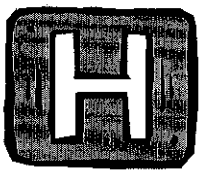
7.12 Public Health and Environmental Hazards

Overall, the CALFED Bay-Delta Program would benefit public health; however, some potentially significant adverse impacts may be associated with increased mosquito breeding habitat. The Program also could result in indirect long-term beneficial impacts by reducing public exposure to certain environmental hazards, such as forest fires.



7.12 Public Health and Environmental Hazards

7.12.1 SUMMARY

Reducing the spread of disease and risk of fires, and limiting the exposure of individuals to hazardous materials and waste are societal goals. Controlling and managing these potential hazards improve the overall quality of life in a society. Many every-day activities relate to the category of public health and environmental hazards. For example, improper disposal of garbage, over time, could create a public health concern. Hazardous wastes often are by-products of modern living. For this document, the public health and environmental hazard resource category addresses three issues that are salient to the CALFED Bay-Delta Program (Program): disease transmission by insect vectors, fire hazards, and increased exposure to hazardous materials and waste. Public health and environmental hazard impacts resulting from poor water quality, disinfection by-products, or trihalomethanes are addressed in the water quality impact analysis, Section 5.3.

Reducing the spread of disease and risk of fires, and limiting exposure to hazardous materials and waste improve the quality of life.

Preferred Program Alternative. The Preferred Program Alternative would benefit public health by providing better water quality, which also could contribute to reduced opportunities for disease transmission and, in some instances, to reducing mosquito breeding habitat. The Water Quality Program is designed to reduce elevated levels of detrimental chemicals, metals, and pesticides. These reductions will not only benefit water quality but also will reduce public health concerns about consuming fish and shellfish from the Bay-Delta. Public health benefits from the Watershed Program could result from fewer or less intense forest fires which, in turn, would lessen the sediment load in streams and rivers. In addition, the organic materials that run off from fire-scorched areas and contribute to mosquito breeding habitat could be reduced. The Water Use Efficiency Program could benefit public health by reducing the amount of water left standing in an agricultural field and by reducing the amount of surface water pollution.

Beneficial impacts associated with the Levee System Integrity and Storage Programs, and the Conveyance Element could include improved flood control and fire management capabilities. However, these elements could cause potentially significant adverse impacts on public health, including temporary additional ponding that could create mosquito breeding habitat and resuspension of or exposure to hazardous materials during

The Preferred Program Alternative would benefit public health by improving water quality, flood control, and fire management capabilities.

construction. Most impacts related to exposure to hazardous materials can be mitigated to less-than-significant levels.

The Ecosystem Restoration, Levee System Integrity, Storage, and Conveyance Elements of the Preferred Program Alternative could result in potentially significant adverse impacts related to disease transmission by insect vectors, primarily by increasing the amount of potential mosquito breeding habitat. The combination of increased mosquito breeding habitat and increased human population could result in potentially significant adverse impacts on public health. In most cases, these impacts can be mitigated to less-than-significant levels. In some cases, mitigation may not be available to reduce this impact to a less-than-significant level.

Alternatives 1, 2, and 3. Alternatives 1, 2, and 3 would result in similar benefits and adverse impacts as those described for the Preferred Program Alternative. Alternatives 2 and 3 have greater potential for construction-related impacts on public health and environmental hazards, such as exposing the public to hazardous materials, because their additional conveyance features would require additional construction activities. However, these alternatives have a greater potential for long-term benefits, including improved flow conditions that could improve water quality. Conversely, Alternative 1 and the Preferred Program Alternative could result in fewer short-term impacts but have less potential for overall long-term benefits on public health and environmental hazards.

The following table presents the potentially significant adverse impacts and mitigation strategies associated with the Preferred Program Alternative. Mitigation strategies that correlate to each listed impact are noted in parentheses after the impact.

Potentially Significant Adverse Impacts and Mitigation Strategies Associated with the Preferred Program Alternative

Potentially Significant Adverse Impacts	Mitigation Strategies
Short- and long-term increases in mosquito breeding habitat from wetland restoration activities or fluctuating water levels (1,2,3,4,5).	1. Using various mosquito control methods, such as biological agents, chemical agents, and ecological manipulation of mosquito breeding habitat.
Increased risk of groundwater and surface water contamination from naturally occurring or spilled hazardous materials and from improper handling of hazardous materials (6).	2. Supporting actions to establish or find funding for mosquito abatement activities.
Increased exposure to hazardous materials and waste from construction activities related to storage and conveyance projects (6,7,8,9).	3. Removing or disturbing water that remains stagnant for more than 3 days at a construction site.
Increases in water quality degradation, resuspension of contaminates, and exposure to hazardous materials from dredging activities (6,8,9).	

