

7.18 Recreation

This section describes the environmental setting, potential impacts, and mitigation measures for recreation impacts that may result from changes in hydrology or changes in water supply. The focus is on potential impacts on water-dependent and water-enhanced recreational activities. The proposed Plan amendments were developed to improve flow and water quality conditions over a large geographic area, and particularly for fish and wildlife beneficial uses in the Sacramento River watershed, Delta eastside tributaries, and Delta regions (Sacramento/Delta). As such, recreational opportunities that are supported by healthy rivers and a functioning watershed are expected to be improved. Under the Porter-Cologne Water Quality Control Act, recreation is a beneficial use of water, to be protected against water quality degradation, and protection of fisheries often protects recreational beneficial uses as well. However, actions associated with changes in hydrology and changes in water supply could negatively affect recreation in some locations, including recreational use of rivers, reservoirs, wildlife refuges, or other recreation areas.

Changes in hydrology could result in changes in water levels at some reservoirs, which could limit recreational opportunities (e.g., boating) and use at certain locations at certain times and may require construction related to replacement or modification of boat ramps. Changes in water supply, including reduced deliveries to wildlife refuges and municipal recreation, or increased use of other water management actions would not result in significant impacts such that substantial physical deterioration of the facility would occur or be accelerated, or require construction or expansion of recreational facilities. Additional discussion of aesthetics impacts is provided in Section 7.3, *Aesthetics*. Details on terrestrial biological resources are provided in Section 7.6.1, *Terrestrial Biological Resources*.

Section 7.1, *Introduction, Project Description, and Approach to Environmental Analysis*, describes reasonably foreseeable methods of compliance and response actions, including actions that would require construction. These actions are analyzed for potential environmental effects in Section 7.21, *Habitat Restoration and Other Ecosystem Projects*, and Section 7.22, *New or Modified Facilities*.

7.18.1 Environmental Checklist

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than- Significant Impact	No Impact
XV. Recreation					
a.	Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☒	☐	☐	☐
b.	Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☒	☐	☐	☐

7.18.2 Environmental Setting

This section describes the recreation setting to inform the impact discussion in this section and in Section 7.21, *Habitat Restoration and Other Ecosystem Projects*; Section 7.22, *New or Modified Facilities*; Chapter 9, *Proposed Voluntary Agreements*; and Chapter 13, *Revised Proposed Plan Amendments*.

Rivers, reservoirs, parks, wildlife refuges, and local amenities in the study area provide many opportunities for water-based recreation, including boating, swimming, fishing, and kayaking, and land-based recreation, including camping, hiking, biking, horseback riding, and wildlife viewing. (Figures 7.18-1a, 7.18-1b, and 7.18-1c).

The State Water Board and regional water boards categorize beneficial uses associated with water-based recreation as contact or non-contact recreation (REC-1 and REC-2, respectively) (Central Valley Water Board 2019). *Water contact recreation* specifies uses of water for recreational activities involving bodily contact with water, where ingestion of water is reasonably possible. These uses include swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs. *Non-contact water recreation* specifies uses of water for recreational activities involving proximity to water but not normally involving bodily contact with water, where ingestion of water is reasonably unlikely. These uses include picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with these activities.

Commercial and sportfishing and shellfish harvesting are designated beneficial uses that involve uses of water for commercial or recreational collection of fish, shellfish, or other organisms intended for human consumption or bait. Beneficial uses of water also include uses that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, mussels) for human consumption, commercial, or sport purposes.

Recreational areas are areas that afford leisure activities such as hiking, biking, horseback riding, camping, boating, swimming, and sightseeing. Many of these areas are forests or parks owned or administered by the National Park Service, U.S. Forest Service, California Department of Parks and Recreation, California Department of Forestry and Fire Protection, Bureau of Land Management, various regional park districts or services, or private landowners. National and state forest lands that include many parks are shown on Figures 7.18-1a, 7.18-1b, and 7.18-1c.

7.18.2.1 Rivers

Rivers throughout the Sacramento River watershed and Delta eastside tributaries regions offer water-based recreational opportunities, such as swimming, boating, rafting, kayaking, and sportfishing as well as land-based recreational opportunities, such as hiking and biking along the banks. Rivers also support on-bank recreational areas, such as beaches, campgrounds, picnic areas, and fishing piers. Figure 1-1a displays the major rivers of the Sacramento/Delta, and Figure 7.18-1a shows them in relation to state and national parks.

Regulated river flows are affected by upstream management of reservoirs and dams to allow for consistent releases that benefit recreationists through increased usability and safety. Rivers with unregulated flows can have more variable flows for recreationists to navigate but also provide benefits primarily in winter and spring for whitewater boaters. The large rivers on the west slope of the Sierra Nevada (e.g., American River, Merced River, Tuolumne River) are some of the most

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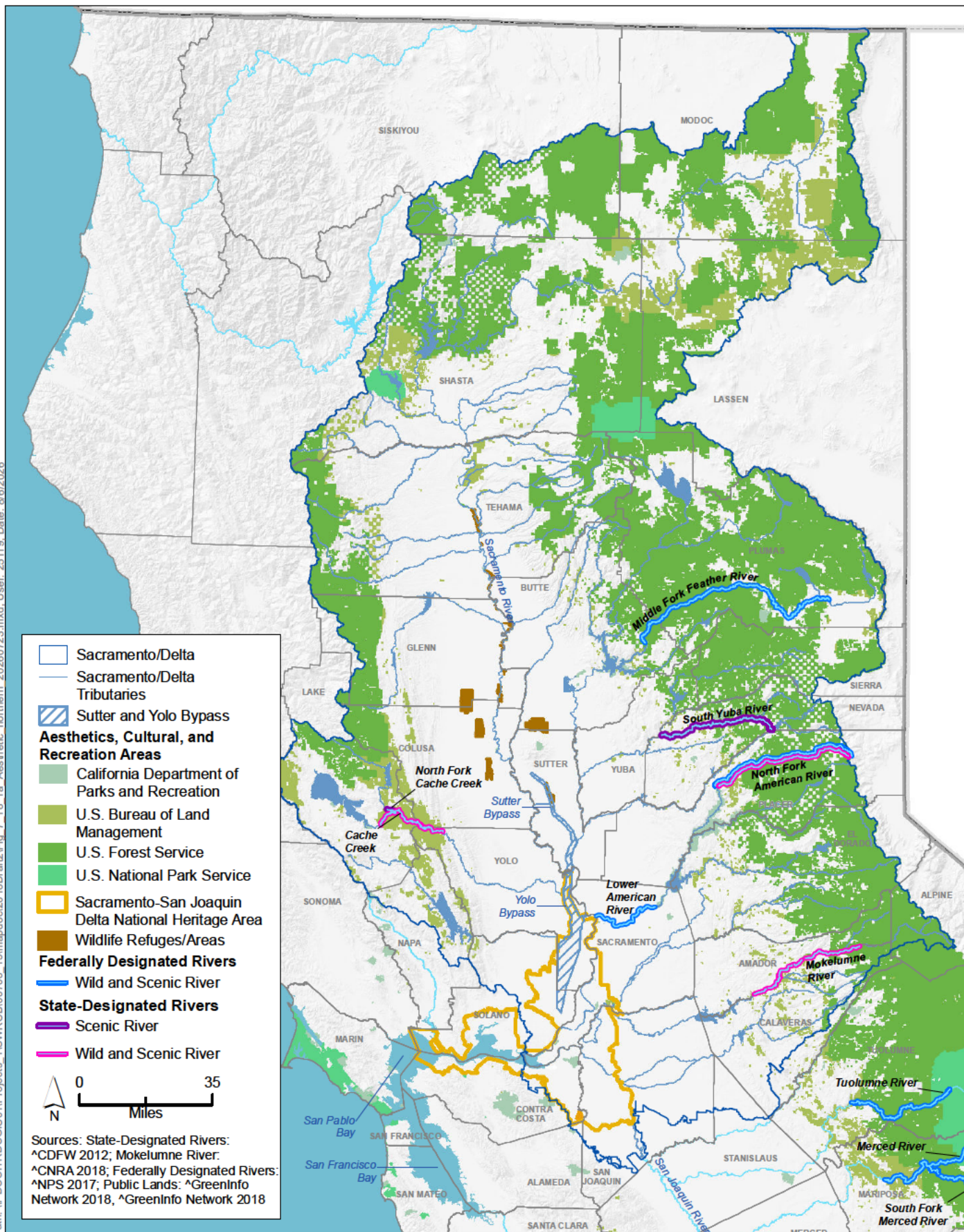


