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CALIFORNIA ESTUARIES

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California Estuaries

Sacramento - San Joaquin Delta

Description: The Delta, the most upstream section of the Estuary, is a thousand-square-mile triangle of diked and drained swampland. Only the barest shreds of once-extensive tule marshes remain, now narrowly fringing sloughs and channels that wind between flat,levee-rimmed farmlands, the Delta "islands." In its natural state,the Delta pointed its hydraulic arrowhead westward from the Central Valley, gathering in waters from the Sacramento River, the San Joaquin River, and the smaller Mokelumne and Cosumnes rivers and shooting them downstream into San Francisco Bay. From "An Introduction to the San Francisco Estuary" by Andrew Cohen. **Photo Credit:** 34 North

IMAGES / VIDEO

QUESTIONS ANSWERED

- What are estuaries, and why are they important?
- Where are California's estuaries?
- How healthy are California's estuaries?
- What's being done to protect California's estuaries?
- How can I be part of the solution?

Estuaries are partly enclosed bodies of water where fresh water coming down the rivers mixes with salt water from the sea. A range of coastal landforms fits this description, including bays, harbors, inlets, lagoons, and some wetlands.

There are many types of estuaries in California including:

- bar-built
- open river mouths
- perennially tidal estuaries

Why are they important?

Estuaries provide us with a suite of resources, benefits, and services. Some of these can be measured in dollars and cents, others cannot. Estuaries provide natural resouces with commercial value, places for recreational activities, scientific study, and aesthetic enjoyment. They are an irreplaceable natural resource that must be managed carefully for the mutual benefit of all who enjoy and depend on them.

ENVIRONMENTAL BENEFITS

Thousands of species of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. And many marine organisms, including most commercially-important species of fish, depend on estuaries at some point during their development. Because they are biologically productive, estuaries provide ideal areas for migratory birds to rest and re-fuel during their long journeys. Because many species of fish and wildlife rely on the sheltered waters of estuaries as protected spawning places, estuaries are often called the "nurseries of the sea."

ECONOMIC BENEFITS

Estuaries have important commercial value and their resources provide economic benefits for tourism, fisheries, and recreational activities. The protected coastal waters of estuaries also support important public infrastructure, serving as harbors and ports vital for shipping and transportation.

What are Phytoplankton?

Phytoplankton

Description: Dinoflagellate (Ceratium species). The astonishing diversity of phytoplankton is visible only under a microscope. One trait all phytoplankton share, however, is chlorophyll—the green pigment that converts energy from the sun into food. **Photo Credit:** Photo by EcoAnalysts, Inc. for DWR

IMAGES / VIDEO

QUESTIONS ANSWERED

- **What are phytoplankton, and why are they important?**
- How and where are they monitored in the SF Estuary?
- What are their trends in the SF Estuary?
- How healthy are they in the SF Estuary?
- What is being done to protect California's estuaries?

QUESTIONS ANSWERED

- **What are phytoplankton, and why are they important?**
- How and where are they monitored in the SF Estuary?
- What are their trends in the SF Estuary?
- How healthy are they in the SF Estuary?
- What is being done to protect California's estuaries?

What are Phytoplankton?

Phytoplankton are small organisms that can be found floating in most water bodies. Like plants, they are primary producers, meaning that they convert light energy from the sun and carbon dioxide into the living matter of their bodies through photosynthesis. Phytoplankton from the SF Estuary fall into four broad categories: cyanobacteria, diatoms, green algae, and various flagellate groups.

Why are Phytoplankton Important?

- Phytoplankton are the foundation of the aquatic food web. They feed a diverse array of organisms, ranging from microscopic, animal-like zooplankton to multi-ton whales. Small fish and benthic organisms also graze on these creatures, and then those smaller animals are eaten by bigger ones. Changes in phytoplankton populations in the SF Estuary can have cascading effects that are felt throughout the food web.
- Phytoplankton can also affect elements of water quality including:
  - pH,
  - dissolved oxygen,
  - algal blooms (toxic and non-toxic)
  - water transparency
- Monitoring changes in phytoplankton can be useful in assessing water quality trends. It is important to note, however, that because of the transient and free-ranging nature of phytoplankton, their use as water quality indicators is limited and should be interpreted in conjunction with chemical, physical, and biological data.

SAN JOAQUIN RIVER
Regional Water Quality Monitoring

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What is the level of aquatic toxicity in the San Joaquin River?

Land and water use activities that directly alter water quality in the greater San Joaquin River Basin by discharging various contaminants that degrade habitat, disrupt food webs, or cause direct...

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Nutrients are vital to the functioning of aquatic ecosystems, and, in their absence, there can be no aquatic life. Aquatic systems, depending on location and type, can have a range of natural... More

Is salt affecting beneficial uses in the San Joaquin River?

Excessive amounts of dissolved salt in water can affect agriculture, drinking water supplies and ecosystem health. Salinity is a significant issue in the San Joaquin River Basin. More

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The San Joaquin River Restoration Program is a comprehensive long-term effort to restore flows

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Fish of the San Joaquin River

Habitats for fish on the Refuge include rivers, permanent wetlands, oxbows and sloughs. Three... More

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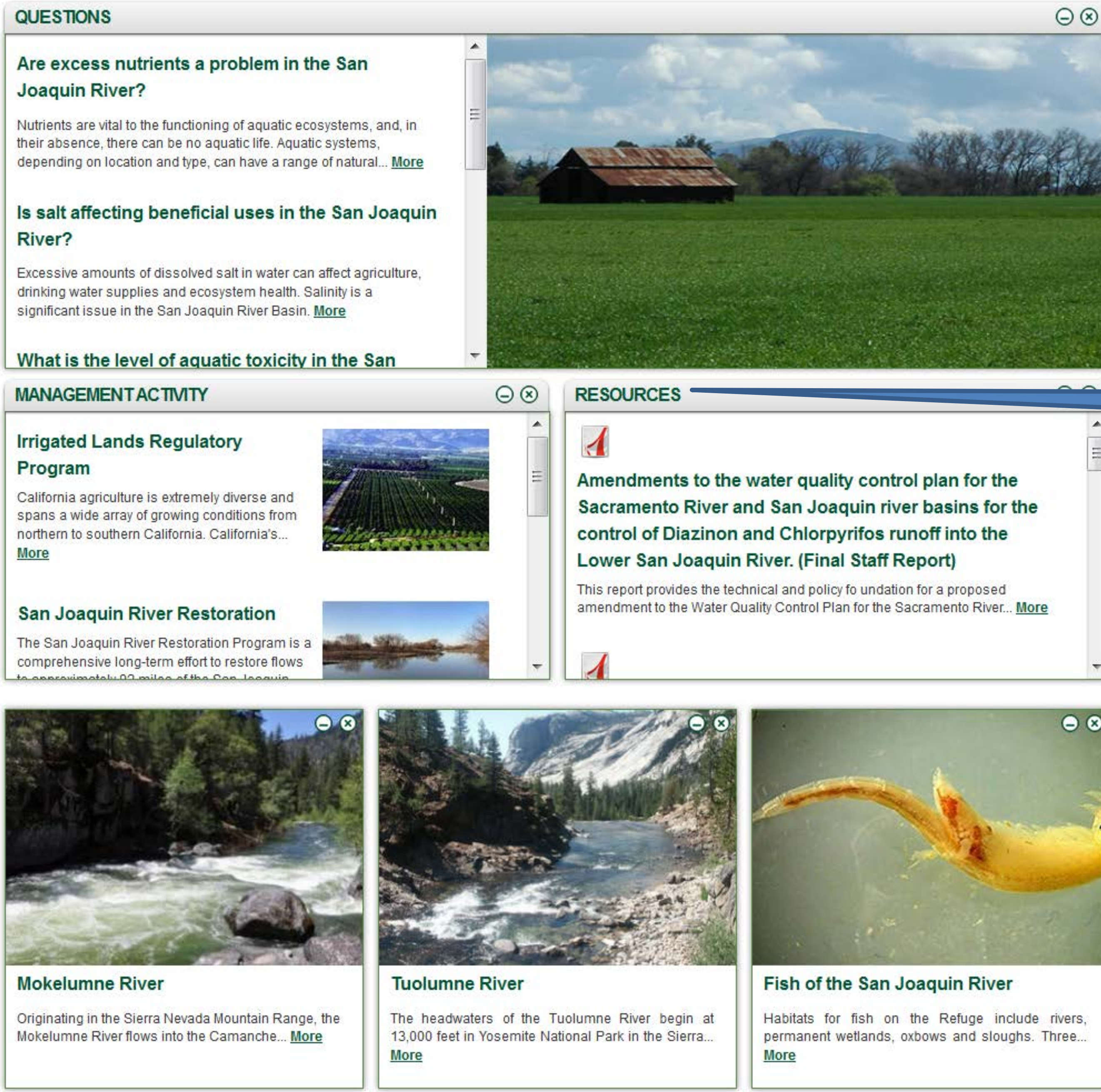

