

# Water-Dependent Recreation



## A Resource Management Strategy of the California Water Plan

California Department of Water Resources

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## Acronyms and Abbreviations

anoxic	low-oxygen
<i>Arundo donax</i>	giant reed
California State Parks	California Department of Parks and Recreation
CEQA	California Environmental Quality Act
CWC	California Water Code
DBW	California Department of Boating and Waterways
DFW	California Department of Fish and Wildlife
DWR	California Department of Water Resources
FERC	Federal Energy Regulatory Commission
GHG	greenhouse gas
IRWM	integrated regional water management
IRWMP	integrated regional water management plan
kW	kilowatt
PM&E	protection, mitigation, and enhancement
SLC	California State Lands Commission
SMUD	Sacramento Municipal Utility District
SWP	State Water Project

# Water-Dependent Recreation

## A Multitude of Recreation Opportunities

With its temperate climate, more than 1.3 million acres of water surface, 2,600 miles of waterways, and 3,427 miles of coastline, California offers a variety of water-dependent recreation opportunities in any season. Each year, millions of California residents and visitors come to California's inland lakes and rivers seeking recreation experiences. In 2010, beach and waterfront activities helped make California one of the most visited states in the nation. The Sierra Nevada and the Cascade Range also draw residents and visitors to recreate on snowy slopes and meadows, which store summer water supplies naturally.

California residents and visitors can choose from a variety of water-dependent recreation activities managed by federal, State, and local agencies, as well as businesses and not-for-profit organizations. They may enjoy recreation activities in or on water, including fishing, swimming, skiing, and snowboarding, waterfowl hunting, motor boating, surfing, and kayaking. They also may participate in recreation activities that can be enhanced by water, such as wildlife viewing (including birding), picnicking, biking, relaxing on the beach, camping, and hiking. Although the latter activities do not require water, they are frequently enjoyed near waterways, lakes, floodways, and the sea. This resource management strategy report will not address water parks, swimming pools, and water-thirsty lawn-dependent recreational facilities, such as ball fields and golf courses; however, these are examples of popular off-stream recreational facilities that may require significant water resources.

## Californians Value Water-Dependent Recreation Opportunities

The right to access waterways for boating and fishing has been embedded in California's Constitution since the founding of the State. It is an important part of Californians' heritage and culture. A number of surveys validate the importance of water in Californians' outdoor recreation activities. For example, *Draft Findings, Public Opinions and Attitudes on Outdoor Recreation in California 2012*, the 2012 release of a survey conducted by the California Department of Parks and Recreation (California State Parks) every five years to better understand residents' recreation habits, found that 52 percent of California's adults participated in beach activities; 35.4 percent swam in freshwater lakes, rivers, or streams; and 25.6 percent fished in fresh waters. More than percent used a beach or water recreation area during their most recent park visit. Significant numbers also enjoyed water-enhanced nature-based activities, such as wildlife viewing (48.6 percent), hiking on trails (60.2 percent), and camping in developed sites (25.8 percent) (California Department of Parks and Recreation, Planning Division 2012).

The same survey also reveals the importance of recreation facilities at lakes, rivers, and reservoirs: 67.8 percent indicated that recreation facilities, such as picnic or camping sites, are needed at lakes and reservoirs (39.4 percent agree and 28.4 percent strongly agree). Also, 61.8 percent felt that the government should place more emphasis on cleaning up pollution of the ocean, lakes, rivers, and streams in park and recreation areas, and 72.1 percent of the respondents indicated that the availability of recreation facilities at lakes, reservoirs, rivers, and wetlands was important or very important.

Public agencies might consider the following value statements to guide water recreation planning and programming:

- California has a strong outdoor recreation legacy because of its pleasant climate, natural beauty, geographic diversity, diversity of habitats, fish and wildlife resources, and bountiful open space.
- Open space lands set aside for water resource protection, storage, or extraction are often suitable for recreational use. These include protected watershed lands, floodways, and reservoirs.
- Providing recreational opportunities that draw Californians outside increases public health, a significant State and local government responsibility (California Department of Parks and Recreation, Planning Division 2009).
- Generations of Californians have, and will, benefit from laws protecting the public's access to navigable waterways and ocean beaches.
- Providing and clearly identifying safe access to waterways where it is feasible increases public safety and reduces trespass on adjacent lands.
- Maintaining the affordability of recreational opportunities allows more Californians to engage in healthy outdoor activities (California Department of Parks and Recreation, Planning Division 2009).
- Recreation and tourism are economic engines that improve the quality of life, increase property values, and provide jobs for many Californians (California Department of Parks and Recreation, Planning Division 2011a).
- The *California Children's Outdoor Bill of Rights* states that every child should have the opportunity to explore nature, learn to swim, go fishing, go boating, and do six other recreation activities (California Roundtable on Recreation, Parks and Tourism 2012).

## Water Managers' Role in Recreation Planning

By planning for water-dependent recreation activities in water projects, water managers play a critical role in ensuring that all Californians today and into the future are able to enjoy such activities. Demand for outdoor recreation opportunities in many parts of California exceeds the capacity of the current infrastructure (California Department of Parks and Recreation, Planning Division 2009). As a result, facilities are likely to be overused, jeopardizing natural and cultural resources on which they depend and degrading the recreational experience.

Furthermore, as California's population continues to grow, public demand for water-dependent recreation opportunities will only increase. Today's population of 39 million is estimated to reach 49 million by 2030 and almost 59.5 million by 2050 (California Department of Finance 2013). Meeting this growing demand is a significant challenge for water managers.

Water managers must comply with a significant body of law because the right of public access to navigable waterways, lakes, and beaches is protected throughout the United States, a concept originating in ancient Roman law. Major federal provisions are:

- The Commerce Clause of the U.S. Constitution insists that public access be maintained by the States.
- The congressional act admitting the State of California into the union declares that "all the navigable waters within the said state shall be common highways, and forever free ... to the

inhabitants of said state as to the citizens of the United States, without any tax, impost or duty therefor” (Stevens [date unknown]).

- The Clean Water Act outlines the beneficial uses of waterways, including water-based recreation, subject to regulation.
- The Reclamation Recreation Management Act of 1992 authorizes the U.S. Bureau of Reclamation to cost-share up to 50 percent of the cost of operating and maintaining recreation facilities at federal lands and waters under its jurisdiction.
- Section 10a of the Federal Power Act requires the Federal Energy Regulatory Commission (FERC) to consider other beneficial public uses in adopting a new license for hydropower facilities, including recreation.

California law also guards and supports the right of public access to the State’s surface waters. Some of these provisions are described below:

- California Constitution, Article 10, Section 4, states, “No individual, partnership, or corporation, claiming or possessing the frontage or tidal lands of a harbor, bay, inlet, estuary, or other navigable water in this State, shall be permitted to exclude the right of way to such water whenever it is required for any public purpose, nor to destroy or obstruct the free navigation of such water; and the Legislature shall enact such laws as will give the most liberal construction to this provision, so that access to the navigable waters of this State shall be always attainable for the people thereof.”
- California’s Bill of Rights, Article 1, Section 25 states, “The people shall have the right to fish upon and from the public lands of the state and in the waters thereof.”
- California Civil Code, Section 830, describes the public trust easement that occurs between the ordinary high and low water mark of non-tidal waterways.
- The Harbors and Navigation Code, Section 68-68.2, states, “[T]he Legislature hereby finds and declares that there is a statewide and continuing interest in the public’s use of the state’s inland waterways for recreational purposes. The Legislature further finds and declares that there exists a need to provide for recreational resource planning of the waterways in a manner that provides access and utilization for recreational purposes.” Section 100 reiterates, “Navigable waters and all streams of sufficient capacity to transport the products of the country are public ways for the purpose of navigation and of such transport.”
- The public trust doctrine recognizes recreation as a public trust use of water that must be considered when managing tidelands and navigable waters and their tributaries (California State Lands Commission 2001, 2010). California’s Public Resources Code, Section 6301, gives the California State Lands Commission (SLC) jurisdiction over these lands.