Figure 7.18-1a
Aesthetics, Cultural, and Recreation Areas in the Study Area (northern)

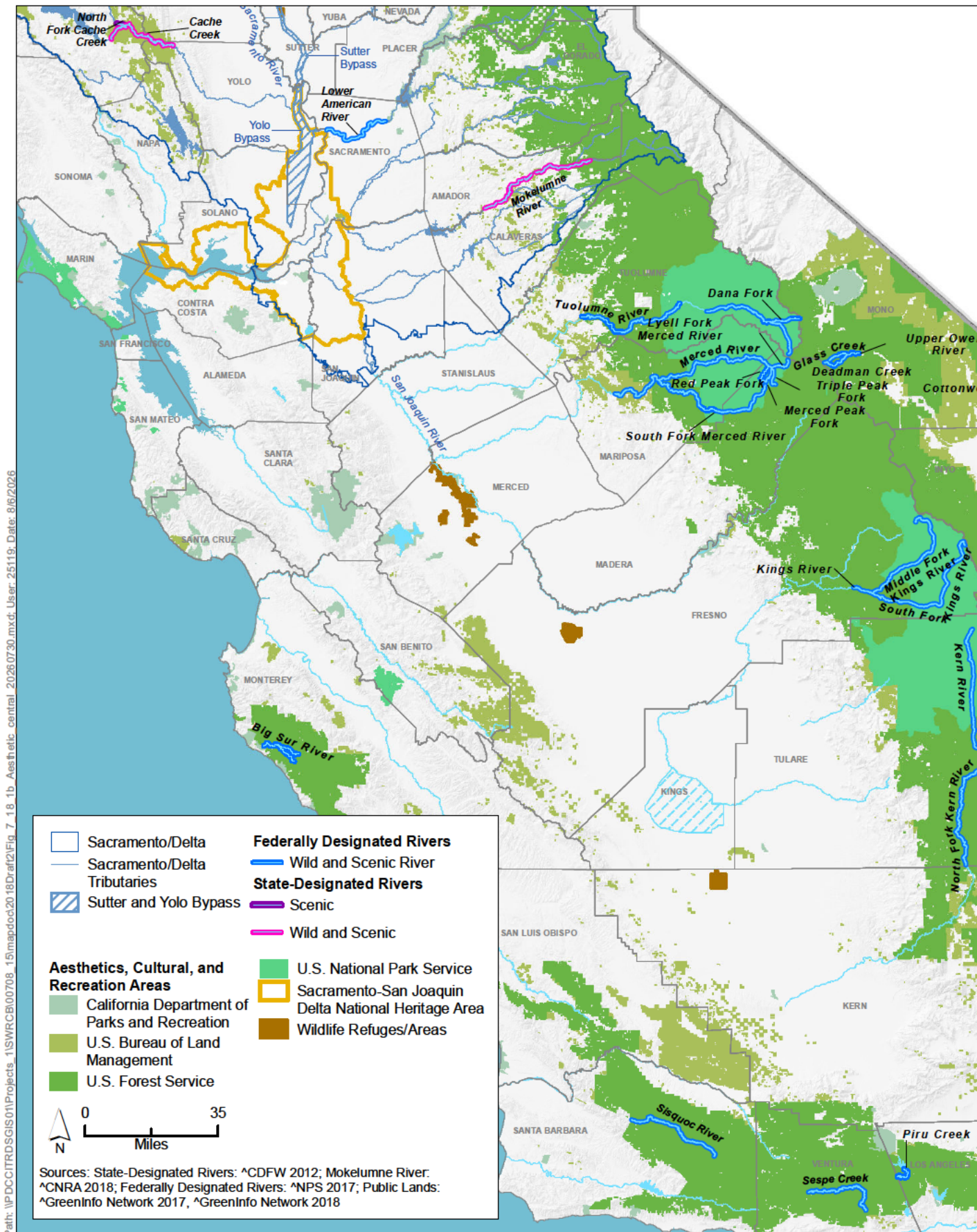


Figure 7.18-1b
Aesthetics, Cultural, and Recreation Areas in the Study Area (central)

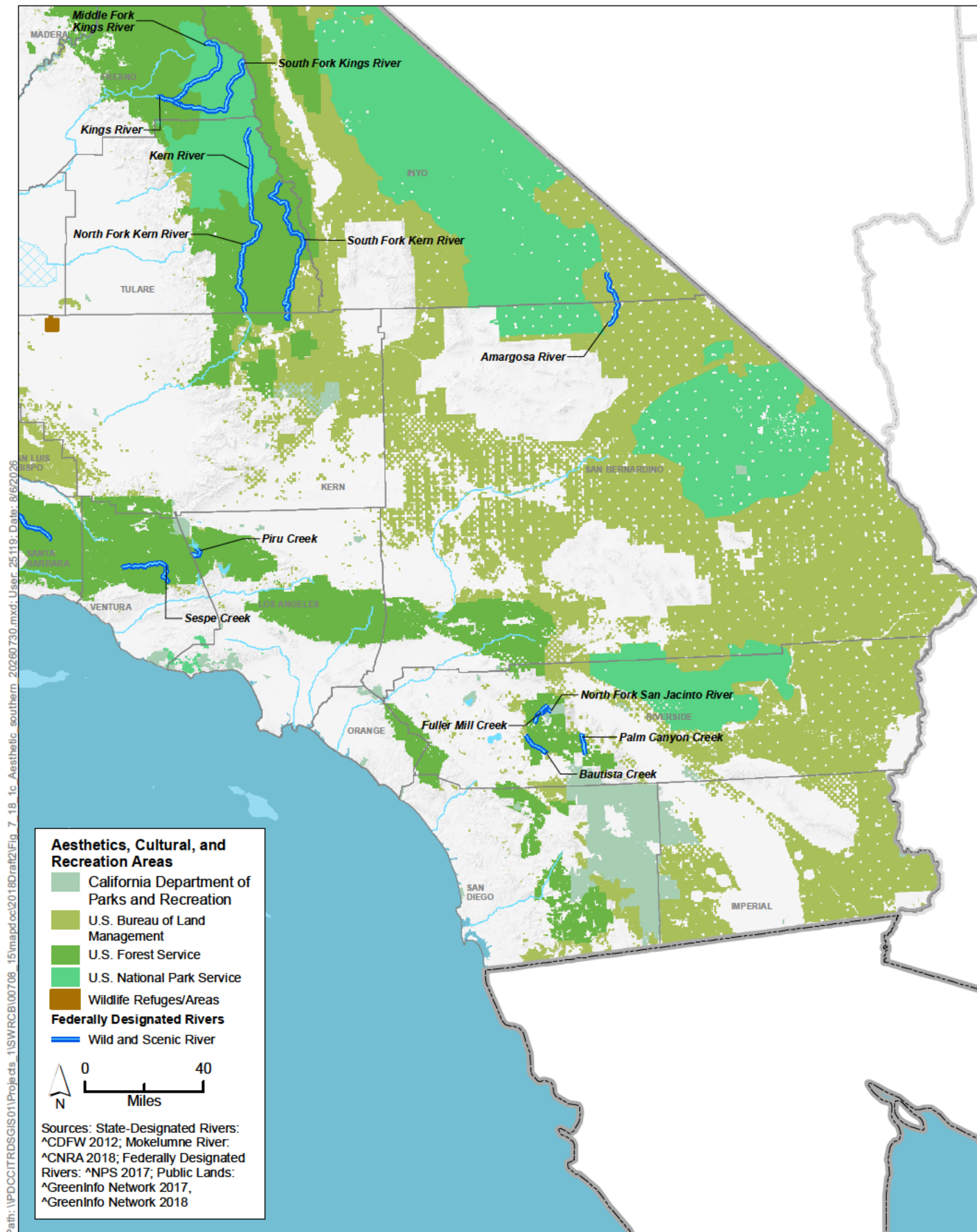


Figure 7.18-1c
Aesthetics, Cultural, and Recreation Areas in the Study Area (southern)

