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Chapter 3  San Francisco Bay Hydrologic Region

Setting

The San Francisco Bay Hydrologic Region, which occupies parts of ten counties, extends from southern Santa Clara County north to Tomales Bay in Marin County, and inland to the confluence of the Sacramento and San Joaquin rivers near Collinsville (Figure 3-1 San Francisco Bay Hydrologic Region). The eastern boundary follows the crest of the Coast Ranges, the highest peaks of which are more than 4,000 feet above sea level. Streams in the region flow into the bay-estuary or to the Pacific Ocean. Bay Area water agencies have come to rely on imported water supplies from the Eastern Sierra Nevada for nearly a century to supply their customers with reliable quality water. Groundwater supply accounts for 15 percent of the region’s annual average water supply (DWR). An estimated 38 percent of Bay Area water agencies supplies come from the Mokelumne and Tuolumne rivers. Population growth and concerns for water quality have led to the development and re-development of local surface water supplies, recharging of existing groundwater basins, and incorporated conservation guidelines in a continuing effort to sustain reliable quality water for future generations. With the onset of a drought into the unforeseeable future the role of conservation and sound Best Management Practices make water conservation efforts all the more crucial.

PLACEHOLDER Figure 3-1 San Francisco Bay Hydrologic Region

The combined flows of the Sacramento and San Joaquin watersheds flow through the Delta and into the San Francisco Bay. Delta outflow interacts with tides to determine how far salt water intrudes from the ocean into the San Francisco Bay Estuary. The resulting salinity gradients influence the distribution of many estuarine fishes and invertebrates as well as plants, birds, and animals in wetlands areas. Delta outflow varies with hydrology, reservoir releases, and diversions upstream.

The bay region boasts significant Pacific Coast marshes such as Pescadero Marsh and Tomales Bay marsh as well as San Francisco Bay itself. San Francisco Bay is an estuary with a deep central channel, broad mudflats, and fringing marsh. The North Bay, which is a subregion of the San Francisco Bay Area consisting of Marin, Sonoma, Napa and Solano counties, is more brackish, while the South and Central bays are more marine dominated. Suisun Marsh, in between the North Bay and the Delta, is the largest contiguous brackish water marsh remaining on the west coast of North America, providing more than 10 percent of California’s remaining natural wetlands.

Watersheds

The overall contributing watershed of the San Francisco Bay extends far north, south, and east into the interior of California and the Sierra Nevada.

The Sacramento and San Joaquin Rivers join in the Delta, contributing an average of 24.4 MAF/year (50-year average, CDEC) of fresh water to the Bay. Daily tidal flows back and forth through the Carquinez Strait are typically much higher than the freshwater flows. The San Francisco Bay Hydrologic Region comprises numerous watersheds that drain directly into the San Francisco Bay downstream of the Sacramento-San Joaquin River Delta and coastal creek watersheds in Marin and San Mateo counties that drain directly to the Pacific Ocean. The San Francisco Bay Hydrologic Region covers approximately 2.88 million acres (4,550 square miles)
and includes all of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda counties. The region corresponds to the boundary of the Regional Water Quality Control Board (Regional Water Board) Region 2 and the San Francisco Bay Area Integrated Regional Water Management (Bay Area IRWM) Plan. The San Francisco Bay region is divided into the North Bay and South Bay. Significant geographic features include the Santa Clara, Napa, Sonoma, Petaluma, Suisun-Fairfield, and Livermore Valleys; the Marin and San Francisco Peninsulas; San Francisco, Suisun, and San Pablo Bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Range. The Guadalupe River and Coyote and Alameda creeks drain the Coast Range and generally trend northwest until terminating in San Francisco Bay. A significant tributary of Alameda Creek is Arroyo de la Laguna, in turn fed by Arroyo Valle. The Napa River originates in the Mayacamas Mountains at the northern end of Napa Valley and flows southward into San Pablo Bay. Sonoma Creek begins in mountains within Sugarloaf State Park, then trends south through Sonoma Valley and enters northern San Pablo Bay.

The San Francisco Bay Area IRWM Plan identifies the 15 largest local watersheds in the San Francisco Bay watershed, as shown in Figure 3-2 Largest local watersheds in San Francisco Bay area (source of map: BAIRWMP, http://gis.ca.gov –Watersheds of the San Francisco Bay Area).

PLACEHOLDER Figure 3-2 Largest local watersheds in San Francisco Bay area

PLACEHOLDER Box 3-1 Acronyms Used in San Francisco Region Report

Ecosystems

The San Francisco Bay is one of the most modified estuaries in the United States. The topography, ebb and flow of the tides, patterns of freshwater inflows locally and from the Delta, and the availability and types of sediment have all been altered. Many new species of plants and animals have been introduced. These exotic and invasive species, such as the Chinese mitten crab and Asian clam, threaten to undermine the estuary’s food web and alter its ecosystem.

Water quality has also changed over time, and the character of the wetlands around the bay has changed dramatically. More than 75 percent of the bay’s historical wetlands have been lost or altered through a variety of land use changes around the bay, including filling for urban and industrial uses and the construction of dikes for agricultural uses. Prior to 1800, the total area covered by the bay at high tide was about 516,000 acres, and tidal marshes covered approximately 190,000 acres on the fringes of the bay. Now the bay covers about 327,000 acres at high tide, and tidal marsh bordering the bay totals approximately 40,000 acres. In recent decades, filling of the bay has slowed significantly due to regulatory changes and the creation of the Bay Conservation and Development Commission, a State agency charged with permitting activities along the shore of the bay since 1965.

There are about 500 species of fish and wildlife associated with the bay lands; 105 wildlife species are designated by state and federal agencies as threatened or endangered. Tidal flats occur from the elevation of the lowest tides to approximately mean sea level and support an extensive community of invertebrate aquatic organisms, fish that feed during higher tides, plants such as algae and occasionally eelgrass, and shorebirds. Historically, around 50,000 acres of tidal flats occurred around the margins of the Bay, approximately 29,000 acres remain - a reduction of over 40 percent.
Climate

The climate within the region varies significantly from west to east. Coastal areas are typically cool and often foggy, and inland valleys are warmer with a Mediterranean-like climate. Rainfall amounts vary among sub-regions as well as seasonally and from year to year. Climatic conditions in the Bay Area are generally characterized as Mediterranean with moist, mild winters and hot, dry summers. Winter temperatures vary between highs of 50 ºF to 65 ºF and lows of 35 ºF to 50 ºF. Summer temperatures generally range between highs of 65 ºF to 90 ºF and lows of 50 ºF to 60 ºF, with warmer temperatures at inland locations. The region’s varied topography creates several microclimates dependent upon elevation, proximity to the bay or coast, and orientation. These microclimates can result in stark climatic differences over only a few miles distance. The microclimates of the bay are also reflected by differences in rainfall amounts and evapotranspiration across the region.