Recreational access is protected and encouraged in regional laws throughout California, including those described below:

- The California Coastal Act, managed by the California Coastal Commission, protects public access to the coastline and tidelands.
- The Delta Reform Act of 2009 states that one of the fundamental goals for managing land in the Sacramento-San Joaquin Delta (Delta) is to “[m]aximize public access to Delta resources and maximize public recreational opportunities in the Delta” (California Water Code [CWC] Section 85022[d][3]).



- The Integrated Regional Water Management Planning Act requires integrated regional water management (IRWM) plans (IRWMPs) to consider California Water Plan recommendations (CWC Section 10541[e][1]).

Recreational facilities increase the benefits of public access while reducing potential impacts on natural and cultural resources, public health, and adjacent landowners. Providing recreational facilities as part of water resources management is also part of California law. California's 1961 Davis-Dolwig Act requires State water projects to integrate recreation facilities as well as fish and wildlife enhancement.

- The act outlines responsibility for project costs allocated to recreation, to fish and wildlife enhancement, and for costs of acquiring property for recreation development, for "the Central Valley Project and every other project constructed by the State itself or by the State in cooperation with the United States, including, but not limited to, the State Water Resources Development System." (CWC Section 11905.)
- CWC Section 12842 also requires that "planning and construction of all flood control and watershed protection projects shall include such features as may be determined to be necessary and desirable to preserve and enhance the state's fish and wildlife resources and to achieve the full utilization of such projects for recreational purposes consistent with the construction and operation of such projects to protect life and property."

This resource management strategy offers water managers and recreation professionals examples and ideas for working together to provide many more opportunities for public access and water-dependent recreation to meet the demand of California's residents and visitors now and into the future. The State agencies with the most significant legislative authority and expertise in water-dependent recreation planning are:

- The California Department of Boating and Waterways (DBW).
- The California Department of Parks and Recreation (California State Parks).
- The California State Lands Commission.
- The California Department of Fish and Wildlife (DFW) (formerly known as the California Department of Fish and Game).
- The California Department of Water Resources (DWR).

## Potential Benefits

Residents and visitors flock to California's beaches, reservoirs, lakes, floodways, waterways, and snow-covered mountains for a variety of fun and healthy outdoor activities. Recreation provides myriad benefits — not only to individuals, but also to communities, the environment, and the economy.

## Health and Social Benefits

Swimming, kayaking, snowboarding, and water-skiing are just a few of the vigorous, fun, and healthy activities available at outdoor recreation areas. For example, in the winter of 2009- 2010, California's snowy mountains hosted 7.5 million skier visits (Natural Resources Defense Council and Protect Our Winters 2012). More than 12 million California residents participate in marine recreation annually (Pendleton and Rooke 2006). By offering opportunities for outdoor exercise, government agencies and other entities can help counteract significant negative health trends, such as the increase in childhood obesity (California Department of Parks and Recreation, Planning Division 2009). A collection of research can be found at [http://www.parks.ca.gov/?page\\_id=25026](http://www.parks.ca.gov/?page_id=25026).



Other, less vigorous outdoor recreation activities refresh and relax mind and body, reducing stress and improving health (Gies 2006). Recreationists enjoy river rafting; sunbathing or playing on beaches; telling stories around a waterfront campfire; strolling near rivers, creeks, and marshlands; and photographing wildlife and plants. These opportunities also provide the public a means to adapt to increasing temperatures brought on by climate change. Local recreational areas that have water and shade create a microclimate that reduces the heat island effects of urbanization. Having access to such areas helps residents cope with heat stress.

In addition to providing the chance for exercise and relaxation, recreation in, on, or near water offers a variety of other social benefits to individuals, communities, and the environment. The following examples illustrate some of those benefits.

- A family picnicking at a popular reservoir enjoys socializing with family and friends while sharing the recreation area with other visitors of many ages, races, and creeds. Leisure experiences such as these help improve cultural understanding and strengthen social bonds.
- A young couple observing nature as they walk or bike along a shady path near a river is making a meaningful connection with the natural environment. Such activities encourage an appreciation for water resources and wildlife. In turn, this can lead to an increase in volunteerism and stewardship of natural resources and can help strengthen communities.
- Led by a park interpretive specialist, a boy and his classmates learn about the importance of watersheds and water-related environments and explore ways they can save water at home. Experiences such as these enrich formal education, instill life-long positive values, deter irresponsible behavior, and help meet the State's commitment to wise use of water resources.
- Riverbanks, lakeshores, and beaches, because of their linear nature, offer excellent opportunities to provide non-motorized recreational and commuter trail routes with fewer motorized traffic conflicts. These routes provide a healthy, affordable, and nonpolluting transportation option for schoolchildren and adults, which may reduce short and mid-range auto trips, improve air quality, and reduce travel costs.
- Relaxing in natural hot springs is widely believed to convey therapeutic benefits and is a traditional activity of some California Native American tribes.

Another illustration of how water-dependent recreation opportunities can provide health and social benefits is Sacramento's American River Parkway that parallels about 30 miles of the American River downstream of Folsom Dam. Visitors may participate in a variety of activities; they walk, run, bike, ride horses, picnic, fish, swim, watch wildlife, and paddle along a boating trail. The parkway also provides access to a rowing facility and a fish hatchery where visitors can view salmon and steelhead trout (County of Sacramento 2009), and it is a popular bicycle commuting route.

### **Economic Benefits**

Water-dependent recreation has a major influence on California's economy. In 2008, the estimated direct and indirect economic benefit of recreational boating alone was more than \$19 billion. As one of the most popular recreational pursuits among California travelers, water-dependent recreation helped attract millions of tourists to California in 2010, making it one of the most visited states in the nation. During 2010, travel spending in California directly supported 873,000 jobs with earnings of \$30 billion. Travel spending generated the greatest number of jobs in arts, entertainment, and recreation (226,000), and accommodation and food services (520,000) (California Department of Parks and Recreation, Planning

Division 2011a). A study by DBW reported that non-motorized boating contributed \$1.7 billion to California's economy in 2006 (California Department of Boating and Waterways 2009d). In 2006, 7.4 million residents and nonresidents 16 years and older fished, hunted, or watched wildlife in California — spending a total of \$8 billion (U.S. Department of the Interior, Fish and Wildlife Service 2012). Winter tourism provided almost 24,000 California jobs and added almost \$1.4 billion to California's economy in the winter of 2009/2010 (Natural Resources Defense Council and Protect Our Winters 2012). Estimated 2005 expenditures on marine recreation fishing were \$205-\$545 million (Pendleton and Rooke 2006). Surfers contributed an estimated \$5.7 million to Orange County's economy in 2009 and \$20 million statewide (Surf-First and the Surfrider Foundation 2011).

Commercial businesses offering recreation equipment, programs, and services boost local economies and create jobs. For example, visitors to Sacramento County's American River Parkway frequently combine a trip to the parkway with eating and shopping at local businesses. Such activities generate about \$260 million annually for the local economy (Gies 2006).

Water-dependent recreation adds economic value to lands that might otherwise have limited economic use, such as those subject to frequent flooding or set aside for watershed protection. This increases the benefits of protected open spaces and viewsheds, prompts long-term investments in more livable communities, and increases adjacent property values. Communities with significant tourism resources, such as San Diego's beaches, can generate revenue from tourism taxes such as hotel occupancy fees. Communities with significant recreation resources, such as many in Marin County, enjoy generous tax revenues from higher property values. Some park districts, such as East Bay Regional Park District, gain public support for parcel taxes that fund open space preservation and recreational development (East Bay Regional Park District 2012). Watersheds that do not contribute significantly to California's water supply, such as the Truckee River, generate much of their economic value from water-dependent recreation.

Water-dependent recreation also generates significant revenue for federal and State recreation and environmental management programs through taxes, fees, permits, and licenses:

- In 2010, 808,649 boats were registered in California generating nearly \$2 billion for the state (California Department of Boating and Waterways 2011)
- Sales of sport fishing and hunting licenses and stamps generated more than \$81 million in revenue for the California Department of Fish and Game (now named the California Department of Fish and Wildlife) in 2011. Fishing-related expenditures are included in Table 1 (California Department of Fish and Game 2012a).
- The Federal Aid in Wildlife Restoration Act (also known as the Pittman-Robertson Act) and the Federal Aid in Sport Fish Restoration Act (also known as the Dingell-Johnson Act) fund wildlife habitat restoration, enhancement, and management through excise taxes paid by hunters, boaters, and anglers (U.S. Department of the Interior, Fish and Wildlife Service 2012).
- The Outdoor Industry Association (2012) reports that, nationwide, outdoor recreation generates almost \$40 billion in federal tax revenue and \$40 billion in state/local tax revenue annually.

