

# Water-Dependent Recreation



*Photo caption.* Man windsurfing in the Sacramento-San Joaquin Delta.

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# Chapter 26. Water-Dependent Recreation

## A Multitude of Recreation Opportunities

With its temperate climate, over 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 waterways seeking recreation experiences. In 2006, beach and waterfront activities helped make California one of the most visited state in the nation.

California residents and visitors can choose from a variety of *water-dependent* recreation activities. They may enjoy recreation activities that are dependent on water, including fishing, swimming, waterfowl hunting and birding, boating, canoeing, and kayaking. They also may participate in recreation activities that can be enhanced by water, such as wildlife viewing, picnicking, camping, and hiking, biking, and riding on trails. While the latter activities do not depend on water, they are frequently enjoyed near water.

California also has a variety of water-dependent recreation facilities with differing levels of public access. Protected status designations for the state's reservoirs, for example, range from prohibiting all public access, prohibiting any body contact with the water, to allowing swimming, fishing and boating.

A number of surveys validate the importance of water in Californians' outdoor recreation activities. For example, the 2007 survey of Public Opinions and Attitudes on Outdoor Recreation in California, conducted by California State Parks every 5 years to better understand residents' recreation habits, found that 59% of California's adults participated in beach activities, 31% swam in freshwater lakes, rivers, and/or streams, and 21% fished in fresh waters (CSP, 2009a, 2009b, 2009c). Over 39% of Californian adults used a beach or water recreation area during their most recent park visit. Significant numbers of Californians also enjoyed water-enhanced nature-based activities such as wildlife viewing (47%), hiking on trails (46%), and camping in developed sites (39%) (CSP, 2009a).

The same survey also reveals the importance of recreation facilities at lakes, rivers, and reservoirs: about 60% indicated that recreation facilities, such as day-use, picnic, or camping sites are needed at lakes and reservoirs. And 78% felt that the government should place more emphasis on cleaning-up the pollution of the ocean, lakes, rivers, and streams in park and recreation areas. In the 2002 survey, about 79% of the respondents indicated that the availability of lakes, reservoirs, rivers, and wetlands was an important factor in their overall enjoyment of their favorite recreation activity.

**Box 26-1 Acronyms and Abbreviations**

|             |  |
|-------------|--|
| Cal Boating | California Department of Boating and Waterways   |
| CSP         | California State Parks                           |
| CSUS        | California State University, Sacramento          |
| DFG         | California Department of Fish and Game           |
| DOF         | California Department of Finance                 |
| FERC        | Federal Energy Regulatory Commission             |
| IRWM        | integrated regional water management             |
| kW          | kilowatt   |
| PM&E        | Protection, Mitigation, and Enhancement Measures |
| SLC         | California State Lands Commission                |
| SMUD        | Sacramento Municipal Utility District            |
| USFWS       | US Fish & Wildlife Service                       |

**Water Managers' Role in Recreation Planning**

By incorporating planning for water-dependent recreation activities in water projects, water managers play a critical role in ensuring that Californians today and into the future are able to enjoy such activities. For example, acquiring land for picnic tables and accessible trails near a planned reservoir can provide visitors a relaxing day by the water. If a picnic area and accessible trails were not included in planning, a valuable water-dependent recreation opportunity is missed.

Demand for water-dependent recreation opportunities in some parts of California is so great that it exceeds the capacity of the current infrastructure. As a result, many of these facilities are overused, jeopardizing natural and cultural resources 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 38 million is estimated to reach 50 million by 2032 and almost 60 million by 2050 (DOF, 2009).

Providing for water-dependent recreation in water projects is part of California law and also part of The California Public Trust Doctrine.

- California's 1961 Davis-Dolwig Act requires state agencies involved in water projects to also be responsible for recreation facilities and fish and wildlife enhancement. The Act also provided a procedure through which the Department was to be reimbursed for those project costs allocated to recreation and fish and wildlife enhancement and for costs of acquiring property for recreation development.
- The California Public Trust Doctrine, upheld by the State Lands Commission, recognizes recreation as a public trust use that state agencies must consider when managing tidelands and navigable waters and their tributaries (SLC, 2001, 2009).

If water managers and recreation professionals work together, they can provide opportunities for water-dependent recreation for California's residents and visitors now and into the future.