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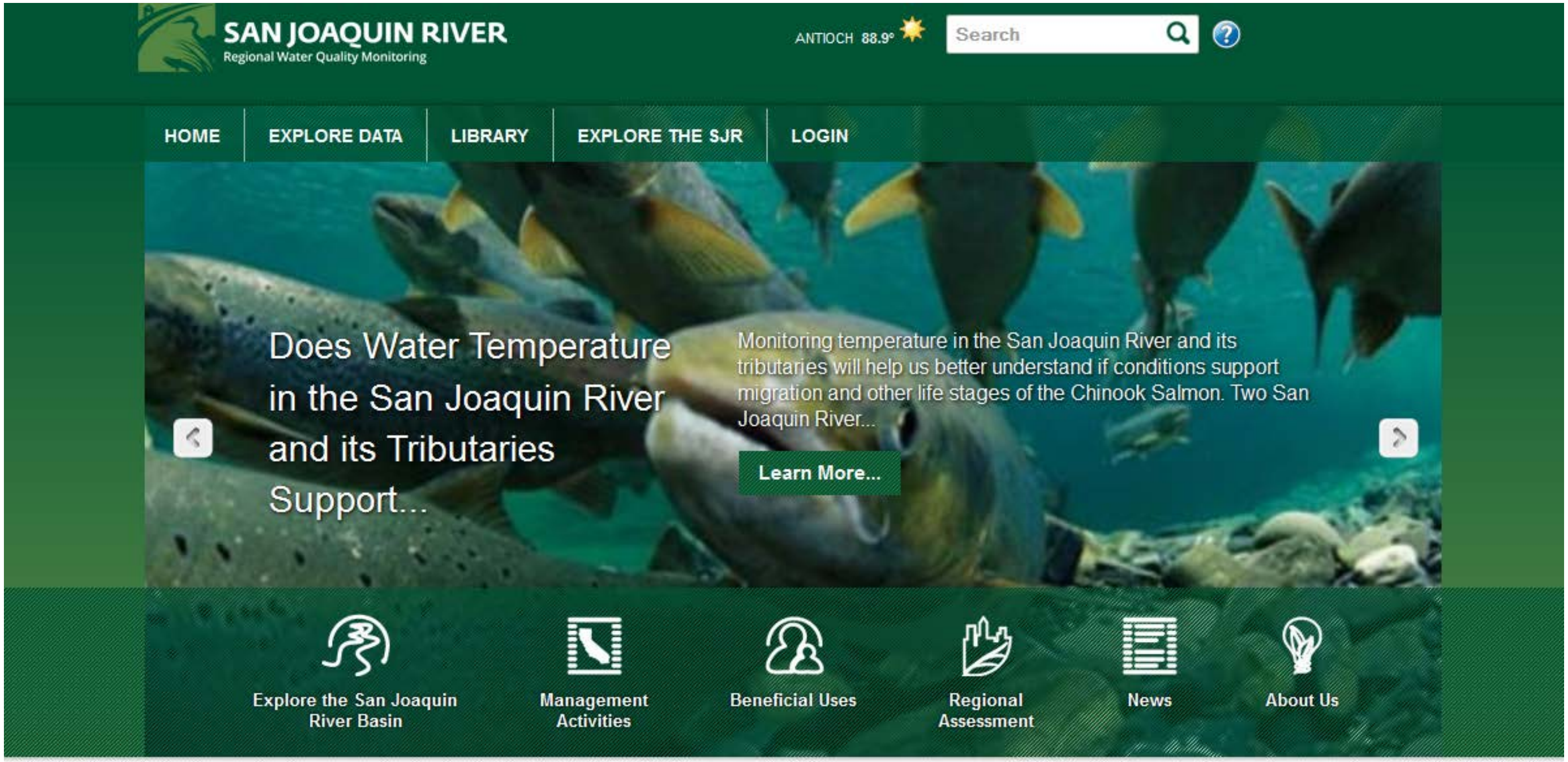
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Does Water Temperature in the San Joaquin River and its Tributaries Support...
Monitoring temperature in the San Joaquin River and its tributaries will help us better understand if conditions support migration and other life stages of the Chinook Salmon. Two San Joaquin River...
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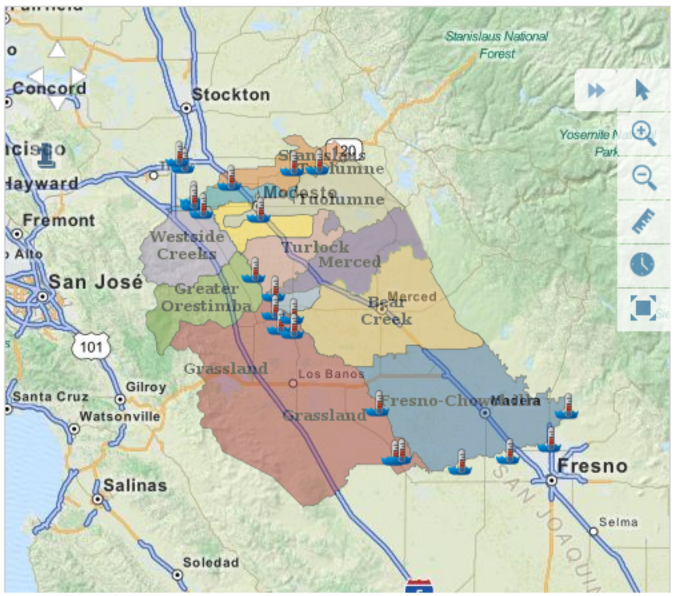
Does Water Temperature in the San Joaquin River and its Tributaries Support Chinook Salmon (Oncorhynchus tshawytscha) Migration?

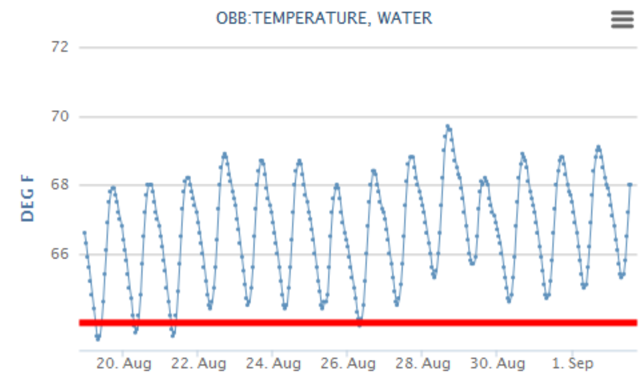
Next Question

Chinook Salmon and the SJR | Current Conditions for Salmon | Fun Facts | Water Quality Objectives and Beneficial Uses



Summary | Station Data | Graph | Meta Data

STANISLAUS R AT ORANGE BLOSSOM BRI (OBB)



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Display Markers as Values:

UnMap | Add to Favorites | Zoom to Station

Graph Mode

Caption: Click on the stations above to see real time temperature conditions. The graphs display the last 14-day temperature values.

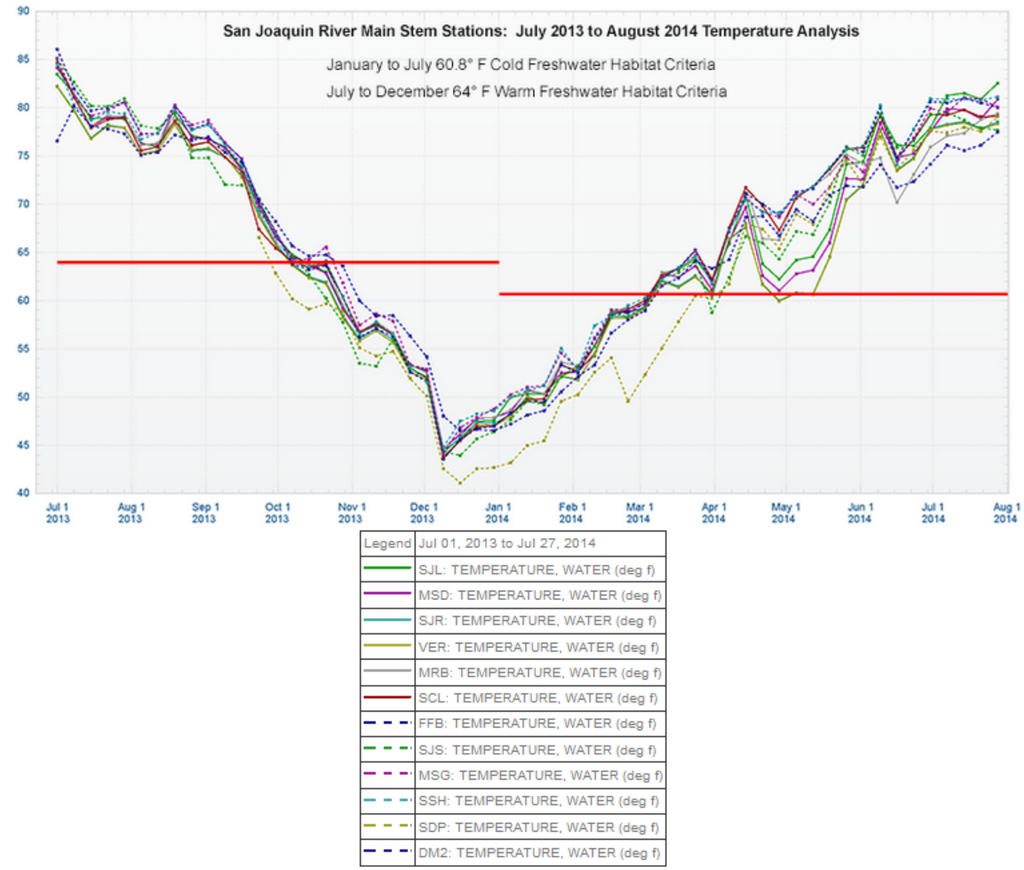
July to December 64 Degree F

Fall-run Chinook salmon migrate upstream between September and December. They are sexually mature when they enter freshwater streams and spawn between October and December. 64° F Warm Freshwater Habitat and 55.4 ° Spawning, Reproduction and/or Early Development (warm)