**Table 1 Fishing-, Hunting-, and Wildlife-Associated Recreation Statistics in California, 2011<sup>a</sup>**

Description of Activities/Expenditures	Amount
Californians who fished or hunted	1.9 million or 7 percent of residents
Californians who participated in wildlife-watching activities	6.5 million or 23 percent of residents
California days of fishing	23.7 million
California days of hunting	6.7 million
Total fishing expenditures	\$2.27 billion
Total hunting expenditures	\$0.97 billion
Total wildlife-watching expenditures	\$3.78 billion

Source: U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau 2011.

Notes:

<sup>a</sup>Residents and nonresidents 16 years and older.

### Value-Added Benefits from Flood Management Projects

Flood protection facilities provide opportunities for integrating suitable recreation facilities, such as trails, picnic sites, wildlife viewing areas, and watercraft launching sites that provide many benefits.

Establishing greenways as part of flood management projects and replacing concrete channels with more natural creek environments can improve residents' quality of life as well as support property values and businesses in urban areas. For example:

- The Tujunga Wash Greenway and Stream Restoration Project is a good example of a value-added project in the San Fernando Valley. The project will provide open space for recreation, improved water quality, and groundwater recharge by diverting water from the concrete channel into a naturalized streambed.
- The Napa River Flood Protection Project includes a user-friendly environment with greenways, walking paths, trails, and open space.
- Lake Elizabeth in Fremont is a critical component of the local flood management program and includes a natural setting with many recreation attributes designed around an urban area.
- The Three Rivers Levee Improvement Authority recently decided to allow public access to some Feather River properties. The organization expects this will reduce vandalism, improve security, and increase the quality of life and property values of nearby communities.

Funding for recreation development can sometimes be generated by including flood management projects in urban development or redevelopment projects. Modern urban design that includes both recreational and natural flood management components increases the desirability and property values of these neighborhoods.

### **Value-Added Benefits from Climate Change Projects**

Water-dependent recreation complements adaptation and mitigation strategies to address climate change, while making communities more resilient to it. As indicated in the “Climate Change” section later in this resource management strategy report, this type of recreation can provide many added benefits, such as mitigating emissions of greenhouse gases (GHGs) and decreasing pollutants in waterways. Protected watershed lands, greenways along waterways, floodways and flood bypasses, marshes, and seashores can provide room to implement both climate change adaptation and mitigation strategies. Incorporating recreation improves the economic sustainability and social benefits of these land uses.

These strategies can include planting vegetation to sequester carbon while creating an inviting recreation area. In some cases, however, the mitigating benefits of water-dependent recreation could be offset — for example, by the use of motorized watercrafts and the vehicles required to tow them to the recreation point. Increasing paddling opportunities encourages less fuel-intensive recreation, and providing boat storage at recreation sites reduces fuel-intensive transportation. Providing commuter bikeways and neighborhood trails along natural or constructed waterways can reduce vehicle miles traveled and GHG generation, especially for short trips. When Californians can safely and comfortably traverse their neighborhoods on foot or on bike, fewer and smaller motor vehicles are necessary, which allows more compact communities with smaller garages, narrower streets, less energy use, and less transportation fuel infrastructure. For example:

- An escalation of gasoline prices created a measurable spike in bicycle commuters using the American River Parkway as a travel alternative. The parkway’s trails connect to paddle and sailboat rental facilities at Willow Creek and Lake Natoma, allowing local recreationists to walk or ride bicycles to enjoy boating at these lakes (Groth et al. 2008).
- Climate adaptation strategies include the provision of buffer lands to accommodate increased storm runoff and rising seas. Greenways and beaches subject to periodic flooding are suitable for recreation, so they can generate revenue and improve the livability of communities. Greenways can be designed to connect habitats, giving native species adaptation corridors, and are often suitable for stormwater infiltration, which increases local water self-sufficiency.

### **Potential Costs**

Significant investments in water-side recreation facilities are made by individuals, businesses, and not-for-profit associations, such as private docks, marinas, boat-in restaurants, marine services, and duck clubs. Public investments are also necessary to provide safe public access and affordable recreational opportunities for all Californians. The State invests significant funds to manage multiuse public lands and waters on which recreationists depend. Accommodating population growth and climate change will require increasing levels of investment to maintain safe access to snow-covered mountains, waterways, lakes, and the ocean.

## Facility Development Costs

- Information on the statewide costs of providing and operating public water-dependent recreation opportunities is not readily available; however, below are some examples of facility development costs. The required Federal Energy Regulatory Commission (FERC) relicensing protection, mitigation, and enhancement (PM&E) measures cost an average of \$25 per kilowatt (kW) capacity of a hydroelectric project for wildlife, \$95 per kW for fisheries, and \$22 per kW for recreation. This allocation is somewhat useful to describe the scale of anticipated costs. PM&E measures benefiting wetlands, aesthetics, cultural resources, and water quality cost about \$24 per kW. Recreation facilities include boat ramps, canoe portages, hiking trails, and fishing access areas, as well as operational changes to augment downstream flows to protect and enhance fisheries and create recreational opportunities, such as whitewater boating, and hydropower education programs. These funds may also be used to operate and maintain facilities, so there is not a direct parallel between the funding available and facility development costs (Federal Energy Regulatory Commission 2001).
- Between 2007 and 2012, DBW funded \$24 million in 43 boating facility projects, ranging in cost from \$85,000 to \$3.25 million, on State lands. During this period, DBW also provided local assistance funding of \$57 million in grants and about \$65 million in loans for the rehabilitation and construction of local boating facilities, including marinas and boat launching facilities. Typically, improvements included adding launching ramps, parking lots, boarding floats, restrooms/floating restrooms, lighting, berthing, moorings, boat-in day-use, and camping/RV sites (California Department of Boating and Waterways 2012a).
- The Tujunga Wash Greenway and Stream Restoration stream channel diversion project mentioned above cost \$7 million to complete and provided multiple benefits (Santa Monica Mountains Conservancy 2013a).
- The *Sacramento-San Joaquin Delta Boating Needs Assessment 2000-2020* estimated that repairing or replacing the existing public and private facilities in all six Delta zones would cost between \$107 million and \$159 million, spread over 20 years (California Department of Boating and Waterways 2003).
- The *2002 California Boating Facilities Needs Assessment* surveyed 646 of California's boating facilities, which included marinas, launch ramps, dry storage facilities, resorts, recreational areas, and yacht clubs.
- Estimated costs to prepare and process applications, and implement environmental permitting measures, including Clean Water Act Section 401 and Section 404 permits and Section 106 compliance, is unavailable at this time, but is reported to be significant.

## Operation and Maintenance Costs

Operation and maintenance costs vary with each facility and its individual characteristics. Operational costs include public safety and maintenance staff salaries, electrical and water utility costs, and vehicles and equipment. Facility replacement and repair needs can include docks/slips, dry boat storage, launch ramp lanes, parking lots, pump stations, restrooms, and transient docks. Maintenance of infrastructure to service facilities, such as utilities, roads, channels, and trails, is also necessary. Maintenance costs, especially in remote areas, are not easily estimated, and no statewide analysis has been prepared. Even the statewide *California Boating Facilities Needs Assessment* survey found that 25 percent of the respondents could not provide cost estimates. As these facilities get upgraded, one must also factor in the cost of adapting to the impacts of climate change so that these facilities can be resilient to environmental

changes, such as rises in sea level. Examples of operations and maintenance costs include those described below.