## Potential Benefits of Water-Dependent Recreation

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

### Health, Social and Environmental Benefits

Swimming, kayaking, and skiing are just a few of the fun and healthy water-dependent activities available at outdoor recreation areas. 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.

Other, less vigorous outdoor recreation activities also can refresh and relax mind and body. Recreationists enjoy paddling in inner tubes, sunbathing or playing on beaches, telling stories around a campfire, strolling near rivers, creeks and marshlands and photographing wildlife and plants.

In addition to providing the chance for exercise and relaxation, water-dependent recreation offers a variety of other benefits to individuals, communities and the environment. For example:

- 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 help strengthen communities.
- Led by an interpretive specialist, a boy and his classmates learn about the importance of watersheds and water-related environments; experiences such as these can supplement a formal education, helping instill life-long positive values and deterring negative behavior.

One example of how water-dependent recreation opportunities can provide health, social and environmental benefits is Sacramento's American River Parkway that parallels about 30 miles of the American River. Visitors may participate in a variety of activities – they walk, run, bike, or horseback ride, picnic, fish, swim, and can motor-boat or paddle along a boating trail. The Parkway also provides access to a rowing facility and a

**Table 26-1 Fishing statistics in California, 2006**

| (residents and nonresidents 16 yrs +)   |               |
|---|---------------|
| Anglers   | 1.7 million   |
| Days of Fishing   | 19 million    |
| Average days per angler   | 11            |
| Total expenditures  | \$2.4 billion |
| Trip related  | \$1.2 billion |
| Equipment and other   | \$1.2 billion |
| Average per angler  | \$1,383       |
| Average trip expenditure per day  | \$62          |
| Source: 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation – California (USFWS, 2007) |               |

California travelers, water-dependent recreation helped attract millions of tourists to California in 2006, making it one of the most visited states in the nation. During 2007, travel spending in California directly supported 924,100 jobs with earnings of \$30 billion. Travel spending generated the greatest number of jobs in arts, entertainment and recreation (226,500), and accommodation and food services (534,000).

Commercial businesses offering recreation equipment, programs, and services also 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.

In addition to the many benefits enjoyed by recreationists, water-dependent recreation facilities help preserve open spaces and view sheds, which in turn prompts long-term investments and increases land and property values. Water-dependent recreation also generates significant revenue for the state through fees, permits and licenses:

- In 2007, 964,881 boats were registered in California generating nearly \$2 billion for the state.
- Sales of sport fishing and hunting licenses and stamps generated more than \$84 million in revenue for the Department of Fish and Game in 2007. Fishing-related expenditures are included in Table 26-1 (DFG, 2009b).
- In 2006, 7.4 million residents and nonresidents 16 years and older fished, hunted, or watched wildlife—spending a total of \$8 billion.

### Value-Added Benefits From Flood Management Projects

As flood protection facilities are built and managed, opportunities are created for developing recreation facilities that would not conflict with the original use, such as levees with trail and water trail systems. Other ideas include establishing green environments as part of flood management projects, like trails and parkways, and restoring greenways by replacing the concrete channels typically used for flood

fish hatchery where visitors can view salmon and steelhead trout (County of Sacramento, 2009).

### 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

management facilities. Creating facilities that are closer to a natural ecological system can provide both recreation opportunities and water and natural resource sustainability.

- 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 Management Project has also integrated a water system with a user-friendly environment that included 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.

Funding can also be acquired by partnering flood management projects and recreation development. Developing an environment designed around urban areas that includes both recreational and flood management components is a common development mitigation strategy.

- The City of Temecula’s flood easement added trails and parkland to its flood management project.

### Value-Added Benefits From Climate Change Projects

Water-dependent recreation provides multiple value-added benefits that address climate change. Providing opportunities for water-dependent recreation encourages residents to use less carbon-intensive forms of transportation, such as running or biking. Creating water-dependent recreation facilities in urban areas can reduce the amount of storm water runoff, increase groundwater recharge rates and wastewater filtration opportunities, while also filtering roadway pollution and increasing carbon sequestration.

- The recent escalation of gasoline prices created a measurable spike in commuters using the American River Parkway as a travel alternative.
- A watershed “makeover” plan has been designed for the Los Angeles basin to expand the basin’s permeable surface area and redesign the remaining impermeable surfaces to create urban green spaces. Storm water runoff will be guided into designated systems within the green spaces for reuse and groundwater recharge. The plan estimates that Los Angeles could reduce flooding and cut water imports by 50 percent by 2020.