Like most of Northern California, the Bay Area is largely governed by weather patterns originating in the Pacific Ocean, primarily by the southern descent of the Polar Jet Stream bringing with it mid-latitude cyclonic storms in winter. Most of the Bay Area’s precipitation (about 90 percent) falls between November and April. Bay Area lowlands (i.e., valley bottoms) receive an average annual rainfall of about 15 to 20 inches in the South Bay in the rain-shadow of the Santa Cruz Mountains and about 20 to 25 inches in the North Bay. Some higher elevations in the region, particularly along the west facing slopes, average more than 40 inches of rain per year. Historical variation since 1914 for San Francisco ranges from 9 to 44 inches/year with an average of 21 in/yr.

Demographics

While being the smallest in size of the hydrologic regions, the San Francisco Bay Hydrologic Region has the second largest population in the state at about 6.3 million in 2005 (CA DOF 2008). Major population centers include the cities of San Francisco, San Jose, and Oakland, with approximately half of the people residing in Alameda and Santa Clara counties. Contra Costa County contains 14 percent of the area’s population, with 1.02 million residents. Populations of the San Francisco Bay Hydrologic Region range widely from the rural communities on the southern edges of Napa and Sonoma counties to the large urban areas like San Francisco. The population densities of the Bay Area range from 200 persons per square mile to more than 16,000 persons/sq mile. The hydrologic region population density per square mile is 1,561 person/sq mile.

The California Department of Finance projects a population of 6.52 million in 2030 and 8.28 million in 2050. Table 3-1 and Figure 3-3 show existing and projected populations in each of the Bay Area counties from year 1960 through current projections to year 2050.

PLACEHOLDER: Figure 3-3 San Francisco Bay Hydrologic Region population, 1960 through projected 2050

PLACEHOLDER: Table 3-1 Demographic Characteristics of San Francisco Region

PLACEHOLDER: Figure 3-4 Populations in Bay Area counties, 2007-2030

Senate Bill 18 (Chapter 905, Statutes of 2004) requires cities and counties to consult with Native American Indian Tribes during the adoption or amendment of local general plans or specific plans. A contact list of appropriate Tribes and representatives within a region is maintained by the Native American Heritage Commission. The following is a list of the Tribes in this region,
according to the commission. A Tribal Consultation Guideline, prepared by the Governor’s Office of Planning and Research, is available online at http://www.opr.ca.gov/programs/docs/09_14_05%20Updated%20Guidelines%20(922).pdf.

- Amah Mutsun Tribal Band
- Coastal Band of the Chumash Nation
- Costanoan Ohlone Rumsen-Mutsen Tribe
- Indian Canyon Mutsun Band of Costanoan
- Muwekma Ohlone Indian Tribe of the SF Bay Area
- Ohlone/Coastanoan-Esselen Nation
- Salinan Tribe of Monterey, San Luis Obispo and San Benito Counties
- The Federated Indians of Graton Rancheria
- The Ohlone Indian Tribe

**Land Use Patterns**

Portions of the region are highly urbanized and include the San Francisco, Oakland, and San Jose metropolitan areas. Zoning restrictions, building regulations and tax incentives that encourage urban sprawl are current obstacles to strategies to meet the demands of population growth focusing on infill development. A statewide infill study has been developed by UC Berkeley to locate potential infill sites. The “Pilot California Infill Parcel Locator” website (infill.gisc.berkeley.edu) provides site locations, feedback about infill programs, resources for infill development.

Agriculture comprises 21 percent of the region’s land area. Agricultural acreage occurs mostly in the north and northeast in Napa, Marin, Sonoma, and Solano counties. Santa Clara and Alameda counties also have significant agricultural acreage at the edge of the urban development. The predominant crops are grapes (72 percent average) along with fruit and nut trees, hay production, and dairy and livestock operations. In the area along the ocean coastline south of the Golden Gate, half of the irrigated acres include specialty crops, such as artichokes, strawberries, or flowers.

There are 11 federal land areas within the San Francisco Bay Area: Point Reyes Seashore, John Muir Woods Monument, Golden Gate Recreation Area, Alcatraz Island, Fort Point Historic Site, Presidio of San Francisco, San Francisco Maritime Historic Park, Eugene O’Neill Historic Site, Rosie the Riveter WWII home Front Park, John Muir Historic Site, and Port Chicago Naval Magazine Memorial. No Federal Tribal lands have been identified.

Senate Bill 18 (Chapter 905, Statutes of 2004) requires cities and counties to consult with Native American Indian Tribes during the adoption or amendment of local general plans or specific plans. A contact list of appropriate Tribes and representatives within a region is maintained by the Native American Heritage Commission. A Tribal Consultation Guideline, prepared by the Governor’s Office of Planning and Research, is available online at http://www.opr.ca.gov/programs/docs/09_14_05%20Updated%20Guidelines%20(922).pdf.
Regional Water Conditions

Although there are several small reservoirs and groundwater basins throughout this region, the primary water supplies are imported from other regions of the state.

Water in the Environment

--identify instream flows pending for Endangered Species Act

Dedicated environmental water use in the area includes instream flows required below most major dams and diversions by State Water Resources Control Board licenses and Federal Energy Regulatory Commission licenses, and agreements with other agencies. In the Bay area region, there are many streams flowing to the ocean and bay. These streams have coho salmon and steelhead trout, both which are endangered species. Other environmental species include the quaga mussel.

There are no wild and scenic rivers.

There are several initiatives by local governments and conservation groups to improve fish passage, reestablish wetlands and habitat for fish and water fowl and other species.

--Identify managed wetlands water use

The Ecosystem Restoration Program (ERP) Conservation Strategy for the Delta and Suisun Marsh Planning Area provides leadership for conservation and restoration in the Delta and Suisun Marsh. It is developed by the California Department of Fish and Game (DFG) in collaboration with US Fish and Wildlife Service and National Marine Fisheries Service, collectively the ERP Implementing Agencies. The strategy reflects changing knowledge, conditions, and understanding of the system, and is intended to facilitate coordination and integration of actions among all resource planning, conservation, and management decisions affecting the Delta and Suisun Marsh. It is integrally linked to the Delta Vision and the conceptual models developed by the science teams formulated by the Adaptive Management Planning Team of the ERP, and to the Bay-Delta Conservation Planning effort. It especially incorporates the projections of sea level rise related to climate change and takes into account the potential effects of seismic events on the Delta ecosystem.