popular stretches for whitewater boating (Rafting.com 2023). Rafters and kayakers recreate on most rivers and creeks in the Sacramento River watershed and Delta eastside tributaries. In addition, rivers provide fishers a wide range of experiences, from fly-fishing in the headwater streams of the Sierra Nevada to casting for steelhead in the lower river reaches. Recreational facilities, such as campgrounds and picnic areas on riverbanks, currently experience inundation during periods of high river flows. The facilities in these locations are built to withstand inundation and retain accessibility to some areas. Certain locations on rivers, such as wide, shallow spots near the confluence of the American River and Sacramento River, are popular for swimming, wading, and floating.

Several tributary streams in these regions are state- or federally designated as Wild and Scenic or Scenic Rivers (Figure 7.18-1a). Wild and Scenic Rivers are those rivers that possess extraordinary scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Within the Wild and Scenic Rivers designation, those rivers designated as *recreational* are rivers, or sections of rivers, that are readily accessible by road or railroad that may have some development along their shorelines and that may have undergone some impoundment or diversion in the past (NWSRS n.d.).

Recreational uses of rivers in other regions in the study area (i.e., San Francisco Bay Area [Bay Area], San Joaquin Valley, Central Coast, and Southern California) are similar to those described for the Sacramento River watershed and Delta eastside tributaries regions. Figures 7.18-1b and 7.18-1c identify designated Wild and Scenic Rivers in these other geographic regions.

Table 7.18-1 shows the miles of national Wild and Scenic Rivers and state Wild and Scenic Rivers classified for recreation on rivers in the study area.

Table 7.18-1. Wild and Scenic Rivers with Recreation Designation in the Study Area

	Miles of River	
	Federal	State
Sacramento River Watershed		
American River	22.82	22.96
Middle Fork Feather River	35.51	0.00
Cache Creek	0.00	5.75
South Yuba River	0.00	8.18
Total	58.33	36.89
Delta Eastside Tributaries		
Mokelumne River	0.00	9.43
San Joaquin Valley		
Tuolumne River	13.00	0.00
Merced River	35.50	0.00
Kings River	15.50	0.00
Kern River	20.90	0.00
Total	84.90	0.00
Southern California		
Piru Creek	3.00	0.00
Owens River Headwaters	6.20	0.00
Amargosa River	6.30	0.00

	Miles of River	
	Federal	State
Surprise Canyon Creek	1.80	0.00
Deep Creek	11.00	0.00
Whitewater River	4.60	0.00
Fuller Mill Creek	0.90	0.00
North Fork San Jacinto River	0.70	0.00
Bautista Creek	9.80	0.00
Total	44.30	0.00

Sources: ^CDFW 2012; ^CNRA 2018; ^NPS 2017.

7.18.2.2 Reservoirs and Parks

Reservoirs in the Sacramento River watershed and Delta eastside tributaries regions offer several water-based recreational opportunities, such as swimming, windsurfing, boating, and sportfishing, as well as land-based recreational opportunities such as hiking and biking along the shore. Figure 6.3-25 shows key reservoirs in the Sacramento/Delta, and Figure 7.18-1a shows waterways in relation to state and national parks. Peak visitation for boating, swimming, jet-skiing, house-boating, camping, and other water-based and land-based recreation at reservoirs varies among reservoirs. The majority of use typically occurs during summer months, between Memorial Day and Labor Day; therefore, the analysis focuses on the months of May to September (i.e., the recreation season).

Beaches, boat ramps, trails, access roads, and picnic areas add to the recreation experience at reservoirs. These types of recreational facilities are prevalent around the shorelines of reservoirs.

Sportfishing is a popular activity at reservoirs (e.g., Shasta, Oroville), involving cold water species such as salmon and trout (e.g., Chinook salmon, rainbow trout) and warm water species such as bass, crappie, and sunfish. Statewide, it is common for salmon and trout to be stocked in reservoirs throughout the year (CDFW 2021a).

Boating is one of the most prominent forms of recreation on reservoirs, including motor boating for tubing, water-skiing, house-boating, and jet-skiing. Boating-related activities on reservoirs depend on access to the water by boat ramps; if reservoir water elevations fall below certain thresholds, these activities can become restricted if one or more boat ramps become unavailable for use.

Recreational facilities in other regions of the study area include reservoirs, waterways, and national and state parks in the San Joaquin Valley, Central Coast, and Southern California regions (Figures 7.18-1b and 7.18-1c). Reservoirs receiving Sacramento/Delta supply (export reservoirs), such as San Luis Reservoir and Lake Castaic, support recreation. Recreational activities at export reservoirs are similar to those described for the Sacramento River watershed and Delta eastside tributaries regions, such as boating, swimming, jet-skiing, sportfishing, swimming, and windsurfing at reservoirs. On-bank or near-shore recreation includes hiking, camping, wildlife viewing, and hunting in the areas surrounding the waterbodies and parks throughout these regions.

Many reservoirs are located within, or adjacent to, national, state, regional, or local parks that are used for land-based recreation. The California Protected Area Database, an online resource, provides a visual representation of open spaces or parks from over 1,000 public agencies and nonprofit

organizations throughout California.¹ State parks and lands owned and operated by the U.S. Forest Service, National Park Service, and Bureau of Land Management can be found throughout the study area. National forests and parks often are used for camping, hiking, backpacking, and viewing iconic scenes of nature. State parks provide for a range of recreational uses, from boating, swimming, and sportfishing in reservoirs to hiking and mountain biking in forests. These areas provide opportunities for water-based activities where there is a water resource.

City and county parks are classified as any open space maintained for recreational public use; these include playfields for various sports, baseball diamonds, playgrounds, and more (^GreenInfo Network 2017, ^GreenInfo Network 2018).

Local and regional parks not associated with prominent waterbodies afford opportunities for land-based recreation such as bike riding, hiking, camping, wildlife viewing, and hunting. A portion of Sacramento/Delta water exported from the Delta supports municipal recreational facilities such as parks, swimming pools, and golf courses.

7.18.2.3 Delta and Bay Waterways

The Delta is recognized as a “unique cultural, recreational, [and] natural resource.” (Pub. Res. Code § 29702, subd. (a).) It is a major recreational destination and “a place for people, homes and businesses, and a place filled with human history, cultural richness and diversity” (^Visit CA Delta 2017). These qualities not only help define the “Delta as an evolving place” concept, as identified in the Delta Reform Act of 2009, but also help establish the unique character of the Delta as a recreational destination. Additionally, the Delta was recently established as a National Heritage Area—the first in California—a designation that will further regional efforts to preserve, enhance, and educate the public about the natural and historical resources of the Delta, including aspects that contribute to recreation and heritage tourism (DPC 2019,). The Delta National Heritage Area extends from the Delta region into the Bay Area region, including portions of Suisun Marsh and the San Francisco Bay (Figure 7.18-1a).

