

# 7.7 Recreation Resources

---

The CALFED Bay-Delta Program is expected to provide an overall increase in both recreation opportunities and the quality of recreation experiences.

7.7.1	SUMMARY .....	7.7-1
7.7.2	AREAS OF CONTROVERSY .....	7.7-3
7.7.3	AFFECTED ENVIRONMENT/EXISTING CONDITIONS .....	7.7-4
7.7.4	ASSESSMENT METHODS .....	7.7-16
7.7.5	SIGNIFICANCE CRITERIA .....	7.7-17
7.7.6	NO ACTION ALTERNATIVE .....	7.7-17
7.7.7	CONSEQUENCES: PROGRAM ELEMENTS COMMON TO ALL ALTERNATIVES .....	7.7-21
7.7.8	CONSEQUENCES: PROGRAM ELEMENTS THAT DIFFER AMONG ALTERNATIVES .....	7.7-30
7.7.9	PROGRAM ALTERNATIVES COMPARED TO EXISTING CONDITIONS .....	7.7-36
7.7.10	ADDITIONAL IMPACT ANALYSIS .....	7.7-37
7.7.11	MITIGATION STRATEGIES .....	7.7-39
7.7.12	POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS .....	7.7-41



# 7.7 Recreation Resources

---

## 7.7.1 SUMMARY

The ability to enjoy “the great outdoors” is a much cherished value to many people, one that some think priceless. Wildlife viewing, fishing, hunting, and water-based recreation such as swimming, motor boating, sailing, and windsurfing are popular throughout the state, and particularly in the Bay-Delta Regions. Recreation is a multi-million dollar industry in the state. The demand for recreation resources in California is expected to increase with future population growth. Increasing demand is expected to put additional pressure on limited recreation resources and potentially contribute to deterioration of the quality of recreational experiences.

**Preferred Program Alternative.** Recreational resources would benefit from increased open space, enhanced or restored wetland or wildlife habitat, improved water quality, more protection against flooding, and increased fish and waterfowl populations. Many Program elements will either directly or indirectly benefit recreational experiences. Ecosystem Restoration and Levee System Integrity Programs will result in increased open space and habitat improvements, which will result in increases in fish and wildlife populations. This increase will provide additional recreational opportunities and improvements in fishing, hunting, and wildlife viewing. The Water Quality Program will provide direct improvements for recreation and indirect benefits to fish, wildlife, and habitat. Water Use Efficiency may provide water supplies for habitat or fish recovery. Overall, the CALFED Bay-Delta Program (Program) could increase recreation use and create more recreation-related jobs than under the No Action Alternative.

---

Under the Preferred Program Alternative, recreational resources would benefit from increased open space, enhanced or restored wetland or wildlife habitat, improved water quality, more protection against flooding, and increased fish and waterfowl populations.

---

Trade-offs or changes in the type of recreational use may occur in a given area. For example, habitat restoration activities in the Delta may restrict speeds and access for motorized boating in some areas but provide increased opportunities for non-motorized boating like canoeing or kayaking. Enlarging existing reservoir facilities could adversely affect on-stream recreation activities but provide new open water recreation opportunities. Some existing recreation sites may be temporarily or permanently altered. Mitigation strategies have been developed which, when implemented, are expected to reduce most potential adverse impacts 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 identified for the Preferred Program Alternative. Alternatives 2 and 3 have greater potential for short-term construction-related impacts. However, these



alternatives may have other long-term benefits, including improved flow conditions or increases in fish, wildlife, and habitat that would provide recreation benefits. Conversely, Alternative 1 and the Preferred Program Alternative result in less short-term impacts on existing facilities but may have less potential for overall long-term benefits.

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**

<b>Potentially Significant Adverse Impacts</b>	<b>Mitigation Strategies</b>
Temporary closure of recreation areas during construction (1,2,3,6,7,8,9,10,15,16,17).	Potential for reduced access to recreation facilities and decreased recreation opportunities from changes in reservoir levels (1,9,10,11,12,13,17).
Increased speed zone restrictions or prohibition of motorized boating in some areas (1,2,3,6,8,9,17).	Potential short-term construction impacts of dredging, such as obstructing or closing channels and creating noise and visual impacts (7).
More stringent regulation of boat discharges (1,9,11).	
<b>Temporary or permanent changes in boating access and navigation (1,2,3,4,5,6,7,8,9,17).</b>	
Permanent closure of some recreation facilities (1,2,9,11,15,17).	1. Incorporating project-level recreation improvements and enhancements.
Increases in boat traffic in some areas because of speed and access restrictions (1,2,3,4,5,6,7,8,9,17).	2. Maintaining boating access to prime areas.
Decrease in recreation opportunities because of speed and access restrictions (1,2,3,4,5,6,7,8,9,17).	3. Identifying and marking alternate boating routes.
Potential decrease in flooded lands suitable for wildlife, hunting, and fishing as a result of water use efficiency actions (1,9,10,11,14).	4. Constructing portage facilities.
Potential for reduced water-contact recreation quality from releases of reservoir cold water (1,9,15,16,17).	5. Constructing boat locks.
Displacement of fish and wildlife from new off-stream or expanded on-stream reservoirs (9,14).	6. Providing public information regarding alternate access.
<b>Potential loss of terrestrial and on-stream recreation from new off-stream or expanded on-stream reservoirs (1,9,14,15,17).</b>	7. Avoiding construction during peak-use seasons and times.
	8. Posting warning signs and buoys in channels.
	9. Working with recreational interests to protect and enhance recreation resources.
	10. Providing in-kind recreation facilities.



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

- |  |   |
|--|---|
| 11. Relocating or constructing new recreation facilities and infrastructure.       | 15. Providing or improving vehicle access and parking for recreation areas. |
| 12. Maintaining reservoir levels as high as possible during the recreation season. | 16. Providing access to waterfront areas and island edges.                  |
| 13. Minimizing water level fluctuation and establishing minimum pool levels.       | 17. Creating new day-use boating and camping areas.                         |
| 14. Purchasing trail rights-of-way or recreational easements.                      |   |

**Bold indicates a potentially significant unavoidable adverse impact.**

## 7.7.2 AREAS OF CONTROVERSY

Under CEQA, areas of controversy involve factors that are currently unknown or reflect differing opinions among technical experts. Unknown information includes data that are not available and cannot readily be obtained. The opinions of technical experts can differ, depending on which assumptions or methodology they use. Below is a brief description of the areas of controversy for this resource category. Given the programmatic nature of this document, many of these areas of controversy cannot be addressed; however, subsequent project-specific environmental analysis will evaluate these topics in more detail.

An economic evaluation of recreation resources inherently relies on the development of assumptions and methodologies that may result in disagreements among technical experts and, therefore, be an area of controversy as defined by CEQA. The use of alternative assumptions and methodologies may lead to different conclusions concerning the economic importance of a resource.

The Program recognizes the economic importance of recreation to regions potentially affected by Program actions. As a multi-million dollar industry, recreation is the basis of livelihood for many small communities throughout the Central Valley and Bay-Delta. Although user groups may disagree about the magnitude of regional economic effects related to recreation activity and the distribution of these effects, the fact that recreation is an important economic base in California is not at issue. Regardless of disagreements over the measurement of its effects, the Program recognizes the economic importance of recreation activity to the businesses, communities, and regional economies that depend on it. At the programmatic level of analysis, any potential adverse effect on recreational opportunities that substantially affects individuals or businesses dependent on recreation activity for their livelihood is considered a potentially significant effect. Subsequent

---

As a multi-million dollar industry, recreation is the basis of livelihood for many small communities throughout the Central Valley and Bay-Delta.

---



project-specific environmental analysis will evaluate these effects at a greater level of detail, including consideration of regional differences.

Other controversial issues regarding effects of Program actions on recreational resources do not meet the CEQA definition of "areas of controversy." For example, the effects on motorized boating in the Delta or flooding of free-flowing rivers by enlargement of existing reservoirs are controversial issues. The environmental consequences of Program actions to these and other recreational resources are presented and disclosed in the "Environmental Consequences" section of this chapter. Strategies are presented to mitigate adverse impacts.

### 7.7.3 AFFECTED ENVIRONMENT/ EXISTING CONDITIONS

Recreation activities in the Program study area include both water-based and land-based activities and their supporting infrastructures. Commercial fisheries also are discussed.

#### 7.7.3.1 DELTA REGION

Prior to the 1850s, the Delta was an extensive tidal marsh that was subject to seasonal flooding. Since the 1950s, the land use trends in the Delta Region have included a reduction in agricultural acreage, an increase in urban development and acreage, and the continued loss of open space lands.

Recreation use of the Delta has increased substantially over the past 45 years. In 1958 and again in 1963, recreation use was estimated at approximately 2.5 million visitor days, with a visitor day representing one person spending a day or portion of a day in one or more types of activities. By 1978, recreation use in the Delta was estimated to range from 7 to 12 million visitor days. Hunting, sport fishing, boating, and other water-based activities have continued to be the most important recreation activities in the region.

Before 1960, the majority of facilities available to boaters and other non-consumptive-use recreational users centered on the use of commercial marinas and a limited number of city or county public access areas. Delta yacht or ski clubs were popular at this time and became instrumental in organizing and promoting waterborne recreation in the Delta. The increasing demand for more Delta recreation opportunities spurred the State to establish Brannan Island State Recreation Area (SRA) in 1965 and Franks Tract SRA in 1966. Development of these SRAs enabled the State to collect fees for use of the areas.

Prior to World War II, the majority of waterfowl and pheasant hunting occurred on private farmland. After the war, the popularity of this sport brought an increasing number of hunters to private farmland. As Delta marshlands were drained and converted to agricultural use, land use conflicts with farmers spurred the development of alternative

---

Prior to the 1850s, the Delta was an extensive tidal marsh that was subject to seasonal flooding. Since the 1950s, the land use trends in the Delta Region have included a reduction in agricultural acreage, an increase in urban development and acreage, and the continued loss of open space lands.

---



---

Recreation use of the Delta has increased substantially over the past 45 years.

---



hunting areas, including Grizzly Island, Joice Island, and Sherman Island Wildlife Management Areas (WMAs), in addition to a variety of state cooperative hunting areas. Although private duck clubs and WMAs have remained popular hunting areas, the state cooperative hunting areas declined in popularity during the 1960s.

Historically, recreational sport fishing has been a major activity in the Delta area, occurring throughout the year from shore locations, piers, and boats. According to the Delta Protection Commission, sport fishing tournaments are an important recreation activity in the Delta that contribute to the local economy. Important sport fishing species included striped bass, shad, black bass, catfish, and steelhead. Although commercial fishing for striped bass was abolished in 1935, a sport fishery was allowed to continue. By the early 1960s, most of the bass angling was concentrated in the Delta. Sport-catch records indicate a declining trend, with an average annual catch ranging from a high of 750,000 fish during the 1960s to a low of approximately 150,000 fish during the early 1980s.

---

Historically, recreational sport fishing has been a major activity in the Delta area, occurring throughout the year from shore locations, piers, and boats.

---

American shad has long been a popular sport fish; however, a sport fishery for this species did not become well established until 1957. Although historical statistics on the shad sport fishery in the Delta are lacking, one operator in the Delta estimated a catch of 30,000 fish by 2,500 anglers in 1954.

In 1954, following a 35-year moratorium on sport fishing for sturgeon, a sport fishery in the Bay-Delta was reestablished. Most of the fishery is concentrated in San Pablo Bay. Although exact sport-catch data are not available, the catch rate for sturgeon is estimated to have increased by 40% over the last two decades. This increase may indicate that fishing for sturgeon has become more popular as stocks of other game fish, such as striped bass, have declined.