Groundwater recharge provides a mechanism to reuse applied groundwater and surface waters, as well as store imported waters. Groundwater recharge can be achieved by settling ponds in which the water percolates back into the ground, or by using injection wells to recharge an aquifer at a more rapid rate. Recharged water is filtered naturally in the soils and clays of the aquifer and then extracted for use again through wells.

The most important habitats of concern around the shore of San Francisco Bay are deep and shallow bay and channel environments, tidal baylands, and diked baylands. Tidal bayland habitats include tidal flats, marshes (both salt and brackish), and lagoons. Diked bayland habitats include diked wetland, agricultural lowlands, salt ponds, and storage ponds (California Wildlife: Conservation Challenges). The goal of the San Francisco Bay Joint Venture is to protect, restore, increase, and enhance all types of wetlands, riparian habitat, and associated uplands throughout the San Francisco Bay region to benefit birds, fish, and other wildlife. In 2001 the

1 Bunn, David et al. (2005). California Wildlife: Conservation Challenges, California’s Wildlife Action Plan, California Department of Fish and Game, 14, 363.
Joint Venture published a 20-year collaborative plan for the restoration of wetlands and wildlife in the bay region called *Restoring the Estuary: an Implementation Strategy for the SFBJV*. This strategy establishes specific acreage goals for wetlands of three distinct types—bay habitats, seasonal wetlands, and creeks and lakes—and lays out programmatic and cooperative strategies for accomplishing them. The Joint Venture partners have agreed to acquire, and/or restore or enhance 260,000 acres of these three types of wetlands over the next two decades all around the estuary (San Francisco Bay Joint Venture – Web site²).

The purpose of the Bay-Delta Conservation Plan is to create a stable regulatory framework to both conserve at-risk native species and natural communities in the Delta and provide water supply reliability for people. A joint Habitat Conservation Plan/Natural Community Conservation Plan is being developed through a collaborative process with water users, State and federal agencies, and non-governmental organizations. The BDCP will examine how to improve the design and operation of the State and federal water projects over both the short term and the long term and implement a major program for restoring and managing habitats within the Delta. The final EIS/EIR and endangered species permits are expected to be completed by the end of 2010. The BDCP is being closely coordinated with the Governor's Delta Vision Task Force.

The coho salmon (*Oncorhynchus kisutch*) range for California is coincident with coastal draining watersheds from the Oregon border down to northern Monterey Bay. DFG, with the assistance of recovery teams representing diverse interests and perspectives, created the Recovery Strategy for California Coho Salmon (*Oncorhynchus kisutch*) (Recovery Strategy) (2004), a guide for the process of recovering coho salmon on the north and central coasts of California. The Recovery Strategy emphasizes cooperation and collaboration at many levels, and recognizes the need for funding, public, and private support for restorative actions, and maintaining a balance between regulatory and voluntary efforts. Landowner incentives and grant programs are some of the many tools available to recover coho salmon. However, the success of this Recovery Strategy will ultimately be determined by the long-term commitment and efforts of all who live in, or are involved with, coho salmon watersheds.

### Water Supplies

In the early 1900s, local water agencies developed significant imported water supplies from the Mokelumne and Tuolumne rivers to meet the anticipated demands. Local reservoirs and watersheds were being developed to capture surface supplies, to recharge the groundwater basins, and to act as terminal reservoirs for the larger projects. In the late 1960’s, the State South Bay Aqueduct brought water into the region. Federal water projects began with the Contra Costa Canal in 1937; the Solano Project in 1958 and the San Felipe Project in 1979.

Table 3-2 shows the sources, conveyance facilities, and quantities of imported surface water supply that flow through these structures.

**PLACEHOLDER Table 3-2: Sources of surface water, imported**

(3-1, vol 3, b160-05)

Figure 3-5 presents bar charts that summarize all of the dedicated and developed urban, agricultural, and environmental water uses and supplies within this hydrologic region for years

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Chapter 3 San Francisco Bay Hydrologic Region

Volume 3 Regional Reports

1998 through 2005. Table 3-3 presents the data of water entering the region, leaving the region, and storage changes within the region for years 1998 through 2005. [discuss reliability]

-discuss water supply sources (local streams, desal)

PLACEHOLDER Table 3-3 San Francisco Bay Hydrologic Region water balance summary, 1998-2005 (taf)

PLACEHOLDER Figure 3-5 San Francisco Bay Hydrologic Region water balance for water years 1998-2005 (bar chart)

Local streams are important to the San Francisco Region, especially in areas where imported water supply projects do not reach.

In the North Bay, local water and groundwater represents 40 percent (DWR, 2003) of the water supply for Urban, Agriculture and Managed Wetlands, this does not include instream flow requirements.

In the South Bay, the interface between local surface water and groundwater is complicated due to the large groundwater recharge systems employed at ACWD, Zone 7 Water Agency and at SCVWD.

In Santa Clara, several large dams capture in excess of 100 thousand acre-feet per year of local surface water, which is slowly released for groundwater recharge. The groundwater basin is used as the conveyance system to deliver the supplies to the local purveyors, who work with SCVWD to maintain the GW Basin.

ACWD and Zone 7 not only recharge local surface water but also recharge State Water Project as part of their operations. Also, ACWD is currently desalinating brackish groundwater from their aquifer rehabilitation project.

Groundwater

Local groundwater accounts for only about 15 percent of the region’s average water year supply. The more heavily used basins include the Santa Clara Valley, Livermore Valley, Westside, Niles Cone, Napa-Sonoma Valley, and Petaluma Valley groundwater basins. For agencies like the Santa Clara Valley Water District (SCVWD), Alameda County Water District (ACWD), and Alameda County Flood Control and Water Conservation District-Zone 7 (Zone 7), groundwater is a critically important local supply that helps offset dependence on imported water supplies. Conjunctive use programs have also been implemented by these agencies to optimize the use of groundwater and surface water resources, and water quality programs are in place to monitor and protect groundwater quality. Throughout the region, additional groundwater resources continue to be investigated and developed to expand the role of conjunctive use programs.

The region has 28 identified groundwater basins. Two of those, the Napa-Sonoma Valley and Santa Clara Valley groundwater basins, are further divided into three and four subbasins, respectively. The groundwater basins underlie approximately 896,000 acres (1,400 square miles) or about 30 percent of the entire San Francisco Bay Hydrologic Region.

In general, the freshwater-bearing aquifers are relatively thin in the smaller basins and moderately thick in the more heavily utilized basins. The more heavily utilized basins (i.e Santa Clara Valley, Napa-Sonoma Valley, and Petaluma Valley groundwater basins), the municipal and irrigation
wells have average depths ranging from about 200 to 500 feet. Well yields in these basins range from less than 50 gallons per minute (gpm) to approximately 3,000 gpm. In the smaller basins; most municipal and irrigation wells have average well depths in the 100- to 200-foot range. Well yields in the smaller and less utilized basins are typically less than 500 gpm.