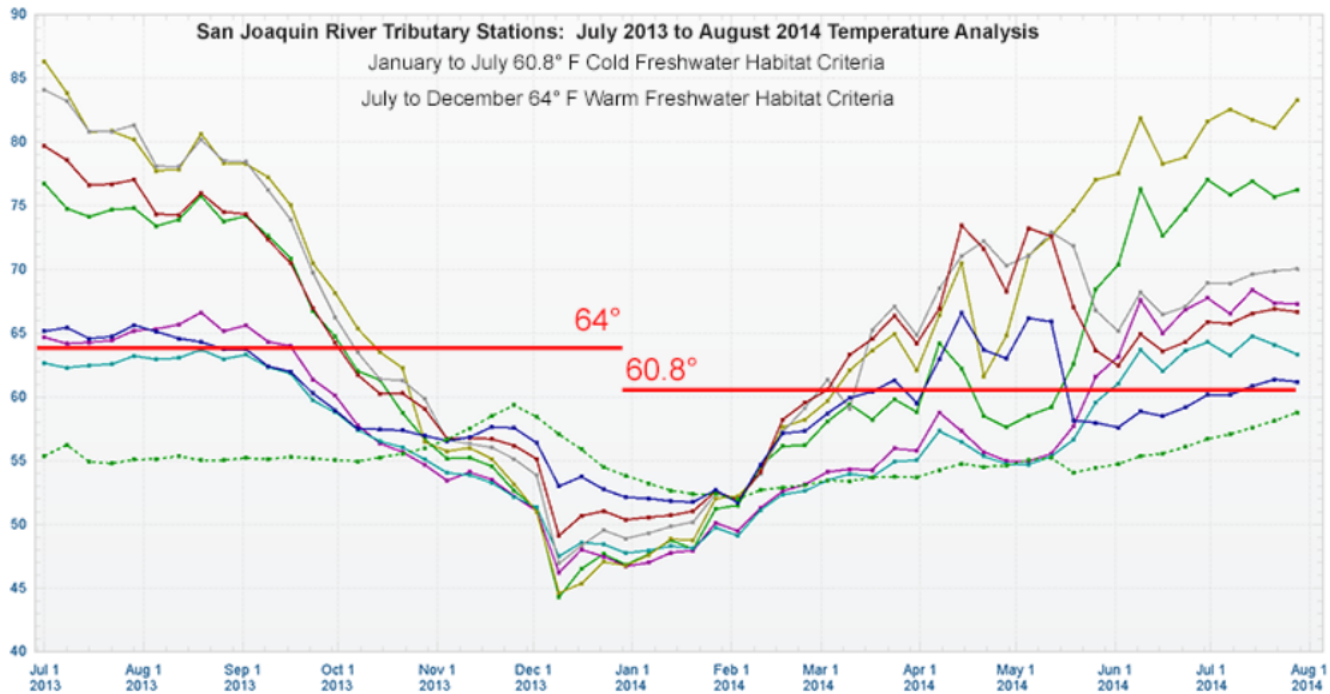
January to July 60.8 Degree F

Caption: Fall-run Chinook salmon migrate upstream between September and December. They are sexually mature when they enter freshwater streams and spawn between October and December. 64° F Warm Freshwater Habitat and 55.4 ° Spawning, Reproduction and/or Early Development (warm)

San Joaquin River Main Stem Temperature Stations (1-Year)



San Joaquin River Tributary Temperature Stations (1-Year)



Caption: The above graph illustrates the last year temperature conditions for the tributaries to the SJR river. January to July temperature criteria is set at 60.8 Degree F for Cold Freshwater Habitat. July to December criteria is set at 64 Degree F for Warm Freshwater Habitat.

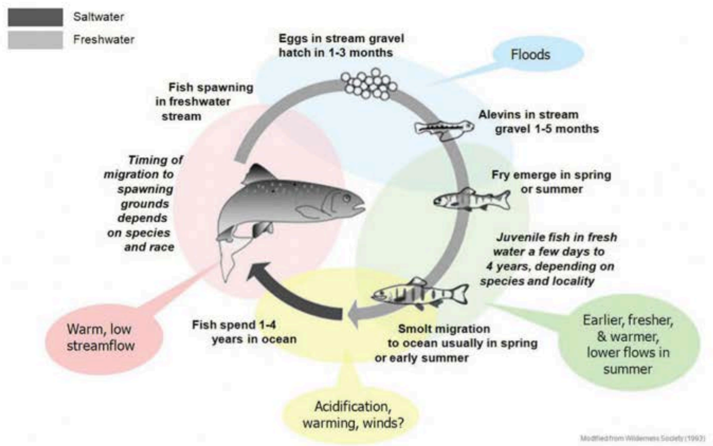
Legend	Jul 01, 2013 to Jul 27, 2014
	SJL: TEMPERATURE, WATER (deg f)
	MSD: TEMPERATURE, WATER (deg f)
	SJR: TEMPERATURE, WATER (deg f)
	VER: TEMPERATURE, WATER (deg f)
	MRB: TEMPERATURE, WATER (deg f)
	SCL: TEMPERATURE, WATER (deg f)
	FFB: TEMPERATURE, WATER (deg f)
	SJS: TEMPERATURE, WATER (deg f)
	MSG: TEMPERATURE, WATER (deg f)
	SSH: TEMPERATURE, WATER (deg f)
	SDP: TEMPERATURE, WATER (deg f)
	DM2: TEMPERATURE, WATER (deg f)

Does Water Temperature in the San Joaquin River and its Tributaries Support Chinook Salmon (Oncorhynchus tshawytscha) Migration?

Next Question

About the Chinook salmon life-cycle

Chinook salmon are anadromous, which means they spawn in freshwater, but migrate to the ocean where they remain for their adult lives. After years of living in the open ocean, they return to their natal freshwater streams to reproduce. Females dig nests in gravel- bedded streams called redds where they deposit their eggs. After the male fertilizes the eggs, the female covers the redd with gravel. The embryos hatch into larval fish called alevin that remain in the gravel redd nourished by the yolk sac of the egg from which they were born. The alevin absorbs the yolk sac and grow, emerging from the gravel as fry. (See life stage illustration below) The fry begin their migration downstream toward the ocean. As they to grow, they develop scales and dark vertical bars on their sides called parr markings. At this stage they are called parr. Smoltification is a physiological change that enables the fish to adapt from living in freshwater to living in saltwater. At the completion of this process they are called smolt. Smolt typically remain in brackish water estuaries as juveniles before they move into the open ocean. Adults migrate throughout the North-east Pacific until returning to the freshwater streams to reproduce.