Crayfish have been commercially harvested in the Delta and sold locally for many years. Currently, the Delta supports the commercial harvest of crayfish and bait fish species, such as bay shrimp and shad. Other species are harvested incidentally. Crayfish harvesting is the largest commercial fishing activity in the Delta Region. Crayfish are harvested in various locations throughout fresh water areas of the Delta, although most are offloaded at Stockton. Most crayfish are sold for human consumption, and a portion of the harvest is exported. Most of the harvest for bait is sold locally. Based on commercial landing data for 1986 and 1995, the commercial crayfish harvest in the Delta has remained relatively stable at about 12,000 pounds per year in recent years.

---

Currently, the Delta supports the commercial harvest of crayfish and bait fish species, such as bay shrimp and shad.

---

The Delta is conveniently located near several large population centers and serves a growing urban population. According to the Delta Protection Commission's 1996 survey of boaters and anglers, approximately half of Delta recreators live within 50 miles of the Delta, and four out of five recreators live within 100 miles of the Delta. The population of the five counties adjoining the Delta is expected to increase to 5.2 million by 2005.

Current Delta use patterns indicate that a majority of the visitors stay in the Delta 1 day or less. The peak recreation period occurs from May through September. Spring and summer (March to September) account for an estimated 75% of total annual use.



Most of the navigable waterways in the Delta are public, and most of the land is private. The lack of public lands serves to limit the use of the Delta for recreation. Public use of the Delta is concentrated in a few areas where marinas and other facilities provide recreational opportunities and access to the Delta waterways. There are few public parks. Some of the recreation areas in the Delta are accessible only by boat, further limiting access to the Delta for some recreationists, mainly bank anglers. Because much of the levee system is privately owned, bank anglers often are trespassing.

---

Most of the navigable waterways in the Delta are public, and most of the land is private.

---

Current recreation in the Delta is primarily water-oriented. Fishing and boating are the most popular activities in the Delta, accounting for approximately 70% of total use. Almost every type of recreation boating activity can be found in the Delta waterways, including houseboats, sailboats, fishing boats, personal watercraft, speedboats, canoes, rowboats, and inflatable boats. Water-based recreation activities include fishing from a boat, water-skiing, sailing, cruising, operating personal watercraft, canoeing, kayaking, houseboating, hunting from a boat, swimming from a boat, boat camping, swimming from shore, bank fishing, and windsurfing.

---

Fishing and boating are the most popular activities in the Delta, accounting for approximately 70% of total use.

---

Marinas account for most recreation facility types in the Delta, totaling approximately 120. Marinas provide many services in addition to boat berthing and boat fuel, including ski boat and houseboat rentals; boat services, such as boat launching and marine supplies; camping and picnicking facilities; guest docks and fuel stations; and food and beverage services. Marinas are not equally distributed throughout the Delta but are concentrated in a handful of locations. The most heavily used areas include Bethel Island in Contra Costa County and Lower Andrus Island in Sacramento County. Bethel Island is very congested, with resorts and 33 marinas providing 1,185 berths. In addition to marina berths, the private facilities at Bethel Island include a large number of support and service facilities. Andrus Island, by comparison, is more rural but provides nearly 1,700 berths.

While the inventory of marinas in the Delta indicates over 12,000 berths as of December 31, 1996, the number of registered vessels in nine Bay Area counties and the Delta counties totals almost 250,000, representing more than 28% of vessels registered statewide. Sacramento and San Joaquin Counties alone have 67,613 registered vessels that range from a large sailing vessel to a personal watercraft.

---

The number of registered vessels in nine Bay Area counties and the Delta counties totals almost 250,000, representing more than 28% of vessels registered statewide.

---

Popular access points for boating, water-skiing, and personal watercrafting include Windmill Cove near SR 4; King Island, Paradise Point, and Herman & Helens near Eight Mile Road; Tower Park near SR 12; and Dels Boat Harbor near the city of Tracy. Houseboating also is concentrated along Eight Mile Road. Windsurfing, a fast-growing sport in the Delta, typically occurs along SR 160 between Sherman Island and Rio Vista and at Windy Cove. Windy Cove is a new facility constructed at Brannan Island SRA and is the only formal windsurfing site in the study area. The limited number of boating access points across the Delta and the lack of readily available rentals for ski boats and personal watercraft continue to be issues for recreational users.

Fishing access in the Delta primarily occurs from four designated access areas and from a variety of roadside locations and levee banks. Of all Delta species, striped bass historically has been the most popular, with an average annual sport catch of 18,900,



followed by American shad, salmon, and sturgeon. According to the Delta Protection Commission, total effort in the black bass fishery currently meets or exceeds effort for striped bass.

Not all recreation activities in the Delta are associated with water. The more popular land-based recreation activities include hunting, camping, picnicking, walking for pleasure, bicycling, wildlife viewing, photographing wildlife, sightseeing (driving for pleasure), and attending special events.

Much of the open space in the Delta is used for public parks and wildlife refuges. The California Department of Parks and Recreation owns 5,000 acres in the Delta, including Brannan Island; Franks Tract (flooded) for recreation; Delta Meadows, a scenic waterway near Locke that is popular with boaters; and over 1,000 acres in the Stone Lakes NWR. Significant amounts of acreage in the Delta have been purchased in recent years by state, federal, and nonprofit agencies for enhancement and management as wildlife habitat. For example, DFG owns 8,080 acres of land in the Delta, including underwater land in the Lower Sherman Island Wildlife Area; portions of the Yolo Bypass, Woodbridge Ecological Reserve, Calhoun Cut Ecological Reserve; and Webb Tract berms and islands. Approximately 23 public recreation facilities are located in the Delta. Three state agencies maintain five recreation areas in the Delta. The remaining recreation areas are operated by county and city agencies.

---

Much of the open space in the Delta is used for public parks and wildlife refuges.

---

During the past 10 years, hunting has continued on private lands, as well as in public areas, on waterways, and on various small Delta islands. Popular areas include Sherman Island WMA, Twitchell Island, Franks Tract SRA, and Clifton Court Forebay.

Estimates of recreation use of the Delta vary considerably. Total recreational use of the Delta has been estimated at 11.9 million visitor days from 1977 to 1978, and 12.9 million for 1985. Water-dependent activities in the Delta are estimated to have accounted for 6.4 million visitor days from 1977 to 1978 and 6.95 million visitor days in 1985. Average expenditures per person per day were estimated at approximately \$16.50 for visitors to the Delta and \$7.90 for residents of the Delta. Annual recreation expenditures were estimated to total approximately \$185.2 million in 1985.

Based on 1985 estimates expanded to account for population growth in the region, current use levels could be as low as about 10 million visitor days. Based on recent surveys conducted for the Delta Protection Commission, the potential level of use could be upwards of 40 million visitor days. Total annual spending by recreationists using the Delta is estimated to range from \$290 million to as much as \$1.1 billion, although this level of spending is considered very unlikely. An estimated 50% of this amount is spent within the boundaries of the Delta, which includes portions of Sacramento, San Joaquin, Solano, and Contra Costa Counties.



### 7.7.3.2 BAY REGION

This section focuses on water-dependent recreation, including sport fishing. Other recreation activities are not addressed in detail because they are not expected to be substantially affected by Program actions in the Bay Region.

For purposes of this description, the Bay Region includes San Francisco Bay, San Pablo Bay, Suisun Marsh and Bay, and the coastal regions in California and Oregon that support ocean sport and commercial salmon fishing.

Large undeveloped areas of land are found in the western, northern, and southern parts of the Bay Region. Lakes and reservoirs are popular day-use destination sites for local residents. These lakes and reservoirs and the surrounding parks accommodate recreation activities year-round because of their proximity to major metropolitan areas. Water resources operated by the San Francisco Water District do not substantially contribute to recreation use in the Bay Region because of access restrictions.

As elsewhere in California, the quality of recreation at lakes and reservoirs in the Bay Region depends largely on surface water levels. During severe drawdown conditions, access to boat ramps and swimming areas is substantially reduced or eliminated. Water-enhanced activities, such as picnicking and hiking, also can be affected as water levels fall.

The Suisun Bay and Suisun Marsh historically have been popular areas for waterfowl hunters. Past estimates of total annual waterfowl hunter-days in the marsh, including use of public hunting areas, range from approximately 48,000 to 62,000 days per hunting season.

In addition, the state owns 15,000 acres in Suisun Marsh at the western edge of the Delta, including approximately 6,000 acres of public hunting areas that compose the Grizzly Island WMA. According to DFG staff, a total of 33 private hunting clubs in the Delta comprise about 52,000 acres.

The San Francisco Bay Estuary supports important sport fisheries for sturgeon, salmon, and striped bass in California. In 1954, following a 35-year moratorium on commercial and sport fishing for sturgeon, a sport fishery in the Bay Region was reestablished. Most of this fishery was centered in San Pablo Bay. Between 1954 and the mid-1960s, most sturgeon were taken incidentally by striped bass anglers. Although exact sport-catch data for white sturgeon are not available, the catch rate for sturgeon is estimated to have increased by 40% over the last two decades. This increase suggests that fishing for sturgeon has become more popular as stocks of other game fish, such as striped bass, have declined. In response to increased angler success, catch regulations were modified.

The salmon sport fishery in California did not become important until after World War II, long after the commercial salmon fishery was established. Historically, the sport fishery has harvested approximately 14% of the salmon landed within the California coastal region, with commercial fishing accounting for 86%. Salmon landings data between 1940 and 1985 show that salmon fishing activity reached major peaks in 1955,

---

The San Francisco Bay Estuary supports important sport fisheries for sturgeon, salmon, and striped bass.

---



1968, and 1972. These data also indicate that fishing activity reached lows in 1957, 1960, and 1978.

Historically, chinook has been the most important salmon species caught in the California coastal fishery, accounting for 79% of the total salmon sport catch. Most of the ocean salmon sport catch has occurred in the San Francisco area, accounting for 67% of total sport landings between 1979 and 1985.

Commercial sport fishing vessels have played an important role in the history of the ocean sport fishery, accounting for an estimated 65% of the total sport harvest of salmon in the California coastal region. Most of these vessels have originated from the San Francisco Bay Area.

Currently, the quality of sport fishing activities in the Bay Region is associated with abundance, migration patterns, and fishing regulations. Sport fishing in the region occurs year-round from private vessels, from charter boat vessels, and along the shore. The popularity of shore and boat fishing is associated with the type of sport fish being sought. Most fishing occurs aboard private vessels. Charter boat operators indicate a sustained decline in the popularity of fishing aboard these vessels.

---

The quality of sport fishing activities in the Bay Region is associated with abundance, migration patterns, and fishing regulations.

---

White sturgeon is one of the popular game fish sought in the Bay Region. Sturgeon are popular game fish because of their large size; however, they have one of the lowest catch rates per hour of angler effort for sport fish in the region. Fishing trips for sturgeon are taken aboard private and charter boat vessels. Sturgeon fishing continues year-round in San Pablo Bay. Fishing success probably is associated with the movement of the fish in response to changing salinity conditions in the Bay-Delta, which is influenced by river flows into the Delta. Sturgeon are more likely found in San Pablo Bay during wet years and further upstream in the Suisun Bay area in dry years.

Ocean sport fishing for salmon in the California coastal areas accounted for an estimated 127,000 visitor days in 1992. This level of use generated an estimated \$10.4 million in trip-related expenditures. Nearly 50% of the expenditures generated by sport fishing occurred in the San Francisco region.

Although salmon support a large sport fishery in the ocean, the current salmon sport fishery in the Bay is relatively small. Salmon typically are caught in the area around the Golden Gate Bridge and upstream of the Carquinez Strait.

