Sacramento River Basin

"The future of California is joined at the hip with the Sacramento River."

— University of California geologist Jeff Mount, Ph.D.

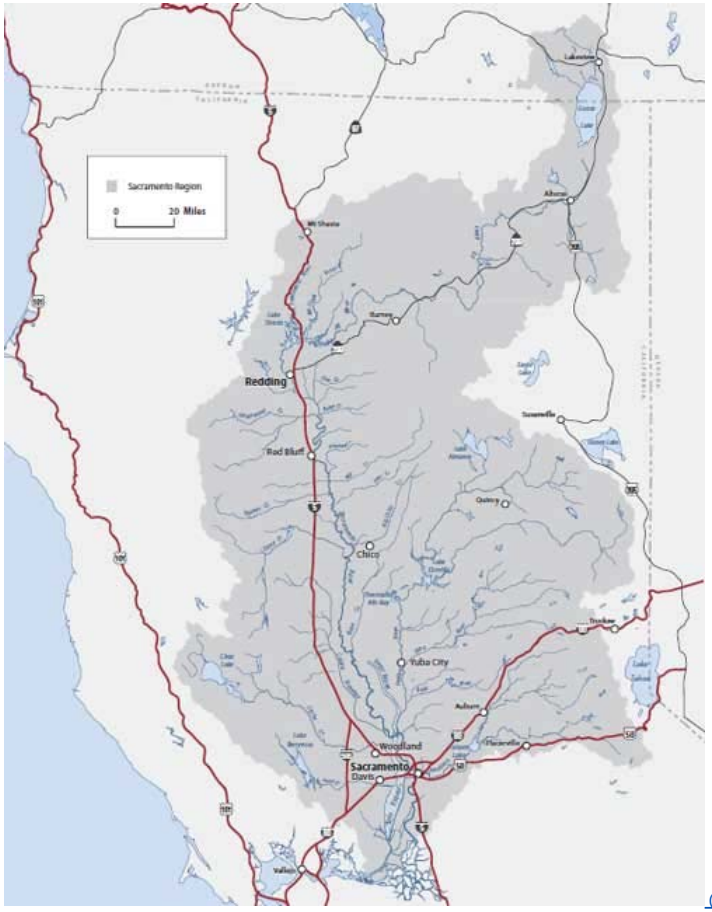
The Sacramento River is the largest river and watershed system in California (by discharge, it is the second largest U.S. river draining into the Pacific, after the Columbia River). This 27,000–square mile basin drains the eastern slopes of the Coast Range, Mount Shasta, the western slopes of the southernmost region of the Cascades, and the northern portion of the Sierra Nevada. The Sacramento River carries 31% of the state's total surface water runoff. Primary tributaries to the Sacramento River are the Pit, Feather, and American Rivers.

The Sacramento River Basin provides drinking water for residents of northern and southern California, supplies farmers with the lifeblood of California's agricultural industry, and is a vital organ for hundreds of wildlife species, including four separate runs of Chinook salmon. It is also the home of more than 2 million northern Californians. From the mountains, to the valley, to the small towns and cities, it is the place where we live, work, and play.

Hydrology

The Sacramento River Basin lies between the Sierra Nevada and Cascade Range in the east and the Coast Range and Klamath Mountains in the west. Its source waters rise in the volcanic plateaus and ranges of northern California as three rivers: the Upper Sacramento, McCloud, and Pit. These three rivers join in the waters of Lake Shasta, a 4.5 million acre-foot reservoir formed by Shasta Dam. From the dam the Sacramento River winds approximately 30 miles south through the foothills between Redding and Red Bluff. Many small and moderate-sized tributaries join the river from both east and west, including Clear, Cottonwood, Cow, and Battle Creeks. At Red Bluff a large portion of its flow is diverted into canals that deliver irrigation water to agriculture south in the Sacramento Valley. The Sacramento River continues to meander south, where it is joined by Antelope, Mill, and Deer Creeks in eastern Tehama County, and by Stony and Big Chico Creeks south of Chico. Butte Creek merges with the

Sacramento River near Colusa and the Sutter Buttes, a group of isolated volcanic hills in the middle of the Sacramento Valley. The Sacramento River is joined by its largest tributary, the Feather River, at Verona. About 10 miles downstream, the Sacramento River flows through the city of Sacramento and receives the American River, its second largest tributary. Here the river divides into the mainstem and the Sacramento Deep Water Ship Channel, constructed for navigation by cargo ships. Both waterways eventually rejoin in the estuary of the Delta near Rio Vista. The mouth of the Sacramento River is at Suisun Bay near Antioch, where it combines with the San Joaquin River. The Sacramento River, now nearly a mile wide at its mouth, flows into San Francisco Bay and finally joins the Pacific Ocean under the Golden Gate Bridge in San Francisco.



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Hydrology in the Sacramento River Basin

Water Quality

Water quality protection and improvement are principal management issues throughout the Sacramento River Basin. While each individual watershed area has its own set of water quality concerns, priority issues for the basin overall can be summarized as:

- potential for aquatic life toxicity and domestic supply impacts resulting largely from agricultural chemical use in the Sacramento Valley;
- mercury and methylmercury levels that are absorbed into and accumulate in the aquatic food chain;
- accelerated erosion of stream channels and uplands that affects sediment transport rates and causes problems from

sediment deposition; and
- temperature impacts on coldwater species resulting from loss of riparian cover canopy, streamflow diversion, and waste discharges.

The Sacramento River itself is considered to have relatively clean water that supports a wide variety of beneficial uses. However, in the Sacramento River Basin are numerous lakes, rivers, and streams (including the Sacramento River) that are state and federally listed (Clean Water Act Section 303(d) list) as impaired water bodies.

Mercury: A California Gold Rush Legacy

Throughout the Sacramento River Basin there are numerous lakes, rivers, and streams currently on the Clean Water Act Section 303(d) list of impaired water bodies for mercury. Mercury enters waterways when soils erode, atmospheric dust falls to the ground, and mineral springs discharge. Another significant source is cinnabar ore (mercury sulfide) that was mined in the Inner Coast Ranges for elemental mercury (quicksilver). This liquid form of mercury was transported from the Coast Ranges to the Sierra Nevada for gold recovery where several million pounds of mercury were lost to the environment during the gold rush.