Potentially Significant Adverse Impacts and Mitigation Strategies
Associated with the Preferred Program Alternative
(continued)

4. Limiting construction to cool weather, when mosquito production is lowest.
5. Limiting construction to periods of low precipitation to avoid forming pools of standing water.
6. Following established and proper procedures and regulations for removing and disposing of contaminated materials.
7. Increasing monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.
8. Limiting or coordinating construction activities to favorable weather conditions to forestall dispersing hazardous materials.
9. Testing sediment before dredging to avoid increased exposure to hazardous materials from placing contaminated dredged materials near population centers.

No potentially significant unavoidable impacts related to public health and environmental hazards are associated with the Preferred Program Alternative.

7.12.2 AREAS OF CONTROVERSY

Areas of controversy as defined by CEQA involve differences of opinion among technical experts or information that is not available and cannot be readily obtained. According to this definition, no areas of controversy relate to public health and environmental hazards.

Other issues regarding the effects of Program actions do not meet the CEQA definition of areas of controversy but represent areas of disagreement or concern. One such concern for public health relates to funding mosquito abatement and vector control activities for the projected increases in wetland habitat. Entities responsible for mosquito abatement and vector control are concerned that Program elements could increase mosquito breeding habitat, which could lead to increased need for abatement activities. At the same time, the Program elements involving land conversion could reduce the financial base upon which abatement activities are funded. Mosquito abatement districts (MADs) rely on property taxes for funding; a change in land use could create additional financial demands. The environmental consequences of Program actions on public health and environmental hazards are disclosed in the environmental consequences sections of this document. Strategies are presented to mitigate potentially significant adverse impacts to less-than-significant levels.

7.12.3 AFFECTED ENVIRONMENT/ EXISTING CONDITIONS

7.12.3.1 DELTA AND BAY REGIONS

Disease Transmission. Mosquitos are the primary vectors for disease in these regions. Urban encroachment, a result of population growth in both the Delta and Bay Regions, resulted in more frequent human exposure to mosquitos and the likelihood of mosquito-borne disease transmission. Mosquito breeding habitat and consequent mosquito populations have been affected by land use changes in these regions.

Mosquitos are the primary vectors for disease in these regions.

By the early 1900s, most prehistoric Delta and Bay marshes (including the Suisun Marsh) were converted to agricultural land. Although this change in land use could suggest a reduction in mosquito breeding habitat, that has not necessarily been the case. Certain agricultural infrastructure and practices (for example, irrigation ditches and post-harvest flooding in fields to provide habitat for wintering waterfowl and other wildlife) could, and often did, create suitable breeding conditions for mosquitos.

In 1915, the California State Legislature enacted the Mosquito Abatement Act, which allowed local mosquito abatement organizations to form into specific special districts. These special districts had taxation authority to finance abatement programs. By 1973, 64 MADs had been established in California.

Diseases carried by mosquitos are known as arboviruses. At least 18 arboviruses with potential to harm humans are present in California, including western equine encephalomyelitis, St. Louis encephalomyelitis, malaria, and dog heartworm.

In the Delta and Bay Regions, current mosquito control efforts focus on seven mosquito species that could transmit malaria and encephalitis or could cause a substantial nuisance in communities: the floodwater mosquito (*Aedes melanimon*), pasture mosquito (*Aedes nigrormaculis*), encephalitis mosquito (*Culex tarsalis*), western malaria mosquito (*Anopheles freeborni*), pale marsh mosquito (*Aedes dorsalis*), cool-weather mosquito (*Culiseta inornata*), and house mosquito (*Culex pipiens*).

Mosquito Breeding Conditions and Habitat. All mosquito species require standing water to complete their growth cycles. Any body of standing water that remains undisturbed for more than 3 days represents a potential mosquito breeding site. Mosquitos produce year-round on Delta islands, but mosquito production diminishes substantially during cooler weather, typically from late October through April.

Any body of standing water that remains undisturbed for more than 3 days represents a potential mosquito breeding site.

Water quality affects the productivity of a potential mosquito breeding site. Typically, water bodies with poor circulation, higher temperatures, and higher organic content produce greater numbers of mosquitos than water bodies with good circulation, lower temperatures, and lower organic content. Irrigation and flooding practices may influence

mosquito production associated with a water body. Typically, water bodies with water levels that slowly rise or lower produce greater numbers of mosquitos than water bodies with water levels that are stable or that rapidly fluctuate.

Two general classes of habitats, open water and flooded, provide suitable conditions for mosquito production. Open-water habitats include permanently inundated wetlands, ditches, sloughs, and ponds. Flooded habitats include managed wetlands and agricultural lands that may seasonally retain surface water.

MADs use a combination of abatement procedures to control mosquitos. Each method may have maximum effectiveness under specific habitat conditions or periods of the mosquito life cycle. As a result of concern about the cumulative effects on the environment of past abatement practices, mosquito control has shifted away from applying pesticides, kerosene, and diesel fuel since the late 1970s. Mosquito control methods currently used by MADs include:

MADs use a combination of abatement procedures to control mosquitos.