## Potential Costs of Water-Dependent Recreation

Information is not readily available on the statewide costs of water-dependent recreation. Yet there is a need to increase the available recreation facilities and services to accommodate population growth. However, it is difficult to translate this increased need into specific recreation costs. Since the population is estimated to nearly double, costs will likely escalate accordingly. But population growth is not the only concern. As California’s climate continues to change, causing the varied impacts mentioned in the

climate change section below, the public's demand for water resources will increase, and new facilities will also be necessary to meet that demand. The potentially larger costs due to climate change have also yet to be calculated. The bullets below include some examples of facility development costs:

### Sample Costs for Facility Development

- The required FERC relicensing Protection, Mitigation, and Enhancement (PM&E) measures typically cost \$25 per kilowatt (kW) capacity of a hydroelectric project for wildlife, \$95/kW for fisheries, and \$22/kW for recreation. PM&E measures benefiting wetlands, aesthetics, cultural resources, and water quality cost about \$24/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.
- Between 2002 and 2004, the Department of Boating and Waterways funded 13 new boating-access projects ranging from \$20,000 to \$188,000. The department also spent almost \$10 million in improvements to 26 projects on numerous bodies of water. Typically, improvements included adding launching ramps, parking lots, boarding floats, restrooms/floating restrooms, lighting, berthing, moorings, boat-in day-use, and camping/RV sites.
- The Tujunga Wash Greenway and Stream Restoration stream channel diversion project mentioned above cost \$7 million to complete.
- A Sacramento-San Joaquin Delta Boating Needs Assessment 200-2020 estimated that repairing or replacing the existing facilities in all six Delta zones would cost between \$107 million and \$159 million, spread over 20 years (Cal Boating, 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. Only about 75 percent of the respondents could provide cost estimates for upgrades and new facilities and so the cost figures provided here are low compared to potential needs (CSUS, 2002).

Table 26-2 provides projected costs for just the launch ramp improvements. Almost 20 percent of the 385 launch facilities surveyed did not have any facility upgrade needs in the next ten years. About 20 percent did not know and the remaining 60 percent identified upgrade needs.

Operations and maintenance is another cost component of meeting the State's need for water-dependent recreation opportunities. Many water-dependent recreation facilities are aging and suffer from wear and tear, creating a large backlog of deferred maintenance. Operation and maintenance costs will vary with each facility and its individual characteristics. Maintenance involves not only a recreation facility and its services but also the infrastructure necessary to reach that facility, like roads and trails. Facility replacement and repair needs can include dredging, docks/slips, dry boat storage, launch ramp lanes, parking lots, pump stations, restrooms, and transient docks. However,

**Table 26-2 Estimated launch ramp facility costs**

| Activity  | Total Costs             | Costs Per Year         |
|---|-------------------------|------------------------|
| Existing Facilities Upgrades Next Ten Years (to 2011)                     | \$142.5 million         | \$14.2 million         |
| New Facilities Ramp Lanes Next Twenty Years (to 2021)                     | \$55.4 to \$89 million  | \$2.8 to \$4.4 million |
| New Facilities Parking for Cars with Trailers Next Twenty Years (to 2021) | \$36 to \$56 million    | \$1.8 to \$2.8 million |
| Total New Launch Facilities Next Twenty Years                             | \$91.4 to \$145 million | \$4.6 to \$7.2 million |

Source: California Boating Facilities Needs Assessment, 2002 (CSUS, 2002)

specific costs for these needs are not readily available. Even the statewide California Boating Facilities Needs Assessment survey found that 25 percent of the respondents could not provide cost estimates. The bullets below include some discrete examples of operations and maintenance costs:

### Sample Costs for Operations and Maintenance

- In 2008, Lake Oroville State Recreation Area spent \$162,000 on housekeeping and operating costs for the reservoir's 84 boat-in campsites and \$137,000 maintaining its 74 miles of non-motorized trails.
- 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 (Cal Boating, 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 over \$50 and costs of \$1,000,000 or more per facility were not uncommon (CSUS, 2002).