- In 2008, California State Parks spent \$162,000 on housekeeping and operating costs for the Lake Oroville State Recreation Area's 84 boat-in campsites and \$137,000 maintaining its 74 miles of non-motorized trails.
- Between 2007 and 2012, DBW provided about \$80 million for local boating law enforcement, including personnel, boats, equipment, and training; and grants for abandoned vessel removal and vessel surrender. DBW provided \$40 million in boating education and safety programs statewide, including to schools and the general public (including school curricula and life-jacket programs); aquatic center grants for classroom and on-the-water safety education to universities, colleges, and local entities; boating safety education multimedia campaign; and boating clean and green education. DBW treated tens of thousands of acres in the Delta at a cost of \$30 million to control the growth of the aquatic invasive weeds *Egeria densa* and water hyacinth (California Department of Boating and Waterways 2012a).
- The *Sacramento-San Joaquin Delta Boating Needs Assessment 2000-2020* estimated it would cost \$27 per square foot to make extensive repairs to an existing marina (California Department of Boating and Waterways 2003).
- The *California Boating Facilities Needs Assessment* noted that estimates for dredging costs varied widely, depending on factors such as tidal flows, location, and dredge disposal options. Estimated costs per cubic yard ranged from \$10 to more than \$50, and costs of \$1,000,000 or more per facility were not uncommon (California State University, Sacramento Foundation 2002).
- DBW provided \$26 million for local assistance funding for beach erosion control and protection infrastructure projects (California Department of Boating and Waterways 2012a).

Research to identify California's recreational trends is necessary to understand the demand and efficiently make facility investments that meet the state's recreation needs. A recent California State Parks survey of State park visitors cost more than \$500,000.

## Major Implementation Issues

### Lack of Access

Californian's navigable waterways are a public trust resource, and access along those waterways is a long-standing right. In many areas, however, it is difficult to find access points. Non-motorized boats, in particular, need safe launching and takeout areas in locations that allow them to avoid in-stream water infrastructure and hazardous areas. Without clear signage, bank anglers may find it difficult to determine whether they are traversing or standing on private or public land, leaving them subject to charges of trespass. Even public lands along waterways, such as road rights-of-way and floodways, often do not provide clearly identified access.

Changes in demographics, population, and types of use may stress the capacity of water-dependent recreation resources. Population growth, if accompanied by static recreation opportunities, may cause overcrowding at existing recreation areas. The Central Valley, for example, has experienced a dramatic population boom but remains an area with insufficient access to recreation opportunities. Changes in

recreation preferences resulting from demographic shifts in California's cultural makeup could also cause capacity issues if the types of recreation resources that serve the preferences of growing ethnic groups are not available, especially in disadvantaged communities. The Outdoor Foundation's *2011 Outdoor Recreation Participation Report* found that almost 10 percent of Americans would participate in paddle sports more often if there were nearby facilities.

Economic changes can have a major impact on visitor demand and availability of recreation facilities. In a depressed economy, people have less money to spend on activities and vacations. They tend to recreate closer to home, creating increased demand on public facilities near population centers. If recreation providers are also operating with reduced budgets, they may need to increase fees to an extent that activity costs become an access barrier for low-income residents at the same time that demand is increasing.

A lack of recreation facilities and safety programs in urban areas limits youths' access to the activities shown in Table 2. While today's youths express an interest in many types of recreation, they may not know how to safely enjoy these activities. A 2007 study found that inexperience was the most common cause (67 percent of the time) of personal watercraft accidents involving youth operators. Excessive speed was a factor in 57 percent of the accidents, followed by inattention (53 percent) (California Department of Boating and Waterways 2008).

Lack of access to State Water Project (SWP) reservoirs can reduce boating recreation. Security concerns after the September 11, 2001, terrorist attacks, and concerns about water quality impacts have reduced recreational access to some facilities. As aging SWP recreation facilities degrade, communities in the Central Valley, Los Angeles Basin, and Inland Empire regions lose these opportunities and the benefits they provide. The U.S. Coast Guard's *Recreational Boating Statistics 2011* shows that boating registration (one measure of demand) increased by 50 percent nationwide between 1988 and 2000, and California's population and boating participation days were increasing strongly (California Department of Parks and Recreation, Planning Division 2009b), but attendance at the SWP reservoirs dropped by 30 percent (California Department of Water Resources 2012).

The following examples illustrate various successful enhancements related to water recreation.

- Bringing nature back into neighborhoods and creating parkland and recreational opportunities in densely populated urban areas increases access. A section of the drainage pipe was removed from under Marsh Street Park adjacent to the Los Angeles River. The ground was then lowered to filter urban runoff before it reached the Los Angeles River. This "daylighting" of an underground stream and converting the water channel to a more natural environment has increased the recreation opportunities in this underserved area (Santa Monica Mountains Conservancy 2013b).
- Coordination between recreation and water management professionals and with urban land-use management strategies can expand the availability of water-dependent recreation resources. The secretary of the interior highlighted both the San Joaquin River Restoration Program and the Los Angeles and San Gabriel River trail improvements as "among the highest investments in the nation to support a healthy, active population ... and create travel, tourism and outdoor-recreation jobs" in October 2011 (U.S. Department of the Interior 2012).



**Table 2 California Youth's Top Rated Activities That They Would Like to Do More Often**

<b>Activity</b>	<b>Percent</b>
Horseback riding	50.2
Camping (tent, recreational vehicle, trailer)	47.1
Backpacking (overnight hiking)	46.3
Mountain biking (unpaved dirt surfaces on trails or roads)	46.3
Archery	44.9
Beach activities, surf play (including sunbathing, wading, playing on beach)	43.9
Rock climbing	43.9
Day hiking on unpaved trails	42.9
Jet skis or wave runners	42.9
Paddle sports (kayaking, canoeing, rowing)	42.9
Sledding, ice skating, snow play	42.7
Snowboarding	42.7
Picnicking	41.0
Exploring tide pools	40.5
In-line skating or rollerblading	40.5
Swimming in a pool	40.5
Target shooting	40.2
Downhill skiing (snow skiing with a lift)	39.8
Visiting historical or cultural sites, museums, zoos, gardens	39.5

Activity	Percent
Waterskiing or wakeboarding	39.5
Operating motor vehicles on dirt roads or trails	39.3
Surfing or boogie boarding	39.0
Swimming in ocean, lakes, rivers, and streams	39.0
Going on a scenic ride	38.3
Martial arts/tai chi/yoga	38.0
Snowmobiling	37.6
Hunting	37.3
Cross-country skiing	37.1
Fishing	37.1
Tennis	37.1
Attending outdoor events (festivals, fairs, concerts, historical reenactments, outdoor theatre)	36.3

- Expanding recreation safety education in urban schools increases safe access. DWB's Boating Safety Education Program educates thousands of school age children through its AquaSMART outreach program, distributing millions of copies of boating safety literature (California Department of Boating and Waterways 2009a, 2009b).
- "Nature-deficit disorder," explained in Richard Louv's book, *The Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder* (2005), can be addressed by creating opportunities for recreation activities listed in the California *Children's Outdoor Bill of Rights* (California Roundtable on Recreation, Parks and Tourism 2012). The water-dependent activities that every child should experience by their 14th year include learning to swim, going fishing, and going boating.
- Day use and camping fees at many State parks in California have increased substantially (California Department of Parks and Recreation 2012a). The department is proposing to begin collecting parking fees at many locations that were previously free (California Department of Parks and Recreation 2012b).
- The basic resident sport-fishing license fee issued by DFW has increased to \$45.93 annually (California Department of Fish and Game 2012b).

### **Climate Change**

Climate change provides both opportunities, as discussed earlier in this resource management strategy report, and challenges for California's recreation lands and programs. Not only does it affect recreational activities that are water-dependent, including boating, fishing, swimming, shoreline hiking, and winter sports (e.g., skiing and ice skating), but it also is altering the management of and demand for these recreation resources. As California's climate continues to change, existing recreational facilities situated along California's rivers, reservoirs, and beaches may be affected first. Sea level rise; changes in precipitation, temperature, and water levels; and reservoir management all affect water-side recreational opportunities and attendance. As temperatures increase, more people seek water-dependent recreation for cooling, which in turn creates more crowded conditions, less available parking, more stress on water quality, and increased trash. During the winter season, snowpack in the Cascades and Sierra Nevada is projected to decrease between 40 percent and 70 percent by 2050, reducing available areas for winter recreational activities (Natural Resources Defense Council and Protect Our Winters 2012). Higher fuel prices and other potential strategies for reducing GHGs are changing recreation preferences and the affordability of traveling to remote recreation areas. These changes increase recreational demand close to population centers and reduce recreation in wilderness areas and at remote reservoirs. However, it is unclear how these changes might intersect with current unmet demand and an increasing population.