Currently, striped bass is the most important sport fish caught in San Francisco Bay. Fishing for striped bass occurs aboard private and charter boat vessels or from shore. Most of the catch of striped bass in California occurs in the Bay-Delta Region. The quality of striped bass angling in the Bay-Delta region depends on location, abundance, and regulations. During winter, striped bass are relatively inactive and fishing success is relatively low. Fishing increases in spring as the fish begin to move up through the Bay and the Delta to spawn. The abundance of striped bass in the region probably is associated with Delta water diversions, Delta outflows, and water quality. Although not directly

---

Currently, striped bass is the most important sport fish caught in San Francisco Bay. Most of the catch of striped bass in California occurs in the Bay-Delta Regions.

---



affecting fishing success, size and possession limits can restrict total angling efforts for striped bass.

Overall, sport fishing in the Bay Region has been declining. Consequently, recreation-related spending associated with sport fishing also has decreased in its contribution to the local and regional economy. Economic declines associated with affected sport fisheries also are indicated by historical reductions in the number of charter boats operating in the Bay Region.

---

Overall, sport fishing in the Bay Region has been declining.

---

The ocean commercial salmon fishery in California began operating in the 1880s in Monterey Bay. Historically, on average, approximately half of all commercial fishing vessels in California land salmon. Since a limited-entry program was established for salmon in 1982, about 77% of all California vessels have been in possession of a salmon permit, and 63% of all permit holders have actually landed salmon. Between 1916 and 1943, ocean landings of chinook salmon in California ranged from 2.2 to 7.2 million pounds and averaged 4.5 million pounds per year. Landings experienced a general upward shift during 1944 to 1982, from 3.7 to 10.3 million pounds, respectively. Important factors contributing to this upward shift were the termination of gill-netting in inland waters in 1957 and the development of fish hatcheries in the American and Feather Rivers in the 1960s.

Salmon originating from the Sacramento and San Joaquin River systems also are caught in Oregon coastal fisheries. Approximately 10–20% of the fish caught in the commercial chinook salmon fishery in Oregon are from the Central Valley. Between 1952 and 1993, commercial landings of chinook salmon in Oregon, where the fishery is much smaller than in California, ranged from 53,000 to 530,000 pounds. California coastal landings over the same period ranged from 1.6 to 14.8 million pounds. Landings in Oregon have been subject to wide fluctuations, similar to the variability of California landings. Oregon commercial salmon landings averaged 212,500 pounds from 1967 to 1993.

A change that has occurred over the years has been the disappearance of spring-run chinook salmon from the ocean harvest. Most of the fish caught today in the commercial harvest are fall-run chinook salmon. Another change has been an increasing proportion of hatchery fish in the catch, with recent estimates ranging from 30–40% overall, and as high as 86% on rivers with terminal hatcheries. Although this change has served the hatcheries' initial purpose (to offset the loss to the populations of fish that would have spawned above major impoundments), it may contribute to the instability recently seen in ocean catch, with a boom-and-bust pattern of harvest dependent on survival of broods from a few major facilities.

---

A change that has occurred over the years has been the disappearance of spring-run chinook salmon from the ocean harvest.

---

Commercial landings of striped bass ceased after 1935 when the commercial fishery for this species was closed, and American shad landings ceased after 1957 when the Sacramento and San Joaquin Rivers were closed to all commercial fishing. Historically, salmon has dominated the commercial harvest of anadromous species, even in years when other anadromous species were landed in significant numbers.



Of all the anadromous fish species addressed in this report, only chinook salmon continues to support a commercial fishery. Commercial fishing for striped bass, sturgeon, and steelhead trout ended before development of the CVP. The commercial fishery for American shad officially ended in 1957, when most commercial fishing in the Bay and Delta was banned by the state legislature.

Key economic indicators of the commercial salmon fishing industry are the relative poundage and ex-vessel value of salmon landed at different ports in proportion to the total pounds and value for all commercial seafood landed at these ports. In 1992, salmon accounted for 0.03% of the total pounds of seafood landed and 0.13% of the total ex-vessel value of seafood landed at ports in the North Coast region, 2.0% of total pounds of seafood landed and 8.0% of the ex-vessel value of all seafood landed at ports in the San Francisco area, and 0.83% of the total pounds of seafood landed and 4.2% of the ex-vessel value of all seafood landed at ports in the Central Coast area.

Another important indicator of the economic health of the commercial salmon fishing industry is the number of permit holders. In 1993, the number of salmon fishing permit holders in California was 2,740, a 54% reduction from the 5,964 permit holders at the inception of the limited entry program in 1982. The percentage of salmon permit holders who actually fished for salmon also has declined over time, and the size of the fleet has declined to record low levels. The decline has been particularly acute for vessels that obtain a relatively significant amount of income (more than \$5,000 annually) from salmon fishing; these vessels account for 85% of the total revenue generated from the fishery. A gradual aging of the fleet has occurred since the early 1980s, perhaps due to declining fishing opportunities. The state's limited entry program also has contributed to this aging by restricting the entry of new vessels into the fishery.

The relative amount of personal income generated by the salmon industry also indicates the economic importance of the industry to a region. In 1992, the salmon industry in the North Coast region, including harvesting and processing activities, generated \$100,000 in personal income, which accounted for less than 0.01% of the total personal income generated within the region. In the San Francisco area, the salmon industry generated \$5.9 million in 1992, which accounted for 66% of all income generated by the salmon industry in the California coastal areas but only about 0.01% of the total personal income generated within the region. In the Central Coast area, the salmon industry generated \$2.9 million in 1992, accounting for approximately 33% of all income generated by the salmon industry in California coastal areas but only about 0.01% of the total personal income generated in the region.

It should be noted, however, that 1992 was a poor year for salmon harvest at many California ports, particularly in the North Coast region. More representative data from 1986 to 1990 show that personal income from salmon harvesting in the North Coast region averaged \$16.2 million annually, representing 0.5% of total income in the region.

Fishing-dependent coastal communities, as a whole, have varied in their ability to adjust to declines in commercial and sport fishing activity. Communities in the southern and inland portions of the California coastal region adjusted to the decline by turning to other

---

In 1993, the number of salmon fishing permit holders in California was 2,740, a 54% reduction from the 5,964 permit holders at the inception of the limited entry program in 1982.

---

---

Fishing-dependent coastal communities have varied in their ability to adjust to declines in commercial and sport fishing activity.

---



industries for economic growth. The transition to other industries has been more difficult for communities in the northern portion of the California coastal region.

### 7.7.3.3 SACRAMENTO RIVER REGION

Major recreation areas in the Sacramento River Region include lakes and reservoirs, rivers and streams, and federal wildlife refuges and state WMAs. Private lands also support considerable waterfowl hunting activity in the region.

Overall, recreation use at important reservoirs, rivers, and wildlife refuges in the Sacramento River Region has paralleled increased population growth in the region. Consequently, recreation-related spending associated with increased visitation has become an important contributor to the local and regional economy.

Recreation opportunities in the Sacramento River Region have been shaped by the construction of large reservoirs and the alteration of major rivers. Construction of Shasta Lake, Whiskeytown Lake, Lake Oroville, Folsom Lake, New Bullards Bar Reservoir, and Englebright Lake provided extensive reservoir recreation opportunities, including flat-water recreation.

---

Recreation opportunities in the Sacramento River Region have been shaped by the construction of large reservoirs and the alteration of major rivers.

---

Shasta Lake was the CVP's first major multipurpose facility, constructed in 1945. Initial recreation use did not occur until 1948, when the reservoir was filled. The U.S. Forest Service (USFS) began developing and managing recreation resources at Shasta Lake after the Whiskeytown-Shasta-Trinity National Recreation Area (NRA) was established. Historically, Shasta Lake has been the most popular recreation reservoir. Whiskeytown Lake, constructed in 1963, also is located in the NRA, with recreation facilities managed by National Park Service. Between 1970 and 1985, annual recreation use at Whiskeytown Lake ranged from a low of 804,000 visitor days in 1974 to a high of 1.6 million visitor days in 1976 and then declined through the early 1980s.

Folsom Lake, completed in 1955, was the second major lake or reservoir constructed by Reclamation in the region. DPR manages the lake's recreation facilities. Visitation is not well documented between 1955 and 1970. After 1970, visitation declined from approximately 2 to less than 1 million visitor days in 1977 but increased to nearly 2.8 million visitor days in 1985. Lake Oroville, a part of the SWP, was completed in 1968, with recreation facilities operated by DPR. Since 1968, visitor use has fluctuated substantially, ranging from 288,000 visitor days in 1968 to 939,000 visitor days in 1981. Visitation declined substantially in 1985 to 771,000 visitor days.

Other major lakes or reservoirs in the region include Englebright Lake and New Bullards Bar Reservoir. Visitation at both has increased steadily from 1941 to 1985. Because Englebright Lake was constructed to control mining debris, recreation use did not begin until new techniques for controlling debris were developed in the early 1960s. From 1970 to 1985, annual visitation at Englebright Lake increased from 66,000 to nearly 116,000 visitor days. Recreation use at New Bullards Bar Reservoir increased steadily from 1970



to 1985, although historical records appear to understate the total amount of recreation known to have occurred at this facility.

Major rivers that could be affected by Program actions include the Sacramento, American, and Feather Rivers. Tributaries to the Sacramento River that could be affected by stream restoration measures include Cottonwood, Cow, Deer, Bear, Battle, Mill, Paynes, Antelope, Butte, Big Chico, Thomes, and Elder Creeks and the Colusa Basin Drain.

Recreation activities along rivers in the Sacramento River Region were modified with the construction of dams on the Sacramento, American, and Feather Rivers. Before major dams were constructed, flows and water temperatures fluctuated seasonally. Low flows and relatively high water temperatures occurred in summer, and high flows and low water temperatures occurred in winter. In some instances, modification to river flows resulted in substantial changes to sport fisheries.

---

Recreation activities along rivers in the Sacramento River Region were modified with the construction of dams on the Sacramento, American, and Feather Rivers.

---

Before Shasta Lake was built, summer flows in the Sacramento River were low, water temperatures rose above optimum ranges for salmon, and only warm water species were present below the dam site during summer. The most common summer game fish in the river before construction of the lake were striped bass and catfish. After Shasta Lake was constructed, water temperatures and flows in the river were altered to such a degree that a year-round salmonid sport fishery was created. Chinook salmon, steelhead trout, and rainbow trout made the greatest contribution to the fishery.

The popularity of the Sacramento River is indicated by the growth in the number of recreation-related facilities. On the reach of the river between Orland and Redding, the number of boat landings to serve the growing sport fishery increased from zero in 1945 to 11 in 1949. An estimated 46 establishments (such as resorts and bait shops) serving the sport fishery were in operation along the river in 1949. Between May 1948 and February 1949, an estimated 8,000 salmon and 3,800 rainbow trout and steelhead were caught on the reach of the river between Orland and Redding. Between 1968 and 1975, an estimated annual average of 17,500 salmon were landed in the entire river.

---

The popularity of the Sacramento River is indicated by the growth in the number of recreation-related facilities.

---

The Feather River below Lake Oroville and the Yuba River below Englebright Lake continued to support an important anadromous fishery, although not as extensive as that on the Sacramento River. Changes in water flow and temperature in the Feather River after completion of Lake Oroville did not substantially alter the number of fish species present in the lower portion of the river. Averages based on angler surveys conducted from 1968 to 1974 indicate that 530 striped bass, 1,800 steelhead trout, and 644 chinook salmon were caught annually.

Wildlife refuges in the Sacramento River Region provide fishing, hunting, and wildlife viewing opportunities. These refuges include Sacramento, Colusa, Sutter, and Delevan NWRs and Gray Lodge WMA.