Research identifying California's needs is also an expensive undertaking. The statewide survey mentioned above was last conducted in 2002. A recent Department of Parks and Recreation survey of State Park visitors cost over \$500,000. Research is essential for understanding the impacts of both population growth and climate change. Although recreation research is expensive, it is an important step towards addressing the state's water-dependent recreation needs.

Even though there are opportunities to provide recreation resources through projects like FERC license applications and a percentage of each water project's total costs are generally allocated for development of permanent recreation facilities, we must seek additional, stable sources of funding in order to provide for ongoing operations and maintenance costs. Concession agreements for recreation facility operations can provide additional income while reducing water managers' responsibilities. Revenue generated by recreation facilities and programs can also contribute toward the fiscal sustainability of the associated water facility.

**Table 26-3 California youths' top rated activities that they would like to do more often**

| Activity   | Preference |
|--|------------|
| Horseback Riding   | 47%        |
| Sledding, Ice Skating, Snow Play   | 45%        |
| Snowboarding   | 45%        |
| Swimming in a Pool   | 45%        |
| Jet Skis or Wave Runners   | 45%        |
| Rock Climbing  | 44%        |
| Beach Activities, Surf Play (including sunbathing, wading, playing on beach) | 44%        |
| Off-road vehicle use   | 43%        |
| Surfing or Boogie Boarding   | 43%        |
| Waterskiing or Wakeboarding  | 42%        |
| Swimming in Ocean, Lakes, Rivers, and Streams                                | 41%        |

Source: 2007 Public Opinions & Attitudes Survey (CSP, 2009a)

## Major Issues Facing Water-Dependent Recreation

### Lack of Access

Capacity issues will be created due to the anticipated changes in demographics, population, and types of use. Population growth, accompanied by static recreation resources, will cause capacity issues at existing recreation areas. The Central Valley, for example, is experiencing a dramatic population boom but remains an area with insufficient access to water-dependent recreation opportunities. Changes in recreation preferences due to demographic shifts in California's cultural make-up could also cause capacity issues if the types of recreation resources that serve the preferences of growing ethnic groups are not available.

The economy can have a major impact on the visitor use and availability of recreation facilities. In a down economy, people have less money to spend on activities and vacations and tend to recreate closer to home, creating increased demand on existing facilities. Recreation providers, however, are also operating with reduced budgets; and may need to increase fees to an extent that activity costs become an access barrier for low-income residents at the same time that their demand is increasing.

While today's youth express an interest in many types of recreation, they may not know how to safely enjoy these activities, limiting their access to many of them. A 2007 study found that inexperience was the most common cause (67%) of personal watercraft accidents involving youth operators. Excessive speed was a factor in 57% of the accidents, followed by inattention (53%). A lack of recreation facilities in low-income and urban areas also limits youth access to the activities in Table 26-3.

Access to a water facility is not always the primary concern; sometimes the real problem is lack of water or poor water quality. Dramatically changing water levels impact the availability of different recreation opportunities. Low levels can separate boat ramps and launches from the water's edge. Folsom Lake State Recreation Area 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 a 5-mile-an-hour speed limit was imposed on all vessels and all the boat ramps were closed. 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.

Dams can also negatively impact recreation opportunities by blocking fish and wildlife migration. Low river flows can even block public access altogether, eliminating opportunities to boat or fish. Water diverted from natural streambeds causes higher water temperatures that cannot sustain healthy fisheries or dilute pollutants and affects opportunities for whitewater boating. There is discussion about potentially removing dams to restore fisheries on the Ventura River, Malibu Creek, the Klamath River and Battle Creek.

### Solutions to Address These Issues

- A section of the drainage pipe was removed from under Marsh Street Park. The ground was then lowered so that water could be filtering urban runoff. The park is adjacent to the Los Angeles River. This project will bring nature back into neighborhoods and create parkland and recreational opportunities in densely populated urban areas where they are needed most. This 'daylighting' of an underground stream and converting the water channel to a natural environment has increased the recreation opportunities in this underserved area.
- Examples of river restoration through FERC relicensing opportunities include improvements to hydropower operations on the Middle Fork of the Stanislaus and Feather Rivers, that resulted in increased base flows to improve habitat and enhance overall river health, modified flows to mimic natural fluctuations, and improved recreational flows and access sites.
- Efforts to reach underserved communities must include consultation with California Indian Tribes. Coordination between recreation and water management professionals and with urban land-use management strategies will also help ensure the availability of water-dependent recreation resources in highly populated areas.
- The California Department of Boating and Waterways' Boating Safety Education Program continues to educate thousands of school age children through their AquaSMART outreach program, distributing millions of copies of boating safety literature (Cal Boating, 2009a, 2009b).
- The problem of our children's 'Nature Deficit Disorder,' mentioned in Richard Louv's book *The Last Child in the Woods* (2005), can be addressed by creating opportunities for recreation activities listed in the California Children's Outdoor Bill of Rights (CRRPT, 2007). The water-dependent activities that every child should experience by their fourteenth year include splashing in the water, learning to swim, and catching a fish.