Today, contaminated mine sites, riverbanks, and debris basins are a legacy source of mercury, and the scale is daunting, with more than 47,000 abandoned mines in California. Liquid mercury is encountered today by large- and small-scale dredging operations in the rivers and streams once used to wash away unwanted waste from historical mine operations. In urban areas, municipal stormwater and sewage also contain mercury from various consumer products.

Why Mercury Is a Problem

Methylmercury is a potent neurotoxin, and thousands of people eat fish and shellfish from mercury-

Addressing the Mercury Problem

Government and land management agencies are tasked with cleaning up mercurycontaminated areas on public lands. Meanwhile, there are few incentives for voluntary private lands cleanup, and regulations regarding assessment and cleanup target levels are not always consistent or understandable. Reducing methylmercury levels in fish will require local, waterway-specific solutions because each waterway has its own unique set of mercury sources, land ownership patterns, and available resources. Both sources and the process of converting elemental mercury into methylmercury must be addressed. It takes less than half of a measuring cup of methylmercury to contaminate 3 million fish to levels above consumption advisories. That amount is a small fraction of the 1,500 pounds (which would fill 25 two-liter bottles) of all the mercury carried by the Sacramento River annually, which in turn is a minuscule portion of the 3 million tons (which would fill 40,000 truckloads) of sediment delivered by the river contaminated by that mercury.

Transformation of various kinds of mercury into methylmercury is a crucial step in the bioaccumulation process. An unfortunate irony is that more productive ecosystems such as wetlands and flooded agriculture

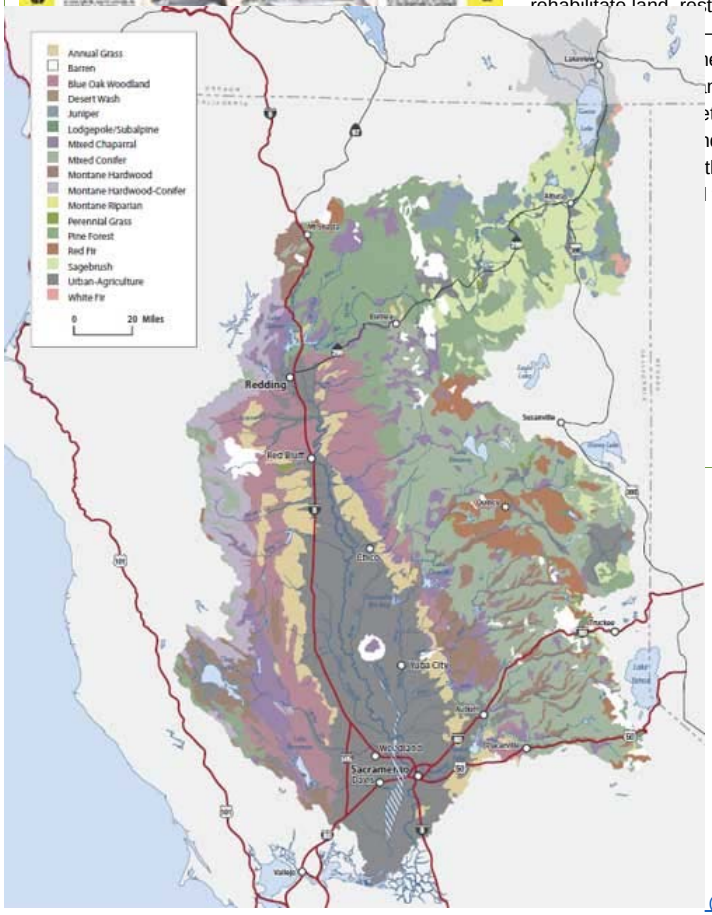
contaminated waterways in the Sacramento River Basin. Methylmercury is readily absorbed from water and food, and therefore concentrations multiply greatly between water and top predators of aquatic food chains. The cumulative result of this bioaccumulation is more than million-fold increases in concentrations of methylmercury in predatory fish such as bass and fish-eating wildlife such as terns and eagles.

tend to generate more methylmercury. A national survey by the USGS of 21 large watersheds across the U.S. demonstrated that methylmercury levels in fish were determined largely by methylmercury concentration in water, and that the percentage of wetlands in these watersheds was an important factor influencing methylmercury concentrations in water. The CALFED Program provided more than $30 million for scientific research into the status of mercury in the Delta and the mechanisms that control the formation of methylmercury. Now actions are needed to implement control measures. Proponents of projects—to rehabilitate land, restore riparian habitat, and manage —need tools and incentives to entally sound removal techniques nsport of mercury and its ethylmercury. Regulators need to nditions and to monitor over time their policies on project outcomes. to convey accurate, relevant

Vegetation

The Sacramento River Basin includes several distinct ecosystems. The Sacramento Valley floor consists largely of a mosaic of irrigated agriculture, wetlands, and riparian habitats. East and west of the valley, the foothills are primarily annual grasslands and oak woodland. Particularly on the west side of the valley, there are large tracts dominated by chaparral (brush species) that is overly thick and decadent as a result of the many years of fire suppression policy. With increasing elevation, the landscape consists predominantly of mixed conifer species such as pine, fir, and cedar. With regard to vegetation and watershed management, two dominant themes emerge for the basin overall:

- reducing forest fuel loads to decrease potential for catastrophic wildfire, and
- eradicating noxious and invasive plant species that are competing with native plant communities.



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Vegetation in the Sacramento River Basin

Fish and Wildlife

The Sacramento River Basin was originally rich with a multitude of avian and aquatic species. Modern-day development has reduced the populations of many species (especially those dependent on riverine habitat), while some species have flourished

under the changes in land and water use. Along the Sacramento River, the once-ample stretches of riparian and wetlands, supported by flooding and wide variations in flow, mostly have been replaced by agricultural lands and expanding urbanization. Fish and wildlife populations in the basin have been affected by water diversions for agriculture and urban areas, and pollution from a variety of sources.