Navigable waterways in the Delta are publicly accessible and support a variety of recreational opportunities—boating, hiking along shores, bird watching, and sportfishing. Private and public marinas support water-based and land-based recreation around the marinas (^DSC 2011). Waterway activities include sailing, water-skiing, motorized boating, kayaking, and windsurfing. Fishing can occur year-round on boats or from shore; popular sportfish include American striped bass, white sturgeon, Chinook salmon, American shad, catfish, and largemouth bass (^DSC 2011).

The recreational areas and facilities that border the Delta and Suisun Marsh are a buffer between these areas and the urban development nearby. Much of the recreation in these areas surrounding urban centers is indirectly related to the Delta because the scenic value of the Delta and Suisun Marsh supports urban recreational facilities such as golf courses, sport fields, and picnic areas for residents (^DSC 2011).

Numerous parks, extensive public lands, and waterways in the Delta and Suisun Marsh provide areas for wildlife viewing, bird watching, hiking, and hunting (Figures 7.18-1a and 7.18-1b). There are more than 125,000 acres of public wildlife areas and several private hunting clubs in the Delta

¹ The California Protected Areas Database (a GIS dataset depicting California parks and open space lands) is available online at calands.org.

(^DSC 2011). Parks and wildlife areas in the Delta include the Yolo Bypass Wildlife Area, Lower Sherman Island, and Cosumnes River Preserve.

The San Francisco and San Pablo Bays in the Bay Area region connect the Delta to the Pacific Ocean. Water-based recreational activities on the bays include boating, windsurfing, fishing, and sailing. Both bays are designated for contact and non-contact recreational beneficial uses by the *Water Quality Control Plan for the San Francisco Bay Basin* (^San Francisco Bay Regional Water Quality Control Board 2019, Chapter 2). A number of national and state parks and other locally designated recreational areas support hiking, biking, and sightseeing near the bays and throughout the region (Figures 7.18-1a and 7.18-1b).

In the Bay Area region, sportfishing is for saltwater species such as rockfish, Pacific halibut, and striped bass. The area also supports crabbing for Dungeness crab and rock crab. Fishing seasons depend on fish populations and California Department of Fish and Wildlife regulations to maintain species (CDFW 2018,).

7.18.2.4 Wildlife Refuges and Agricultural Lands

Wildlife refuges are set aside to protect wildlife and habitat and, in some instances, to create a space for public use such as recreational opportunities for hiking, hunting, photography, bird watching, and sportfishing (NWRA n.d.). Wildlife refuges may have federal, state, or local levels of protection. In the study area, the Sacramento River watershed and San Joaquin Valley are the only geographic regions with wildlife refuges that receive Sacramento/Delta water supplies (Figures 7.18-1a, 7.18-1b, and 7.18-1c).

The Sacramento River watershed includes the Sacramento National Wildlife Refuge (NWR), Delevan NWR, Colusa NWR, and Sutter NWR. This region also includes the Gray Lodge State Wildlife Area (WA). The San Joaquin Valley includes the San Luis NWR Complex, Kesterson NWR, and Merced NWR and the Los Banos State WA, Volta WA, Mendota WA, and North Grasslands WA. Chapter 2, *Hydrology and Water Supply*, and Section 7.6.1, *Terrestrial Biological Resources*, discuss these areas further. These parks and wildlife refuges support land-based recreational activities such as hiking and bird watching. Agricultural land, such as rice fields, can indirectly support recreation by providing habitat for waterfowl and other wildlife. Rice fields are predominantly present in the Sacramento River watershed, including Glenn, Colusa, Yolo, Sutter, Yuba, and Butte Counties (Figure 7.4-4a). Wildlife watchers may come year-round, and duck hunters may visit the fields and adjacent wildlife refuges during hunting season.

7.18.3 Impact Analysis

CEQA refers to existing neighborhood and regional parks or other *recreational facilities* for the evaluation of recreation impacts. While water-dependent recreation opportunities are not typically referred to as a *facility*, they are considered as such for the purpose of this analysis and are evaluated to determine whether implementation of the proposed Plan amendments would increase the use “such that substantial physical deterioration of the facility would occur or be accelerated.” This section evaluates how changes in hydrology (flows and reservoir levels) and changes in water supply (reduced Sacramento/Delta supplies) could affect the recreational use of rivers, reservoirs, wildlife refuges, or other recreation areas. Effects could occur because a recreation area may become less attractive for recreation (e.g., when there is less wildlife to view at a refuge) or less functional (e.g., when lake level and boat ramps are not accessible). These reduced recreational

opportunities are not by themselves physical impacts on the environment requiring CEQA analysis. They may, however, lead people to use other, less affected (or unaffected) recreational facilities. If this new demand leads to degradation of the alternate facilities, that damage may be a significant adverse impact on the physical environment. For example, if lake levels consistently fall below boat ramps at one reservoir, boaters may go to a nearby lake where levels remain high. This influx of new users might accelerate deterioration of the ramps and docks, or other facilities, thus causing an environmental impact.

Changes to flows and reservoir levels may limit recreational opportunities (e.g., boating) and use at certain locations at certain times, which may in turn increase recreational activities at other locations as users seek new opportunities to replace those lost. This analysis focuses on the likely location and magnitude of such changes and whether the potential increased use of other recreational facilities would cause substantial physical deterioration at those facilities. Reduced Sacramento/Delta supply is evaluated for potential effects on recreation activities associated with agricultural land and wildlife refuges (e.g., birdwatching, hiking) and municipal recreational facilities. Changes in water supply include other water management actions in response to reduced Sacramento/Delta supply that also are evaluated.

Changes in hydrology and changes in water supply would not result in a substantial increase in population or, therefore, in recreational use, because they would not result in development of housing or other population-inducing development (e.g., job centers) (see Section 7.16, *Population and Housing*). The Sacramento Water Allocation Model (SacWAM) results for reservoir storage and streamflow were used to inform the general trends in reservoir storage and river flows at recreational locations. SacWAM results for changes in agricultural, refuge, and municipal water supply also inform the discussion of potential effects on recreational wildlife viewing associated with refuges and agricultural lands and use of outdoor municipal recreation facilities such as playfields and swimming pools. See Chapter 6, *Changes in Hydrology and Water Supply*, and Appendix A1, *Sacramento Water Allocation Model Methods and Results*.

Section 7.21, *Habitat Restoration and Other Ecosystem Projects*, and Section 7.22, *New or Modified Facilities*, describe and analyze potential recreation impacts from various actions that involve construction.

Impact REC-a: Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated

Changes in Hydrology

Rivers/Streamflows

Implementation of the proposed Plan amendments is expected to improve water quality conditions over a large geographic area, particularly for fish and wildlife beneficial use in the Delta. As such, recreational opportunities that are supported by healthy rivers and a functioning watershed (e.g., swimming, fishing) are expected to be improved overall.

Changes in flows would vary by tributary, although flows would remain within the historical range of flows observed (see Chapter 6, *Changes in Hydrology and Water Supply*) both within the rivers and interior to the Delta, with peak flows and higher flows during winter storms and during the snow

melt in spring and lower flows during late summer and fall in some tributaries. Changes in flow could affect water-based recreational opportunities in the rivers of the Sacramento/Delta, such as when flows are lower or higher than optimal for boating or swimming. Higher flows also could inundate and reduce access to existing on-bank recreational facilities (e.g., campsites), and lower flows could reduce boating access to rivers on boat launch ramps. Section 6.3.1, *Flows*, provides a summary of SacWAM results for flows on regulated and unregulated tributaries, through flood basins, as well as Delta inflows and outflows. Appendix A1, *Sacramento Water Allocation Model Methods and Results*, provides detailed SacWAM results for all tributaries.

Higher flows in Sacramento/Delta tributaries could increase the number of popular locations for whitewater rafting and kayaking and could expand the length of the season for those activities (i.e., increase the number of boatable days) compared with baseline conditions, including on recreational Wild and Scenic Rivers. These changes in hydrology would provide a benefit to these recreational activities. Some tributaries could have lower flows during summer months, which could increase or decrease the boating difficulty of rapids for rafting and kayaking; however, opportunities would still be available in existing locations, such as the American River and other locations in the Sacramento River watershed and Delta eastside tributaries regions. While some recreationists looking for more technical or difficult whitewater rafting conditions may decide to move to other locations, the existing capacity of facilities in the region is expected to be sufficient such that any increased use by these recreationists would not be expected to cause substantial physical deterioration of these facilities. This impact would be less than significant.