## Effects of Climate Change

As California's climate changes, so will the management of and demand for recreation resources. Climate change will have numerous potential impacts on water-dependent recreation; in fact, many are already evident. Changes in temperature, rainfall, and water levels are impacting visitor use and their demands. Rising seas will damage the coast and its beaches, creating a higher need for coastal protection. And these changes are accelerating. As recreation demands shift to accommodate the new climatic conditions, more strain will be 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 impact the quality and availability of the recreation experience.

Table 26-4 shows some possible—and dramatic—effects of climate change on water-dependent recreation.

## Solutions to Address These Issues

- Create facilities to accommodate environmental changes, including moveable facilities such as floating campsites and restrooms. Conduct systematic assessments of potential impacts of climate change on recreation resources and identify suggested adaptations.
- As coastal recreation areas become damaged and submerged due to rising sea levels, recreationists will be forced inland, creating an increased demand for inland water facilities. As reservoir levels drop, there may be a need to emphasize river recreation, such as through implementing California State Parks Central Valley Vision for increased river access and water trails for rafters and boaters (CSP, 2008).

## Lack of Funding

Financing can transcend all other issues affecting outdoor recreation, including water-dependent recreation. Funding issues fall into two categories: (1) planning and development of new recreational sites financed through water and other development projects, and (2) the operation and maintenance of recreation sites once they are in place.

When dam, reservoir, or canal projects are being built or upgraded, there may not be enough funding to fully incorporate recreation. One reason for this is that the beneficiaries of recreation may be different from the other beneficiaries of the water project, requiring complex funding mechanisms to fully support recreation planning. This is a significant issue in State Water Project planning: The Davis-Dolwig Act specifies that water users shall not be charged for the cost of recreation facilities, but other funding mechanisms have not always been made available.

Maintenance of recreation facilities may be more susceptible to funding cuts in a bad economy than for other resources thought to be more essential. Without reliable funding, it is difficult for recreation providers to deliver quality, consistent and relevant

**Table 26-4 Climate change impact**

| <b>Impact</b>                     | <b>Effect on Water-Dependent Recreation Facilities and Amenities</b>                      | <b>Effect on Recreationists</b>  |
|-----------------------------------|---|--|
| Increased sea levels              | Erosion and damage to coastal beaches, reefs, wetlands, archaeological and cultural sites | Coastal areas unavailable for recreation activities; coastal recreationists forced inland        |
| Irregular seasonal precipitation  | Less water available for natural groundwater and surface water systems                    | Less ability to swim, boat, fish or enjoy other water-dependent recreation                       |
| Higher temperatures               | Warmer rivers and streams   | Fewer coldwater fish (such as salmon, trout) available for anglers                               |
| Worse ozone air pollution         | Worse ozone air pollution in public lands   | Reduced outdoor recreation; health threats   |
| Increased seasonal flooding       | Amenities more likely to be flooded seasonally, damage to sites and facilities            | Less ability to enjoy outdoor activities such as picnicking, camping, or trails                  |
| Less snow and more rain in winter | Less snow at winter recreation areas  | Less ability to ski, snowboard, play in the snow or enjoy other winter recreation                |
| Decreased river flows             | Decreased water quality in rivers and streams   | Less ability to boat, swim, fish or enjoy other river recreation                                 |
| Increased fire danger             | Possible closures of recreation areas, risk of destruction of sites and facilities        | Inability to enjoy closed recreation areas, potential health threats from smoke and particulates |

Source: Changing Climate, Changing Parks: An Outline of Key Concepts," (California State Parks, 2009d, internal document.

facilities and services to meet growing demand. Many park and recreation providers have taken steps to reduce programs and operating costs and become more efficient on leaner budgets by raising fees and charges, reducing or eliminating services, delaying equipment purchases, and deferring land acquisition, facility developments, and rehabilitation and renovation of aging infrastructure. However, impacts from invasive species, such as the quagga mussel, are increasing maintenance costs beyond their control. Inconsistent funding also makes it difficult to plan for services, and reduces the willingness of many service providers to offer new programs or to take risks.