Increased variability in annual precipitation volumes and patterns affects recreation. Furthermore, less overall rain leads to lower lake and stream levels and, combined with higher temperatures, can affect aquatic, riparian, and shoreline ecosystems. Such changes could result in decreased populations of edible fish and more pollutant accumulation in fish tissues and, thus, could affect recreational anglers, as well as subsistence fishers. Less water also adds stress to riparian habitats, which provide shade for streams as well as recreationists. On the other hand, more intense rain events localize pollutants, such as sediments, into recreational lakes and streams, increase the instability of recreation sites due to infrastructure failure (e.g., sloughing of banks and erosion of trails), and affect public safety. Changes in water levels also can affect the navigability of waterways. Rising sea levels, more intense wave actions, and changes in beach replenishment patterns squeeze coastal recreation that is bounded by development and transportation systems and damage the coast and its beaches, creating a higher need for coastal protection. Armoring coastlines and bays pose a particular threat to recreational access and beach sustainability.

### **Adaptation**

Adaptation is a key element in preparing for the effects of climate change. As these changes to the environment continue to occur and affect water-dependent recreation (shown in Table 3), recreation demands shift to accommodate new climatic conditions, and more strain is put on the other management strategies, such as ecosystem restoration and water treatment. All of the above will increase costs for maintenance, restoration, and development and will affect the quality and availability of the recreation experience.

Developing adaptation strategies to prepare for these impacts will require significant planning and collaboration with multiple agencies. Research is essential for understanding the impacts of both population growth and climate change and is an important step toward efficiently addressing California's water-dependent recreation demand.

**Table 3 Potential Climate Change Impacts**

<b>Impact</b>	<b>Effect on Water-Dependent Recreation Facilities and</b>	<b>Effect on Recreationists</b>
Increased sea levels and storm surges	Flooding of coastal beaches and estuaries. Erosion and damage to coastal beaches, reefs, wetlands, archaeological, and cultural sites. Sewage treatment facilities, beach restrooms, coastal roadways, lodging, homes, and marinas inundated, armored, or moved. Visual resources degraded. Armored beachfront communities may lose connectivity to the sea and associated economic benefits.	Seasonal or permanent loss of coastal trail, camping, and beach recreation. Historic facilities and sites unavailable. Impaired visual resources. Increased water quality impacts and beach closures from loss of coastal restrooms and sewage treatment facilities. Surfing opportunities degraded, relocated, or lost.
Irregular seasonal precipitation	Less water available for natural groundwater and surface water systems. More polluted water bodies.	Less opportunity to swim, boat, fish, or enjoy other water-dependent recreation. Navigation increasingly difficult.
Higher temperatures	Warmer rivers and streams will impair the coldwater food web from headwaters to the ocean. Less healthy riparian and wetland habitat.	Fewer coldwater fish (such as salmon and trout) available for anglers. Fewer predators, such as orcas and eagles, to view.
Worse ozone air pollution	More air pollution at public lands. Environmental damage to sensitive native habitats.	Increased public health impacts of outdoor recreation. Less recreation opportunity for sensitive receptors, such as children and those with respiratory difficulties. Fewer wildlife-associated recreation opportunities.
Increased seasonal flooding	Natural resources and amenities more likely to be flooded seasonally. Damage to sites and facilities. Increased construction of flood control facilities, such as levees.	Less opportunity to enjoy outdoor activities such as picnicking, camping, or trails. Visual impacts in flood-prone areas.
Increased fire danger	Possible closures of recreation areas. Risk of destruction of sites and facilities. More brush clearing around facilities and communities.	Loss of opportunity to enjoy recreation areas. Potential health threats from smoke and particulates. Visual and natural habitat impacts.

Impact	Effect on Water-Dependent Recreation Facilities and	Effect on Recreationists
Less snow in winter	Reduced natural snow and shorter season at lower elevations. More manufactured snow necessary at winter recreation areas. Existing facilities and tourism-driven communities may become economically unsustainable and must relocate or diversify.	Less opportunity to ski, snowboard, play in the snow, or enjoy other winter recreation. Increased costs. Must drive farther from population centers to winter recreation areas.
Decreased river flows/ more diversions	Decreased water quantity and quality in rivers and streams. Less sediment deposition on wetlands and beaches.	Less opportunity to boat, swim, fish or enjoy other river recreation. Loss of wetlands and beaches. Fewer wildlife-associated recreation opportunities. More costly beach replenishment activities.
Increased fuel costs	Visitation shifts to areas closer to population centers. More crowding and associated environmental impacts of exceeding carrying capacity. Shift to less-fuel-intensive recreation.	Reduced recreation choices and affordability, especially for the economically disadvantaged.

Existing and new water-dependent recreation facilities should be designed to be resilient to these environmental changes.

Increasing access to existing water-dependent recreation opportunities, such as providing more local swimming opportunities and increasing shading around existing recreation sites, would help residents adapt to a warmer climate while minimizing issues of overcrowding. Planners should take advantage of providing education and outreach at existing facilities, to inform members of the public about what they can do to adapt to and mitigate for climate change and to involve them. Education and outreach programs should stress a multi-benefit approach.

Developing urban greenways and open space to manage floods better, increase local water supply, improve water quality, and increase local recreation opportunities would provide more options for a growing population to recreate closer to home. Nevertheless, with changes in climate, there will be stress on water systems. Water-dependent recreation must be balanced with competing uses so that communities can continue to provide clean drinking water to a growing population, suitable water for agricultural production and other industrial uses, and water for the diverse water-related ecosystems in California.

Examples of how the balancing of competing water uses might be addressed include these proposed actions:

- California State Parks is preparing climate adaptation strategies to guide development in beachfront parks subject to sea level rise. For instance, sewage treatment systems are often near waterways and beaches at the lowest elevation of parks and are subject to damage from sea level rise, increased storm surge, and increased flooding. Restrooms protect water quality and

public health, so a lack of sewage treatment can require closing down campgrounds and picnic areas, too.

- As coastal recreation areas become damaged and submerged as a result of rising sea levels, recreationists may select inland destinations more frequently, creating an increased demand for inland water facilities. As average reservoir levels drop, there may be a need to emphasize river recreation, such as by implementing California State Parks' "Central Valley vision for increased river access and water trails for rafters and boaters (California Department of Parks and Recreation, Planning Division 2009a).

## Mitigation

Mitigation is accomplished by reducing or offsetting GHG emissions in an effort to lessen contributions to climate change. Providing local opportunities for water-dependent recreation encourages residents to use forms of transportation that are less carbon-intensive, such as running or biking. Creating more open space for water-dependent recreation in urban areas can reduce the amount of stormwater runoff, increase groundwater recharge rates and stormwater filtration opportunities, filter roadway pollution, and increase carbon sequestration, thereby reducing the energy needed to accomplish these tasks through more active measures. Mitigation strategies also should include methods to limit the impacts of visitors; to reduce GHG emissions during park development and operation; to encourage less-carbon-intensive recreational pursuits; and to incorporate existing federal, State, and local climate change strategies into water-dependent recreation areas.

## Lack of Funding

Despite significant and long-standing State and federal policies supporting public access and water-dependent recreation, funding has been inadequate to meet the demand for nearby safe and affordable opportunities for all citizens. Financing influences the ability to address most outdoor recreation issues, including water-dependent recreation. Funding issues fall into four categories: (1) research and planning, (2) acquisition and development of new recreational sites, (3) operation and maintenance, and (4) the "beneficiaries pay" principle.