Overall, the proposed plan amendments would have little effect on swimming and wading opportunities. Additional flow could provide more opportunities for swimming and wading, especially in tributaries that are more impaired (see Chapter 2, *Hydrology and Water Supply*), early in summer by providing deeper pools and better water quality. In some cases, however, increased flows could reduce opportunities for swimming or wading in rivers in spring; faster flows and stronger currents in some locations could become unsafe for swimming or wading. In addition, increases in the magnitude of flows relative to the baseline condition generally would occur in February through June, which is relatively early in the swimming season. If any recreationists move to other river locations or reservoirs as a result of these changes, those recreationists likely would go to dispersed locations such that the number of people is unlikely to be substantial enough to physically deteriorate those alternate locations. Flows in the later, warmer months of summer, although reduced on some tributaries that currently release artificially high flows for water diversions, would be closer to flows that would occur under the baseline condition. Swimming and wading opportunities would largely continue to be available at their current locations. Users would be unlikely to shift to other locations in sufficient numbers to substantially degrade those alternate facilities. Therefore, the impact related to swimming and wading as a recreational activity would be less than significant.

Streamflows in tributaries that do not have storage reservoirs (e.g., Battle Creek, Big Chico Creek, Cosumnes River) would generally remain unchanged through the range of flows under the proposed Plan amendments. Boating and swimming opportunities could increase in summer months as flows are restored. There would be no impact on these tributaries.

It is unlikely that increased flows during spring months could substantially damage any existing on-bank recreational facilities below the high-water mark, such as canoe or kayak access points,

including on recreational Wild and Scenic Rivers.² These facilities, like many recreational facilities constructed in proximity to rivers, are capable of withstanding periodic inundation by higher flows. Overall, any inundation as a result of implementing the flow requirements would be within the historical range. Accordingly, a change from the baseline condition is not expected, and there would be no inundation impact on recreation or associated facilities beyond what is currently experienced.

Reservoir Levels

Changes in reservoir water elevations could affect access to the water from established recreational facilities (e.g., boat ramps, piers) or reduce the reservoir surface area, potentially resulting in increased recreational use (e.g., boating, sportfishing) in other areas. Reservoir recreational use often decreases as receding water levels reduce water surface area, making boat ramps less accessible or useful, and creating conditions where recreational facilities are farther from shorelines. Lower water levels at any of the reservoirs could affect the recreational facilities and activities by precluding or limiting lake access from existing facilities such as marinas, boat launch ramps, and beaches or by creating less desirable day use and camping areas due to increased distances from the lowered water levels.

Sacramento/Delta

Surface water elevations for reservoirs fluctuate throughout the year. Upper watershed reservoirs and rim reservoirs historically experience substantial changes in water elevation based on operational needs and hydrology. Most of the changes in reservoir elevations resulting from changes in hydrology would be within the historical ranges; however, elevations could be lower more frequently (see Section 6.3.2, *Reservoir Storage and Elevation*, for further discussion on changes to reservoir elevations).

During the recreation season (May through September), the water elevation could be lower in some reservoirs, which could affect recreational opportunities in some locations. However, in many locations, boat ramps and other water access points would still be accessible. Reservoirs often have boat ramps with multiple launching lanes designed to enable access to the water at varying lake levels. For example, at Folsom Lake, some boat ramps are accessible when the water level exceeds 369 feet (Folsom Lake Marina 2017). SacWAM results suggest that water levels would stay above this elevation more frequently under the proposed Plan amendments than under the baseline condition. However, some boat ramps located at higher elevations, such as at Rattlesnake Bar, may not be accessible as frequently. There would be similar trends at Lake Shasta. Boat ramps with launching lanes at varying lake levels, such as Centimudi and Jones Valley, would be expected to remain accessible during the recreation season, although higher elevation ramps such as at Bailey Cove may not be accessible as frequently during late summer. Overall, for the May through September recreation season, water levels could be lower at some reservoirs than baseline conditions, which could lead to some boat ramps being inaccessible more frequently. These impacts would be particularly significant during critical and dry water years. Because recreation is considered a beneficial use of water in the Bay-Delta Plan and other basin plans, and is an important public use of these reservoirs, this impact would be potentially significant.

As discussed in Chapter 5, *Proposed Changes to the Bay-Delta Plan for the Sacramento/Delta*, the proposed Plan amendments would require reservoir operators in the Sacramento/Delta to develop

² The high-water mark is that point on a riverbank or surrounding land marking the peak height of high water, typically, but not always, resulting from flood flows (USGS 2017).

and implement long-term strategies and annual operations plans for approval by the State Water Board to implement the cold water habitat objective. That process would reduce changes in reservoir drawdown. However, some uncertainty exists regarding the precise implementation measures for the cold water habitat objective.

In addition to cold water habitat implementation, implementation of Mitigation Measures MM-REC-a: 1 and 2 will reduce or avoid recreation impacts associated with changes in reservoir levels in the Sacramento/Delta. Mitigation Measure REC-1.i requires reservoir operators in the Sacramento/Delta to include measures to avoid or reduce impacts on recreation in their long-term strategies and annual operations plans for cold water habitat objective implementation. In addition, Mitigation Measure MM-REC-a: 1.ii which incorporates Mitigation Measure MM-AQUA-a,d: 1.i-ii will reduce recreation impacts at reservoirs. All reservoir owners and operators are subject to existing regulatory requirements that protect water quality in reservoirs and streams below reservoirs. In exercising its regulatory authorities, the State Water Board will consider recreation and ensure that any recreation impacts are avoided or reduced. Reservoir owners and operators also should implement other recreation management actions to further minimize potential impacts. In limited instances, recreation impacts may result even with mitigation or where mitigation activities take time to implement effectively. Therefore, recreation impacts from changes in reservoir levels remain potentially significant.

To the extent that implementation of Mitigation Measure MM-REC-a: 2 results in actions to modify or rebuild boat ramps, there could be temporary effects similar to those of construction actions addressed in 7.22, *New or Modified Actions*. Section 7.22 describes standard mitigation measures for construction activities that could reduce the impacts to a less-than-significant level. However, unless and until the mitigation measures are fully implemented, the impacts remain potentially significant.

As explained in Section 7.6.2, *Aquatic Biological Resources*, the proposed Plan amendments would have a positive impact on native fish species and sportfish in streams below reservoirs in the Sacramento River watershed and Delta eastside tributaries regions. In reservoirs with unchanged or little-changed elevations, the amount of sportfishing would not change because both cold water and warm water fisheries would remain consistent with existing conditions. For reservoirs in the plan area, the proposed narrative objective to maintain cold water storage for the Sacramento/Delta tributaries (see Chapter 5, *Proposed Changes to the Bay-Delta Plan for the Sacramento/Delta*) would benefit not only cold water species but also warm water species by maintaining end-of-September storage, which would benefit warm water habitat with regard to water elevations.