- Biological agents, such as mosquitofish, which eat mosquito larvae
- Source reductions, such as draining the water bodies that produce mosquitos
- Pesticides
- Ecological manipulations of mosquito breeding habitat

Other Vectors and Host Populations. Other public health concerns related to animal-vectored disease in California include the transmission of Lyme disease by ticks, bubonic plague by fleas, and rabies by wildlife; however, none of these issues are considered a high risk to public health in the Delta or Bay Regions.

Fire Hazard. Little information is available as to how frequently the Delta and Bay Regions experienced fires prior to European settlement in the 1800s. As more land in both regions were reclaimed for agricultural uses, the possibilities of fires increased because of changes in land use and vegetation, in addition to increased population. As a result of reclamation efforts in swamp lands, there is some limited potential for peat fires in the regions. In the Bay Region, fire suppression policies and large-scale grazing in the forested areas caused material decomposition rates to decline, which contributed to fuel accumulation throughout most of the Bay Region's wildlands.

In the Bay Region, fire suppression policies and large-scale grazing in the forested areas caused material decomposition rates to decline, which contributed to fuel accumulation throughout most of the Bay Region's wildlands.

Several recent fire management measures were adopted by both the state and federal governments. In 1981, the California Department of Forestry and Fire Protection (CDF) initiated its Vegetation Management Program to reduce wildfire damage and enhance resource values by reducing wildland fuel hazards. The Vegetation Management Program encompasses all major ecosystems in the state and a wide range of fuel management techniques. CDF also is implementing a pre-fire management initiative to conduct pre-fire planning in parts of the state for which it has fire suppression responsibility. The goal of the U.S. Forest Service's (USFS's) forest health initiative is to provide periodic fuel management treatment to as much national forestland as possible.

The Bay Region experienced a devastating fire in 1991 in the Oakland-Berkeley Hills. The fire swept through more than 1,500 acres, killing 25 people, destroying almost 3,000 single-family homes, and costing more than $1.5 billion in losses. Severe fires such as the Oakland-Berkeley Hills fire accelerate runoff that can contain greater amounts of soil sediments and increase sedimentation in streams, particularly when riparian vegetation has been burned. Reduced water infiltration through the soil resulting from fires can lead to mudslides.

Severe fires accelerate runoff that can contain greater amounts of soil sediments and increase sedimentation in streams, particularly when riparian vegetation has been burned.

Hazardous Materials and Waste. In both the Delta and Bay Regions, hazardous waste sites associated with agricultural production activities include storage facilities and agricultural ponds or pits contaminated with fertilizers, pesticides, herbicides, or insecticides. Petroleum products and other materials may be present in the soil and groundwater near leaking underground tanks used to store these materials. Leaking or abandoned pesticide storage containers also may be present on farmland. Water from agricultural fields on which fertilizers and pesticides are applied may drain into ponds, and rinse water from crop duster tanks and other application equipment routinely is dumped into pits. Evaporation can increase chemical concentration in pond water and cause chemicals to be deposited in underlying soil. Surface water percolation can pollute groundwater and expand the area of soil contamination.

Spills and leaking tanks or pipelines from industrial and commercial sites also can be sources of contaminants, such as petroleum hydrocarbons and polychlorinated biphenyls from old electrical transformers. Groundwater pollution in the Bay Region primarily is a result of leaking fuel tanks. Currently, more than 7,500 fuel tanks have leaked in the Bay Region; most groundwater cleanup activities are for fuels leaked from underground storage tanks (USTs). At about 500 other sites, chemicals that usually are toxic industrial solvents have leaked into groundwater. Contamination from manufactured gasoline plants could include polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons from USTs, as well as cyanide and phenols. Contamination from chlorinated solvents, such as trichloroethylene (TCE) from manufacturing and plating, occurs in San Jose. Contamination from metals and PAHs also could result from railroad operations. Metals such as cadmium, zinc, and mercury are present in inactive and abandoned mines, and in streams in the Delta Region.

Groundwater pollution in the Bay Region primarily is a result of leaking fuel tanks.

A multitude of hazardous chemicals, such as petroleum hydrocarbons and chlorinated solvents, may be present at active and closed military bases and industrial sites. Military bases scheduled for closure in the Bay Region currently are undergoing environmental clean-up activities. The California Environmental Protection Agency (CalEPA) has oversight authority for these clean-up activities. Among the concerns are hazardous materials, such as metals, polychlorinated biphenyl (PCBs), petroleum products, volatile organic compounds (VOCs), asbestos, and unexploded ordnance. Because landfills accepted almost all kinds of waste until the 1980s, any closed landfills may contain hazardous waste. In the study area, naturally occurring elements such as metals may be found at concentrations and amounts that may be considered hazardous.

Illegal drug manufacture and distribution facilities often are located in secluded abandoned structures; these structures can include abandoned barns and other structures present on farmland. Operation of these facilities can result in the improper storage and disposal of hazardous chemicals used during the manufacturing process.