1. Research is critical to discerning recreation trends and needs. Recreation providers often rely on special interest research funded by manufacturers of recreation equipment or advocacy groups. California State Parks conducts impartial statewide recreation trends research every five years, which provides valuable guidance on most efficiently serving the public's needs, but public funding is scarce. Applying research findings requires planning, but funding for this step is also difficult to secure, even as California's growing population puts additional pressures on existing recreation resources.
2. When dam, reservoir, levee, or canal projects are being planned or upgraded, funding to include land acquisition and recreational facility development such as boat ramps, fishing access points, and picnic areas may not be included. One reason is that recreation beneficiaries may be different from the water project beneficiaries, which means complex funding mechanisms are required. This is a significant issue at the SWP. The Davis-Dolwig Act specifies that water contractors shall not bear the cost of recreational enhancements, but the California Environmental Quality Act (CEQA) requires project proponents to avoid or bear the cost of mitigation of significant environmental impacts (including the cost of recreational mitigation). The State has struggled to develop funding sources to meet the recreation mandates in the California Water Code.

3. Publicly owned recreation facilities strive to keep fees affordable to all segments of the population, so they often cost more to operate than they generate in entrance, rental, service, and sales revenues. This operational deficit must be funded with public dollars. Because of public funding reductions, and the difficulty of fairly assessing all beneficiaries, many water-dependent recreation facilities are aging and suffer from a lack of maintenance. As facilities age and are removed from service, recreation opportunities are reduced. Less attendance translates into reduced revenues, further reducing opportunities. Without an infusion of capital, these recreation opportunities and the benefits they bring to the State are lost. Without reliable funding, it is difficult for recreation providers to deliver quality, consistent, and relevant facilities and services to meet increasing demand. Many parks and recreation providers, faced with leaner budgets, have reduced programs and operating costs, raised fees, reduced or eliminated services, and delayed equipment purchases — as well as deferred land acquisition, facility developments, and rehabilitation and renovation of aging infrastructure. Inconsistent funding also reduces the willingness of many service providers to offer new programs even as the population increases and becomes more diverse.
4. Applying the “beneficiaries pay” principle of water management to recreation raises many questions worthy of debate. Does it conflict with public access laws (see the section “Water Managers’ Role in Recreation Planning,” above)? How should public land managers comply with these laws while generating the revenue they need to build, operate, and maintain facilities? Who are the beneficiaries of efforts to protect natural and cultural resources? How can recreational management costs be apportioned fairly among all beneficiaries of California’s reservoirs, rivers, coastline, snowy mountains, and forests?

Examples of how to balance revenue generation with protection of natural and cultural resources and fair apportionment of recreational management costs include the following actions:

- The federal Land and Water Conservation Fund provides 50 percent of the funding for impartial research, such as the California Outdoor Recreation Plan prepared by California State Parks. Matching funds are becoming more difficult to secure.
- Operational deficits (the difference between revenues and expenses) at SWP recreational units operated by California State Parks are as high as \$2.6 million annually. State funding for public safety at water-dependent recreation areas along the SWP can ease the burden on local communities.
- Eighty percent of California’s hydropower dams are regulated through long-term licenses issued by the Federal Energy Regulatory Commission (FERC). One half of those facilities (150 dams), many with degraded recreational facilities, are scheduled to be relicensed in the next 15 years. Many recently issued FERC licenses contain enhanced terms and conditions to protect or improve recreation, fisheries, wildlife, water quality, wetlands, and cultural resources. For instance, when the Sacramento Municipal Utility District (SMUD) filed a FERC license application for its Upper American River Project, SMUD proposed to spend approximately \$12.5 million over the life of the license, including a new recreation plan to enhance recreation throughout the project boundary by reconstructing facilities. The application included implementation of a maintenance plan for service roads in forests, which would coordinate access to recreational opportunities. SMUD also proposed to incorporate releases of additional water from Ice House Dam, during the three weekends after Labor Day during “wet” and “above normal” water years, for whitewater recreation (Sacramento Municipal Utility District 2005, 2008).



- Local taxes may be more acceptable to voters when tied to specific projects that benefit them. East Bay Regional Parks District is funded, in part, by a homeowner's tax of \$10 annually per \$100,000 of assessed valuation. This tax funds popular water-based recreation improvements at Big Break Regional Shoreline, along the San Francisco Bay Trail, in the Delta, and in many other areas of Contra Costa County. The list of planned projects and benefits was included in the campaign literature for this measure, which was approved by voters in 2008 (East Bay Regional Park District 2012).

### **Natural Resources Degradation**

Natural resource values often define the character and aesthetic appeal of water-dependent recreation, making it desirable and interesting to visitors. For instance, whitewater rafting occurs where rivers and streams descend rapidly through the landscape. Bicycling and hiking is popular along vegetated rivers and streams, and surfing and swimming require good water quality. Fishing often depends on the seasonal availability of game fish, water quality and quantity, riverine habitat qualities, and access. Hunting and viewing of migratory waterfowl require the timely flooding of seasonal and permanent wetlands with sufficient water to provide food resources, protective cover, and brooding areas. California is home to two World Surfing Reserves locations, which acknowledge the "worth of a wave and its environs" (World Surfing Reserves 2011). Degradation of these natural resources can affect the recreation experience and reduce usage.

Recreation is often a concurrent use, not a sole use, of many open space lands, so a wide range of natural resource management actions can affect recreational experiences. Pollution or diversion of surface waters can limit visitor use and enjoyment of waterways and lakes. Dams and other flood management measures can affect recreation through reducing the fishery, making navigation more difficult, changing bank characteristics, and reducing native habitat. Water infrastructure and bank protection measures can decrease the sediment supply to the coast, narrowing beaches and diminishing coastal access and recreation opportunities. More frequent and prolonged drought events can further degrade the natural resources and provide an opportunity for invasive species to take over natural areas.

Without adequate recreation resource management, outdoor recreation visitors can also threaten ecosystem functions; disrupt and displace wildlife; or degrade the natural, environmental, and aesthetic quality of an area. Visitors unfamiliar with ecological processes or environmental ethics are often unaware of the consequences of their actions. California's increasing population puts additional stress on parklands and their natural resources.

### **Invasive Species Impacts**

The expansion of invasive species, particularly from the San Francisco estuary and the Colorado River, could have far-reaching effects on California's ability to provide adequate water to its constituents.

Recreational uses of waterways, including along the SWP, have been negatively affected in the Delta region by invasive plant species. Invasive aquatic plants such as *Egeria densa* and water hyacinth limit recreational and commercial vessel navigation and passage, restrict water flows, clog water intakes, and entrap sediments. These nonnative plants potentially decrease productivity of Delta fisheries by hindering and impeding anadromous and pelagic fish migration, competing with native vegetation, causing anoxic (low-oxygen) conditions and threatening water quality. These invasive plants also increase agricultural

pumping maintenance requirements and other associated costs. The expansion rate of these invasive species in the Delta is approximately 10 percent per year. Invasive plants also are opportunistic and are able to occupy areas stressed by drought, fire, and other conditions caused by changes in climate. Once established, these plants not only out-compete native vegetation, but also tend to utilize more water than natives and can create greater fire and flooding hazards in riparian areas (California Department of Boating and Waterways 2012a).

The quagga mussel is a close relative of the zebra mussel, and both have similar environmental and economic impacts. Quagga mussels were first found in the Colorado River system in January 2007 and later were found in San Diego and Riverside counties. Zebra mussels were found in a San Benito County reservoir in January 2008. Recreation users can inadvertently spread these invasive species to other water bodies, adversely affecting natural resources, native species, and maintenance costs. They can be easily transported by a boat or its trailer. Boat engines and other parts of the craft also can carry mussel larvae — called veligers — which can spread into waterways and lakes. The spread of the mussels threatens water delivery systems, hydroelectric facilities, agriculture, recreational boating and facilities, fishing, and the environment in general, in some of the following ways (California Department of Boating and Waterways 2012b):

- Reducing fish populations.
- Limiting or eliminating recreational opportunities to boaters.
- Damaging boat engines by blocking the cooling system.
- Jamming boat steering equipment.
- Increasing drag at the bottom of a boat, wasting fuel and reducing speed.
- Requiring scraping and repainting of boat bottoms.
- Colonizing boat ramp and boat docks.