Land subsidence has been a significant problem in the Santa Clara Valley Groundwater Basin in the past. An extensive annual monitoring program has been set up within the basin to evaluate changes in an effort to maintain land subsidence at less than 0.01 feet per year (SCVWD 2001). Additionally, groundwater recharge projects have been implemented in the Santa Clara Valley to ensure that groundwater will continue to be a viable water supply in the future.

**Recycled Water**

Recycled water in the bay region is used in a full spectrum of applications, including landscape irrigation, agricultural needs, and as a supply to the area’s many wetlands. The area has a large potential market for recycled water, up to 240,000 AF/year by 2025, as reported in the 1999 Bay Area Recycled Water Master Plan. The Plan identified opportunities to use 125,000 acre-feet per year (AF/yr) by 2010.

**Water Uses**

Water use in the bay region is predominantly urban, with more than 50 percent of the use being residential. There are also numerous industrial users around the bay. Agricultural water use is a much smaller percentage of total water use in this region compared to inland regions, such as the Sacramento River region, San Joaquin River region, and the Tulare Lake region. For example, in the San Francisco Bay region part of the SCVWD service area, agricultural use is less than one percent of total water use of 383,000 acre-feet per year (2005).

Figure 3-6 (San Francisco Bay Hydrologic Region water use and distribution of dedicated supplies (taf)) provides a graphical presentation of all of the water supply sources that are used to meet the developed water uses within this hydrologic region for years 1998 through 2005.

**Figure 3-6 San Francisco Bay Hydrologic Region water use and distribution of dedicated supplies (taf)**

About 70 percent of the water supply in the SF Region is imported. The planning, maintenance and operation cost, as well as vulnerability to drought cause the purveyors to monitor and spend capitol on their systems. This drives the cost of supplies to where bay area water is fairly expensive. Small lot sizes, cooler climate, and higher density development are drivers in low urban water usage.

Water usages in the San Francisco hydrologic region are comparatively lower than communities located in the warmer central valley regions with inexpensive water that can range from 200 gpd to 300 gpd. The City of San Francisco has a per capita use value of around 100 gpd, Alameda CWD 160 gpd, Cupertino 215 gpd, EBMUD Pinole area 125 gpd and Marin MWD 145 gpd.

Monitoring and metering allow greater flexibility to the purveyors, enabling tier rates, incentives, public outreach programs and other efforts to maintain low water usage. Much of the area is well-developed, and is undergoing urban renewal projects. The older areas of Oakland and San Francisco have new construction replacing older buildings and which brings greater efficiencies to service areas.
Urban water usage by sector (2003) in the North Bay and South Bay is shown in Table 3-4.

**Table 3-4 Urban water use (percent) by sector, North Bay and South Bay (2003)**

<table>
<thead>
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<th>SFR</th>
<th>MFR</th>
<th>Com</th>
<th>Ind</th>
<th>Lands</th>
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<td>12</td>
<td>2</td>
<td>5</td>
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</tr>
<tr>
<td>South Bay</td>
<td>50</td>
<td>18</td>
<td>18</td>
<td>5</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

[further discuss uses, trends, etc. based on portfolio data]

[address conservation, landscape water use, any managed wetland use]

--demand of water use does not necessarily relate to population. (E.g. seasonal populations – winter residents, migrant labor, tourism)

--discuss indoor/outdoor aspects of urban water use; relate to land use patterns

PLACEHOLDER Table 3-5 San Francisco Bay Hydrologic Region water use and distribution of dedicated supplies (taf)

**Water Quality**

The San Francisco Estuary’s immediate watershed is highly urbanized, resulting in contaminant loads from both point and nonpoint sources, as well as pollutants from the Sacramento-San Joaquin Delta and the Central Valley. Bay Area residents generally receive good quality drinking water that varies by source and treatment. Sources range from high quality Hetch Hetchy and Mokelumne River supplies, local surface and groundwater, and variable-quality Delta water.

**Overarching Water Quality Issues**: The San Francisco Bay Region has a large variety of water quality issues to address. The Bay Area is highly urbanized and is affected by all of the impacts associated with commercial, industrial, and residential development, including wastewater and industrial discharges, significant historic loss of wetlands through diking and filling, widespread stream modification projects for flood control and urban development, and contamination from pollutants such as industrial chemicals, hydrocarbons, pesticides, and legacy pollutants such as PCBs and mercury. The Region has seen a rapid expansion of residential development within the past thirty years, which has lead to impacts from increased impervious surface, storm water pollution, and changes to stream channels, hydrographs and riparian zones. Groundwater contamination from industrial sites, leaking underground tanks, landfills, and MTBE are also major water quality concerns in the Region. Other major stressors include water diversions from bays and other waterways, and impacts from invasive species.

There are also water quality impacts in the more rural areas of the Region from grazing and agriculture, confined animal facilities, onsite sewage systems, and land conversions. Coastal watersheds are impaired due to impacts from sedimentation and habitat degradation (e.g., excess fine sediments, lack of large woody debris, and lack of spawning gravels)

**Mercury**: The San Francisco Water Board is developing new regulatory requirements to address the mercury sources to the Estuary, most significantly, the New Almaden mine, as well as the thousands of abandoned mercury and gold mine tailings in the Central Valley watershed. Mercury contamination in Estuary fish, such as the striped bass has remained high for more than 30 years.
Wetland restoration could increase mercury methylation processes and cause higher contamination in fish.

Watershed Monitoring and Assessment: Priorities include the Surface Water Ambient Monitoring Program, Regional Monitoring Program, and coordination with other federal, State and local monitoring efforts.

Since 1993, the San Francisco Regional Monitoring Program has been providing monitoring and synthesis of findings on water, sediment, and fish contamination issues in the bay. More monitoring and studies are needed to determine the effects of contaminants, including the emerging contaminants, on the aquatic ecosystem of the bay. Continued monitoring is needed to evaluate the effectiveness of management actions, detect long-term trends and investigate emerging issues from new contaminants.

**Critical Coastal Areas:** Critical Coastal Areas (CCAs) are specially designated land areas of the California coast where state, federal and local government agencies and other stakeholders have agreed to improve degraded water quality or protect exceptional coastal water quality from the impact or threat of nonpoint source pollution, by coordinating expertise and resources. A total of 21 CCAs in Region 2 have been designated, and nine of these have been proposed as high priority CCA planning and implementation areas.