Today, the Sacramento River Basin continues to support a diversity of fish and wildlife species, although the numbers are not as robust as they were with historical conditions. The health of the Sacramento River and its tributaries is critical to anadromous fish species such as Chinook salmon, steelhead, and sturgeon. Rivers and streams in the upper watersheds are vital for coldwater fish such as native trout. Located along the Pacific Flyway, the marshlands in the Sacramento Valley continue to be an important stop for migrating waterfowl. Both migratory and resident species rely on the complex of state and federal wildlife refuges that exist throughout the basin and on the vast acreage of irrigated agricultural land.

Pacific Salmon: King of California Fish

For hundreds of years, Pacific salmon have been part of California's natural landscape. Resilient and ever-determined, they face huge odds to travel from their inland birthplace to the open ocean, where they mature for several years before making the journey back home to spawn at the end of their lives. But salmon numbers have been dropping. In 2008 and 2009, the population of California's Chinook salmon was so low the state had to close sport and commercial salmon fisheries for the first time in history. Businesses failed, traditions were lost, and anglers were frustrated.

The Sacramento River represents by far the largest population of returning Pacific Chinook salmon. There are four distinct runs; fall, late-fall, winter, and spring, giving the Sacramento River the unique distinction of having some salmon in its waters year-round. Historically (1900s) maximum spawning runs in the Central Valley approached 2 million salmon, including 100,000 late-fall, 200,000 winter, 700,000 spring, and 900,000 fall run. Currently, Sacramento River salmon populations are at a historic low. In 2009, total Chinook populations were fewer than 69,000 salmon, including 50,000 fall, 10,000 late-fall, 3,800 spring, and 4,700 winter run. While numbers of all populations (called stocks) have been in serious decline, winter-run Chinook salmon are federally listed as endangered, and spring-run Chinook are listed as threatened. In terms of numbers and value to sport and commercial fisheries, fall-run Chinook salmon are most important and currently are listed as species of special concern.

Many factors have contributed to the decline over the past two decades, including predation by competing native and nonnative species, water quality and water exports in the Delta, commercial and sport harvest, and changing ocean conditions. Currently, state and federal fishery agencies are increasing monitoring efforts,

The locally directed watershed management programs discussed in this Roadmap document are making major contributions toward most of the practices recommended.

The Anadromous Fish Restoration Program is a major program currently underway in the Sacramento River and throughout the Central Valley. It is part of the 1992 enactment of the Central Valley Project Improvement Act, which directed the Secretary of the Interior to implement a program that makes all reasonable efforts to at least double natural production of anadromous fish in California's Central Valley. The major resulting program became known as the Anadromous Fish Restoration Program, and since 1995 the program has implemented more than 195 projects to restore natural production of anadromous fish. Only time will tell whether these efforts, together with those of the many partner watershed organizations working throughout the Sacramento River Basin, will result in restoring Pacific salmon populations to their desired prominence.

Life in the Watershed

undertaking restoration projects, and promoting management practices to protect core habitats and maintain genetic diversity. A recent DFG publication listed the following practices to benefit salmon in light of predicted habitat and climate changes in the years to come:

- maintain genetic diversity;
- protect coldwater sources;
- maintain habitat complexity;
- connect rivers/streams and floodplains;
- protect alpine meadows, springs, and riparian areas;
- limit interaction between hatchery and wild fish;
- temper extreme high and low flows; and
- restore estuaries, sloughs, and marshes.

In the upper watershed, much of the land area is managed by the U.S. Forest Service for multiple uses such as timber production, grazing, and recreation. Large tracts of mixed conifer forest are privately owned and used for commercial timber production. Particularly in the more arid north and east portions of the basin, high desert forest and sagebrush lands are managed by the Bureau of Land Management. Alluvial valleys in the upper watershed are mostly privately owned and used for irrigated agriculture and cattle ranching. Most of the Sacramento Valley is intensely cultivated, with some 2 million acres of irrigated farmland growing crops that include rice, wheat, orchard fruits and olives, corn, alfalfa, tomatoes, and vegetables. Along with the agrarian base, the basin is home to about 2.2 million people, almost half of whom live in the Sacramento metropolitan area. Other larger cities are Redding, Chico and Yuba City/Marysville. The Sacramento River Basin covers all or most of nine counties and extends into portions of 11 other counties.

The Sacramento River Basin includes large areas of forests such as the Mendocino and Trinity National Forests in the Coast Range, Shasta and Lassen National Forests in the southern Cascades, and the Plumas, Tahoe and Eldorado National Forests on the western slopes of the Sierra Nevada. The basin is also home to Lassen Volcanic Park, which covers 106,000 acres centered around Lassen Peak, the southernmost Cascade volcano. Whiskeytown- Shasta-Trinity National Recreation Area, which is over 200,000 acres in size, straddles much of the upper Sacramento and Trinity Rivers, centering around three popular human-made lakes—Shasta Lake, Trinity Lake, and Whiskeytown Lake. Many other state parks and recreation areas lie within the watershed.

Key Management Issues

The Sacramento River Basin includes a variety of habitats, landscapes, and cultures; however, management issues common throughout the basin can be summarized as follows:

- salmon/steelhead passage and habitat;
- wild trout, native fish;
- forest health and fire risk;
- aquatic and riparian habitat;
- water quality;
- water supply;
- flood management;
- open space and land conservation;
- erosion and natural stream function; and
- noxious and invasive species.