7.12.3.2 Sacramento River and San Joaquin River Regions

Disease Transmission. The existing conditions related to mosquitos and mosquito-borne diseases are similar to those described for the Delta and Bay Regions.

Fire Hazards. Prehistorically, fire was the principal mechanism by which the nutrients contained in forest material were recycled. Since the 1800s, fire suppression policies and large-scale grazing have caused the rate of material decomposition to decline dramatically, and has led to fuel accumulation throughout most of the wildlands of the Sacramento River and San Joaquin River Regions. Fire suppression efforts also have reduced the frequency of wildfires. Due to their infrequency, wildfires now burn at higher intensities and damage larger areas. Wildfires can affect the quantity, quality, and timing of flows from watersheds and are responsible for the most intensive and extensive changes in watershed conditions.

Due to their infrequency, wildfires now burn at higher intensities and damage larger areas.

Through vegetation removal, burning organic matter in soil, and creation of impervious soil layers, severe fires accelerate the amount of runoff. This runoff contains greater amounts of soil sediments and increases sedimentation in streams, particularly when riparian vegetation has been burned. With reduced water infiltration through the soil, mudslides can become more prevalent.

Fire suppression and large-conifer logging have resulted in forests dominated by small, shade-tolerant, and fire-sensitive tree species, such as white firs and incense cedars. These species have contributed to the amount of live and dead wood fuels near the forest floor. The presence of these fuels allows fires to climb to the forest canopy, leading to large-scale, severe wildfires. The changes have been greatest in the lower and middle elevations of the Sierra Nevada, the areas where human development has been the most rapid. These two conditions have led to an increase in the amount of people and property that are threatened by fire.

Conifer vegetation is common in the upper watersheds of the Sacramento River and San Joaquin River Regions, and presents a serious wildfire risk. These regions also contain vegetation that makes them susceptible to grass fires and brush fires, which can cause effects similar to, but less intense than, those from forest fires.

Hazardous Materials and Waste. Types of hazardous waste sites in the Sacramento River and San Joaquin River Regions include contaminated agricultural ponds; spills; and leaking tanks or pipelines from industrial sites, railroad operations, commercial sites, and mining.

Metals such as cadmium, copper, mercury, and zinc, are present in inactive and abandoned mines in the Sacramento River drainage.

Metals such as cadmium, copper, mercury, and zinc, are present in inactive and abandoned mines in the Sacramento River drainage. The Sulphur Bank Mercury Mine in Clear Lake is listed as an EPA Region IX Superfund Site. Pollution in the San Joaquin River drainage includes pesticides and solvents from heavy industries in Fresno, and includes metals such as cadmium, zinc, and mercury from inactive and abandoned mines. Iron from naturally occurring geologic formations is another source of hazardous materials in the San Joaquin River Region. Landfills and commercial activities, such as dry cleaning, could be sources of contamination in these regions.

Military bases scheduled for closure in the Sacramento River Region currently are undergoing environmental clean-up activities. Among the concerns are hazardous materials such as metals, PCBs, petroleum products, VOCs, TCE, municipal wastes, and solvents. The EPA Region IX Superfund National Priorities List includes Mather AFB, McClellan AFB, and Sacramento Army Depot, all of which are in Sacramento. In the San Joaquin River Region, Castle AFB in Atwater is on the EPA Region IX Superfund National Priorities List. Environmental concerns include TCE, VOCs, and metals. The CalEPA has oversight authority for the environmental clean-up activities on these bases.

7.12.3.3 Other SWP and CVP Service Areas

Disease Transmission. The existing conditions related to mosquitos and mosquito-borne diseases are similar to those described for the Delta and Bay Regions.

Fire Hazards. The perspective for wildfires is similar to that described for the Sacramento River and San Joaquin River Regions.

Hazardous Materials and Waste. Many of the land uses in the Other SWP and CVP Service Areas are similar to those in the other Program regions. Contamination is possible from agricultural, industrial, commercial, landfill development, and military land uses in the region.

7.12.4 ASSESSMENT METHODS

To identify impacts on public health and environmental hazards resulting from the Program alternatives, changes to the following variables were assessed:

- Amount of mosquito breeding habitat
- Proximity of human populations to mosquito breeding habitat
- Frequency and severity of large-scale wildfires
- Release of hazardous materials or waste

Program actions could affect public health by creating conditions favorable to mosquito breeding, which could cause an increase in mosquito populations. An increase in these

Program actions could affect public health by creating conditions favorable to mosquito breeding, which could cause an increase in mosquito populations.

populations could increase the possibility of mosquito-human contact. Similarly, decreasing the distance between human and mosquito populations would increase the likelihood of contact. More frequent contact, in turn, would increase the likelihood of disease transmission.

The more frequent and severe the occurrence of large-scale wildfires, the greater the amount of damage inflicted. In contrast, small-scale controlled wildfires may reduce the likelihood of large-scale catastrophic wildfires.