Invasive species control is increasing park operational costs. Recreational boaters and facility managers bear some of the cost of protecting water supplies, even though they were not responsible for the initial invasions.

Examples of attempts at invasive species control and associated costs include the following actions:

- The Santa Ana and Santa Clara rivers have been invaded by the giant reed (*Arundo donax*). Many resources and much money have been spent in trying to eradicate this species from recreational waterways (California Department of Boating and Waterways 2012a).
- The East Bay Municipal Utility District's reservoirs have restricted access, requiring all incoming boats to be inspected. Boats coming from outside California or Southern California counties are being turned away (East Bay Municipal Utility District 2012).
- A multiagency taskforce that includes DFW, DWR, DBW, the California Department of Food and Agriculture, California State Parks, and multiple federal partners have developed a boater education program aimed at preventing the spread of quagga and zebra mussels. The campaign asks boaters to clean, drain, and dry their boats before moving from one water body to another (California Department of Boating and Waterways 2009c).

## Water Quality Impacts

Water quality can both affect and be affected by water-dependent recreation. California has a variety of water-dependent recreation opportunities, with differing levels of public contact. In some cases the public contact is a consequence of impaired water quality, and in other cases it is because of the potential impact

of recreational activities on domestic water supplies. Water quality issues may be used to determine levels of recreation access, such as prohibiting all public access; prohibiting anybody contact with the water; or allowing swimming, fishing, paddling, or motor boating.

Untreated or partially treated sewage released into the ocean has led to highly publicized closures of public beaches. Stormwater runoff and non-point-source pollution have major impacts on coastal water quality. According to the Heal the Bay organization, funding for monitoring is often difficult to find (Heal the Bay 2012). Fertilizers and chemicals from agricultural runoff may also contribute to poor water quality. With the potential for flashier floods and more frequent extreme storm events due to changes in climate, increased erosion of streambanks and siltation of waterways is anticipated. Contaminated lakes, rivers, and streams, as well as eroded banks and trails, not only present both health and safety risks to those participating in contact and non-contact water recreation, but also can significantly diminish the recreation experience. Poor water quality can cause marina closures to protect both the users and the environment, such as pollution-related beach closures or navigable waterway barriers. Water diverted from natural streambeds reduces opportunities for whitewater boating, causes higher water temperatures that cannot sustain healthy fisheries, and may increase pollutant concentrations.

Water-dependent recreation can also negatively affect water quality. Human-source contamination, such as untreated sewage and petroleum products discharged from houseboats and other pleasure craft, can be a significant problem in reservoirs, in bays, and along beaches. Some watershed land and reservoir managers restrict public access because of these concerns.

Examples:

- Heal the Bay has been publishing an *Annual Beach Report Card* for 21 years, which identifies impaired beaches (Heal the Bay 2012).
- The State Water Resources Control Board (SWRCB) is currently proposing a statewide policy for bacterial standards for water contact recreation in the fresh waters of California. Elements of the final policy may include a revised indicator organism (such as *E. coli*), a risk protection level, and expanded and standardized bacteria control implementation (State Water Resources Control Board 2008).
- The SWRCB maintains a Web site to help recreationists investigate water quality at beaches, at rivers, and in fish (State Water Resources Control Board 2013).

## **Water Quantity Changes**

Dramatically changing water levels affect the availability of different recreation opportunities. Low levels can separate boat ramps and launches from the water's edge. Folsom Lake and Lake Oroville are examples where changing water levels often affect recreation opportunities. In the summer of 2008, the water level at Folsom Lake was so low that a 5-mile-per-hour speed limit was imposed on all vessels and all the boat ramps were closed.

Low river flows can block public access, eliminating opportunities to boat or fish. Water diverted from natural streambeds affects opportunities for whitewater boating. Early summer season water transfers and prolonged drought periods can cause extremely low water levels at reservoirs later, affecting the availability of recreation opportunities.

## **Inadequate Agency/Organization Coordination**

Funding deficiencies and impacts on recreation resources are exacerbated by a lack of coordination among agencies, both those that manage water resources and those that provide recreational services. Agencies are too often limited in scope and effectiveness in recognizing and mitigating trends affecting resource conditions, particularly those outside their immediate jurisdiction. Although partnerships and cooperation among agencies, organizations, and individuals have grown, efforts at the watershed or landscape level are often fragmented, and opportunities to achieve broader goals are missed, placing both resources and the public at risk. Good coordination between reservoir operators and recreation facility operators is needed to maximize recreation potential while meeting other authorized purposes. A lack of coordination between the managing agencies and the recreation providers can result in unreliable water recreation resources, unbudgeted financial implications, staffing problems, and missed partnerships that could provide expanded recreation opportunities.

Examples of collaborative processes aimed at maximizing recreation potential, while meeting other authorized purposes, include the following proposals and actions.

- The integrated regional water management (IRWM) planning process is aimed at securing long-term water supply reliability within California by first recognizing the interconnectivity of water supplies and the environment and then pursuing projects yielding multiple benefits for water supplies, water quality, and natural resources. The IRWM planning process also must address reducing GHG emissions and being resilient to climate change, which in turn provides an opportunity for communities to identify water-dependent recreation strategies that assist in mitigating and adapting to climate change (citation needed). Adding recreation coordination within the IRWMs would help leverage existing water-dependent recreation resources, increase dependable opportunities, and disperse recreation demand.
- The Santa Ana Watershed Project Authority has been working with the Crest-to-Coast Partnership to complete the Santa Ana River Trail and add parkway elements to the river. The effort is funded by the counties and cities in the watershed and by environmental groups interested in completing a 110-mile trail system (Santa Ana Watershed Project Authority 2012).
- California State Parks is proposing partnerships between land-owning agencies and recreation businesses in the Central Valley and the Delta to concentrate intensely developed recreational facilities and services, such as campgrounds and equipment rentals, into “base camps” to minimize impacts on natural resources while providing low-impact recreational access (California Department of Parks and Recreation, Planning Division 2009a, 2011b).
- The State Water Project Recreation Coordinating Committee, established in 1960, provides interagency collaboration.

## **Recommendations**

### **Lack of Access**

1. All public agencies in California should endeavor to better protect and enhance public access to waterways, lakes, and beaches within their jurisdiction.
2. The California State Lands Commission (SLC) could lead an identification and education effort to clarify existing legal points of river access.
3. Recreation and water management agencies need to increase partnerships with schools to provide public safety education that introduces youths from urban and low-income

- communities to water-dependent recreation activities near them and that includes injury and drowning prevention strategies, such as DWR's Aquatic Adventure program and California State Parks' Junior Lifeguard Program.
4. In developing water-dependent recreation opportunities, agencies should consider the needs of the public and low-income communities, and increased population and diversity as identified in planning documents such as the California Outdoor Recreation Plan updates.
  5. Use existing data and new surveys to determine recreation needs that might be met by incorporating recreation more fully into State and regional water management planning.
  6. Collect data on visitation rates versus reservoir water levels and downstream flow rates and use these data to help optimize the timing of water that is released or held for recreation, to the degree possible consistent with other water needs. This information could be used to plan recreation facility schedules and staffing.
  7. DWR should include recreation use data and trends, unmet demand, improvement goals, and development milestones in Bulletin 132 about the management of the SWP.
  8. Develop partnerships between recreation planners, recreation equipment manufacturers and retailers, and universities to coordinate the monitoring of public recreation use, equipment, and emerging water-dependent recreation trends.
  9. Develop strategies to incorporate recreation facilities, such as trails, in the planning design of new floodways, levees, environmental restoration, and other water facilities.
  10. Maintain access to public beaches.
  11. Participate in the National Water Trails System.
  12. Consider removal of unnecessary navigational barriers.
  13. Consider legislation or regulatory changes to address public access liability concerns of private property owners adjacent to navigable waterways.
  14. Construct water-dependent recreational facilities in urban areas and disadvantaged communities.
  15. Develop more robust marketing strategies, including free days, special events, and incentives to visit more often to attract new users.
  16. California State Parks should quantify unmet recreation demand in the SWP and Central Valley Flood Protection Plan market regions and develop a comprehensive strategy for meeting the needs identified.
  17. Incorporate public transit and bicycle access to water-dependent recreational facilities and lands in county or regional transportation plans.
  18. Perform research on the water quality impacts of recreation and develop best management practices for monitoring and reducing these impacts.
  19. Develop multilingual adult education programs to introduce safe practices in water-dependent recreation.