**Wetlands and Stream Protection:** Priorities for the Regional Water Quality Control Board include Basin Plan amendments to include a stream protection policy and additional beneficial uses for stream and wetland protection; permitting and technical oversight of several large wetland restoration and enhancement projects in San Francisco Bay and coastal areas, including the North and South Bay Salt Ponds; mitigation tracking and monitoring for wetland projects; permitting of stream

**Rural Nonpoint Source (NPS):** Priorities include permitting and oversight of confined animal facilities (dairies, horse boarding, and other); application of sound management principles to vineyards and other agricultural land conversion activities; and oversight of existing Rural Wastewater and non-Chapter 15 Waste Discharge Requirements (WDRs).

**Watershed Management:** Priorities include continuing to work with watershed stakeholders in areas including Tomales Bay, Contra Costa, Alameda Creek watershed, and the Santa Clara Basin, while expanding and improving watershed partnerships in other key watersheds

**Sources of Drinking Water:** Drinking water sources range from high quality Hetch Hetchy and Mokelumne River supplies, local surface and groundwater, and variable-quality Delta water. Utilities that depend on the Delta for all or part of their domestic water supplies do meet the current drinking water standards, though they remain concerned about issues such as microbial contamination, salinity, and organic carbon. Delta water constitutes about one-third of the domestic water in the bay region.

**North Coast, San Francisco, & Central Coast Sustainability Workgroup:** This workgroup was formed to identify and describe the connections between water quality and climate change on the coast from central California to the Oregon border as well as actions in the water quality arena that can help reduce greenhouse gases and solve the problems created by climate change.

**San Francisco Estuary:** The San Francisco Estuary is the main focus of water quality issues in this region. Water and sediment in the Estuary meet quality guidelines for most contaminants,
with constituents in water meeting toxicity and chemical guidelines about 87 percent of the time. Sediment concentrations, though, are more problematic, due to legacy pollutants, with only about 60 percent of the sediment samples meeting chemical guidelines and passing toxicity tests.

**Suisun Marsh:** Habitat in the Suisun Marsh is threatened by increasing sedimentation. Exotic and invasive species, such as the Chinese mitten crab and Asian clam, threaten to undermine the Estuary’s food web and alter its ecosystem.

**Tomales Bay:** Though protected from urban development, is an impaired water body due to impacts from pathogens, sediment, and mercury. Tomales Bay is one of only four commercial shellfish growing areas on the entire west coast.

**Bolinas Lagoon:** Sediment threatens water quality and habitat in Bolinas Lagoon, the only wetland on the West Coast designated as a Wetland of International Significance by USFWS.

**San Francisco Bay Seaport/Vessel Wastes:** Because San Francisco Bay has several active seaports, discharge of ballast water and vessel wastes, and maintenance dredging and disposal of contaminated sediments, are water quality concerns.

**Groundwater Quality:** In general, groundwater quality throughout most of the region is suitable for most urban and agricultural uses with only local impairments, such as leaking underground storage tanks. [Add issues and current Status]

**Future Water Quality Projects:** Most utilities that deliver water from the Delta are pursuing a range of projects to protect and improve the quality of the water that they serve, including the ability to store Delta water when it is relatively good, watershed management, source blending, and advanced treatment.

**Project Operations**

[Summarize water project capabilities and constraints (source: operations plans, permits, etc)]

- need to show how the State Water Project fits into the regional report; how water quality is affected going east and south
- sea level rise issues (saltwater intrusion into outfalls)

**Water Governance**

- add section on “Regulatory Environment” – e.g. how laws have changed the way water is managed and planned.
- Area of Origin water rights have not been tested.
- representing diverse stakeholders with bio-region

The San Francisco Bay Hydrologic Region is home to many planning organizations that seek to identify future trends and the challenges that accompany them (Box 3-2 Planning Organizations). These groups are working on issues of land use, housing, environmental quality, and economic development, wetlands, waters reliability, watershed management, groundwater management, water quality, fisheries, and ecosystem restoration.

**Box 3-2 Planning Organizations**
## Bay Area/North Coast/Central Coast Water Quality and Sustainability Work Group

### Bay Area Water Supply and Conservation Agency (BAWSCA)
The Bay Area Water Supply and Conservation Agency represents the interests of 26 cities and water districts, and two private utilities that purchase water on a wholesale basis from the San Francisco Public Utilities Commission (SFPUC) regional water system. BAWSCA’s goals are to ensure high quality, reliable water supply for the 1.7 million people residing in Alameda, Santa Clara, and San Mateo Counties that depend on the SFPUC regional water system.

### ABAG-CALFED Task Force
Regional body of elected officials from local government and water districts, staff, and nongovernmental organizations that was formed to link planning for water supply and water supply reliability, water quality, and environmental protection for the Bay; support the objectives of the CALFED Record of Decision; and explore opportunities to improve regional cooperation.

### Bay Area Water Forum
First convened in 2000 to provide a venue for all stakeholders in the Bay region, including water, wastewater, flood control and storm water agencies, local governments, environmental and business groups, community and civic organizations and the general public, to identify, educate one another, and work cooperatively on key water resources issues for the Bay region.

### Bay Area Water Agencies Coalition
Established in 2002 to provide a forum and a framework for water agency general managers to discuss water management planning issues and coordinate projects and programs to improve water supply reliability and water quality.

### Northern California Salinity Coalition
Created in 2003 to advance the interests of the eight member water agencies in the development of local and regional efforts that will use desalination or salinity management technologies, practices, and approaches to improve water supply reliability for coalition members and to reduce salinity-related problems affecting the water supplies of the member agencies.

### Bay Area Clean Water Agencies
Founded in 1984, BACWA is an association comprised of local governmental agencies that own and operate publicly owned treatment works that discharge to the waters of San Francisco Bay Estuary. BACWA’s members serve more than 6 million people in the nine-county Bay Area, treating all domestic and commercial wastewater and a significant amount of industrial wastewater.

### Bay Planning Coalition
Established in 1983, the BPC is a nonprofit, membership-based organization representing the maritime industry and related shoreline business, ports and local governments, landowners, recreational users, environmental and business organizations, and professional service firms in engineering, construction, law, planning, and environmental sciences.

### Bay Area Flood Protection Agencies
“Governance Subcommittee” dated December 27, 2006.
Flood Management

Historic Floods
Because the region generally receives very little snow, floodwaters originate primarily from intense rainstorms. Flooding occurs most frequently in winter and spring, and the steep terrain results in floods that are intense and of short duration. Hillsides denuded by wildfires can exacerbate flood-induced damages by increasing runoff and contributing increased sediment. The northern portion of the region receives greater precipitation than the southern and floods more often. Flooding at river mouths often occurs, and storm surges coincident with high tides can create severe flooding in low-lying areas. Flood parameters for all the major flood-producing streams are listed in Appendix 3A Flood Management in Table 3A-1. Flood parameters for principal streams. Recent notable flood events have been:

- The Great Flood 1861-1862.