SUBREGION	WATERSHED	KEY MANAGEMENT ISSUES									
		Salmon / Steelhead	Wild Trout	Forest Health / Fuels Management	Aquatic / Riparian Habitat	Water Quality	Water Supply	Flood Management	Open Space / Land Conservation	Erosion / Natural Stream Function	Invasive Species
Northeast	Upper Sacramento River		■	■	■	■					
	McCloud River		■	■	■	■					
	Pit River		■	■	■	■	■			■	■
Westside	Clear Creek	■	■	■	■					■	
	Cottonwood Creek	■		■	■				■	■	
	Tehama West			■	■				■	■	■
	Stony Creek	■		■	■					■	■
	Cache Creek			■	■	■	■	■		■	■
	Putah Creek			■	■	■				■	■
Eastside	Tehama East	■		■	■				■		
	Stillwater/Churn Creeks			■	■	■			■		■
	Cow Creek	■		■	■	■			■		
	Bear Creek	■		■	■				■		
	Battle Creek	■		■	■	■			■	■	
	Mill Creek	■		■	■				■	■	
	Deer Creek	■		■	■			■		■	
	Big Chico Creek	■		■	■	■			■		
	Butte Creek	■		■	■	■	■	■			
Feather	Upper Feather River		■	■	■	■				■	
	Lower Feather River	■			■	■	■	■	■	■	
American	Upper American River		■	■	■	■					
	Lower American River	■			■		■	■			
	Yuba River	■	■	■	■	■		■			
	Bear River	■		■	■	■					
Sacramento Valley	Sacramento River Mainstem	■			■	■	■	■	■		

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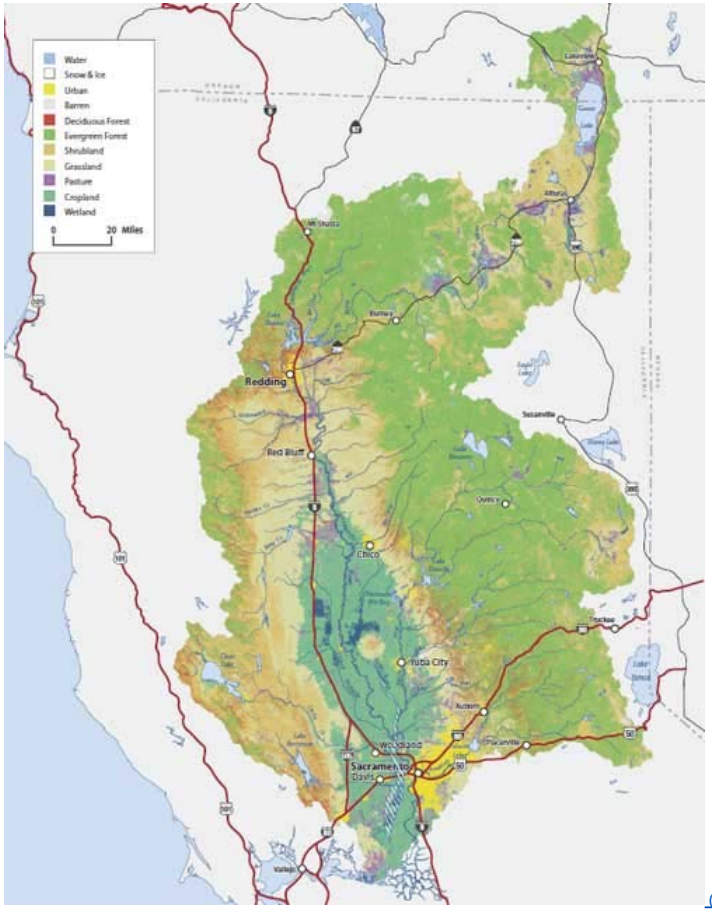

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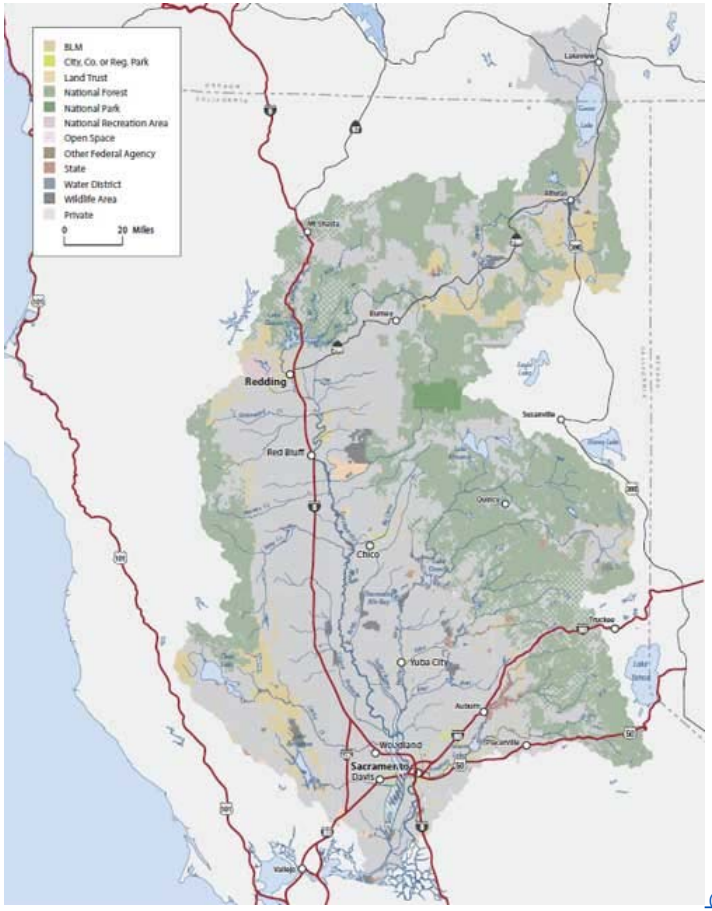
Land use in the Sacramento River Basin



