щ                    |     |
| Mallard Reservoir               | 山   | 口   |      |     | 口   | Щ    |      |          |      |          |                   |        |      | 口    | 山        | 田               | П          | Ь                    |     |

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

| EBE2H <sub>e</sub>                    | +             | 1                  | 1                           | 1                           | ;            | 1               | 1              | ;              | 1                | 1                        | 1               | ;           | ;                 | ;             | 1                  | 1                       | 1                              | 1                              | 1                            | 1                   |                                | 1             | ;             | 1             | 1                       | -                       |
|---------------------------------------|---------------|--------------------|-----------------------------|-----------------------------|--------------|-----------------|----------------|----------------|------------------|--------------------------|-----------------|-------------|-------------------|---------------|--------------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|--------------------------------|---------------|---------------|---------------|-------------------------|-------------------------|
| $VCE_2$                               | Ь             | 田                  | 田                           | 田                           | 田            | Ь               | Ь              | Ь              | 田                | Ь                        | Ь               | 田           | Ь                 | Ь             | 田                  | 田                       | Ь                              | Ь                              | 山                            | Ь                   | 田                              | 田             | 田             | 山             | 田                       | 日                       |
| IND,                                  | Ь             | 田                  | 田                           | 田                           | 田            | Ь               | Ь              | Ь              | Ь                | Ь                        | Ь               | Ь           | Ь                 | Ь             | 田                  | 田                       | 田                              | 田                              | Ь                            | 田                   | Ь                              | Ь             | Ь             | Ь             | Ь                       | Ь                       |
| ЬВОС3                                 | Ь             | 田                  | 田                           | 田                           | 田            | Ь               | Ь              | Ь              | Ь                | Ь                        | Ь               | Ь           | Ь                 | Ь             | Э                  | 口                       | 田                              | 田                              | Ь                            | 田                   | Ь                              | Ь             | Ь             | Ь             | Ъ                       | Ь                       |
| ZNUM                                  | Ь             | 田                  | 田                           | 田                           | 田            | Ь               | Щ              | Ь              | 田                | Ь                        | Щ               | Щ           | Ь                 | Ь             | Щ                  | 田                       | Ь                              | Ь                              | Ь                            | Ь                   | 日                              | 田             | Щ             | Щ             | Ь                       | 田                       |
| Basin<br>Number <sup>1</sup>          | 2-8           | 2-9.01             | 2-9.04                      | 2-10                        | 2-11         | 2-4             | 2-5            | 2-6            | 2-7              | 2-31                     | 2-27            | 2-28        | 2-29              | 2-30          | 2-2.01             | 2-2.03                  | 2-32                           | 2-33A                          | 2-33B                        | 2-37                | 2-35A                          | 2-38          | 2-39          | 2-40          | 2-35B                   | 2-35C                   |
| Groundwater<br>Sub-Basin <sup>1</sup> | 1             | Niles Cone         | East Bay Plain              | ;                           | 1            | 1               | 1              | 1              | ;                | ;                        | 1               | ;           | ;                 | ;             | Napa Valley        | Napa-Sonoma<br>Lowlands | ;                              | :                              | ł                            | 1                   | 1                              | ;             | 1             | 1             | ł                       | 1                       |
| Groundwater Basin Name <sup>1</sup>   | Castro Valley | Santa Clara Valley | Santa Clara Valley          | Livermore Valley            | Sunol Valley | Pittsburg Plain | Clayton Valley | Ygnacio Valley | San Ramon Valley | Arroyo del Hambre Valley | Sand Point Area | Ross Valley | San Rafael Valley | Novato Valley | Napa-Sonoma Valley | Napa-Sonoma Valley      | Visitacion Valley              | Islais Valley A <sup>7</sup>   | Islais Valley B <sup>7</sup> | South San Francisco | Westside A <sup>7</sup>        | Lobos         | Marina        | Downtown      | Westside $\mathbf{B}^7$ | Westside C <sup>7</sup> |
| County                                | Alameda       | Alameda            | Alameda and<br>Contra Costa | Alameda and<br>Contra Costa | Alameda      | Contra Costa    | Contra Costa   | Contra Costa   | Contra Costa     | Contra Costa             | Marin           | Marin       | Marin             | Marin         | Napa               | Napa and Solano         | San Francisco and<br>San Mateo | San Francisco and<br>San Mateo | San Francisco                | San Francisco       | San Francisco and<br>San Mateo | San Francisco | San Francisco | San Francisco | San Francisco           | San Mateo               |

| EKESH <sub>e</sub>                    | ;              | 1                  | 1                               | 1                     | 1                   | 1                | 1                | ;                       | ł                   | ;                  | 1                                   |                                     | ;              | ×                                   |                                  |
|---------------------------------------|----------------|--------------------|---------------------------------|-----------------------|---------------------|------------------|------------------|-------------------------|---------------------|--------------------|-------------------------------------|-------------------------------------|----------------|-------------------------------------|----------------------------------|
| VCK <sub>2</sub>                      | Ь              | Ь                  | 田                               | 山                     | 山                   | 山                | Ь                | 田                       | 田                   | 山                  | 田                                   | n Plan <sup>9</sup>                 | 田              | ×                                   | ו Plan ח                         |
| ŀUD⁴                                  | 田              | 山                  | 田                               | Ь                     | Ь                   | Ь                | Ь                | 田                       | Ь                   | Ь                  | Ь                                   | See RB1 Basin Plan <sup>9</sup>     | Ь              | ×                                   | See RB3 Basin Plan <sup>10</sup> |
| ьКОС <sub>3</sub>                     | 田              | 闰                  | 田                               | Ь                     | Ь                   | Ь                | Ь                | 田                       | Ь                   | Ь                  | Ь                                   | See R                               | Ь              | ×                                   | See R                            |
| zNOW                                  | 田              | 闰                  | 田                               | 田                     | 田                   | 山                | Ъ                | 田                       | 田                   | 田                  | 田                                   |                                     | 田              | ×                                   |                                  |
| Basin<br>Number <sup>1</sup>          | 2-35D          | 2-9.03             | 2-9.03                          | 2-22                  | 2-24                | 2-26             | 2-36             | 2-3                     | 2-1                 | 2-2.02             | 1.59                                | 1.59                                | 2-19           | 2-23                                | 3-3.01                           |
| Groundwater<br>Sub-Basin <sup>1</sup> | 1              | San Mateo<br>Plain | Santa Clara                     | ;                     | ł                   | ;                | ;                | ;                       | 1                   | Sonoma Valley      | 1                                   | ;                                   | ;              | ;                                   | Llagas Area                      |
| Groundwater Basin Name <sup>1</sup>   | Westside $D^7$ | Santa Clara Valley | Santa Clara Valley <sup>8</sup> | Half Moon Bay Terrace | San Gregorio Valley | Pescadero Valley | San Pedro Valley | Suisun-Fairfield Valley | Petaluma Valley     | Napa-Sonoma Valley | Wilson Grove Formation<br>Highlands | Wilson Grove Formation<br>Highlands | Kenwood Valley | Napa – Sonoma Volcanic<br>Highlands | Gilroy – Hollister Valley        |
| County                                | San Mateo      | San Mateo          | San Mateo and<br>Santa Clara    | San Mateo             | San Mateo           | San Mateo        | San Mateo        | Solano                  | Sonoma and<br>Marin | Sonoma             | Sonoma and<br>Marin                 | Sonoma and<br>Marin                 | Sonoma         | Sonoma                              | Santa Clara                      |

# Notes:

- Department of Water Resources (DWR) Bulletin 118 "California Groundwater", 2003.
  - MUN = Municipal and domestic water supply.
    - PROC = Industrial process water supply. IND = Industrial service water supply.

      - AGR = Agricultural water supply.
- 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 6 4 6 9
- groundwater basins based on the geographic location of the old basins compared to the new basins. The basin names, such as Westside A, The existing and potential beneficial uses for groundwater basins listed in the 1995 Basin Plan (Table 2-3) were assigned to the new 7.

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.

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

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 WET | LAND       |            |
|----------------|--------|-----------|-------------|------------|------------|
| BENEFICIAL USE | MARINE | ESTUARINE | RIVERINE    | LACUSTRINE | PALUSTRINE |
| AGR            |        | 0         | 0           | 0          | 0          |
| COLD           |        |           | 0           | 0          | 0          |
| COMM           | 0      | 0         |             |            |            |
| EST            |        | 0         |             |            |            |
| FRESH          |        |           | 0           | 0          | 0          |
| GWR            | 0      | 0         | 0           | 0          | 0          |
| IND            |        | 0         | •           | •          |            |
| MAR            | 0      |           |             |            |            |
| MIGR           | 0      | 0         | 0           | 0          |            |
| NAV            | 0      | 0         | 0           | 0          | 0          |
| PROC           |        |           |             |            |            |
| REC-1          | 0      | 0         | 0           | 0          | 0          |
| REC-2          | 0      | 0         | 0           | 0          | 0          |
| SHELL          | 0      | 0         | 0           |            |            |
| SPWN           | 0      | 0         | 0           | 0          | 0          |
| WARM           |        |           | 0           | 0          | 0          |
| WILD           | 0      | 0         | 0           | 0          | 0          |
| RARE           | 0      | 0         | 0           | 0          | 0          |

- NOTE:

  O Existing beneficial use

  Potential beneficial use

Table 2-4 Examples of Beneficial Uses of Wetland Areas<sup>a</sup>

| _                       | WETLA | ND TYPES |     |     |      | В    | ENEFIC. | ial Usi | ES   |      |      |      |
|-------------------------|-------|----------|-----|-----|------|------|---------|---------|------|------|------|------|
| Basin/Marsh Area        | 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.

# **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 <a href="Chapter 6">Chapter 6</a>). 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 <a href="Antidegradation Policy">Antidegradation Policy</a>. 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 <a href="Chapter 2">Chapter 2</a> 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

<u>Table 3-1</u> provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. <u>Table 3-2</u> 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<br>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 <u>Table 3-5</u>).

#### 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 "<u>Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California</u>," 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 <a href="Chapter 4">Chapter 4</a>), 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 <u>Chapter 4</u> 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, 3-3A, 3-3B, 3-3C, 3-4 and 3-4A.

The Water 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 Water 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. The objectives in Tables 3-3 and 3-4 apply throughout the region except as otherwise indicated in the tables or when site-specific objectives for the pollutant parameter have been adopted. Site-specific objectives have been adopted for copper in segments of San Francisco Bay (see Figure 7.2-1-01), for nickel in South San Francisco Bay (Table 3-3A), and for cyanide in all

San Francisco Bay segments (<u>Table 3-3C</u>). Objectives for mercury that apply to San Francisco Bay are listed in <u>Table 3-3B</u>. Objectives for mercury that apply to Walker Creek, Soulajule Reservoir, and their tributaries, and to waters of the Guadalupe River watershed are listed in <u>Table 3-4A</u>.

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 Water 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 Water 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 (<u>AGR</u>) shall not contain concentrations of constituents in excess of the levels specified in <u>Table 3-6</u>.

# 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 <u>Table 3-7</u>.

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 <u>municipal and domestic supply</u>, 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 <u>domestic or municipal supply</u> (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 <u>Table 3-5</u>.)

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 <u>domestic or municipal supply</u> (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 <u>Table 3-5</u>.)

#### 3.4.4 TASTE AND ODOR

Groundwater designated for use as <u>domestic or municipal supply</u> (MUN) shall not contain tasteor 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 <u>Title 22</u>, 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 <u>Table 3-5</u>.)

# 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 <u>Table 3-7</u> apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

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

#### **TABLES**

Table 3-1: Water Quality Objectives for 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 San Francisco Bay Segments

- Table 3-3B: Marine Water Quality Objectives for Mercury in San Francisco Bay
- Table 3-3C: Marine Water Quality Objectives for Cyanide in San Francisco Bay
- Table 3-4: Freshwater Water Quality Objectives for Toxic Pollutants for Surface Waters
- <u>Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and All Tributary Waters</u>
- Table 3-5: Water Quality Objectives for Municipal Supply
- Table 3-6: Water Quality Objectives for Agricultural Supply
- Table 3-7: Water Quality Objectives for the Alameda Creek Watershed above Niles

Table 3-1: Water Quality Objectives for Bacteria<sup>a</sup>

| Beneficial Use   | Fecal Coliform<br>(MPN/100ml)                 | Total Coliform<br>(MPN/100ml)                     | Enterococcus (MPN/100ml) <sup>g</sup>  |
|--|---|---|--|
| Water Contact<br>Recreation                                  | geometric mean < 200<br>90th percentile < 400 | median < 240<br>no sample > 10,000                | geometric mean < 35<br>no sample > 104 |
| Shellfish Harvesting <sup>b</sup>                            | median < 14<br>90th percentile < 43           | median < 70<br>90th percentile < 230 <sup>c</sup> |  |
| Non-contact Water<br>Recreation <sup>d</sup>                 | mean < 2000<br>90th percentile < 4000         |   |  |
| Municipal Supply: - Surface Water <sup>e</sup> - Groundwater | geometric mean < 20                           | geometric mean < 100 < 1.1 <sup>f</sup>           |  |

- 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: California Department of Public Health 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.
- g. Applicable to marine and estuarine waters only. Numeric values are based on Section 7958 of Title 17 of the California Code of Regulations, 69FR 67217 et seq., and 40 CFR Part 131.41 (effective date December 16, 2004).

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

|                          | Fresh V     | Fresh 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<sup>a</sup> 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 <sup>b, c, d</sup>        | 36            | 69           |               |
| Cadmium <sup>b, c, d</sup>        | 9.3           | 42           |               |
| Chromium VI <sup>b, c, d, e</sup> | 50            | 1100         |               |
| Copper <sup>c, d, f</sup>         |               |              |               |
| Cyanide <sup>g</sup>              |               |              |               |
| Lead <sup>b, c, d</sup>           | 8.1           | 210          |               |
| Mercury <sup>h</sup>              | 0.025         | 2.1          |               |
| Nickel <sup>b, c, d</sup>         | 8.2           | 74           |               |
| Seleniumi                         |               |              |               |
| Silver <sup>b, c, d</sup>         |               | 1.9          |               |
| Tributyltin <sup>j</sup>          |               |              |               |
| Zinc <sup>b, c, d</sup>           | 81            | 90           |               |
| PAHs <sup>k</sup>                 |               |              | 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) or as specified in note h (below). 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.
- 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) (Note: at the time of writing, the values are 1.0 µg/l (4-day average) and 1.0 µg/l (1-hr. average)) and apply, except that site-specific

- marine water quality objectives for cyanide have been adopted for San Francisco Bay as set forth in Table 3-3C.
- h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984). The 4-day average value for mercury does not apply to San Francisco Bay; instead, the water quality objectives specified in Table 3-3B apply. The 1-hour average value continues to apply to San Francisco Bay.
- 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 San Francisco Bay Segments (ug/L)

| Compound | 4-day<br>Average<br>(CCC) <sup>1</sup> | 1-hr Average<br>(CMC) <sup>2</sup> | Extent of Applicability   |
|----------|--|------------------------------------|---|
| Copper   | 6.9                                    | 10.8                               | The portion of Lower San Francisco Bay south of the line representing the Hayward Shoals shown on Figure 7.1. and South San Francisco Bay   |
| Copper   | 6.0                                    | 9.4                                | The portion of the delta located in the San Francisco Bay Region, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, and the portion of Lower San Francisco Bay north of the line representing the Hayward Shoals on Figure 7.1. |
| Nickel   | 11.9                                   | 62.4*                              | South San Francisco Bay   |

<sup>&</sup>lt;sup>1</sup>Criteria Continuous Concentration

<sup>&</sup>lt;sup>2</sup>Criteria Maximum Concentration

<sup>\*</sup>Handbook of Water Quality Standards, 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.

| Table 3-3B: Marine <sup>a</sup> Water Quality Objectives for Mercury in San Francisco Bay <sup>b</sup> |                             |  |  |  |
|--|-----------------------------|--|--|--|
| Protection of Human Health 0.2 mg mercury per kg fish tissue   |                             | Average wet weight concentration measured in the edible portion of trophic level 3 and trophic level 4 fish <sup>c</sup> |  |  |
| Protection of Aquatic<br>Organisms and Wildlife  | 0.03 mg mercury per kg fish | Average wet weight concentration measured in whole fish 3–5 cm in length   |  |  |

- 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. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.
- b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Richardson Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay (including the Lower South Bay).
- c. Compliance shall be determined by analysis of fish tissue as described in Chapter 6, Surveillance and Monitoring.

| Table 3-3C: Marine <sup>a</sup> Water Quality Objectives for Cyanide in San Francisco Bay <sup>b</sup> (values in ug/l) |                                  |     |  |  |
|---|----------------------------------|-----|--|--|
| Cyanide Chronic Objective (4-day Average) 2.9   |                                  |     |  |  |
| Cyanide   | Acute Objective (1-hour Average) | 9.4 |  |  |

- 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. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.
- b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay.

Table 3–4: Freshwater<sup>a</sup> Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

| Compound                          | 4-day Average    | 1-hr Average     |
|-----------------------------------|------------------|------------------|
| Arsenic <sup>b, c, d</sup>        | 150              | 340              |
| Cadmium <sup>b, d</sup>           | е                | е                |
| Chromium III <sup>f</sup>         |                  |                  |
| Chromium VI <sup>b, c, d, g</sup> | 11               | 16               |
| Copper <sup>b, c, d</sup>         | 9.0 <sup>h</sup> | 13 <sup>h</sup>  |
| Cyanide <sup>i</sup>              |                  |                  |
| Lead <sup>b, c, d</sup>           | 2.5 <sup>j</sup> | 65 <sup>j</sup>  |
| Mercury <sup>k</sup>              | 0.025            | 2.4              |
| Nickel <sup>b, c, d</sup>         | 52 <sup>1</sup>  | 470 <sup>l</sup> |
| Selenium <sup>m</sup>             |                  |                  |
| Silver <sup>b, c, d</sup>         |                  | 3.4 <sup>n</sup> |
| TributyItin°                      |                  |                  |
| Zinc <sup>b, c, d</sup>           | 120 <sup>p</sup> | 120 <sup>p</sup> |

- 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 = In (hardness) as CaCO<sub>3</sub> in mg/l: The four-day average objective for cadmium is  $e^{(0.7852\,H-3.490)}$ . This is 1.1  $\mu$ g/l at a hardness of 100 mg/l as CaCO<sub>3</sub>. The one-hour average objective for cadmium is  $e^{(1.128\,H-3.828)}$ . This is 3.9  $\mu$ g/l at a hardness of 100 mg/l as CaCO<sub>3</sub>.
- 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<sub>3</sub>. At other hardnesses, the objectives must be calculated using the following formulas where H = In (hardness): The 4-day average objective for chromium III is e<sup>(0.8190H+1.561)</sup>. The 1-hour average for chromium III is e<sup>(0.8190H+3.688)</sup>.
- 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<sub>3</sub>. At other hardnesses, the objectives must be calculated using the following formulas where H = In (hardness): The 4-day average objective for copper is e<sup>(0.9545H-1.702)</sup>. The 1-hour average for copper is e<sup>(0.9422H-1.700)</sup>.
- 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<sub>3</sub>. At other hardnesses, the objectives must be calculated using the following formulas where H = In (hardness): The 4-day average objective is e<sup>(1.273H-4.705)</sup>. The 1-hour average for lead is e<sup>(1.273H-1.460)</sup>.
- 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. The 4-day average value for mercury does not apply to Walker Creek and Soulajule Reservoir and their tributaries nor to waters of the Guadalupe River watershed; instead, the water quality objectives specified in Table 3-4A apply. The 1-hour average value continues to apply to waters specified in Table 3-4A.
- I. The objectives for nickel are based on hardness. The table values assume a hardness of 100 mg/l CaCO<sub>3</sub>. At other hardnesses, the objectives must be calculated using the following formulas where H = In (hardness): The 4-day average objective is e<sup>(0.8460H + 0.0584)</sup>. The 1-hour average objective is e<sup>(0.8460H + 2.255)</sup>.
- 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<sub>3</sub>. At other hardnesses, the objective must be calculated using the following formula where H = In (hardness): The 1-hour average objective for silver is e<sup>(1.72H 6.52)</sup>. U.S. EPA has not developed a 4-day criterion.
- 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<sub>3</sub>. At other hardnesses, the objectives must be calculated using the following formulas where H = In (hardness): The 4-day average objective for zinc is e<sup>(0.8473 H+0.884)</sup>. The 1-hour average for zinc is e<sup>(0.8473 H+0.884)</sup>.

Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and Their Tributaries; and in Waters of the Guadalupe River Watershed, Except Los Gatos Creek and its Tributaries Upstream of Vasona Dam, Lake Elsman, Lexington Reservoir, and Vasona Lake

| Protection of Aquatic<br>Organisms and Wildlife <sup>a</sup> | 0.05 mg methylmercury per kg<br>fish | Average wet weight concentration measured in whole trophic level 3 fish 5–15 cm in length    |
|--|--------------------------------------|--|
|  | 0.1 mg methylmercury per kg<br>fish  | Average wet weight concentration measured in whole trophic level 3 fish 15 – 35 cm in length |

a. The freshwater water quality objectives for the protection of aquatic organisms and wildlife also protect humans who consume fish from the Walker Creek and Guadalupe River watersheds.

# **Table 3-5: Water Quality Objectives for Municipal Supply**

| <u>Parameter</u>                           | Objective (in MG/L)                  | <u>Parameter</u>                 | Objective (in MG/L)     | <u>Pa</u> | <u>rameter</u>    | Objective (in MG/L)             |
|--|--------------------------------------|----------------------------------|-------------------------|-----------|-------------------|---------------------------------|
| Physical:                                  |                                      | Synthetic Organic                | Chemicals:              | Vo        | olatile Organic ( | Chemicals (cont'd):             |
| Color (units) <sup>a</sup>                 | 15.0                                 | Alachor <sup>h</sup>             |                         |           |                   | 2-trifluoromethane <sup>h</sup> |
| Odor (number) <sup>a</sup>                 |                                      | Atrazine <sup>h</sup>            | 0.001                   |           |                   | 1.2                             |
| Turbidity (NTU) <sup>a</sup>               |                                      | Bentazon <sup>h</sup>            | 0.018                   |           |                   | 0.15                            |
| pH <sup>b</sup>                            | 65-80                                | Benzo(a)pyrene <sup>h</sup>      |                         |           |                   | 0.0005                          |
| TDS <sup>c</sup>                           |                                      | Dalapon <sup>h</sup>             | 0.0002                  |           |                   | um of isomers) <sup>h</sup>     |
|  |                                      | Dinoseb <sup>h</sup>             | 0.007                   |           |                   | 1.750                           |
| EC (mmhos/cm) <sup>c</sup>                 | 900                                  | Diquat <sup>h</sup>              |                         | ••••      |                   | 1./30                           |
| Corrosivity                                | non-corrosive                        | Endothall <sup>h</sup>           | 0.02                    | Ra        | dioactivity:      |                                 |
| Inorganic Parameter                        | rs:                                  | Ethylene dibromide <sup>l</sup>  | 0.00005                 |           |                   | 226 and Radium-228i             |
| Aluminum <sup>d</sup>                      |                                      | Glyphosateh                      |                         |           |                   | 5                               |
| Antimony <sup>d</sup>                      | 0.006                                | Heptachlor <sup>h</sup>          | 0.00001                 |           | oss Alpha Particl |                                 |
| Arsenic <sup>d</sup>                       | 0.05                                 | Heptachlor epoxide <sup>h</sup>  | 0.00001                 |           |                   | 15i                             |
| Asbestos <sup>d</sup>                      | 7 MFI <sup>e</sup>                   | Hexachlorecyclopen               | tadieneh 0.001          |           |                   | 20,000                          |
| Barium <sup>d</sup>                        |                                      | Molinate <sup>h</sup>            | 0.02                    | Str       | ontium-90i        | 8                               |
|  |                                      |                                  |                         |           |                   |                                 |
| Beryllium <sup>d</sup>                     |                                      | Oxarnyl <sup>h</sup>             |                         |           |                   | Activity <sup>i</sup>           |
| Chloride <sup>c</sup>                      |                                      | Pentachlorophenol <sup>h</sup> . |                         |           |                   | 50                              |
| Cadmium <sup>d</sup>                       |                                      | Picloram <sup>h</sup>            |                         | Ura       | anıum'            | 20                              |
| Chromium <sup>d</sup>                      |                                      | Polychlorinated Bip              | nenyls" 0.0005          |           |                   |                                 |
| Copper <sup>a</sup>                        |                                      | Simazine <sup>h</sup>            | 0.004                   | No        | OTES:             |                                 |
| Cyanide <sup>d</sup>                       |                                      | Thiobencarb <sup>h</sup>         | 0.07 / 0.001            | a.        |                   | ximum Contaminant               |
| Fluoride <sup>f</sup>                      |                                      |                                  |                         |           |                   | rified in Table 64449-          |
| Iron <sup>a</sup>                          |                                      | Volatile Organic C               | hemicals:               |           | A of Section 6    | 64449, Title 22 of the          |
| Lead <sup>b</sup>                          | 0.05                                 | Benzene <sup>h</sup>             | 0.001                   |           | California Cod    | de of Regulations, as           |
| Manganese <sup>a</sup>                     | 0.05                                 | Carbon Tetrachlorid              | e <sup>h</sup> 0.005    |           | June 3, 2005.     |                                 |
| Mercury <sup>d</sup>                       | 0.002                                | 1,2-Dibromo-3-chlo               |                         | b.        | Table III-2, 19   | 986 Basin Plan                  |
| Nickel <sup>d</sup>                        | 0.1                                  | 1,2-Dichlorobenzene              | e <sup>h</sup> 0.6      | c.        | Secondary Ma      | ximum Contaminant               |
| Nitrate (as NO <sub>3</sub> ) <sup>d</sup> | 45.0                                 | 1,4-Dichlorobenzene              | e <sup>h</sup> 0.005    |           |                   | rified in Table 64449-          |
| Nitrate + Nitrite (as N                    |                                      | 1,1-Dichloroethaneh              | 0.005                   |           |                   | 4449, Title 22 of the           |
| Nitrite (as N) <sup>d</sup>                |                                      | 1,2-Dichloroethane <sup>h</sup>  | 0.0005                  |           |                   | de of Regulations, as           |
| Selenium <sup>d</sup>                      | 0.05                                 | cis-1,2-Dichloroethl             | vene <sup>h</sup> 0.006 |           |                   | 5. (Levels indicated            |
| Silver <sup>b</sup>                        | 0.1                                  | trans-1,2-Dichloroet             | hylanah 0.01            |           |                   | nded" levels. Table             |
| Sulfate <sup>c</sup>                       |                                      | 1,1-Dichloroethylen              |                         |           |                   | ains a complete list of         |
| Thallium <sup>d</sup>                      |                                      | Dichloromethane <sup>h</sup>     | 0.005                   |           |                   |                                 |
|  |                                      |                                  |                         |           |                   | rt-term ranges.)                |
| Zinc <sup>a</sup>                          | 3.0                                  | 1,2-Dichloropropane              | b 0.005                 | d.        |                   | ntaminant Levels as             |
|  |                                      | 1,3-Dichloropropene              | e" 0.0005               |           | specified in Ta   |                                 |
| Organic Parameters                         |                                      | Ethylbenzene <sup>h</sup>        | 0.7                     |           |                   | emicals) of Section             |
| MBAS (Foaming ager                         | nts) <sup>a</sup> 0.5                | Methyl-tert-butyl eth            | ner" 0.13 / 0.005       |           |                   | 2 of the California             |
| Oil and grease <sup>b</sup>                | none                                 | Monochlorobenzene                | <sup>n</sup> 0.07       |           | Code of Regu      | lations, as of June 3,          |
| Phenols <sup>b</sup>                       | 0.001                                | Styrene <sup>h</sup>             |                         |           | 2005.             |                                 |
| Trihalomethanes <sup>b</sup>               | 0.1                                  | 1,1,2,2-Tetrachloroe             |                         | e.        | MFL = million     | n fibers per liter;             |
|  |                                      | Tetrachloroethylene              | 10.005                  |           | MCL for fiber     | s exceeding 10 um in            |
| Chlorinated Hydroca                        | arbons:                              | 1,2,4-Trichlorobenze             | ene <sup>h</sup> 0.005  |           | length.           | _                               |
| Endrin <sup>h</sup>                        | 0.002                                | 1,1,1-Trichloroethan             |                         | f.        |                   | ctives depend on                |
| Lindaneh                                   | 0.0002                               | 1,1,2-Trichloroethan             |                         |           | temperature.      |                                 |
| Methoxychlor <sup>h</sup>                  | 0.03                                 | Trichloroethylene <sup>h</sup>   |                         | g.        |                   | st of optimum and               |
| Toxaphene <sup>h</sup>                     | 0.003                                | Trichlorofluorometh              |                         | δ.        |                   | entrations is specified         |
| 2,3,7,8-TCDD (Dioxii                       | n) <sup>h</sup> 3 x 10 <sup>-8</sup> |                                  |                         |           | _                 | 3.2-A of Section                |
| 2,4-D <sup>h</sup>                         | 0.07                                 |                                  |                         |           |                   | 22 of the California            |
| 2,4,4-TP Silvex <sup>h</sup>               | 0.05                                 |                                  |                         |           | ,                 | lations, as of June 3,          |
| ۵,7,4-11 SIIVEX                            | 0.03                                 |                                  |                         |           | 2005.             | auons, as of June 3,            |
|  |                                      |                                  |                         | L         |                   | ntominant I avala a-            |
|  |                                      |                                  |                         | h.        |                   | ntaminant Levels as             |
|  |                                      |                                  |                         |           | specified in Ta   |                                 |
|  |                                      |                                  |                         |           |                   | nicals) of Section              |
|  |                                      |                                  |                         |           |                   | 2 of the California             |
|  |                                      |                                  |                         |           |                   | lations, as of June 3,          |
|  |                                      |                                  |                         |           | 2005              |                                 |

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

of June 3, 2005.

Radon and Uranium.

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

Included Radium-226 but excludes

Table 3-6: Water Quality Objectives for Agricultural Supply<sup>a</sup> (in mg/l)

| Parameter                                       | Threshold | Limit            | Limit for Livestock Watering |
|---|-----------|------------------|------------------------------|
| Physical:                                       |           |                  |                              |
| рН  | 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 <sup>b</sup> |                              |
| 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°              | 100.0                        |
| Selenium  |           | 0.02             | 0.05                         |
| Sodium adsorption ratio (adjusted) <sup>d</sup> | 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-90<sup>th</sup> percentile)

500 mg/l (daily maximum)

Chlorides: 60 mg/l (90 day-arithmetic mean)

100 mg/l (90 day-90<sup>th</sup> 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 <a href="Chapter 2">Chapter 2</a> define the resources, services, and qualities of aquatic ecosystems that are the ultimate goals of protecting and achieving water quality. The objectives presented in <a href="Chapter 3">Chapter 3</a> 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 guides the water resource protection efforts of the State and Regional Water Boards. A key component of the Strategic Plan is the <a href="Watershed Management Initiative (WMI)">Watershed Management Initiative (WMI)</a>, which promotes a watershed management approach for water quality protection as discussed in <a href="Chapter 1">Chapter 1</a>.

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 <u>Section 4.1.3</u> 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 <u>Chapter 3</u> 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 <a href="Chapter3">Chapter 3</a> 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 systemwide, 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 <a href="#">Chapter 6</a>.

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 and 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 <u>San Joaquin Valley Drainage Program</u>, 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 <u>Table 4-1</u> 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.)

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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.

# 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 <u>National Pollutant Discharge Elimination System (NPDES)</u> <u>permits</u>. Although the NPDES program was established by the federal <u>Clean Water Act</u>, 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 <u>Porter-Cologne Water Quality Control Act</u>, 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 (<u>Table 4-1</u>) 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 <u>Clean Water Act</u> (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 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 Water 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.

Site-specific objectives have been adopted by the Water Board for copper in San Francisco Bay and for nickel in South San Francisco Bay, (<u>Table 3-3A</u>) and for cyanide in San Francisco Bay (<u>Table 3-3C</u>).

# 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 CFR 122 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 <a href="Chapter 3">Chapter 3</a>.

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 Water 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 <a href="Chapter 3">Chapter 3</a>, 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

<u>Table 4-2</u> contains effluent limitations for discharges to inland surface waters and enclosed bays and estuaries within the region.

<u>Table 4-2a</u> contains both daily maximum and longer-term effluent limitations for bacteriological indicator organisms. All NPDES permits for discharges that contain sanitary waste shall include the applicable effluent limitations from <u>Table 4-2a</u>. The water quality-based effluent limitations in <u>Table 4-2a</u> may be adjusted to account for dilution in a manner consistent with procedures in the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (see footnotes 'a' and 'e' in <u>Table 4-2a</u>.

# 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 <u>Policy for Implementation of</u>

<u>Toxics Standards for Inland Surface Waters, Enclosed Bay, and Estuaries of California</u> (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 <u>Chapter 3</u>) 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 <a href="Chapter 3">Chapter 3</a>) 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 4-3 and Table 4-4.

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 Judgment. 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 <a href="the Effluent Toxicity">the Effluent Toxicity</a>
<a href="Characterization Program">Characterization Program</a> (ETCP). This includes all municipal facilities with pretreatment 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 <u>Table 4-5</u> 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 (<u>Table 4-1, No. 1</u>), 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 <u>California Ocean Plan</u>. 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 <a href="Antidegradation Policy">Antidegradation</a> 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 methodology in the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California" (SIP).

Site-specific objectives have been adopted by the Water Board for copper in San Francisco Bay and for nickel in South San Francisco Bay (<u>Table 3-3A</u>) and for cyanide in San Francisco Bay (<u>Table 3-3C</u>).

# 4.7.2.1 Copper and Nickel in South San Francisco Bay

As part of the implementation plan for copper and nickel site-specific objectives, the municipal wastewater dischargers in South San Francisco Bay shall have effluent limits for copper and nickel, derived from the site-specific objectives in <u>Table 3-3A</u> using SIP methodology. The Water Quality Attainment Strategy for copper and nickel in South San Francisco Bay that implements these site-specific objectives is included in <u>Chapter 7</u>.

# 4.7.2.2 Cyanide

Cyanide is present in low levels in all municipal wastewater effluents and most industrial wastewater effluents. Disinfection processes contribute to in-plant formation of cyanide. Therefore, cyanide in the effluent from municipal treatment plants is a combination of cyanide in the influent and cyanide produced during disinfection. Cyanide concentration spikes in the effluent, although rare, are generally caused by accidental high concentration discharges in the collection system.

As part of the implementation plan for marine site-specific objectives for cyanide, all municipal wastewater dischargers that discharge to any segment of San Francisco Bay including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay shall have effluent limits for cyanide derived from the marine site-specific objectives in <a href="Table 3-3C">Table 3-3C</a>, using the methodology in the SIP. Specifically, under Step 7 of the SIP methodology, effluent limits are necessary considering the nature of cyanide, its use in the disinfection process, and to promote achievement and ensure maintenance of the marine cyanide site-specific objectives.

Industrial wastewater dischargers to San Francisco Bay shall have effluent limits for cyanide derived from the marine site-specific objectives in <u>Table 3-3C</u>, using the methodology in the SIP. However, effluent limits shall not be required, under Step 7 of the SIP alone, where the industrial discharger demonstrates one of the following:

- Cyanide is not detected in its effluent, using a method with a detection limit of  $1.0~\mu g/l$
- It does not disinfect any portion of its effluent
- It otherwise demonstrates that cyanide is not used in its industrial process

Effluent limits for shallow water dischargers that have been granted an exception to Basin Plan Prohibition 1 shall be based on the dilution credits set forth in <u>Table 4-6</u>. Setting forth dilution credits in <u>Table 4-6</u> does not authorize discharges into shallow

waters. Each discharger must continue to satisfy all requirements for an exception to Basin Plan Prohibition 1.

Where cyanide effluent limits are included in an NPDES permit, the discharger shall be required to implement a monitoring and surveillance program. This program shall include influent and effluent monitoring and ambient monitoring in San Francisco Bay. Each discharger shall review sources of cyanide to its influent at least once every five years. Where potential cyanide contributors exist within a discharger's service area, the discharger shall implement a local program to prevent illicit discharges to the sewer system which, at a minimum, shall include inspecting potential contributor sites, developing and distributing educational materials and preparing emergency monitoring and response plans to be implemented if a significant cyanide discharge occurs. Additionally, if ambient monitoring shows cyanide concentrations of 1.0  $\mu$ g/L or higher, the discharger shall undertake actions to determine and abate identified sources of cyanide in San Francisco Bay.