Gray Lodge WMA, the first wildlife refuge in the Sacramento River Region, was established in 1931. Historically, Gray Lodge WMA has been the most popular of the five refuges in the region, accounting for approximately 61% of total use at all refuges in the



region between 1973 and 1985. Use at the refuge increased by approximately 95% between 1973 and 1985. The Sacramento NWR, established in 1937, historically has been the second most popular refuge in the Sacramento River Region. Non-consumptive uses accounted for approximately 73% of total use during 1973 and 1985. Colusa NWR, established in 1944, has been the third most popular refuge in the region, with an annual average of 8,000 visitor days between 1973 and 1985. Non-consumptive and consumptive uses historically have been equally popular at the refuge, each accounting for 50% of total use. Sutter and Delevan NWRs, established in 1944 and 1963, respectively, have been used almost exclusively for hunting. Between 1973 and 1985, annual hunting activity averaged approximately 2,500 visitor days at Sutter NWR and 5,500 visitor days at Delevan NWR.

---

Gray Lodge WMA has been the most popular of the five refuges in the Sacramento River Region.

---

Water-dependent activities at these potentially affected reservoirs, rivers, and wildlife refuges in the Sacramento River Region generated approximately 5 million visitor days in 1992. This level of activity generated an estimated \$100 million in recreation-related spending. Because 1992 was a dry water year, this level of activity likely understates what occurs in most years.

#### 7.7.3.4 SAN JOAQUIN RIVER REGION

Reservoirs, rivers, and wildlife refuges in the San Joaquin River Region support a variety of recreational activities, including sport fishing, hunting, boating, camping, swimming, picnicking, and sightseeing. Private lands also support considerable waterfowl hunting activity in the region.

---

Reservoirs, rivers, and wildlife refuges in the San Joaquin River Region support a variety of recreational activities, including sport fishing, hunting, boating, camping, swimming, picnicking, and sightseeing. Private lands also support considerable waterfowl hunting activity in the region.

---

Important reservoirs and lakes in the San Joaquin River Region include San Luis, Millerton, New Melones, New Don Pedro, McClure, and New Hogan. Except for New Melones Reservoir, these reservoirs were constructed in the 1960s and 1970s. Important historical use trends at these reservoirs include substantial increases in use during the 1970s and 1980s, particularly at San Luis Reservoir, Lake McClure, and New Hogan Lake.

Important rivers in the San Joaquin River Region include the San Joaquin, Stanislaus, Tuolumne, and Merced. Millerton Lake modified the flows and temperature of the San Joaquin River. During the irrigation season, the river was diverted substantially, creating hazards for chinook salmon, steelhead trout, striped bass, American shad, and sturgeon.

The Stanislaus River downstream of Goodwin Dam historically supported resident populations of warm water game species, including largemouth and smallmouth bass, channel and white catfish, black crappie, bluegill, and green sunfish. Historical anadromous fish populations below Goodwin Dam included chinook salmon, steelhead trout, striped bass, American shad, and sturgeon. Salmon production in the Stanislaus River contributed to sport and commercial catches in the ocean and lower San Francisco Bay.

The Tuolumne River historically supported a significant trout fishery in the upper cold water reaches of the river. Rainbow, brown, brook, and golden trout ranged as far downstream as the present location of New Don Pedro Reservoir. Largemouth and



smallmouth bass, bluegill, white catfish, and other warm water fish species were common in the lower foothill and valley reaches of the river. Before impoundment of the lower reach, the Tuolumne River supported steelhead and annual chinook salmon runs of up to 100,000 fish.

The Merced River historically supported populations of spring- and fall-run chinook salmon that averaged 12,000 fish per year. The salmon run on the Merced River declined and was in poor condition for at least 20 years before the construction of Lake McClure. Operation of the dam has improved the project flow conditions, and salmon habitat improvement projects have effectively maintained chinook salmon populations.

Overall, recreation use data for these rivers are limited. In 1962, DFG estimated that the Stanislaus River chinook salmon run supported an average annual use of 10,000 angler days of sport fishing. No other use data for the Stanislaus River or other important rivers in the San Joaquin River Region are available.

Wildlife refuges in the San Joaquin River Region provide fishing, hunting and wildlife viewing opportunities. Important wildlife refuges in the San Joaquin River Region include Los Banos and Volta WMAs; and Kern, Kesterson, Merced, Mendota, Pixley, and San Luis NWRs. Historical use data for NWRs are not available; however, overall use trends at the NWRs probably resemble the trends at the WMAs. Recreation use at Los Banos WMA and Volta WMA increased from an estimated 36,400 visitor days in 1973 to an estimated 69,300 visitor days in 1985. Recreation opportunities for both non-consumptive and consumptive activities are provided at all wildlife refuges in the region.

Overall, recreation use at important reservoirs, rivers, and wildlife refuges in the San Joaquin River Region has been increasing since the 1940s. Consequently, recreation-related spending associated with increased use by visitors to the recreation areas has been increasing and has become an important contributor to local and regional economies.

Other potentially affected lakes and reservoirs in the region include Bethany Reservoir, O'Neill Forebay, New Hogan Lake, Camanche Reservoir, and other reservoirs located upstream of major reservoirs. Fishing opportunities also occur along the California Aqueduct and the Delta Mendota Canal.

Overall, water-dependent activities at potentially affected reservoirs, rivers, and wildlife refuges in the San Joaquin River Region generated approximately 3 million visitor days in 1992. This level of activity generated an estimated \$60 million in recreation-related spending. Because 1992 was a dry water year, this level of activity likely understates what occurs in most years.

---

Overall, recreation use at important reservoirs, rivers, and wildlife refuges in the San Joaquin River Region has been increasing since the 1940s.

---

### 7.7.3.5 OTHER SWP AND CVP SERVICE AREAS

The Other SWP and CVP Service Areas region includes two distinct, noncontiguous areas: in the north, are the San Felipe Division's CVP service area and the South Bay SWP service area; to the south, are the SWP service areas. The northern section of this region



encompasses parts of the central coast counties of Santa Clara, San Benito, Santa Cruz, and Monterey. The southern portion includes parts of Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties.

Development of the SWP and CVP created recreational opportunities at facilities constructed outside the Central Valley. Use of these facilities has generated spending in local economies and benefitted recreationists. Most of the recreational use of SWP and CVP facilities occurs at storage reservoirs.

---

Most of the recreational use of SWP and CVP facilities occurs at storage reservoirs.

---

In southern California, recreational opportunities are provided at Castaic, Pyramid, Silverwood, and Perris Lakes. Recreation-related spending and benefits to users of these facilities generally have grown in proportion to population growth. In 1992, recreation use of these facilities was estimated at 3.1 million visitor days, generating about \$130 million in trip-related spending.

#### 7.7.4 ASSESSMENT METHODS

Both qualitative and quantitative methods were used to assess changes in recreation opportunities, use of affected facilities, and related economic effects. Quantitative methods included consideration of thresholds at which recreation opportunities are affected (for example, the reservoir level at which boat ramps become unusable and use declines). More qualitative methods used to assess recreation impacts included consideration of potential effects on the availability and accessibility of recreation sites; support facilities at affected recreation sites (for example, boat launches and docks); and the abundance of fish and wildlife, particularly waterfowl and other bird species.

The effects of the alternatives on each of these recreation opportunity indicators were evaluated at representative locations in each region. Information on potential changes in hydrologic conditions and results of the biological assessment were used to conduct the analysis. The overall impact on recreation resources in the regions also was considered.

---

The effects of the alternatives on each of these recreation opportunity indicators were evaluated at representative locations in each region.

---

Important economic indicators that were considered include changes in spending by visitors to affected recreation areas. Although the economic indicators were not quantified (except for the No Action Alternative), the magnitude of potential changes is described. (For the No Action Alternative, spending values were estimated by adjusting the values for existing conditions by the percentage change in population between 1995 and 2020.) The effect on recreation use of allocating potential costs of the Program to recreation users was not explicitly considered because these costs are unknown at this time.

Potential impacts on commercial fishing in the Delta and Bay Regions were evaluated qualitatively.



## 7.7.5 SIGNIFICANCE CRITERIA

Program actions would result in a potentially significant adverse impact on recreation resources if recreation opportunities at affected facilities were substantially reduced, which also could lead to substantial effects on recreation-serving businesses. Although professional judgment must be relied on in evaluating the significance of these impacts, a conservative approach was used. Any measurable reduction in recreation opportunities or use was considered potentially significant unless otherwise noted.

Conversely, if Program actions could enhance recreational opportunities at affected resources or increase use, the impact was considered beneficial.

Among the types of Program-induced effects that could result in potentially significant impacts on recreational opportunities are:

- Fluctuation in lake or reservoir water levels.
- Changes in fresh water flows in rivers and the Delta during the recreational season.
- Changes of river temperature that reduce recreational swimming, tubing, canoeing, kayaking, and rafting.
- Temporary restriction of recreation activities due to construction.
- Conversion of recreation facilities to other uses.
- Changes in aesthetic conditions that could affect visitor appreciation of an area.
- Reduction of opportunities for one activity resulting in an increase in visitor days for other recreational uses in the Delta (shifting activities).
- Changes in fishing or hunting opportunities.
- Changes in accessibility to recreation sites.

## 7.7.6 NO ACTION ALTERNATIVE

### 7.7.6.1 DELTA REGION

Historical land use trends are expected to continue through 2020. Population trends in the Delta are expected to continue. The increased population is expected to increase demands on existing recreational resources, which could reduce the quality of recreation resources.

---

Program actions would result in a potentially significant adverse impact on recreation resources if recreation opportunities at affected facilities were substantially reduced or if recreation-serving businesses were expected to be substantially affected by reduced spending.

---



---

Increased population levels are expected to increase demands on existing recreational resources in the Delta Region.

---



Adverse impacts on fisheries and wildlife habitat noted in other sections of this report will result in potentially significant reductions in opportunities associated with recreation resources. Future development of land-based recreational facilities (such as parks, camping and picnic areas, and pedestrian and cycling facilities) and facilities that support water-based activities (such as boating, fishing, swimming, and water-skiing) may place additional demands on terrestrial and aquatic habitat, leading to further reductions or trade-offs in available recreational opportunities.

Other actions that could affect recreational resources in the Delta Region include implementation of the CVPIA, which would improve fishing conditions for anadromous species in Delta waters. With fishery flows implemented under the CVPIA, fishery populations are expected to increase and the availability of water will increase. These changes could substantially increase opportunities for sport fishing, thereby also increasing sport fishing-related spending in the Delta Region.

Based on the additional recreation use generated by regional population growth and the increased use associated with implementation of the CVPIA, spending within the region related to recreational use of the Delta is projected to total approximately \$400 million by 2020.

Commercial fishing for crayfish and bait fish species in the Delta and Suisun Bay would not change appreciably under No Action Alternative conditions relative to current resource conditions. Harvest revenue and net income generated by commercial fishing have not been estimated but were assumed to be minor, especially in the context of the regional economy.

### 7.7.6.2 BAY REGION

Increased population levels are expected to increase demands on existing recreational resources in the Bay Region which could reduce the quality of recreation resources. As described for the Delta Region, increased recreational use of Bay waters and shoreline areas may result in adverse impacts on the recreational value of terrestrial and aquatic resources if facilities are not expanded or managed to prevent degradation from overuse.

Sport fishing opportunities for anadromous species in Bay and coastal waters could increase under No Action Alternative conditions as a result of implementation of the CVPIA. Relative to current conditions, implementation of the CVPIA could result in small increases in benefits and sport fishing-related spending in the North Coast region but larger increases in the San Francisco and Central Coast regions. Based on additional demand generated by regional population growth and enhancements associated with implementation of the CVPIA, spending in the Bay Region (including outer Bay and nearshore areas) related to ocean salmon sport fishing is projected to total approximately \$23 million by 2020.