In some reservoirs, potential changes in water surface area and elevation could affect fish habitat. Reservoirs in the study area provide sportfishing for cold water species such as salmon and trout (frequently maintained by stocking [CDFW 2021a]) and warm water species such as bass, crappie, and sunfish. The potential reduction in reservoir levels is not expected to reduce fishing opportunities at these reservoirs: trout populations would be maintained due to stocking, bass would move into deeper water (Martin 2017), and sunfish are tolerant of many habitats and conditions (SCDNR 2020; University of California 2021). Anglers likely would not need to seek opportunities elsewhere because of changes in reservoir levels. Although occasional drawdowns could affect sportfish populations, based on the temporary nature of the drawdowns and the benefit of maintaining cold water storage, these drawdowns are not expected to change sportfish populations enough to result in a substantial number of anglers moving to other reservoirs. Even if some anglers did move to other reservoirs at certain times during certain years, this shift would not likely be in sufficient numbers of anglers to result in substantial deterioration of recreational

facilities at alternate locations. To the extent that a small number of people do turn to other locations, many locations in the study area offer sportfishing opportunities, as discussed in Section 7.18.2, *Environmental Setting*. Based on the minimal impact on fishing opportunities within the study area, the number of recreational sites within the state (CDFW 2021b), and the small number of people traveling to other facilities, locations should be able to absorb increased use without experiencing substantial physical deterioration. This impact would be less than significant.

San Francisco Bay Area, San Joaquin Valley, Central Coast, Southern California Reservoirs

Depending on operational needs, export reservoir levels may be reduced in the Bay Area and in other geographic regions south of the Delta that receive Sacramento/Delta supply. Reservoirs in these other regions also are used for recreation and could be affected during the recreation season at some locations. Export reservoirs likely would still have water levels high enough to accommodate boat ramp access for motorboats and docks for houseboats during most, or all, of the recreation season; lower water levels likely would not be so severe that users would shift to other reservoirs in sufficient numbers to result in substantial physical deterioration of facilities there. However, recreational access could be more limited, and this impact would be potentially significant. Export reservoirs receiving Sacramento/Delta supplies are not subject to the narrative cold water habitat objective and would not be required to develop and implement a long-term strategy and annual plan for reservoir operations that would consider recreation.

Implementation of Mitigation Measures MM-REC-a: 1.ii and 2 would reduce or avoid recreation impacts at export reservoirs. All reservoir owners and operators are subject to existing regulatory requirements that protect water quality in reservoirs and streams below reservoirs. In exercising its regulatory authorities, the State Water Board will consider recreation and ensure that any recreation impacts are avoided or reduced. Reservoir owners and operators also should implement other recreation management actions to further minimize potential impacts. However, unless and until the mitigation is implemented, any impact of changes in reservoir storage levels on recreation in export reservoirs in other regions (Bay Area, San Joaquin Valley, Central Coast, Southern California) that receive Sacramento/Delta supply remains potentially significant.

Harmful Algal Blooms

As discussed in Section 7.12.1, *Surface Water*, increased harmful algal blooms (HABs) could occur where there would be a substantial reduction in storage in reservoirs. HABs can pose a potential health risk to humans and animals through the release of cyanotoxins. Excessive growth of HABs, as can occur in surface waterbodies with ample nutrients, low flow, and elevated water temperatures, can limit recreational activities in those waterbodies due to concerns about public exposure to cyanotoxins. Response efforts include public education and notification to minimize exposure of pets and people to waterbodies containing HABs. Between 2016 and 2019, 11 lakes throughout California were closed to swimming or fishing due to HABs (SWRCB 2019). An incremental increase in potential HABs from changes in reservoir levels could cause closures to recreation in some waterbodies.

As discussed in Section 7.12.1, *Surface Water*, HABs and the proliferation of invasive aquatic plants affect surface waterbodies in the Delta under existing conditions; implementation of the proposed Plan amendments could incrementally increase the chances of HAB formation and bloom size and the production of invasive aquatic plants in some Delta channels at some times, particularly in the southern Delta. HABs, due to release of cyanotoxins, as well as invasive aquatic plants, can limit recreational opportunities in and adjacent to surface waterbodies in the Delta. Generally, excessive

growth of invasive aquatic plants can limit or interfere with boat and other watercraft access to recreation areas and fishing and create the potential for recreationists to move to alternate recreational facilities.

The Delta is a popular recreational destination. According to a study published in 2019 by the Delta Protection Commission, 16.6 percent of study participants who recreated in the Delta in the past 2 years reported participating in watercraft- and shoreline-based recreation activities in the southern Delta, which comprises the counties of Contra Costa, San Joaquin, and Alameda. The summer months from Memorial Day to Labor Day are the peak times for powerboating activities in the Delta, with the Fourth of July typically the single highest peak-use event of the year, followed by other summer weekends and special event days (CDBW 2003). If recreationists are unable to use some Delta recreation facilities as a result of HABs or excessive growth of invasive aquatic plants, they may relocate to similar nearby facilities where HABs and/or invasive aquatic plants are not present, which could result in increased recreational facility usage at neighboring waterways. In addition, some recreationists seeking alternate watercraft- and shoreline-based recreational opportunities may choose to visit waterbodies north of the Delta or in the San Francisco Bay area.

While the potential increased frequency of closures is not expected to result in a substantial number of recreationists moving to alternate recreational locations to the extent that it would physically deteriorate those alternate locations, due to significant public input on this topic, this impact conclusion is revised. Recreational access could be more limited, and recreation is an important public use of these Delta channels and reservoirs and is considered a beneficial use of water in the Bay-Delta Plan and other basin plans. Implementation of a cold water habitat objective would reduce changes in reservoir levels; however, some uncertainty exists regarding the precise implementation measures for the cold water habitat objective. In addition, export reservoirs receiving Sacramento/Delta supplies are not subject to the narrative cold water habitat objective and would not be required to develop and implement a long-term strategy and annual plan for reservoir operations that would consider recreation. The impact on recreation from incremental increases in HAB production would be potentially significant.

Implementation of Mitigation Measure MM-REC-a: 3 incorporates measures to avoid or reduce HABs and invasive aquatic weeds (Mitigation Measures MM-SW-a,f: 1, 3, 4, 5, and 7). HABs are a statewide water quality issue that exists independently of potential incremental impacts from the revised proposed Plan amendments. Several ongoing activities to address HABs, such as those coordinated by the FHAB Program, also could be employed to mitigate the impacts of the proposed Plan amendments. As explained in Section 7.12.1.2, *Environmental Setting (Surface Water)*, HABs can pose a potential health risk to humans and animals. The most immediate response efforts include public education and notification efforts to minimize exposure of pets and people to waterbodies containing HABs. The California Water Quality Monitoring Council maintains a website for the CCHAB Network that tracks HABs and provides information about how to respond to HABs, including information from USEPA on measures that should be implemented to prevent and respond to HABs in surface waters and drinking water supplies. The State and regional water boards also regulate discharges of nitrogen and phosphorus, which help control these discharges that contribute to HAB formation.

While the State Water Board and others are engaged in efforts to address HABs, those efforts will take time and may not fully resolve HAB issues, including the incremental impacts associated with the proposed Plan amendments, to a less-than-significant level. Unless and until the mitigation is fully implemented and proven effective, the impacts remain potentially significant.

Changes in Water Supply

Wildlife Refuges and Agricultural Lands

As discussed in Section 7.6.1, *Terrestrial Biological Resources*, reduced deliveries to wildlife refuges could result in reduced nesting habitat for Swainson's hawk, greater sandhill crane, and other species in the long term in the Sacramento/Delta and San Joaquin Valley. Fallowing and idling agricultural lands, as described in Section 7.6.1, could reduce rice production in Glenn, Colusa, Yolo, Sutter, Yuba, and Butte Counties—with a potentially significant impact on greater sandhill crane populations dependent on rice fields. In addition, reduced deliveries to wildlife refuges in the Sacramento River watershed and San Joaquin Valley could result in a reduction in greater sandhill crane wintering habitat over time. These conditions could reduce opportunities for wildlife viewing. If these and other wildlife species, particularly waterfowl, were affected as a result of reduced surface water supply to wildlife refuges, recreationists (e.g., hikers and birdwatchers) could shift to other areas and potentially affect alternate recreational facilities, including facilities at other wildlife refuges.