# 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, and Limits of Quantification

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

Practical Quantitation Level (PQL) 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 <u>Table 4-7</u>. 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 <u>Chapter 5 Plans and Policies</u>). 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 treatment works (POTW). Furthermore, as required in <u>State Water Board Resolution 89-21</u> (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. <u>CAG912002</u>); 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. <u>CAG912003</u>.

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 effluent 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)

<u>Table 4-8</u> is a list of municipal wastewater treatment facilities (excluding wet weather facilities) within the Region that discharge directly into surface waters. <u>Figure 4-1</u> 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 José/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 <u>Table 4-1</u>). Exceptions to the first three of these prohibitions are discussed in <u>Section 4.2 Discharge Prohibitions Applicable Throughout the Region</u>.

State Water Board Order <u>WQ 90-5</u> (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 offline 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 (<u>Table 3-7</u>) 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 <u>Groundwater Protection and Management</u>.

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 <u>Table 4-9</u>, and their locations are shown in <u>Figure 4-2</u>. 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 <u>Section 4.12 Industrial Facilities</u> 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 <u>Section 4.13.2.4 Targeted Pollution Prevention for POTWs</u>.

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

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 exceeding 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 22, 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 <u>Chapter 2</u>) 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 <u>Table 4-10</u>) 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 <u>Table 4-10</u> to submit annual reports (pursuant to <u>Section 13225(c)</u> 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. <u>Table 4-10</u> 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 fleetwashing 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 <u>Title 23</u>, <u>California Code of Regulations</u>, <u>Chapter 15</u>, <u>Article 6</u>. 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.

# 4.15.1.3 Water Board Program

## 4.15.1.3.1 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 <a href="California Code of Regulations - Title 23">Chapter 15</a> (Discharge of Waste to Land).

# 4.15.1.3.2 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 <u>Water Code Section 13050</u>, 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, <u>Water Board Order No. 96-011 (General Water Reuse Permit)</u>. 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 <u>Policy on Discrete</u> <u>Sewerage Facilities in 1978</u>. 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 <u>Resolution No. 79-5</u>: 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 <u>Title 24</u>, <u>CCR</u>, <u>Part 5</u>, <u>Appendix G</u>, 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

## 4.20.1 Background

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. The largest volume of sediment that affects the Bay is the approximately 100 million cubic yards that are re-suspended in the water column by the actions of tide, wind and currents.

Dredging is generally necessary to maintain the beneficial use of navigation. The trend towards increasingly larger vessels also necessitates increased channel depths in the shipping channels.

Disposal of the majority of dredged material from San Francisco Bay has historically been at designated disposal sites in San Francisco Bay. This practice dates back to at least the beginning of the 20<sup>th</sup> century. Currently there are three such multi-user disposal sites designated by the U.S. Army Corps of Engineers (USACE, or Corps): the Alcatraz (SF-11), San Pablo Bay (SF-10), and Carquinez (SF-9) Disposal Sites. A fourth site (Suisun Bay, SF-16) is maintained for Corps use exclusively for material from dredging of the Suisun Bay and New York Slough federal channels.

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 inbay disposal sites. All designated 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. Additionally, one of the management practices is to only allow material to be disposed of at disposal sites downstream of the dredging sites, with the objective of moving sediments away from dredging sites and out of the Bay. While the overall hydrodynamics of the Bay are not completely understood it is clear that the fate of material placed at in-bay disposal sites is dependent upon material type, disposal volume, and disposal frequency.

Since 1994, when the U.S. EPA designated the Deep Ocean Disposal Site approximately 50 miles offshore of San Francisco, approximately 6 million cubic yards of dredged material have been disposed of there.

Dredged material has also been used as fill for wetland restoration projects, for levee maintenance, and as daily cover for landfills. Volumes for these, and other beneficial reuse projects, have totaled approximately 2 million cubic yards over the past 9 years.

# 4.20.2 Regulatory Framework

The Corps of Engineers issues federal permits for dredging projects pursuant to Section 404 of the Clean Water Act. The U. S. EPA provides oversight of the Corps' regulatory program.

As a part of the Section 404 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. The Water Board reviews the proposed project, then may grant or deny certification. Additionally, the Water Board may choose to act under the authority of the state <a href="Porter Cologne Water Quality Control Act">Porter Cologne Water Quality Control Act</a>, by issuing waste discharge requirements for the project in conjunction with the water quality certification.

Water quality certifications and waste discharge requirements often contain conditions to protect water resources that the permittee must meet during the term of the permit.

The <u>San Francisco Bay Conservation and Development Commission (BCDC)</u> also regulates dredging and disposal under the provisions of the <u>McAteer-Petris Act</u>.

Projects involving the use of sovereign lands of the state may be subject to the lease or permitting requirements of the State Lands Commission.

# 4.20.3 Long-term Management Strategy

In the early 1980s, the problems associated with heavy reliance on in-Bay disposal sites became apparent, including navigational problems associated with the "mound" of dredged material at the Alcatraz disposal site, as well as potential environmental problems associated with disposal and dredging activities in general. These conditions led to the creation of the Long Term management Strategy for the Placement of Dredged Material in the San Francisco Bay Region (LTMS).

The LTMS program began in 1990, when the Water Board joined with USACE, U. S. EPA, BCDC, the State Board, and representatives from the dredging and environmental communities to ensure adequate dredged material disposal and reuse capacity and protection of aquatic resources over a 50-year planning period. The adopted goals for the program (Table 4-11) reflect this purpose. The primary focus of the LTMS is on the various dredged material disposal options and their related impacts. The LTMS was also initiated to maximize beneficial reuse of dredged material, improve coordination of the agencies governing these activities, and ensure a more predictable regulatory framework.

The LTMS examined several possible long-term dredged material management strategies. The LTMS Policy Environmental Impact Statement/Programmatic Environmental Impact Report (LTMS EIS/EIR) selected as the preferred alternative a reduction in the reliance on in-Bay disposal. The ultimate goal of this alternative is a "low" volume of disposal at in-Bay sites (20% of historical average dredging volumes), and an increased reliance on ocean disposal and beneficial reuse of dredged material (with the remaining material split evenly between these two options). The LTMS EIS/EIR was certified by the USACE and U.S. EPA in July 1999 and by the State Board in November 1999, thus beginning the implementation of the preferred alternative.

During the preparation of the LTMS EIS/EIR, the LTMS agencies consulted with the United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (CDFG) regarding potential impacts of dredging and dredged material disposal to sensitive biological resources. These resource agencies, in conjunction with the LTMS agencies, developed a list of restrictions for such projects to protect critical habitat for special status and important commercial and recreational species.

The LTMS EIS/EIR identified the overall future disposal management strategy (i.e. reduced in-Bay disposal volumes at the designated dispersive sites). The LTMS Management Plan contains specific guidance that will be used to implement the preferred alternative by each of the LTMS agencies. The Management Plan will be reviewed and updated every three years to reflect changing statutory, regulatory, technical, or environmental conditions. The Basin Plan dredging policies will be updated, as necessary, in conjunction with Management Plan updates.

# 4.20.4 Environmental Impacts of Dredging and Disposal in the Aquatic Environment

Most dredging and dredge material disposal operations cause localized and ephemeral impacts with related biological consequences (<u>Table 4-12</u>). In the 1980s it was determined that the Alcatraz disposal site was accumulating significant amounts of material, causing the depth of the site to decrease 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. EPA, 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. These volumes were reduced further for the Alcatraz disposal site (SF-11) in 1993 when the USACE issued Public Notice 93-3.

#### 4.20.5 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 has 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.

## 4.20.6 Delta Island Levee Repair and Maintenance

Winter Island, located in the western Delta, near Pittsburg, is operated as a duck club by the local Reclamation District. In 1998, the Reclamation District, in need of material to repair levees, partnered with the Corps of Engineers, and accepted over 200,000 cubic yards of sandy dredged material from the Corps' dredging of the federal Suisun Bay Channel. In 1999, an additional 225,000 cubic yards from the Suisun Bay Channel project was placed on the site, along with approximately 30,000 cubic yards of finer-grained material from the Port of San Francisco. The Reclamation District estimates that they will have a long-term need for fine-grained dredged material, of about 100,000 cubic yards per year.

Other Delta islands are also in need of material for levee repair. For example, the Corps is currently exploring the possibility of taking material from the Suisun Bay Channel to Sherman Island. Cooperation with the Department of Water Resources, the Central Valley Regional Water Quality Control Board, and the CalFed program may provide additional opportunities for reuse of dredge material in the future.

## 4.20.7 Water Board Policies on Dredging and Dredge Sediment Disposal

The overall policy for dredging and disposal of dredged sediment includes a reduction of in-bay disposal volumes and an increased emphasis on beneficial reuse of dredged material. The most likely beneficial reuse of dredged material is wetland restoration projects or for levee maintenance and repair. Additional capacity for dredged material is available at the deep ocean disposal site designated by U.S. EPA in 1994. The goal of the policies below is to reduce in-bay disposal volumes to approximately 20% of recent historical dredging volumes, to about 1 million cubic yards per year.

Dredging and dredged material disposal should be conducted in an environmentally and economically sound manner. Dredgers should reduce disposal in the Bay over time to achieve the LTMS goal of one million cubic yards, or less, per year. The LTMS agencies will implement a system of disposal allocations for the designated disposal sites to individual dredgers to achieve the LTMS goal only if voluntary efforts are not effective in reaching this goal.

#### 4.20.7.1 Need for Regional and Local Monitoring

The Regional Monitoring Program (RMP) provides information on the regional-scale effects of contaminants in the Bay. The Water Board is evaluating whether additional, more localized monitoring to isolate the effects of the disposal of dredged material in the Bay is needed. In the interim, existing sediment evaluation procedures (See Policy 4.20.7.5, below) and monitoring and management efforts at the in-Bay disposal sites are protective of the beneficial uses of the Bay.

#### 4.20.7.2 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. Additional specific requirements regarding material type and dredging and disposal mechanisms may be implemented as required, based on ongoing site monitoring and adaptive management.

# 4.20.7.3 Volume Targets

## 4.20.7.3.1 Individual Disposal Sites

Volume targets for each disposal site were developed based on understandings of sediment dynamics and historical information regarding disposal volumes (Table 4-14).

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 Protection, Research, and Sanctuaries Act (MPRSA).

## 4.20.7.3.2 Overall In-bay Disposal

Although the overall in-Bay disposal goal is one million cubic yards per year, the LTMS recognized that the inherent variability in dredging operations and needs and other factors may impact dredgers' ability to achieve this goal. The LTMS therefore established a slightly higher long-term in-Bay disposal volume target of 1.25 million cubic yards per year. Total in-Bay disposal volumes should decrease according to the schedule identified in <u>Table 4-15</u>, until the long-term LTMS target of 1.25 million cubic yards per year is attained.

In addition to the total volume specified in Table 4-15:

- a. Material from small dredging projects (see below) will, in general, be exempt from restrictions on in-Bay disposal if it is demonstrated through an alternatives analysis that there are no practical alternatives to in-Bay disposal, and
- b. A contingency volume of 250,000 cubic yards per year will be established for "emergencies" or for years when sedimentation or other factors result in unanticipated material volumes.

# 4.20.7.4 Volume Target Implementation

#### 4.20.7.4.1 Individual Disposal Sites

The Water Board will consider denial of water quality certification for:

a. Any project proposing to place material at a disposal site for which the annual or monthly volume target, as defined in <u>Table 4-14</u>, has been exceeded; and

<sup>&</sup>lt;sup>1</sup> A dredging emergency is a situation that poses an immediate danger to life, health, property, or essential public service and that demands action by the Board more quickly than the Board's normal permit procedures would allow.

b. Any project that does not provide an adequate alternatives analysis showing that there are no practicable alternatives to in-Bay disposal.

Small project proponents may apply for an exemption to monthly or annual volume targets. A small project is defined as a facility or project whose design depth does not exceed 12 feet Mean Lower Low Water (MLLW) with an annual average disposal volume of less than 50,000 cubic yards. The project proponent must demonstrate that:

- The additional burden of using an alternative to in-Bay disposal placed upon the applicant would be inordinate relative to the beneficial uses protected; and
- b. The alternatives analysis indicates that there are no practical alternatives to in-Bay disposal.

# 4.20.7.4.2 Overall In-bay Disposal

A voluntary program will be instituted to attain the overall in-Bay disposal targets adopted by the LTMS EIS/EIR with the majority of maintenance material from Corps of Engineers projects being used in wetland restoration projects or taken to the ocean disposal site. As part of the voluntary program, other dredgers will make efforts to use alternatives to in-Bay disposal.

Progress towards the goal will be evaluated both on an annual basis and every three years, based on the three-year average volume of in-Bay disposal. Should this voluntary program fail to provide progress toward the goal in the reviews outlined above, a mandatory allocation program will be considered. The institution of the mandatory allocation process will occur as outlined below and the determination to rescind mandatory allocation, if imposed, will be a symmetric process.

The Water Board will consider the imposition of mandatory allocation in a Water Board hearing. In making its decision regarding disposal allocations, the Water Board will confer with the LTMS agencies and consider the factors affecting the need for allocations in light of progress towards the long-term goal adopted by the LTMS EIS/EIR, including (1) the status of alternatives to in-Bay disposal and cooperative efforts to implement them, (2) exigencies that hamper the use of alternative sites, and (3) other relevant factors. If the Water Board votes to impose mandatory allocations, the mandatory allocation program will be regulated through the issuance of general Waste Discharge Requirements for small- and medium-category dredging projects and through separate Waste Discharge Requirements for all USACE dredging projects. If in place, rescission of the mandatory allocation program would be considered if the three-year average disposal volume was lower than the target volumes as identified in <u>Table 4-15</u>, unless, after review by the Water Board in a public hearing, the Water Board votes to not rescind mandatory allocations. Both the institution and rescission of the mandatory allocation program would be discretionary actions of the Water Board, and thus subject to review pursuant to CEQA under the Water Board's functionally-equivalent process.

## 4.20.7.5 Use of Testing Guidelines

authorizations for such disposal.

<u>Proposed for Discharge in Waters of the U.S. – Testing Manual, Inland Testing Manual (ITM)</u>. The ITM has been adopted by the LTMS agencies as the framework for the evaluation of the suitability of dredged material for in-Bay disposal. It provides comprehensive guidance to dredging permit applicants on sampling and testing of sediment proposed for disposal in waters of the United States, pursuant to Section 404 of the Clean Water Act. Disposal at the in-Bay disposal sites is subject to this guidance. The ITM outlines a tiered approach to sediment testing, similar to the existing Ocean Disposal Testing Manual, or "Green Book," the federal guidance document for testing for ocean disposal

(pursuant to MPRSA). The Water Board's Executive Officer will require evaluation of

sediments proposed for in-Bay disposal according to the ITM, before issuing

In February of 1998, the Corps and U.S. EPA published *Evaluation of Dredged Material* 

The ITM was intended to only address testing of material for aquatic disposal and does not provide a protocol for upland disposal. Water Board staff have developed a document, "Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines," to assist project planners with developing testing procedures for beneficial reuse projects, including wetland restoration, levee maintenance, and construction fill. The document also provides general sediment screening guidelines for these uses. However, disposal of dredged material for beneficial reuse will be subject to site-specific testing requirements and material suitability criteria that will be defined in Water Board Orders.

The Water Board is working in cooperation with other LTMS agencies to develop a regional implementation manual which will detail testing requirements for all three disposal environments.

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.

#### 4.20.7.6 Environmental 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 those specified by USFWS and NMFS in their review of the LTMS programmatic EIS/EIR pursuant to Section 7 of the Endangered Species Act, and will incorporate any requirements from project specific consultations.

#### 4.20.7.7 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:

- a. Special reporting procedures for the hydraulic pumping of dredged material into transport scows prior to disposal (marina slip applications);
- b. Evidence of compliance with the conditions described in 4.20.7.6, above;
- c. Time limit on the overflow from hopper-type hydraulic dredges in order to obtain an economical load; or
- d. 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.)

## 4.20.7.8 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 reuse of high value sediments. Staff will also continue to work with staff from the Central Valley Regional Water Quality Control Board to provide appropriate options for material use in levee maintenance in the delta or for use on delta islands, as appropriate.

# 4.20.7.9 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 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 may request, but not require, that applicants submit testing and other project data in a specific electronic format.

Water Board staff have been participating in a coordinated permitting process, the Dredged Material Management Office (DMMO), since 1995. The DMMO consists of staff representatives of the Water Board, BCDC, U. S. EPA, USACE, and the California State Lands Commission, with active participation by the California Department of Fish and Game and the National Marine Fisheries Service as commenting resource agencies. The DMMO meets regularly to review permit applications and sediment testing plans and results and to make recommendations on proposed dredging projects. While each agency retains its separate authority the agency representatives strive to provide clear and coordinated guidance to applicants and to reach consensus-based recommendations.

## 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 (<u>Table 4-16</u> and <u>Figure 4-5</u>). 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
- <u>Water Code Section 13142.5</u> (applies to coastal marine wetlands).

The goals of the <u>California Wetlands Conservation Policy</u> 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 <u>the Estuary Project's Comprehensive Conservation and Management Plan</u> (2007) for recommendations on how to effectively participate in a Regionwide, 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: <a href="Baylands">Baylands</a> <a href="Ecosystem Habitat Goals">Ecosystem Habitat Goals</a> (1999) and Baylands <a href="Ecosystem Species">Ecosystem Species</a> 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 <u>Chapter 2 Beneficial Uses</u> and are applicable throughout the Region. Chapter 2 also identifies and specifies the beneficial uses of 34 significant marshes within the Region (<u>Table 2-3</u>). 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 noncontiguous 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.

#### 4.23.4Wetland 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 jurisdictional determination or in instances where the Corps may not have 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 <a href="Comprehensive Conservation and Management Plan">Comprehensive Conservation and Management Plan</a>, 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 <u>Wetland Ecological Assessment (WEA)</u> and the <u>California Rapid Assessment Method (CRAM)</u>.

#### 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 <u>State Water Board Resolution No. 88-63</u>, 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 <u>Section 4.25.1 Application of Water Quality Objectives</u>.
- 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 "<u>A Compilation of Water Quality Goals</u>". 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 (<u>State Water Board Resolution No. 68-16</u>), 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 petroleumimpacted 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 4.25.3.1.3 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.

# 4.25.2.3.1 Groundwater Cleanup 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>U.S. EPA's Risk Assessment Guidance for Superfund</u>, 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.

#### 4.25.2.3.2 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 <u>Health and Safety</u> <u>Code</u> and <u>the federal Superfund law</u> 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).

#### 4.25.3.1.2 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.

### 4.25.3.1.3 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

An underground storage tank (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 <u>Health and Safety Code</u> <u>Division 20, Chapters 6.7</u> and <u>6.75</u>, 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 <a href="Proposition 65">Proposition 65</a> 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 landuse 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 <a href="California Integrated Waste">California Integrated Waste</a> 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.

### 4.25.3.3.1 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 nonpotable 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.

# 4.25.3.3.2 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. <u>68-16</u>, <u>88-63</u>, and 92-49.

Under the <u>Base Realignment and Closure Act of 1990</u> (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 <u>Water Code Section 13304</u> to allow investigation and cleanup after the military property is transferred. For additional regulatory tools, see <u>Section 4.25.2 Requirements for Site Investigation, Cleanup, and Site Closure</u>.

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 (<u>Defense-State Memorandum of Agreement</u>, <u>DSMOA</u>)). 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 <u>Aboveground Petroleum Storage Act</u> 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 <u>Section 4.26 Emerging Program Areas</u>. 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 <u>adopted Resolution No. 81, "Statement of Policy on Sewer and Drainage Wells"</u>, 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.

### 4.25.4.5.2 Shallow Drainage 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.

- 1. 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.
- 2. 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** 

Figure 4-1: Publicly Owned Treatment Works (POTWs)

Figure 4-2: Industrial Dischargers

Figure 4-3: Urban Areas in San Francisco Bay Basin

Figure 4-4: Dredged Material Disposal Sites

Figure 4-5: Inactive Mine Sites

Figure 4-6: Municipal Solid Waste Landfill Sites in the Region

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Table 4-14: Dredged Material Volume Targets

Table 4-15 Transition Volume Targets for In-Bay Disposal of Dredged Materials

Table 4-16: Inactive Mine Sites

# **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.

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.

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. 9249 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 Department 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.

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.

CATEGORICAL EXEMPTION TO THE POLICY FOR IMPLEMENTATION OF TOXICS STANDARDS FOR INLAND SURFACE WATERS, ENCLOSED BAYS, AND ESTUARIES OF CALIFORNIA FOR DISCHARGES FROM DRINKING WATER SYSTEMS IN THE SAN FRANCISCO BAY REGION - RESOLUTION R2-2008-0101

The Water Board will grant exceptions to discharges from drinking water systems from meeting the priority pollutant objectives for copper and trihalomethanes when necessary to implement control measures conducted to fulfill statutory requirements under the federal Safe Drinking Water Act or the California Health and Safety Code.

#### **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

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.

EVALUATION FRAMEWORK FOR DREDGED MATERIAL PROPOSED FOR IN-BAY DISPOSAL AND DREDGED MATERIAL MANAGEMENT OFFICE – RESOLUTION NO. 01-065

This resolution, (1) adopted the federal guidance issued by the USACE and the U. S. EPA in 1998 for evaluating the suitability of dredged material for disposal at aquatic disposal sites like the in-Bay disposal sites: *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual, Inland Testing Manual* (ITM), as well as the guidance for implementing the ITM locally, which was developed jointly by Water Board staff, USACE San Francisco District, U. S. EPA Region IX, San Francisco Bay Conservation and Development Commission, and State Lands Commission through the multi-agency Dredged Material Management Office (DMMO); and (2) recognized the success of the DMMO in providing a coordinated permitting process for dredging and disposal projects in the Bay area and as an important component in implementing the Long Term Management Strategy for Disposal of Dredged Material in the San Francisco Bay Region (LTMS), and directed staff to continue to participate in the DMMO.

#### 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.

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.

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);
- 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.

# 6.5.1 Compliance Monitoring - San Francisco Bay Mercury Human Health Objective

Compliance with the human health marine water quality objective for mercury in San Francisco Bay (<u>Table 3-3B</u>) will be evaluated in fish at the lengths shown below (<u>Table 6-4</u>). The mercury concentration in the edible portion of these five species will be averaged and compared to the human health water quality objective.

#### 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**

Figure 6-1: Regional Monitoring Program Sampling Stations

Figure 6-2: State Mussel Watch Program Monitoring Network

Figure 6-3: Toxic Substances Monitoring Network

#### **TABLES**

Table 6-1: Parameters Analyzed for in the Regional Monitoring Program

Table 6-2: Key to Figure 6-2: State Monitoring Network

Table 6-3: Key to Figure 6-3: State Monitoring Network

Table 6-4: Five Most Commonly Consumed Bay Fish

# 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)

На

Phaeophytin

Salinity

Temperature

Total Chlorophyll-a

**Total Suspended Solids** 

# **Sediment Quality Parameters**

% clay ( $< 4 \mu m$ )

% silt (4  $\mu$ m-62  $\mu$ m )

% sand (2 mm > 62  $\mu$ m)

% 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 (continued)

Trace elements analyzed in water, sediment, and tissue samples:

Target Method Detection Limits (MDLs) are in parentheses following the reporting units.

Water Sediment
(Dissolved (dry weight)
and Total)

Lab(s) BRL/UCSCDET BRL/CCSF/
UCSCDET

Aluminum (AI)\*

- mg/kg (200)

Arsenic (As)

| Aluminum (AI)*                                      | -                | 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         |
| Matterday and way (Maller)                          | ·······/ (0.005) | (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)     |
| Development and in contract of few the constitution |                  |               |

<sup>-</sup> Parameter is not sampled for the matrix.

<sup>\*</sup> 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.

# Table 6-1 Parameters Analyzed for in the Regional Monitoring Program (continued)

Trace organic parameters (lab; reporting units) – in water (AXYS & CDFG; pg/L), sediment (EBMUD;  $\mu g/kg$ ), and bivalve tissue (CDFG-WPCL;  $\mu g/kg$ ) samples:

Organochlorines analyzed by GC-ECD will be determined using two columns of differing polarity. Polynuclear Aromatic SYNTHETIC BIOCIDES OTHER SYNTHETIC COMPOUNDS <sup>1</sup>New analytes added in 2002. **Hydrocarbons (PAHs)** (Target MDLs: water - 2 pg/L, (Target MDLs: water - 200 pg/L, sediment and tissue – 1 μg/kg) <sup>2</sup>Not required by RMP but are expected to be sediment and tissue – 5 µg/kg; analyzed in the 2002 RMP samples. water PAHs reported in ng/L) 1-Methylnaphthalene Cyclopentadienes Polychlorinated Biphenyls (PCB) 2,3,5-Trimethylnaphthalene Aldrin Congeners (IUPAC numbers) 2,6-Dimethylnaphthalene Dieldrin (Target MDLs: water - 2 pg/L, sediment and 2-Methylnaphthalene Endrin tissue – 1 ua/ka) Biphenyl 8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, Naphthalene **Chlordanes** 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 1-Methylphenanthrene alpha-Chlordane 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, 203 Acenaphthene cis-Nonachlor Acenaphthylene gamma-Chlordane Polybrominated Diphenyl Ethers<sup>1</sup> Anthracene Heptachlor Heptachlor Epoxide (BDE-IUPAC No., Compound Name) Fluorene (Target MDLs: water - 1 pg/L, sediment and Phenanthrene Oxychlordane Benz(a)anthracene trans-Nonachlor tissue – 1  $\mu$ g/kg). Chrysene Fluoranthene Dichloro-diphenyl-trichloroethane BDE 7 [2.4-DiBDE] [2,4'-DiBDE] Pyrene (DDTs) BDE 8 Benzo(a)pyrene o,p'-DDD **BDE 10** [2,6-DiBDE] Benzo(b)fluoranthene o.p'-DDE **BDE 11** [3,3'-DiBDE] Benzo(e)pyrene o,p'-DDT **BDE 12** [3,4-DiBDE] Benzo(k)fluoranthene p,p'-DDD **BDE 13** [3.4'-DiBDE] Dibenz(a,h)anthracene **BDE 15** [4,4'-DiBDE] p,p'-DDE [2.2'.4-triBDE] Perylene p,p'-DDT **BDE 17** Benzo(ghi)perylene **BDE 25** [2,3',4-triBDE] Indeno(1,2,3-cd)pyrene **BDE 28** [2,4,4'-triBDE] Hexachlorcylohexane (HCH) Dibenzothiophene **BDE 30** [2,4,6-triBDE] alpha-HCH **BDE 32** [2,4',6-triBDE] beta-HCH [2',3,4-triBDE] **Alkylated PAHs** delta-HCH **BDE 33** C1-Chrysenes gamma-HCH **BDE 35** [3,3',4-triBDE] [3,4,4'-triBDE] C2-Chrysenes **BDE 37** C3-Chrysenes **Other Synthetic Biocides BDE 47** [2,2',4,4'-tetraBDE] C4-Chrysenes **BDE 49** [2,2',4,5'-tetraBDE] Chlorpyrifos (water only; CDFG-WPCL) C1-Dibenzothiophenes **BDE 51** [2,2',4,6'-tetraBDE] Dacthal (water only) C2-Dibenzothiophenes Diazinon (water only; CDFG-WPCL) **BDE 66** [2,3',4,4'-tetraBDE] C3-Dibenzothiophenes Endosulfan I (water only) **BDE 71** [2,3',4',6-tetraBDE] C1-Fluoranthene/Pyrenes Endosulfan II (water only) **BDE 75** [2,4,4',6-tetraBDE] C1-Fluorenes Endosulfan Sulfate (water only) [3,3',4,4',-tetraBDE] **BDE 77** C2-Fluorenes Hexachlorobenzene **BDE 82** [2,2',3,3',4-pentaBDE] C3-Fluorenes **BDE 85** [2,2',3,4,4'-pentaBDE] Mirex [2,2',4,4'5-pentaBDE] C1-Naphthalenes Oxadiazon (water only) **BDE 99** [2,2',4,4',6-pentaBDE] C2-Naphthalenes **BDE 100** C3-Naphthalenes **BDE 105** [2,3,3',4,4',-pentaBDE] C4-Naphthalenes **BDE 116** [2,3,4,5,6-pentaBDE] C1-Phenanthrene/Anthracenes **BDE 119** [2,3',4,4',6-pentaBDE] C2-Phenanthrene/Anthracenes [2,3',4,5,5'-PeBDE **BDE 120** C3-Phenanthrene/Anthracenes **BDE 126** [3,3',4,4',5-PeBDE] C4-Phenanthrene/Anthracenes [2,2',3,3',4,4'-hexaBDE] **BDE 128** 

**BDE 138** 

[2,2',3,4,4',5'-hexaBDE]

| Polynuclear Aromatic Hydrocarbons (PAHs) (Target MDLs: water – 200 pg/L, sediment and tissue – 5 μg/kg; water PAHs reported in ng/L) | (Target MDLs: water $-2 \text{ pg/L}$ , sediment and tissue $-1 \text{ µg/kg}$ )  1 New analytes accepted and tissue $-1 \text{ µg/kg}$ )  2 Not required by | YNTHETIC COMPOUNDS  In the second of the sec |  |
|--|--|--|--|
| ,  |  | BDE 140  | [2,2', 3,4,4',6'-hexaBDE]                            |
|  |  | BDE 153<br>BDE 154   | [2,2',4,4',5,5'-hexaBDE]<br>[2,2',4,4',5,6'-hexaBDE] |
|  |  | BDE 154<br>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 / Fiel 4  Concord Naval Weapons Station / Seal Isl | 38 03 21             | 122 02 50              | 1988                             |
| 299.1          | •  | 38 03 25             | 122 14 52              | 1988, 1996                       |
| 299.1          | Selby Slag 4   |                      |                        | 1988                             |
| 299.2          | Selby Slag 5   | 38 03 29<br>38 03 31 | 122 14 48<br>122 14 19 | 1988                             |
|                | Selby Slag 6   |                      |                        | 1988                             |
| 299.4<br>300.2 | Selby Slag 7<br>Mare Island  | 38 03 28             | 122 13 54              | 1985-1989                        |
| 301.0          | Davis Point  | 38 04 30             | 122 14 45              |                                  |
| 301.4          | Union Oil Outfall  | 38 03 09<br>38 02 44 | 122 15 36<br>122 15 43 | 1980, 1983, 1988<br>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                        |
| 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                             |
|                |  |                      |                        |                                  |

**Table 6-2 Mussel Watch Program Monitoring Network** 

| 307.9 | San Francisco / Islais Channel       | 37 44 51 | 122 23 05 | 1987-1988                        |
|-------|--------------------------------------|----------|-----------|----------------------------------|
|       |                                      |          |           | 1981-1983, 1991-1993,            |
| 308.0 | San Francisco Bay / Hunter's Point   | 37 41 42 | 122 20 27 | 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                             |
| 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
 Key to Figure 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  |

**Table 6-4. Five Most Commonly Consumed Bay Fish** 

| Species and Edible Portion               | Evaluation Length (cm) |
|--|------------------------|
| Striped bass, muscle without skin        | 60                     |
| California halibut, muscle without skin  | 75                     |
| Jacksmelt, muscle with skin and skeleton | 25                     |
| White sturgeon, muscle without skin      | 135                    |
| White croaker, muscle with skin          | 25                     |

# 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 in this chapter.

# 7.1 Region-Wide Water Quality Attainment Strategies And TMDLs

# 7.1.1 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.

# 7.1.1.1 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.

# 7.1.1.2 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.

# 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.

#### 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.

# 7.1.1.3 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.

# 7.1.1.4 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.

# 7.1.1.5 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.

# 7.1.1.6 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.

#### 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.

# 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).

# 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).

# 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.

# 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.

#### 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.

# 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.

# 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:

- 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;
- Track progress by periodically reviewing the discharger's pesticide use and pesticide use by its hired contractors;
- Train the discharger's employees to use integrated pest management techniques and require that they rigorously adhere to integrated pest management practices;
- Require the discharger's contractors to practice integrated pest management; and
- 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:

- 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;
- 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.
- Encourage public and private landscape irrigation management that minimizes pesticide runoff;
   and
- 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:

- 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);
- Disseminate monitoring data to appropriate regulatory agencies; and
- 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:

• 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;
- 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
- 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.

#### 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.

# 7.1.1.7 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.

# 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);
- 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?

# 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 LC50 values for aquatic organisms (the concentration that kills one half of the test organisms), a monitoring benchmark may be calculated by dividing the lowest LC50 value measured by the appropriate benchmark factor from Table 7.1.1-1 (typically 14 or less for a registered pesticide).

#### Monitoring Benchmark = Lowest LC<sub>50</sub> ÷ Benchmark Factor

Where multiple LC<sub>50</sub> measurements are available, the lowest "genus mean acute value" may be used in place of the lowest LC<sub>50</sub>. 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<sub>50</sub> 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 7.1.1-1 is not intended for deriving monitoring benchmarks for sediment tests.

Table 7.1.1-1 Benchmark Factors

| Number of Data Requirements Satisfied a | Benchmark Factor b |
|---|--------------------|
| 2                                       | 16                 |
| 3                                       | 14                 |
| 4                                       | 14                 |
| 5                                       | 12                 |
| 6                                       | 10                 |
| 7                                       | 8                  |

#### Notes:

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.

# 7.1.1.8 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 7.1.1-2 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.

Table 7.1.1-2: 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 |

<sup>&</sup>lt;sup>a</sup> U.S. EPA water quality criteria guidelines require data for at least eight taxonomic families to derive water quality criteria.

These values apply only when both daphnid and salmonid toxicity data are available. U.S. EPA typically requires such data to register a pesticide.

| Action  | Schedule   |
|---|--|
| Identify waters impaired by pesticide-related toxicity and waters where there is a potential for impairment       | Biennially   |
| 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   |

# 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.

- Are changes in urban creek conditions moving toward improvements in water quality (e.g., toward target attainment)?
- If it is unclear whether there is progress, how should monitoring efforts be modified to measure trends?
- If there has not been adequate progress, how might the implementation actions or allocations be modified to improve progress?
- Is there new information that suggests the need to modify the targets, allocations, or implementation actions?
- 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.

#### 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.

#### 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.

# 7.2 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR SAN FRANCISCO BAY AND BAY SEGMENTS

# 7.2.1 Water Quality Attainment Strategy to Support Copper Site-specific Objectives for San Francisco Bay, and Nickel Site-specific Objectives for South San Francisco Bay

The Water Quality Attainment Strategy (WQAS) for copper in all San Francisco Bay segments (see Figure 7.2.1-1) and nickel in South San Francisco Bay is designed to prevent water quality degradation and ensure attainment of the copper and nickel site-specific objectives (SSOs). 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 are:

- Control measures/actions to minimize the discharge of copper (from wastewater treatment plants, urban runoff, anti-fouling boat paints, and lagoons to ensure that significant copper sources are properly managed)
- Statistically-based water quality "triggers" and a receiving water monitoring program that would initiate additional control measures/actions if the "triggers" are exceeded
- Metal translators that will be used to compute copper and nickel effluent limits for the municipal wastewater treatment plants discharging to South San Francisco Bay
- Metal translators that will be used to compute copper effluent limits for municipal and industrial
  wastewater treatment plants that discharge to deep water (see Section 4.6.1 for definition) north
  of the Dumbarton Bridge

# 7.2.1.1 Background

All San Francisco Bay segments (see Figure 7.2.1-1) meet water quality objectives for copper and nickel. Since the mid-1980s, because of effective treatment and successful pollution prevention and source control efforts, substantial reductions in metal loading to San Francisco Bay segments have been achieved. Other sources that are difficult to manage such as urban runoff (which includes copper from automobile brake pads), historical deposits of copper in the Bay sediments, and natural sources of copper

| are among the dominant contributions to current ambient water concentrations. SSOs (see Chapter 3) for dissolved copper in all Bay segments (and nickel in South San Francisco Bay) have been derived using toxicity data representing site-specific conditions in all San Francisco Bay segments, and these SSOs fully protect San Francisco Bay beneficial uses. |
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Figure 7.2.1-1 Segments of San Francisco Bay showing location of Hayward Shoals as a line connecting Little Coyote Point and the Oakland Airport.