### Solutions to Address These Issues

- Eighty percent of California's hydropower dams are regulated through licenses issued by the Federal Energy Regulatory Commission. One half of those facilities (150 dams) are scheduled to be relicensed in the next 15 years. Every FERC license contains terms and conditions to protect or improve recreation, fisheries, wildlife, water quality, wetlands, and/or cultural resources.
- When the Sacramento Municipal Utility District (SMUD) filed a FERC license application for its Upper American River Project, they 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 forest service roads maintenance plan that will 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 (SMUD, 2005, 2009).

### **Loss of Cultural Resources**

Low water levels and stream flows and impacts to fish habitat from dams and water transfer diversions can prevent Native Americans from participating in traditional cultural activities such as spear- and net-fishing. A water diversion on the Klamath River has led to conditions that caused an unprecedented fish-kill of over 33,000 salmon, steelhead and other fish species. Many other traditional activities, such as ceremonial dancing and basket making, are also dependent on the water flows of specific rivers and streams. Regalia and basket making resources, such as bear grass and willows, are important cultural resources which are dependent on the health of California’s waterways.

Recreational water use can lead to the pollution, demolition, and desecration of cultural resources, such as sacred sites, religious materials, and wildlife. Recreational use of waterways make it difficult and/or impossible for Tribes to access important materials located near streams, rivers, lakes and beaches. It is important to ensure that cultural groups have access to the resources necessary to preserve and celebrate their heritage.

Greatly reduced and sustained low reservoir water levels expose archaeological and cultural sites, thereby jeopardizing the cultural resources as well as requiring restrictions to public access in those areas. Some recreation activities are being curtailed to protect the cultural resources.

### **Solutions to Address These Issues**

- Implementing the recommendations in the National Research Council’s study findings that fair and science-based flow levels that provide for fish recovery can be part of a broader solution for the fish-kill problems in the Klamath Basin (NRC, 2008; The National Academies, 2007). Their suggested long-term solution includes removal of the lower four Klamath River dams, a voluntary program to buy back water rights from Klamath irrigation interests and return these flows to rivers and streams, and a large-scale wetlands restoration program, starting with an end to commercial agricultural development on Tule Lake National Wildlife Refuge.
- To ensure that the Chumash Indians have access to the resources necessary to preserve and celebrate their heritage, the Wishtoyo Foundation helped fund a stream habitat restoration project at Nicholas Canyon Creek near a reconstructed Chumash village. Since water and plants play a central role in Chumash culture, teachings about creek and riparian ecosystems are incorporated into the Chumash village interpretive program.

- Government agencies should consult with Tribes in order to receive their input regarding the impact and effects that water-dependent recreation have on cultural resources, religious practices, and subsistence fishing. This should be done on a regional basis in order to mitigate damages to cultural resources specific to the affected area.

### **Degradation of Natural Resources**

Natural resource values often define the character and aesthetic appeal of water-dependent recreation, making it desirable and interesting to visitors. Poor natural resource management can impact recreational experiences. Pollution or over-withdrawal of surface waters and groundwater can impair the natural functioning of aquatic and terrestrial ecosystems and diminish visitor use and enjoyment of park waters. Dams and other flood management measures can also impact recreation through decreasing the sediment supply to the coast, narrowing beaches and diminishing coastal access and recreation opportunities. Exceeding the use limits of what a natural environment can sustain leads to recreation resource closures.

Without proper resource management, increasing numbers of outdoor recreation visitors can also threaten ecosystem functions, disrupt and displace wildlife, or degrade the natural, environmental, and aesthetic quality of an area. Visitor impacts are only going to increase due to population growth and climate change. Visitors unfamiliar with ecological processes or environmental ethics are often unaware of the consequences of their actions.