Commercial fishing for anadromous species in Bay and coastal waters could increase under No Action Alternative conditions due to implementation of the CVPIA. (Regional

---

Increased recreational use of Bay waters and shoreline areas may result in adverse impacts on the recreational value of terrestrial and aquatic resources if facilities are not expanded or managed to prevent degradation from overuse.

---



population growth, while adding pressure on the fishery, would not necessarily result in increased fishery-related economic activity because catch is regulated by state and federal resource management agencies.) Improvements in fishery habitats under the CVPIA could substantially increase ocean commercial harvest values and net income derived from the catch of salmon.

---

Improvements in fishery habitats under the CVPIA could substantially increase ocean commercial harvest values and net income derived from the catch of salmon.

---

### 7.7.6.3 SACRAMENTO RIVER REGION

Higher population levels are expected to increase the demands on existing recreation facilities in the Sacramento River Region which could reduce the quality of recreation resources. Trends not related to population growth, such as the conversion of crops that are associated with wildlife habitat (for example, rice) to other types of crops, also may affect recreation opportunities for hunting and wildlife viewing in the Sacramento River Region.

---

Increased population levels are expected to increase the demands on existing recreation facilities in the Sacramento River Region.

---

Other actions that could affect recreational resources in the Sacramento River Region include reoperation or expansion of Folsom Reservoir, development of the Stone Lakes NWR, and implementation of the CVPIA. Reoperating Folsom Reservoir could affect existing recreation opportunities at the reservoir by lowering lake levels during the peak-use recreation season; expanding Folsom Reservoir could enhance opportunities for flat-water recreation. The extent and type of impacts would vary, depending on the amount of flood storage required. Similarly, benefits to recreation could be realized downstream of the reservoir if releases were greater. The overall effect on recreation opportunities both at the reservoir and downstream is uncertain at this time.

The Stone Lakes NWR provides opportunities for non-consumptive recreation activities, such as nature walks and wildlife viewing. Ultimate development of the refuge would increase opportunities for wildlife-related recreation in the Sacramento River Region.

Implementation of the CVPIA could substantially increase sport fishing opportunities in the Sacramento, Feather, American, and Yuba Rivers and could marginally reduce flat-water recreation opportunities at reservoirs such as Shasta and Oroville. Wildlife refuges in the region could experience substantial increases in wildlife viewing and waterfowl hunting opportunities because of improved wildlife habitat conditions in refuges that result from implementation of the CVPIA.

Relative to current conditions, projected changes in the overall operation of CVP and SWP reservoirs to meet downstream water demands are expected to have minor impacts on water-dependent recreation opportunities during the peak summer recreation season.

Under the No Action Alternative, recreation-related expenditures would increase substantially as a result of the 69% increase in population projected for the Sacramento River Region between 1995 and 2020. Additionally, a number of projects and actions, including reoperation or expansion of Folsom Reservoir, development of the Stone Lakes NWR, and implementation of the CVPIA, could affect recreation-related economic activity in the Sacramento River Region under No Action Alternative conditions. Based



on population growth and effects of projects under No Action Alternative conditions, 2020 levels of recreation-related expenditures are projected to total about \$130 million in the Sacramento River Region.

#### 7.7.6.4 SAN JOAQUIN RIVER REGION

Population levels in the San Joaquin River Region are expected to increase by 68% between 1995 and 2020. The larger population would substantially increase the demands on existing recreational resources in the region which could reduce the quality of recreation resources. Possible future retirement of agricultural lands on the west side of the San Joaquin River Region could positively affect the region if the lands were made available for recreational use.

Other actions that could affect recreational resources in the San Joaquin River Region include implementation of the CVPIA, which would affect recreation opportunities at many of the region's rivers, reservoirs, and wildlife refuges. Relative to current conditions, projected changes in the overall operation of CVP and SWP reservoirs are expected to potentially reduce opportunities for flat-water recreation during the peak recreation season at reservoirs in the San Joaquin River Region. However, corresponding changes in recreation use of the reservoirs and rivers and related spending would most likely be small. Spending generated by visitation at the region's wildlife refuges would most likely increase substantially relative to existing levels.

Based on regional population growth and likely effects of the CVPIA, No Action Alternative levels of recreation-related spending are projected to total \$102 million in the San Joaquin River Region in 2020.

---

Possible future retirement of agricultural lands on the west side of the San Joaquin River Region could positively affect the region if the lands were made available for recreational use.

---

#### 7.7.6.5 OTHER SWP AND CVP SERVICE AREAS

Increased population levels are expected to increase the demand on existing recreational resources in the Other SWP and CVP Service Areas which could reduce the quality of recreation resources. Recreational use of existing facilities is expected to increase under the No Action Alternative.

Spending and benefits associated with recreational use of reservoirs in the Other SWP and CVP Service Areas could be affected by population growth and projects such as the CVPIA and MWD's Eastside Reservoir. Important lakes that could be affected include Castaic, Pyramid, Silverwood, and Perris. Based on the 46% increase in population growth projected for counties containing these lakes, recreation spending could annually total a projected \$193 million by 2020.

---

Recreational use of existing facilities in the Other SWP and CVP Service Areas is expected to increase under the No Action Alternative.

---



## 7.7.7 CONSEQUENCES: PROGRAM ELEMENTS COMMON TO ALL ALTERNATIVES

For recreation resources, the environmental consequences of the Ecosystem Restoration, Water Quality, Levee System Integrity, Water Use Efficiency, Water Transfer, and Watershed Programs, and the Storage element are similar under all Program Alternatives. The environmental consequences of the Conveyance element, which vary among Program alternatives, are described in Section 7.7.8.

### 7.7.7.1 DELTA REGION

#### *Ecosystem Restoration Program*

In general, the Ecosystem Restoration Program is expected to increase recreation opportunities and improve the quality of recreational activities in the Delta. In addition, new recreational opportunities for consumptive and non-consumptive recreation activities are likely to occur as a result of ecosystem restoration actions.

The Ecosystem Restoration Program would result in increased open space for hiking, wildlife viewing, hunting, and fishing. Fish and wildlife populations are expected to increase as a result of Ecosystem Restoration Program actions. Restoration actions are expected to result in increased use of restored and adjoining areas by birds and other wildlife, which could result in improved success for wildlife viewing, hunting, and fishing. Restoring fresh-water marshes, tidal wetlands, and other terrestrial habitat areas could create new opportunities for hunters. Restoration actions are also likely to enhance visual resources, resulting in an overall improvement in quality of the recreation experience. The Ecosystem Restoration Program could result in construction of new deep-water areas and tidally influenced channels that could create new opportunities for boaters.

The Ecosystem Restoration Program also is expected to result in large, positive changes in populations of bird species important for wildlife viewing and hunting. Increases in populations of anadromous and resident fish species are expected to lead to increased recreational opportunities, including sport fishing. These actions are expected to increase recreation use and result in a corresponding positive effect on user benefits in the Delta Region.

Although the overall impact of habitat restoration would be positive, restoration activities may result in potentially significant adverse impacts on recreation. During construction, some recreation areas or facilities may be temporarily closed to the public. Certain recreation facilities, such as piers or marinas, would be temporarily or permanently closed following restoration actions. Temporary, seasonal, or permanent closure of Delta waterways could result in potentially significant adverse impacts on boating access and circulation. Impacts associated with temporary and seasonal closures of Delta waterways

---

The Ecosystem Restoration Program is expected to increase recreation opportunities and improve the quality of recreational activities in the Delta.

---



can be mitigated to less-than-significant levels. Permanent closure of Delta waterways would result in a potentially significant unavoidable adverse impact.

The Ecosystem Restoration Program includes potential actions for constructing fish control barriers. Constructing the barriers could adversely affect boating access and circulation, thereby reducing recreational opportunities. This is considered a potentially significant adverse impact that can be mitigated.

The Ecosystem Restoration Program includes a provision to reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow-water and riparian habitat are susceptible to wake damage. Reduction of boat traffic in some areas could result in an increase in traffic in other areas, causing congestion during peak-use days in summer. Mandatory speed reductions in some areas could result in a shift from motorized boating to non-motorized boating, swimming, and fishing in restricted areas. Currently, no speed limits exist in the Delta, except for the 5-mph speed limits around marinas. Although the Ecosystem Restoration Program does not specify proposed speed requirements, the Ecosystem Restoration Program could alter personal watercraft and boat use, and decrease the number of use-days for boating in the Delta. This decrease is considered a potentially significant unavoidable adverse impact.

---

The Ecosystem Restoration Program includes a provision to reduce boat traffic and boat speeds in order to minimize wake damage in habitats.

---

Overall, the Ecosystem Restoration Program is expected to enhance recreation opportunities in the Delta Region, which should lead to increased use of recreational resources in the region. Increased use would generate more recreation-related spending at local businesses that provide goods and services to recreationists, including retail stores, lodging places, and eating and drinking establishments; and businesses that provide recreation services, such as guiding and marina operations. The number of jobs in recreation-serving businesses should increase, which is considered a beneficial impact on the region.

Commercial fishing for crayfish and bait fish species in the Delta and Suisun Bay would not change appreciably under the Preferred Program Alternative.

### *Water Quality Program*

The Water Quality Program is intended to provide improved water quality in the Delta that will directly and indirectly benefit recreation resources. Elements of the Water Quality Program could result in improved fishery, river recreation, and wildlife refuge conditions throughout the Delta Region. Improved water quality in the Delta could result in improved water clarity for swimming, boating, and other aquatic uses. Improved water clarity could result in improved aesthetics for all types of recreational use. Existing health hazards related to ingesting raw water from the Delta during recreational activities would diminish. Improved water quality is expected to benefit fish and wildlife populations, resulting in improved wildlife viewing, hunting, and fishing.

---

The Water Quality Program is intended to provide improved water quality in the Delta that will directly and indirectly benefit recreational resources.

---

Improvements in recreational opportunities and the overall quality of recreational experiences would enhance user benefits and result in increased use of recreational resources in the region. Increased use would generate additional visitor spending in the



resources in the region. Increased use would generate additional visitor spending in the Delta Region, which should lead to more jobs in recreation-serving businesses in the region.

### *Levee System Integrity Program*

Many of the Levee System Integrity Program actions proposed for the Delta are closely linked with the Ecosystem Restoration Program and incorporate habitat improvements into levee restoration. Levee improvements could include setback levees that would increase waterside habitat and beach areas, construction of oversize levees with habitat development on the landward slope, and development of permanent wetlands to control soil subsidence adjacent to levee slopes. Generally, the Levee System Integrity Program is expected to result in beneficial impacts on recreation facilities and opportunities. In addition to the benefits described for the Ecosystem Restoration Program, the Levee System Integrity Program is intended to reduce the risk to land uses from catastrophic breaching of Delta levees. Currently, many recreation areas in the Delta, such as camping facilities and boat launches, are at risk of damage if a levee in the vicinity were to be breached. The Levee System Integrity Program would provide increased levels of flood protection to recreational facilities in the Delta.

Levee System Integrity Program activities may result in some potentially significant adverse impacts on recreation. During construction, certain recreation areas or facilities may be temporarily closed to the public. Certain recreation facilities, such as piers or marinas, would be temporarily or permanently closed following levee restoration actions. Temporary, seasonal, or permanent closure of Delta waterways could result in potentially significant impacts on boating access and circulation. Impacts associated with temporary and seasonal closures of Delta waterways can be mitigated. Permanent closure of Delta waterways would result in a potentially significant unavoidable adverse impact.