# 7.2.1.2 Implementation Plan and Monitoring Program

This section discusses the actions and ambient monitoring program-needed to ensure continued attainment of the copper site-specific objectives throughout San Francisco Bay and-ensure that copper sources are properly managed so ambient copper levels do not increase due to potential increases in loading of copper to San Francisco Bay. The implementation plan also calls for requirements in NPDES permits to support investigations to resolve three key areas of remaining technical uncertainty regarding copper: urban tributary loads and trends; toxicity to benthic organisms; and possible effects on the olfactory system of salmonids.

# Control Measures for Urban Runoff Management Agencies

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and copper control measures designed to prevent urban runoff discharges from causing or contributing to exceedances of copper water quality objectives. Requirements in each 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 copper in stormwater runoff to the maximum extent practicable. Urban runoff management agencies must implement control measures targeting: vehicle brake pads, architectural copper, copper pesticides, and industrial copper use. Additionally, these permits shall contain requirements to conduct or cause to be conducted: monitoring of copper loading to the Bay at locations and frequency sufficient to track loading trends; and technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.

If an ambient trigger concentration in any San Francisco Bay segment (see Ambient Monitoring Program, below) is exceeded, all urban runoff management agencies discharging to that segment shall submit a report to the Water Board that describes best management practices that are currently being implemented and additional measures, with a schedule, that will be implemented to prevent their copper discharges from causing or contributing to the exceedance.

#### Control Measures for Wastewater Treatment Facilities

The management measures for municipal and industrial wastewater treatment facilities will be implemented through their individual NPDES permits, which shall include the following elements:

- Water quality-based effluent limits (WQBELs) computed from the SSOs.
- Baseline Program of pollution prevention measures.
- Requirement to conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and sublethal effects on salmonids.
- Effluent Monitoring and Reporting.

The baseline pollution prevention measures for wastewater facilities include:

- Evaluate copper sources (all municipal and industrial facilities)
- Confirm industrial facility compliance with local pre-treatment copper limits (municipal facilities only)
- Control municipal water supply pipeline corrosion from commercial and residential sources (municipal facilities only)

More advanced, facility-specific pollution prevention measures shall be implemented by facilities that exceed a copper effluent limit due to increased copper influent loading compared to the previous year's

performance. Additionally, if an ambient trigger concentration (see Ambient Monitoring Program, below) is exceeded, each municipal and industrial wastewater facility discharging to that segment of the Bay shall evaluate the history of its facility's effluent copper concentrations. Those facilities with increasing copper effluent trends shall develop and implement plans to control these increasing levels.

# **Metal Translators**

An important regulatory element of the WQAS is the specification of metal translators. Water quality objectives for copper and nickel are expressed as dissolved metal concentrations. Effluent limits for the wastewater dischargers' treatment facilities are expressed as total metal concentrations and must be calculated according to the procedure outlined in the "Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California." Therefore, for metals like copper and nickel, the calculation of an effluent limit requires the use of a ratio of total to dissolved metals called the metal translator.

South San Francisco Bay copper and nickel translators were developed using a regression relationship between the translators and total suspended solids (TSS). The translators were computed by evaluating the upper 95 percent confidence interval regression relationship at the median TSS value for South San Francisco Bay. For this reason, there is a single translator value for each metal (Table 7.2.1-1). The higher translators that result from using the upper confidence level regression result in lower numeric effluent limits and provide an additional measure of protection of beneficial uses.

There is not a strong relationship between TSS and translators for the segments of the Bay north of the Dumbarton Bridge. There are geographic differences in computed translators between the northernmost segments and those in the southern segments the Bay. In such cases, median and 90th percentile translators can be computed from available data for use in computing average monthly and maximum daily effluent limits, respectively. The translators in Table 7.2.1-2 apply only to deepwater wastewater discharges to San Francisco Bay because the available translator data are not representative of shallow water discharge (defined as those wastewater discharges that have been granted an exception to the prohibition against wastewater discharges into non-tidal water, dead-end sloughs or at any point that wastewater does not receive dilution of at least 10:1) locations. Shallow water wastewater dischargers must develop translators applicable to the discharge location at the time of permit reissuance.

Table 7.2.1-1 Translators Applicable to South San Francisco Bay Municipal Wastewater Discharges for Copper and Nickel

| Bay Segments            | Copper Translator For<br>Effluent Limit<br>Calculation | Nickel Translator For Effluent Limit<br>Calculation |
|-------------------------|--|---|
| South San Francisco Bay | 0.53   | 0.44  |

Table 7.2.1-2 Translators Applicable to Other San Francisco Bay Municipal and Industrial Wastewater Deep Water Discharges for Copper

| Bay Segments   | Copper Translator For<br>Average Monthly<br>Effluent Limit<br>Calculation | Copper Translator For Maximum Daily Effluent Limit Calculation |
|--|---|--|
| Suisun Bay<br>San Pablo Bay                          | 0.38  | 0.66   |
| Central San Francisco Bay<br>Lower San Francisco Bay | 0.73  | 0.87   |

# Copper From Anti-Fouling Boat Paint

Paints applied to boats and ships to control unwanted "fouling" growth on their hulls often contain copper-based biocides. In San Francisco Bay, there are major ports, industrial piers, and dozens of marinas. Boats and ships coated with copper-containing biocides may release copper directly into the Bay during storage, operation, and in-water maintenance.

The Water Board is relying on the authority of the California Department of Pesticide Regulation (DPR) to regulate the pesticidal use of copper in antifouling paints such that water quality objectives will be attained. The Water Board will work with DPR as it executes its regulatory strategy for biocides in marine antifouling coatings, which includes monitoring to evaluate water quality impacts and review of registration status.

#### Control Measures for Lagoons

There are many managed lagoons that are hydraulically connected to the Bay. Because of nutrient loading and stagnant conditions, excessive growth of aquatic plants and algae can cause nuisance conditions. In addition to mechanical harvesting, copper-based algaecides are used to control nuisance plant and algae growth. The application of these algaecides is permitted under the State Water Board's Statewide General NPDES Permit (Order No. 2004-0009-DWQ) for discharges of aquatic pesticides to surface waters. The Water Board recognizes coverage under the general permit as being sufficient to ensure that application of copper pesticides to lagoons shall not cause or contribute to violations of the water quality objectives.

# Ambient Monitoring Program

The implementation plan establishes copper control measures in order to prevent increases in ambient dissolved copper concentrations. Ambient concentrations of copper in the Bay have remained essentially unchanged from 1993 through 2006 and are not expected to increase in the future. In order to determine systematically if ambient concentrations have increased, specific copper concentration triggers are compared to data collected through the Regional Monitoring Program for Trace Substances (RMP). This is accomplished by calculating every year the three-year rolling mean of RMP copper concentrations in segments of the Bay. These rolling mean concentrations will be compared to trigger concentration values for each segment. The trigger concentrations (shown in Table 7.2.1-3) were calculated in order to detect a change (from 2003 concentrations) in dissolved copper concentration of about 1  $\mu$ g/L with a statistical power of 99%. If the trigger concentration is exceeded in any Bay segment, the Water Board will

investigate causes of the exceedance and potential control options and require wastewater and urban runoff dischargers to that segment to investigate whether they have caused or contributed to the exceedance and, if so, to identify and submit a plan and schedule to implement controls to resolve their contribution to the exceedance.

The Water Board will assess the continued appropriateness of the SSOs for San Francisco Bay should conditions change in Bay water quality. Dissolved organic carbon (DOC) will be used as a surrogate measure of the protective effect of Bay water against copper water column toxicity. An analysis and evaluation of trends in DOC data collected through the RMP will determine whether or not additional water column toxicity tests are needed to confirm that the SSOs are protective. In addition, the Water Board will evaluate sediment copper concentration and sediment toxicity data collected through the RMP to assess possible effects related to copper accumulation in Bay sediments. The need for a reevaluation of the SSOs or other regulatory actions will be established through the triennial review of the Basin Plan.

Table 7.2.1–3 Dissolved Copper ( $\mu$ g/L) Trigger Concentrations at 99% Statistical Power

| Bay Segment (or portion thereof)  | Trigger Level (µg/L) |
|---|----------------------|
| Suisun Bay  | 2.8                  |
| San Pablo Bay   | 3.0                  |
| Central San Francisco Bay<br>Lower San Francisco Bay (north Hayward Shoals) | 2.2                  |
| Lower San Francisco Bay (south of Hayward Shoals)                           | 3.6                  |
| South San Francisco Bay   | 4.2                  |

# 7.2.2 San Francisco Bay Mercury TMDL

The following sections establish the allowable annual mercury load (Total Maximum Daily Load [TMDL]) to San Francisco Bay, and actions and monitoring necessary to implement the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments attain applicable water quality standards, including the mercury water quality objectives set forth in Table 3-3B, established to protect and support beneficial uses.

The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.

#### 7.2.2.1 Problem Statement

San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury concentrations in San Francisco Bay fish are high enough to threaten the health of humans who consume

them. In addition, mercury concentrations in some bird eggs harvested from the shores of San Francisco Bay are high enough to account for abnormally high rates of eggs failing to hatch.

In the context of this TMDL, "San Francisco Bay" refers to the following water bodies:

- Sacramento/San Joaquin River Delta (within San Francisco Bay region)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- Central San Francisco Bay
- Lower San Francisco Bay
- South San Francisco Bay (including the Lower South Bay)

This TMDL also addresses the following mercury-impaired water bodies that exist within the water bodies listed above:

- Castro Cove (part of San Pablo Bay)
- Oakland Inner Harbor (part of Central San Francisco Bay)
- San Leandro Bay (part of Central San Francisco Bay)

# 7.2.2.2 Numeric Targets

TMDL numeric targets interpret narrative and/or numeric water quality standards, including beneficial uses and water quality objectives. To protect humans who consume Bay fish, the average fish tissue mercury concentration for a commonly consumed fish species is specified below as a human health target. To protect wildlife and rare and endangered species, the average fish tissue mercury concentration in fish consumed by piscivorous birds is specified below as a wildlife target. The goal of this target is that controllable water quality factors not cause detrimental mercury concentrations in San Francisco Bay wildlife, which is consistent with the bioaccumulation objective in Chapter 3. To achieve the human health and wildlife targets and to attain water quality standards, the Baywide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

The Regional Monitoring Program (RMP) conducts monitoring relevant to evaluating progress toward meeting the sediment and human health and wildlife targets. The following passages describe acceptable approaches to evaluate progress toward meeting the targets. Other approaches can be considered during adaptive implementation reviews.

# Suspended Sediment Target

The suspended sediment target (0.2 mg mercury per kg dry sediment) shall be compared to the annual median Bay suspended sediment mercury concentration found through RMP monitoring. The suspended sediment mercury concentration shall be computed as the difference between total and dissolved mercury concentration in a water sample (at each location) divided by the suspended sediment concentration for that same sample.

#### Human Health Target

The human health target is a fish tissue mercury concentration (0.2 mg mercury per kg fish tissue). This target applies to average wet weight fish tissue muscle concentrations in 60 cm long striped bass. The RMP conducts fish tissue sampling and analysis in San Francisco Bay every three years. Progress toward attainment of the human health target shall be evaluated by tracking mercury concentrations in striped bass, a commonly consumed sport fish with relatively high mercury concentrations. Striped bass are routinely caught in three size ranges: 45-59 cm (small), 60-82 cm (medium), and larger than 82 cm (large). To provide sufficient data to evaluate the target, striped bass in the small and medium size ranges should be caught and analyzed. The best functional relationship between mercury concentration and length shall be established for the fish caught, and the resulting equation of fit shall be evaluated at 60 cm to compute the mercury concentration to compare to the human health target. The RMP tracks mercury concentrations in other San Francisco Bay sportfish, such as halibut and jack-smelt. This information will be used to assess overall trends and human health risks.

# Wildlife Target

The wildlife target is a fish tissue mercury concentration (0.03 mg mercury per kg fish). This target applies to average wet weight whole fish concentrations in 3–5 cm length fish.

The RMP is developing a long term monitoring program to evaluate mercury concentrations in small fish typically consumed by birds, including by the California least tern. Progress toward attainment of the wildlife target will be evaluated by tracking mercury concentrations in 3–5 cm long Bay fish. The RMP is also collaborating with the U.S. Fish and Wildlife Service on long-term monitoring and analysis of bird egg mercury concentrations.

#### 7.2.2.3 Sources and Losses

During the California Gold Rush, cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada foothills. Mercury was later mined and used to produce munitions, electronics, and health care and commercial products.

The year 2003 estimate of total mercury inputs to the San Francisco Bay is about 1220 kg/yr. The sources of mercury in San Francisco Bay include bed erosion (about 460 kg/yr), the Central Valley watershed (about 440 kg/yr), urban stormwater runoff (about 160 kg/yr), the Guadalupe River watershed (about 92 kg/yr), direct atmospheric deposition (about 27 kg/yr), non-urban stormwater runoff (about 25 kg/yr), and wastewater discharges (about 18 kg/yr). There is a potential that mercury may enter the Bay from Bay margin contaminated sites and abandoned mercury mines outside the Guadalupe watershed. An evaluation of these potential sources is addressed below under Mercury TMDL Implementation.

Using box models for sediment and mercury inputs and outputs to and from San Francisco Bay, the 2003 estimate for San Francisco Bay mercury losses is approximately 1700 kg/yr. Mercury leaves the Bay by transport to the Pacific Ocean via the Golden Gate, the net result of dredging and disposal (in-Bay and upland), and other losses.

# 7.2.2.4 Allocations

Tables 7.2.2-1 through 7.2.2-5 present load and wasteload allocations for San Francisco Bay mercury sources. Table 7.2.2-1 presents load and wasteload allocations by source category and the 2003 estimated annual loads. Tables 7.2.2-2 through 7.2.2-5 contain wasteload allocations for individual wastewater and

urban stormwater discharges to San Francisco Bay. When summed, the individual allocations equal the category totals for urban stormwater and wastewater shown in Table 7.2.2-1.

Table 7.2.2-1 Mercury Load and Wasteload Allocations By Source Category

| Source                                      | 2003 Mercury Load<br>(kg/yr) | Allocation<br>(kg/yr)   |
|---|------------------------------|-------------------------|
| Bed erosion <sup>a</sup>                    | 460                          | 220                     |
| Central Valley Watershed                    | 440                          | 330                     |
| Urban Stormwater Runoff                     | 160                          | 82                      |
| Guadalupe River Watershed (mining legacy)   | 92 <sup>b</sup>              | 2                       |
| Atmospheric deposition                      | 27                           | 27                      |
| Non-urban stormwater runoff                 | 25                           | 25                      |
| Wastewater (municipal and industrial)       | 18                           | 12                      |
| Sediment dredging and disposal <sup>c</sup> | net loss                     | 0                       |
|   |                              | ≤ ambient concentration |

#### Notes:

b This load does not account for mercury captured in ongoing sediment removal programs conducted in the watershed.

<sup>&</sup>lt;sup>a</sup> Bed erosion occurs as mercury buried in Bay sediment becomes available for biological uptake when overlying sediment erodes.

Sediment dredging and disposal often moves mercury-containing sediment from one part of the Bay to another. The dredged sediment mercury concentration generally reflects ambient conditions in San Francisco Bay sediment. This allocation is both mass-based and concentration-based. The allocation will be implemented by confirming both that the combined effect of dredging and disposal continues to be a net loss and that the mercury concentration of dredged material disposed in the Bay must be at or below the Baywide ambient mercury concentration. This allocation ensures that this source category continues to represent a net loss of mercury.

Table 7.2.2-2 Individual Wasteload Allocations for Mercury in Urban Stormwater

Discharges

| Entity   | NPDES<br>Permit | Allocation<br>(kg/yr) <sup>a</sup> | Load<br>Reduction<br>(kg/yr) <sup>b</sup> |
|--|-----------------|------------------------------------|---|
| Santa Clara Valley Urban Runoff Pollution Prevention Program | CAS029718       | 23                                 | 21  |
| Alameda Countywide Clean Water Program                       | CAS029831       | 20                                 | 19  |
| Contra Costa Clean Water Program                             | CAS029912       | 11                                 | 11  |
| San Mateo County Stormwater Pollution Prevention Program     | CAS029921       | 8.4                                | 8.0                                       |
| Vallejo Sanitation and Flood Control District                | CAS612006       | 1.6                                | 1.6                                       |
| Fairfield-Suisun Urban Runoff Management Program             | CAS612005       | 1.6                                | 1.5                                       |
| American Canyon  | CAS612007       | 0.14                               | 0.13                                      |
| Sonoma County area <sup>c</sup>                              | CAS000004       | 1.6                                | 1.5                                       |
| Napa County area <sup>c</sup>                                | CAS000004       | 1.6                                | 1.5                                       |
| Marin County area <sup>c</sup>                               | CAS000004       | 3.3                                | 3.2                                       |
| Solano County area <sup>c</sup>                              | CAS000004       | 0.81                               | 0.77                                      |
| San Francisco County area <sup>c,d</sup>                     | CAS000004       | 8.8                                | 8.4                                       |
| Total<br>Notes:  |                 | 82 <sup>e</sup>                    | 78 <sup>e</sup>                           |

# Notes:

<sup>&</sup>lt;sup>a</sup> Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

This column contains calculated load reductions relative to the estimated 2003 urban stormwater runoff annual load that are consistent with attaining the wasteload allocation. Demonstration of such load reductions is an alternative manner of showing compliance with the allocations.

<sup>&</sup>lt;sup>c</sup> Includes unincorporated areas and all municipalities in the county that are in the Region and drain to the Bay. The statewide municipal stormwater general permit issued by the State Water Resources Control Board covers these municipalities.

d This urban stormwater runoff load estimate does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the Bayside facilities (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

<sup>&</sup>lt;sup>e</sup> These totals differ slightly from the column sum due to rounding.

Table 7.2.2-3 Individual Wasteload Allocations for Mercury in Municipal Wastewater Discharges

| Permitted Entity (Bold type indicates advanced treatment)   | NPDES Permit  | 2000-2003<br>Load<br>(kg/yr)                             | Interim<br>Allocation<br>(kg/yr)                                | Final<br>Allocation<br>(kg/yr)                                  |
|---|---|--|---|---|
| American Canyon, City of  | CA0038768   | 0.12   | 0.095   | 0.095   |
| California Department of Parks and<br>Recreation, Angel Island State<br>Park  | CA0037401   | 0.013  | 0.013   | 0.013   |
| Benicia, City of  | CA0038091   | 0.088  | 0.088   | 0.088   |
| Burlingame, City of   | CA0037788   | 0.089  | 0.089   | 0.089   |
| Calistoga, City of  | CA0037966   | 0.016  | 0.016   | 0.016   |
| Central Contra Costa Sanitary<br>District   | CA0037648   | 2.23   | 1.8   | 1.3   |
| Central Marin Sanitation Agency   | CA0038628   | 0.18   | 0.15  | 0.11  |
| Delta Diablo Sanitation District  | CA0038547   | 0.31   | 0.25  | 0.19  |
| East Bay Dischargers Authority  | CA0037869   | 3.6  | 2.9   | 2.2   |
| Livermore, City of (CA0038008) Union Sanitary District, wet wear  | ther (CA0038733)  | 0.08   |   |   |
| East Bay Municipal Utilities District   | CA0037702   | 2.6 <sup>a</sup>   |   | 4 =   |
| East Brother Light Station  | 0 4 0 0 0 0 0 0 0   |  | 2.1   | 1.5   |
|   | CA0038806   | 0.00001  | 0.000012  | 0.000012  |
| Fairfield-Suisun Sewer District   | CA0038806<br>CA0038024  |  |   |   |
| Las Gallinas Valley Sanitary District   |   | 0.00001  | 0.000012  | 0.000012  |
| Las Gallinas Valley Sanitary  | CA0038024   | 0.00001<br><b>0.22</b>                                   | 0.000012<br><b>0.17</b>   | 0.000012<br><b>0.17</b>   |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District,  | CA0038024<br>CA0037851  | 0.00001<br><b>0.22</b><br>0.17                           | 0.000012<br><b>0.17</b><br>0.13                                 | 0.000012<br><b>0.17</b><br>0.10                                 |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District, Paradise Cove  Marin County Sanitary District,   | CA0038024<br>CA0037851<br>CA0037427                                   | 0.00001<br><b>0.22</b><br>0.17<br>0.00055                | 0.000012<br><b>0.17</b><br>0.13<br>0.00055                      | 0.000012<br>0.17<br>0.10<br>0.00055                             |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District, Paradise Cove  Marin County Sanitary District, Tiburon   | CA0038024 CA0037851 CA0037427 CA0037753                               | 0.00001<br>0.22<br>0.17<br>0.00055<br>0.0099             | 0.000012<br>0.17<br>0.13<br>0.00055<br>0.0099                   | 0.000012<br>0.17<br>0.10<br>0.00055<br>0.0099                   |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District, Paradise Cove  Marin County Sanitary District, Tiburon  Millbrae, City of  | CA0038024 CA0037851 CA0037427 CA0037753 CA0037532                     | 0.00001<br>0.22<br>0.17<br>0.00055<br>0.0099<br>0.052    | 0.000012<br>0.17<br>0.13<br>0.00055<br>0.0099<br>0.052          | 0.000012<br>0.17<br>0.10<br>0.00055<br>0.0099<br>0.052          |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District, Paradise Cove  Marin County Sanitary District, Tiburon  Millbrae, City of  Mountain View Sanitary District                           | CA0038024 CA0037851 CA0037427 CA0037753 CA0037532 CA0037770           | 0.00001  0.22  0.17  0.00055  0.0099  0.052  0.034       | 0.000012<br>0.17<br>0.13<br>0.00055<br>0.0099<br>0.052<br>0.034 | 0.000012<br>0.17<br>0.10<br>0.00055<br>0.0099<br>0.052<br>0.034 |
| Las Gallinas Valley Sanitary District  Marin County Sanitary District, Paradise Cove  Marin County Sanitary District, Tiburon  Millbrae, City of  Mountain View Sanitary District  Napa Sanitation District | CA0038024 CA0037851 CA0037427 CA0037753 CA0037532 CA0037770 CA0037575 | 0.00001  0.22  0.17  0.00055  0.0099  0.052  0.034  0.28 | 0.000012  0.17  0.13  0.00055  0.0099  0.052  0.034  0.23       | 0.000012  0.17  0.10  0.00055  0.0099  0.052  0.034  0.17       |

0.055

0.055

0.055

CA0037796

Pinole, City of

| Permitted Entity (Bold type indicates advanced treatment                          | NPDES Permit | 2000-2003<br>Load<br>(kg/yr) | Interim<br>Allocation<br>(kg/yr) | Final<br>Allocation<br>(kg/yr) |
|---|--------------|------------------------------|----------------------------------|--------------------------------|
| Contra Costa County, Port Costa<br>Wastewater Treatment Plant                     | CA0037885    | 0.00072                      | 0.00072                          | 0.00072                        |
| Rodeo Sanitary District   | CA0037826    | 0.060                        | 0.060                            | 0.060                          |
| Saint Helena, City of   | CA0038016    | 0.047                        | 0.047                            | 0.047                          |
| San Francisco, City and County of,<br>San Francisco International Airport<br>WQCP | CA0038318    | 0.032                        | 0.032                            | 0.032                          |
| San Francisco, City and County of,<br>Southeast Plant                             | CA0037664    | 2.7                          | 2.1                              | 1.6                            |
| San Jose/Santa Clara WPCP   | CA0037842    | 1.0                          | 0.80                             | 0.80                           |
| San Mateo, City of  | CA0037541    | 0.32                         | 0.26                             | 0.19                           |
| Sausalito-Marin City Sanitary<br>District   | CA0038067    | 0.078                        | 0.078                            | 0.078                          |
| Seafirth Estates  | CA0038893    | 0.00036                      | 0.00036                          | 0.00036                        |
| Sewerage Agency of Southern<br>Marin  | CA0037711    | 0.13                         | 0.10                             | 0.076                          |
| Sonoma Valley County Sanitary<br>District   | CA0037800    | 0.041                        | 0.041                            | 0.041                          |
| South Bayside System Authority  | CA0038369    | 0.53                         | 0.42                             | 0.32                           |
| South San Francisco/San Bruno<br>WQCP   | CA0038130    | 0.29                         | 0.24                             | 0.18                           |
| Sunnyvale, City of  | CA0037621    | 0.15                         | 0.12                             | 0.12                           |
| US Naval Support Activity,<br>Treasure Island WWTP                                | CA0110116    | 0.026                        | 0.026                            | 0.026                          |
| Vallejo Sanitation & Flood Control<br>District                                    | CA0037699    | 0.57                         | 0.46                             | 0.34                           |
| West County Agency, Combined Outfall  | CA0038539    | 0.38°                        | 0.30                             | 0.23                           |
| Yountville, Town of   | CA0038121    | 0.040                        | 0.040                            | 0.04                           |
| Total Notes:  |              | 17 <sup>b</sup>              | 14 <sup>b</sup>                  | 11 b                           |

Notes:

This allocation includes wastewater treatment and all wet weather facilities.

Total differs slightly from the column sum due to rounding.

Mercury monitoring data quality concerns pertaining to this discharger will need to be addressed during the next review.

Table 7.2.2-4 Individual Wasteload Allocations for Mercury in Petroleum Refinery **Wastewater Discharges** 

| Permitted Entity                       | NPDES Permit | Allocation (kg/yr) |
|--|--------------|--------------------|
| Chevron Products Company               | CA0005134    | 0.34               |
| ConocoPhillips                         | CA0005053    | 0.13               |
| Martinez Refining Co. (formerly Shell) | CA0005789    | 0.22               |
| Ultramar, Golden Eagle                 | CA0004961    | 0.11               |
| Valero Refining Company                | CA0005550    | 0.08               |
| Total                                  |              | 0.9                |

Table 7.2.2-5 Individual Wasteload Allocations for Mercury in Industrial (Non-Petroleum Refinery) Wastewater Dischargesc

| Permitted Entity  | NPDES Permit | Allocation (kg/yr) |
|---|--------------|--------------------|
| C&H Sugar Co.   | CA0005240    | 0.0013             |
| Crockett Cogeneration   | CA0029904    | 0.0047             |
| The Dow Chemical Company  | CA0004910    | 0.041              |
| General Chemical <sup>a</sup>   | CA0004979    | 0.21               |
| GWF Power Systems, Site I   | CA0029106    | 0.0016             |
| GWF Power Systems, Site V   | CA0029122    | 0.0025             |
| Hanson Aggregates, Amador Street  | CA0030139    | 0.000005           |
| Hanson Aggregates, Olin Jones Dredge Spoils Disposal                    | CA0028321    | 0.000005           |
| Hanson Aggregates, Tidewater Ave. Oakland                               | CAA030147    | 0.000005           |
| Pacific Gas and Electric, East Shell Pond                               | CA0030082    | 0.00063            |
| Pacific Gas and Electric, Hunters Point Power Plant                     | CA0005649    | 0.020              |
| Rhodia, Inc.  | CA0006165    | 0.011              |
| San Francisco, City and Co., SF International Airport<br>Industrial WTP | CA0028070    | 0.051              |
| Southern Energy California, Pittsburg Power Plant                       | CA0004880    | 0.0078             |
| Southern Energy Delta LLC, Potrero Power Plant                          | CA0005657    | 0.0031             |
| United States Navy, Point Molate  | CA0030074    | 0.013              |
| USS-Posco   | CA0005002    | 0.045              |
| Total   |              | 0.4 b              |

Notes:

a Data quality concerns pertaining to this discharger will need to be addressed during the next review.

b Total differs slightly from the column sum due to rounding.

# 7.2.2.5 Total Maximum Daily Load

The mercury TMDL for San Francisco Bay is the sum of the load and wasteload allocations, 700 kg/yr. The Bay will attain applicable water quality standards for mercury when the overall mercury load is reduced to the TMDL and mercury methylation control measures are implemented.

A TMDL must include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality. This TMDL's targets and allocations rely on conservative assumptions, which thereby provide an implicit margin of safety. The adaptive approach to implementation provides an additional margin of safety.

There is no evidence that mercury contamination in San Francisco Bay is worse at any particular time of year. Therefore, the TMDL and allocation scheme do not have a seasonal component.

#### 7.2.2.6 Mercury TMDL Implementation

The San Francisco Bay mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, (3) conduct monitoring and focused studies to track progress and improve the scientific understanding of the system, and (4) encourage actions that address multiple pollutants. The plan establishes requirements for dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. The adaptive implementation section describes the method and schedule for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

#### Mercury Source Control Actions

This section, organized by mercury source categories, specifies actions required to achieve allocations and implement the TMDL.

#### Central Valley Watershed

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) is developing mercury TMDLs for several mercury-impaired water bodies in its region that drain to San Francisco Bay. The Central Valley Water Board staff is currently developing a mercury TMDL for portions of the Delta within the Central Valley region designed to meet the Central Valley watershed's load allocation. This Delta mercury TMDL is scheduled for consideration as a Basin Plan Amendment by the Central Valley Water Board by December 2006.

Attainment of the load allocation shall be assessed as a five-year average annual mercury load by one of two methods. First, attainment may be demonstrated by documentation provided by the Central Valley Water Board that shows a net 110 kg/yr decrease in total mercury entering the Delta from within the Central Valley region. Alternatively, attainment of the load allocation may be demonstrated by multiplying the flow-weighted suspended sediment mercury concentration by the sediment load measured at the RMP Mallard Island monitoring station. If sediment load estimates are unavailable, the

Wasteload allocations for industrial wastewater discharges do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.

load shall be assumed to be 1,600 million kg of sediment per year. The mercury load fluxing past Mallard Island will be less than or equal to 330 kg/yr after attainment of the allocation.

The allocation for the Central Valley watershed should be achieved within 20 years after the Central Valley Water Board begins implementing its TMDL load reduction program. Studies need to be conducted to evaluate the time lag between the remediation of mercury sources and resulting load reductions from the Delta. An interim loading milestone of 385 kg/yr of mercury, halfway between the current load and the allocation, should be attained ten years after implementation of the Central Valley Delta TMDL begins. This schedule will be reevaluated as the load reduction plans are implemented.

# Urban Stormwater Runoff

The wasteload allocations shown in Table 7.2.2-2 shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, "source category") including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

The allocations for this source category should be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

The NPDES permits for urban runoff management agencies shall require the implementation of best management practices and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, best management practices or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in each 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 pollutants in stormwater runoff to the maximum extent practicable and remain consistent with the section of this chapter titled "Surface Water Protection and Management—Point Source Control—Stormwater Discharges." The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

- 1. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;
- 2. Develop and implement a mercury source control program;
- 3. Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;
- 4. Monitor levels of methylmercury in discharges;
- 5. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

- 6. Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board:
- 7. Prepare an annual report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and
- 8. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Table 7.2.2-2, by using one of the following methods:
  - Quantify the annual average mercury load reduced by implementing (a) pollution prevention activities, and (b) source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.
  - Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
  - Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

Once the Water Board accepts that a requirement has been completed by an urban runoff management agency, it need not be included in subsequent permits for that agency. These requirements apply to municipalities covered by the statewide municipal stormwater general permit (issued by the State Water Resources Control Board) five years after the effective date of the San Francisco Bay mercury TMDL.

Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an urban runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Within the jurisdiction of each urban runoff management agency, Caltrans is responsible for discharges associated with roadways and non-roadway facilities. Consequently, Caltrans shall be required to implement the following actions:

- 1. Develop and implement a system to quantify mercury loads or loads reduced through control actions;
- 2. Prepare an annual report that documents mercury loads or loads reduced through control actions; and
- 3. Develop an equitable allocation-sharing scheme that reflects Caltrans load reduction responsibility in consultation with the urban runoff management agencies, and report the details to the Water Board. Alternatively, Caltrans may choose to implement load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agency's allocation. In such a case, the Water Board will consider a separate allocation for

Caltrans for which they may demonstrate progress toward attaining an allocation or load reduction in the same manner mentioned previously for municipal programs.

# Guadalupe River Watershed (Mining Legacy)

In the near term, the effort underway to develop the Guadalupe River Watershed Mercury TMDL will be the mechanism used to implement and track progress toward achieving the load allocation. Ultimately, the Water Board expects the implementation plan for the Guadalupe River Watershed Mercury TMDL to integrate implementation efforts relative to that TMDL with those implementation efforts for the San Francisco Bay mercury TMDL.

The Guadalupe River Watershed Mercury TMDL will provide a watershed-wide mercury management strategy. Efforts are already underway in the watershed to take early actions to reduce mercury loads, and more are planned. A high priority for the watershed-based strategy is to control upper watershed sources associated with the mining legacy to avoid compromising actions taken in the lower watershed. The strategy will include measures that prevent mercury-laden sediment from reaching the Bay, either by removal or by preventing their transport to the Bay. The strategy will also feature measures intended to reduce methylmercury production and risks to human health and wildlife. An essential component of the strategy will also involve testing and evaluation of new techniques and control measures, the benefits of that may apply throughout the Bay. As the mercury load, methylation, and reductions resulting from these efforts are quantified by the dischargers identified through the Guadalupe River Watershed Mercury TMDL process, the Water Board will consider how the reductions achieved will be counted toward fulfillment of the load reductions required to meet the Guadalupe River watershed load allocation.

The Guadalupe River watershed mining legacy mercury load allocation is expected to be attained within 20 years after the Water Board begins implementing the Guadalupe River Watershed Mercury TMDL. As a way to measure progress, an interim-loading milestone of 47 kg/yr of mercury, halfway between the current load and the allocation, should be achieved within ten years. If the interim loading milestone is not achieved, dischargers shall make reasonable and measurable progress toward achieving the ten-year load reduction through implementation of the watershed-wide strategy.

Progress toward (a) the interim loading milestone, or (b) attainment of the allocation, shall be demonstrated by the dischargers identified through the Guadalupe River Watershed TMDL using one of the methods listed below:

- Quantify the annual average mercury load reduced by implementing (a) pollution prevention
  activities, (b) source and treatment controls, and (c) if applicable, other efforts to reduce
  methylation or mercury-related risks to humans and wildlife consistent with the watershedbased strategy. The Water Board will recognize loads reduced resulting from activities
  implemented after 1996 (or earlier if actions taken are not reflected in the 2001 load estimate) to
  estimate load reductions.
- Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations.
- Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged from the watershed to San Francisco Bay is below the suspended sediment target.

#### Municipal Wastewater

The individual municipal wastewater wasteload allocations shown in Table 7.2.2-3 shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 11 kg/yr. The Water Board will issue a San Francisco Bay watershed mercury NPDES permit to all dischargers listed in Table 7.2.2-3 to implement the individual and aggregate mass limits.

The wasteload allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, interim individual allocations equal to a 20 percent reduction from 2000-2003 annual mass discharge levels shall be achieved within 10 years. These interim allocations, shown in Table 7.2.2-3, shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual interim allocations, 14 kg/yr. During the initial ten years, individual mass limits shall be the 2000-2003 annual mass discharge levels shown in Table 7.2.2-3, and the aggregate mass limit is the sum of these individual mass discharge levels.

If any aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass discharges exceed their individual mass limits.

The mass limits and the following requirements shall be incorporated into the watershed NPDES permit for municipal wastewater dischargers:

- Develop and implement effective programs that include but are not limited to pollution
  prevention to control mercury sources and loading, a plan and schedule of actions and
  effectiveness measures applicable for the term of the permit, based on identification of the largest
  and most controllable sources and an updated assessment of source control measures and
  wastewater treatment technologies (the level of effort shall be commensurate with the mercury
  load and performance of the facility) and quantify the mercury load avoided or reduced;
- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Track individual facility and aggregate wastewater loads and the status of source control and pollution prevention activities;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay and tidal areas;
- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The watershed NPDES permit shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that municipal wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation as a 12-month rolling average

or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, implement a corrective action plan, and to submit a report within 60 days that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance;
- Evaluates other measures for preventing future exceedances, depending on the cause of an exceedance; and
- Includes an action plan and time schedule to correct and prevent trigger exceedances.

Effluent mercury trigger concentrations for secondary treatment facilities are a daily maximum of 0.065  $\mu$ g/l total mercury and monthly average of 0.041  $\mu$ g/l total mercury. For advanced treatment facilities, effluent mercury trigger concentrations are a daily maximum of 0.021  $\mu$ g/l total mercury and a monthly average of 0.011  $\mu$ g/l total mercury.