### **Solutions to Address These Issues**

- River naturalization or de-channelization can provide urban open-space along the river or canal for recreation. The Guadalupe River Flood Control Project creates a linear urban park along the Guadalupe River that utilizes designs and materials to accommodate flood control without restricting human access.
- Creating flood control, water transfer and storage facilities that are closer to natural ecological systems could help mitigate some of the impacts of public-use. By building programs with natural processes and re-creating water recreation facilities to better mimic a natural system, the local ecosystem will also be able to recover faster from the impacts of overuse.
- To help users better understand and accept why they are unable to access recreation resources, they need to be educated in environmental processes, and preservation and restoration efforts. This could be done using interpretive centers associated with water facilities.

### **Impact of Invasive Species**

Invasive species issues in any waters of the state are of particular concern. The future discovery of additional invasive species in the Sacramento/San Joaquin Delta could be an environmental disaster that could have far reaching effects on the ability of California

to provide water to its constituents, whatever the use. Recreational uses of waterways, as well as the State Water Project, have already been negatively affected in the Delta region by invasive plant species. Invasive aquatic plants limit recreational and commercial vessel navigation and passage, restrict water flows, clog water intakes, and entrap sediments. These non-native 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.

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, and the environment in general, in some of the following ways:

- Reduces fish populations
- Limits or eliminates recreational opportunities to boaters
- Damages boat engines by blocking the cooling system
- Jams boat steering equipment
- Increases drag at the bottom of a boat, wasting fuel and reducing speed
- Requires scraping and repainting of boat bottoms
- Colonizes boat ramp and boat docks

### **Solutions to Address These Issues**

- The East Bay Municipal Utility District’s Pardee, Camanche, San Pablo, Lafayette, Chabot, and Briones reservoirs have restricted access, requiring all incoming boats to be inspected. Those boats coming from outside California, Southern California, San Benito or Santa Clara counties and those coming from other quagga mussel high risk areas are being turned away (EBMUD, 2009).
- A multi-agency taskforce that includes the Departments of Fish and Game, Water Resources, Boating and Waterways, Food and Agriculture, Parks and Recreation 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 (DFG, 2009a, 2009b; Cal Boating, 2008a, 2009c).

## Water Quality Impacts

Water quality can both affect and be affected by water-dependent recreation. Untreated sewage released into the ocean has led to highly publicized closures of public beaches. Fertilizers and chemicals from agricultural runoff also contribute to poor water quality in recreation areas. Contaminated lakes, rivers, and streams not only present health risks to those participating in water-contact recreation, but can significantly diminish the recreation experience. Conversely, water-dependent recreation can affect water quality. Human-source contamination, such as body contact, untreated sewage, and petroleum products discharged from houseboats and other pleasure craft can be a significant problem to reservoirs storing drinking water.

The condition of the water is not the only concern, but also the amount available. Low water levels and stream flows can significantly impact water quality, natural resources and the recreation experience. The amount or timing of streamflow is often regulated through water transfer schedules. These may have a good or bad effect on recreation. Inadequate stream flows affect rafting and other water sports as well as fish and waterfowl populations, impacting recreational fishing and hunting. Low flow releases from dams can also increase downstream water temperatures and fish densities, leading to increased aquatic pathogens. Early summer season water transfers can cause extremely low water levels at reservoirs later, impacting the water quality and availability of recreation opportunities.

## Solutions to Address These Issues

- To improve poor water quality conditions, the Delta Vision proposes water management improvements that include gates with boat locks in order to avoid potential adverse effects on boaters.
- The State Water Resources Control Board 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*), risk protection level, and expansion and standardization of bacteria control implementation (SWRCB, 2008).
- Coordination with water transfer management is necessary to ensure adequate water supply is available for recreation users. This coordination could also help address issues with recreation users affecting water quality and natural resources.

## Inadequate Agency Coordination

Funding deficiencies and impacts to natural and associated recreation resources are exacerbated by the lack of coordination among agencies, both those who manage water resources and those who 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. While partnerships and cooperation among agencies, organizations and individuals have grown, efforts at the watershed or landscape level are often fragmented, and opportunities are missed to

achieve broader goals, placing both resources and the public at risk. Poorly coordinated hydroelectric and flood management practices at reservoirs can impact upstream and downstream recreation opportunities. A lack of coordination between the managing agencies and the recreation providers can result in unreliable water recreation resources and missed partnerships that could provide expanded recreation opportunities.