The Levee System Integrity Program is expected to indirectly result in positive changes in populations of bird species important for wildlife viewing and hunting. Increases in populations of anadromous and resident fish species are expected to lead to increased recreational opportunities, including sport fishing. These actions are expected to result in a corresponding positive effect on user benefits in the Delta Region.

Levee modification activities in the Suisun Marsh would occur primarily on private lands that do not allow public access but would provide flood protection benefit to a large number of private duck clubs. Some levee repairs would occur in areas where public fishing opportunities exist; however, impacts on these resources would be minimal and temporary.

Overall, the Levee System Integrity Program is expected to enhance recreational opportunities in the Delta Region, which should lead to increased use of Delta recreation resources and facilities. This increase in use should, in turn, generate additional spending by visitors to the region, which would benefit recreation-serving businesses.

---

Many of the Levee System Integrity Program actions proposed for the Delta are closely linked with the Ecosystem Restoration Program and incorporate habitat improvements into levee restoration.

---



---

During construction, certain recreation areas or facilities may be temporarily closed to the public. Certain recreation facilities, such as piers or marinas, would be temporarily or permanently closed following levee restoration actions.

---



---

Overall, the Levee System Integrity Program is expected to enhance recreational opportunities in the Delta Region, which should lead to increased use of Delta recreation resources and facilities.

---



Levee System Integrity Program actions would directly affect recreation resources only in the Delta Region. This program therefore is not addressed under the remaining Program regions.

### *Water Use Efficiency Program*

Water Use Efficiency Program measures could potentially reduce the extent of waterfowl habitat in the Delta. The extent of this reduction is unknown but would be influenced by changes in irrigation pricing to induce crop changes or act as a disincentive to after-harvest flooding of fields. This reduction could adversely affect the availability of lands for recreational hunting and for bird watching. These impacts are not expected to be significant in the Delta Region. Improved water conservation from the Water Use Efficiency Program may provide more water in reservoirs for recreational use. The Water Use Efficiency Program is unlikely to result in substantial impacts on recreation use of affected resources or on associated spending in the Delta Region.

---

Water Use Efficiency measures could potentially reduce the extent of waterfowl habitat in the Delta.

---

### *Water Transfer Program*

No impacts on recreation are expected in the Delta Region as a result of the Water Transfer Program.

### *Watershed Program*

The Watershed Program would result in little or no effect on recreation in the Delta Region.

### *Storage*

New off-stream or expanded on-stream storage facilities have the potential to provide important environmental water supplies and operational flexibility, which could be used to improve habitat and assist in the recovery of fish and wildlife populations. These facilities would benefit recreation users by providing new opportunities for flat-water recreation in the Delta and by indirectly enhancing recreation quality throughout the Delta Region.

Any new storage facilities developed in the Delta may result in potentially significant impacts on existing recreation resources due to inundation or other impacts related to construction. Flooding of reservoir sites could displace wildlife and increase usage of other recreational facilities in the area. Changes in reservoir operations related to water transfers, water supply needs, or fish recovery could affect existing minimum pool levels and adversely affect recreational opportunities related to specific water surface elevations, including access to marinas and boat launching facilities. Changes in reservoir operations

---

Overall, surface water storage facilities are expected to enhance recreation opportunities in the Delta Region, thereby increasing the use of Delta recreation resources.

---



resulting in increased cold-water flows could adversely affect water-contact recreation, such as swimming, windsurfing, and the use of personal watercraft; but the impact is considered less than significant.

Overall, surface storage facilities are expected to enhance recreation opportunities in the Delta Region, which should increase the use of Delta recreation resources. This increase in use should, in turn, generate additional spending by visitors to the region, which would benefit recreation-serving businesses.

Without construction of surface storage under the Preferred Program Alternative, areas that provide recreation opportunities in a natural setting, such as fishing, wildlife viewing, and boating, would not be inundated. Without storage, less water would be available for environmental water flows for Ecosystem Restoration Program habitat restoration. Without storage, opportunities for flow-related recreation] in the Delta would be less than under the Preferred Program Alternative with storage.

### 7.7.7.2 BAY REGION

#### *Ecosystem Restoration and Levee System Integrity Program*

In general, Ecosystem Restoration and Levee System Integrity Program actions in the Bay Region, including the Suisun Marsh, would be similar to those proposed for the Delta Region and are anticipated to result in similar impacts on recreation activities.

A number of programmatic actions in the Ecosystem Restoration Program could improve spawning, rearing, and survival conditions for sport fish species, including chinook salmon. The improved conditions should lead to increased populations of sport fish in the Bay Region and enhanced opportunities for sport fishing, which would generate positive changes in recreational spending and benefits to sport anglers in the Bay Region.

Ecosystem Restoration Program actions also could lead to larger populations of chinook salmon originating from the Central Valley river systems. It is difficult to assess the extent of this benefit to the ocean sport and commercial fishing industries. Ocean populations are comprised of salmon originating from various systems along the Pacific Coast, including Klamath and Snake River salmon whose populations are protected by catch restrictions. Because populations are intermingled, restrictions on the catch of Klamath and Snake River salmon can severely restrict the harvest of Central Valley chinook salmon. Assuming that ocean commercial and sport salmon harvest restrictions are eased in the future for protected stocks, increases in populations of Central Valley chinook would lead to substantially increased salmon catch levels. Increased catch levels would result in a corresponding positive economic impact on the commercial fishing industry, charter boat operators, and ocean sport anglers.

---

Ecosystem Restoration Program actions could lead to larger populations of chinook salmon originating from the Central Valley river systems.

---



### *Water Quality Program*

Elements of the Water Quality Program could result in improved fishery, river recreation, and wildlife refuge conditions in the Bay Region. Improved water quality in San Francisco Bay should lead to healthier anadromous fish populations and improved conditions for water-contact recreation in the Bay Region. These enhanced recreation opportunities could lead to increased use and visitor spending at recreation-serving businesses in the Bay Region.

---

Improved water quality in San Francisco Bay should lead to healthier anadromous fish populations and improved conditions for water-contact recreation in the Bay Region.

---

### *Water Use Efficiency and Water Transfer Programs, and Storage*

The Water Use Efficiency and Water Transfer Programs and the Storage element would not result in potentially significant impacts on recreation resources in the Bay Region.

### *Watershed Program*

Vegetation and habitat restoration activities and channel improvements in the upper watershed areas of the Bay Region could result in beneficial impacts on recreation resources. For example, restoring fresh-water marshes and tidal wetlands may create new recreation opportunities for hunters. To the extent that restoration actions result in increased visitation by birds and other wildlife, expanded opportunities for wildlife viewing likely would result.

Restoration and channel improvement activities may result in some adverse impacts on recreation resources from construction activities. During construction, recreation areas may be temporarily closed to the public; certain recreation facilities, such as piers or marinas, could be temporarily or permanently closed. Closure is considered a potentially significant adverse impact that can be mitigated. Potential road improvements would not adversely affect recreation opportunities, although road removals could limit access to recreation areas in the watershed.

Overall, the Watershed Program is expected to enhance recreation opportunities in the Bay Region, which could lead to increased use that would benefit recreation-serving businesses.



### 7.7.7.3 SACRAMENTO RIVER AND SAN JOAQUIN RIVER REGIONS

#### *Ecosystem Restoration Program*

A large number of the Ecosystem Restoration Program actions planned for the Sacramento River and San Joaquin Regions have been developed to recover declining fish populations. Recovery of fish populations could improve sport fishing opportunities. Restoration of riparian habitat is likely to improve fish and wildlife populations—and may also increase recreation opportunities, including hiking, hunting, wildlife viewing, and sport fishing, by providing additional areas for shoreline access.

Adverse impacts on recreation could result from temperature changes of reservoir releases, depending on the timing and extent of temperature changes. If water released is significantly cooler than the existing conditions, recreation use for activities such as swimming, tubing, canoeing, kayaking, and rafting could be reduced. However, cooler water temperatures would create beneficial fish habitat and improve fish populations in the Sacramento River and San Joaquin River Regions.

Overall, the Ecosystem Restoration Program is expected to enhance recreation opportunities in the Sacramento River and San Joaquin River Regions, which should lead to increased use of recreational resources. Increased use would generate more recreation-related spending at businesses that cater to recreationists. The number of jobs in these businesses should increase, which is considered a beneficial impact on the regions.

---

A large number of the Ecosystem Restoration Program actions planned for the Sacramento River Region have been developed to recover declining fish populations.

---

#### *Water Quality Program*

Elements of the Water Quality Program could result in improved fishery, river recreation, and wildlife refuge conditions throughout the Sacramento River and San Joaquin Regions. The benefits of improved water quality to users of affected recreation resources are difficult to judge; however, improved water quality in rivers should lead to healthier anadromous fish populations and improved conditions for water-contact recreation.

#### *Water Use Efficiency Program*

The Water Use Efficiency Program could lead to reduced diversions, which would provide more water for in-stream purposes. Improved water conservation may provide more water in reservoirs for recreational use. These changes could provide greater opportunities for water-dependent recreation activities, both along affected rivers and at reservoirs. Recreation use at affected rivers and reservoirs, and associated spending and net benefits could increase.

The Water Use Efficiency Program could result in reduced opportunities for waterfowl hunting and wildlife viewing. Associated spending and net benefits could be reduced from

---

The Water Use Efficiency Program could lead to reduced diversions, which would provide more water for in-stream purposes. Improved water conservation may provide more water in reservoirs for recreational use.

---



potential decreases in wetlands and riparian areas that depend on irrigation runoff and after-harvest field flooding. These effects on spending and net benefits are expected to be less than significant.

---

The Water Use Efficiency Program could result in reduced opportunities for waterfowl hunting and wildlife viewing. Associated spending and net benefits could be reduced from potential decreases in wetlands and riparian areas that depend on irrigation runoff and after-harvest field flooding.

---

### *Water Transfer Program*

Increased water transfers based on storage releases that result from the Water Transfer Program could increase the drawdown of recreational reservoirs, which has been shown to decrease the quality of the recreational experience and could result in reduced use of the affected reservoirs. In addition to adversely affecting reservoir users, decreased reservoir use could adversely affect businesses that rely on visitor spending. Enhanced flows in rivers below the affected reservoirs could benefit river users and offset some of the regional impacts related to reduced spending at reservoirs. Specific water transfers can be conditioned to mitigate these impacts.

### *Watershed Program*

Potential impacts on recreation resources from vegetation and habitat restoration activities, as well as from channel improvements, generally would be the same as those described above for the Bay Region. Road improvements would not adversely affect recreation resources in these areas, although road removals could limit access to recreation areas in the watershed.

### *Storage*

New off-stream or expanded on-stream storage facilities have the potential to provide important environmental water supplies and operational flexibility, which could be used to improve habitat and assist in the recovery of fish and wildlife populations. Storage facilities would benefit recreation users by providing new opportunities for flat-water recreation in the Sacramento River and San Joaquin River Regions and by indirectly enhancing recreation quality throughout the regions.

Any new storage facilities developed may result in potentially significant impacts on existing recreation resources due to inundation or other impacts related to construction. Flooding of reservoir sites could displace wildlife and increase usage of other recreational facilities in the area. Changes in reservoir operations could affect existing minimum pool levels and adversely affect recreational opportunities related to specific water surface elevations, including access to marinas and boat launching facilities. Changes in reservoir operations resulting in increased cold water flows could adversely affect water-contact recreation such as swimming, windsurfing, and the use of personal watercraft, but the impact is considered less than significant.

---

Storage facilities would benefit recreation users by providing new opportunities for flat-water recreation in the Sacramento River and San Joaquin River Regions and by indirectly enhancing recreation quality throughout the regions.