## **Climate Change**

20. Water-dependent recreation providers should create/participate in a climate change network of agencies that keeps members abreast of new data and strategies and provides opportunities for collaboration.
21. Conduct climate change adaptation planning for each region of the state. Create a geographic-information-systems-based tool to identify water-dependent recreation areas and resources vulnerable to climate change impacts, such as low elevations vulnerable to sea level rise, floodplains, and areas with plants and wildlife sensitive to drought.

22. Identify a procedure to incorporate climate change assessments within all infrastructure planning, budgeting, and project development that reveals challenges to, and opportunities for, water-dependent recreation resources.
23. Design facilities to accommodate environmental and management changes, including longer boat ramps, as well as moveable facilities such as floating campsites, lifeguard towers, and restrooms. Conduct systematic assessments of potential impacts of climate change on recreation resources to identify suggested adaptations.
24. If average reservoir levels drop, there may be a need to emphasize river recreation, such as through implementing California State Parks' Central Valley Vision Implementation Plan for increased river access and water trails for rafters and boaters
25. Consider developing artificial reefs to prevent coastal beach and bluff erosion and to enhance surfing.
26. Develop climate change education programs at parks.
27. Consider regulatory changes to facilitate easier climate change adaptation and mitigation project permitting at public parks and beaches.
28. Develop a CEQA checklist for potential impacts of climate change adaptation infrastructure, such as sea walls, on recreation resources.

### **Lack of Funding**

29. Develop more robust funding streams for impartial recreation research, including assessments of the full benefits of water-dependent recreation.
30. Strengthen the requirement that IRWM plans consider water-dependent recreation and that multi-benefit projects, such as those with recreation components, receive funding priority.
31. Update the Davis-Dolwig Act provisions to fund water-dependent recreation enhancements more fully at federally authorized and State-authorized water projects.
32. Work closely with hydroelectric dam operators participating in FERC relicensure to identify adequate funding sources for proposed recreation enhancements.
33. Update State funding programs, such as that authorized by the Davis-Grunsky Act, which prioritize multi-benefit projects and encourage future grant programs to give priority to multi-benefit flood control and water supply projects and programs that incorporate recreation.
34. Quantify how reduced water-dependent recreation opportunities — such as low lake/ reservoir levels occurring during peak visitation periods that affect visitor spending — can affect park budgets and local economies.
35. Develop more realistic cost/benefit analyses that allow appropriate cost-sharing among all beneficiaries of water projects.
36. Develop more stable State and local funding sources to ensure safe, affordable public access to recreational opportunities.
37. Maintain an updated list of deferred maintenance of recreational facilities to facilitate applications for federal, State, and philanthropic funding.
38. Develop funding to resolve legacy impacts, such as reduced fisheries and restricted access to inland waterways, especially in or near disadvantaged communities.
39. Develop more flexible funding strategies for facilities that can be constructed only during low-water periods (e.g., boat ramps and docks).
40. Consider providing mitigation funding for recreational facilities affected by reservoir reoperation for flood management and water supply.



41. Reduce construction costs for water-dependent recreation projects by revising water quality standards such that turbidity levels may be allowed up to levels found in the waterway during heavy rainstorms.
42. Consider expanding recreation-equipment-based fees, such as fees on hunting and fishing equipment, to a wider array of recreation equipment to fund new recreation facilities or renovate existing ones.

### **Natural Resources Degradation**

43. Conduct flow assessments on major river systems to analyze the impacts of flow levels on wildlife, habitats, and recreation opportunities.
44. Evaluate and periodically re-examine scientifically valid studies of the carrying capacity of proposed and existing sites for water-dependent recreation, to help prevent degradation of water quality and wildlife habitat. Examine and utilize data collected by agencies such as the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, and FERC.
45. Maintain and restore vegetation along rivers and streams that support and enhance outdoor recreation.
46. Restore sustainable populations of native and/or game fish.
47. Consider river naturalization or de-channelization to provide urban open space along rivers or canals for recreation.
48. Create multi-benefit flood control, water transfer, and storage facilities that emulate natural ecological systems and accommodate recreational access.
49. Create partnerships with education providers to educate youths about outdoor ethics and about preserving and protecting natural resources. Examples of progress on this recommendation include work being done by the Biodiversity Council and Stewardship Council. Use waterside parks as outdoor classrooms to teach water resources management topics.
50. Improve sand flow for natural beach replenishment by reestablishing soft-bottom creeks and rivers, removing dams that impede sand flow, and preventing groins and jetties that also impede sand flow.
51. Develop and share sand replenishment and conservation strategies among agencies.
52. Integrate recreational facilities into habitat mitigation projects.

### **Invasive Species Impacts**

53. Inventory water facilities and measure their vulnerability to specific invasive species known to be transported by recreation users.
54. Prioritize and develop preventive measures and response strategies for the most at-risk facilities providing water-dependent recreation.
55. Develop stable funding to expand monitoring and preventative measures with a combination of “beneficiary pays” and “stressor pays” principles.
56. Develop long-term watershed-based strategies for invasive species control that affects water-dependent recreation.
57. Develop regional and statewide recreation provider partnerships to establish consistent inspection guidelines, reduce cost, and allow easier compliance with invasive species inspection programs.
58. Expand research into efficient management strategies to reduce recreation-related impacts.
59. Engage volunteer groups in management programs that reduce recreation-related impacts.



### **Water Quality Impacts**

60. Educate residents and businesses in the watershed about their role in protecting water quality and recreational opportunities. Explain water quality issues to the public in more understandable and compelling ways.
61. Test surface water quality more often and make real-time water quality information for surface waters more accessible online and at recreation sites.
62. Develop best management practices guidance for reducing recreation-based water quality impacts, including impacts from recreation vehicles — such as reduced pollution of marine engines and parking lot runoff.
63. Enter into agreements with other agencies and governing bodies, as appropriate, to secure their cooperation in maintaining or restoring the quality of water resources utilized for recreation.
64. Take proactive measures to limit sea level rise impacts on water-side sewage facilities.
65. Integrate stormwater management devices/techniques into open space or parks, or both, to address water quality and quantity issues. Stormwater can be redirected from impervious surfaces (e.g., roads, driveways, sidewalks, and rooftops) and into open space/park land where stormwater devices (e.g., vegetated swales, retention areas, infiltration basins, and porous pavement) capture runoff, remove pollutants, and recharge aquifers.
66. Develop a plan to resolve legacy pollution impacts on recreational waters.

### **Water Quantity Changes**

67. Develop and maintain closer working relationships between water management agencies, such as DWR and the U.S. Bureau of Reclamation, and water-dependent recreation providers, such as East Bay Regional Park District and California State Parks, so that recreation planning and operations are better incorporated into water management planning.
68. Design and construct facilities to accommodate environmental and management changes, including longer boat ramps as well as moveable facilities, such as floating campsites, lifeguard towers, and restrooms.
69. Develop plans for accommodating increased precipitation variability and uncertainty, including drought contingency planning, for parks.
70. Develop and implement plans to minimize artificial sedimentation that creates recreational boating barriers.

### **Agency/Organization Coordination**

71. Promote and establish effective partnerships among federal agencies, State and local governments, California tribes, and the private sector for operation, maintenance, and law enforcement at water-dependent recreation sites.
72. Work to maintain consistency between the California Water Plan and other agency reports, such as the California Outdoor Recreation Plan updates and all federally authorized and State-authorized water projects.
73. Coordinate research needs with recreation-serving businesses and manufacturers.
74. Provide an online searchable database of recreation-oriented educational opportunities offered by agencies and organizations.
75. Provide an online searchable database of recreation-oriented volunteer opportunities offered by agencies and organizations.

76. Include collaboration time and funding in project schedules and budgets to determine whether the project can accommodate water-dependent recreation needs.
77. Invite stakeholder collaboration in the project formulation stage to determine whether the project can accommodate water-dependent recreation needs.

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