The more frequent and severe the occurrence of large-scale wildfires, the greater the amount of damage inflicted. In contrast, small-scale controlled wildfires may reduce the likelihood of large-scale catastrophic wildfires.

Program actions could increase the exposure of people and the environment to hazardous materials and waste. Hazardous materials include raw materials and products, such as fuels and oils, that are commonly used in commercial activities and during construction activities. Known and unknown sites containing hazardous waste also can be present in a project area. Releases, and subsequent public exposure to, hazardous materials and waste could result from accidental spills, subsurface site disturbance, and flooding in areas where these substances are present.

7.12.5 SIGNIFICANCE CRITERIA

An adverse impact is considered potentially significant if a proposed Program action would create a new public health or environmental hazard, or an increase in any existing hazard. An increase in an existing hazard could include:

- An increase in mosquito breeding habitat
- A decrease in the distance between human and mosquito populations
- An increase in the threat of wildfires
- An increase in releases or increased exposure to hazardous materials or waste

7.12.6 NO ACTION ALTERNATIVE

At this programmatic level of analysis, the environmental consequences of the No Action Alternative would not substantially differ from existing conditions. Current programs to ameliorate existing disease transmission, fire hazard, and hazardous materials problems would result in some beneficial impacts; but their effectiveness may depend on funding. As habitat restoration and urban development take place next to each other, the potential for increased disease vector (mosquito) and human interaction increases. Continued trends in water quality degradation also could increase mosquito breeding habitat, but successful water quality improvement efforts could negate any potential increase. There is a slight potential for increased fire hazards as population increases; the magnitude of the hazard could depend on the population density. For example, as Bay Area population increases, a fire similar to the Oakland-Berkeley Hills event could be even more devastating.

The environmental consequences of the No Action Alternative would not substantially differ from existing conditions.

Urbanization also may be a factor in public exposure to hazardous materials and hazardous waste sites.

7.12.7 CONSEQUENCES: PROGRAM ELEMENTS COMMON TO ALL ALTERNATIVES

For public health and environmental hazards, the environmental consequences of the Ecosystem Restoration, Water Quality, Levee System Integrity, Water Use Efficiency, Water Transfer, Watershed, and Storage Program elements are similar under all Program alternatives, as described below. The environmental consequences of the Conveyance Element vary among Program alternatives, as described in Section 7.12.8.

7.12.7.1 DELTA AND BAY REGIONS

Ecosystem Restoration Program

The Ecosystem Restoration Program should result in healthier fish, waterfowl, and wildlife populations, which could indirectly benefit the public health of anglers, hunters, and their families. However, actions associated with the Ecosystem Restoration Program could increase the amount of mosquito breeding habitat. For example, expanding floodplains in the Delta could leave areas of standing shallow water when water levels decline, which would provide excellent mosquito breeding grounds. Converting agricultural land to wetland or other habitat and seasonally flooding agricultural land also could increase standing water. These conditions could increase mosquito breeding habitat, resulting in potentially significant adverse impacts. Increased mosquito breeding grounds could increase the need for abatement activities. At the same time, the Program elements involving land conversion could reduce the financial base upon which abatement activities are funded. MADs rely on property taxes for funding; a change in land use could create additional funding demands. Mitigation strategies are available to reduce these impacts to less-than-significant levels.

Increased mosquito breeding grounds could increase the need for abatement activities.

Water Quality and Watershed Programs

The Water Quality and Watershed Programs could benefit public health and potentially reduce environmental hazards. Program actions could reduce surface water pollution, which could decrease health risks from drinking water or contact with contaminated water. Improved surface water quality could benefit waterfowl, fish, and other wildlife that depend on the water. A reduction in surface water pollution could decrease

contaminants in fish, which would benefit the health of fish consumers. (For a discussion of impacts related to water quality, please see Section 5.3, "Water Quality.")

A potential indirect benefit of improved water quality could include a decrease in the mosquito population. Decreased amounts of organic material in the water could discourage mosquitos from breeding.

Decreased amounts of organic material in the water could discourage mosquitos from breeding.

Water Use Efficiency Program

Public health and environmental hazards could benefit from actions associated with improving water use efficiency. Public health could benefit from reduced amounts of irrigation water applied to or left standing on agricultural fields, or modifications in the timing of wetland dewatering—actions that could reduce mosquito breeding habitat.

Agricultural efficiency improvements could reduce the level of contaminants in surface waters. Agricultural drainage water typically contains organic carbons, a major concern for public drinking water quality. Reducing drainage water through efficiency improvements could reduce the organic carbon loading into Delta surface waters. Less organic material in the water could, in turn, discourage mosquito breeding.

Efficiency improvements could increase the long-term operation of pumping equipment for both existing and new groundwater wells. The risk of long-term groundwater contamination from naturally occurring or spilled hazardous materials could increase if groundwater pumps in operation for longer periods were not routinely maintained and inspected. Groundwater pumping operations also could expose people to hazardous materials if established regulations are not properly followed, such as the method of storing gasoline or propane to run the pumps. This could translate into more people exposed to hazardous materials in drinking water, a potentially significant adverse impact. Mitigation is available to reduce this potentially significant impact to a less-than-significant level.