---

Overall, surface storage facilities are expected to enhance recreation opportunities in the Sacramento River and San Joaquin River Regions, which should increase the use of



recreation resources. This increase in use should, in turn, generate additional spending by visitors to the region, which would benefit recreation-serving businesses.

Without construction of surface storage under any alternative, areas that provide recreation opportunities in a natural setting, such as fishing, wildlife viewing, and boating, would not be inundated. Without storage, less water would be available for environmental water flows for Ecosystem Restoration Program habitat restoration, and opportunities for flow-related recreation in the regions would be less than under an alternative with storage.

#### 7.7.7.4 OTHER SWP AND CVP SERVICE AREAS

##### *Ecosystem Restoration, Water Quality and Watershed, and Storage*

These programs would result in no potentially significant impacts on recreation resources in the Other SWP and CVP Service Areas.

##### *Water Use Efficiency Program*

The Water Use Efficiency Program may provide an opportunity to reoperate some reservoirs, which could change the availability of water to support recreation activities. It is expected that implementing more stringent conservation measures would help conserve existing supplies to meet a greater future demand. This action could reduce the flexibility to delay drawdown of reservoirs and could negatively affect opportunities for reservoir recreation. Although not expected to be significant, the impact could reduce use and associated spending and user benefits at reservoirs in the Other SWP and CVP Service Areas.

---

It is expected that implementing more stringent conservation measures would help conserve existing supplies to meet a greater future demand.

---

##### *Water Transfer Program*

To the extent that reservoirs in the region are operated to facilitate the transfer of water, potential adverse impacts on recreation could occur through more frequent drawdown of water levels. Specific water transfers can be conditioned to mitigate these impacts.



## 7.7.8 CONSEQUENCES: PROGRAM ELEMENTS THAT DIFFER AMONG ALTERNATIVES

For recreation resources, the Conveyance element results in environmental consequences that differ among the alternatives. This section describes the direct effects of the Conveyance element on recreation resources; indirect effects of the Conveyance element on other Program elements also are identified, where relevant.

### 7.7.8.1 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.

#### *Delta Region*

A pilot diversion facility near Hood and accompanying conveyance channel and channel modifications to improve conveyance may result in temporary recreation impacts during construction. Some of these actions could permanently displace such land-based recreation opportunities as camping, hiking, and picnicking; however, some actions could increase aquatic-related recreation opportunities, including fishing, wildlife viewing, and boating. Open-water habitat created as part of conveyance modifications could generate new waterfowl hunting opportunities. Dredging could result in short-term construction impacts, such as obstructing or closing channels and creating noise and visual impacts.

Operating fish control barriers in the south Delta could negatively affect boating circulation patterns in that area. Barrier placement for fish and flow control in the Delta could restrict boat travel. Impacts on boating, marina access and use, and fishing are the primary types of recreational effects that would occur as a result of installing temporary or permanent barriers. Depending on location, these adverse impacts could be potentially significant and unavoidable.

Changes in project operations are expected to be beneficial for fish populations and related fishing activities in the Delta. These changes are not anticipated to adversely affect recreational resources. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation.

In summary, construction and operation of conveyance facilities would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction under the Preferred Program Alternative).

---

Open-water habitat created as part of conveyance modifications could generate new waterfowl hunting opportunities.

---



---

Construction and operation of conveyance facilities would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction).

---



### *Bay Region*

Under the Preferred Program Alternative, impacts on recreational resources in the Bay Region due to construction of conveyance features are expected to be negligible.

Changes in project operations could benefit fish populations and related fishing activities in the Bay Region. These changes are not anticipated to adversely affect recreational resources at existing facilities. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation resources.

### *Sacramento River and San Joaquin River Regions*

Changes in operations are not anticipated to adversely affect recreational resources in the Sacramento River or San Joaquin River Region. Flows and timing of flows may be changed in the Sacramento River and Feather River as a result of reservoir release changes made in response to operational changes at the water export pumps in the Delta. These changes are not expected to significantly affect recreation resources. Variations in water storage levels at San Luis Reservoir may occur due to changes in the amounts of water exported at the pumping plants, but the variations are not expected to be significant.

The addition of storage generally would result in only minor effects on water-dependent recreation opportunities at existing facilities.

In conclusion, changes in operations to meet downstream water demands are not expected to significantly affect water-dependent recreation opportunities at facilities in the Sacramento River or San Joaquin River Region under the Preferred Program Alternative.

---

Changes in operations to meet downstream water demands are not expected to significantly affect water-dependent recreation opportunities at facilities in the Sacramento River or San Joaquin River Region.

---

### *Other SWP and CVP Service Areas*

The Conveyance element would not affect recreation in the Other SWP and CVP Service Areas.

## 7.7.8.2 ALTERNATIVE 1

### *Delta Region*

Conveyance channels and channel modifications to improve conveyance in the south Delta may result in temporary recreation impacts during construction. Some of these actions could permanently displace such land-based recreation opportunities as camping, hiking, and picnicking; however, some actions could increase aquatic-related recreation opportunities, including fishing, wildlife viewing, and boating. Habitat created as part of conveyance modifications could generate new waterfowl hunting opportunities. Dredging



could cause short-term construction impacts such as obstructing or closing channels and creating noise and visual impacts.

Operating fish control barriers in the south Delta could negatively affect boating circulation patterns in that area. Barrier placement for fish and flow control in the Delta could restrict boat travel. Impacts on boating, marina access and use, and fishing are the primary types of recreational effects that would occur as a result of installing temporary or permanent barriers. Depending on location, these adverse impacts could be potentially significant and unavoidable.

Changes in project operations are expected to benefit fish populations and related fishing activities in the Delta. These changes are not anticipated to adversely affect recreational resources. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation resources.

In summary, construction and operation of south Delta conveyance facilities would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction under Alternative 1).

---

Under all Program Alternatives, operating fish control barriers in the south Delta could negatively affect boating circulation patterns in that area.

---

### *Bay Region*

Under Alternative 1, no impacts on recreational resources in the Bay Region would result from construction of south Delta conveyance features.

Changes in project operations could benefit fish populations and related fishing activities in the Bay Region. These changes are not anticipated to adversely affect recreational resources at existing facilities. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation.

### *Sacramento River and San Joaquin River Regions*

Changes in operations are not anticipated to significantly affect recreational resources in the Sacramento River or San Joaquin River Region. Flows and timing of flows may be changed in the Sacramento River and Feather River as a result of reservoir release changes made in response to operational changes at the water export pumps in the Delta. These changes are not expected to significantly affect recreation. Variations in water storage levels at San Luis Reservoir may occur due to changes in the amounts of water exported at the pumping plants, but the variations are not expected to be significant.

With storage, adverse impacts on recreation opportunities at existing facilities would slightly increase at facilities in the Sacramento River Region (because of the timing of releases) and slightly decrease at facilities in the San Joaquin River Region.

---

With storage, adverse impacts on recreation opportunities at existing facilities would slightly increase at facilities in the Sacramento River Region (because of the timing of releases) and slightly decrease at facilities in the San Joaquin River Region.

---



In conclusion, changes in operation to meet downstream water demands are not expected to significantly affect water-dependent recreation opportunities at facilities in the Sacramento River and San Joaquin River Regions under Alternative 1.

### *Other SWP and CVP Service Areas*

Under Alternative 1, the Conveyance element would not affect recreation resources in the Other SWP and CVP Service Areas.

## 7.7.8.3 ALTERNATIVE 2

### *Delta Region*

A 10,000-cfs water diversion facility near Hood and accompanying conveyance channel and channel modifications to improve conveyance may result in temporary recreation impacts during construction. Some of these actions could permanently displace such land-based recreation opportunities as camping, hiking, and picnicking; however, some actions could increase aquatic-related recreation opportunities, including fishing, wildlife viewing, and boating. Habitat created as part of conveyance modifications could generate new waterfowl hunting opportunities. Dredging could cause short-term construction impacts such as obstructing or closing channels and creating noise and visual impacts.

Operating fish control barriers in the south Delta could negatively affect boating circulation patterns in that area. Barrier placement for fish and flow control in the Delta could restrict boat travel. Impacts on boating, marina access and use, and fishing are the primary types of recreational effects that would occur as a result of installing temporary or permanent barriers. Depending on location, these adverse impacts could be potentially significant and unavoidable.

Changes in project operations are expected to benefit fish populations and related fishing activities in the Delta. These changes are not anticipated to adversely affect recreational resources. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation resources.

In summary, construction and operation of south Delta conveyance facilities would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction under Alternative 2).

---

Impacts on boating, marina access and use, and fishing are the primary types of recreational effects that would occur as a result of installing temporary or permanent barriers. Depending on location, these adverse impacts could be potentially significant and unavoidable.

---



### *Bay Region*

Under Alternative 2, construction of conveyance features would not affect recreation resources in the Bay Region.

Changes in project operations could benefit fish populations and related fishing activities in the Bay Region. These changes are not anticipated to adversely affect recreational resources at existing facilities. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation resources.

### *Sacramento River and San Joaquin River Regions*

Changes in operations are not anticipated to adversely affect recreational resources in the Sacramento River or San Joaquin River Region. Flows and timing of flows may be changed in the Sacramento River and Feather River as a result of reservoir release changes made in response to operational changes at the water export pumps in the Delta. These changes are not expected to significantly affect recreation resources. Variations in water storage levels at San Luis Reservoir may occur due to changes in the amounts of water exported at the pumping plants, but the variations are not expected to be significant.

With storage, the adverse impacts on recreation opportunities at existing facilities would slightly increase at facilities in the Sacramento River Region (because of the timing of releases) and would slightly decrease at facilities in the San Joaquin River Region.

In conclusion, changes in operation to meet downstream water demands are not expected to significantly affect water-dependent recreation opportunities at facilities in the Sacramento River or San Joaquin River Region under Alternative 2.

### *Other SWP and CVP Service Areas*

Under Alternative 2, the Conveyance element would not affect recreation resources in the Other SWP and CVP Service Areas.

## 7.7.8.4 ALTERNATIVE 3

### *Delta Region*

An isolated conveyance facility could improve spawning, rearing, and survival conditions for fish species and lead to increased fish populations. Larger populations could lead to increases in associated recreational activities like sport fishing. Constructing an open-channel isolated facility likely would result in potentially significant adverse impacts on existing recreation resources. An open-channel isolated conveyance facility could be

An isolated conveyance facility could improve spawning, rearing, and survival conditions for fish species and lead to increased fish populations. Larger populations could lead to increases in associated recreational activities like sport fishing.



constructed at locations that would affect several existing recreation areas, including Stone Lakes NWR, fishing and boating access areas along several sloughs, and several trails and parks in San Joaquin County. Depending on the location of the conveyance facilities, construction could require temporary disruption of existing facilities. Operation may result in closing several existing facilities to allow for construction of the pumps, siphons, access roads, storage buildings, and utilities. Such closure is considered a potentially significant adverse impact that can be mitigated.

Areas where fish and wildlife habitat could be developed by the Ecosystem Restoration Program may differ between Alternative 3 and the other Program alternatives. Associated recreational opportunities and improvements would occur in areas where habitat restoration occurs. For Alternative 3, habitat and corresponding recreation improvements would be limited to establishing a riparian corridor along the North Fork of the Mokelumne River. Shallow-water habitat and corresponding recreation improvements for Alternative 3 would be located in the east Delta along the South Fork of the Mokelumne River.