The Water Board will pursue enforcement action against dischargers that do not respond to exceedances of triggers or do not implement reasonable actions to correct and prevent trigger exceedances. Determination of reasonable actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

#### Industrial Wastewater

The individual wasteload allocations for the industrial wastewater discharges from the five Bay Area petroleum refineries (Chevron, ConocoPhillips, Martinez Refining Co., Ultramar Golden Eagle, and Valero) listed in Table 7.2.2-4, and the individual wasteload allocations for all other industrial wastewater facilities listed in Table 7.2.2-5 shall be implemented via individual mass limits and an aggregate mass limit that is the sum of the individual allocations, 1.3 kg/yr. If the aggregate mass limit is exceeded, the Water Board will pursue enforcement actions against those individual dischargers whose mass discharges exceed their individual mass limits.

The mass limits and the following requirements shall be incorporated into NPDES permits for all industrial wastewater dischargers:

- Develop and implement effective programs to control mercury sources and loading including
  demonstration that discharge levels represent good performance based on an updated
  assessment of source control measures and wastewater treatment technologies (the level of effort
  will be commensurate with the mercury load and performance of the facility) and quantify the
  mercury load avoided or reduced;
- Develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify the risk reductions resulting from these activities;
- Comply with water quality-based effluent limitations, to be elaborated through the permit, that are consistent with the assumptions and requirements of the mercury wasteload allocation;
- Monitor levels of methylmercury in discharges;
- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay and tidal areas;

- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on
  fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges; and
- Prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions.

The NPDES permits for industrial facilities shall also specify conditions that apply to each individual facility. These conditions are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that industrial wastewater facilities maintain proper operation, maintenance, and performance. If a facility exceeds its individual mercury load allocation as a 12-month rolling average or an effluent mercury trigger concentration, it shall be required to report the exceedance in its individual Self-Monitoring Report, implement a corrective action plan, and submit a report within 60 days that:

- Evaluates the cause of the trigger or mass exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance;
- Evaluates other measures for preventing future exceedances, depending on the cause of an exceedance; and
- Includes an action plan and time schedule to correct and prevent trigger exceedances.

Effluent mercury trigger concentrations are a daily maximum of  $0.062 \mu g/l$  total mercury and monthly average of  $0.037 \mu g/l$  total mercury.

The Water Board will pursue enforcement action against dischargers that do not respond to exceedances of triggers or do not implement reasonable actions to correct and prevent trigger exceedances. Determination of reasonable actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

Bay Area petroleum refineries shall be required to work collaboratively with the Water Board to investigate the environmental fate of mercury in crude oil and report findings to the Water Board within five years of the effective date of the San Francisco Bay mercury TMDL implementation plan. These requirements may be implemented via the Water Board's authority under Section 13267 of the California Water Code or petroleum refinery wastewater NPDES permits. The report shall address two key questions:

- 1. What are the potential pathways by which crude oil mercury could be discharged to the Bay from Bay Area petroleum refining facilities?
- 2. What are the annual mercury loads associated with these discharge pathways?

# Sediment Dredging and Disposal

The allocation for sediment dredging and disposal is both mass-based and concentration-based. The mercury concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile mercury concentration of the previous 10 years of Bay sediment samples collected through the Regional Monitoring Program (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and

analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with the Dredging and Disposal of Dredged Sediment program described in Chapter 4 and the Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region.

The process of dredging and disposing of dredged material in the Bay may enhance biological uptake and methylmercury exposure. To address this concern, permitted dredging and disposal operations shall demonstrate that their activities are accomplished in a manner that does not increase bioavailability of mercury. As part of this demonstration, the Waste Discharge Requirements for such operations shall include requirements to conduct or cause to be conducted studies to better understand how their operations affect mercury fate, transport, and biological uptake.

#### Atmospheric Deposition

Mercury that deposits directly on the Bay surface and the surrounding watershed is attributed to both remote and local sources. The extent to which these sources can be controlled is unknown and the Water Board's authority to control such sources is limited. The load allocation does not allow an increase of current loads, and does not require a reduction from this source category at this time. Recent scientific studies suggest that mercury newly deposited from the atmosphere may be more available for biological uptake than mercury already present in an aquatic system. As such, the following implementation efforts need to be undertaken to evaluate the significance of atmospheric deposition and the feasibility of load reductions:

- The U.S. Environmental Protection Agency should investigate the significance of atmospheric deposition and actively pursue national and international efforts to reduce the amount of mercury released through combustion of fossil fuels; and
- The Bay Area Air Quality Management District should conduct a local mercury emissions inventory, investigate the significance of local mercury air emissions, evaluate the effectiveness of existing control measures and the feasibility of additional controls.

If local air sources are found to contribute substantially to atmospheric deposition loading to the Bay and its surrounding watershed, the Water Board will consider assigning allocations and load reductions to individual air sources and work with the Bay Area Air Quality Management District to ensure allocations are achieved.

#### New Mercury Sources

As the TMDL is implemented, new sources of mercury may emerge either as the result of a new facility applying for a discharge permit or as a result of a new source being discovered. The Water Board will consider establishing a load or wasteload allocation for a new mercury source under any of the following circumstances:

- The allocation from one or more existing sources of the same category (e.g., municipal wastewater) will be reduced by an amount equal to the new allocation; or
- The Water Board finds that the magnitude of the new allocation is negligible compared to load reductions from all sources that will have been realized prior to establishing the new allocation; or
- The allocation is for a previously unquantified discharge of mercury from a source category that does not already have an allocation.

This section specifies actions required for sources that are potentially either discharging mercury or enhancing methylmercury production in the Bay.

# **Mercury Mines**

Local inactive mercury mines shall be addressed through continued implementation of the Mines and Mineral Producers Discharge Control Program (Mines Program) described in Chapter 4. The key regulatory component of this established program is that property owners of inactive and active mine sites that discharge stormwater contaminated by contact with any overburden, raw material, intermediate products, finished products, byproducts, or waste products are required to comply with NPDES industrial stormwater regulations. Under the Mines Program, the Water Board has the authority to issue individual industrial permits or allow the discharger to obtain coverage under the industrial stormwater general permit issued by the State Water Resources Control Board. For those mines that are not currently meeting the conditions set forth in the Mines Program, responsible parties shall attain compliance within five years of the effective date of the San Francisco Bay mercury TMDL implementation plan.

#### Bay Margin Contaminated Sites

A number of former industrial and military sites that contain mercury-enriched sediment surround the Bay. Available data are insufficient at this time to determine whether these sites may be discharging to the Bay. While the load these sites contribute to the Bay may be small relative to known sources, these sites may pose local threats. As such, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will require parties responsible for Bay margin contaminated sites to:

- 1. Quantify mercury mass on site such that the upper 95% confidence limit of the mean value is no more than 20% higher than the estimated mean;
- 2. Determine seasonal and spatial patterns of total mercury and methylmercury in sediments on site;
- 3. Estimate future mercury mass on site and patterns of contamination after planned remediation efforts are complete;
- 4. Determine seasonal patterns of total mercury and methylmercury in the water column at the site;
- 5. Collect prey items for local fish and birds and assess mercury concentrations; and
- 6. Quantify rate of sediment accretion or erosion at the site.

These requirements shall be incorporated into relevant site cleanup plans within five years of the effective date of the San Francisco Bay mercury TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL.

#### Wetlands

Wetlands may contribute substantially to methylmercury production and biological exposure to mercury within the Bay. Plans for extensive wetland restoration in the San Francisco Bay region raise the concern that mercury methylation may increase, thereby increasing the amount of mercury entering the food web. Implementation tasks related to wetlands focus on managing existing wetlands and ensuring that new constructed wetlands are designed to minimize methylmercury production and subsequent transfer to the food web.

The Water Board issues Waste Discharge Requirements and Clean Water Act Section 401 certifications that set forth conditions related to Bay filling and the construction and management of wetlands. To implement the San Francisco Bay mercury TMDL, the Waste Discharge Requirements and Section 401 certifications for wetland projects shall include provisions that the restored wetland region be designed and operated to minimize methylmercury production and biological uptake, and result in no net increase in mercury or methylmercury loads to the Bay. Additionally, projects must include pre- and post-restoration monitoring to demonstrate compliance. There is much active research on mercury cycling in wetlands. Information about how to manage wetlands to suppress or minimize mercury methylation will be adaptively incorporated into this implementation plan as it becomes available.

#### Risk Management

The mercury problem in San Francisco Bay may take decades to solve. However, there are activities that should be undertaken immediately to help manage the risk to consumers of mercury-contaminated fish. In this effort, the Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Health Services, and dischargers that pursue risk management as part of their mercury-related programs. The risk management activities will include the following:

- Providing multilingual fish-consumption advice to the public to help reduce methylmercury
  exposure through community outreach, broadcast and print media, and signs posted at popular
  fishing locations;
- Regularly informing the public about monitoring data and findings regarding hazards of eating mercury-contaminated fish; and
- Performing special studies needed to support health risk assessment and risk communication.
- Investigate ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of and mitigate health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay caught fish, such as subsistence fishers and their families.

#### Adaptive Implementation

The Water Board will adapt the TMDL to incorporate new and relevant scientific information such that effective and efficient actions can be taken to achieve TMDL goals. Approximately every five years, the Water Board will review the San Francisco Bay mercury 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. 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. Is the Bay progressing toward TMDL targets as expected? If it is unclear whether there is progress, 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 loads for the various source categories, how have these loads changed over time, 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? In particular, is there new evidence regarding

- methylmercury that might justify a methylmercury TMDL or allocation, either in addition to or instead of the total mercury TMDL and allocations? If so, how should the TMDL be modified?
- 4. Are effective risk management activities in place to reduce human and wildlife exposure to methylmercury? If not, how should these activities be modified or enhanced?
- 5. Do prey fish monitoring data confirm that TMDL load allocations are adequate to attain the wildlife target?
- 6. Are mercury mine and Bay margin contaminated site cleanups proceeding as expected? Are any additional actions needed to protect water quality?

Using available data, the load and wasteload allocations were determined on the basis of their sufficiency to achieve water quality standards. As part of the adaptive implementation process, the Water Board will review the TMDL as a whole and determine whether new evidence suggests revisions of specific load and wasteload allocations that will result in more strategic, efficient, and cost effective achievement of water quality standards. For example, as reliable information becomes available regarding methylation control or the relative bioavailability of sources, the Water Board will consider adjusting allocations to implement the TMDL more effectively. The Water Board may also consider revising implementation requirements and/or resulting permit requirements if such changes are consistent with the assumptions and requirements of the allocations and the cumulative effect of such changes will ensure attainment of water quality standards.

Achievement of the allocations for three of the largest source categories (Central Valley Watershed, Urban Stormwater Runoff, Guadalupe River Watershed) is projected to take 20 years, with an interim 10-year milestone of fifty percent achievement. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the load allocations for a source category or individual discharger provided that they have complied with all applicable permit requirements and all of the following have been accomplished relative to that source category or discharger:

- A diligent effort has been made to quantify mercury loads and the sources of mercury and potential bioavailability of mercury in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger have been fully implemented, and evaluates and quantifies the comprehensive water quality benefit of such measures;
- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

Achievement of the wasteload allocations for municipal wastewater dischargers is required within 20 years, and interim allocations within 10 years. The interim allocations are expected to be attained though aggressive pollution prevention and other cost-effective mercury reduction methods. The final wasteload allocations are expected to be attained through wastewater treatment system improvements and/or implementation of a pollutant offset program. Approximately 10 years after the effective date of the TMDL or any time thereafter, the Water Board will consider modifying the schedule for achievement of the wasteload allocations or revisions to wasteload allocations if:

- The State Board has not established a pollutant offset program that can be implemented within the 20 years required to achieve final wasteload allocations;.
- It can be demonstrated that all reasonable and feasible efforts have been taken to reduce mercury loads; and
- It can be demonstrated that no adverse local effects will result.

At approximately 20 years after the start of implementation and after taking the steps regarding schedule modification listed above, if a source category or individual discharger cannot demonstrate achievement of its allocation, despite implementation of all technically and economically feasible and cost effective control measures recognized by the Water Board as applicable for that source category or discharger, the Water Board will consider revising the allocation scheme provided that any resulting revisions ensure water quality standards are attained.

Load and wasteload allocations have been assigned to individual entities. However, assigning loads by watersheds could be a useful approach for managing pollutant loads, particularly if net environmental benefits can be realized. A watershed-based allocation program would only involve watersheds in the San Francisco Bay region that drain to the Bay. Such an approach could involve urban runoff management programs, wastewater facilities, and other dischargers in a watershed accepting joint responsibility for load reductions. An acceptable watershed allocation program may include incentives for agencies to implement load reduction activities and account for avoided mercury loads as well as incentives for strategic removal or sequestration of mercury already in the system. Credits could be used to offset annual loads and attain allocations for multiple sources. In addition, the Water Board will encourage and consider a pilot mercury mass offset program if it is demonstrated that such a program is a more cost effective and efficient means of achieving water quality standards, and the relative potential for mercury from different sources to enter the food web and the potential for adverse local impacts have been evaluated. These programs should recognize and reward ongoing efforts that are above and beyond those required by this TMDL. Until such programs are established, the Water Board will consider mercury source control and risk reduction activities on a case-by-case basis to determine how they contribute toward achievement of TMDL goals. The Water Board will also include in any new or modified NPDES permit a reopener to implement a pollutant offset program when it is established.

# 7.2.3 San Francisco Bay Polychlorinated Biphenyls TMDL

The following sections establish the TMDL for total polychlorinated biphenyls including dioxin-like PCBs congeners (hereinafter referred to as PCBs) for the San Francisco Bay. The associated numeric target, allocations, and implementation plan are designed to ensure attainment of beneficial uses and water quality objectives for the San Francisco Bay.

#### 7.2.3.1 Problem Statement

All segments of the San Francisco Bay have been identified as impaired due to elevated levels of PCBs in sport fish. Neither the narrative water quality objective, which states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life, nor the numeric water quality objective of  $0.00017~\mu g/L$  total PCBs in water is attained in the San Francisco Bay. The existing beneficial use s-for commercial and sport fishing is not fully supported.

This TMDL addresses impairment of San Francisco Bay segments by PCBs. In the context of this TMDL, "San Francisco Bay" refers to all of the following water bodies:

- Sacramento/San Joaquin Delta (within Region 2)
- Suisun Bay
- Carquinez Strait
- San Pablo Bay
- Richardson Bay
- San Francisco Bay, Central
- San Francisco Bay, Lower (including)
  - o Central Basin, San Francisco
  - o Mission Creek
  - o Oakland Inner Harbor (Fruitvale site)
  - o Oakland Inner Harbor (Pacific Dry-Dock Yard 1 site) San Francisco Bay, South

This TMDL is intended to achieve protection of the commercial and sport fishing beneficial use and to the extent that other beneficial uses are affected by PCBs, the TMDL will also ensure protection of other beneficial uses, specifically, preservation of rare and endangered species, estuarine habitat and wildlife habitat.

#### 7.2.3.2 Numeric Target

The numeric target (also referred to as the TMDL target) to protect both human health and wildlife is an average fish issue concentration of 10 micrograms total PCBs per kilogram of typically consumed fish, on a wet weight basis ( $10 \mu g/kg$  wet weight). Attainment of the total PCBs fish tissue numeric target will also protect human health and wildlife for dioxin-like PCBs.

Attainment of the fish tissue target for PCBs in San Francisco Bay will be initially evaluated by comparing the average total PCBs concentrations in the edible portion of two fish species, white croaker (size class, 20 to 30 centimeters in length) and shiner surfperch (size class, 10 to 15 centimeters in length) to the target. Comparison of the fish target against these two species of fish is considered to be protective and provides a margin of safety for the TMDL, because PCBs concentrations in these species are the highest of the fish species measured and sport recreational fishers likely consume a variety of fish species, including those species with lower PCBs concentrations. As part of the adaptive implementation of this TMDL, the Water Board will require the collection of additional information regarding recreational and subsistence fishers' patterns of consumption and evaluate if fish species other than white croaker and shiner surfperch should be considered to evaluate attainment of the target.

The number of fish samples collected to determine compliance with the target will be based on guidance described in USEPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (EPA 823-B-00-007) and on the statistical power needed to demonstrate trends in total PCBs concentration over time.

#### 7.2.3.3 Sources

Sources of PCBs to fish and the water column of San Francisco Bay fall into two categories: (1) external sources including atmospheric deposition, Central Valley inflow, municipal and industrial wastewater discharges, and urban and non-urban stormwater runoff; and (2) internal sources, including movement

or release of PCBs already in San Francisco Bay sediments, specifically, dredging and in-Bay disposal of dredged sediment, erosion of bay bottom sediment containing PCBs (bed erosion), and in-Bay contaminated sediment sites. These sources and estimates of associated loads are shown in Table 7.2.3-1. Decreases of PCBs in San Francisco Bay occur via out-of-Bay dredge material disposal, natural attenuation, and outflow through the Golden Gate.

Table 7.2.3-1 PCBs Sources and Current Loads to San Francisco Bay

| Source Category                       | PCBs Loads         |
|---------------------------------------|--------------------|
|                                       | Kilograms per year |
|                                       |                    |
| External                              |                    |
| Direct Atmospheric Deposition         | Net Loss           |
| Central Valley Watershed              | 11                 |
| Municipal Wastewater Dischargers      | 2.3                |
| Industrial Wastewater Dischargers     | 0.035              |
| Urban and Non Urban Stormwater Runoff | 20                 |
| Total                                 | 33 <sup>a</sup>    |
|                                       |                    |
| Internal                              |                    |
| Sediment Dredging and Disposal        | Net Loss           |
| Bed Erosion                           | Not Quantified     |
| In-Bay Contaminated Sediment          | Not Quantified     |
|                                       |                    |

a. Total differs from column sum due to rounding

# 7.2.3.4 Total Maximum Daily Load

The TMDL for PCBs in San Francisco Bay is 10 kg/year. Calculation of the TMDL is based on two models: a food-web PCBs bioaccumulation model and a long-term fate mass balance model. The model results predict that attainment of the numeric target will occur when the total PCBs concentration in surface sediments in the Bay declines to one  $\mu$ g/kg, which will be achieved when loads from external sources are reduced to 10 kg/year.

#### 7.2.3.5 Load and Wasteload Allocations

Load allocations are presented in Table 7.2.3-2 for source categories. Individual wasteload allocations for municipal wastewater dischargers and industrial wastewater dischargers are presented in Table 7.2.3-3 and Table 7.2.3-4. Individual wasteload allocations for stormwater runoff to county-based watersheds are presented in Table 7.2.3-5.

Table 7.2.3-2 Load and Wasteload Allocations

| Source Category   | Allocations            |
|---|------------------------|
|   | Kilograms per year     |
|   |                        |
| External  |                        |
| Direct Atmospheric Deposition                                   | 0 <sup>a</sup>         |
| Central Valley Watershed  | 5                      |
| Municipal Wastewater Dischargers                                | 2                      |
| Industrial Wastewater Dischargers                               | 0.035                  |
| Stormwater Runoff   | 2                      |
| Stormwater Runoff Treatment by Municipal Wastewater Dischargers | 1                      |
|   |                        |
| Total   | <b>10</b> <sup>b</sup> |

Zero allocation reflects overall net loss to the atmosphere Total differs from column sum due to rounding

Table 7.2.3-3 Individual Wasteload Allocations For Municipal Wastewater Dischargers

| Permitted Entity  | NPDES<br>Permit | Allocations        |
|---|-----------------|--------------------|
|   |                 | kilograms per year |
| American Canyon, City of  | CA0038768       | 0.002              |
| Benicia, City of  | CA0038091       | 0.009              |
| Burlingame, City of   | CA0037788       | 0.01               |
| Calistoga, City of  | CA0037966       | 0.002              |
| Central Contra Costa Sanitary District  | CA0037648       | 0.1                |
| Central Marin Sanitation Agency   | CA0038628       | 0.04               |
| Delta Diablo Sanitation District  | CA0038547       | 0.04               |
| East Bay Dischargers Authority Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0037702) Livermore, City of (CA0038008) Union Sanitary District, Wet Weather (CA0038733) | CA0037869       | 0.3                |
| East Bay Municipal Utilities District   | CA0037702       | 0.3                |
| East Brother Light Station  | CA0038806       | 0.00030            |
| Fairfield-Suisun Sewer District   | CA0038024       | 0.05               |
| Las Gallinas Valley Sanitary District   | CA0037851       | 0.01               |
| Marin County Sanitary District, Paradise Cove   | CA0037427       | 0.00003            |
| Marin County Sanitary District, Tiburon   | CA0037753       | 0.002              |
| Millbrae, City of   | CA0037532       | 0.007              |
| Mt. View Sanitary District  | CA0037770       | 0.007              |
| Napa Sanitation District  | CA0037575       | 0.04               |
| Novato Sanitary District  | CA0037958       | 0.02               |
| Palo Alto, City of  | CA0037834       | 0.09               |
| Petaluma, City of   | CA0037810       | 0.02               |
| Pinole, City of   | CA0037796       | 0.009              |
| Contra Costa County, Port Costa Wastewater Treatment Plant  | CA0037885       | 0.0001             |
| Rodeo Sanitary District   | CA0037826       | 0.002              |
| Saint Helena, City of   | CA0038016       | 0.001              |
| San Francisco, City and County of,<br>San Francisco International Airport WQCP  | CA0038318       | 0.002              |
| San Francisco, City and County of, Southeast Plant  | CA0037664       | 0.3                |
| San Jose/Santa Clara WPCP   | CA0037842       | 0.4                |

| Permitted Entity                                | NPDES<br>Permit | Allocations           |
|---|-----------------|-----------------------|
|   |                 | kilograms per year    |
| San Mateo, City of                              | CA0037541       | 0.04                  |
| Sausalito-Marin City Sanitary District          | CA0038067       | 0.005                 |
| Seafirth Estates                                | CA0038893       | 0.00001               |
| Sewerage Agency of Southern Marin               | CA0037711       | 0.01                  |
| Sonoma Valley County Sanitary District          | CA0037800       | 0.01                  |
| South Bayside System Authority                  | CA0038369       | 0.06                  |
| South San Francisco/San Bruno WQCP              | CA0038130       | 0.03                  |
| Sunnyvale, City of                              | CA0037621       | 0.05                  |
| US Naval Support Activity, Treasure Island WWTP | CA0110116       | 0.002                 |
| Vallejo Sanitation & Flood Control District     | CA0037699       | 0.05                  |
| West County Agency, Combined Outfall            | CA0038539       | 0.05                  |
| Yountville, Town of                             | CA0038121       | 0.001                 |
| Total   |                 | <b>2</b> <sup>a</sup> |

a) Total differs from column sum due to rounding

Table 7.2.3-4 Individual Wasteload Allocations for Industrial Wastewater Dischargers

| C&H Sugar and Crockett Community Services         CA0005240           District.         0.00006           Chevron Products Company         CA0005134         0.003           ConocoPhillips         CA0005053         0.0006           Crockett Cogeneration LP, and Pacific Crockett         CA0029904         0.0006           Energy, Inc.         CA0004979         0.0009           General Chemical         CA0029106         0.0001           GWF Power Systems, Site I         CA0029122         0.0001           GWF Power Systems, Site V         CA0029122         0.0001           Hanson Aggregates, Amador Street         CA0030139         0.00003           Hanson Aggregates, Olin Jones Dredge         CA0028321         0.00003           Spoils Disposal         CA0005185         0.00003           Hanson Aggregates, Tidewater Ave., Oakland         CA0030147         0.00003           Morton Salt         CA0005185         0.00008           Pacific Gas and Electric, East Shell Pond         CA0030082         0.00003           Rhodia, Inc.         CA0006165         0.0003           San Francisco, City and Co., SF International<br>Airport Industrial WTP         CA00028070         0.002           Shell Oil Products US and Equilon Enterprises<br>LLC         CA0005789         0.002 <th>Permitted Entity</th> <th>NPDES Permit</th> <th>Allocationsa</th>  | Permitted Entity                           | NPDES Permit | Allocationsa       |
|--|--|--------------|--------------------|
| District.         0.00006           Chevron Products Company         CA0005134         0.003           ConocoPhillips         CA0005053         0.0006           Crockett Cogeneration LP, and Pacific Crockett         CA0029904         0.0006           Energy, Inc.         0.0006         0.0006           General Chemical         CA0004979         0.0009           GWF Power Systems, Site I         CA0029106         0.0001           GWF Power Systems, Site V         CA0029122         0.0001           Hanson Aggregates, Amador Street         CA0030139         0.00003           Hanson Aggregates, Olin Jones Dredge         CA0028321         0.00003           Hanson Aggregates, Tidewater Ave., Oakland         CA0030147         0.00003           Morton Salt         CA0005185         0.00008           Pacific Gas and Electric, East Shell Pond         CA0030082         0.00003           Rhodia, Inc.         CA0006165         0.0003           Ban Francisco, City and Co., SF International Airport Industrial WTP         CA0028070         0.002           Shell Oil Products US and Equilon Enterprises         CA0005789         0.002           Mirant Delta LLC, Pittsburg Power Plant         CA0004880         0.0003           Fesoro Refining and Marketing Company         CA  |  |              | kilograms per year |
| istrict. 0.00006 hevron Products Company CA0005134 0.003 onocoPhillips CA0005053 0.0006 rockett Cogeneration LP, and Pacific Crockett nergy, Inc. 0.0006 leneral Chemical CA0004979 0.0009 lew F Power Systems, Site I CA0029106 0.0001 lew F Power Systems, Site V CA0029122 0.0001 anson Aggregates, Amador Street CA0030139 0.00003 anson Aggregates, Olin Jones Dredge CA0028321 0.00003 anson Aggregates, Tidewater Ave., Oakland CA0030147 0.00003 lorton Salt CA0005185 0.00008 lorton Salt CA0005185 0.00008 ani Francisco, City and Co., SF International irport Industrial WTP CA0028070 0.002 lirant Delta LLC, Pittsburg Power Plant CA0004880 0.0008 lirant Potrero LLC, Potrero Power Plant CA0004910 0.002 he Dow Chemical Company CA000502 0.02 alero Refining Company CA0005550 0.0007  |  |              |                    |
| ConocoPhillips Conoco | •  | CA0005240    | 0.00006            |
| Crockett Cogeneration LP, and Pacific Crockett Energy, Inc.         0.0006           General Chemical         CA0004979         0.0009           GWF Power Systems, Site I         CA0029106         0.0001           GWF Power Systems, Site V         CA0029122         0.0001           Hanson Aggregates, Amador Street         CA0030139         0.00003           Hanson Aggregates, Olin Jones Dredge         CA0028321         0.00003           Spoils Disposal         CA0030147         0.00003           Hanson Aggregates, Tidewater Ave., Oakland         CA0030147         0.00003           Morton Salt         CA0005185         0.00008           Pacific Gas and Electric, East Shell Pond         CA0030082         0.00003           Rhodia, Inc.         CA0006165         0.0003           San Francisco, City and Co., SF International Airport Industrial WTP         CA0028070         0.002           Shell Oil Products US and Equilon Enterprises         CA0005789         CA0005789           LLC         US and Equilon Enterprises         CA0004880         0.0002           Mirant Potrero LLC, Potrero Power Plant         CA0004880         0.0003           Tesoro Refining and Marketing Company         CA0004961         0.002           The Dow Chemical Company         CA0005002         0.02 </td <td>Chevron Products Company</td> <td>CA0005134</td> <td>0.003</td>   | Chevron Products Company                   | CA0005134    | 0.003              |
| Senergy, Inc.   0.0006   | ConocoPhillips                             | CA0005053    | 0.0006             |
| SWF Power Systems, Site I  CA0029106  CA0029122  CA0029122  CA00001  SWF Power Systems, Site V  CA0029122  CA00003  Stanson Aggregates, Amador Street  CA0030139  CA0028321  CA0028321  CA00003  Spoils Disposal  Stanson Aggregates, Tidewater Ave., Oakland  CA0030147  CA00003  CA0005185  CA00003  CA00003  CA0005185  CA00003  CA00028070  CA00028070  CA0005789  CA0005789  CA0005789  CA0005657  CA00004  CA0004880  CA0005657  CA0005655  | ·  | CA0029904    | 0.0006             |
| ### CA0029122  | General Chemical                           | CA0004979    | 0.0009             |
| Hanson Aggregates, Amador Street CA0030139 0.00003 Hanson Aggregates, Olin Jones Dredge Spoils Disposal Hanson Aggregates, Tidewater Ave., Oakland Morton Salt CA0030147 0.00003 Morton Salt CA0005185 0.00008 Cacific Gas and Electric, East Shell Pond CA0030082 CA0006165 0.00003 CA0006165 CA0008070 CA0008070 CA0008070 CA0008070 CA0008070 CA0008070 CA0005789 LC CA0005789 LC CA0005789 Alirant Delta LLC, Pittsburg Power Plant CA0004880 CA0004880 0.0008 CA0005657 0.0003 CESORO Refining and Marketing Company CA0004961 0.002 Che Dow Chemical Company CA0004910 0.0006 CA0005550  | GWF Power Systems, Site I                  | CA0029106    | 0.0001             |
| Hanson Aggregates, Olin Jones Dredge Spoils Disposal Hanson Aggregates, Tidewater Ave., Oakland Morton Salt Pacific Gas and Electric, East Shell Pond CA0030082 CA0005185 CA00003 CA00003 CA00003 CA000003 CA00028070 CA00028070 CA00028070 CA0005789 CA0005789 CA0005789 CA0005789 CA0005789 CA0004960 CA0004960 CA0004960 CA0004960 CA0004960 CA0004960 CA0004960 CA0004960 CA0005550  | GWF Power Systems, Site V                  | CA0029122    | 0.0001             |
| Spoils Disposal Hanson Aggregates, Tidewater Ave., Oakland CA0030147 O.00003 Morton Salt CA0005185 O.00008 Pacific Gas and Electric, East Shell Pond CA0030082 CA0006165 O.0003 Rhodia, Inc. CA0006165 O.0003 CA0028070 CA0028070 O.002 Chell Oil Products US and Equilon Enterprises LC Mirant Delta LLC, Pittsburg Power Plant CA0004880 CA0005657 O.0003 Cesoro Refining and Marketing Company CA0004961 O.002 Che Dow Chemical Company CA0004910 O.002 CA0005550 CA0005550 O.0007  | lanson Aggregates, Amador Street           | CA0030139    | 0.00003            |
| Morton Salt CA0005185 0.00008 Pacific Gas and Electric, East Shell Pond CA0030082 0.00003 Rhodia, Inc. CA0006165 0.0003 CA0028070 CA0028070 0.002 CA0005789 LC CA0005789 LC CA0004880 0.0008 Mirant Delta LLC, Pittsburg Power Plant CA0005657 0.0003 Cesoro Refining and Marketing Company CA0004961 0.002 Che Dow Chemical Company CA0004910 0.0006 USS-Posco CA0005550 0.0007   |  | CA0028321    | 0.00003            |
| Pacific Gas and Electric, East Shell Pond CA0030082 CA0006165 0.0003 CA0006165 0.0003 CA0028070 CA0028070 O.002 Chell Oil Products US and Equilon Enterprises LLC CA0005789 CA0004880 O.0008 Mirant Delta LLC, Pittsburg Power Plant CA0004880 CA0005657 O.0003 Cesoro Refining and Marketing Company CA0004961 CA0004961 CA0004910 O.0006 CA0005002 CA0005550 O.0007  | Hanson Aggregates, Tidewater Ave., Oakland | CA0030147    | 0.00003            |
| Rhodia, Inc.  CA0006165  CA0008070  CA0028070  O.002  Chell Oil Products US and Equilon Enterprises LC  Mirant Delta LLC, Pittsburg Power Plant  CA0004880  CA0005657  CA0004961  CA0004961  O.002  Che Dow Chemical Company  CA0004910  CA0005550  CA0005550  CA0005550  O.0007   | Norton Salt                                | CA0005185    | 0.00008            |
| San Francisco, City and Co., SF International Airport Industrial WTP  Shell Oil Products US and Equilon Enterprises LC  Mirant Delta LLC, Pittsburg Power Plant  CA0004880  Mirant Potrero LLC, Potrero Power Plant  CA0005657  CA0004961  CA0004961  CA0004910  CA0005002  CA0005002  CA0005002  CA0005550  | Pacific Gas and Electric, East Shell Pond  | CA0030082    | 0.00003            |
| Airport Industrial WTP  CA0028070  0.002  Shell Oil Products US and Equilon Enterprises LC  Oilirant Delta LLC, Pittsburg Power Plant  CA0004880  Oilirant Potrero LLC, Potrero Power Plant  CA0005657  CA0005657  CA0004961  Oilirant Power Plant  CA0005550  Oilirant Potrero LLC, Potrero Power Plant  CA0005550  Oilirant Potrero LLC, Potrero Power Plant  CA0005657  Oilirant Potrero LLC, Potrero Power Pla | Rhodia, Inc.                               | CA0006165    | 0.0003             |
| Mirant Delta LLC, Pittsburg Power Plant CA0004880  Mirant Potrero LLC, Potrero Power Plant CA0005657  Cesoro Refining and Marketing Company CA0004961  CA0004961  CA0004910  CA0005002  CA0005002  CA0005550  CA0005550  CA0005550  CA0007   |  | CA0028070    | 0.002              |
| Mirant Potrero LLC, Potrero Power Plant CA0005657 0.0003 Tesoro Refining and Marketing Company CA0004961 0.002 The Dow Chemical Company CA0004910 0.0006 USS-Posco CA0005002 0.02 Valero Refining Company CA0005550 0.0007   | ·  | CA0005789    | 0.002              |
| Tesoro Refining and Marketing Company CA0004961 0.002 The Dow Chemical Company CA0004910 0.0006 USS-Posco CA0005002 0.02 Valero Refining Company CA0005550 0.0007  | Mirant Delta LLC, Pittsburg Power Plant    | CA0004880    | 0.0008             |
| The Dow Chemical Company         CA0004910         0.0006           JSS-Posco         CA0005002         0.02           /alero Refining Company         CA0005550         0.0007  | Mirant Potrero LLC, Potrero Power Plant    | CA0005657    | 0.0003             |
| USS-Posco CA0005002 0.02  Valero Refining Company CA0005550 0.0007   | Tesoro Refining and Marketing Company      | CA0004961    | 0.002              |
| /alero Refining Company CA0005550 0.0007   | he Dow Chemical Company                    | CA0004910    | 0.0006             |
|  | JSS-Posco                                  | CA0005002    | 0.02               |
|  | Valero Refining Company                    | CA0005550    | 0.0007             |
| Total 0.035 <sup>b</sup>   | F-4-1                                      |              | $0.035^{b}$        |

Wasteload allocations for industrial wastewater dischargers do not include mass from once-through cooling water. The Water Board will apply intake credits to once-through cooling water as allowed by law.

Total differs from column sum due to rounding

Table 7.2.3-5 County-Based Watershed Wasteload Allocations for Stormwater Runoff

| Countyb                    | Allocationsa  |
|----------------------------|---------------|
|                            | kilograms per |
|                            | year          |
| Alameda                    | 0.5           |
| Contra Costa               | 0.3           |
| Marin                      | 0.1           |
| Napa                       | 0.05          |
| San Francisco <sup>c</sup> | 0.2           |
| San Mateo                  | 0.2           |
| Santa Clara                | 0.5           |
| Solano                     | 0.1           |
| Sonoma                     | 0.05          |
|                            |               |
| Total                      | 2             |

a. Allocations implicitly include all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas within the County. Examples of discharges include but are not limited to California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

# 7.2.3.6 Implementation Plan

The implementation plan includes three general implementation categories: control of external loadings of PCBs to the Bay, control of internal sources of PCBs within the Bay, and actions to manage risks to Bay fish consumers. In addition, the plan includes monitoring to measure attainment of the numeric target and load allocations, and measuring implementation progress. The plan will be implemented in phases via an adaptive implementation strategy founded on requiring actions in each category based on the current state of knowledge of PCBs sources and control measures, while also conducting studies to improve our understanding of PCBs sources, control options, and fate in the environment.

#### External Sources

This section, organized by source categories, specifies actions required to achieve allocations and implement the TMDL.

b. Includes unincorporated areas and all municipalities in the county that drain to the Bay and are part of the San Francisco Bay Region.

c. Does not account for treatment provided by San Francisco's combined sewer system. The treatment provided by the City and County of San Francisco's Southeast Plant and Northpoint Wet Weather Facility (NPDES permit CA0037664) will be credited toward meeting the allocation and load reduction.