The life cycle of a Salmon takes it from rivers to the ocean and back again. At every steps, they face challenges of a changing world, shown in the shaded bubbles.
Source: Washington State Recreation and Conservation Office

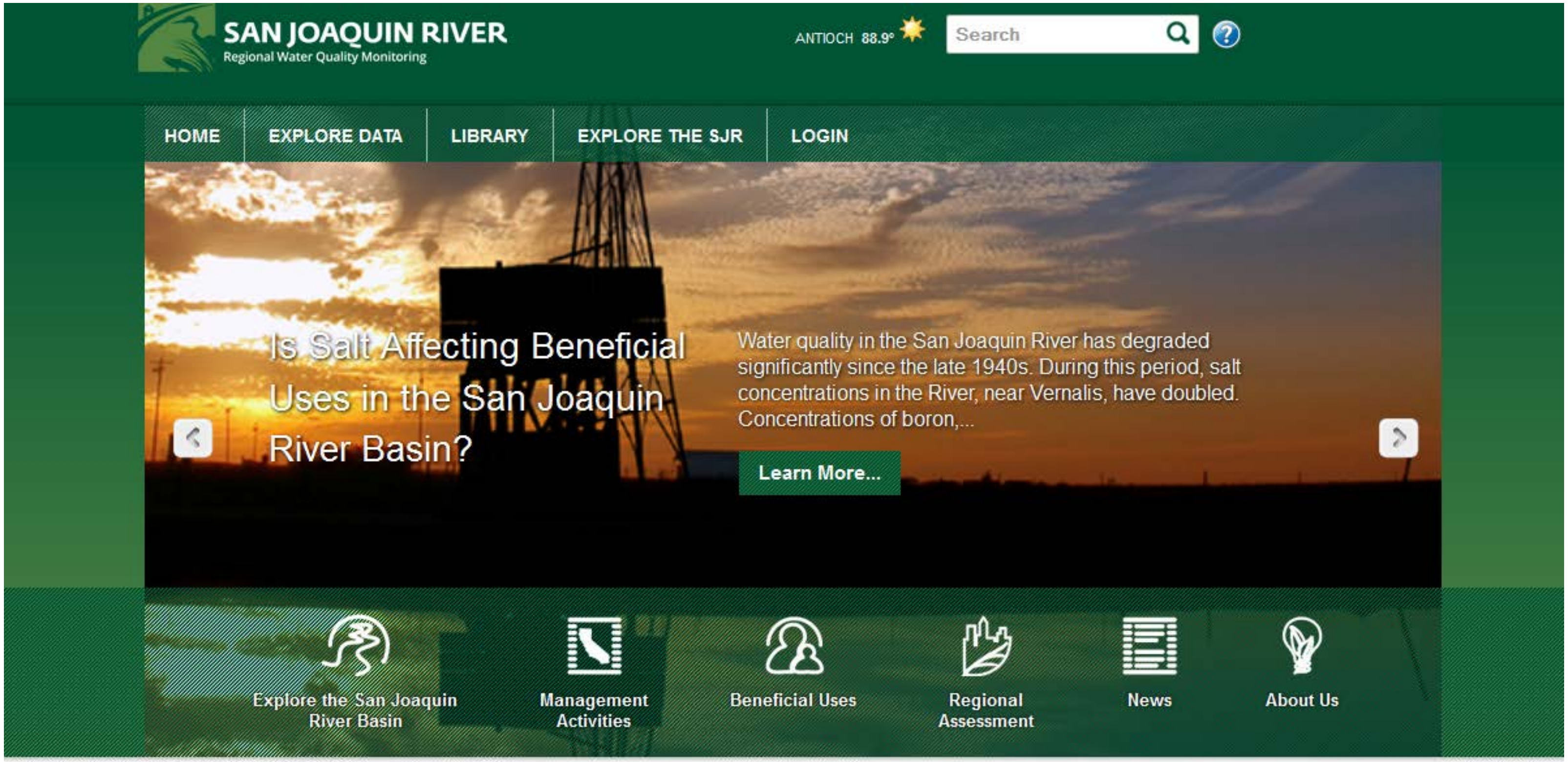
Chinook Salmon and the San Joaquin River?

There are two distinct runs of Chinook salmon in the San Joaquin River. Runs are designated based on the timing that adults enter into freshwater from the oce toward their natal spawning streams. Many factors, however, influence the precise timing of the runs such as water temperature, flow characteristics and matura the fish.

Fall-run Chinook salmon migrate upstream between September and December. They are sexually mature when they enter freshwater streams and spawn betw October and December.

Spring-run Chinook salmon typically migrate upstream between February and May. They remain in cold freshwater habitats while they sexually mature and spa between August and October.

Fall-run												
Life Stage	Jan	Fed	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	De
Adult Migration												
Spawning												
Incubation and Emergence												
Rearing												
Ocean Migration												
Spring-Run												
Adult Migration												
Holding												
Spawning												
Incubation and Emergence												
Rearing												
Ocean Migration												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Is Salt Affecting Beneficial Uses in the San Joaquin River Basin?
Water quality in the San Joaquin River has degraded significantly since the late 1940s. During this period, salt concentrations in the River, near Vernalis, have doubled. Concentrations of boron,...
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MAIN MENU QUESTIONS

Is Salt Affecting Beneficial Uses in the San Joaquin River Basin?

Next Question

Salinity in the SJR River & Tributaries | Current Electrical Conductivity Conditions | Salinity | WQ Objectives

Current Electrical Conductivity Conditions

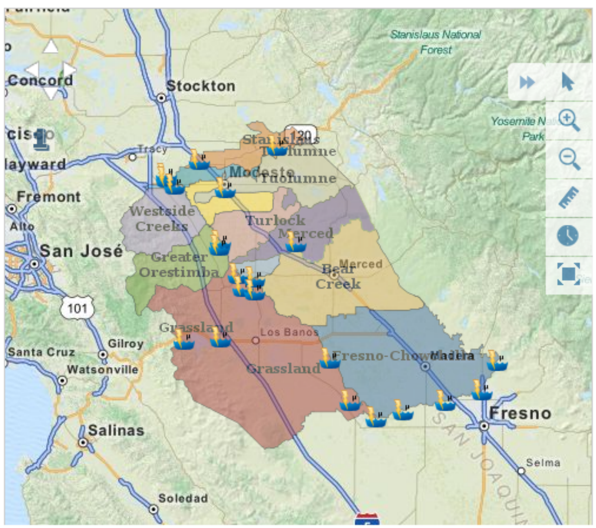
SALINITY IN THE SAN JOAQUIN BASIN

There are more than 23 stations monitoring Salinity and other Water Quality parameters in the San Joaquin Basin. The stations below monitor Electrical Conductivity daily on a 15 minute interval.

HOW SALINITY IS MEASURED

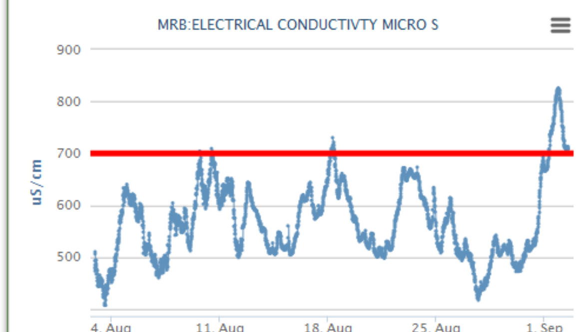
There are two main methods of determining the salt content of water: Total Dissolved Salts (or Solids) and Electrical Conductivity. Total Dissolved Salts (TDS) is **measured** by evaporating a known volume of water to dryness, then weighing the solid residue remaining. Below, Electrical Conductivity is used to monitor salt in the SJR River.

Real Time Salt Conditions in the Basin (Measure in EC)



Summary | Station Data | Graph | Meta Data

SAN JOAQUIN R AT MAZE RD BRIDGE (MRB)



Updated 9/2/2014 15:36

Display Markers as Values:

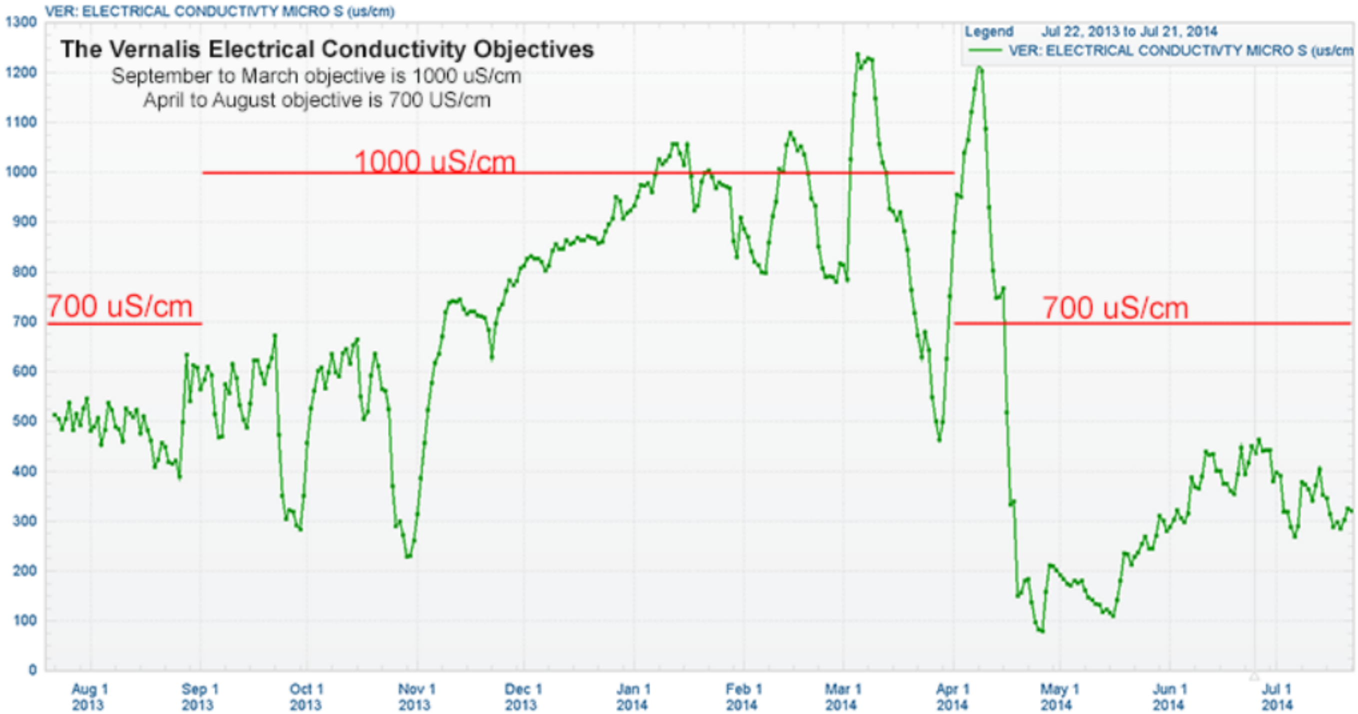
UnMap Add to Favorites Zoom to Station

Graph Mode

Caption: Click on the stations above to see real time Electrical Conductivity conditions. The graphs display the last 7-Day EC values. The San Joaquin River at Vernalis EC Objectives are 700 uS/cm from April through August and 1,000 uS/cm from September through March (30-day running average). The south Delta EC objectives are the same as the Vernalis EC objectives at the three compliance locations: SJR at Brandt Bridge, Old River at Union, and Old River at Tracy Boulevard.