Conveyance channels and channel modifications to improve in-Delta conveyance may result in temporary recreation impacts during construction. The magnitude of in-Delta conveyance and its impact would be related to the amount of channel improvements required for a dual-Delta water conveyance system. A smaller isolated facility could require more in-Delta conveyance, and a larger isolated facilities less. Conveyance channel and channel modifications could displace such land-based recreation opportunities as camping, hiking, and picnicking; however, some actions could increase aquatic-related recreation opportunities, including fishing, wildlife viewing, and boating. Habitat created as part of conveyance modifications could generate new waterfowl hunting opportunities. Dredging could cause short-term construction impacts such as obstructing or closing channels and creating noise and visual impacts.

Operating fish control barriers in the south Delta could negatively affect boating circulation patterns in that area. Barrier placement for fish and flow control in the Delta could restrict boat travel. Impacts on boating, marina access and use, and fishing are the primary types of recreational effects that would occur as a result of installing temporary or permanent barriers. Depending on location, these adverse impacts could be potentially significant and unavoidable.

Changes in project operations are expected to benefit fish populations and related fishing activities in the Delta. These changes are not anticipated to adversely affect recreational resources. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation.

In summary, construction and operation of an isolated conveyance facility would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction under Alternative 3).

---

Construction and operation of Delta conveyance facilities would benefit certain recreation activities (primarily sport fishing) and potentially adversely affect other activities (primarily boating and activities at facilities near construction).

---



---

Areas where fish and wildlife habitat could be developed by the Ecosystem Restoration Program may differ between Alternative 3 and the other Program alternatives. Associated recreational opportunities and improvements would occur in areas where habitat restoration occurs.

---



### *Bay Region*

Under Alternative 3, construction of conveyance features would not affect recreational resources in the Bay Region.

Changes in project operations could benefit fish populations and related fishing activities in the Bay Region. These changes are not anticipated to adversely affect recreational resources at existing facilities. Flows and timing of flows may be changed within Delta waterways due to changes in pumping patterns at the export pumps, but the changes are not expected to significantly affect recreation.

### *Sacramento River and San Joaquin River Regions*

Under Alternative 3, changes in project operations to meet downstream water demands are expected to adversely affect water dependent recreation opportunities at existing facilities in the Sacramento River Region. These impacts could be mitigated by maintaining higher reservoir levels at facilities that would be most affected. Water availability throughout the system is sufficient if additional storage is added that improves flexibility. Changes in project operations would be beneficial for recreation opportunities at existing facilities in the San Joaquin River Region.

---

Under Alternative 3, changes in project operations to meet downstream water demands are expected to adversely affect water dependent recreation opportunities at existing facilities in the Sacramento River Region.

---

### *Other SWP and CVP Service Areas*

Under Alternative 3, the Conveyance element would not affect recreation resources in the Other SWP and CVP Service Areas.

## **7.7.9 PROGRAM ALTERNATIVES COMPARED TO EXISTING CONDITIONS**

This section presents the comparison of existing conditions to the Preferred Program Alternative and Alternatives 1, 2, and 3. This programmatic analysis found that the potentially beneficial and adverse impacts from implementing any of the Program alternatives when compared to existing conditions are essentially the same impacts as those identified in Sections 7.7.7 and 7.7.8, which compare the Program alternatives to the No Action Alternative.

The analysis indicates that recreation resources would experience an overall beneficial effect when the Program alternatives are compared to existing conditions. As population levels and demand would not increase under the existing conditions scenario, the benefits to recreation resources would be slightly higher under existing conditions than when

---

The analysis indicates that recreation resources would experience an overall beneficial effect when the Program alternatives are compared to existing conditions.

---



compared to the No Action Alternative. At the programmatic level, however, these differences would not be significant.

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 potentially significant impacts associated with the Preferred Program Alternative include:

- Temporary closure of recreation areas during construction.
- Increased speed zone restrictions or prohibition of motorized boating in some areas.
- More stringent regulation of boat discharges.
- **Temporary or permanent changes in boating access and navigation.**
- Permanent closure of some recreation facilities.
- Increases in boat traffic in some areas because of speed and access restrictions.
- Decrease in recreation opportunities because of speed and access restrictions.
- Potential decrease in flooded lands suitable for wildlife, hunting, and fishing as a result of water use efficiency actions.
- Potential for reduced water-contact recreation quality from releases of reservoir cold water.
- Displacement of fish and wildlife from new off-stream or expanded on-stream reservoirs.
- **Potential loss of terrestrial and on-stream recreation from new off-stream or expanded on-stream reservoirs.**
- Potential for reduced access to recreation facilities and decreased recreation opportunities from changes in reservoir levels.

**Bold indicates a potentially significant unavoidable impact.**

## 7.7.10 ADDITIONAL IMPACT ANALYSIS

**Cumulative Impacts.** Cumulative impacts on recreational opportunities (including the quality of recreational experiences), recreation-related spending and associated effects on businesses, and commercial fisheries could be both beneficial and adverse. As population

---

As population and demand for recreation opportunities increase, recreational use and spending are expected to increase while recreational quality are expected to decrease.

---



and demand for recreation opportunities increase, recreational use and spending are expected to increase while recreational quality is expected to decrease. Projects other than the Program (for example, the CVPIA, Montezuma Wetlands, Red Bluff Diversion Dam fish passage program and Hamilton City Pumping Plant fish screen—which improve fish and wildlife resources, create more open space or habitat areas, or improve the availability or quality of water) would result in a cumulative beneficial impact on recreation resources that should increase opportunities for recreation activities and commercial fishing.

Projects such as the Pardee Reservoir Enlargement Project, EBMUD Supplemental Water Supply Project, and CCWD's Multi-Purpose Pipeline Project—which result in the loss of open space or habitat areas, adverse impacts on fish and wildlife populations, reduced flows, or the availability or quality of water—could result in adverse cumulative effects on recreation resources, including recreation economics and commercial fishing.

**Growth-Inducing Impacts.** Growth-inducing impacts could be caused by beneficial impacts on recreational resources associated with the Preferred Program Alternative. These impacts could include economic or population growth, or the construction of new housing caused by the recreational enhancement of areas due to Ecosystem Restoration Program activities or construction of storage reservoirs. The degree of growth-inducing impact would depend on the locations of these activities and other factors dependent on the location. The significance of the growth-inducing impact cannot be determined at the programmatic level. However, because the demand for, and use of, recreational resources is expected to increase in the future as a result of increased population growth, recreational benefits that result from implementation of Program actions would most likely accommodate that demand rather than induce new growth.

Improvements in water supply caused by the Preferred Program Alternative could induce growth, depending on how additional water supply was used by water contractors. If additional water was used to expand agricultural production or population, the proposed action would foster economic and population growth, including possible construction of new housing. Expansion of agricultural production and population could affect recreational resources. The nature of the effects would depend on where economic or population growth occurred and how it was managed.

**Short- and Long-Term Relationships.** The Preferred Program Alternative generally would maintain and enhance long-term productivity of recreation resources but may cause adverse impacts on recreation resources resulting from short-term uses of the environment.

Substantial overall benefits to the long-term productivity of recreation resources would result from Program actions. Benefits resulting from increased fish and wildlife populations, improved water quality, increased open space, and new recreation opportunities at new off-stream or enlarged existing reservoirs generally would outweigh the short-term adverse impacts.

Short-term, construction-related impacts on recreation resources would be localized and cease after construction is completed. Where possible, avoidance and mitigation measures

---

Substantial overall benefits to the long-term productivity of recreation resources would result from Program actions. Benefits resulting from increased fish and wildlife populations, improved water quality, increased open space, and new recreation opportunities at new off-stream or enlarged existing reservoirs generally would outweigh the short-term adverse impacts.



would be implemented as a standard course of action to lessen impacts on these resources. Potentially significant long-term unavoidable impacts on motorized boating in the Delta Region and possible stream inundation through enlargement of existing reservoirs in the Sacramento River and San Joaquin Rivers were identified in this impact analysis.

**Irreversible and Irretrievable Commitments.** The Ecosystem Restoration Program, Levee System Integrity Program, Storage, Conveyance, and other elements of the Preferred Program Alternative can be considered to cause potentially significant irreversible changes in recreational resources. 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 the beneficial impacts of improved recreational opportunities and use due to the increases in fish and wildlife populations and increased recreational access and facilities associated with the development of the Preferred Program Alternative. Long-term adverse irreversible changes include displacement of recreational opportunities and use caused by development of the Preferred Program Alternative, caused by changes in boating access and circulation patterns in the Delta Region, and inundation of flowing streams and rivers by new off-stream or enlarged existing storage reservoirs.

---

The long-term beneficial irreversible changes include the beneficial impacts of improved recreational opportunities and use due to the increases in fish and wildlife populations and increased recreational access and facilities associated with the development of the Preferred Program Alternative.

---

### 7.7.11 MITIGATION STRATEGIES

These mitigation strategies will be considered during 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.

To minimize adverse effects and maximize beneficial effects, the Program will develop a comprehensive recreation planning program concurrent with project-specific implementation planning for Program actions. The planning will identify and prioritize recreation enhancement and mitigation projects to be included in implementation of the Preferred Program Alternative. This recreation program will address existing deficiencies in recreation, particularly in the Delta, as well as provide for appropriate modifications and additions to recreational facilities that may be required to accommodate other Program actions. The timing of such a process would be consistent with the Phase III documentation and implementation schedule, ensuring that recreation resources are appropriately considered as part of the Bay-Delta solution. Recreation enhancement will be included with site-specific development.

---

Recreation enhancement will be included with site-specific development.

---

The following mitigation strategies could be used to minimize adverse impacts on recreation resources:

- As part of the project-specific implementation strategy and planning for all Program actions, considering and incorporating to the extent feasible recreational improvements and enhancements as part of project features.



- Working with recreational interests, including water-skiing groups, boating manufacturers, resort owners, and other boating interests, to protect and enhance recreational boating and other recreational resources in all project areas.
- Conducting an analysis of boating circulation to ensure that appropriate alternative routes are identified and clearly marked if boating circulation in the Delta is to be modified due to temporary, seasonal, or permanent channel closures or to speed restrictions.
- Restoring and designing existing and new levees to accommodate vehicular access and parking for shoreline fishing, boat launching, swimming, hiking, bicycling, and wildlife viewing whenever feasible.
- Maintaining boating access to prime boating areas, including Grant Line, Fabian, Bell, and Victoria Canals, for recreational purposes even if flow control barriers are constructed.
- Offsetting adverse impacts resulting from temporary and permanent barriers on boating, marina access and use, and fishing by providing portage facilities, boat locks, and public information regarding alternate access.
- Reducing adverse impacts associated with temporary and permanent barriers by avoiding construction activities during peak-use times, posting warning signs and buoys in channels, and providing information and education regarding alternate access and access facilities.
- Minimizing construction impacts by avoiding construction activities during peak-use times, posting warning signs and buoys in channels, and providing information and education regarding alternate recreation and access facilities.
- Replacing facilities in kind when existing facilities are temporarily eliminated and relocating or building similar recreational facilities if Program actions require the permanent closure of a recreation facility. Including local interests in the decision-making process for designing and locating these facilities.
- Minimizing water level fluctuation of existing and new reservoirs. Establishing operating criteria that designate minimum pool levels and maintain reservoir levels as high as possible throughout the recreation peak-use season. Coordinating operation of all reservoir facilities, including new facilities, to minimize adverse reservoir fluctuations in any particular facility.
- Acquiring and protecting open space recreation areas through the purchase of trail rights-of-way or recreational easements.



## 7.7.12 POTENTIALLY SIGNIFICANT UNAVOIDABLE IMPACTS

Potentially significant unavoidable impacts on recreation resources could include: (1) loss of terrestrial and on-stream recreation from the enlargement of surface storage facilities; and (2) temporary or permanent changes to motorized boating recreation, from speed limits, channel closures, and the installation of flow and fish control barriers in the Delta.