The risk of long-term groundwater contamination from naturally occurring or spilled hazardous materials could increase if groundwater pumps in operation for longer periods were not routinely maintained and inspected.

Levee System Integrity Program

The Levee System Integrity Program could result in both beneficial and potentially significant adverse impacts in the Delta and Bay Regions, including the Suisun Marsh, related to public health and environmental hazards. For example, the aftermath of uncontrolled flooding increases opportunities for mosquito breeding and exposure to hazardous materials. The Levee System Integrity Program would benefit public health and safety by reducing the potential for flooding, thus decreasing potential mosquito breeding habitat. However, some levee reconstruction could create riparian and wetland habitat, and reconstruction activities could result in permanent or temporary (during construction) standing water. The presence of standing water could increase mosquito breeding habitat, as well as the risk of exposure to hazardous materials and waste.

Dredging as a component of the Levee System Integrity Program could result in both beneficial and potentially significant adverse impacts. Dredging may be used to increase channel capacity for flood protection, which could indirectly benefit public health by reducing the likelihood that flooded fields would provide mosquito breeding habitat. (Please see Section 7.8, "Flood Control," for additional discussion about impacts related to flood control.) Potentially significant adverse impacts related to public health and environmental hazards that may be associated with dredging include temporary water quality degradation during dredging (which could contribute to increased mosquito breeding habitat), resuspension of contaminates, potential exposure to hazardous materials from placement of contaminated dredged spoils near population centers, and changes to hydrology that could affect the dispersion of hazardous materials.

All potentially significant adverse impacts related to public health and environmental hazards that are associated with Levee System Integrity Program actions can be mitigated to less-than-significant levels.

The Levee System Integrity Program would not directly affect public health and environmental hazards in any Program region other than the Delta and Bay Regions. The Other SWP and CVP Service Areas would experience the indirect benefit of avoided increased salinity in water supplies that otherwise would have resulted from flooding in the Delta. The Levee System Integrity Program is not addressed further in the region-specific discussions that follow.

Water Transfer Program

The Water Transfer Program would result in a negligible effect on public health and environmental hazards. Some water transfers could provide water to wildlife refuges and other natural habitats, which in turn could expand mosquito breeding habitat; however, the potential amount of water transferred to these uses likely would remain small relative to other uses of transfer water.

Storage

Channel widening, island flooding, and fluctuating water levels associated with Storage Program actions could create pockets of standing water that could provide mosquito breeding habitat in the Delta Region.

Although the proposed action would not decrease fire hazards, additional surface water storage could indirectly enhance fire-fighting capabilities in both the Delta and Bay Regions. These facilities could provide additional water sources available for fighting regional wildfires. This would reduce the transport time for water to wildfire sites, thereby limiting the damage from the fires. This beneficial impact would be most apparent during drought years, when fire hazards increase and the amount of available water decreases.

Additional surface water storage could indirectly enhance fire-fighting capabilities in both the Delta and Bay Regions.

Construction activities could expose people to hazardous materials and waste, such as PCBs, petroleum products, pesticides, and metals—resulting in potentially significant adverse impacts. Impacts could be caused by exposure to naturally occurring or spilled hazardous materials, or by subsurface disturbance of contaminated sites. Mitigation is available to reduce these potentially significant impacts to less-than-significant levels.

7.12.7.2 Sacramento River and San Joaquin River Regions

Ecosystem Restoration Program

Impacts associated with the Ecosystem Restoration Program in the Sacramento River and San Joaquin River Regions would be similar to those described for the Delta and Bay Regions. Because only a small amount of wetland habitat would be created in the region, the potential for increases in mosquito breeding habitats could be less in the San Joaquin River Region.

Water Quality Program

Impacts associated with Water Quality Program actions in the Sacramento River and San Joaquin River Regions would be similar to those described for the Delta and Bay Regions. Benefits include reduced exposure to surface water pollutants and reduced organic material—both of which promote mosquito breeding. An additional minor decrease in mosquito breeding habitat could occur if irrigation canals and other facilities are eliminated when agricultural land is retired to reduce drainage problems in the San Joaquin River Region.

Eliminating irrigation canals when agricultural land is retired would reduce mosquito breeding habitat in the San Joaquin River Region.

Water Use Efficiency and Water Transfer Programs, and Storage

The effects of the Water Use Efficiency and Water Transfer Programs, and the Storage element in the Sacramento River and San Joaquin River Regions, would be similar to those described for the Delta and Bay Regions.

Watershed Program

If the Watershed Program includes forest management activities in the upper watersheds, the frequency and severity of wildfires could be reduced. Forest management activities could reduce the amount of fuel available to fires through a variety of techniques, including controlled burns and removing dead and dying vegetation. Additional potential

benefits include increased water yield from restored meadows and reduced organic material in the water.