# Central Valley Watershed

Sediments entering the Bay from the Central Valley have lower concentrations of PCBs than in-Bay sediment. Major mass loading events that occur during episodic high flow conditions generally flow directly out of the Bay through the Golden Gate. It is anticipated that the Central Valley allocation will be attained through natural attenuation.

#### Municipal and Industrial Wastewater Dischargers

Wasteload allocations shall be implemented through NPDES permits that require implementation of best management practices to maintain optimum treatment performance for solids removal and the identification and management of controllable sources. NPDES permits shall include effluent limits based on current performance and a requirement for quantification of PCBs loads to the Bay in order to determine attainment of the wasteload allocations. Compliance with effluent limits shall be determined using a Title 40, Code of Federal Regulations, Part 136 analytical method (effective as of April 25, 2007). In addition, municipal and industrial wastewater dischargers will be required to support actions to reduce the health risks of people who eat PCBs-contaminated, San Francisco Bay fish and to conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

It is the Water Board's intent to implement individual wasteload allocations via numeric water quality-based effluent limitations for PCBs in NPDES permits. These limits shall represent individual dischargers' PCBs loads, consistent with the underlying assumptions and requirements of the wasteload allocations. In the absence of actual discharge performance data sufficient to calculate such limits, the Water Board will apply appropriate uncertainty factors to the individual wasteload allocations.

Dischargers shall also be required to conduct sufficient monitoring of their effluent, which accounts for discharge variability and blended effluent, to enable calculation of current PCBs loading. These requirements will be implemented via NPDES permits or the Water Board's authority under Section 13267 of the California Water Code, such that monitoring begins no later than January 2009 and is completed in a timely manner.

# Stormwater Runoff

Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued, shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater 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 Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

# Urban Stormwater Runoff Treatment by Municipal Wastewater Dischargers

Routing of urban stormwater runoff through municipal wastewater treatment facilities may be an efficient means of reducing PCBs, and other particle-associated contaminant loads to the Bay. This load allocation shall be implemented through a permit. Within five years of adoption of this TMDL, the Water Board will consider issuance of a permit under which municipal wastewater dischargers can apply for a portion of this reserved allocation.

# **Internal Sources**

#### In-Bay PCB-Contaminated Sites

A number of former industrial and military sites adjacent to PCBs-enriched sediment are found throughout the Bay. This TMDL does not require any specific party to implement new actions for in-Bay PCB-contaminated sites. However, cleanup of these sites is a Water Board priority and many cleanups are underway. The Water Board will maintain an inventory of contaminated sites and continue to set priorities for investigating and remediating the sites. The existing list of in-Bay PCB-contaminated sites referred to in this TMDL is based on data collected under the Bay Protection Toxic Cleanup Program, which identified sites with total PCBs in sediment that exceed 180  $\mu$ g/kg. This TMDL does not set a cleanup level for total PCBs in sediment. The fish tissue target of 10  $\mu$ g/kg and the sediment goal of one  $\mu$ g/kg are not cleanup standards, nor should they be considered appropriate, or relevant, and applicable requirements (ARARs) or a "to-be-considered" ARAR under the National Contingency Plan, 40 CFR Part 300 et. Seq. or the 1986 Superfund Amendments and Reauthorization Act. An analysis of the feasibility, technical practicability, and potential environmental impacts of individual clean-up actions is currently required prior to conducting cleanup of contaminated in-Bay sediment overseen by the Water Board and the Department of Toxic Substances Control and will continue to be required, not withstanding this

TMDL. The Water Board has the authority to approve, disapprove or condition these projects to minimize adverse environmental impacts while achieving the goals of environmental cleanup.

The Water Board will coordinate cleanup actions with the U.S. EPA and the Department of Toxic Substances Control, and advise them that the fish tissue target and sediment goal do not constitute cleanup standards for ARARs. The Water Board will issue cleanup orders as necessary. The Water Board will require responsible parties for each specific Bay margin contaminated site to:

- 1) Estimate the pre-cleanup and post-cleanup vertical and lateral extent of PCBs in Bay sediments;
- 2) Estimate the pre-cleanup and post-cleanup mass of PCBs in Bay sediments;
- 3) Quantify rate(s) of sediment accretion, erosion or natural attenuation;
- 4) Implement on-land source control measures, if necessary, to ensure that on-land sources of PCBs do not further contaminate in-Bay sediments;
- 5) Evaluate post-cleanup, the residual risks to humans and wildlife;
- 6) Support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish;
- 7) Conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

These requirements shall be incorporated into relevant site investigation plans within five years of the effective date of this TMDL, and the actions shall be fully implemented within ten years of the effective date of this TMDL or as agreed to in the individual site investigation plan.

# Navigational Dredging

The PCBs concentration in dredged material disposed of in the Bay shall not exceed the 99th percentile PCBs concentration of the previous 10 years of Bay sediment samples collected through the RMP (excluding stations outside the Bay like the Sacramento River, San Joaquin River, Guadalupe River and Standish Dam stations). Prior to disposal, the material shall be sampled and analyzed according to the procedures outlined in the 2001 U.S. Army Corps of Engineers document "Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region." All in-Bay disposal of dredged material shall comply with Section 4.20, entitled Dredging and Disposal of Dredged Sediment, including the Long Term Management Strategy. Additionally, dredged material dischargers will be required to conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

#### Risk Management

Load reductions and attainment of the numeric target to support fishing in the Bay as a beneficial use will take time to achieve. However, there are actions that should be undertaken prior to achievement of the numeric fish tissue target to help manage the risk to consumers of PCBs-contaminated fish. The Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Toxic Substances Control, the California Department of Public Health, dischargers, and interested parties to pursue risk management strategies. The risk management activities will include the following:

• Investigating and implementing actions to address the public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce the actual and potential exposure of, and mitigate health impacts to, people and communities most likely to be consuming PCB-

contaminated fish from San Francisco Bay, such as recreational and subsistence fishers and their families;

- Providing multilingual fish-consumption advice to the public to help reduce PCBs exposure through community outreach, broadcast and print media, and signs posted at popular fishing locations;
- Regularly informing the public about monitoring data and findings regarding hazards of eating PCB-contaminated fish; and
- Conducting special studies needed to support health risk assessment and risk communication, including the collection of additional information regarding recreational and subsistence fishers' patterns of consumption.

#### 7.2.3.7 Critical Data Needs

Additional data and other information will be needed to assess both the progress toward attainment of the fish tissue target and to evaluate the need for modifications to the implementation plan, TMDL, and/or allocations. Dischargers will be required to conduct or cause to be conducted the following studies to fill critical data needs.

- PCBs mass budget modeling and food web model improvements Model refinements to
  improve our ability to predict recovery rates of the Bay from impairment by PCBs, to help
  strategically focus implementation actions on those actions with the most potential for success,
  and to help better our understanding of the role in-Bay PCBs-contaminated sites play in the Bay's
  recovery.
- Rate of natural attenuation of PCBs in the Bay environments –A better understanding of local rates of natural attenuation in order to predict with more certainty the recovery time of the Bay.

#### Monitoring

Monitoring to demonstrate progress toward attainment of the TMDL target shall be conducted by maintaining discharger-funded RMP monitoring of PCBs in San Francisco Bay fish, sediments, and water at a spatial scale and frequency to track trends in the decline of PCBs in the Bay. Monitoring of load allocations to demonstrate progress towards attainment shall be conducted by municipal and industrial wastewater dischargers and stormwater permittees as discussed in external sources above.

Continued regular monitoring of PCB loads from the Central Valley and other tributaries to the Bay shall be conducted by maintaining discharger-funded RMP monitoring in order to provide information on the long term decline of PCBs to the Bay and to confirm the assumption that Central Valley loads are being reduced due to natural attenuation. Monitoring of loads allocated to other sources will be considered as part of the RMP special studies.

# Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Accordingly, this TMDL will be implemented in phases starting with actions described in each source category, risk management, monitoring, and critical data needs section above with subsequent modifications and phases based on improved knowledge of PCBs sources, control measures, and fate in the environment.

The Water Board will adapt the TMDL and implementation plan to incorporate new and relevant scientific information such that effective and efficient measures can be taken to achieve the allocations and numeric fish tissue target. The Water Board staff will present an annual progress report to the Water Board on implementation of the TMDL that includes evaluation of new and relevant information that becomes available through implementation actions, monitoring, special studies, and the scientific literature. Within ten years of the effective date of the TMDL, Water Board will consider a Basin Plan amendment that will reflect and incorporate the data and information that is generated in the intervening years. The Water Board will consider amending the PCBs TMDL and implementation plan as necessary to ensure attainment of water quality standards in a timely manner while considering the financial and environmental consequences of new control measures.

In particular, achievement of the allocations for stormwater runoff, which is projected to take 20 years, will be challenging. Consequently, the Water Board will consider modifying the schedule for achievement of the load allocations for stormwater runoff provided that dischargers have complied with all applicable permit requirements and accomplished all of the following:

- A diligent effort has been made to quantify PCBs loads and the sources of PCBs in the discharge;
- Documentation has been prepared that demonstrates that all technically and economically
  feasible and cost-effective control measures recognized by the Water Board have been fully
  implemented, and evaluates and quantifies the PCBs load reduction of such measures;
- A demonstration has been made that achievement of the allocation will require more than the remaining 10 years originally envisioned; and
- A plan has been prepared that includes a schedule for evaluating the effectiveness and feasibility of additional control measures and implementing additional controls as appropriate.

# 7.3 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE MARIN COASTAL BASIN (SEE FIGURE 2-3)

# 7.3.1 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 the TMDL. 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.

#### 7.3.1.1 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

#### 7.3.1.2 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.

# 7.3.1.3 Numeric Targets

Table 7.3.1-1 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.

# Table 7.3.1-1 Water Quality Targets 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

- 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.

# 7.3.1.4 Total Maximum Daily Load

Table 7.3.1-2 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.

| Table 7.3.1-2 Total Maximum Daily Load of Pathogens Indicators for Tomales Bay and its Tributaries |                        |  |
|--|------------------------|--|
| Waterbody  | Indicator<br>Parameter | TMDL<br>(Most Probable Number (MPN) of fecal coliforms<br>per 100 mL of water) |
| Tomales Bay  | Fecal coliform         | Median < 14 <sup>a</sup> 90th Percentile < 43 <sup>b</sup>                     |
| Major Tributaries:<br>Walker Creek<br>Lagunitas Creek<br>Olema Creek                               | Fecal coliform         | Log mean <200 <sup>a</sup> 90th percentile < 400 <sup>b</sup>                  |

<sup>&</sup>lt;sup>a.</sup> Based on a minimum of five consecutive samples equally spaced over a 30-day period.

#### 7.3.1.5 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 7.3.1-3 presents density-based load allocations for Tomales Bay watersheds pathogens source categories that implement tributary targets, and Table 7.3.1-4 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 7.3.1-3) and the applicable geographic-based allocations (Table 7.3.1-4).

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.

# 7.3.1.6 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

b. No more than 10% of total samples during any 30-day period may exceed this number.

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 (State Water Resources Control Board. 2004. Policy for Implementation and Enforcement of the Nonpoint Source Pollution Prevention Control Program), and human waste discharge prohibitions (Prohibitions 5 and 15, Table 4-1).

This plan specifies required implementation measures (Table 7.3.1-5) for each of the source categories (Table 7.3.1-3). 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 7.3.1-5. 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.

Table 7.3.1-3 Density-Based Pollutant Wasteload and Load Allocations for **Dischargers of Pathogens in Tomales Bay Watershed** Wasteload and Load Allocations Fecal Coliform (MPN/100 mL) Categorical For Direct Discharges to For Discharges to Major **Pollutant Source** the Bay **Tomales Bay Tributaries** 90th **Median**<sup>b</sup> Log Meanb Percentile<sup>c</sup> Onsite Sewage Disposal 0 0 Systems 0 **Small Wastewater Treatment** 0 0 Facilities 0 0 **Boat Discharges** 0 N/A **Grazing Lands** <14 <43 < 200 < 200 **Dairies** <14 <43 **Equestrian Facilities** <14 <43 < 200 < 200 Municipal Runoff <14 <43 Open space lands (terrestrial <14 <43 < 200 wildlife) d In-Bay Background (marine

wildlife) d

<14

<43

N/A

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 7.3.1-4 Density-Based Pollutant Load Allocations for Tomales Bay Tributaries |   |  |
|--|---|--|
| Tributary  | Allocation<br>Fecal Coliform (MPN/100 mL)<br>Log Mean |  |
| Walker Creek at Highway 1 Bridge   | 95 <sup>a</sup>                                       |  |
| Lagunitas Creek at Green Bridge  | 95ª   |  |

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

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 7.3.1-5 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.

Table 7.3.1-5 Trackable Implementation Measures for the Tomales Bay Watershed Pathogens Total Maximum Daily Load

|                            | <b>.</b>  |   |   |
|----------------------------|---|---|---|
| Source Category            | Action  | Implementing Party                            | Completion Dates  |
| Sewage Disposal (2020) sme | 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<br>Agency | January 2007  |
| g əti2-nO<br>otsv2         | Report progress on implementation of OSDS evaluation and repair program.  | Marin County, Community<br>Development Agency | Starting January 2011<br>and biennially thereafter                |
| Treatment                  | Comply with applicable Waste Discharge<br>Requirements (WDRs).  | Small wastewater treatment facilities         | As specified in the applicable WDRs                               |
| rstewater<br>Facilities    | Inspect and evaluate all permitted WDR facilities and update WDRs as warranted.   | Water Board staff                             | January 2009  |
| sW IIsm2                   | Report progress on inspection and evaluation of WDR facilities.   | Water Board staff                             | No less than once every<br>five years starting in<br>January 2009 |
| 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  |

| Source Category            | Action   | Implementing Party   | Completion Dates                                  |
|----------------------------|--|--|---|
| (bənnifnoc                 | 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<br>Coastal Commission, California State Lands<br>Commission, California State Parks, County of<br>Marin, Regional Water Board, Gulf of the<br>Farallones National Marine Sanctuary.  | January 2009                                      |
| ) səgnsrhərid tsod         | Report progress on implementation of boating management plan.  | As specified in the Boating Management Plan:<br>Point Reyes National Seashore, California<br>Coastal Commission, California State Lands<br>Commission, California State Parks, County of<br>Marin, Regional Water Board, Gulf of the<br>Farallones National Marine Sanctuary | As specified in the<br>Boating Management<br>Plan |
|                            | Comply with boating management plan for<br>Tomales Bay.  | Boaters  | As specified in the<br>Boating Management<br>Plan |
| Grazing Lands <sup>2</sup> | Submit a Report of Waste Discharge¹ 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                                      |

| Source Category       | Action   | Implementing Party  | Completion Dates                                     |
|-----------------------|--|---|--|
|                       | Comply with applicable Waste Discharge<br>Requirements (WDRs) or waiver of WDRs.   | Dairies and ranchers (landowners and leasees)   | As specified in applicable<br>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<br>WDRs or waiver of WDRs |
| <sup>8</sup> s∋irisΩ  | 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<br>WDRs or waiver of WDRs |
| Equestrian Facilities | Submit a Report of Waste Discharge1 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   |

| Source Category | Action   | Implementing Party  | Completion Dates   |
|-----------------|--|---|--|
|                 | Comply with applicable Waste Discharge<br>Requirements (WDRs) or waiver of WDRs.   | Equestrian facilities   | As specified in applicable<br>WDRs or waiver of<br>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<br>WDRs or waiver of WDRs     |
| al 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<br>Program  | January 2009   |
| sqioinuM        | Report progress on implementation of pathogens reduction measures.   | Marin County, Stormwater Pollution Prevention<br>Program  | As specified in approved stormwater management plan      |

<sup>&</sup>lt;sup>1</sup> WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.

<sup>&</sup>lt;sup>2</sup> 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.

<sup>&</sup>lt;sup>3</sup> 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.

| Table 7.3.1-6 Regulatory Framework for Discharges by Source Category  |                                      |  |
|---|--------------------------------------|--|
| Source Category Regulatory Tool   |                                      |  |
| On-site Sewage Disposal Systems (OSDS)  Waiver <sup>a</sup> of Waste Discharge Requirement 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 <sup>a</sup> of Waste Discharge Requirements   |                                      |  |
| Dairies Waiver <sup>a</sup> of Waste Discharge Requirements of Individual WDRs, as appropriate  |                                      |  |
| Equestrian Facilities Waiver <sup>a</sup> of Waste Discharge Requirements   |                                      |  |
| Aunicipal Runoff NPDES Permit   |                                      |  |
| Water Board retains the option of requiring individual waste discharge requirements or compliance with a discharge prohibition, as appropriate. |                                      |  |

## 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.

## 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 7.3.1-1) and load allocations (Table 7.3.1-3 and Table 7.3.1-4).

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 7.3.1-5. 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 7.3.1-7 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.

| Constituent                   | Location   | Frequency  | Sampling Entities  |
|-------------------------------|--|--|--|
| Tomales Bay                   | •  |  |  |
| Fecal Coliform <sup>a</sup>   | California Department Health Services designated primary water quality monitoring stations | Weekly for five weeks<br>beginning in January;<br>Monthly March –<br>December<br>Weekly for five weeks<br>during summer months | Shellfish Growers  |
| Tributaries                   |  |  |  |
| Fecal coliform<br>Stream Flow | Olema Creek<br>(tributary to<br>Lagunitas)   | Weekly for five weeks<br>beginning in January;<br>Monthly March -<br>December  Weekly for five weeks<br>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<br>Stream Flow | Lagunitas Creek  | Same as above  | Water Board, Salmon<br>Protection and Watershed<br>Network |
| Fecal coliform<br>Stream Flow | Walker Creek   | Same as above  | Water Board  |

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.

#### 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.

- 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?
- 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?
- 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?
- 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?
- How does estuarine mixing and dilution of tributary waters vary by flow and season?
- What is the relationship between precipitation, runoff, tributary loads, Bay coliform levels, and water quality exceedances and shellfish harvesting closures?
- 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.

## 7.3.2 Total Maximum Daily Load for Mercury in Walker Creek and Soulajule Reservoir

Walker Creek and Soulajule Reservoir, which is located in the Walker Creek watershed, are impaired by mercury. This TMDL applies to Soulajule Reservoir and the freshwater portions of Walker Creek. The goal of the TMDL is to establish and maintain environmental conditions that will support beneficial uses of these waters established in Chapter 2.

The following sections establish a concentration-based TMDL for mercury in the Walker Creek watershed, and prescribe actions and monitoring necessary to implement and maintain the TMDL. The numeric targets, allocations, and associated implementation plan will ensure that Walker Creek and Soulajule Reservoir attain applicable water quality standards and achieve the TMDL.

The TMDL allocations and implementation plan are designed to control the amount of mercury discharged to Walker Creek and from Soulajule Reservoir, and prescribe and promote actions to minimize the potential for mercury to be present in the toxic and bioavailable form, methylmercury. Effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed. The TMDL may be adapted as warranted.

### 7.3.2.1 Problem Statement

Walker Creek and Soulajule Reservoir are impaired because mercury adversely affects beneficial uses, including wildlife habitat and all uses supporting aquatic life.

- Mercury concentrations in Walker Creek exceed the mercury freshwater aquatic life acute toxicity objective established to protect aquatic organisms (Table 3.4).
- Terrestrial species that primarily or exclusively eat fish (such as piscivorous birds, the most sensitive wildlife species in the watershed) are at risk from exposure to mercury due to its tendency to bioaccumulate in the food web. Because mercury concentrations in Walker Creek fish are high enough to threaten the health of piscivorous birds, the narrative bioaccumulation objective (see Chapter 3) and numeric aquatic organism and wildlife mercury water quality objective (Table 3-4a) are not being met.
- Soulajule Reservoir is impaired because some fish in the reservoir exceed mercury levels considered safe for human consumption.
- The beneficial use aimed at protecting the health of people who choose to consume Soulajule Reservoir fish (REC1) is impaired and the narrative bioaccumulation water quality objective is not being met.
- In 2004, the California Office of Environmental Health Hazard Assessment issued an interim
  advisory recommending that people limit consumption of reservoir fish due to elevated mercury
  levels.

#### 7.3.2.2 Sources

The following sources have the potential to discharge mercury to surface waters in the Walker Creek watershed:

- Gambonini Mine site An inactive mercury mine and the largest mercury processing facility in the watershed. Mining waste was not properly contained on-site, and consequently the site discharged large quantities of mercury-laden sediments prior to cleanup (initiated in 1998).
- Soulajule Watershed and Reservoir Two abandoned mercury mines are located in this watershed. Soulajule Reservoir discharges into Walker Creek just downstream of the Gambonini Mine drainage.
- **Downstream depositional features** Mercury-laden sediments in depositional areas (creek beds, banks, and floodplains) downstream of the mercury mines, which discharge mercury to the creek during storms.
- **Background** Mercury is present at low concentrations throughout the watershed. Background levels account for atmospheric deposition and naturally occurring mercury found in the watershed's soils. The Walker Creek watershed background suspended sediment mercury concentration is 0.2 mg mercury per kg dry sediment.

## 7.3.2.3 TMDL Targets

• To protect wildlife and rare and endangered species, the mercury concentration in fish consumed by piscivorous birds shall not exceed 0.05 mg mercury per kg fish, measured in whole fish 5–15 cm in length, average wet weight nor shall it exceed 0.1 mg mercury per kg fish, measured in

whole fish 15-35 cm in length, average wet weight. The goal of these targets, which are consistent with the bioaccumulation objective in Chapter 3, is to ensure that controllable water quality factors do not cause detrimental mercury concentrations in Walker Creek and Soulajule Reservoir wildlife.

- To protect aquatic organisms, water column mercury concentrations shall not exceed the water quality objective of  $2.4 \mu g/l$  (one-hour average).
- To protect humans who consume Soulajule Reservoir and Walker Creek fish (assuming future conditions allow for the consumption of Walker Creek fish), water column mercury concentrations shall not exceed the California Toxics Rule (CTR) criterion of 0.050  $\mu$ g/l (averaged over a 30-day period).

# 7.3.2.4 Allocations and Total Maximum Daily Load

The TMDL for Walker Creek is 0.5 mg mercury per kg suspended sediment and the TMDL for Soulajule Reservoir is 0.04 ng dissolved methylmercury per liter water. Concentration-based load allocations for Walker Creek and Soulajule Reservoir mercury sources are shown in Table 7.3.2-1.

Table 7.3.2-1 TMDL Mercury Wasteload and Load Allocations

| Source   | Wasteload Allocation                      | Load Allocation                                 |
|--|---|---|
| Gambonini Mine site NPDES Permit no. CAS000001 | 5 mg mercury per kg<br>suspended sediment |   |
| Soulajule watershed and                        |   | 0.04 ng dissolved methylmercury per liter water |
| Reservoir                                      |   | 0.5 mg mercury per kg suspended sediment        |
| Downstream depositional features <sup>1</sup>  |   | 0.5 mg mercury per kg suspended sediment        |
| Background <sup>2</sup>                        |   | 0.2 mg mercury per kg suspended sediment        |

<sup>&</sup>lt;sup>1</sup> Applies to sediment released from depositional features (creek beds, banks, and floodplains) downstream of the Gambonini Mine and Soulajule Reservoir.

## 7.3.2.5 Implementation Plan

The implementation plan builds upon previous and ongoing successful efforts to reduce mercury loads in Walker Creek and its tributaries. Table 7.3.2-2 contains the required implementation measures for each source. It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

<sup>&</sup>lt;sup>2</sup> The background allocation applies to all areas in the Walker Creek watershed outside of the influence of the Gambonini Mine site or Soulajule Reservoir.

Table 7.3.2-2 Implementation Measures for Walker Creek Mercury TMDL

| Source  | Action   | Implementing<br>Parties                         | Completio<br>n Date |
|---|--|---|---------------------|
|   | Apply for coverage under the State of California's Industrial Stormwater General Permit  | Gambonini                                       |                     |
| Gambonini<br>Mine Site  | Submit to the Water Board for approval a Stormwater Pollution Prevention Plan (SWPPP), implementation schedule, and monitoring plan  | Mine Site<br>owner(s)                           | 2007                |
| Reservoir  Sausal Creek, and 2) develop and implement methylmercury production controls necessary to attain both in-reservoir and downstream TMDL targets  Water Di |  | Marin Municipal<br>Water District               | 2009                |
|   | Applicants seeking coverage under waste discharge requirements (WDRs) or waivers of WDRs to control pathogens, nutrients, or sediments discharges in the Walker Creek watershed shall incorporate management practices that minimize mercury discharges and methylmercury production | All creekside property owners downstream of     | 2009                |
| Downstream  | All projects regulated under Clean Water Act Section 401 shall include provisions to minimize mercury discharges and methylmercury production  | Gambonini<br>Mine and<br>Soulajule<br>Reservoir |                     |
| Depositional<br>Features  | Comply with conditions of Marin County's Creek Permit Program  |   |                     |
|   | Update Marin County's Creek Permit Guidance for Unincorporated Areas of Marin to include specific guidance for projects in areas that may contain mercury-enriched sediments   | County of<br>Marin                              | 2008                |

## Cost Estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control plan, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141). We estimate that 100 percent of the downstream depositional areas can be considered grazing lands. Costs estimated for reducing mercury discharges and methylmercury production on grazing lands are \$1.5 to 2.5 million over a ten-year period. These costs are associated with reducing sediment discharges and enhancing habitat conditions on Walker Creek and its tributaries. Considering potential benefits to the public in terms of habitat restoration and water quality, we expect that a significant portion of the costs will be paid for with public funds.

## **Evaluation and Monitoring**

Water Board staff will conduct water quality monitoring to evaluate mercury concentrations in Walker Creek and its tributaries as part of the Surface Water Ambient Monitoring Program (SWAMP). Marin

Municipal Water District will conduct water quality monitoring to evaluate mercury concentrations in both Soulajule Reservoir and reservoir discharges to Arroyo Sausal Creek. 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 this program. The main objectives of the monitoring are:

- Assess attainment of TMDL targets and load allocations
- Evaluate spatial and temporal water quality trends
- Refine understanding of mercury loading in downstream depositional areas
- Refine understanding of methylmercury production and bioaccumulation in Soulajule Reservoir
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions

Table 7.3.2-3 presents locations in the Walker Creek watershed for baseline water quality monitoring. These sites will be monitored for suspended particulate, methyl- and total mercury concentrations during the wet and dry seasons. Fish tissue mercury concentrations will be monitored to aid in understanding mercury and the food web. Mercury concentrations in fish of the size typically consumed by wildlife and humans will be monitored in Soulajule Reservoir to assess progress towards attaining the wildlife and human health target. Wet season sampling will focus on characterizing conditions during peak flow events. SWAMP monitoring will be conducted based on availability of funds.

Walker Creek Ranch is considered an "integration" site for the watershed. Water quality data collected at Walker Creek Ranch integrates Salmon Creek background concentrations with loads from the Gambonini Mine Site, Soulajule Reservoir, and some downstream depositional features. Mercury levels in 5–15 cm fish in Walker Creek will be monitored every five years at Walker Creek Ranch to assess progress towards attaining the wildlife target. In addition, the Water Board, in cooperation with the United States Geological Survey, maintains a continuous data recorder at Walker Creek Ranch that monitors suspended sediment and particulate mercury concentrations in Walker Creek.

Five years after adoption of this TMDL, the Water Board will evaluate monitoring results and assess progress made toward attaining targets and load allocations. Beginning in 2012 and approximately every five years thereafter, the Water Board will evaluate site specific, sub-watershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.3.2-2.

Table 7.3.2-3. Baseline Monitoring Sites

| Salmon Creek, upstream of the Gambonini Mercury Mine Site |  |  |
|---|--|--|
| Walker Creek at Walker Creek Ranch                        |  |  |
| Walker Creek at Highway 1                                 |  |  |
| Chileno Creek downstream of the inactive Chileno Mine     |  |  |
| Soulajule Reservoir                                       |  |  |
| Arroyo Sausal Creek downstream of Soulajoule Reservoir    |  |  |

### Adaptive Implementation

Approximately every five years, the Water Board will review the Walker Creek Mercury TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. At a

minimum, the following questions will be incorporated into the reviews. Additional questions will be developed in collaboration with stakeholders during each review cycle.

- Are Walker Creek and its 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 should the implementation actions or allocations be modified?
- What are the pollutant loads for the various sources? Have these loads changed over time? How
  do they vary seasonally? How might source control measures be modified to improve load
  reduction?
- What wetland and creek restoration methods should be used to minimize mercury discharges and methylmercury production while enhancing and restoring habitat values?
- Are wildlife feeding in Soulajule Reservoir at risk? If so, how can the Reservoir be managed to reduce this risk?
- Does additional sediment, water column, or fish tissue total or methylmercury data support our understanding of linkages in the watershed or suggest an alternative allocation strategy?
- 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?

Reviews will be coordinated through the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Walker Creek is also impaired.

# 7.4 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SAN MATEO COASTAL BASIN (SEE FIGURE 2-4)

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# 7.5 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE CENTRAL BASIN (SEE FIGURE 2–5)

## 7.5.1 Richardson Bay Pathogens Total Maximum Daily Load (TMDL)

The following sections establish the TMDL for pathogens in Richardson Bay. The numeric targets, load allocations, and implementation plan are designed to support and protect the Bay's designated beneficial uses, water contact recreation and shellfish harvesting. The TMDL includes actions for adaptive implementation to evaluate the effectiveness of implementation actions, monitor progress toward targets, and review the scientific understanding pertaining to pathogens, which may result in modifying the TMDL in the future.

#### 7.5.1.1 Problem Statement

Richardson Bay is impaired by pathogens. Monitoring results indicate that the Bay exceeds bacteria water quality objectives for shellfish harvesting (e.g., clam, mussel, and oyster harvesting), and water contact recreation (swimming, fishing); Table 3-1). The presence of pathogens is inferred from high concentrations of fecal coliform bacteria, a commonly used indicator of human pathogenic organisms.

Therefore, the beneficial uses of shellfish harvesting and recreational water contact are not fully supported.

#### 7.5.1.2 Sources

Pathogen sources are identified based on elevated coliform bacteria (pathogen indicator) levels downstream or in the vicinity of identified land uses or facilities and from documentation of inadequately treated human waste discharges. If not properly managed, the following source categories have the potential to discharge pathogens to Richardson Bay: sanitary sewer systems, stormwater runoff, houseboats, and vessels.

- High coliform levels detected downstream of storm drains, and the increase in the number of wet season exceedances as compared to the number of dry season exceedances, point to stormwater runoff as a potential pathogen source.
- Documentation of sanitary sewer overflows in Richardson Bay area municipalities suggests that sanitary sewer systems are a potential source of pathogens to the Bay.
- Consistently high coliform levels in houseboat and vessel marinas indicate that houseboat and vessel marinas' failing sewage collection systems are potential sources of pathogens.

Bacteria levels are low at monitoring sites that contain wildlife but are minimally impacted by human activities. This suggests that wildlife may not be a significant, widespread potential source of pathogens in Richardson Bay. Wildlife may be a significant source on an intermittent, localized basis.

## 7.5.1.3 Numeric Targets

The numeric targets (desired future long-term conditions) proposed for pathogen indicators in Richardson Bay are presented in Table 7.5.1-1.

| Table 7.5.1−1. Numeric Targets for Richardson Bay <sup>a</sup> |  |  |
|--|--|--|
| Beneficial Use   | Numeric Target   |  |
| Shellfish Harvesting   | Median fecal coliform density <sup>b</sup> < 14 (MPN <sup>c</sup> /100 mL)  90th percentile fecal coliform density < 43 (MPN/100 mL)   |  |
| Water Contact Recreation                                       | Geometric mean fecal coliform density < 200 90th percentile fecal coliform density < 400 Geometric mean Enterococci density < 35 CFU <sup>d</sup> /100 mL 90th percentile Enterococci density < 104 CFU/100 mL |  |

- a. Based on a minimum of five consecutive samples equally spaced over a 30-day period
- b. "Density" refers to the number of bacteria in a given volume of water (U.S. EPA, 1986, 2002, 2003). The term is analogous to "concentration," which refers to the mass of chemical pollutant in a given volume of water. "Bacterial density" and "bacterial concentration" are sometimes used interchangeably.
- c. Most Probable Number (MPN) is a statistical representation of the standard coliform test results.
- d. CFU stands for colony forming unit (e.g., as in number of bacterial colonies)

The bacterial density targets are based on the Basin Plan's shellfish harvesting and water contact recreation water quality objectives for fecal coliform and on U.S. EPA's recommended Enterococci criteria for water contact recreation in salt water.

## 7.5.1.4 Total Maximum Daily Load

Table 7.5.1-2 shows Richardson Bay's density-based pathogens TMDL, expressed as fecal coliform bacteria concentrations.

| Table 7.5.1-2. Total maximum daily load for pathogen indicators (fecal coliforms) for Richardson Bay  |  |  |
|---|--|--|
| Indicator Parameter TMDL  |  |  |
| Fecal coliform  Median <sup>a</sup> < 14 MPN/100 mL  90th Percentile <sup>b</sup> < 43 MPN/100 mL   |  |  |
| a. Based on a minimum 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. |  |  |

#### 7.5.1.5 Load Allocations

Density-based fecal coliform allocations for each potential pathogen source category in Richardson Bay are presented in Table 7.5.1-3. Each discharger in the Richardson Bay watershed is responsible for meeting its source category allocation. All potential dischargers are also responsible for complying with applicable waste discharge requirements, or waste discharge prohibitions (Table 4-1, Prohibitions 5, 15, and 18).

All discharges of raw or inadequately treated human waste, including sewage from vessels, are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

| Table 7.5.1-3 Density-Based Pollutant Wasteload and Load Allocations <sup>a</sup> for Richardson Bay |                                  |  |  |
|--|----------------------------------|--|--|
| Octomorical  |                                  | Wasteload and Load Allocations Fecal Coliform (MPN/100 mL) |  |
| Categorical Pollutant Source   | For Direct Discharges to the Bay |  |  |
|  | Median <sup>b</sup>              | 90 <sup>th</sup> Percentile <sup>c</sup>                   |  |
| Stormwater Runoff <sup>d</sup>   | <14                              | < 43   |  |
| Wildlife <sup>e</sup>  | <14                              | < 43   |  |
| Sanitary Sewer Systems   | 0                                | 0  |  |
| Houseboats   | 0                                | 0  |  |
| Vessels (Recreational, Live-aboard, Anchor-out Boats)  | 0                                | 0  |  |

<sup>&</sup>lt;sup>a.</sup> These allocations are applicable year-round.

#### 7.5.1.6 Implementation Plan

The Richardson Bay Pathogens TMDL Implementation Plan builds upon previous and ongoing successful efforts to reduce potential pathogen loads in Richardson 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, and human waste discharge prohibitions (Table 4-1, Prohibitions 5, 15, and 18).

Table 7.5.1-4 lists the required implementation measures for the source categories listed in Table 7.5.1-3. These measures include evaluation of operating practices, identification of comprehensive, site-specific pathogens control measures and an associated implementation schedule, and submittal of progress reports to the Water Board documenting actions taken.

<sup>&</sup>lt;sup>b.</sup> Based on a minimum of five consecutive samples equally spaced over a 30-day period.