For more information on these floods see Appendix 3A Flood Management.

Flood Hazards

- Many areas within the region are vulnerable to damages caused by flooding. The following list of flood hazard areas is representative of the flood hazards in the Bay Area. The upper Guadalupe River and reaches of Coyote Creek do not contain the channel capacities necessary to convey 100-year flood events, threatening homes and businesses in Santa Clara County.

- Siltation in Cull Canyon and Don Castro reservoirs has decreased the storage available to capture floodwaters.
- Levees along many of Alameda Creek’s tributaries are not high enough to contain 100-year flood stages.
- The Line A Channel, channels between Union Pacific Railroad and Interstate 880, and other channels in the Alameda Creek drainage lack the capacity to convey 100-year flood events.
- Construction of homes adjacent to unregulated Napa River tributaries has exacerbated the flooding risk in such areas.
- Low bridges spanning unregulated Napa River tributaries remain vulnerable to failure during flood stages.
- Large wildfires followed by intense rainfall can result in catastrophic flooding.
- Several old railroad bridges at creek crossings around the bay are inadequate to convey flood flows.

Flood Governance
Flood management is a cooperative effort for which federal, state, and local agencies all play significant parts. The principal participants are listed in Box 3-3 Flood Management Agencies. For more information on the agencies’ roles, see Table 3A-2 Flood management participants in Appendix 3A.
Box 3-3 Flood Management Agencies

**Federal**
- Federal Emergency Management Agency
- Natural Resources Conservation Service
- United States Geological Survey
- United Stated Army Corps of Engineers

**State**
- California Conservation Corps
- Department of Corrections
- Department of Forestry and Fire Protection
- Department of Water Resources

**Local**
- County emergency services units
- County planning departments
- County building departments
- Local conservation corps
- Local initial response agencies
- Alameda County FCWCD
- Contra Costa County FCWCD
- Marin County FCWCD
- Napa County FCWCD
- San Francisco Department of Public Works
- San Francisquito Creek Joint Powers Authority
- San Mateo County Flood Control District
- Sonoma County Water Agency

**Flood Risk Management**

Flood risk management includes a wide variety of projects and programs, which may be grouped as Structural Approaches (Constructed facilities, coordination of flood operations, maintenance), Land Use Management (Floodplain function restoration, regulation, flood insurance), and Disaster Preparedness, Response and Recovery (Information and education, disaster preparedness, emergency response, post-flood recovery). Major reservoirs and their flood control features are listed in Table 3A-3 (Flood control reservoirs, San Francisco Bay Hydrologic Region) in Appendix 3A.

**Coordination of Flood Operations**—No formal forecast-coordinated operations agreements exist between agencies with flood control reservoirs. However, reservoir operators are often involved in daily operations conferences with the Corps of Engineers and DWR at the State-Federal Flood Operation Center during high-water periods. Changes to reservoir operations frequently result from these meetings.

**Maintenance**— [Place Holder]

**Land Use Management**

**Floodplain Function Restoration**— [Place Holder]
Regulation—All counties within the San Francisco Bay Hydrologic Region have ordinances regulating floodplain development; floodplain management is usually part of the counties’ general plans. A number of cities have additional ordinances that further restrict development in areas particularly susceptible to flooding. Officially designated floodways in the region include Cull, Crow Canyon, Alameda, and Arroyo de la Laguna creeks in Alameda County; the Napa River in Napa County; Sonoma and San Antonio creeks in Sonoma County; and Novato Creek in Marin County.

Flood Insurance—FEMA has provided Flood Insurance Rate Maps (FIRMs) for all counties in the region. Many of these maps were drawn in the 1980s and 1990s; since then many amendments and revisions have been applied. Updated FIRMs for the entire region should be effective by 2009. Of the eight counties, one city and county, and 85 cities within the hydrologic region, five counties and 21 cities participate in the National Flood Insurance Program Community Rating System. In 2007, the participating counties had community ratings: Contra Costa County, Class 6, Santa Clara, Alameda, and Solano counties, Class 7, and Sonoma County, Class 10. For the cities, Milpitas and Petaluma were in CRS Class 6; Fremont, Morgan Hill, Palo Alto, San Jose, Santa Clara, Sunnyvale and Walnut Creek, Class 7; Corte Madera, Cupertino, Fairfield, Los Altos, Mountain View, Napa, Novato, Pleasant Hill, Pleasanton, San Leandro and San Ramon, Class 8, and Richmond, Class 9. See Chapter 1 State Summary of this volume for more information on the Community Rating System.

Disaster Preparedness, Response, and Recovery

Information and Education—DWR’s Awareness Floodplain Mapping project gives citizens an easy-to-use website for acquiring information about floodplains in their regions. Currently, maps have been drawn for portions of all counties except Contra Costa; all developing areas will be mapped by 2012. The website can be accessed at the following address: http://www.fpm.water.ca.gov/mapping/awareness_mapping.cfm.

Relationship with Other Regions

- this section should link water quality, water quantity, and ecosystem health
- inter-IRWMP coordination
- quantifying upstream-upstream interlays of supply
- compacts with other states
- aboriginal upstream claims
- there are strong relationships with other regions (Russian River, SWP, and water banking on the south San Joaquin)
- Sonoma and North Marin get water from Russian River
- is eastern Solano and Yolo in SF Bay hydrologic region? project require diversions here
- area of origin water needs
- environmental and economic relationships with other regions
- Delta island flooding
- upstream water quality
- Bay influence on ocean; impacts of discharges on marine life
- capabilities of water districts for interties (e.g. in 1977, LA freed up water for Marin County – water carried across Richmond Bridge); there are interties within Bay Area, need interties with San Luis Reservoir and other regions
Regional Water and Flood Planning and Management

[Develop tribal content: Include major issues that involve tribes, name tribal governments and agencies involved.]

- public/private partnerships and economic benefits (e.g. dredging)
- sub-regional planning organizations: North Bay Water, Coastside, Tomales Bay; Napa County has joined Bay Area IRWM; Solono County is in Bay Area IRWMP; flood protection; watershed coordinating committee (Phil Stephans and Coastal Commission); MBWA, Blueprint, SF Vision, Footprint, FOCUS (ABAG, BCDC, MTC, ARB)
- need groundwater management performance measures (Zone 7 is a good example)
- in Contra Costa, houses are still being built below sea level (Bethany Island, Oakley)
  - flood management agencies have no say

Some of the major water related challenges facing the San Francisco Bay region include improving water supply reliability to sustain water supplies in drought periods and other emergency outages, maintaining and improving drinking water quality across the region by continuing to meet and exceed current and anticipated drinking water quality standards and protecting drinking water sources, and improving the ecosystem health of San Francisco Bay. Other challenges include linking local land use planning with water system planning and improving water management planning on a regional level.