Overall, reduced surface water deliveries could affect wildlife populations at refuges. It is unlikely that such impacts would be concentrated at one or a few refuges. Because several wetland habitat refuge areas are located in the Sacramento/Delta and San Joaquin Valley (as discussed in Section 7.6.1, *Terrestrial Biological Resources*), it is unlikely that certain wildlife refuges in these areas would experience substantial physical deterioration due to increased numbers of recreationists displaced from other sites. Thus, any potential impacts on wildlife populations at wildlife refuges due to reductions in water supply would not sufficiently alter the distribution of recreationists among refuges to substantially degrade facilities at other refuges. This impact on the recreational use of wildlife refuges would be less than significant. In addition, Section 7.6.1 identifies mitigation measures that, if implemented, would further reduce potential impacts on waterfowl and shorebirds, including greater sandhill crane.

Municipal Recreation

Some municipal communities may be vulnerable to reduced Sacramento/Delta supply, particularly in dry years, if their water supply is not sufficient to meet demand. This is true for municipal use that relies primarily on one water source that is reduced under the proposed Plan amendments and that does not have access or funding to develop or use other supplies. Health and safety protection for municipal use is a serious issue and is addressed elsewhere in this report (see Section 7.20, *Utilities and Service Systems*). These instances are not widespread and would not lead to substantial deterioration of recreational facilities supporting additional use. Most municipalities have or are developing other water supplies to supplement reductions to surface water supplies and to ensure adequate water resources for their communities.

Reduced municipal water supply to geographic regions in the study area that are expected to experience the greatest reduction (i.e., Bay Area and Southern California) could lead to less water available for irrigating parks and playfields, potentially making them less desirable places to visit and leading to consolidation of use at other parks where irrigation continues. Many uses of playfields, however, such as soccer, can take place even if the grass has limited watering, assuming that the turf is properly managed (McAfee n.d.). Moreover, park managers are likely to make irrigation decisions with water supply issues in mind, spreading irrigation (and thus use) among parks or consolidating it at select parks, as appropriate to the jurisdiction's capacity. The state of

California has had previous experience in managing sports fields' water supply, such as during the 2015 drought when required to reduce water usage by 25 percent. Therefore, it is reasonable to assume that similar measures (e.g., installation of artificial turf or using collected rain or gray water to irrigate) would be implemented in response to reduced water supply (Wharton 2015). Although patterns of use at municipal recreational facilities could change—based on the park management and potential water conservation measures—changes are not expected to result in substantial deterioration of facilities supporting additional use.

Swimming pools are a source of municipal water consumption, not only for filling the pool but also for topping off water loss due to normal pool use and maintenance and water loss due to evaporation. Public swimming pools are popular recreational, as well as athletic and fitness, facilities—primarily during summer, although many cities host year-round pools. Reduced municipal water supply is unlikely to affect public swimming pools because the total water savings of pool closures would not be substantial. Once a pool is filled, it is not typically emptied and refilled seasonally; draining community/public pools is not recommended (County of San Diego n.d.) unless substantial maintenance is required. Thus, the biggest water use of a swimming pool, the initial filling, is a “sunk cost” that would not be saved by closure. A recent study by the Pacific Institute on water use in residential pools in Los Angeles concluded that water use and losses from swimming pools are relatively low compared to total water use (Gleick 2013). It is estimated that a covered swimming pool uses more than five times less water than a traditional landscape (e.g., lawn) and provides even greater savings over a drought-tolerant landscape (Flaccus 2015). Thus, even in geographic regions in the study area that may be affected more than others (i.e., the Bay Area and Southern California), public pool closures would be unlikely. Furthermore, even if pools were closed and users were displaced to other pools, managers would plan such closures to consolidate use at facilities with capacity. Maximum occupancy limits would additionally protect the remaining pools from substantial degradation due to the additional use. Although such limitations could leave some users with reduced recreational opportunities, changes are not expected to result in substantial deterioration of facilities supporting additional use. The impact of reduced water supply on municipal recreation opportunities would be less than significant.

Other Water Management Actions

In response to reduced surface water supply, water users may increase their use of other water management actions, including groundwater storage and recovery, water transfers, water recycling, and water conservation. Groundwater storage and recovery would be unlikely to affect recreational resources. Parks with large grassy areas could utilize direct precipitation to catch basins or infiltration areas facilitating passive groundwater recharge and stormwater management (City of Bellingham 2021). Where this takes place, it is reasonable to assume that groundwater recharge would occur during periods of precipitation (i.e., fall and winter seasons); and because the water would be directed away from the playfields, they would not likely become flooded. Groundwater storage under agricultural lands would not result in impacts on recreational facilities because recreational facilities typically are not located in agricultural fields. Therefore, groundwater recharge would not be considered an adverse effect on recreational opportunities, nor would groundwater recharge be expected to result in substantial physical deterioration of alternate recreational facilities.

Water transfers would be unlikely to affect recreational resources at reservoirs or those in or adjacent to rivers. Some of the facilities used for water transfers are not recreational facilities (e.g., canals); therefore, their use would not affect recreation. Depending on the timing and location of a

transfer, it is possible that transfers could improve recreation opportunities, such as an increased instream flow from a transfer in summer. The magnitude of incremental changes in reservoir storage, total diversions, or river flows at the downstream end of the rivers from water transfers compared with the overall volume of these waterbodies is so small that the effect of a transfer may not even be perceptible by a recreationist. There would be minimal to no displaced recreational users and therefore no substantial physical deterioration of alternate facilities.

Water recycling would be unlikely to affect recreational resources. Use of recycled water from existing facilities for irrigation of parks would not affect park use. Recycled water could serve as another water supply that could help with irrigation at parks and benefit recreation. Many waterbodies receive tertiary-treated wastewater effluent that supports recreational and other beneficial uses downstream of these discharges. Use of recycled water could remove quantities of this water from the stream and could affect instream recreational beneficial uses. However, the effect on recreational uses would not be expected to displace a substantial number of recreational users; therefore, no substantial physical deterioration of alternate facilities would occur.

Finally, water conservation has the ability to stretch municipal supply, thereby potentially benefiting associated municipal recreational facilities such as parks and playfields.

There would be no impact on recreation and recreational facilities from increased use of other water management actions.

Impact REC-b: Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment

Most of the actions associated with changes in hydrology would not include recreational facilities or require construction or expansion of recreational facilities. Although flows could increase in tributaries, the inundation of on-bank facilities (e.g., campgrounds) is not expected to vary greatly from the baseline or existing condition or to be outside the historical range. Accordingly, the current on-bank facilities are capable of withstanding periodic inundation from higher flows based on their previous performance under historical periods of inundation. Therefore, changes to tributary flows would not result in a need for construction of new or expanded recreational facilities.

As analyzed in Impact REC-a, reservoir levels generally are not expected to drop so low as to affect access to boat ramps or docks. However, some reservoirs could experience periods of lower water elevation that, when compared to baseline conditions, would result in associated boat ramps or docks becoming inaccessible (see discussion of *Reservoir Levels* under Impact REC-a). These locations may require construction or expansion of recreational facilities. Any replacement or modification of ramps would be under the control of individual reservoir operators. Construction related to replacement or modification of boat ramps could result in adverse physical effects on the environment. Impacts would be potentially significant.

Implementation of Mitigation Measure MM-REC-b, which incorporates mitigation measures from Section 7.22, *New or Modified Facilities*, will reduce or avoid impacts associated with construction of new or modified boat ramps. Construction of new or modified facilities, including new or modified boat ramps, is evaluated in Section 7.22. Section 7.22 describes standard mitigation measures for construction activities that could reduce potential impacts to a less-than-significant level. However, unless and until the mitigation measures are fully implemented, the impacts remain potentially significant.

None of the following actions from changes in water supply would require construction or expansion of recreational facilities; therefore, there would be no associated physical effect on the environment: changes in agricultural land, reduced water supply to refuges and municipalities, increased groundwater pumping, groundwater storage and recovery, water transfers, water recycling, or water conservation. There would be no impact.