<sup>&</sup>lt;sup>c</sup> No more than 10% of total samples during any 30-day period may exceed this number.

d. Wasteload allocation for discharges from municipal separate storm sewer systems (NPDES Permit Nos. CAS000004 and CAS00003).

e. Wildlife is not believed to be a readily controllable source of pathogens; therefore, no management measures are required.

|  | Completion<br>Dates | As specified in<br>applicable WDR<br>permit   | As specified in approved stormwater management plan and in applicable NPDES permit                          |  |  |
|--|---------------------|---|---|--|--|
| ation measures for the Richardson Bay pathogens TMDL | Action              | <ol> <li>Comply with the Statewide General Waste Discharge Requirements for<br/>Sanitary Sewer Systems.</li> </ol>  | 1. Implement applicable stormwater management plan.   | <ol> <li>Update/amend applicable stormwater management plans, as appropriate,<br/>to include specific measures to reduce pathogen loading, including<br/>additional education and outreach efforts, and installation of additional pet<br/>waste receptacles.</li> </ol> | <ol> <li>Report progress on implementation of pathogen reduction measures to<br/>Water Board.</li> </ol> |
| Table 7.5.1-4 Trackable implementati                 | Implementing Party  | Marin County Sanitary District No. 5, Sewerage Agency of Southern Marin, Tamalpais Community Services District, City of Mill Valley, Homestead Valley Sanitary District, Alto Sanitary District, Almonte Sanitary District, City of Sausalito, Sausalito Marin City Sanitary District, Richardson Bay Sanitary District | Marin County, City of<br>Sausalito, City of Mill<br>Valley, City of Tiburon, City<br>of Belvedere, Caltrans |  |  |
| <b>Table 7.5.</b>                                    | Source<br>Category  | Sanitary Sewer Systems  | Stormwater Runoff   |  |  |

| Table 7.5.         | I-4 Trackable implement          | Table 7.5.1-4 Trackable implementation measures for the Richardson Bay pathogens TMDL   |                     |
|--------------------|----------------------------------|---|---------------------|
| Source<br>Category | Implementing Party               | Action  | Completion<br>Dates |
|                    | RBRA; Marin County; local cities | 1. Submit to the Executive Officer for approval a plan and schedule for 1) evaluating adequacy and performance of sewage collection systems (onboard sewage systems, pumps, sewer lines, etc.) for all houseboats in Richardson Bay, 2) biennial evaluation of sewage collection system operation and maintenance for all houseboats once they have been repaired/upgraded such that they do not discharge any sewage into the Bay. | July 2009           |
|                    |                                  | 2. Conduct evaluation per submitted plan.   | July 2010           |
| sts                |                                  | 3. Report progress on implementation of the plan to Water Board.  | Annually            |
| Ponsepo            | Houseboat marina owners          | <ol> <li>Submit to the Executive Officer for approval a plan and schedule for 1) repairing/upgrading identified substandard/malfunctioning sewage collection systems (onboard sewage systems, pumps, sewer lines, etc.) such that they do not discharge any sewage into the Bay, 2) long-term operation and maintenance of the systems.</li> </ol>  | July 2011           |
|                    |                                  | 2. Report progress on implementation of the plan to Water Board.  | Annually            |
|                    | Houseboat owners,                | <ol> <li>Repair/Upgrade identified substandard/malfunctioning sewage collection<br/>systems (onboard sewage systems, pumps, sewer lines, etc.) such that they<br/>do not discharge any sewage into the Bay.</li> </ol>  | July 2013           |
|                    | nouseboat marna owners           | <ol> <li>Operate and maintain sewage collection systems such that they do not<br/>discharge any sewage into the Bay.</li> </ol>   | Ongoing             |

| Source<br>Category | Implementing Party                     | Action  | Completion<br>Dates |
|--------------------|--|---|---------------------|
|                    | RBRA; Marin County; local cities       | 1. Submit to the Executive Officer for approval a plan and implementation schedule for 1) evaluating adequacy and performance of sewage collection systems (sewage dump stations, sewage pumpout stations, onboard sewage systems, sewer lines, etc.) for all vessel marinas and vessels with toilet facilities in Richardson Bay, 2) biennial evaluation of sewage collection system operation and maintenance for all vessel marinas and vessels once they have been repaired/upgraded such that they do not discharge any sewage into the Bay.   | July 2009           |
|                    |  | 2. Conduct evaluation per submitted plan.   | July 2010           |
|                    |  | 3. Report progress on implementation of the plan to Water Board.  | Annually            |
| s∣əssə∧            | Vessel marina owners                   | 1. Submit to the Executive Officer for approval a plan and schedule for 1) installing, as needed, an adequate number of sewage pumpout and dump stations. If no new sewage pumpout and dump stations are needed, provide an explanation as why they are not needed, 2) repairing/upgrading identified leaky/malfunctioning sewage collection systems (sewage dump stations, sewage pumpout stations, onboard sewage systems, sewer lines, etc.) such that they do not discharge any sewage into the Bay, 3) long-term operation and maintenance of the systems such that they do not discharge any sewage into the Bay. | July 2011           |
|                    |  | 2. Report progress on implementation of the plan to Water Board.  | Annually            |
|                    |  | <ol> <li>Repair/upgrade identified leaky/malfunctioning sewage collection systems<br/>(sewage dump stations, sewage pumpout stations, onboard sewage<br/>systems, sewer lines, etc.) such that they do not discharge any sewage into<br/>the Bay.</li> </ol>  | July 2013           |
|                    | Vessel owners, vessel<br>marina owners | 2. Operate and maintain sewage collection systems such that they do not discharge any sewage into the Bay.  | Ongoing             |
|                    |  | <ol> <li>Enroll in RBRA's mobile sewage collection and disposal service for all live-<br/>aboards (both anchor-outs and marina-berthed vessels).</li> </ol>   | July 2010           |

## Regulatory Framework

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under waste discharge requirements, waivers of waste discharge requirements, Basin Plan discharge prohibitions, or some combination of these tools. Municipal and highway stormwater runoffs are regulated under NPDES permits. Table 7.5.1-5 describes the regulatory mechanism by which dischargers in each source category will be regulated.

| Table 7.5.1-5. Regulatory Framework |   |  |  |  |
|-------------------------------------|---|--|--|--|
| Source Category                     | Regulatory Tool   |  |  |  |
| Sanitary Sewer Systems              | General WDR permit  |  |  |  |
| Stormwater Runoff                   | NPDES permit  |  |  |  |
| Houseboats                          | Existing prohibition of human waste discharge (Table 4-1, Prohibitions 5 and 15)      |  |  |  |
| Vessels                             | Existing prohibition of human waste discharge (Table 4-1, Prohibitions 5, 15, and 18) |  |  |  |

## Ongoing Water Quality Monitoring in Richardson Bay

Water quality monitoring will be conducted to assess water quality improvements and obtain additional information for further refinement of the TMDL. The main objectives of the ongoing monitoring program are to:

- Assess attainment of TMDL targets
- Evaluate spatial and temporal water quality trends in the Bay
- Obtain additional information about significant potential pathogen source areas
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions

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.

#### Adaptive Implementation

In 2013, the Water Board will evaluate monitoring results and assess progress toward attaining TMDL targets (Table 7.5.1-1) and load allocations (Table 7.5.1-3). The Water Board will also evaluate compliance with the trackable implementation measures specified in Table 7.5.1-4, as documented by submitted progress reports.

If evaluation and monitoring show that source control actions have been fully implemented throughout the watershed, but the TMDL targets (water quality objectives) are not attained, the Water Board may reevaluate the attainability/applicability of designated water quality objectives.

The Water Board will review the Richardson Bay Pathogens TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. At a minimum, these reviews will aim to find answers to the following questions. Additional questions may be developed in collaboration with stakeholders.

- 1. Is Richardson Bay progressing toward TMDL targets? If progress is unclear, how can monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions be modified?
- 1. What are the pollutant contributions for the various source categories? How have these contributions changed over time? How do they vary seasonally? How might source control measures be modified to improve load reduction? If the answers to these questions are not clear, how can monitoring efforts be modified to answer these questions?
- 2. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, or implementation actions? If so, how should the TMDL be modified?

Modifications to the targets or implementation plan will be incorporated into the Basin Plan via an amendment process.

# 7.6 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SOUTH BAY BASIN (SEE FIGURE 2–6)

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# 7.7 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SANTA CLARA BASIN (SEE FIGURE 2-7)

# 7.7.1 Total Maximum Daily Loads for Mercury in Waters of the Guadalupe River Watershed

The following sections establish TMDLs for mercury in impaired waters of the Guadalupe River watershed. These TMDLs and associated allocations implement the mercury water quality objectives in waters of the Guadalupe River watershed listed in Table 3-4A.

These TMDLs address seven mercury-impaired waters: five waters on the 2006 303(d) list of impaired waters, Guadalupe Reservoir, Calero Reservoir, Guadalupe Creek, Alamitos Creek, and the Guadalupe River upstream of tidal influence; and two additional waters, Almaden Reservoir and Lake Almaden, which are also impaired by mercury.

These TMDLs are closely integrated with the San Francisco Bay mercury TMDL, which addresses the lower portion of the watershed (from tidal influence to open Bay water, including the Guadalupe River below about Highway 237, both Guadalupe and Alviso sloughs, and the former salt ponds adjacent to these sloughs). Implementation actions in the Guadalupe River watershed TMDLs implementation plan implement the legacy mercury allocation of the San Francisco Bay mercury TMDL to the Guadalupe River watershed.

### 7.7.1.1 Problem Statement

Fish downstream of the New Almaden Mining District have extremely high concentrations of mercury in their tissues. As of 2004, Guadalupe Reservoir had the highest recorded fish mercury concentrations in California—about 20 times higher than the U.S. EPA methylmercury criterion. To protect the health of humans who consume fish that may be contaminated by mercury, in 1987 Santa Clara County issued a fish consumption advisory warning people not to eat any fish from Guadalupe, Almaden and Calero reservoirs, Guadalupe and Alamitos creeks, the Guadalupe River, and percolation ponds along the river and creeks.

Terrestrial wildlife that primarily or exclusively eat fish (such as piscivorous birds, the most sensitive wildlife species in the watershed) are at risk from mercury. Because mercury concentrations in fish in waters downstream of the New Almaden Mining District exceed both the narrative bioaccumulation objective (see Section 3.3.21) and the numeric aquatic organism and wildlife mercury water quality objectives (Table 3-4A) the health of piscivorous birds is threatened. Beneficial uses of waters in the watershed that are impaired by mercury are water contact recreation (due to human consumption of fish), wildlife habitat, and preservation of rare and endangered species.

#### 7.7.1.2 Sources

Mercury mining waste is the largest source of mercury to waters of the Guadalupe River watershed and San Francisco Bay. Mercury is a legacy pollutant from the California Gold Rush, when cinnabar mines in the Central Coast Ranges produced the mercury used to extract gold from the Sierra Nevada. The world's fifthlargest mercury mine was the historic New Almaden Mercury Mining District, located in the headwaters of the Guadalupe River watershed.

Current sources of mercury in the Guadalupe River watershed include 1) mercury mining waste, 2) reservoirs, lakes, and shallow impoundments, where mercury is converted to methylmercury, 3) urban stormwater runoff, 4) nonurban stormwater runoff, and 5) atmospheric deposition.

## 1) Mercury mining waste

Mercury mining waste is found at historic mine sites and downstream of them, at three categories of locations:

- **a) New Almaden Mining District and Guadalupe Mine**. The New Almaden Mining District includes the following mines and their associated processing areas and mining wastes:
  - New Almaden Mine (Mine Hill, Cora Blanca, Harry, Velasco, Central stope, Victoria, North Randol, South Randol, San Francisco, Santa Mariana, and San Pedro-Almaden mines)
  - America Mine

- Providencia Mine
- Enriquita Mine
- San Antonio Mine
- San Mateo Mine
- Senador Mine
- Deep Gulch placer cinnabar deposit

Guadalupe Mine is located on Los Capitancillos Ridge contiguous with the New Almaden Mining District, but because of separate ownership, it has retained a distinct name. Because mining waste was not contained on these mine sites, the wastes continue to erode and discharge large quantities of mercury-laden sediments to streams in the watershed.

- b) Santa Teresa and Bernal mercury mines. These much smaller, less productive mercury mines are located within the Guadalupe River watershed outside of the New Almaden Mining District. These mines include the mine sites, their associated processing areas, and mining wastes.
- c) Depositional areas. Depositional areas downstream of mercury mines accumulate mercury mining waste and include creek beds, banks, and floodplains, percolation ponds, and shallow impoundments. Impoundments are slow-moving water bodies that form behind engineered structures and anthropogenic alterations to the landscape that pond water. Depositional areas also accumulate mercury from other sources, such as urban stormwater runoff and atmospheric deposition. Depositional areas discharge mercury mining waste (in the form of mercury-laden sediment) to surface waters during periods of erosive flows.

- 2) Reservoirs and lakes. Reservoirs and lakes (deep impoundments) undergo thermal stratification in the dry season. Thermal stratification increases the conversion of inorganic mercury to methylmercury, a bioaccumulative toxin, in the deep, cold waters of a reservoir or lake's hypolimnion. In the dry season, reservoirs and lakes discharge elevated methylmercury concentrations to downstream waters.
- *3) Urban stormwater runoff.* Urban stormwater runoff contains mercury from controllable urban sources, such as improperly discarded fluorescent lamps, electrical switches, thermostats, thermometers, and other mercury-containing devices; historical and ongoing industrial activities; and naturally occurring mercury in soil. Mercury in urban stormwater runoff also results in part from atmospheric deposition to the land surface.
- *4) Nonurban stormwater runoff.* Nonurban stormwater runoff contains mercury from atmospheric deposition to the land surface, and from naturally occurring mercury in soil.
- *5) Atmospheric deposition.* Mercury emissions from many industrial processes are widely dispersed in the atmosphere and deposit directly on the land and water surface. Mercury deposition from the atmosphere is minimal relative to other loads in the watershed.

## 7.7.1.3 Targets

The numeric TMDL targets are the fish-tissue water quality objectives from Table 3-4A designed to protect aquatic organisms and wildlife. They are also protective of human health. The targets are:

- 0.05 mg methylmercury per kg fish, average wet weight concentration measured in whole trophic level 3 fish 5–15 cm in length, and
- 0.1 mg methylmercury per kg fish, average wet weight concentration measured in whole trophic level 3 fish >15–35 cm in length.

## 7.7.1.4 Total Maximum Daily Loads

The TMDLs, shown in Table 7.7.1-1, are expressed as methylmercury and mercury concentrations in water and sediment.

| Table 7.7.1-1: Total Maximum Daily Loads |  |  |  |
|--|--|--|--|
| Waters                                   | TMDLs  |  |  |
| Creeks and river:                        |  |  |  |
| Guadalupe Creek                          | 0.2 mg mercury per kg suspended  |  |  |
| Alamitos Creek                           | sediment (dry wt., annual median)  |  |  |
| Guadalupe River                          |  |  |  |
| Reservoirs and lakes:                    | 1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) |  |  |
| Guadalupe Reservoir                      |  |  |  |
| Almaden Reservoir                        | ny ponininon)  |  |  |
| Calero Reservoir                         |  |  |  |
| Lake Almaden                             |  |  |  |

## 7.7.1.5 Load and Wasteload Allocations

Concentration-based pollutant allocations by source category, equal to the TMDLs in Table 7.7.1-1, are shown in Table 7.7.1-2.

Table 7.7.1-2: Load and Wasteload Allocations

| Source  | Load Allocation   | Wasteload Allocation   |
|---|---|--|
| Total Mercury Sources:  |   |  |
| Mercury mining waste discharged from the<br>New Almaden Mining District, and Guadalupe,<br>Santa Teresa, and Bernal mercury mines   | 0.2 mg mercury per kg<br>erodible mercury mining<br>waste<br>(dry wt., median) <sup>a, b, c</sup> |  |
| Mercury-laden sediment discharged from depositional areas in Alamitos Creek, Guadalupe Creek, Los Gatos Creek downstream of Vasona Dam <sup>d</sup> , Canoas Creek, Ross Creek, Guadalupe River, tributaries to these creeks that drain mercury mines, and percolation ponds along these creeks | 0.2 mg mercury per kg<br>erodible sediment<br>(dry wt., median) <sup>a, b</sup>                   |  |
| Urban stormwater runoff discharges <sup>e</sup> : Santa Clara Valley Water District, County of Santa Clara, Town of Los Gatos, cities of Campbell, Monte Sereno, San José, Santa Clara, and Saratoga  |   | 0.2 mg mercury per<br>kg suspended sediment<br>(dry wt., annual median) <sup>f</sup> |
| Nonurban stormwater runoff discharges <sup>9</sup>  | 0.1 mg mercury per<br>kg suspended sediment<br>(dry wt., annual median) <sup>h</sup>              |  |
| Atmospheric deposition  | 0.02 mg mercury per<br>square meter of water<br>surface (per year) <sup>i</sup>                   |  |
| Methylmercury production in reservoirs and lakes  | j   |  |
| Guadalupe Reservoir, Almaden Reservoir,<br>Calero Reservoir, and Lake Almaden   | 1.5 ng total methylmercury per liter water (seasonal maximum, hypolimnion) <sup>b</sup>           | /  |

Notes continued on next page

#### Notes:

- Allocations to mercury mining waste and mercury-laden sediment are not cleanup standards. These allocations are equal to the mercury suspended sediment TMDLs in Table 7.7.1-1.
- <sup>b</sup> "Erodible" means material readily available for transport by stormwater runoff to surface waters.
- <sup>c</sup> The mercury mining waste allocation shall be measured in fines less than 63 microns in diameter.
- <sup>d</sup> This allocation applies to the Los Gatos Creek watershed between Vasona Dam and Lenihan Dam.
- Urban stormwater runoff is subject to an NPDES permit. At the time of adoption, the permit no, was CAS029718
- The urban stormwater runoff allocation is proportionally equivalent to the mass allocation (7.2 kg mercury per year) in the San Francisco Bay mercury TMDL. The urban stormwater runoff allocation is the fraction of the Santa Clara Valley Urban Runoff Pollution Prevention Program allocation attributed to the Guadalupe River watershed. The urban stormwater runoff allocation implicitly includes all current and future permitted discharges within the geographic boundaries of municipalities and unincorporated areas including, but not limited to, California Department of Transportation (Caltrans) roadways and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.
- <sup>9</sup> This allocation applies to waters that do not drain areas mined for mercury upstream of Lenihan Dam, Guadalupe Reservoir, Almaden Reservoir, and Calero Reservoir.
- h The nonurban stormwater runoff allocation is proportionally equivalent to the mass allocation (0.5 kg mercury per year) in the San Francisco Bay mercury TMDL. The nonurban stormwater runoff allocation is the fraction of the regionwide allocation attributed to the Guadalupe River watershed. The background mercury concentration in non-urban and non-mined areas is equal to the nonurban stormwater runoff allocation (0.1 mg mercury per kg suspended sediment), and includes mercury from both naturally occurring mercury in soil and atmospheric deposition.
- <sup>i</sup> The atmospheric deposition allocation to water surfaces in the Guadalupe River watershed is equal to the rate in the San Francisco Bay mercury TMDL.
- <sup>j</sup> The methylmercury allocation to reservoirs and lakes is equal to the methylmercury TMDL in Table 7.7.1-1.

## 7.7.1.6 Implementation Plan

This implementation plan:

- Implements these TMDLs, allocations, and the water quality objectives in Table 3-4A
- Builds upon past and ongoing successful efforts to reduce mercury loads both in the Guadalupe River watershed and to San Francisco Bay, and anticipates the development of new and innovative methylmercury control methods
- Encourages a coordinated watershed approach
- Reduces mercury loads in the watershed and simultaneously to the South Bay Salt Pond Restoration Project adjacent to Alviso Slough and to San Francisco Bay
- Reduces methylmercury production in the watershed, and reduces the risks from methylmercury exposure to both humans and wildlife.

The Guadalupe River watershed mercury TMDLs implementation plan will proceed in two phases, beginning [effective date of the amendment], with targets to be attained before 2029. The goals for the first phase include implementing effective source control measures for mining waste at mine sites; completing studies to reduce discharge of mining waste accumulated in Alamitos Creek; and completing studies of methylmercury and bioaccumulation controls in reservoirs and lakes, by December 31, 2018. The goal for the second 10-year phase of implementation is the attainment of the watershed fish tissue targets and the San Francisco Bay mercury TMDL allocations to urban stormwater runoff and legacy mercury sources in the Guadalupe River watershed, by December 31, 2028.

This plan establishes requirements for responsible parties to reduce or control mercury loads using available technology (see Mercury Source Control Actions). If methods under development to reduce methylmercury production and bioaccumulation prove feasible and effective, this plan also requires responsible parties to implement proven methods in Phase I (see Methylmercury Production Control Actions). Monitoring of mercury loads, mercury and methylmercury concentrations in water and suspended sediments, and bioaccumulation will occur throughout both phases to ensure that mercury and methylmercury levels have declined and fish targets are attained (see Coordinated Watershed Monitoring Program). The adaptive implementation section describes the approach and schedule for evaluating and adapting the TMDLs and implementation plan as needed to assure water quality standards are attained.

## Mercury Source Control Actions

Actions are required to control mercury mining waste and urban runoff sources. This section specifies actions required to control discharges from sources to surface waters.

Mercury mining waste control actions are phased so that mercury discharges from upstream will be eliminated or significantly reduced before downstream projects are undertaken. Erosion control actions at mercury mines shall be completed within the first 10 years (Phase 1). Water Code Chapter 5.7 contains a program for public agencies and cooperating private parties, who are not otherwise legally responsible for abandoned mine lands, to reduce the threat to water quality caused by these lands without becoming responsible for completely remediating mining waste from abandoned mines. The Water Board encourages these parties to participate in the program.

Downstream erosion control actions shall be completed within the second 10 years (Phase 2). Implementation actions that reduce loads of mercury mining waste and/or mercury-laden sediment to

the waters of the Guadalupe River watershed downstream of dams will also count towards achieving the San Francisco Bay mercury TMDL allocation to legacy mercury sources in the Guadalupe River watershed.

The implementation plan for urban stormwater runoff, nonurban stormwater runoff, and atmospheric deposition source categories is contained in the San Francisco Bay mercury TMDL. Monitoring required in the Bay mercury TMDL for urban stormwater runoff is similar to the monitoring requirements herein. Consequently, the urban stormwater runoff permittees may find it is advantageous to participate in coordinated watershed monitoring. Urban stormwater runoff implementation actions in the Guadalupe River watershed that reduce loads of mercury to San Francisco Bay will also count towards achieving the Guadalupe TMDL allocation to the urban stormwater runoff source.

## Implementation Actions for Mercury Mines

The Water Board will implement load allocations for mercury mining waste discharged from the New Almaden Mining District and the Guadalupe, Santa Teresa, and Bernal mercury mines through Water Code §§ 13267 and 13304 orders to compel investigation, clean up and monitoring, as well as through Basin Plan Section 4.21.4 (*Mining Program Description*) to the extent applicable. Parties responsible for investigation, cleanup, and monitoring include, but are not limited to, current mine site property owners and prior mine owners and/or operators that have caused or permitted, or threaten to cause or permit, mercury to be discharged or deposited where it will probably be discharged into waters of the State and create a condition of pollution or nuisance. Except for the cleanup and restoration projects at Hacienda Furnace Yard (including immediately adjacent reaches in Alamitos Creek); Mine Hill; San Francisco Open Cut; Senador, Enriquita and San Mateo mines; Jacques Gulch; and Deep Gulch; the Water Board will issue the § 13267 no later than [six months from the effective date] and the § 13304 orders by June 30, 2011.

These orders will collectively require the responsible parties to:

- 1. Conduct a site investigation evaluating the erosion potential of mercury mining waste and the potential for seeps to discharge mercury from mining waste to surface waters. Submit the site investigation report for review and approval by the Executive Officer within the first two years of Phase 1, but no later than [two years from the effective date].
- Develop plans and schedules to control mercury mining waste discharges to surface waters.
   Submit plans and schedules for review and approval by the Executive Officer within 6 months of approval of the investigation report. Implement the approved plans in accordance with the approved schedule.
- 3. Cleanup and abate discharges of mercury mining waste within the 10-year duration of Phase 1. Submit a cleanup report for review and approval by the Executive Officer no later than December 31, 2018.
- 4. Monitor to evaluate the following:
  - a) effectiveness of erosion control measures
  - b) mercury loads discharged annually to waters of the State at the points of discharge
  - c) fish bioaccumulation of mercury in waters downstream of the discharge
  - d) mercury loads discharged annually to San Francisco Bay, and
  - e) answer the questions posed by special study 3b

Alternatively, the responsible parties may participate in a coordinated watershed monitoring program to address above monitoring requirements c) to e); see Coordinated Watershed Monitoring Program. The Water Board may consider waiving or reducing monitoring requirement b), on an individual basis, based on progress on abating discharges of mining waste and participation in an approved coordinated watershed monitoring program.

### Implementation Actions for Depositional Areas

The Water Board will implement load allocations to depositional areas, as defined above, in creeks and the Guadalupe River downstream of mercury mines through Clean Water Act § 401 certifications and/or waste discharge requirements to minimize discharge of mercury-laden sediment. Specifically, when projects are proposed in depositional areas that may result in sediment discharges and/or require § 401 certifications, the Water Board will require projects designed for channel stability and implementation of measures to minimize erosion. Additionally, it will impose monitoring and reporting requirements to demonstrate the effectiveness of erosion control measures in floodplains, creek banks, creek beds, and shallow impoundments.

Examples of projects subject to these requirements include riparian habitat restoration and creek bank stability projects by the District and creekside property owners. The District may also propose projects in shallow impoundments, which will be regulated through the existing § 401 certifications and waste discharge requirements for the District's Stream Maintenance Program. The Water Board will issue § 401 certifications and/or waste discharge requirements to the District for percolation pond operations and maintenance activities unless actions are satisfactorily undertaken on a voluntary basis.

The Water Board's strategy for Alamitos Creek, which is highly polluted with mercury mining waste, is to encourage a cooperative effort among the District, local agencies, and creekside property owners to undertake a comprehensive creek bank stability and habitat restoration project. The Water Board encourages the District to be the technical lead for this project, and to seek funding for it. The Water Board will identify mercury cleanup as a grant funding priority for the San Francisco Bay Region. Where necessary, the Water Board will invoke its cleanup authority to compel upstream dischargers who initially discharged mercury mining waste into depositional areas, to cleanup and abate mercury mining waste. Creekside property owners are responsible to provide reasonable access to the creek for project studies, construction, and monitoring, and to not take actions on their property that worsen the discharge of mercury mining waste into the creek. The Water Board urges the District and its partners to complete studies by December 31, 2016; submit plans and schedules for review and approval by the Executive Officer by December 31, 2018; and complete and report on the project within the 10-year duration of Phase 2, by December 31, 2028.

#### Implementation Actions for Urban Stormwater Runoff

The San Francisco Bay mercury TMDL and urban stormwater NPDES permit require control programs for mercury and monitoring (mercury is a pollutant of concern). The stormwater permit allows for a coordinated and collaborative watershed monitoring program. Urban runoff permittees may participate in a coordinated watershed monitoring program to a) determine fish bioaccumulation of mercury in waters downstream of the discharge ("studies aimed at better understanding the fate, transport, and biological uptake of mercury discharged in urban runoff to San Francisco Bay and tidal areas"), and b) determine the loads of mercury discharged annually to San Francisco Bay; see Coordinated Watershed Monitoring Program. Additionally, if the Water Board determines that special study 3b is necessary, urban runoff permittees shall participate in special study 3b during the second 10-year phase of implementation (see "Special Studies" section below), to determine whether urban stormwater runoff

contributes to methylmercury production and bioaccumulation. If special study 3b is necessary and it is not undertaken voluntarily, the Water Board will compel permittees and others (see Special Studies) to undertake special study 3b through Water Code § 13267 requirements.

## Methylmercury Production Control Actions

The Santa Clara Valley Water District is a leading researcher in methods of controlling methylmercury production and bioaccumulation in reservoirs and lakes. This TMDL project anticipates that before the end of the implementation period (20 years), new methylmercury production controls in reservoirs and lakes will reduce methylmercury bioaccumulation both in the reservoirs and lakes, and downstream. However, if implementation actions in the reservoirs and lakes do not result in attaining targets downstream, the District shall evaluate and test additional methods of controlling methylmercury production and bioaccumulation in shallow impoundments.

### Implementation Actions for Reservoirs and Lakes

The District shall voluntarily conduct or cause to be conducted technical studies of methylmercury production and control. As necessary, the Water Board will compel the District to undertake technical studies of methylmercury production and control through Water Code § 13267 requirements. The responsible party for these studies and subsequent implementation actions is the owner and operator of the reservoirs and lakes, the District. Without methylmercury controls, construction and operation of reservoirs and lakes create nuisance conditions and discharges of methylmercury, which pollutes downstream waters.

The District shall continue to operate, maintain and improve the performance of, or replace with newer technology, existing methylmercury controls already in place on Lake Almaden, Almaden Reservoir, and Guadalupe Reservoir. The District shall install methylmercury controls in Calero Reservoir, if necessary, by December 31, 2017. The District shall report to the Water Board, by December 31 of odd years until directed to stop, on the operation and effectiveness of the methylmercury controls.

Where the Water Board finds it is feasible to reduce methylmercury production and/or bioaccumulation, the Water Board will issue cleanup and abatement orders to the District to undertake actions to reduce fish mercury concentrations to attain the targets.

The Water Code § 13267 requirements and/or cleanup and abatement orders will also require the District to a) determine the loads of mercury discharged annually to waters of the State at the points of discharge, b) monitor mercury in fish tissue, c) determine the loads of mercury discharged annually to San Francisco Bay, and to d) conduct the special studies described in the Monitoring Program below. Alternatively, the District may participate in a coordinated watershed monitoring program to address monitoring requirements b and c, and to address special study 3b); see Coordinated Watershed Monitoring Program. The Water Board may consider waiving or reducing monitoring requirement a), based on participation in an approved coordinated watershed monitoring program.

The Water Board will consider the need to control methylmercury production and bioaccumulation in shallow impoundments in the reviews described below under "Adaptive Implementation."

### Monitoring Program

The monitoring program encompasses:

 Monitoring to ensure continued effectiveness of erosion control measures to reduce discharges of mercury mining wastes, including mercury-laden sediment (applicable to mercury mines and depositional areas)

- 2. Monitoring of mercury load at the points of discharge to demonstrate progress in reducing loads (applicable to mercury mines, and reservoirs and lakes)
- 3. Fish tissue mercury monitoring to assess progress in attaining targets (applicable to mercury mines, and reservoirs and lakes)
- 4. Monitoring of mercury load to San Francisco Bay to assess progress in attaining the legacy and urban stormwater runoff mass load allocations assigned by the Bay mercury TMDL (applicable to mercury mines, urban stormwater runoff, and reservoirs and lakes)
- 5. Special studies to inform adaptive implementation of these TMDLs (applicable to mercury mines, urban stormwater runoff, and reservoirs and lakes)

The Water Board will compel the responsible parties to conduct monitoring through NPDES stormwater permits, Water Code § 13267 requirements, and/or cleanup and abatement orders, as described above, which will require the responsible parties to submit a (individual or coordinated watershed) monitoring plan no later than [one year from the effective date] for review and approval by the Executive Officer. Although the responsible parties are required to satisfy the monitoring requirements individually, the Water Board encourages a coordinated watershed approach particularly for mercury in fish tissue and loads to San Francisco Bay. The Water Board will collaborate with other resource agencies to coordinate fish monitoring, to leverage their expertise and, where possible, to achieve multiple objectives.

Prey fish (i.e., fish that wildlife consume) methylmercury concentrations shall be estimated as a) one hundred percent of the total mercury in eviscerated fish, or b) ninety-five percent of the total mercury in whole fish, or c) a percentage of methylmercury (as total mercury) in fish tissue based on scientific studies and upon approval of the Executive Officer of the Water Board. Large predator fish (i.e., fish that humans consume) methylmercury concentrations shall be estimated as one hundred percent of the total mercury in skinless filet samples. Water quality shall be monitored at the same time and location as fish collection for mercury species, nutrients, and general water quality parameters.

#### Coordinated Watershed Monitoring Program

The responsible parties may satisfy monitoring requirements 2–5 through a coordinated effort. Fish mercury monitoring is best undertaken in a coordinated effort, because fish integrate methylmercury over time and space. Monitoring of legacy (i.e., mercury mining waste) and urban stormwater runoff mercury discharges to San Francisco Bay is best undertaken in a coordinated effort, because this load to the Bay is from a combination of sources and responsible parties. The Water Board encourages a coordinated watershed approach to monitoring, and will consider reducing or waiving monitoring requirement 2 (mercury load at the points of discharge), based on progress in implementation and participation in coordinated watershed monitoring. To participate in the coordinated watershed monitoring program, participating parties shall submit a coordinated watershed monitoring plan no later than [one year from the effective date], for review and approval by the Executive Officer.

#### Special Studies

Additional studies may be needed to provide information to improve understanding of mercury cycling in the watershed, and to verify assumptions used in developing these TMDLs. Results of the studies will inform adaptive implementation of these TMDLs and the implementation plan. The special studies should address the following questions.

1. How do the reservoirs and lakes in the Guadalupe River watershed differ from one another? Factors to consider include, but are not limited to, area of connected wetlands, food web, water chemistry (phosphorus, pH, acid neutralizing capacity, and dissolved organic carbon), water

- level fluctuations, and infrastructure (outlet structure). <u>Do outlet samples adequately represent hypolimnetic methylmercury concentrations for each reservoir?</u> How significant are these differences?
- 2. Is it possible to increase the assimilative capacity for methylmercury in reservoirs and lakes? Is it feasible? If it is feasible, will this help to attain the fish tissue targets? How does increasing the assimilative capacity affect the food web: Is the resulting food chain multiplier from large (>15 cm) trophic level 3 (TL3) to large TL4 fish significantly different from 2? If it is significantly different, where and at what frequency should large predator fish (i.e., fish that humans consume) be monitored?

If the monitoring program has not already provided the information to answer these questions, the District shall voluntarily conduct or cause to be conducted studies 1 and 2, or equivalent or alternative studies with prior approval of the Water Board Executive Officer. As necessary, the Water Board will compel the District to undertake these studies in accordance with Water Code § 13267 requirements (see "Implementation Actions for Reservoirs and Lakes"). Completing study 1 within the first five years of Phase 1 (by December 31, 2013), and completing study 2 within the 10-year duration of Phase 1 (by December 31, 2018), would meet the following goal for the first phase of implementation: "completing studies of methylmercury and bioaccumulation controls in reservoirs and lakes".

- 3a. What effect do the reservoir and lake control measures have on methylmercury bioaccumulation downstream? Are the fish targets attained downstream?
- 3b. If not, what factors contribute to methylmercury production and bioaccumulation in creeks and rivers? Factors to consider include, but are not limited to, shallow impoundments, excess nutrients, stagnant pools, shade cover, and aquatic vegetation.

If the monitoring program has not already provided the information to answer these questions, the District shall voluntarily conduct or cause to be conducted study 3a, or equivalent or alternative studies with prior approval of the Water Board Executive Officer. As necessary, the Water Board will compel the District to undertake these technical studies in accordance with Water Code § 13267 requirements (see "Implementation Actions for Reservoirs and Lakes"). If the fish targets are not attained downstream by methylmercury controls in the reservoirs and lakes, the District together with the New Almaden Mining District and the Guadalupe, Santa Teresa and Bernal mercury mines responsible parties, and the urban stormwater runoff permittees shall conduct or cause to be conducted study 3b, or equivalent or alternative studies with prior approval of the Water Board Executive Officer, either voluntarily or in accordance with Water Code § 13267 or NPDES stormwater permit requirements (see above). Completing studies 3a and 3b within the first 5 years of Phase 2 (by December 31, 2023) would support the Water Board's effort to identify whether methylmercury production and bioaccumulation controls are necessary in shallow impoundments, in accordance with the adaptive implementation program.

- 4. Where the TL3 50–150 mm target is attained, is methylmercury in fish that Forster's terns consume (fish less than 50 mm in length), at or below 0.05 mg/kg? Where the TL3 >150–350 mm target is attained, is methylmercury in fish that ospreys consume (TL4 >150–350 mm target), at or below 0.20 mg/kg? If these assumptions pertaining to proportional bioaccumulation are not valid for this watershed, what monitoring should be conducted to support a revised water quality objective and target to protect piscivorous wildlife?
- 5. Where the larger TL3 target is attained (in fish >150-350 mm), is the smaller TL3 target also attained (fish 50-150 mm)? If so, how should the monitoring frequency for the smaller TL3 target be reduced?

If the monitoring program has not already provided the information to answer these questions, the Water Board will conduct studies 4 and 5. Completing study 4 within the 10-year duration of Phase 1 (by December 31, 2018), would provide timely information to support whether the water quality objectives require revision through the adaptive implementation process. The timing for study 5 is contingent upon the effectiveness of methylmercury controls.

### Adaptive Implementation

Adaptive implementation entails taking actions commensurate with the existing, available information, reviewing new information as it becomes available, and modifying actions as necessary based on the new information. Taking action allows progress to occur while more and better information is collected and the effectiveness of current actions is evaluated. Accordingly, these TMDLs will be implemented in phases starting with source controls at mine sites so that upstream mercury discharges will be eliminated or significantly reduced before downstream projects are undertaken.