Many projects and programs are already under way to address these needs. However, the various parties concerned with water-related issues in the bay region are increasingly recognizing that there is also a need to develop solutions on a more collaborative regional or sub-regional basis. Some of the longstanding regional planning efforts within the bay region are described in this section, including projects under way to improve water supply reliability, water quality and ecosystem restoration through regional partnerships. In addition, some of the newer water management and drinking water quality regional planning initiatives are described in the section, “Looking to the Future.”

Integrated Regional Water Management

Four Integrated Regional Water Management Plans (IRWMPs) cover the entirety of the San Francisco Bay Area Hydrologic Region. A fifth serves as functionally equivalent to an IRWMP. One of the plans occupies the entire region; three IRWMPs overlap into this region from adjacent hydrologic regions. IRWMPs are living documents and may change as planning efforts mature, opportunities for collaboration and partnership are discovered, and State guidance is further refined. There may be existing efforts which, at the time of this printing, are not yet known on a statewide basis. The known planning efforts in the region are presented in Table 3-6 and Figure 3-7.
Table 3-6 Strategies of Integrated Regional Water Management efforts, San Francisco Bay

<table>
<thead>
<tr>
<th>Strategy</th>
<th>San Francisco Bay Area IRWMP</th>
<th>Solano IRWMP and Strategic Plan</th>
<th>Napa-Berryessa IRWMP</th>
<th>Tomales Bay ICWMP</th>
<th>East Contra Costa IRWMP</th>
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</thead>
<tbody>
<tr>
<td>Conjunctive use</td>
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<td>Desalination</td>
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<td>Ecosystem restoration</td>
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<td>Education and outreach</td>
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<td>Environmental and habitat protection and improvement</td>
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<td>Flood management</td>
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<td>Groundwater banking</td>
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<tr>
<td>Groundwater management</td>
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<td>✓</td>
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<td>Imported water</td>
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<td>✓</td>
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<tr>
<td>Increase conveyance capacity and utilization</td>
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<tr>
<td>Infrastructure reliability</td>
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<td>Interties</td>
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<td>✓</td>
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<td>Monitoring and modeling</td>
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<td>Nonpoint source pollution control</td>
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<td>Optimize delivery of water to end users</td>
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<td>Recreation and public access</td>
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<td>Regional cooperation</td>
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<td>Storm water capture and management</td>
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<td>Water conservation</td>
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<td>Water transfers</td>
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<td>Watershed planning</td>
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<tr>
<td>Wetlands enhancement and creation</td>
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</table>

Note: The summary information contained in these tables was obtained from various IRWM plans. For additional details or information related to a specific plan, please consult the current version of the plan or its authors.

3 Functional equivalent
The main water issues identified by IRWM regions are providing adequate supplies to meet the needs of their customers in the future, managing flood plain amidst urban development and high land costs, environmental water demands, and water quality in receiving waters. The main water management strategies used to overcome the water management issues are listed in Table 1.

Examples of integrated, multi-benefit projects include: EBMUD-CCWD Raw Water Intertie, Regional Conservation Outreach Campaign, and the Alameda Creek fish Passage projects. The intertie connects CCWD and EBMUD to bolster water supply reliability for customers of both agencies. The outreach campaign coordinates conservation messages throughout the San Francisco Bay to increase water conservation awareness at a regional level. The fish passage maintains the existing local groundwater recharge operations while providing for steelhead fish passage and protection at the diversion.

The makeup of each IRWM planning region in this hydrologic region is unique and reflects the water management priorities and stakeholder relationships specific to that region. Regardless of the stage of development, each IRWM region represents an extensive endeavor to meet regional water needs and the new paradigm of water resource planning.

**Figure 3-7 Integrated Water Management Plan efforts, San Francisco Bay Hydrologic Region**
stormwater permits felt at land use planning level (this provides an opportunity to 
require interaction between land use agencies and water agencies)
- agencies are working with cities and counties for future demand (e.g. in 1970s, 
  Livermore water agencies imposed development fees (through their connection 
  program) to ensure water supplies); Zone 7
- Pilotos Creek received an IRWM grant from the State Board (for the west side of 
  San Mateo)
- Santa Clara Basin Watershed Management Initiative (www.scbwmi.org)

[Discuss varying status of plans (status includes state of planning, state of outreach, integration, 
area covered, water management issues…) Future text needs to include a discussion of any 
areas of overlap to clarify those relationships]

Of five IRWMPs that that encompass the San Francisco Hydrologic Region, three specifically 
address flood control. Though the Solano County IRWMP lists no flood control infrastructure to 
be constructed in the near term, it does discuss updating its flood control plan and flood-hazard 
maps; establishing more clearly its flood control duties with other agencies; and evaluating the 
safety of its major structures (e.g., Monticello Dam, which impounds Lake Berryessa). The San 
Francisco Bay Area IRWMP discusses flooding in depth; 48 flood control projects are identified, 
with 22 short-term projects providing direct flood control benefits. The Tomales Bay Integrated 
Coastal Water Management Plan lists four flood control projects, two of which could be 
completed by 2010.

Accomplishments
Bay region water agencies have made significant investments in programs and projects to actively 
protect municipal water quality including facility upgrades, advanced treatment methods, 
watershed monitoring, groundwater monitoring and protection, demineralization projects, and 
nonpoint water source evaluations.

- Contra Costa Water District - Completed Veale Tract drainage relocation project, 2008.
- Contra Costa Water District - CEQA and NEPA environmental impact documentation for 
  the Los Vaqueros Reservoir Expansion Project complete for public review in Fall 2008.
- San Francisco Public Utility Commission – Water System Improvement Program.
- The San Francisco Public Utilities Commission (SFPUC) has unanimously approved (2008) 
  the construction of the New Crystal Springs Bypass Tunnel, a critical link in delivering 
  Sierra source water to the San Francisco Peninsula. Project will take two years to complete.
- East Bay Municipal Utility District – Freeport Regional Water Project

Challenges
-land use entities need to consider water availability and increased flood potential when issuing 
  permits for growth and development.
-conflicting objectives of State programs.
-reduced greenhouse gases v. recycling (and other high-energy water management strategies)
-need more consolidation of State and Regional water planning; need inter-regional planning; perhaps a State agency to manage water supply? ——(staff comment: optimize resources available to get best use of programs)

- contaminated groundwater (boron, selenium, salinity), inappropriate land use: State Board asked CALFED Science Board to look at