### **Solutions to Address These Issues**

- The Integrated Regional Water Management (IRWM) planning process is aimed at securing long-term water supply reliability within California by first recognizing the inter-connectivity of water supplies and the environment and then pursuing projects yielding multiple benefits for water supplies, water quality, and natural resources. Adding recreation coordination within the IRWMs will 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.
- California State Parks is proposing partnerships between land-owning agencies in the Central Valley to concentrate intensely developed recreation resources in one area to minimize impacts to natural resources.

## **Recommendations to Facilitate Water-Dependent Recreation**

### **Access**

1. Recreation and water management agencies need to partner with schools to provide public safety education that includes injury and drowning prevention programs aimed at youth from urban and low income communities.
2. In developing water-dependent recreation opportunities, jurisdictions should consider the needs of the public and low income communities, and increased population and diversity as identified in statewide planning documents such as the California Outdoor Recreation Plan and the Central Valley Vision.
3. Use existing data and new surveys to determine recreational needs that might be met by incorporating recreation more fully into new state and regional water project planning.
4. Collect data on visitation rates versus reservoir water levels and downstream flow rates, and use this data to help optimize the timing of water that is released or held for recreation, to the degree possible consistent with other water needs.

5. Develop partnerships with universities to coordinate the monitoring of public recreation use, equipment, and emerging water-dependent recreation trends.
6. Create partnerships with education providers to educate youth about outdoor ethics, and preserving and protecting natural resources. Examples of progress on this recommendation include work being done by the Biodiversity Council and Stewardship Council.
7. Include built-in recreation opportunities in the planning design of new floodways, levees, and/or other water facilities.

### **Climate Change**

8. Create/participate in a climate change network of agencies that keeps members abreast of new data and strategies and provides opportunities for collaboration.
9. Conduct climate change adaptation planning for each region of the state. Create a GIS-based tool to identify areas and resources vulnerable to climate change, such as low elevations vulnerable to sea-level rise and areas with plant and wildlife sensitive to drought.
10. Identify a procedure to incorporate climate change assessments within all infrastructure planning, budgeting, and project development.

### **Funding**

11. Coordinate with the Department of Fish and Game in exploring the use of funding from the Bay-Delta Sport Fishing Enhancement Stamp to integrate new and improved public angling opportunities.
12. Pursue mitigation and environmental enhancement funding for recreation facilities through grant programs, such as those associated with the FloodSAFE program.
13. Quantify how reduced water-dependent recreation opportunities can impact local economies, such as low lake/reservoir levels occurring during peak visitation periods that affect visitor spending.

### **Cultural Resources**

14. Research, identify and mitigate the impact of low water levels and stream flows to fish habitat from dams and water transfer diversions that prevent Native Americans from participating in their traditional cultural activities.
15. Continue inventories of archaeological and cultural resources associated with water facilities to identify and mitigate those in danger of exposure and destruction due to reduced and sustained low reservoir water levels and recreational use.

### **Natural Resources**

16. Evaluate, and periodically reexamine, 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 other agencies, such as the US Bureau of Reclamation, US Army Corps of Engineers, and the Federal Energy Regulatory Commission, such as the results of FERC relicensing studies.
17. Conduct flow assessments on the major river systems to analyze the impacts of flow levels on wildlife, habitats and recreation opportunities.

### **Invasive Species**

18. Inventory water facilities and measure their vulnerability to specific invasive species, prioritizing and developing preventive measures and response strategies for the most at-risk facilities.

### **Water Quality**

19. Develop a strategy to reduce impacts to water quality and recommend improvements in water recreation vehicles – such as stricter regulation outputs on gasoline engines on waterways.
20. Enter into agreements with other agencies and governing bodies, as appropriate, to secure their cooperation in maintaining or restoring the quality of water resources.

### **Agency Coordination**

21. Develop closer working relationships among water managing agencies such as DWR, DFG, Cal Boating, CSP, State Lands Commissions, and Ocean Protection Council so that recreation planning is incorporated appropriately into the Delta Vision program planning.
22. 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 recreation sites.
23. Work to maintain consistency between the Water Plan and other agency reports such as the California Outdoor Recreation Plan and the Central Valley Vision.
24. Require all IRWM Programs to link a recreation component to every water management feature or justify why recreation cannot be accommodated.

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