The Water Board will adapt these TMDLs and the implementation plan to incorporate new and relevant scientific information, so that effective and efficient actions can be taken to attain TMDL allocations and targets. The Water Board recognizes that attaining the methylmercury allocation may be especially difficult because of the need for new and innovative control methods. The Water Board staff will present an annual progress report to the Water Board on implementation of the TMDL that includes evaluation of new and relevant information that becomes available through implementation actions, monitoring, special studies, and current scientific literature. Within ten years of the effective date of this TMDL project (by December 31, 2018), the Water Board will consider amending this TMDL project and implementation plan as necessary to ensure attainment of fish targets in a timely manner.

Reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities for stakeholder participation. Water Board staff will propose modifications to the targets, allocations, implementation plan actions, or the schedule in this Basin Plan amendment. At a minimum, answers to the following questions will be included in the reviews. Water Board staff will develop additional questions in collaboration with stakeholders during each review.

- Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should this TMDL project be modified?
- Is the watershed 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 should the implementation actions or allocations be modified?
- Does additional sediment, water column, or fish tissue mercury or methylmercury data support our understanding of linkages and food webs in the watershed? Does new data suggest an alternative allocation or implementation strategy?
- What are the current pollutant loads from the various sources? Have these loads changed over time? Are they meeting the allocations? How might source control measures be modified to further reduce loads?
- Are Water Board strategies to encourage and compel implementation actions effective? If not, how should the Water Board revise its strategies to reach the goal of attaining fish tissue targets within 20 years?
- Can the assimilative capacity for mercury in reservoirs and lakes be increased? If so, how can reservoirs and lakes be managed to reduce bioaccumulation? Should the implementation actions or allocations be modified? If so, how?

Are capital projects like the Lower, Downtown, and Upper Guadalupe Flood Control Projects
helping to meet TMDL allocations or are these projects causing increasing loads of mercury and
methylmercury to the Guadalupe River and San Francisco Bay? If the loads are increased over
pre-project conditions, how might the loads be reduced or their effects be mitigated?

# 7.8 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SAN PABLO BASIN (SEE FIGURE 2-8)

### 7.8 1 Sonoma Creek Pathogens Total Maximum Daily Load (TMDL)

Sonoma Creek and its tributaries are impaired by pathogens. The overall goal of this TMDL is to minimize human exposure to waterborne disease-causing pathogens and to protect uses of water for recreational activities such as wading, swimming, fishing, and rafting.

The most common sources of pathogens are wastes from warm-blooded animals, including humans, livestock, domestic pets, and wildlife. The following sections establish a density-based pathogen TMDL for Sonoma Creek and its tributaries, and identify actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based bacteria concentrations and prohibits discharge of raw or inadequately treated human waste. The implementation plan specifies actions necessary to protect and restore water contact recreation beneficial uses.

This TMDL strives to achieve a balance that allows ongoing human activities including agriculture and recreation to continue, while restoring and protecting water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, results of monitoring to track progress toward targets, and the scientific understanding of pathogens will be reviewed periodically, and the TMDL may be adapted to future conditions as warranted.

In addition to pathogens, both animal and human wastes contain nutrients that in excess pose a threat to aquatic ecosystem beneficial uses; Sonoma Creek is also listed as impaired by excess nutrients. By eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect the beneficial uses of the Sonoma Creek watershed's aquatic ecosystem, such as cold and warm freshwater habitat, and wildlife habitat. Controlling human and animal wastes discharges will also reduce risks from other harmful constituents such as steroids and pharmaceuticals.

#### 7.8.1.1 Problem Statement

Due to the presence of pathogens in Sonoma Creek and its tributaries, the beneficial uses of water contact and noncontact recreation are impaired. Waterborne pathogens pose a risk to human health. In ambient waters, the presence of human and animal fecal waste and associated pathogens is inferred from high concentrations of fecal coliform and *E. coli* bacteria. Bacteria levels in Sonoma Creek and its tributaries are higher than the bacteria water quality objectives established to protect people who swim, wade, and fish in these waters (Tables 3-1 and 3-2). Consequently, humans who recreate in Sonoma Creek and its tributaries are at risk of contracting waterborne disease.

#### 7.8.1.2 Sources

The following source categories have the potential to discharge pathogens to surface waters in the Sonoma Creek watershed:

On-site sewage disposal systems (septic systems)

- Sanitary sewer systems
- Municipal runoff
- Grazing lands
- Dairies
- Municipal wastewater treatment facility
- Wildlife

Water quality monitoring data indicate that on-site sewage disposal systems are potentially a significant pathogen source to Sonoma Creek downstream of the community of Kenwood. Municipal runoff and sanitary sewer lines are the primary pathogen sources in the urban areas. Livestock grazing and dairies are potentially significant pathogen sources in the more rural portions of the watershed.

Discharger monitoring reports from 2001-2005 indicate that the one municipal wastewater treatment facility is not a significant pathogen source. This facility is considered a potential source due to the possibility of spills or treatment system malfunction.

Wildlife are not a significant, widespread pathogen source, as evidenced by low indicator bacteria levels at sites that contain wildlife but are minimally impacted by human activities. Wildlife may be a significant source on a limited, localized basis.

## 7.8.1.3 Numeric Targets

The numeric water quality targets listed in Table 7.8.1-1 are derived from water quality objectives for coliform bacteria in contact recreational waters, and from U.S. EPA's bacteriological criteria (Tables 3-1 and 3-2). The last target, "zero discharge of untreated or inadequately treated human waste," is consistent with Discharge Prohibition 15 (Table 4-1). The zero human waste discharge target is necessary because human waste is a significant source of pathogenic organisms including viruses; and attainment of fecal coliform targets alone may not be sufficient to protect human health. These bacteria targets, in combination with the human waste discharge prohibitions, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

## Table 7.8.1-1 Water Quality Targets<sup>a</sup> for Sonoma Creek

E. coli density: Geometric mean < 126 CFU/100 mL<sup>b</sup>; 90<sup>th</sup> percentile < 409 CFU/100 mL<sup>c</sup>

Fecal coliform density<sup>d</sup>: Geometric mean < 200 CFU/100 mL<sup>b</sup>; 90<sup>th</sup> percentile < 400 CFU/100 mL<sup>c</sup>

Total coliform density<sup>d</sup>: Median < 240 CFU/100 mL<sup>b</sup>; no sample to exceed 10,000 CFU/100 mL

Zero discharge of untreated or inadequately treated human waste

#### 7.8.1.4 Total Maximum Daily Load

The TMDL, as indicated in Table 7.8.1-2, is expressed as density-based total coliform, fecal coliform, and *E. coli* bacteria limits.

<sup>&</sup>lt;sup>a</sup>These targets are applicable year-round.

<sup>&</sup>lt;sup>b</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period

<sup>&</sup>lt;sup>c</sup>No more than 10 percent of total samples during any 30-day period may exceed this number.

<sup>&</sup>lt;sup>d</sup>The water quality targets for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with *E.coli* based water quality objectives for contact recreation.

| Table 7.8.1-2 Total Maximum Daily Loads of Pathogen Indicators |
|--|
| for Sonoma Creek   |

| Indicator                   | TMDL (CFU/100 mL)  |
|-----------------------------|--|
| E. coli                     | Geometric mean < 126 <sup>a</sup> 90 <sup>th</sup> percentile < 409 <sup>b</sup> |
| Fecal coliform <sup>c</sup> | Geometric mean < 200 <sup>a</sup> 90 <sup>th</sup> percentile < 400 <sup>b</sup> |
| Total coliform <sup>c</sup> | Median < 240 <sup>a</sup> No sample to exceed 10,000                             |

<sup>&</sup>lt;sup>a</sup>Based on a minimum of five consecutive samples collected at approximately equa intervals over a 30-day period.

#### 7.8.1.5 Load Allocations

Density-based pollutant allocations for pathogen source categories are presented in Table 7.8.1-3. This table also presents the wasteload allocation for the single municipal wastewater discharger in the watershed, Sonoma Valley County Sanitation District, and for municipal runoff. Due to the inherent uncertainty in estimating pathogen loading from nonpoint sources and municipal runoff, allocations for these source categories incorporate a 10 percent margin of safety. Each entity in the watershed is responsible for meeting its source category allocation. All facilities are also responsible for meeting the requirements of applicable waste discharge requirements, waivers, or prohibitions.

All discharges of raw or inadequately treated human waste are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife. If wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program.

<sup>&</sup>lt;sup>b</sup>No more than 10 percent of total samples during any 30-day period may exceed this number.

<sup>&</sup>lt;sup>c</sup>The Total Maximum Daily Loads for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

Table 7.8.1-3 Density-Based Pollutant Load and Wasteload Allocations<sup>a</sup> for Dischargers of Pathogens in the Sonoma Creek Watershed

| Load Allocations <sup>a</sup>                                   |                                |  |                                |  |                             |                             |
|---|--------------------------------|--|--------------------------------|--|-----------------------------|-----------------------------|
|   | E. coli                        |  | Fecal coliform <sup>b</sup>    |  | Total coliform <sup>b</sup> |                             |
| Categorical Pollutant Source                                    | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile <sup>d</sup> | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile <sup>d</sup> | Median <sup>c</sup>         | Single<br>sample<br>maximum |
| On-site sewage disposal systems                                 | 0                              | 0  | 0                              | 0  | 0                           | 0                           |
| Sanitary sewer systems  | 0                              | 0  | 0                              | 0  | 0                           | 0                           |
| Grazing lands   | < 113                          | < 368  | < 180                          | < 360  | < 216                       | 9,000                       |
| Dairies   | <113                           | <368   | <180                           | <360   | <216                        | 9,000                       |
| Wildlife <sup>e</sup>   | < 113                          | < 368  | < 180                          | < 360  | < 216                       | 9,000                       |
| Wasteload Allocations <sup>a</sup>                              |                                |  |                                |  |                             |                             |
|   | E. coli                        |  | Fecal coliform <sup>b</sup>    |  | Total coliform <sup>b</sup> |                             |
| Categorical Pollutant<br>Source                                 | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile <sup>d</sup> | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile <sup>d</sup> | Median <sup>c</sup>         | Single<br>sample<br>maximum |
| Sonoma Valley County<br>Sanitation District<br>NPDES Permit No. | <126                           | <409   | <200                           | <400   | <240                        | 10,000                      |

<180

<360

<216

9.000

<368

<113

## 7.8.1.6 Implementation Plan

CA0037800

Municipal runoff (NPDES

Permit No. CAS00004)<sup>t</sup>

This implementation plan builds upon previous and ongoing successful efforts to reduce pathogen loads in Sonoma Creek and its tributaries, and requires actions consistent with the California Water Code (CWC Section 13000 et seq.); the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369) and its Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program; and the human waste discharge prohibition.

Table 7.8.1-4 contains the required implementation measures for each of the source categories listed in Table 7.8.1-3. These measures include evaluation of operating practices: development of comprehensive,

<sup>&</sup>lt;sup>a</sup>These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit. Load allocations and the wasteload allocation for municipal runoff reflect a 10 percent Margin of Safety.

<sup>&</sup>lt;sup>b</sup> The allocations for total and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal water quality objectives in the Basin Plan with E.coli based water quality objectives for contact recreation.

<sup>&</sup>lt;sup>c</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

<sup>&</sup>lt;sup>d</sup> No more than 10 percent of total samples during any 30-day period may exceed this number.

<sup>&</sup>lt;sup>e</sup> Wildlife are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

<sup>&</sup>lt;sup>f</sup> Municipal runoff permitees are: Sonoma County Water Agency, County of Sonoma, City of Sonoma, Sonoma Developmental Center, and any other entities designated per the criteria specified in NPDES General Permit No. CAS00004.

site-specific pathogen control measures and a corresponding implementation schedule: and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or to third parties if designated. These progress reports will serve as documentation that source reduction measures are being implemented.

It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under (WDRs), waiver of WDRs, Basin Plan prohibitions, or some combination of these tools. Table 7.8.1-5 specifies the regulatory framework for each discharger source category. The Water Board intends to work with stakeholders to develop conditions for waiving WDRs for grazing lands by 2009.

Table 7.8.1-4 Trackable Implementation Measures for the Sonoma Creek Pathogen Total Maximum Daily Load

| Source Category | Action   | Implementing Party  | Completion Dates                                     |
|-----------------|--|---|--|
| tic Systems)    | Submit to the Water Board Executive Officer for approval a plan and implementation schedule to evaluate septic system performance and correct deficiencies in septic systems identified as potentially discharging to surface waters. Priority should be given to systems identified as posing water quality risks | Sonoma County Permit and Resource<br>Management Department  | January 2008   |
| idəS) sme       | Report progress on implementation of septic system evaluation and repair program, as related to pathogen reduction   |   | January 2011 and<br>biennially thereafter            |
| osal Syste      | Comply with applicable County, Water Board, or State<br>Board requirements   | Septic system owners  | As specified in applicable requirement               |
| oqziQ əgswə     | Apply for coverage under the State Water Board's general WDRs for sanitary sewer systems. Comply with provisions of WDRs.  | Sonoma Valley County Sanitation District  | As specified in<br>general WDRs                      |
| 2 əJi2-nO       | Report progress on inspection and evaluation of sewer systems <sup>a</sup> . Priority should be given to areas identified as posing water quality risks.   |   | Annually   |
|                 | Submit a Report of Waste Discharge <sup>b</sup> 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 an implementation schedule for identified management measures              | Ranchers (landowners and lessees). These<br>Reports may be submitted individually or<br>jointly or through a third party <sup>c</sup> . | January 2010   |
| spue            | Comply with applicable WDRs, waiver conditions, or prohibitions  | Ranchers (landowners and lessees).  | As specified in applicable WDRs or waiver conditions |
| sd gnissaə      | Report progress on implementation of grazing-management measures that reduce animal waste runoff.  | Ranchers (landowners and leasees). These reports may be submitted individually or jointly through a third party°.                       | As specified in applicable WDRs or waiver of WDRs    |

| Š  | Source Category  | Action   | Implementing Party   | Completion Dates  |
|--|--|--|--|---|
|  |  | Comply with applicable WDRs or waiver of WDRs.   | Dairy Facility Owners  | As specified in applicable WDRs or waiver of WDRs.        |
|  | səinis⊡  | Report progress on implementation of management<br>measures that reduce animal waste runoff  |  | As specified in<br>applicable WDRs or<br>waiver of WDRs   |
|  | गेonuЯ l   | Comply with approved stormwater management plans and update/amend stormwater management plans as needed to include specific measures to reduce discharge of human and animal wastes  | Sonoma County Water Agency, County of<br>Sonoma, City of Sonoma, Sonoma<br>Developmental Center, and any other | As specified in<br>approved stormwater<br>management plan |
|  | sqiɔinuM   | Report progress on implementation of human and animal waste runoff reduction measures  | entities designated per the criteria specified<br>in NPDES General Permit No. CAS00004.                        | and in applicable<br>NPDES permit                         |
|  | Municipal<br>Wastewater<br>Discharges                                  | Comply with applicable NPDES permit.   | Sonoma Valley County Sanitation District<br>Facility   | As specified in<br>applicable NPDES<br>permit             |
| $\widehat{C}\widehat{\Omega}\widehat{a}$ | Reports may be incor<br>WDRs waiver conditic<br>While third parties me | Reports may be incorporated into annual SSMP audit reports.<br>WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.<br>While third parties may provide valuable assistance in TMDL implementation, the discharger is the entity responsible for compliance with the specified regulations and regulatory controls | ntity responsible for compliance with the specified regulatic  | ns and regulatory controls                                |

| Table 7.8.1–5 Regulatory Framework fo            | r Discharges by Source Category   |
|--|---|
| Source Category                                  | Regulatory Tool   |
| On-site sewage disposal systems (septic systems) | General waste discharge requirements (WDRs), individual WDRs, or waiver WDRs, as appropriate Prohibition of human waste discharge |
| Sanitary sewer systems                           | General WDRs or individual WDRs, as appropriate Prohibition of human waste discharge  |
| Grazing lands                                    | Waiver of WDRs <sup>b</sup>   |
| Dairies  | Waiver of WDRs or individual WDRs, as appropriate   |
| Municipal runoff                                 | NPDES permit  |
| Municipal wastewater discharges                  | NPDES permit  |

<sup>&</sup>lt;sup>a</sup>Regulatory tool(s) employed will be consistent with State Board regulatory actions.

## Cost estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control plan, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141).

The average annual program implementation cost to agricultural dischargers is estimated to range from \$35,000 to \$134,000 for the next ten years. These costs will be shared by Sonoma Creek watershed grazing land operators (approximately 10). 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 livestock control fencing along up to 25 percent of streams in grazing lands. 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. In addition to private funding, potential sources of financing include federal and state water quality grants and federal agricultural grants.

#### **Evaluation and Monitoring**

Beginning in 2011 and approximately every five years thereafter, the Water Board will evaluate site specific, subwatershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.8.1-4. In evaluating compliance with the trackable implementation measures, the Water Board will consider levels of participation for each source category as well as for individual dischargers (as documented by Water Board staff or third parties).

In addition to the programmatic monitoring described above, Water Board staff, in collaboration with stakeholders, will conduct water quality monitoring to evaluate *E. coli* concentration trends in Sonoma Creek and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7.8.1-1) and load allocations (Table 7.8.1-3). The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets
- Evaluate spatial and temporal water quality trends
- Further identify significant pathogen source areas

<sup>&</sup>lt;sup>b</sup>The Water Board retains the option of requiring general or individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.

- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions.
- Collect sufficient data to evaluate the costs of pathogen source control measures and the existence of other pollutant reduction benefits (e.g., nutrients or sediments), if any.

Table 7.8.1-6 presents locations for baseline water quality monitoring. Each site will be sampled for *E. coli* ten times each year. Five samples will be collected weekly during one 30-day period in each wet season (November through March) and one 30-day period in each dry season (May through September). 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. Additional monitoring will be conducted as needed if funds are available.

| Table 7.8.1-6 Baseline Monitoring Sites     |  |
|---|--|
| Sonoma Creek at Highway 12                  |  |
| Sonoma Creek Below Kenwood                  |  |
| Sonoma Creek at Sonoma Developmental Center |  |
| Sonoma Creek at Maxwell Park                |  |
| Sonoma Creek at Watmaugh Road               |  |
| Nathanson Creek at Nathanson Park           |  |
| Nathanson Creek at Watmaugh Road            |  |
| Schell Creek at Highway 121                 |  |

If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may consider whether the TMDL targets are attainable, and re-evaluate or revise the TMDL and allocations as appropriate. Alternatively, if the required actions are not implemented or are only partially implemented, the Water Board may consider regulatory or enforcement action against dischargers not in compliance.

#### Adaptive Implementation

Approximately every five years, the Water Board will review the Sonoma Creek Pathogen TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. 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 cycle.

- Are the Creek 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?
- 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?
- 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?

Reviews will be coordinated through the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the

Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Sonoma Creek watershed is also impaired.

## 7.8.2 Napa River Pathogens Total Maximum Daily Load (TMDL)

The Napa River and its tributaries are impaired by pathogens. The overall goal of this TMDL is to minimize human exposure to waterborne disease-causing pathogens and to protect uses of water for recreational activities such as wading, swimming, fishing, and rafting.

The most common sources of pathogens are wastes from warm-blooded animals, including humans, livestock, domestic pets, and wildlife. The following sections establish a density-based pathogen TMDL for the Napa River and its tributaries, and identify actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based bacteria concentrations and prohibits discharge of raw or inadequately treated human waste. The implementation plan specifies actions necessary to protect and restore water contact recreation beneficial uses.

This TMDL strives to achieve a balance that allows ongoing human activities including agriculture and recreation to continue, while restoring and protecting water quality. As outlined in the adaptive implementation section, the effectiveness of implementation actions, results of monitoring to track progress toward targets, and the scientific understanding of pathogens will be reviewed periodically, and the TMDL may be adapted to future conditions as warranted.

In addition to pathogens, both animal and human wastes contain nutrients that in excess pose a threat to aquatic ecosystem beneficial uses; the Napa River is also listed as impaired by nutrients. By eliminating the discharge of human waste and controlling the discharge of animal waste, this TMDL will also protect the beneficial uses of the Napa River watershed's aquatic ecosystem, such as cold and warm freshwater habitat, and wildlife habitat. Controlling human and animal waste discharges will also reduce risks from other harmful constituents such as pharmaceuticals and steroids.

#### 7.8.2.1 Problem Statement

Due to the presence of pathogens in the Napa River and its tributaries, the beneficial uses of water contact and noncontact recreation are impaired. Waterborne pathogens pose a risk to human health. In ambient waters, the presence of human and animal fecal waste and associated pathogens is inferred from high concentrations of fecal coliform and E. coli bacteria. Bacteria levels in the Napa River and its tributaries are higher than the bacteria water quality objectives established to protect people who swim, wade and fish in these waters (Tables 3-1 and 3-2). Consequently, humans who recreate in the Napa River and its tributaries are at risk of contracting waterborne disease.

#### 7.8.2.2 Sources

The following source categories have the potential to discharge pathogens to surface waters in the Napa River watershed:

- On-site sewage disposal systems (septic systems)
- Sanitary sewer systems
- Municipal runoff
- Grazing lands
- Confined animal facilities
- Municipal wastewater treatment facilities

#### Wildlife

Water quality monitoring data indicate that on-site sewage disposal systems are potentially a significant pathogen source, primarily in the Murphy Creek, Browns Valley Creek, and Salvador Channel subwatersheds. Sanitary sewer lines are a likely source, primarily in the Browns Valley Creek and Salvador Channel sub watersheds. Municipal runoff is a significant source in all urban areas, and livestock grazing and confined animal facilities are considered to be potential sources throughout the watershed.

Both discharger monitoring reports and in-stream water quality monitoring indicate that municipal wastewater treatment facility discharges are not significant pathogen sources in the Napa River watershed. These facilities are considered potential sources due to the possibility of spills or treatment system malfunction.

Wildlife are not a significant, widespread pathogen source, as evidenced by low indicator bacteria levels at sites that contain wildlife but are minimally impacted by human activities. Wildlife may be a significant source on a limited, localized basis.

## 7.8.2.3 Numeric Targets

The numeric water quality targets listed in Table 7.8.2-1 are derived from water quality objectives for coliform bacteria in contact recreational waters, and from U.S. EPA's bacteriological criteria (Tables 3-1 and 3-2). The last target, "zero discharge of untreated or inadequately treated human waste," is consistent with Discharge Prohibition 15 (Table 4-1). The zero human waste discharge target is necessary because human waste is a significant source of pathogenic organisms including viruses; and attainment of fecal coliform targets alone may not be sufficient to protect human health. These bacteria targets, in combination with the human waste discharge prohibitions, are the basis for the TMDL and load allocations, and fully protect beneficial uses.

## Table 7.8.2-1 TMDL Water Quality Targets<sup>a</sup> for the Napa River

E. coli density: Geometric mean < 126 CFU/100 mL<sup>b</sup>; 90<sup>th</sup> percentile < 409 CFU/100 mL<sup>c</sup>

Fecal coliform density<sup>d</sup>: Geometric mean < 200 CFU/100 mL<sup>b</sup>; 90<sup>th</sup> percentile < 400 CFU/100 mL<sup>c</sup>

Total coliform density<sup>d</sup>: Median < 240 CFU/100 mL<sup>b</sup>; no sample to exceed 10,000 CFU/100 mL

Zero discharge of untreated or inadequately treated human waste

#### 7.8.2.4 Total Maximum Daily Load

The TMDL, as indicated in Table 7.8.2-2, is expressed as density-based total coliform, fecal coliform, and *E. coli* bacteria limits.

<sup>&</sup>lt;sup>a</sup>These targets are applicable year-round.

<sup>&</sup>lt;sup>b</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

<sup>&</sup>lt;sup>c</sup>No more than 10 percent of total samples during any 30-day period may exceed this number.

<sup>&</sup>lt;sup>d</sup>The numeric targets for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

| Table 7.8.2-2 Total Maximum Daily Loads of Pathogen Indicators | S |
|--|---|
| for the Napa River   |   |

| Indicator                   | TMDL (CFU/100 mL)  |
|-----------------------------|--|
| E. coli                     | Geometric mean < 126 <sup>a</sup> 90 <sup>th</sup> percentile < 409 <sup>b</sup> |
| Fecal coliform <sup>c</sup> | Geometric mean < 200 <sup>a</sup> 90 <sup>th</sup> percentile < 400 <sup>b</sup> |
| Total coliform <sup>c</sup> | Median < 240 <sup>a</sup> No sample to exceed 10,000                             |

<sup>&</sup>lt;sup>a</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

#### 7.8.2.4 Load Allocations

Density-based pollutant allocations for pathogen source categories (except wastewater treatment facilities) are shown in Table 7.8.2-3. Table 7.8.2-4 presents wasteload allocations for individual municipal wastewater dischargers. Due to the inherent uncertainty in estimating pathogen loading from nonpoint sources and municipal runoff (Table 7.8.2-3), allocations for these source categories incorporate a 10 percent margin of safety. Each entity in the watershed is responsible for meeting its source category allocation.

All discharges of raw or inadequately treated human waste are prohibited. All sources of untreated or inadequately treated human waste have an allocation of zero.

Discharging entities will not be held responsible for uncontrollable discharges originating from wildlife. If wildlife contributions are found to be the cause of exceedances, the TMDL targets and allocation scheme will be revisited as part of the adaptive implementation program.

<sup>&</sup>lt;sup>b</sup>No more than 10 percent of total samples during any 30-day period may exceed this number.

<sup>&</sup>lt;sup>c</sup>The Total Maximum Daily Loads for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation.

Table 7.8.2-3 Density-Based Pollutant Load Allocations and Wasteload Allocationsa for Pathogen Dischargers in the Napa River Watershed

|                                 | E. coli                        |  | Fecal colifo                   | rm <sup>b</sup>                     | Total coli                  | form <sup>b</sup>           |
|---------------------------------|--------------------------------|--|--------------------------------|-------------------------------------|-----------------------------|-----------------------------|
| Categorical Pollutant Source    | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile <sup>c</sup> | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>percent-<br>ile | <b>M</b> edian <sup>c</sup> | Single<br>sample<br>maximum |
| On-site sewage disposal systems | 0                              | 0  | 0                              | 0                                   | 0                           | 0                           |
| Sanitary sewer systems          | 0                              | 0  | 0                              | 0                                   | 0                           | 0                           |
| Municipal runoff                | < 113                          | < 368  | < 180                          | < 360                               | < 216                       | 9,000                       |
| Grazing lands                   | < 113                          | < 368  | < 180                          | < 360                               | < 216                       | 9,000                       |
| Confined animal facilities      | < 113                          | < 368  | < 180                          | < 360                               | < 216                       | 9,000                       |
| Wildlife <sup>d</sup>           | < 113                          | < 368  | < 180                          | < 360                               | < 216                       | 9,000                       |

<sup>&</sup>lt;sup>a</sup> These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit. Allocations reflect a 10% margin of safety. Wasteload allocations for wastewater treatment facilities are shown in Table 7.8.2-4.

Table 7.8.2-4 Density-Based Wasteload Allocations<sup>a</sup> for Municipal Wastewater

Treatment Facilities

|   | E. coli Dens                   | sity (CFU/1                           | 00 mL)                         |                          |                             |                         |           |
|---|--------------------------------|---------------------------------------|--------------------------------|--------------------------|-----------------------------|-------------------------|-----------|
| E   | E. coli                        |                                       | Fecal colifo                   | rm <sup>b</sup>          | Total coliform <sup>b</sup> |                         | NPDES     |
| Facility                                    | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>%ile <sup>c</sup> | Geometric<br>mean <sup>c</sup> | 90 <sup>th</sup><br>%ile | <b>M</b> edian <sup>c</sup> | Single<br>sample<br>max | Permit #  |
| Napa Sanitation<br>District                 | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0037575 |
| Town of Yountville                          | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0038121 |
| City of St. Helena                          | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0038016 |
| City of Calistoga                           | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0037966 |
| City of American<br>Canyon                  | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0038768 |
| Napa River<br>Reclamation District<br>#2109 | < 126                          | < 409                                 | < 200                          | < 400                    | < 240                       | 10,000                  | CA0038644 |

<sup>&</sup>lt;sup>b</sup>The allocations for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation. <sup>c</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

<sup>&</sup>lt;sup>d</sup>Wildlife are not believed to be a significant source of pathogens and their contribution is considered natural background; therefore, no management measures are required.

## 7.8.2.5 Implementation Plan

This plan builds upon previous and ongoing successful efforts to reduce pathogen loads in the Napa River and its tributaries, and requires actions consistent with the California Water Code (CWC Section 13000 et seq.); the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369) and its Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program; and the human waste discharge prohibition.

Table 7.8.2-5 contains the required implementation measures for each of the source categories listed in Table 7.8.2-3 and 7.8.2-4. These measures include evaluation of operating practices; development of comprehensive, site-specific pathogen control measures and a corresponding implementation schedule; and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or to third parties if designated. These reports will serve as documentation that source reduction measures are being implemented.

It is important to note that the numeric targets and load allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with specified implementation measures and any applicable waste discharge requirements (WDRs) or waiver conditions.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges be regulated under WDRs, waivers of WDRs, Basin Plan prohibitions, or some combination of these tools. Table 7.8.2-6 specifies the regulatory framework for each discharger source category. The Water Board intends to work with stakeholders to develop conditions for waiving WDRs for grazing lands by 2009.

<sup>&</sup>lt;sup>a</sup>These allocations are applicable year-round. Wasteload allocations apply to any sources (existing or future) subject to regulation by a NPDES permit.

<sup>&</sup>lt;sup>b</sup>The allocations for total coliform and fecal coliform shall sunset and shall no longer be effective upon the replacement of the total and fecal coliform water quality objectives in the Basin Plan with *E.coli*-based water quality objectives for contact recreation. <sup>c</sup>Based on a minimum of five consecutive samples collected at approximately equal intervals over a 30-day period.

Table 7.8.2-5 Trackable Implementation Measures for the Napa River Pathogen Total Maximum Daily Load

| Source Category Ac | Δetion  | Implementing Party   | 00,000  |
|--------------------|---|--|---|
|                    |   | mperioris any  | Completion Dates                                  |
|                    | Submit to the Water Board Executive Officer for approval a plan and implementation schedule for evaluating OSDS performance and correcting deficiencies in OSDSs identified as potentially discharging to surface waters. Priority should be given to the Browns Valley Creek, Murphy Creek, and Salvador Channel subwatersheds | Napa County  | January 2008                                      |
| Systems            | Report progress on implementation of OSDS evaluation and repair program   |  | January 2011 and<br>biennially thereafter         |
| <u> </u>           | Comply with applicable County, Water Board, or State Water Board requirements   | Septic system owners   | As specified in applicable requirements           |
| Sewer Systems      | Apply for coverage under the State Water Board's general WDRs for sanitary sewer systems Board (Order No. 2006-0003). Comply with provisions of WDRs.   | Napa Sanitation District, City<br>of Calistoga, City of St.<br>Helena, Yountville Joint<br>Treatment Plant, City of<br>American Canyon, Napa River | As specified in general<br>WDRs                   |
|                    | Report progress on inspection and evaluation of sewer systems <sup>a</sup>  | Reclamation District #2109   | Annually  |
|                    | Submit a Report of Waste Discharge° 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 an implementation schedule for identified management measures                                       | Ranchers (landowners and lessees). These reports may be submitted individually or jointly or through a third party <sup>4c</sup> .                 | January 2010                                      |
| J gnize∙           | Comply with applicable WDRs, waiver conditions, or prohibitions   | Ranchers (landowners and lessees)  | As specified in WDRs or waiver conditions         |
|                    | Report progress on implementation of grazing management measures that reduce animal waste runoff  | Ranchers (landowners and lessees). These reports may be submitted individually or jointly or through a third party <sup>c</sup> .                  | As specified in applicable WDRs or waiver of WDRs |

| Source Category                       | Action   | Implementing Party  | Completion Dates  |
|---------------------------------------|--|---|---|
| seilities                             | Submit a Report of Waste Discharge <sup>b</sup> 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  | Confined animal facilities. These reports may be submitted individually or jointly or through a third party.  | January 2010  |
| 引 IsminA b                            | Comply with applicable WDRs or waiver conditions   | Confined animal facilities  | As specified in applicable WDRs or waiver of WDRs.      |
| əniìnoƏ                               | Report progress on implementation of management measures that reduce animal waste runoff   | Confined animal facilities. These reports may be submitted individually or jointly or through a third party.  | As specified in<br>applicable WDRs or<br>waiver of WDRs |
| al Runoff                             | Comply with approved stormwater management plans. Update/amend storm water management plans as needed to include specific measures to reduce discharge of human and animal wastes  | Napa County, City of Napa,<br>Town of Yountville, City of St.   | As specified in approved stormwater                     |
| qioinuM                               | Report progress on implementation of human and animal waste runoff reduction measures  | Helena, City of Calistoga, City<br>of American Canyon   | in applicable NPDES                                     |
| Municipal<br>Wastewater<br>Discharges | Comply with applicable NPDES permits   | Napa Sanitation District, City of Calistoga, City of St. Helena, Yountville Joint Treatment Plant, City of American Canyon, Napa River Reclamation District #2109 | As specified in<br>applicable NPDES<br>permits          |
|                                       | <ul> <li><sup>a</sup> Reports may be incorporated into annual SSMP audit reports.</li> <li><sup>b</sup> WDRs waiver conditions may allow for other submittals in lieu of a Report of Waste Discharge.</li> <li><sup>c</sup> While third parties may provide valuable assistance in TMDL implementation, the discharger is the entity responsible for compliance with the specified regulations and regulatory controls.</li> </ul> | ort of Waste Discharge.<br>ation, the discharger is the entity re   | esponsible for  |

| Table 7.8.2-6 Regulatory Framework for D  | Discharges by Source Category  |
|---|--|
| Source Category                           | Regulatory Tool  |
| On-site Sewage Disposal Systems           | General Waste Discharge Requirements (WDRs),<br>Individual WDRs, or Waiver of WDRs, as<br>appropriate <sup>a</sup><br>Prohibition of Human Waste Discharge |
| Sanitary Sewer Systems                    | General WDRs or Individual WDRs, as appropriate Prohibition of Human Waste Discharge   |
| Grazing Lands                             | Waiver of WDRs <sup>b</sup>  |
| Confined Animal Facilities                | Waiver of WDRs <sup>b</sup>  |
| Municipal Runoff                          | NPDES Permit   |
| Municipal Wastewater Treatment Facilities | NPDES Permit   |

<sup>&</sup>lt;sup>a</sup>Regulatory tool(s) employed will be consistent with State Water Board regulatory actions.

## Cost estimate: Agricultural Water Quality Control Program

Because the implementation measures for grazing lands constitute an agricultural water quality control program, the cost of that program is estimated below, consistent with California Water Code requirements (Section 13141).

The average annual program implementation cost to agricultural dischargers is estimated to range between \$60,000 and \$250,000 for the next 10 years. These costs will be shared by Napa River watershed grazing lands operators (approximately 20). This estimate includes the cost of implementing animal waste controls and grazing management measures, and is based on costs associated with technical assistance and evaluation, installation of water troughs, and livestock control fencing along up to 25 percent of streams in grazing lands. 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. In addition to private funding, potential sources of financing include federal and state water quality grants and federal agricultural grants.

#### **Evaluation and Monitoring**

Beginning in 2011 and approximately every five years thereafter, the Water Board will evaluate site-specific, subwatershed-specific, and watershed-wide compliance with the trackable implementation measures specified in Table 7.8.2-5. In evaluating compliance with the trackable implementation measures, the Water Board will consider levels of participation for each source category as well as for individual dischargers (as documented by Water Board staff or third parties).

In addition to the programmatic monitoring described above, Water Board staff, in collaboration with stakeholders, will conduct water quality monitoring to evaluate *E. coli* concentration trends in the Napa River and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 7.8.2-1) and load allocations (Table 7.8.2-3). The main objectives of the Monitoring Program are to:

- Assess attainment of TMDL targets
- Evaluate spatial and temporal water quality trends

<sup>&</sup>lt;sup>b</sup>Water Board retains the option of requiring general or individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.