7.12.7.3 Other SWP and CVP Service Areas

Ecosystem Restoration and Watershed Programs, and Storage

The Ecosystem Restoration and Watershed Programs and the Storage element would not result in any potentially significant impacts on public health or environmental hazards in the Other SWP and CVP Service Areas.

Water Quality and Water Use Efficiency Programs

The effects of the Water Quality and Water Use Efficiency Programs in the Other SWP and CVP Service Areas would be similar to those described for the Delta and Bay Regions.

7.12.8 Consequences: Program Elements That Differ Among Alternatives

For public health and environmental hazards, the Conveyance element results in environmental consequences that differ among the alternatives, as described below.

7.12.8.1 Preferred Program Alternative

This section includes a description of the consequences of a pilot diversion project. If the pilot project is not built, these consequences would not be associated with the Preferred Program Alternative.

A pilot diversion facility near Hood and an accompanying conveyance channel, and channel modifications to improve conveyance in the south Delta could result in standing water. The presence of standing water could provide mosquito breeding habitat. Water project operation changes and conveyance features could cause water levels to fluctuate, potentially providing additional mosquito breeding habitat.

Construction activities could expose people to hazardous materials and waste, such as PCBs, petroleum products, pesticides, and metals, resulting in potentially significant adverse impacts. Impacts could be caused by exposure to naturally occurring or spilled hazardous materials, or by subsurface disturbance of contaminated sites. Dredging to increase conveyance capacity also could result in potentially significant adverse impacts.

Construction activities could expose people to hazardous materials and waste.

Impacts associated with dredging may include temporary water quality degradation (during dredging), resuspension of contaminates, increased exposure to hazardous materials from placement of contaminated dredged spoils near population centers, and changes to the hydrology that could affect the dispersion of hazardous materials.

All potentially significant adverse impacts related to public health and environmental hazards that are associated with the Preferred Program Alternative can be mitigated to less-than-significant levels.

7.12.8.2 ALTERNATIVE 1

Conveyance channels and channel modifications to improve conveyance in the south Delta may create additional mosquito breeding habitat. Operating fish barriers in the south Delta and changes in project operations could cause water levels to fluctuate, thereby providing additional breeding habitat for mosquitos. These adverse impacts are considered potentially significant.

Although construction activities would result in similar environmental impacts as those described for the Preferred Program Alternative, the magnitude would be less, since less construction is planned under Alternative 1.

7.12.8.3 ALTERNATIVE 2

The environmental impacts on public health and environmental hazards would be the same under Alternative 2 as those described for the Preferred Program Alternative. The primary difference is the degree of potential public exposure to hazardous materials during construction. Since Alternative 2 includes a 10,000-cfs water diversion structure near Hood, it could be reasonably construed that public exposure to construction-related hazardous materials could be increased as construction would take longer for the larger facility.

Public exposure to construction-related hazardous materials could be increased as construction would take longer for the 10,000-cfs facility.

7.12.8.4 ALTERNATIVE 3

As with Alternative 2, the additional conveyance facilities proposed under Alternative 3 account for the magnitude of the potential public exposure to hazardous materials during construction. An isolated Delta conveyance facility could result in greater potential public exposure to construction-related hazardous materials. The impact of in-Delta conveyance would depend in part on the channel improvement requirements for a dual-Delta water conveyance system. A smaller isolated facility could require more in-Delta conveyance, and a larger isolated facility could require less. The greater amount and extended time to

complete construction would result in greater potential for public exposure to hazardous materials.

7.12.9 PROGRAM ALTERNATIVES COMPARED TO EXISTING CONDITIONS

This section presents the comparison of the Preferred Program Alternative and Alternatives 1, 2, and 3 to existing conditions. This programmatic analysis found that the potentially beneficial and adverse impacts from implementing any of the Program alternatives when compared to existing conditions were the same impacts as those identified in Sections 7.12.7 and 7.12.8, which compare the Program alternatives to the No Action Alternative.

As stated under the "No Action Alternative," conditions under the No Action Alternative related to public health and environmental hazards are expected to remain similar to present conditions. Current trends regarding public health and environmental hazards are unlikely to change substantially.

Current trends regarding public health and environmental hazards are unlikely to change substantially.

At the programmatic level, the comparison of the Program alternatives to existing conditions did not identify any additional potentially significant environmental consequences than were identified in the comparison of Program alternatives to the No Action Alternative.

The following potentially significant impacts related to public health and environmental hazards are associated with the Preferred Program Alternative:

- Short- and long-term increases in mosquito breeding habitat from wetland restoration activities or fluctuating water levels.
- Increased exposure to hazardous materials and waste from construction activities related to storage and conveyance projects.
- Increases in water quality degradation, resuspension of contaminates, and exposure to hazardous materials from dredging activities.