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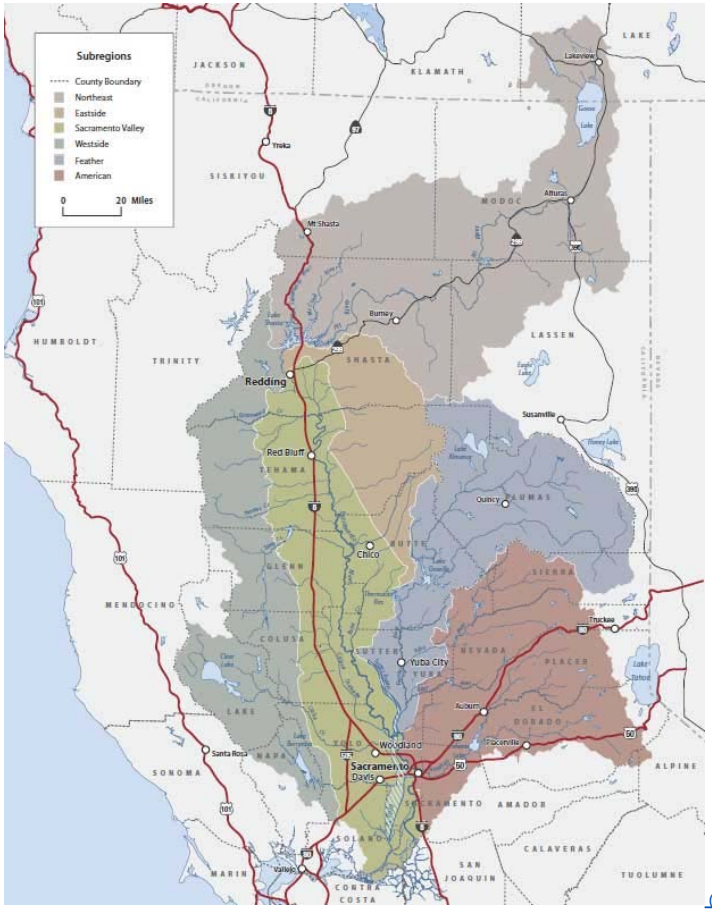
Land ownership in the Sacramento River Basin



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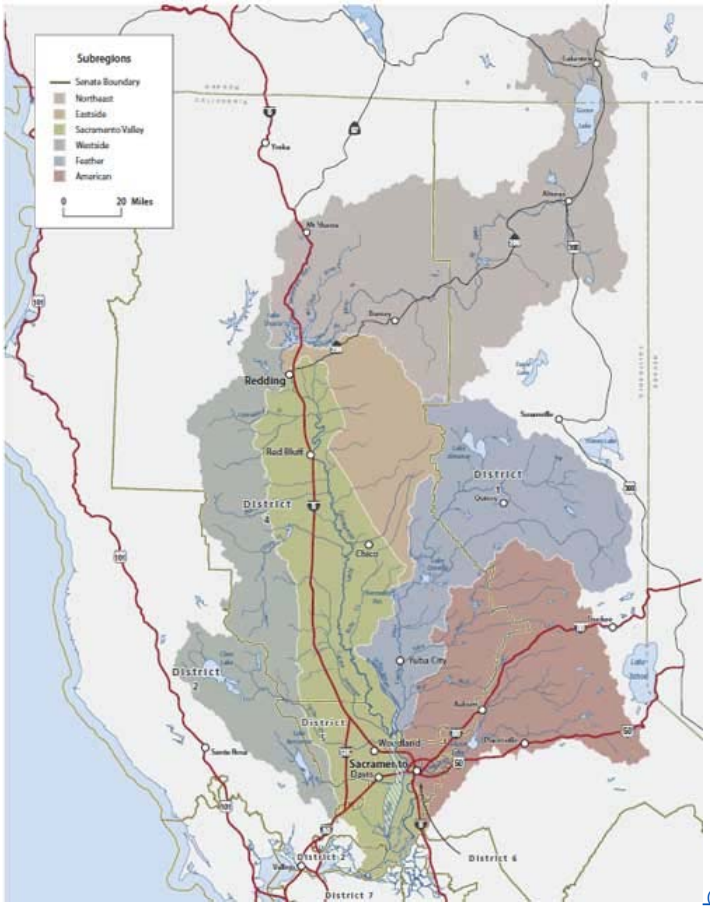
County boundaries in the Sacramento River Basin



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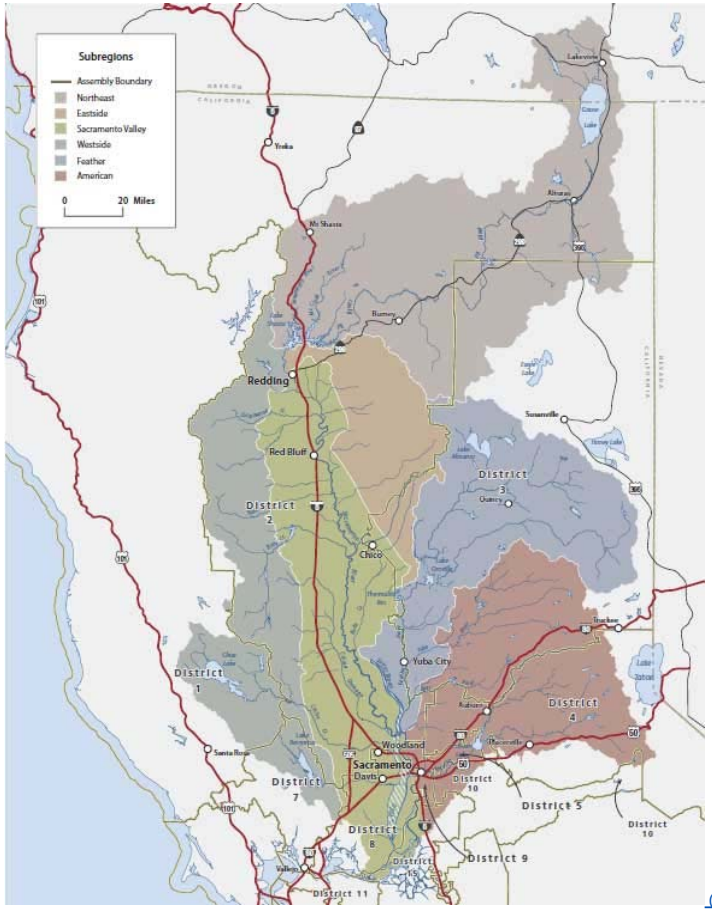
Senate boundaries in the Sacramento River Basin