Caption: The San Joaquin River at Vernalis EC Objectives are 700 uS/cm from April through August

EC Objectives at Vernalis (1-Year)



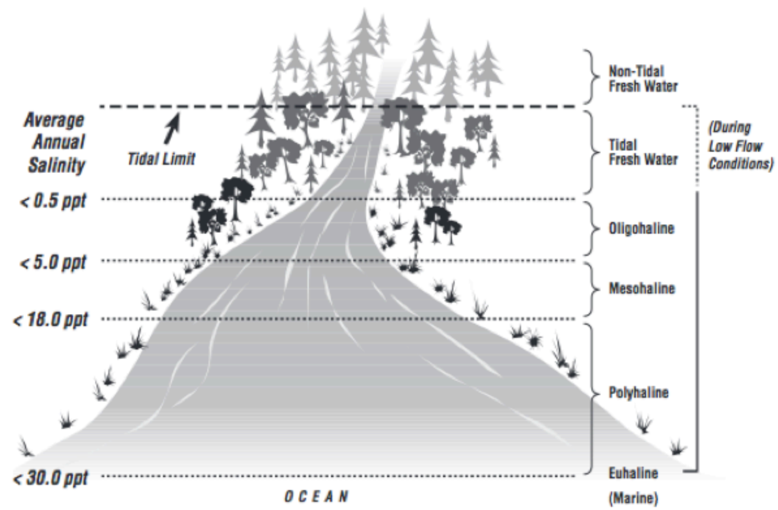
Caption: The primary stressor addressed by the Program is contaminants entering the lower SJR. The main objective of the project is to facilitate the control and timing of wetland and agricultural drainage to coincide with periods when dilution flow is sufficient to meet Vernalis salinity objectives. By increasing the frequency of meeting Vernalis EC objectives, the project may reduce the number and/or magnitude of high quality releases (e.g., releases of Stanislaus River flows from New Melones Reservoir) made specifically for meeting Vernalis EC objectives.

Is Salt Affecting Beneficial Uses in the San Joaquin River Basin?

Next Question

Salinity and the SJR River and Tributaries

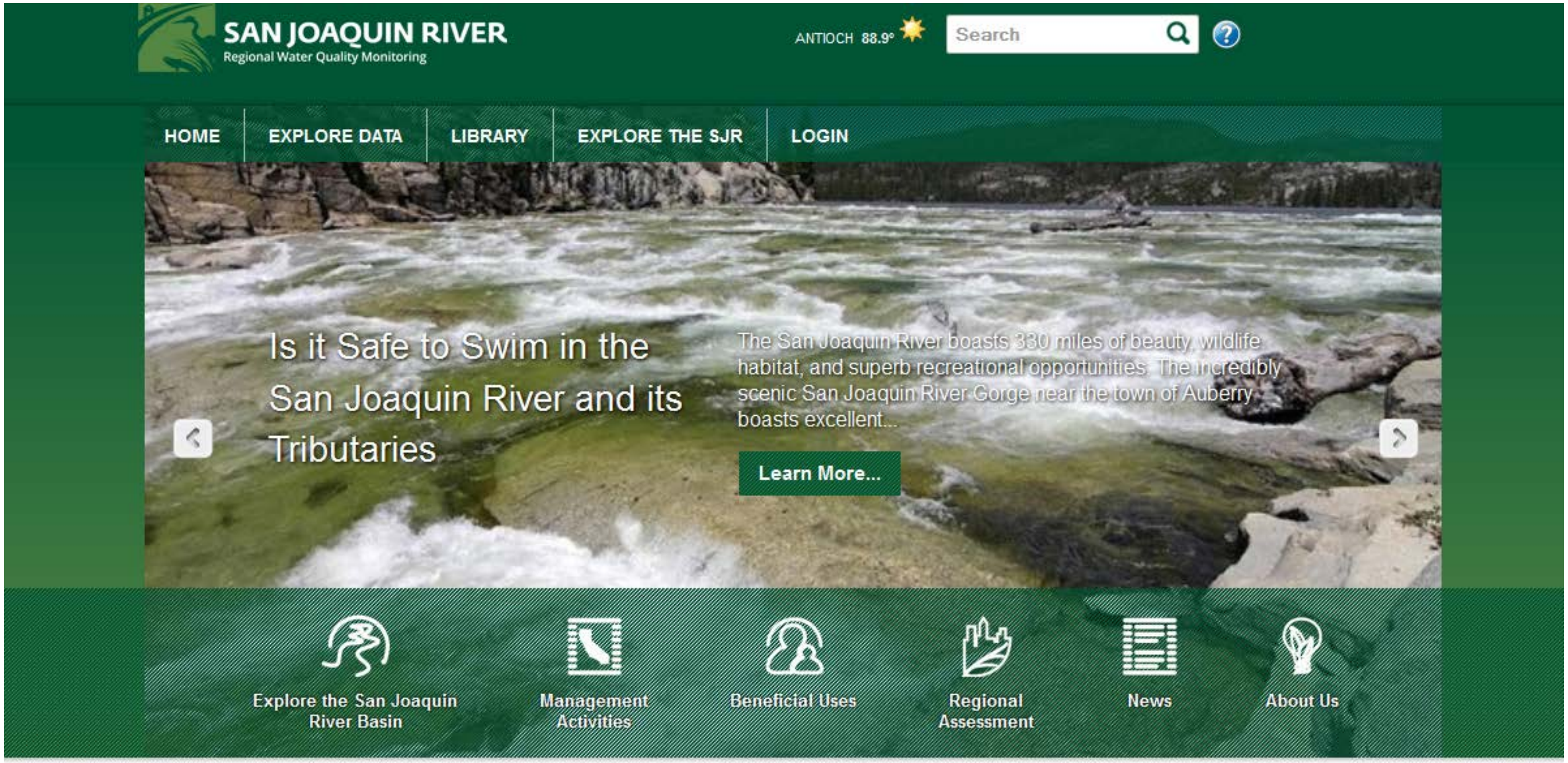
Salinity is simply a measure of the amount of salts dissolved in water. Salinity is usually expressed in parts per thousand (ppt) or 0/00. The fresh water from rivers has a salinity of 0.5 ppt or less. Within the estuary, salinity levels are referred to as oligohaline (0.5-5.0 ppt), mesohaline (5.0-18.0 ppt), or polyhaline (18.0¬-30.0ppt). Near the connection with the open sea, estuarine waters may be euhaline, where salinity levels are the same as the ocean at more than 30.0 ppt (Mitsch and Gosselink, 1986)



THE PROBLEM

Water quality in the San Joaquin River has degraded significantly since the late 1940s. During this period, salt concentrations in the River, near Vernalis, have doubled. Concentrations of boron, selenium, molybdenum and other trace elements have also increased. These increases are primarily due to reservoir development on the east side tributaries and upper basin for agricultural development, the use of poorer quality, higher salinity, Delta water in lieu of San Joaquin River water on west side agricultural lands and drainage from upslope saline soils on the west side of the San Joaquin Valley. Point source discharges to surface waters only contribute a small fraction of the total salt and boron loads in the San Joaquin River.

The water quality degradation in the River was identified in the 1975 Basin Plan and the Lower San Joaquin River was classified as a Water Quality Limited Segment. At that time, it was envisioned that a Valley-wide Drain would be developed and these subsurface drainage water flows would then be discharged outside the Basin, thus improving River water quality. However, present day development is looking more toward a regional solution to the drainage water discharge problem rather than a valley-wide drain. Because of the need to manage salt and other pollutants in the River, the Regional Water Board began developing a Regional Drainage Water Disposal Plan for the Basin. The development began in FY 87/88 when Basin Plan amendments were considered by the Water Board in FY 88/89. The amendment development process included review of beneficial uses, establishment of water quality objectives, and preparation of a regulatory plan, including a full implementation plan. The regulatory plan emphasized achieving objectives through reductions in drainage volumes and pollutant loads through best management practices and other on-farm methods.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Is it Safe to Swim in the San Joaquin River and its Tributaries
The San Joaquin River boasts 330 miles of beauty, wildlife habitat, and superb recreational opportunities. The incredibly scenic San Joaquin River Gorge near the town of Auberry boasts excellent...
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Is It Safe To Swim in the San Joaquin River and its Tributaries?