No potentially significant unavoidable impacts related to public health and environmental hazards are associated with the Preferred Program Alternative.

7.12.10 ADDITIONAL IMPACT ANALYSIS

Cumulative Impacts. For a summary comparison of cumulative impacts for all resource categories, please refer to Chapter 3. A description of the projects and programs contributing to this cumulative impact analysis can be found in Attachment A.

In all regions except the Other SWP and CVP Service Areas, Program actions and the projects listed in Attachment A would result in cumulative impacts on public health and environmental hazards. Beneficial impacts associated with these projects include increased water supply and water quality, and some flood control. These programs indirectly benefit public health by reducing opportunities for mosquito breeding and for exposure to some forms of hazardous materials, such as pesticides. Increases in wetlands and habitat restoration projects could create potential mosquito breeding habitat. Restoration actions under the Preferred Program Alternative could be coordinated with these projects, however, to help reduce the extent of the potential cumulative impacts on public health. The cumulative potential for exposure to hazardous materials and waste primarily is associated with constructing surface storage or conveyance facilities. Actions under the Preferred Program Alternative could be coordinated with present and proposed projects, thereby reducing the extent of these cumulative impacts.

Increases in wetlands and habitat restoration create potential mosquito breeding habitat. The cumulative potential for exposure to hazardous materials and waste primarily is associated with constructing surface storage or conveyance facilities.

Mitigation strategies have been identified that would reduce the impacts associated with Program actions and the projects listed in Attachment A. Further site-specific studies are required to determine the specific level of impact, to study the correlation between increased mosquito habitat and increased disease transmission, and to determine the potential effectiveness of various control methods. Cumulative impacts on public health and environmental resources are considered potentially significant.

Growth-Inducing Impacts. It is unlikely that any Program impacts related to public health and environmental hazards would induce growth. However, improvements in water supply caused by the Preferred Program Alternative could induce growth, depending on how the additional water supply was used. If the additional water was used to expand agricultural production or urban housing development, the proposed action would foster economic and population growth. Expansion of agricultural production and population could affect public health and environmental hazards resources, the nature of which would depend on where the economic or population growth occurred and how it was managed.

It is unlikely that any Program impacts related to public health and environmental hazards would induce growth.

Short- and Long-Term Relationships. Significant overall long-term benefits related to public health and environmental hazards would result from Program actions. Long-term benefits include reduced mosquito breeding potential from improved water quality, flood control, and water use efficiency; increased fire management capabilities; and increased water supply for fire management. Benefits generally would outweigh the short-term adverse impacts.

Significant overall long-term benefits related to public health and environmental hazards would result from Program actions.

Most short-term impacts are related to construction and would cease when construction is complete. Where possible, avoidance and mitigation measures would be implemented as a standard course of action to lessen impacts on public heath and environmental hazards. Potentially significant long-term unavoidable impacts could include creation of increased mosquito breeding habitat near expanding urban areas.

Irreversible and Irretrievable Commitments. All Program elements under the Preferred Program Alternative can be considered to cause significant irreversible changes in public health and environmental hazards. Avoidance and mitigation measures can be implemented to lessen adverse effects, but changes will be experienced by future generations. The long-term beneficial irreversible changes include a reduction in mosquito breeding habitat, a reduction in fuels that contribute to forest fires, and additional water supply to help fight forest fires. Long-term adverse irreversible changes include potential for creating additional mosquito breeding habitat.

7.12.11 MITIGATION STRATEGIES

These mitigation strategies will be considered during specific project planning and development. Specific mitigation measures will be adopted, consistent with the Program goals and objectives and the purposes of site-specific projects. Not all mitigation strategies will be applicable to all projects because site-specific projects will vary in purpose, location, and timing.

Potential increases in mosquito populations and exposure to hazardous materials are the two issues for which mitigation strategies were developed. Since fire hazards would not be adversely affected, no change to existing fire management programs is suggested.

The following strategies could be implemented to reduce impacts related to public health and environmental hazards:

- Using various mosquito control methods, such as biological agents, chemical agents, and ecological manipulation of mosquito breeding habitat.
- Supporting actions to establish or find funding for mosquito abatement activities.
- Removing or disturbing water that remains stagnant for more than 3 days at a construction site.
- Limiting construction to cool weather, when mosquito production is lowest.
- Limiting construction to periods of low precipitation to avoid forming pools of standing water.

- Following established and proper procedures and regulations for removing and disposing of contaminated materials.
- Increasing monitoring activities to ensure that groundwater pumping equipment is operating to existing standards.
- Limiting or coordinating construction activities to favorable weather conditions to forestall dispersing hazardous materials.
- Testing sediment before dredging to avoid increased exposure to hazardous materials from placing contaminated dredged materials near population centers.

7.12.12 POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS

No potentially significant unavoidable impacts related to public health and environmental hazards are associated with the Preferred Program Alternative.

No potentially significant unavoidable impacts related to public health and environmental hazards are associated with the Preferred Program Alternative.