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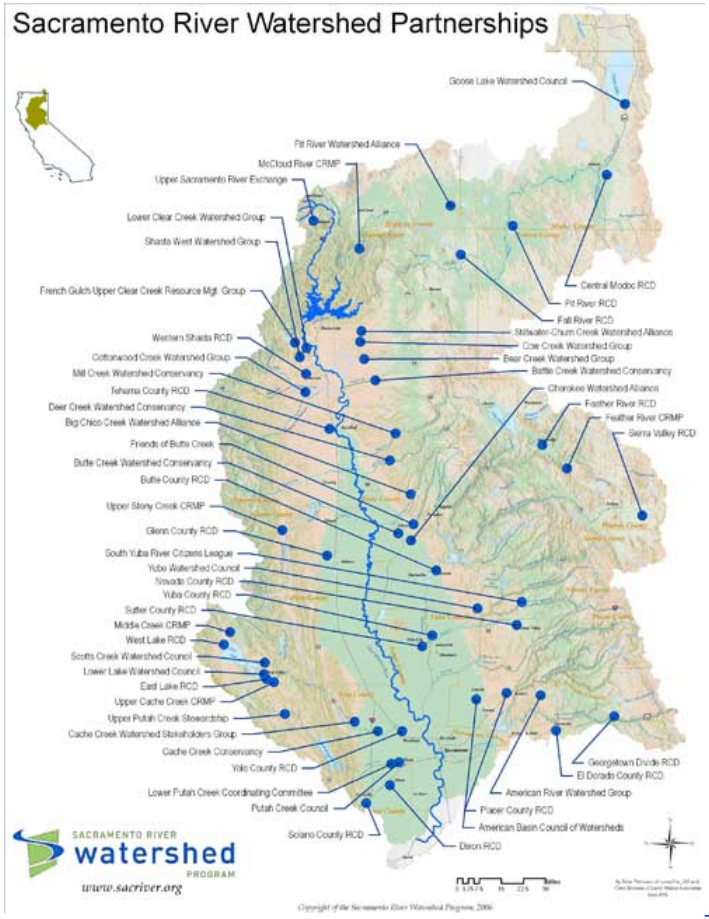
Assembly boundaries in the Sacramento River Basin



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Map of Sacramento River Basin partners

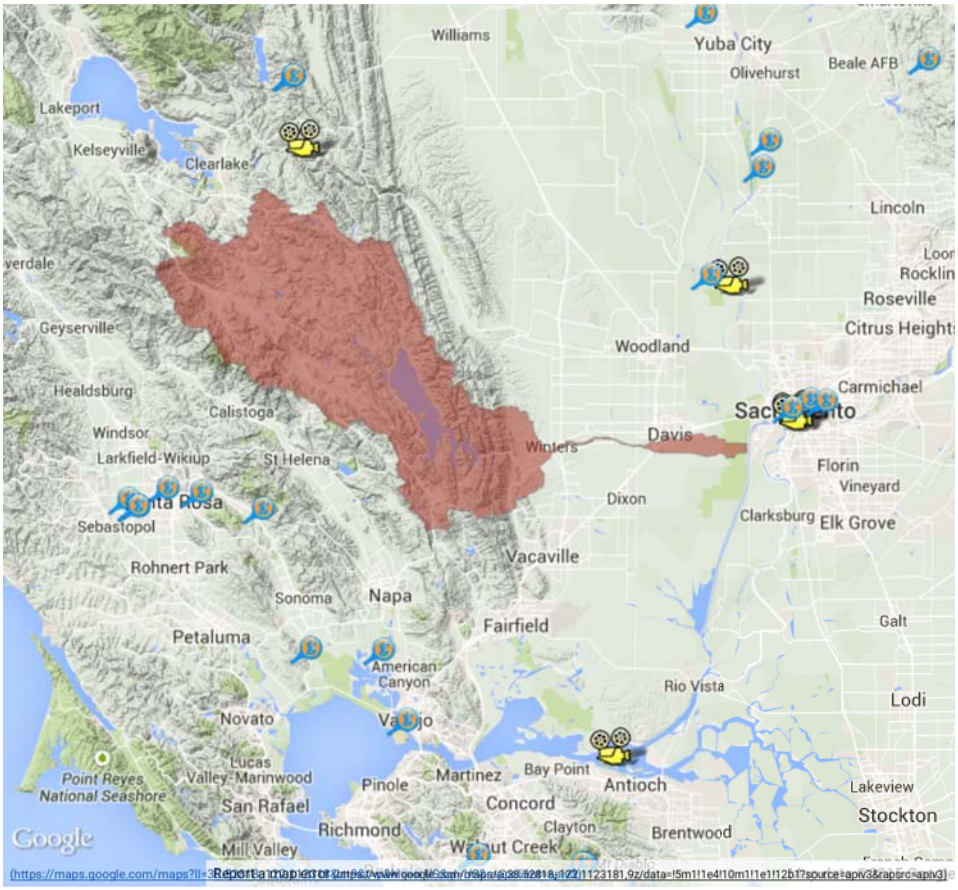
Sacramento River Basin Partners

In recent years locally directed watershed management in the Sacramento River Basin has grown to more than 60 individual programs (RCDs, watershed groups, CRMPs, etc.) covering virtually all tributary watershed areas in the basin. These programs work independently to protect and improve watershed conditions within their area of responsibility. SRWP provides a forum for this dynamic network of watershed programs and works with these partners to maintain a shared vision for the Sacramento River Basin. Collectively, these local management programs are making a vital contribution toward watershed protection and improvement and are assisting local, state, and federal resource agencies in achieving their individual program objectives. The Reference section provides contact information for these Sacramento River Basin Partners.