-wastewater and pharmacological contaminates – unknown risk

-representing water managers, agricultural users, urban users, economic development, water specialists formally in constituent group committees

-levee protection; obtaining dedicated levee funding for urban areas with a population of more than 10,000; HOA assessment on new development to maintain levees

-levee impacts regarding water supply reliability and water quality

-wetlands restoration and mercury issues

-AB 32 and ARB – carbon reduction goals

-Salt Ponds

Some of the challenges ahead related to flood protection include:

- Mapping of the 100-year floodplain throughout the region needs to become a high priority and be completed as quickly as possible.
- Strengthening local city and county ordinances regulating residency and floodplain use should occur.
- More streamlined funding mechanisms for building and maintaining flood control infrastructure need to be developed and implemented.
- Identify undersized railroad bridge crossings and develop a plan to enlarge the flow carrying capacity for major urban streams around the Bay.
- Managing colonizing beaver populations in improved urban floodways.
- Certifying levees in communities throughout the Bay Area to meet FEMA standards.

**Drought and Flood Planning**
[Summarize status of drought planning & preparedness from IRWM, UWM Plans, etc.]

Bay Area IRWMP brought flood protection agencies together, created regional agency voice for flood protection element of plans need connection between flood protection and water management; tidal flooding, wastewater outfalls, need Federal assistance need policy recommendations for flood infrastructure funding mechanisms – revolving fund also emergency interventions and longer interventions; need awareness; interties; plans; catastrophic preparedness; storm water retention, impervious surface, BASWMA- see Emeryville’s application for LID (reducing discharge at source) – relates to land use

add Bay Area Flood Protection Agencies Association groundwater banking for drought contingencies
Most agencies in the region presently have some level of flood planning. Vallejo Sanitation and Flood Control District has an emergency preparedness program in place and emergency funds available in the event of flooding damage. The city of Napa has a system of road closures based on the stage of the Napa River that reduces risk to individuals and property in the event of a flood. Solano County Water Agency provides a Flood Awareness Manual that gives guidelines to citizens for appropriate planning and response behaviors for floods, as well as small grants for construction of flood control infrastructure. The Contra Costa Resource Conservation District has a watershed management plan for Alhambra Creek, which discusses myriad options for reducing the risk of flooding in Martinez and surrounding areas. The newly created Bay Area Flood Protection Agencies Association is a consortium of flood control and water agencies within the hydrologic region that provides a forum for discussing flooding issues, collaborating on multiagency projects, and sharing resources.

Looking to the Future

Future Scenarios

[insert discussion of future scenarios from volume 1 of concern to the region]

[look at scenarios of reduced imports from Delta, drought, climate change, and storage (e.g. Mattole River)]

- quantification of allocations in computer models with GIS overlay
- look at increased water for Delta (decreased diversions)
- reduced imports from all sources (not just Delta)
- reduced supply to Southern California from Colorado River

[Develop tribal content: Mention if something is pending in tribal water rights.]

Climate Change

Climate change is projected to present water resource management challenges to the San Francisco Bay Area. Many climate models predict warming and increased precipitation variability over the entire Sierra Nevada, which would result in reduced snow accumulation, earlier and quicker snowmelt and potentially affect water supplies for the San Francisco Region.

Another effect of the projected climate warming is mean sea level rise. California’s coastal observations and global model projections indicate that California’s open coast and estuaries will experience increasing sea levels during the next century. Historical records show that sea level in San Francisco Bay has risen 7 inches over the past 150 years. The 2006 California Climate Action Team Report project that global sea level will rise between 4 and 33 inches by the year 2100. As the mean sea level increases, historical coastal structure design criteria may be exceeded causing levee needs and jeopardizing structures. Additionally, ecosystems, salinity levels and water resources could be adversely affected. Recently, the Bay Conservation and Development Commission (BCDC) has become increasingly concerned that continued sea level rise from global warming will have extreme impacts in the San Francisco Bay Region. Using GIS data the BCDC has prepared illustrative maps showing that a one-meter rise in the level of the Bay could flood over 200 square miles of land and development around the San Francisco Bay.
Response Strategies

[insert discussion of selected response strategies from Volume 2 important to the region]

[Focus on key strategies from workshops: improve infrastructure, diversify water supplies, reuse stormwater, recycle wastewater, develop future conservation BMP’s, market water, conserve energy, protect watersheds, link habitat/riparian water issues with water quality & supply, address EJ, expand reuse and storage]

- linking water quality and quantity to land use;
- establishing buy-in from municipalities in regional plan (MOUs, upstream-downstream interests interfacing);
- maximizing local water resources;
- add storm water retention.

Each region in the state will have a developed set of Regional Response Packages. These packages are determined by the Regional Objectives and proposed RMS for each HR. [To be developed]

Implementation Next Steps

[insert comments from workshops about incentives, funding sources, DWR actions to support regional strategies:]

[identify costs and benefits for actions; include cost of failure (risk analysis); establish quantifiable indicators/measures of success to track process on reaching goals; provide flexibility on how to achieve targets;]

[prioritize implementation and economic efficiency - reduce permitting roadblocks, frame as 'action plan', report cost effectiveness of recommendations, include performance metrics and accountability, enhance public communication; prioritize regional multi-objective projects; fund demonstration projects;]

[expand outreach to local agencies on using the Water Plan (key information includes challenges, strategies, and incentives);]

[improve linkage between water and land use planning (general plan elements, emergency plans beyond 2 days, regional planning, growth, flood management, drought plans);]

[improve consistency in methodology and reporting in urban water management plans;]

[discuss water-smart growth (toolkit); assist with increasing the acceptance and use of recycled water;]

[improve hydrologic data collection, compilation, sharing programs]

- brine management for brackish and ocean desal (master plan needed, e.g. So. Cal outfalls); State policy for beneficiary pays – discuss change?
- encourage low-impact development – training sessions for developers and contractors; defining priorities and regional public welfare statements; developing stakeholder bodies for water authorities
- full wastewater reclamation
- public education; financial assistance, local ordinances for infrastructure investments
- additional agricultural water use efficiency and beneficial management practices.
Water Portfolios from 1998–2005

[present water supply and use data, if possible include onsite reuse (gray water), supply options (rain catching, storm water reuse), estimate water use by sector, if possible estimate change in groundwater levels or storage]

PLACEHOLDER Table 3-7 San Francisco Bay Hydrologic Region water balance summary (taf), 1998-2005

PLACEHOLDER: Figure 3-8 San Francisco Hydrologic Region – illustrated water flow diagram

PLACEHOLDER: Figure 3-9 San Francisco Hydrologic Region – schematic flow diagram