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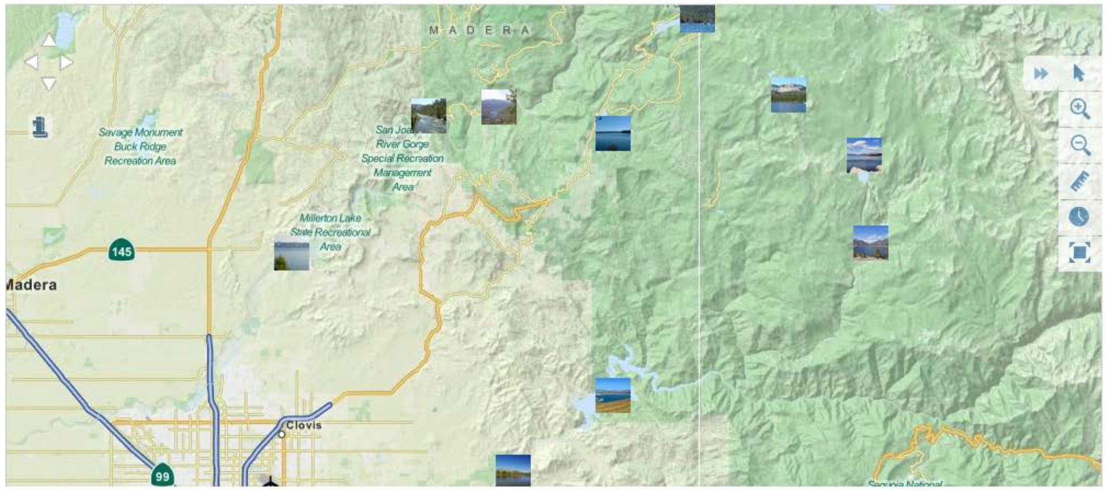
Next Question

Swim in the SJR Basin

Places to Swim in the San Joaquin River Basin- Highlights



Mammoth Pool Reservoir

Mammoth Pool Reservoir is a reservoir on the San Joaquin River in the Sierra Nevada, within the Sierra National Forest in California. It straddles the border of Fresno County and Madera County. It is about 45 miles (72 km) north-northeast of Fresno.

North Fork of the San Joaquin River

North Fork, which starts 1.8 mi (2.9 km) southeast of Mount Lyell. The upper San Joaquin River system runs 97 mi (156 km) above Friant Dam in the Sierra is characterized as a steep-gradient, rocky mountain stream. Over millions of years, the upper San Joaquin, as well as the upper reaches of most of its tributaries, have eroded enormous amounts of rock and sediment from the mountains.

San Joaquin River Gorge

The San Joaquin River flows through a spectacular gorge encompassing more than 6,000 acres of public land managed by the Bureau of Land Management (BLM) in the Sierra foothills northeast of Fresno. An extensive trail system provides access to the Gorge for hikers, mountain bikers, equestrians, hunters, and wildlife/wildflower aficionados. One of the few publicly owned recreation areas in the lower foothills of Fresno and Madera Counties, the Gorge also boasts two campgrounds and is used as an outdoor environmental education classroom.

San Joaquin River Gorge Foot Bridge

BLM's San Joaquin River Gorge Management Area is located just upstream of the existing Millerton Reservoir and Friant Dam. A short 45-minute drive from Fresno via Highway 168 and through the small town of Auberry brings visitors to this delightful area. Granite rock outcrops punctuate the oak woodlands, meadows, and chaparral of the Gorge, which is probably best known for its gorgeous spring wildflower display. This habitat supports a wide range of wildlife, including mule deer, bear, mountain lion, and waterfowl.

Tuolumne Rainbow Pools

Rainbow Pools are natural swimming holes along the south fork of the Tuolumne River, where one can dip their feet, take a plunge or just watch courageous kids jump the rock lined ledges into the largest of the inviting pools. Originally a Toll Stop on the Big Oak Flat Road to Yosemite, and later

Minaret Creek

Glacier-fed Minaret Lakes are at the foot of the Minaret Pinnacles in the Ritter Range. From the Devils Postpile Visitor Center (shuttle stop #6) it is less than a mile to the junction with the John Muir Trail. A bridge across the river leads to several trail junctions. Follow the John Muir Trail as it climbs

HOW BACTERIA IS MEASURED

There are various programs focused on measuring and evaluating bacteria in California's waters. Below are the current assessment methods:

USEPA's 2012 Recreational Water Quality Criteria

The geometric mean (GM) should not be exceeded in any 30-day interval
The statistical threshold value (STV) should not be exceeded by more than 10 percent of the samples taken in any 30-day interval

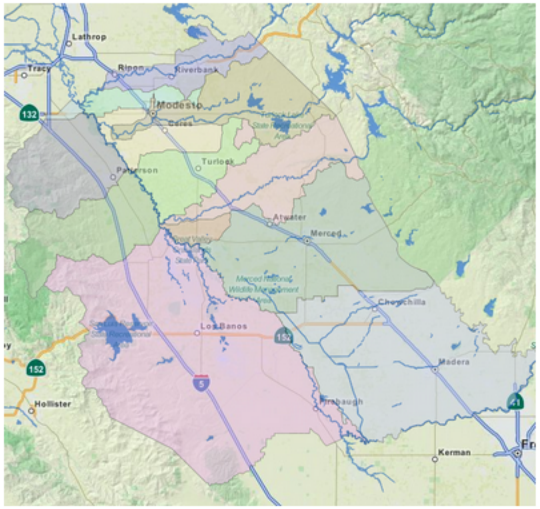
	Recommendation 1 (estimated illness rate 36/1,000)		**Recommendation 2** (estimated illness rate 32/1,000)	
	GM	STV	GM	STV
E. coli (cfu/100 mL)	126	410	100	320

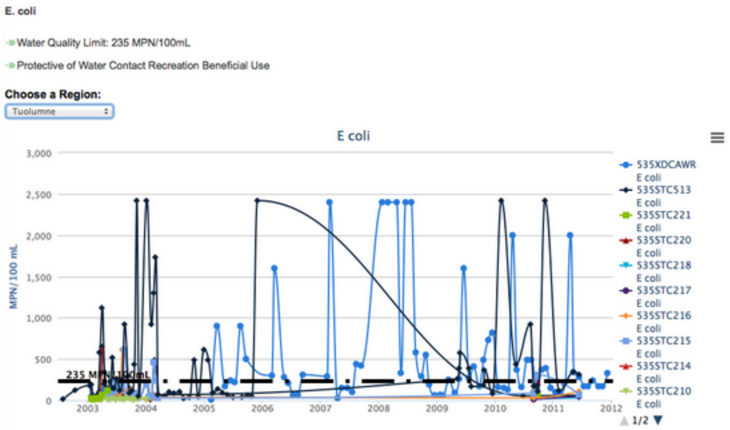
Water Quality Control Plan for the Sacramento and San Joaquin River Basins

Fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 mL, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 mL.

Read the Basin Plan for more information

Choose a region using the map to see monitoring results from that area:





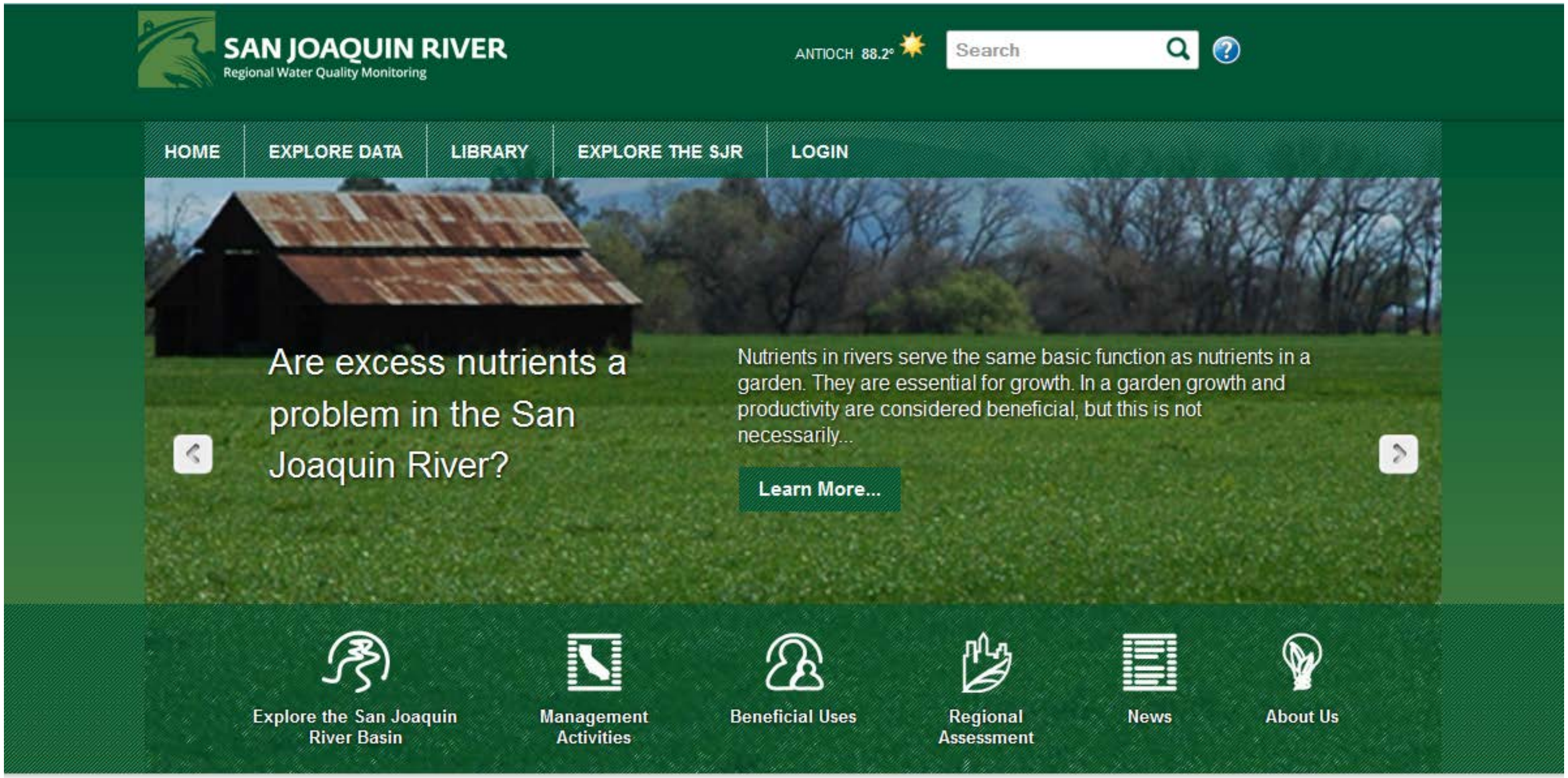
Monitoring for Recreation Uses

The San Joaquin River boasts 330 miles of beauty, wildlife habitat, and superb recreational opportunities. The incredibly scenic San Joaquin River Gorge near the town of Auberry boasts excellent hiking, mountain biking and horseback riding trails as well as guided nature walks, camping, swimming, and more. Keeping our water safe for recreational uses is a national priority.

San Joaquin River Gorge

North Fork San Joaquin River

Rainbow Falls & Pools


SAN JOAQUIN RIVER
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Are excess nutrients a problem in the San Joaquin River?
Nutrients in rivers serve the same basic function as nutrients in a garden. They are essential for growth. In a garden growth and productivity are considered beneficial, but this is not necessarily...
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Are excess nutrients a problem in the San Joaquin River?

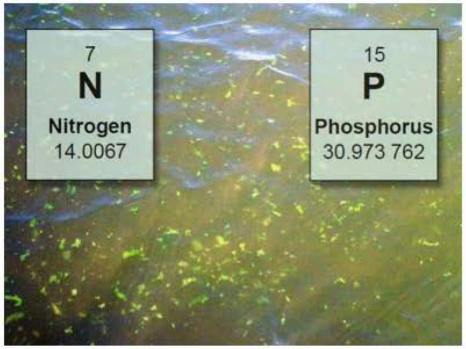
Next Question

Nutrients and the San Joaquin River Basin | Recent Monitoring Results | Understanding Nutrients and Pollution

Content: Nutrients and the San Joaquin River Basin

Nutrients in rivers serve the same basic function as nutrients in a garden. They are essential for growth. In a garden growth and productivity are considered beneficial, but this is not necessarily so in a river. The additional algae and other plant growth allowed by the nutrients may be beneficial up to a point, but may easily become a nuisance.

The main nutrients of concern are phosphorus and nitrogen. Both elements are measured in several forms. Phosphorus can be measured as total phosphorus (TP), or soluble reactive phosphate (SRP) (also sometimes called phosphate (PO4) or orthophosphate (ortho-P). The last, three represent different terms used to describe the fraction of TP that is soluble or available to organisms for growth.



Microcystis in the San Joaquin River (Photo courtesy of Scott Waller, Department of Water Resources)

Rock Slough Algae Bloom

THE PROBLEM

The San Joaquin River Basin is predominately used for agriculture. Fertilizers are used on agricultural lands because nitrogen and phosphorus are often depleted from the soil. Excess or unused amounts are carried by surface runoff or as tail water into river systems. During the low-flow summer periods, agricultural water tail discharges account for the major portion of the river's flow in many sections of the river. Nutrients from agriculture can also infiltrate with water into ground water aquifers. Many wells in the basin area have been closed due to high nitrate levels. (CRWQB 1998)

Livestock operations, such as dairy farms, are another source of pollution. Water that drains from the facilities transports waste nutrients, along with sediments and bacteria directly into the river system via surface water runoff.

Urban population has expanded throughout the basin area over the last century. This has placed increasing demands on waste water treatment facilities, which contribute excess nutrients into the river system. Construction and urban runoff are major contributors of sedimentation.

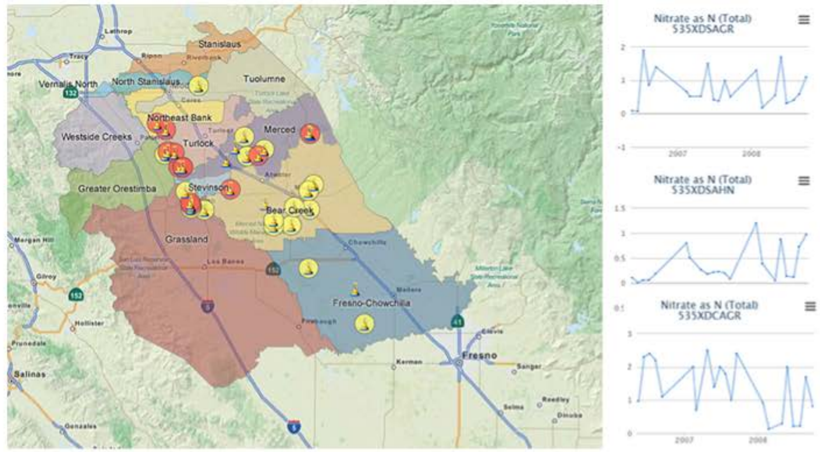
REASONS FOR NATURAL VARIATION

Constituents of Concern

NITRATE AS N (Total, Dissolved and Not Recorded)

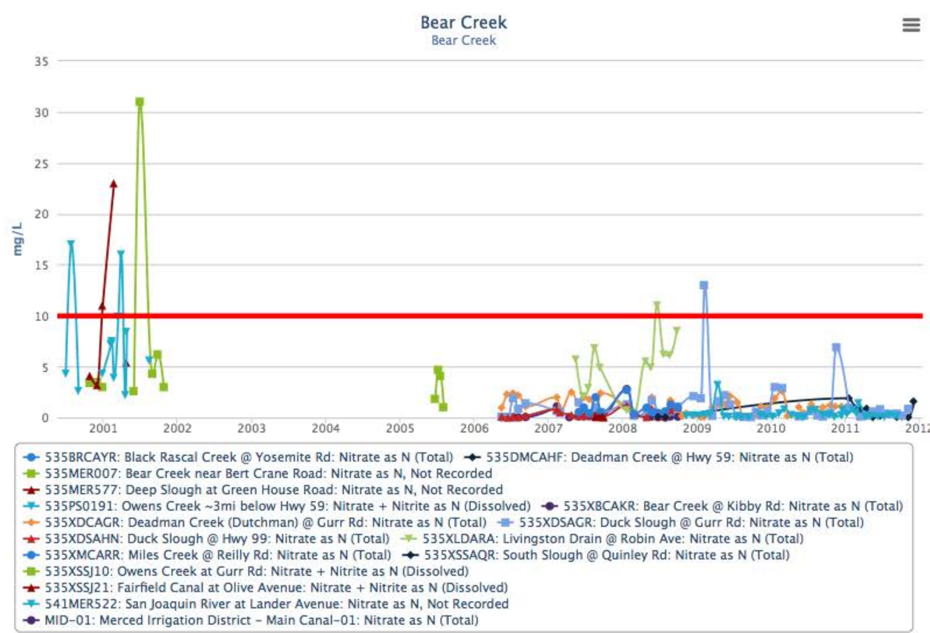
(Nitrate as N (Total) +Nitrate as N (Dissolved) + Nitrate as N (Not Recorded) +(Nitrate + Nitrite) (Dissolved) + (Nitrate + Nitrite) (Total) +(Nitrate + Nitrite) (Not Recorded)