(/files/documents/roadmap/report/SacRiverBasin.pdf) *Download the PDF version of this chapter from the original report here (/files/documents/roadmap/report/SacRiverBasin.pdf) .*

Putah Creek Watershed

Google Map (/aboutwatershed/roadmap/watersheds/westside/putah-creek-watershed?quicktabs_1=0#quicktabs-1)



Hydrology

Putah Creek originates from springs on the eastside of Cobb Mountain in Lake County. It descends eastward to the town of Whispering Pines, where it turns southeast, paralleling State Route 175. Upper watershed tributaries include Bear Canyon, Dry, Helena, Crazy, Harbin, and Big Canyon Creeks. Putah Creek enters Napa County at the confluence with Hunting Creek about 11 miles east of Middletown. In Napa County, the creek merges with Butts Creek just before it empties into Lake Berryessa. This lake is formed by the Monticello Dam, the only major storage dam on the creek. Lake Berryessa has a capacity of 1,602,000 acre-feet of water, making it one of the largest reservoirs in California. The dam and lake are part of the BLM's Solano Project to provide water for irrigation, although it also supplies municipal and industrial water to major cities in Solano County.

Downstream of Monticello Dam, Putah Creek leaves Napa County and becomes the boundary between Yolo and Solano Counties. The stream continues east along State Route 128, meeting Pleasants, McCune, and Dry Creeks and passing through the town of Winters to reach Interstate 505. From there it continues eastward, paralleling Putah Creek Road to Stevenson Bridge Road. A few miles east of Davis, the county line turns south, but the creek continues eastward, passing south of Davis to feed into the Yolo Bypass about one-quarter mile west

The Watershed at a Glance

Putah Creek is 70 miles (113 km) long and has its headwaters in the Mayacamas Mountains, a part of the Coast Range. Putah Creek typically is divided into the upper watershed, which encompasses the 576–square mile area upstream of Monticello Dam, and the lower watershed, which consists of a considerably smaller but less precisely defined area between Monticello Dam and the Yolo Bypass. Approximately 90% of the total annual flow of Putah Creek measured at the confluence of Putah Creek and the Yolo Bypass originates from the upper watershed. The watershed supports a unique assemblage of natural communities, including serpentine chaparral, grasslands, oak savanna, oak and mixed oak/coniferous woodlands,

of the Sacramento Deep Water Channel.

The natural flow pattern of Putah Creek has been altered by water storage in Lake Berryessa, and spring through fall irrigation releases. Flows from Monticello Dam are high in summer and low in winter in all but the wettest years. The largest diversion is the Putah South Canal diversion at Putah Diversion Dam; this and other irrigation diversions reduce flows to very low levels in all but wet years. Until recently, flows near Davis were very low during summer and fall, generally 0 to 60 cfs. These lengthy periods of drying resulted in substantial fish deaths and a general depression of the overall fish population to the dismay of creekside landowners, conservationists, birders, nature lovers, and environmentalists.

On May 23, 2000, following 10 years of litigation related to streamflows for supporting fish and other natural resources, Putah Creek Council, City of Davis, and UC Davis signed on to a historic water accord with the Solano County Water Agency, Solano Irrigation District, and other Solano water interests to establish permanent surface water flows for the 23 miles of Putah Creek below the Putah Diversion Dam. Water is now released to Lower Putah Creek from Putah Diversion Dam to maintain a minimum flow for environmental protection; to meet valid water rights to the Interstate 80 bridge; and maintain continuous flow downstream to the western boundary of the Yolo Bypass. Approximately 32,000 acre-feet per year is required to be passed below the dam for environmental purposes. Another 200,000 acre-feet of Putah Creek water per year is diverted to Solano County farmers (about 75%) and urban users (about 25%).

Water Quality

The Putah Creek Watershed is rich in mineral deposits, and prospecting for mercury and gold has taken place in the watershed since the mid- 1800s. Natural weathering, mining waste, and venting from natural geothermal springs all have contributed to the introduction of mercury in the area's water bodies. Campus wastewater discharges from UC Davis and runoff from a U.S. Department of Energy Superfund site both contribute to the excessive mercury levels in Putah Creek. Putah Creek has been listed on the Clean Water Act Section 303(d) list of impaired water bodies for excessive mercury.

Lower Putah Creek also is affected by high turbidity from eroding tributary channels. The tributaries are adjusting to 20-foot-lower peak water surface elevations in the main channel compared with pre- Monticello Dam conditions. The cross-sectional area of tributary channels has increased approximately ten-fold in the post-dam era, and Lake Solano (7 miles below Monticello Dam) is filled to capacity with sediment. Loading of fine sediments degrades aquatic habitat by embedding gravel substrate.

Nonnative plant species commonly found in the watershed are eucalyptus, saltcedar (Tamarisk spp.), giant reed (Arundo donax), Himalayan blackberry, tree-of-heaven, perennial pepperweed, and invasive annual grasses. The predominant invasive annual weeds include star-thistle, Italian thistle, milk thistle, and wild oats.

In 2008, Solano County Water Agency on behalf of the Lower Putah Creek Coordinating Committee entered into an agreement with the CAL FIRE to use nursery facilities at the L.A. Moran Reforestation Center in Davis to propagate local ecotypes of native plants from seeds and cuttings collected in the Putah-Cache Bioregion.

Vegetation

The natural riparian forest in the Putah Creek Watershed is composed mostly of Central Valley mixed riparian woodland. Typical understory species include box elder, Oregon ash, white alder, Goodding and red willow, buttonwillow, mulefat, California nettle, wild rose, wild grape, and California blackberry. Typical canopy species include Fremont cottonwood, valley oak, and California sycamore. Canopy vegetation in the Riparian Reserve established by UC Davis is dominated by valley oaks and northern California black walnut. Arroyo willow and narrow-leaved willow are found on the streambanks closest to the water and within the annual flood zone.

Fish and Wildlife

The creek and its riparian vegetation are a refuge for wildlife that is otherwise rare or declining in the region, including the giant garter snake, the valley elderberry longhorn beetle, the northwestern pond turtle and Swainson's hawk. The Putah Creek Watershed is home to 220 bird species, 31 butterfly species, 14 species of reptiles and amphibians, and 31 species of mammals. Small mammals such as beavers, squirrels, and raccoons are abundant along the creek. Bears and mountain lions are sometimes spotted in the Putah Creek Riparian Reserve. During the spring and fall, the bushes along the creek are rich with migrating warblers and sparrows. Putah Creek also contains a large number of fish species. While the majority of these are introduced game fish, the creek still supports remnants of the onceabundant Central Valley native fish such as hitch, squawfish,

riparian, freshwater lake, and cliff habitats. As a result of historical mining, water quality in Putah Creek has been 303(d) listed as impaired for excessive mercury bioaccumulation in edible fish. Invasive weed and New Zealand mudsnail infestations are also an issue in the watershed. Major land uses around Putah Creek include rangeland and recreation. On an annual basis, Putah Creek has one of the highest rates of angler use per mile of any similar-sized streams in California. The Riparian Reserve established by UC Davis in1983 is a favorite spot for bird watching and picnicking.