- Further identify significant pathogens source areas
- Collect sufficient data to prioritize implementation efforts and assess the effectiveness of source control actions
- Collect sufficient data to evaluate the costs of pathogen source control measures and the existence of other pollutant reduction benefits (e.g., nutrients or sediment), if any

Table 7.8.2-7 presents locations for baseline water quality monitoring. Each site will be sampled for *E. coli* ten times each year. Five samples will be collected weekly during one 30-day period in each wet season (November through March) and one 30-day period in each dry season (May through September). 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. Additional monitoring will be conducted as needed if funds are available. In lieu of the monitoring plan described in Table 7.8.2-6, one or more implementing parties may submit an alternative monitoring plan for Executive Officer approval.

| Table 7.8.2-7 Baseline Monitoring Sites   |
|---|
| Napa River at Third Street, Napa  |
| Napa River at Zinfandel Lane  |
| Napa River at Calistoga Community Center  |
| Browns Valley Creek at Browns Valley Road   |
| Browns Valley Creek at Borrette Lane  |
| Murphy Creek at Coombsville Road  |
| Murphy Creek at upstream location to be determined <sup>a</sup>                               |
| Salvador Channel at Solano Avenue   |
| Salvador Channel at Dry Creek Road  |
| Four additional tributaries to be determined <sup>a</sup> , rotated each year                 |
| <sup>a</sup> Sites will be determined by Water Board staff in coordination with stakeholders. |

If source control actions are fully implemented throughout the watershed and the TMDL targets are not met, the Water Board may consider whether the TMDL targets are attainable, and re-evaluate or revise the TMDL and allocations as appropriate. Alternatively, if the required actions are not implemented or are only partially implemented, the Water Board may consider regulatory or enforcement action against dischargers not in compliance.

#### Adaptive Implementation

Approximately every five years, the Water Board will review the Napa River Pathogen TMDL and evaluate new and relevant information from monitoring, special studies, and the scientific literature. At a minimum, the following questions will be included in the reviews. Additional questions will be developed in collaboration with stakeholders during each review cycle.

- 1. Are the river 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 generally accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?

Reviews will be coordinated by the Water Board's continuing planning program, with stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan via an amendment process. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Napa River watershed is also impaired.

#### 7.8.3 Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan

The goals of the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan (Plan) are to:

- Conserve the steelhead trout population
- Restore water quality to meet water quality standards, including attaining beneficial uses
- Enhance the overall health of the native fish community
- Protect and enhance habitat for native aquatic species
- Enhance the aesthetic and recreational values of the creek and its tributaries

To achieve these goals, specific actions are needed to:

- 1. Reduce sediment loads, and fine sediment in particular, to Sonoma Creek and its tributaries
- 2. Attain and maintain suitable gravel quality in freshwater reaches of Sonoma Creek and its tributaries
- 3. Reduce and prevent channel incision
- 4. Reduce erosion and sedimentation
- 5. Repair large sources of sediment supply (e.g., landslides)
- 6. Enhance channel complexity (e.g., by adding and encouraging retention of large woody debris and restoring riparian vegetation)

The following sections establish:

- 1. A sediment total maximum daily load (TMDL) defining the allowable amount of sediment that can be discharged into Sonoma Creek, expressed as mass, and as a percentage of the natural background sediment delivery rate to channels
- 2. An implementation plan to achieve the TMDL and related habitat enhancement goals

#### 7.8.3.1 Problem Statement

Steelhead populations in the Sonoma Creek watershed have declined substantially since the late 1940s. Results of recent analyses of fisheries and sediment sources indicate that:

 Excessive amounts of fine sediment have been deposited in the streambed at potential steelhead spawning and rearing sites. Excess fine sediment in the streambed can cause poor incubation conditions for fish eggs, resulting in high mortality prior to emergence. Fine sediment also compromises the quality of pools as rearing habitat, and reduces winter rearing habitat by filling the spaces between cobbles and boulders.

- 2. Changes in physical habitat structure that appear to be caused by erosion of bed and banks (incision) in Sonoma Creek are resulting in significant adverse changes to steelhead habitat. Analysis of instream shelter in Sonoma Creek yielded a low score when considering the watershed-wide average (38, which is 13 percent of the maximum score), indicating low quality of rearing habitat for juvenile steelhead. A steelhead census performed in 2002 indicates only 10 percent of steelhead are surviving past the juvenile rearing stage. These conditions are limiting the success of steelhead fish in Sonoma Creek.
- 3. Stressful water temperatures, low summer flows, and migration barriers also impact the health of Sonoma Creek's coldwater fishery.

Due to excess erosion and sedimentation in the Sonoma Creek Watershed, the narrative water quality objectives for sediment and settleable material are not being met and cold freshwater habitat, wildlife habitat, fish spawning, recreation, and preservation of rare and endangered species beneficial uses are impaired. In addition, channel incision has caused habitat simplification, which has reduced and quantity and quality of spawning and rearing habitat for salmonids and other native aquatic species. Channel incision is a controllable water quality factor that is contributing to a violation of the narrative water quality objective for population and community ecology.

## 7.8.3.2 Numeric Targets and Desired Condition

Meeting the numeric targets and desired condition listed in Table 7.8.3-1 will allow water quality in Sonoma Creek and its tributaries to achieve the Basin Plan's narrative water quality objectives for sediment, settleable material, and population and community ecology.

Table 7.8.3-1 TMDL Sediment Targets for Sonoma Creek and its Tributaries

| Spawning gravel permeability         | Median value ≥ 7000 cm/hr <sup>a</sup>   |
|--------------------------------------|--|
| Pool filling                         | Decreasing trend in the volume of fine sediment deposited in pools   |
| Substrate Composition- Percent Fines | Percent of fine sediment less than 0.85 mm in diameter is less than or equal to 14 percent of the total bulk core sample (<14% fines < 0.85 mm) <sup>b</sup> |
| Substrate Composition- Percent Fines | Percent of fine sediment less than 6.40 mm in diameter is less than or equal to 30 percent of the total bulk core sample (<30% fines < 6.40 mm) <sup>b</sup> |

<sup>&</sup>lt;sup>a</sup>Target applies to all potential spawning sites for steelhead and salmon in Sonoma Creek and its tributaries.

#### 7.8.3.3 Sources

Field assessments and sediment load modeling provide credible estimates of average rates of sediment delivery to Sonoma Creek. As shown in Table 7.8.3-2, the average annual sediment load to the freshwater reach of Sonoma Creek is estimated to be 117,000 tons per year, or 360 tons per km² per year. The natural background sediment delivery rate to Sonoma Creek is 52,000 tons per year, or 160 tons per km² per year. Therefore, the current sediment delivery rate is estimated to be 225 percent of the natural background rate.

<sup>&</sup>lt;sup>b</sup>Target applies to wadeable streams and rivers with gradient less than 3 percent. A wadeable stream is one which an average human can safely cross on foot during the summer, low flow season while wearing chest waders.

Table 7.8.3-2. Average Annual Sediment Delivery to Sonoma Creek (tons/year)a

| Source Cate       | egories  | Estimated Rate <sup>c</sup> (tons/year) |
|-------------------|--|---|
| Se                | Channel Erosion, Incision <sup>b</sup>                                       | 25,400                                  |
| esse              | Colluvial Bank Erosion (Soil Creep)  | 16,600                                  |
| Proc              | Surface Erosion <sup>b</sup>   | 6,200                                   |
| Natural Processes | Landslides <sup>b</sup>  | 4,100                                   |
| Natu              | Total- Natural Processes   | 52,300                                  |
|                   | Channel Incision and Gully Erosion <sup>b</sup>                              | 43,300                                  |
| ջ                 | Roads and Stream Crossings   | 11,200                                  |
| Human Actions     | Surface Erosion <sup>b</sup> from vineyards, other row crops, and rangelands | 8,600                                   |
| тша               | Urban Stormwater Runoff  | 1,100                                   |
| Ĭ                 | Landslides <sup>b</sup>  | 900                                     |
|                   | Total- Human Actions   | 65,100                                  |
| GRAND TO          | TAL  | 117,400                                 |

<sup>&</sup>lt;sup>a</sup> Sediment delivery rates are rounded to the nearest hundred.

## 7.8.3.4 Total Maximum Daily Load and Allocations

The Sonoma Creek sediment TMDL is established at 65,400 tons per year, which is approximately 125 percent of natural background load. Natural background load depends upon natural processes, and varies significantly. Therefore, the TMDL and allocations are expressed both in terms of sediment mass and percent of natural background. The percentage based TMDL, 125% of natural background, applies throughout the watershed. In order to achieve the TMDL, controllable sediment delivery resulting from human actions needs to be reduced by approximately 80 percent from current proportion of the total load (Table 7.8.3-3). TMDL attainment will be evaluated at the limit of tidal influence in the Sonoma Creek watershed, which approximates the downstream boundary of freshwater habitat for steelhead. Sonoma Creek has several tributaries that join the mainstem below the tidal limit; therefore, several points will be used to evaluate TMDL attainment. These points are: mainstem Sonoma Creek just downstream of the Fowler/Carriger Creek confluence, and the freshwater portions (above tidal influence) of Schell, Ramos, Carneros, and Merazo Creeks. Attainment of the TMDL will be evaluated over a 5-to-10-year averaging period. The TMDL equal to 125 percent of natural background load, can be achieved if human-related sources are reduced to the level of the allocations shown in Table 7.8.3-3.

<sup>&</sup>lt;sup>b</sup> Channel erosion and incision, surface erosion, and landslides are occur due to both Natural Processes and Human Actions. For these sources, each component (natural processes vs. human actions) is displayed separately.

<sup>&</sup>lt;sup>c</sup> The timeframe associated with the average annual rate varies from long-term average rates which were estimated for landslides, channel incision, and gully erosion to those for urban stormwater, surface erosion, and road-related erosion, which are estimated based on current/contemporary conditions.

Table 7.8.3-3. Sonoma Creek Sediment Load and Wasteload Allocations (tons/year)<sup>a</sup>

|                                    | 7.8.3-3. Sonoma Creek Seum   |                                     | Estimated                            | Allocation |                               |
|------------------------------------|--|-------------------------------------|--------------------------------------|------------|-------------------------------|
|                                    | Source Category  | Current<br>(2005) Load <sup>b</sup> | Reductions<br>Needed<br>(Percentage) | tons/year  | Percent Natural<br>Background |
|                                    | Natural Processes  |                                     |                                      |            |                               |
|                                    | Channel Erosion, Incision  | 25,400                              | 0                                    | 25,400     | 49                            |
|                                    | Colluvial Bank Erosion (Soil<br>Creep)   | 16,600                              | 0                                    | 16,600     | 32                            |
|                                    | Surface Erosion  | 6,200                               | 0                                    | 6,200      | 12                            |
| ons                                | Landslides   | 4,100                               | 0                                    | 4,100      | 8                             |
| cati                               | Human Actions  |                                     |                                      |            |                               |
| Load Allocations                   | Channel Erosion, Incision  | 43,300                              | 81                                   | 8,100      | 15                            |
| -oac                               | Roads and Stream Crossings   | 11,200                              | 81                                   | 2,100      | 4                             |
|                                    | Surface Erosion, including vineyards, grazed lands, unmanaged areas, and minor agriculture | 8,600                               | 81                                   | 1,600      | 3                             |
|                                    | Landslides   | 900                                 | 81                                   | 200        | 0.4                           |
|                                    | TOTAL  | 116,300                             |                                      | 64,300     | 123                           |
|                                    | Municipal Stormwater -<br>NPDES Permit No. CAS000004                                       | 600                                 | 0                                    | 600        | 1                             |
| Wasteload Allocations <sup>c</sup> | Construction Stormwater - NPDES Permit No. CAS000002                                       | 300                                 | 0                                    | 300        | 0.6                           |
| ad Allo                            | Industrial Stormwater – NPDES Permit No. CAS000001   | 100                                 | 0                                    | 100        | 0.2                           |
| /astelo                            | Caltrans Stormwater – NPDES Permit No. CAS000003   | 100                                 | 0                                    | 100        | 0.2                           |
| >                                  | TOTAL  | 1,100                               |                                      | 1,100      | 2                             |
| TOTAL<br>Backgro                   | ALLOCATIONS = TMDL = 125 % o   | of Natural                          |                                      | 65,400     | 125                           |

<sup>&</sup>lt;sup>a</sup> Sediment loads and allocations are rounded to the nearest hundred. Some totals may not appear to add up due to rounding.
<sup>b</sup> Table 7.8.3-2 also displays the estimated current (2005) sediment loads. Total current (2005) estimated sediment load = 117,400 tons/year.

tons/year.

<sup>c</sup> Source categories included in the wasteload allocations (e.g., municipal stormwater) are described as "urban stormwater" in Table 7.8.3-2. The term "urban stormwater" in Table 7.8.3-2 incorporates municipal, construction, industrial, and Caltrans stormwater.

## 7.8.3.5 Implementation Plan

The implementation actions described below are to achieve TMDL targets and allocations and habitat enhancement goals. In addition, actions specified in this plan are expected to enhance steelhead population. It is important to note that the allocations in the TMDL are not directly enforceable. To demonstrate attainment of applicable allocations, responsible parties must demonstrate that they are in compliance with required implementation measures and any applicable waste discharge requirements (WDRs), WDR waiver conditions, or NPDES permits.

## Regulatory Tools

The State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires regulation of nonpoint source discharges using the Water Board's administrative permitting authorities, including WDRs, waivers of WDRs, Basin Plan Discharge Prohibitions, or some combination of these. Consistent with this policy, Tables 7.8.3-4 – 7.8.3-7 specify actions and performance standards by nonpoint source category, as needed to achieve TMDL sediment targets and allocations in the Sonoma Creek watershed. The Water Board will consider adopting conditions for waiving WDRs that apply to the nonpoint sources (vineyards, grazing, roads, etc.) listed in Tables 7.8.3-4 – 7.8.3-7, address all pollutants of concern, protect all beneficial uses, and balance the agricultural, environmental, recreational, and residential needs of the watershed.

The wasteload allocations contained in Table 7.8.3-3 apply to point sources of sediment that are regulated by NPDES permits. Table 7.8.3-8 shows implementation measures required of these sources, which include municipal stormwater, runoff from state highways, and from industrial and construction sites.

Problems associated with channel incision, related rapid bank erosion, and loss of essential habitat features, reflect and integrate multiple historical and ongoing disturbances, some of which are local and direct, and others that are indirect and distal. Effectively addressing these issues will require cooperative and coordinated actions by multiple landowners, working with public agencies, over significant distances along the creek. The most effective means of controlling channel incision and reducing related fine sediment delivery to the creek is a channel restoration program that re-establishes width-to-depth ratios and sinuosity values conducive to formation of alternate bars and a modest flood plain. The Water Board will work with stakeholders along Sonoma Creek, through local stewardship groups, to implement such channel restoration/habitat enhancement projects. Tables 7.8.3-9 to 7.8.3-11 (Recommended Measures to Protect or Enhance Habitat), specify actions to address adverse impacts of channel incision on salmonid habitat quantity and quality, and to accomplish habitat enhancement goals for flow, temperature, and fish passage for steelhead.

Individual landowners or coalitions may work with "third parties" to develop and implement sediment pollutant control programs. With regard to achievement of actions to protect or enhance baseflow, fish passage, habitat complexity, and stream temperature, the effectiveness of the recommended actions specified in Tables 7.8.3-9 through 7.8.3-11, will be evaluated as part of the adaptive implementation program.

#### **Agricultural Water Quality Control Program Costs**

Implementation measures for grazing lands and vineyards constitute an agricultural water quality control program and therefore, consistent with California Water Code requirements (Section 13141), the cost of this program is estimated herein. This cost estimate includes the cost of implementing all actions to reduce sediment discharges and enhance habitat complexity as specified in the implementation plan, and is based on costs associated with technical assistance and evaluation, project design, and implementation of actions needed to achieve the TMDL. In estimating costs, the Water Board has

assumed that owners of agricultural businesses own 75 percent of total land area on hillside parcels, and 95 percent of the land along Sonoma Creek and lower reaches of its tributaries. Based on these assumptions, the estimated total cost for program implementation for agricultural sources is \$1.3-to-2.3 million per year throughout the 20-year implementation period. More than three-quarters of these potential costs are associated with addressing channel incision and enhancing habitat conditions (to reverse the impacts of channel incision) in Sonoma Creek and its tributaries. Considering potential benefits to the public in terms of ecosystem functions, aesthetics, recreation, and water quality, it is anticipated that at least 75 percent of the cost of these actions will be paid for with public funds. Therefore, the total cost to agricultural businesses associated with efforts to reduce sediment supply and enhance habitat in Sonoma Creek is \$300,000-\$600,000 per year over the 20-year implementation period.

## **Evaluation and Monitoring**

In collaboration with stakeholders in the watershed, Water Board staff will develop a detailed monitoring program to assess progress of TMDL attainment and provide a basis for reviewing and revising TMDL elements or implementation actions. As an initial milestone, by fall 2011, the Water Board and watershed partners will complete monitoring plans to evaluate: a) attainment of water quality targets; and b) suspended sediment and turbidity conditions. Initial data collection, based on the protocols established in these monitoring plans is anticipated to begin in the winter of 2011-2012.

As a whole, the monitoring program will be designed to:

- 1. Assess channel response and progress towards achieving water quality targets. In-channel effectiveness monitoring will be conducted to evaluate: a) progress toward achieving water quality targets, and b) channel response to management measures and natural processes. Parameters that will be monitored to assess progress toward achieving water quality targets are streambed permeability, pool filling, and percent fines composition of the substrate. The number of sites to be monitored will be selected based on availability/presence of the applicable habitat feature (i.e., spawning gravels and pools), as well as the number of samples needed to have a high degree of statistical confidence in estimated values. Frequency of monitoring should be once every five years, at a minimum, for streambed permeability and pool filling. If resources are available, desired monitoring frequency for all TMDL target parameters is once every two to three years. Pool filling should be monitored every two to three years to allow a trend analysis. The Water Board may establish alternative water quality parameters and/or numeric target values at a future date as part of the adaptive implementation process, when/if information becomes available to conclude with a high degree of confidence that one or more alternative parameters or target values provide a superior basis for determining attainment of water quality objectives for sediment, and the protection of fisheries-related beneficial uses.
- 2. Further evaluate potential impacts of suspended sediment and related turbidity. To further study potential impacts of suspended sediment and related turbidity, monitoring of turbidity should continue. The Sonoma Ecology Center maintains a continuous and automated monitoring station at the Sonoma Valley Watershed Station in Eldridge, CA. Monitoring of suspended sediment should continue to further understanding of turbidity and suspended sediment concentrations in ambient conditions, and during and after storms. Turbidity/suspended sediment data should be analyzed to determine the length of time it takes for turbidity levels to drop to pre-storm levels after a storm event.

It is expected that as sediment reduction and habitat enhancement measures (including reducing channel incision) are undertaken, suspended sediment concentrations and turbidity levels will decrease. This expectation should be confirmed with continued turbidity monitoring. In addition,

- turbidity monitoring can provide information regarding the effectiveness of sediment reduction measures because it is a sensitive measure of the effects of land use on streams.
- 3. Assess whether required sediment reduction measures are undertaken. Implementation monitoring will be conducted by landowners or designated agents, per the compliance monitoring and reporting provisions of applicable waivers of WDRs, WDRs, and NPDES permits.
- 4. Evaluate effectiveness of selected sediment reduction measures (both structural and management-related. The Water Board will conduct upslope effectiveness monitoring to evaluate sediment delivery to channels from land use activities and natural processes. The first sediment source analysis update will occur by 2020, when sediment delivery associated with human activities may be reduced by 25 percent or more. A subsequent update may occur, assuming the water quality targets for sediment are not already achieved, by 2025, when sediment supply associated with human activities may be reduced by 40 percent or more. An additional goal for future updates of the source analysis is to reduce uncertainty associated with estimates of sediment delivery rates.
- 5. Evaluate effectiveness of recommended habitat enhancement measures and assess progress towards goals of the Habitat Enhancement Plan. The Water Board and local partners should monitor habitat complexity-related water quality indicators to assess progress towards achievement of a balanced sediment budget (where the amount of fine and course sediment input to a given channel reach is equal to the amount that is transported downstream).
  - Monitoring should occur to determine whether there is an increasing trend in the percent of the length of mainstem of Sonoma Creek, and in the lower alluvial reaches of its tributaries, that attain the following conditions:
  - a. The bankfull channel width-to depth ratio is  $\geq$  12:1.
  - b. The average spacing between alluvial and/or forced gravel bars within the active channel is ≤ 7 times the width of the bankfull channel.
  - c. Available shear stress at bankfull flow does not exceed the amount required to initiate motion of the streambed by more than approximately 20 percent.
  - d. Floodplain width is  $\geq 4$  times bankfull channel width.

Monitoring should also assess whether there is:

- e) An increasing trend through time in the mean area and frequency of riffles and gravel bars within the mainstem channel; and
- f) A decreasing trend through time in the percent of the length of the mainstem of Sonoma Creek, and in the lower alluvial reach of its tributaries, where banks or bed are hardened, and/or where constructed levees contribute to channel instability.

The information gained from monitoring will guide adaptive implementation.

## 7.8.3.6 Adaptive Implementation

In concert with the monitoring program, described above, the Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan will be regularly updated. Results of in-progress or anticipated studies that enhance understanding of the population status of steelhead trout in the Sonoma Creek watershed, and/or factors controlling those populations, may also trigger changes to the plan and TMDL. At a minimum, data in response to the following questions will be considered to guide research and monitoring efforts and focus each subsequent update of the TMDL.

## Key Questions to be considered in the course of Adaptive Implementation:

- What is the population status of steelhead in the watershed? Is there an increase in the number or percentage of steelhead that survive past the juvenile rearing life stage as sediment reduction and habitat enhancement measures are implemented? An improved understanding of the current status of steelhead populations in the Sonoma Creek watershed is essential for guiding adaptive updates to the management actions recognized in this plan. Two types of monitoring data may be needed to evaluate the current population status in the watershed: 1) "smolt" production and sizes, and 2) adult spawning run-size. Smolt refers to the life stage when juvenile salmonids migrate from freshwater to the ocean. These two types of monitoring would provide a basis for assessing the influences of ocean and freshwater rearing habitat on steelhead run-size.
- Are Sonoma Creek and its tributaries progressing toward TMDL targets as expected? If there has
  not been adequate progress, how might the implementation actions, targets or allocations be
  modified?
- What are expected benefits of various actions to enhance habitat for steelhead? Which actions, and in which locations, would enhancement measures have the most benefit and be the most cost-effective?
- Are the specified sediment reduction measures and recommended habitat enhancement measures resulting in an improving trend in channel stability?
- What effect will climate change have on hydrology, sediment transport, and habitat for the watershed's aquatic species? Is there evidence that TMDL implementation actions, together with climate change, may affect Bay tidal habitats? How will climate change effect the outcome of required and recommended measures, and how should these measured be adjusted in response?
- Are there new data or information available that warrants revision of water quality targets, allocations, or implementation measures?

Table 7.8.3-4 Required and Trackable TMDL Implementation Measures for Sediment Discharges Associated with Vineyards<sup>1</sup>

| Performance Standards  | Actions   | Implementing<br>Parties  | Completion Dates   |
|--|---|--|--|
| Surface Erosion associated with vineyards: Comply with the Sonoma County Vineyard Erosion and Sediment Control Ordinance (Sonoma County Code, Chapter 30, Article V) and minimize erosion from existing vineyards; and   | Submit a Report of Waste Discharge <sup>2</sup> to the Water Board that provides, at a minimum, the following: a description of the vineyard; identification of site-specific erosion control measures needed to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. |  |  |
| Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and  | OR<br>Implement farm plan certified under Fish<br>Friendly Farming Environmental Certification  | Vineyard owner<br>and/or operator  | June 2014  |
| <b>Gullies and/or shallow landslides:</b> Promote natural recovery and minimize human-caused increases in sediment delivery from unstable areas; <b>and</b>  | Program or other farm plan certification program approved as part of a WDR waiver policy. All dischargers applying for coverage under a WDR waiver policy also will be required   |  |  |
| Effectively attenuate significant increases in storm runoff. Runoff from vineyards shall not cause or contribute to downstream increases in rates of bank or bed erosion.  | to file a notice of intent (NOI) for coverage, and to comply with all conditions of the WDR waiver policy 4.  |  |  |
|  | Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.   | Vineyard owner and/or operator   | As specified in applicable WDRs or waiver of WDRs                                  |
|  | Report progress on implementation of site specific erosion control measures. <sup>3</sup>   | Vineyard owner and/or operator   | As specified in applicable WDRs or waiver of WDRs                                  |
| 'As needed to achieve TMDL allocations and consistent with the State Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program  Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.  Reports may be submitted individually or jointly through a recognized third party.  This Basin Plan amendment recognizes farm plans certified under the Fish Friendly Farming Environmental Certification Program as effective with regard to control of pollutant discharges associated with vineyards. Additional conditions will be required under a General WDR and/or waiver program consistent with the State Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program, and/or as needed to avoid potentially significant environmental impacts. | is Policy for Implementation and Enforcement of the Nonpoint Spted by the Water Board.  arty.  Friendly Farming Environmental Certification Program as effectived/or waiver program consistent with the State Board's Policy for Nironmental Impacts.   | Source Pollution Control ve with regard to control or Implementation and E | Program<br>of pollutant discharges associated<br>nforcement of the Nonpoint Source |

<sup>- 117 -</sup>

Table 7.8.3-5 Required TMDL Implementation Measures for Sediment Discharges Associated with Grazing

| Source(s) and Performance Standard(s)  | Actions   | Implementing<br>Parties            | Completion Dates                                     |
|--|---|------------------------------------|--|
| Surface erosion associated with livestock grazing: Attain or exceed minimal residual dry matter values consistent with University of California Division of Agriculture and Natural Resources guidelines; and          | Submit a Report of Waste Discharge to the Water Board that provides, at a minimum, the following: description of the property; identification of sitespecific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for | Landowner and/or<br>ranch operator | June 2014  |
| <b>Roads</b> : Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; <b>and</b>   | implementation of identified<br>erosion control measures.   |                                    |  |
| <b>Gullies and/or shallow landslides</b> : Promote natural recovery and minimize human-caused  | Comply with applicable waste discharge requirements (WDRs) or waiver of WDRs.   | Landowner and/or<br>ranch operator | As specified in applicable<br>WDRs or waiver of WDRs |
| increases in sediment delivery from unstable areas.  | Report progress on implementation of site specific erosion control measures. <sup>2</sup>   | Landowner and/or<br>ranch operator | As specified in applicable<br>WDRs or waiver of WDRs |
| <sup>1</sup> Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board. <sup>2</sup> These reports may be prepared individually or jointly or through a recognized third party. | at may be adopted by the Water Board.<br>n a recognized third party.  |                                    |  |

Table 7.8.3-6 Required TMDL Implementation Measures for Sediment Discharges Associated with Rural Lands<sup>1,</sup>

| Sources and<br>Performance Standards   | Actions  | Implementing<br>Parties | Completion Dates                                     |
|--|--|-------------------------|--|
| Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: | Submit a Report of Waste Discharge <sup>2</sup> to the Water Board that provides, at a minimum, the following: description of the property; identification of site-specific erosion control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified erosion control measures. | Landowners              | June 2014  |
| Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas.  | Comply with applicable Waste Discharge<br>Requirements (WDRs) or waiver of<br>WDRs.  | Landowners              | As specified in applicable<br>WDRs or waiver of WDRs |
|  | Report progress on implementation of site specific erosion control measures. <sup>3</sup>  | Landowners              | As specified in applicable<br>WDRs or waiver of WDRs |

Rural lands include: non-farmed and non-grazing portions of parcels >10 acres that contain one or more residences, and/or a winery; vacant residential parcels >10 acres; and/or portions of 10-acres or larger parcels with secondary vineyard, orchard, and/or grazing. Parcels smaller than 10 acres, but that are identified by Water Board staff as posing a threat to water quality, may also be required to implement the specified actions.

Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board

These reports may be prepared individually or jointly or through a recognized third party.

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Table 7.8.3-7 Required TMDL Implementation Measures for Sediment Discharges associated with Parks and Open Space, and/or Municipal Public Works

| Landowner<br>Type              | Sources and<br>Performance Standards   | Actions   | Implementing<br>Parties   | Completion Dates   |
|--------------------------------|--|---|---|--|
| ND OPEN SPACE AND PUBLIC WORKS | Roads: Design, construct, and maintain rural roads to minimize road-related sediment delivery to stream channels; and Gullies and/or shallow landslides: Promote natural recovery, and minimize human caused increases in sediment delivery from unstable areas. | Submit a Report of Waste Discharge 1 to Water Board that provides, at a minimum, the following: description of the road network and/or segments; identification of erosion and sediment control measures to achieve performance standard(s) specified in this table; and a schedule for implementation of identified control measures. For paved roads, erosion and sediment control actions could primarily focus on road crossings to meet the performance standard.  Adopt and implement best management practices for maintenance of unimproved (dirt/gravel) roads, and conduct a survey of stream-crossings associated with paved public roadways, and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road-related erosion and protect stream-riparian habitat conditions. | Sonoma County Stormwater Management Program (SWMP) State of California, Department of Parks and Recreation State of California, Department of Transportation County of Sonoma Transportation and Public Works | June 2014  |
| PARKS A                        |  | Comply with applicable Waste Discharge<br>Requirements (WDRs) or waiver of WDRs.  | Landowners  | As specified in applicable WDRs or waiver of WDRs, and/or the SWMP |
|                                |  | Report progress on development and implementation of best management practices to control road-related erosion. <sup>2</sup>  | Landowners  | As specified in applicable WDRs or waiver of WDRs, and/or SWMP     |

<sup>&</sup>lt;sup>1</sup> Or compliance with applicable conditional waivers of WDRs that may be adopted by the Water Board.

 $<sup>^2\</sup>mathsf{These}$  reports may be prepared individually or jointly or through a recognized third party.

Table 7.8.3-8 Required TMDL Implementation Measures for Sediment Discharges associated with Urban Land Uses

| Source                            | Performance Standards   | Actions   | Implementing<br>Parties                               | Completion Dates  |
|-----------------------------------|---|---|---|---|
|                                   |   | Comply with the requirements of the General Permit for Discharges of Storm Water Associated with Construction Activity (NPDES Permit No. CAS000002) or updated versions of the Construction General Permit. |   |   |
| Construction<br>Stormwater Runoff | Control and minimize sediment and erosion from construction sites through appropriate use of Best Management Practices. | Develop, maintain, and implement a Storm Water Pollution Prevention Plan (SWPPP) that describes BMPs to be used to control erosion and sedimentation.   | Owners or<br>Operators of Sites<br>under Construction | As specified in the<br>Construction General<br>Permit (NPDES Permit No.<br>CAS000002)         |
|                                   |   | Develop and implement a sediment monitoring plan if the construction site discharges directly to Sonoma Creek or its tributaries.   |   |   |
| Industrial                        | Control discharges from industrial facilities to the standard of "best available technology                             | Comply with the requirements of the General Permit for Discharges of Stormwater Associated with Industrial Activities (NPDES Permit No. CAS000001).   | Owners or<br>Operators of                             | As specified in the<br>Industrial Stormwater<br>General Permit (NPDES<br>Permit No. CAS00001) |
| Stormwater Runoff                 | economically achievable" and the "best conventional pollutant control technology".                                      | Develop a SWPPP and monitoring plan to identify sources of pollutants (including sediment) and the means to control them to reduce stormwater pollution.  | Industrial Facility<br>Sites                          |   |

| Municipal                              | Reduce discharge of pollutants,<br>including sediment, to the<br>maximum extent practicable<br>(MEP) <sup>1</sup> | Comply with approved stormwater management plans. Comply with Municipal Stormwater Permit (NPDES Permit No. CAS000004). | Sonoma County Water Agency, County of Sonoma, City of Sonoma Sonoma Developmental Center, and any other designated | As specified in approved stormwater management plan and in applicable NPDES permit (NPDES Permit No. CAS000004). |
|--|---|---|--|--|
| Runoff                                 | Attenuate peak flows and durations from new and redevelopment projects to MEP standards.                          | Amend and implement stormwater<br>management plans to control peak<br>flow rates and durations                          | Sonoma County Water Agency, County of Sonoma, City of Sonoma Sonoma Developmental Center, and any other designated | No later than June 2014  |
| State Highways<br>Stormwater<br>Runoff | Control runoff from state highways and associated construction activities.  | Comply with the Caltrans Statewide Stormwater Permit (NPDES Permit No. CAS000003).                                      | California<br>Department of<br>Transportation<br>(Caltrans)  | As specified in applicable NPDES permit (NPDES Permit No. CAS000003).  |

<sup>1</sup> MEP is the performance standard specified in Section 402(p) of the Clean Water Act. What constitutes MEP evolves with technology and feasibility, and therefore may change in the future. As of 2008, we consider MEP to be those standards specified in the Phase I Municipal Regional Stormwater Permit Revised Tentative Order (NPDES Permit No. CAS612008, provision C.3).

Table 7.8.3-9 Recommended Actions to Reduce Sediment Load and Enhance Habitat Complexity in Sonoma Creek and its Tributaries

| Recommended Action                     | Management Objective(s)   | Actions  | Implementing Parties  | Completion Dates and Notes   |
|--|---|--|---|--|
|  | Reduce rates of sediment delivery (associated with incision and associated bank erosion) to channels, by 80 percent.                                  |  |   |  |
| Prevent and Reduce<br>Channel Incision | Enhance channel habitat as needed to support self-sustaining run of steelhead and enhance the overall health of the native fish community.            | Develop and prioritize channel restoration projects to address unstable areas, based on level of incision and/or landslide instability.              | Landowners and/or<br>designated agents, and<br>reach-based stewardships | Comply with conditions of Clean Water Act Section 401 certifications |
|  | Stabilize channel banks<br>and riparian areas to<br>reduce sediment loads from<br>landslides.   |  |   |  |
| Enhance Physical Habitat<br>Structure  | Enhance quality of rearing habitat for juvenile salmonids by increasing riparian canopy, large woody debris, and frequency and depth of pool habitat. | Develop, prioritize, and implement plans to increase channel complexity, including increasing riparian canopy, pool habitat, and large woody debris. | Landowners and/or<br>designated agents, and<br>reach-based stewardships |  |

Table 7.8.3-10 Recommended Actions to Protect or Enhance Baseflow

| Recommended<br>Action                     | Management<br>Objective  | Action(s)  | Implementing Parties   | Schedule/Notes   |
|---|--|--|--|--|
| Enhance<br>Summer Base<br>Flows           | Maintain suitable conditions for juvenile rearing, and smolt migration to Sonoma Creek estuary.  | Implement a groundwater management plan to: 1) maintain groundwater levels for the support of beneficial uses, 2) increase water recycling and conservation in order to enhance summer base-flows, 3) identify and protect groundwater recharge areas, 4) enhance the recharge of groundwater where appropriate; and 5) protect against adverse interactions between groundwater and surface water flows.  Identify potential groundwater recharge areas and develop pilot projects. | Sonoma County Water Agency,<br>Valley of the Moon Water District, City<br>of Sonoma, Basin Advisory Panel <sup>1</sup> ,<br>and interested collaborators | The Sonoma Valley Groundwater Management Plan² was adopted by the Sonoma County Water Agency in November 2007. The plan includes an implementation schedule to achieve recommended actions to protect or enhance baseflow. |
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<sup>2</sup> The Sonoma Valley Groundwater Management Plan (developed by the Sonoma County Water Agency, Valley of the Moon Water District, and City of Sonoma) is a non-regulatory plan aimed at locally managing, protecting, and enhancing groundwater resources. <sup>1</sup>The Basin Advisory Panel was formed to act as the groundwater management plan stakeholder group for the Sonoma Valley Basin

Table 7.8.3-11 Recommended Actions to Restore to Fish Passage

| Recommended<br>Action | Management<br>Objective(s)   | Action(s)  | Implementing Parties  | Schedule/Notes |
|-----------------------|--|--|---|----------------|
| Address Fish          | No significant structural impediments to salmonid migration or passage in mainstem or key tributaries. | Design, replace or retrofit road crossings to allow fish passage according to fish-friendly guidance such as those developed by FishNet 4C, Department of Fish and Game, or other appropriate entity with expertise in salmonid habitat restoration. | Local public agencies,<br>watershed groups and<br>landowners  |                |
| Passage barriers      | Reduce the number of stream miles inaccessible to fish.  | Develop, prioritize, and implement plans to remove identified barriers to fish passage.  | Local public agencies,<br>watershed groups, and<br>landowners |                |

# 7.9 WATER QUALITY ATTAINMENT STRATEGIES AND TMDLS FOR THE SUISUN BASIN (SEE FIGURE 2–9)

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