7.18.4 Mitigation Measures

MM-REC-a: Mitigate recreation impacts associated with reservoir level changes

1. Reservoir Management:

- i. Reservoir owners and operators should avoid or reduce impacts on recreation from changes in reservoir levels and must include measures to avoid or reduce any impacts on recreation in their long-term strategy and annual operation plans submitted for cold water habitat objective implementation.
- ii. All reservoir owners and operators are subject to existing regulatory requirements that protect water quality in reservoirs and streams below reservoirs, including export reservoirs. In exercising its regulatory authorities, the State Water Board will consider recreation and ensure that any recreation impacts are avoided or reduced. (Mitigation Measure MM-AQUA-a,d: 1.i-ii).

2. Recreation Management Measures: Owners and operators of reservoirs and other recreational facilities should implement management actions to avoid or minimize substantial temporary or permanent impairment, degradation, or elimination of recreational facilities that causes users to be directed toward other existing facilities.

- i. Coordinate with affected public and private recreation providers to direct displaced users to under-utilized recreational facilities.
- ii. Provide additional operations and maintenance of existing facilities to prevent deterioration of these facilities.
- iii. If possible, provide temporary replacement facilities.
- iv. If the increase in use is temporary, once use returns to existing conditions, rehabilitate or restore degraded facilities.
- v. Where impacts on existing facilities are unavoidable, compensate for impacts through mitigation, restoration, or preservation of off-site facilities or creation of additional permanent new replacement facilities.

3. Protect Water Quality and Avoid or Reduce Harmful Algal Blooms and Invasive Aquatic Weeds: Implement Mitigation Measures MM-SW-a,f: 1, 3, 4, 5, and 7 to reduce potential impacts of changes in hydrology that could result in incremental increases in harmful algal bloom formation and affect recreation.

MM-REC-b: Mitigate impacts from construction or expansion of recreational facilities (boat ramps)

1. Implement MM-REC-a to avoid or reduce potential for recreation impacts associated with changes in reservoir levels.
2. If construction of new or modified boat ramps is necessary, implementation of mitigation measures described in Section 7.22, *New or Modified Facilities*, will reduce or avoid construction-related impacts.

7.18.5 References Cited

7.18.5.1 Common References

- ^California Department of Fish and Wildlife (CDFW). 2012. *California Wild and Scenic Rivers* (State Public Resource Code [PRC] Designations Only). Available: <https://www.wildlife.ca.gov/Data/GIS/Clearinghouse>. Accessed: September 11, 2017.
- ^California Natural Resources Agency (CNRA) . 2018. Mokelumne River Wild and Scenic Reaches. Available: <https://fte.water.ca.gov/owncloud/index.php/s/YUGwGVkFN2aukrP>. Accessed: October 2, 2018.
- ^Central Valley Regional Water Quality Control Board (Central Valley Water Board). 2019. *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region*. Fifth Edition. Revised February 2019.
- ^Delta Stewardship Council (DSC). 2011. *Delta Plan, Program Environmental Impact Report*. Draft. Sacramento, CA.
- ^GreenInfo Network. 2017. CPAD California Protected Areas Database. Available: <http://www.calands.org>. Accessed: January 1, 2018.
- ^GreenInfo Network. 2018. CPAD California Protected Areas Database. Available: <http://www.calands.org>. Accessed: December 17, 2018.
- ^National Park Service (NPS). 2017. *Federally Designated Rivers*. Available: https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_WildScenicRiverSegments_01/MapServer. Accessed: August 9, 2017.
- ^San Francisco Bay Regional Water Quality Control Board. 2019. San Francisco Bay Basin (Region 2) *Water Quality Control Plan (Basin Plan)*. Oakland, CA.
- ^Visit CA Delta. 2017. *About Visit CA Delta*. Available: <https://visitcadelta.com/about/>. Accessed: September 29, 2018.

7.18.5.2 Section References

- California Department of Boating and Waterways (CDBW). 2003. *Sacramento – San Joaquin Delta Boating Needs Assessment 2000–2020*. December.

- California Department of Fish and Wildlife (CDFW). 2018. *Current California Ocean Recreational Fishing Regulations*. Available: <https://www.wildlife.ca.gov/Fishing/Ocean/Regulations/Fishing-Map/SF-Bay>. Accessed: January 12, 2018.
- California Department of Fish and Wildlife (CDFW). 2021a. *Fish Planting Schedule*. Available: <https://nrm.dfg.ca.gov/FishPlants/>. Accessed: March 9, 2021.
- California Department of Fish and Wildlife (CDFW). 2021b. *Fish Guide*. Available: <https://apps.wildlife.ca.gov/fishing/>. Accessed: March 9, 2021.
- City of Bellingham. 2021. *Ball Field Infiltration Basin*. Available: <https://stormwater.cob.org/tour-squalicum-creek-park/site-ball-field-infiltration-basin/>. Accessed: April 23, 2021.
- County of San Diego. n.d. *Swimming Pool Operator's Guide*. 1st Edition. County of San Diego Department of Health Food and Housing Division.
- Delta Protection Commission (DPC). 2019. *Recreation & Tourism in the Delta: A Study of Preferences for Activities and Facilities, Information Sources, and Economic Contributions of Delta Events*. California State University, Sacramento. May.
- Flaccus, G. 2015. *A Look at Competing Math on Pools versus Lawns*. Phys.org. Available: <https://phys.org/news/2015-06-math-pools-lawns.html>. Accessed: October 8, 2018.
- Folsom Lake Marina. 2017. *Folsom Lake Launching Ramps*. Last Revised: October 22, 2017. Available: <http://www.folsomlakemarina.com/Ramps.html>. Accessed: November 20, 2017.
- Gleick, P. 2013. *Water Policy: What about All Those Swimming Pools in Los Angeles?* Pacific Institute. Available: <http://pacinst.org/water-policy-what-about-all-those-swimming-pools-in-los-angeles/>. Accessed: October 10, 2018.
- Martin, Hugo. 2017. *California's Lakes Are Full Again but Fishing Remains in a Drought*. Los Angeles Times. July 3, 2017. Available: <https://www.latimes.com/business/la-fi-fishing-drought-20170703-story.html>. Accessed March 9, 2021.
- McAfee, James. n.d. *Managing Sports Fields in Drought/Adverse Conditions*. AgriLife Extension Services, Texas A&M System.
- National Wildlife Refuge Association (NWRA). No date. *Recreation*. Available: <http://refugeassociation.org/what-we-do/friends-groups-engagement/recreation/>. Accessed: April 13, 2017.
- National Wild and Scenic Rivers System (NWSRS). No date. *About the WSR Act*. Available: <https://www.rivers.gov/wsr-act.php>. Accessed: April 13, 2017.
- Rafting.com. 2023. *Whitewater Rafting Guide to River Trips, California*. Available: <https://www.rafting.com/california/>. Accessed: April 19, 2023.
- South Carolina Department of Natural Resources (SCDNR). 2020. *Fish Species – Freshwater*. Available: <https://www.dnr.sc.gov/freshwater.html>. Accessed March 9, 2021.
- State Water Resources Control Board (SWRCB). 2019. *California Harmful Algal Blooms (HABs) Portal*. Available: <https://mywaterquality.ca.gov/habs>. Accessed: May 24, 2023.

U.S. Geological Survey (USGS). 2017. *High-Water Marks and Stream Stage*. Available: <https://water.usgs.gov/edu/highwatermarks.html>. Accessed: October 1, 2018.

University of California. 2021. *California Fish Species, Sacramento Perch*. Available: <http://calfish.ucdavis.edu/species/?uid=81&ds=241>. Accessed March 9, 2021.

Wharton, David. 2015. *Drought Spurs Sports to Look at Water Use on Fairways and Fields*. Los Angeles Times. June 7, 2015. Available: <https://www.latimes.com/local/california/la-sp-sports-drought-20150608-story.html>. Accessed: March 9, 2021.