Watershed Statistics

Watershed Size: 71 square miles

Watershed Length: ~70 miles

Average Annual Precipitation: 50 inches (upper); 17 inches (lower)

Elevation:

- Highest: 4,722 ft. (Cobb Mountain)
- Lowest: 13 ft. (Toe Drain)

Population: ~80,000

Management Issues: forest health/fuels management, aquatic/riparian habitat, water quality, erosion/natural stream function, invasive species

Counties: Lake, Napa, Solano, Yolo

and Sacramento suckers. Native rainbow trout still swim in the upper mountain reaches, and historically, Chinook salmon and steelhead spawned in the lower and middle portions of the creek. Putah Diversion Dam is now the upstream terminus of salmon and steelhead migration. Salmon attraction flows allow some spawning of anadromous fish even in years with limited runoff.

An invasive species that is of concern in this watershed is the New Zealand mudsnail. It was first discovered along Putah Creek in October 2003. It is thought that anglers are spreading this invasive species on wading gear between areas in the watershed. The New Zealand mudsnail can choke out other native snails and insects, deprive fish of their main sources of food, multiply rapidly, and damage fisheries and native habitats.

Life in the Watershed

The Putah Creek Watershed encompasses four counties: Lake, Napa, Solano, and Yolo. Land in the upper watershed is used mainly for recreation and rangeland. Putah Creek and its respective lakes offer excellent swimming holes, opportunities for boating, and trails for bicycling or jogging. Fishing is a major recreational activity in this watershed. On an annual basis, Putah Creek has one of the highest rates of angler use per mile of any similar-sized streams in California.

The major “industry” in the Lower Putah Watershed is UC Davis. UC Davis established the Riparian Reserve in 1983 to preserve creekside habitat on campus property for research, teaching, and wildlife habitat protection. The Putah Creek Riparian Reserve is approximately 640 acres, along 5.5 miles of Putah Creek, on the UC Davis campus. People have been visiting the reserve for years for bird watching and picnicking. The reserve is a natural haven for wildlife in an urbanized and agricultural landscape and presents a unique opportunity to conduct field research on a riparian system near the central campus.

Management Objectives

Although there are several organizations actively involved in managing Putah Creek Watershed resources, there is currently not a comprehensive management plan for the entire watershed. The Upper Putah Creek Stewardship helps to coordinate watershed management in the upper watershed. In the lower watershed, a management plan for the Putah Creek Riparian Reserve was developed in 2005 to guide the future direction of the reserve. Objectives of this management plan are:

- remove and control invasive species within the reserve;
- expand teaching use of reserve;
- expand research use of reserve;
- expand community awareness and appreciation of reserve and Putah Creek Watershed; and
- allow for public recreation, so long as it is done safely and does not conflict with above objectives.

Additionally, the Lower Putah Creek Coordinating Committee, with funding from the CALFED Watershed Program, developed a Watershed Management Action Plan in three parts: (1) Watershed Assessments (2005)—a scientific assessment of current conditions; (2) Stewardship Meetings to determine community priorities (2007); and (3) Priority Projects—a synthesis of science and community priorities. The overarching goal of the plan is to restore Lower Putah Creek to self-sustaining ecological condition with particular attention to natural channel morphology as a foundation of ecological health, and recognition that communities manage watersheds.

Lastly, both Solano and Yolo Counties have developed IRWM plans. An IRWM plan for Yolo County (including portions of Putah Creek Watershed) was completed in April 2007. The planning process was led by the Water Resources Association of Yolo County and focused on the following elements:

- water supply and drought preparedness,
- water quality (both surface water and groundwater),
- flood management and storm drainage,
- aquatic and riparian ecosystem enhancement, and
- recreation.

In 2005, an IRWM plan was developed for the Solano County Water Agency and its member cities and districts. The Solano IRWM Plan proposed region-wide policies and projects to meet the following ten objectives of the Solano agencies:

- match supply to demand through the long term,
- manage Solano County’s groundwater resources,
- encourage water of the appropriate quality for the intended use,
- improve runoff water quality,
- manage flood control services,
- participate in multi-county flood control,
- manage environmental resources,
- leverage state and federal funding opportunities,
- address safety and security issues, and
- prepare for climate change.

Recently, Yolo and Solano Counties have joined with Colusa, Napa, and Lake Counties to collaboratively develop a revised IRWM Plan for the Westside Region.

Organizations Active in the Watershed

In addition to the government agencies that are actively working in the watershed, the nonprofit organizations discussed below also are involved.

Putah Creek Council

Founded in 1988, the Putah Creek Council is dedicated to the protection and enhancement of Putah Creek and its tributaries through advocacy, education, and community-based stewardship.

Putah Creek Trout

Putah Creek Trout is a 501(c)(3) nonprofit organization that grew out of an online community of more than 900 Putah Creek fishers concerned with the many challenges facing the creek, including litter, erosion, low streamflows, illegal fishing, and invasive species. Putah Creek Trout fosters stewardship to improve the wild trout fishery in Putah Creek.

The Upper Putah Creek Stewardship

The Upper Putah Creek Stewardship is a nonprofit, community-based watershed organization located in Lake County that began in 1996 and received 501(c)(3) status in 2000. The Stewardship encourages watershed residents to make conscious decisions that balance economy, environment, and social equity. Additionally, the Stewardship works to enhance and maintain water quality and habitat, and community well-being, through education and careful action. The goals are accomplished through water quality monitoring, youth-based education, and community outreach.

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