Graphs



Using the menu below choose a region to Graph Nitrate. Data is not real time and varies on region. The red line represents maximum contaminant level (MCL) for nitrate in drinking water is 10 milligrams per liter as nitrogen (mg/L as N):

Bear Creek



Top half of the website

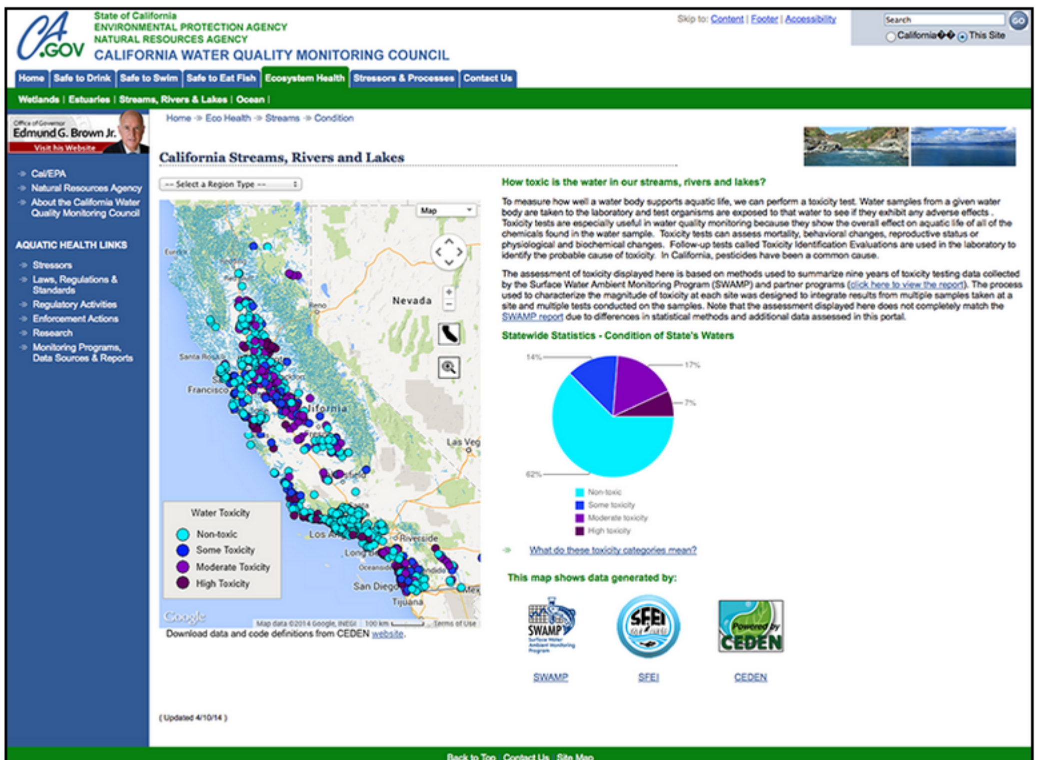
What is the level of aquatic toxicity in the San Joaquin River?

Next Question

California River and Streams Portal

How toxic is the water in our streams, rivers and lakes?

The California River and Streams Portal measures how well a water body supports aquatic life. Water samples from a given water body are taken to the laboratory and test organisms are exposed to that water to see if they exhibit any adverse effects . Toxicity tests are especially useful in water quality monitoring because they show the overall effect on aquatic life of all of the chemicals found in the water sample. Toxicity tests can assess mortality, behavioral changes, reproductive status or physiological and biochemical changes. Follow-up tests called Toxicity Identification Evaluations are used in the laboratory to identify the probable cause of toxicity. In California, pesticides have been a common cause. **Visit the portal for more information and interactive data experience.**



Success Stories

San Joaquin River Stakeholders Cooperate to Reduce Diazinon in River

Waterbodies Improved: Widespread use of the pesticide diazinon resulted in elevated concentrations in the San Joaquin River (SJR) that were toxic to aquatic invertebrates and exceeded water quality standards. Consequently, the SJR was placed on California's Clean Water Act (CWA) section 303(d) list of impaired waters for diazinon in 1992. Watershed stakeholders implemented agricultural best management practices (BMPs) in orchards to lessen the use of organophosphate pesticides, including diazinon. Regulatory developments also reduced diazinon use. SJR diazinon concentrations decreased, prompting California to remove two reaches of the SJR from the state's list of impaired waters for diazinon in 2010.

A collaborative effort that included both voluntary and regulatory approaches motivated the agricultural community in the SJR watershed to reduce diazinon use. Beginning in the 1990s, a number of grants and research projects by the University of California (UC) and others supported the development of diazinon management practices and encouraged participation by local growers. In 1994 watershed partners initiated the Biologically Integrated Orchard System (BIOS) project, a community-based pollution prevention program that uses biological methods to replace chemical farming practices. Participating growers adopted whole-system management approaches to reduce the use of diazinon and other pesticides, while also adopting practices to increase production and improve crop quality. For example, BIOS uses biological controls, cover crops, and maintenance of natural areas and hedgerows to provide habitat for beneficial insects to control pests. Beginning in 2002, the CV-RWQCB began to regulate discharges from agricultural lands through its Irrigated Lands Regulatory Program (ILRP). The ILRP allows growers to attain regulatory compliance through coalition groups. In the San Joaquin Valley, the Westside San Joaquin River Watershed Coalition and East San Joaquin Water Quality Coalition organized to educate growers about water quality problems and management practices, monitored water quality, and served as intermediaries between regulators and growers.The work of the coalitions was critical in motivating growers to implement practices to reduce diazinon discharges. In 2003 the CV-RWQCB adopted a diazinon total maximum daily load (TMDL). The TMDL, along with the reductions required through the ILRP, played a key role in motivating the agricultural community to implement BMPs. In 2003 the U.S. Environmental Protection Agency (EPA) developed a special label for products containing diazinon, which noted that users must implement practices to reduce diazinon runoff. In 2004 EPA canceled all nonagricultural uses of diazinon; in 2006 the California DPR adopted dormant spray regulations that require that users implement protective practices when applying dormant orchard sprays. The diazinon-reduction practices used in CWA section 319(h) projects in the Central Valley also helped to solve other pesticide problems in the area. For example, in 2009 the Sustainable Cotton Project, a farm-based program dedicated to sustainable farming practices and integrated pest management (IPM), helped orchard growers near the SJR to adopt biologically based techniques, including using pest traps and scouting for pests and beneficial insects.

San Joaquin Basin Grasslands Bypass Project Reduces Selenium in the Basin

(View the latest report card)

Waterbodies Improved: Farmland irrigation contributed to selenium exceedances in subsurface drainage in the Grasslands Watershed, located in the San Joaquin River (SJR) Basin. As a result, the Grasslands Watershed marshes and a portion of the SJR were placed on California's Clean Water Act (CWA) section 303(d) list of impaired waters in 1988. The listing of two local tributaries, Mud Slough (northern reach) and Salt Slough, followed in 1990. The Grasslands Bypass Project implemented agricultural best management practices (BMPs) and areawide measures to reroute drainage and reduce the total selenium loading. These efforts led to significant selenium load reductions, which in turn resulted in the de-listing of Salt Slough (10 miles) in 2008 and three segments of the SJR (totaling 40.4 miles) in 2010.

In 1996 the Central Valley Regional Water Quality Control Board (Regional Water Board) adopted an amendment to the Central Valley Quality Control Plan for the Control of Subsurface Agricultural Drainage, which emphasized managing irrigation in the Grasslands Watershed agricultural area. The amendment included the Grasslands Bypass Project (GBP), which was designed to: Reroute agricultural subsurface drainage water around wetlands to the SJR via the San Luis Drain, a concrete-lined bypass, and a six-mile segment of Mud Slough to attain water quality objectives in the wetland supply channels Improve management practices to achieve selenium objectives in the mainstem of the SJR below the Merced River Achieve short-term load reductions by October 2010, and prohibit discharges not meeting objectives by 2019, to bring Mud Slough and a lower flow portion of the SJR (above the Merced confluence) into compliance. The U.S. Bureau of Reclamation (USBR) and the San Luis and Delta-Mendota Water Authority developed a use agreement that states that the San Luis Drain will be closed if annual load targets are exceeded by more than 20 percent and no acceptable explanation is provided. The Regional Water Board adopted the three selenium TMDLs, developed a Waste Discharge Requirement permit that required Grasslands area farmers (known as the GAF) to reduce the discharge of selenium below pre-GBP levels, and established a plan to guide coordinated implementation of these requirements. California's Nonpoint Source Program provided funding to develop a selenium trading program, which established collective load limits for selenium discharge at the San Luis Drain outlet and fees for exceeding the limits. Over the past 15 years, the GAF have implemented various BMPs to meet the selenium targets, including changing crops, improving irrigation efficiency, reusing water and controlling discharge timing.

Data Sources:

The California Environmental Data Exchange Network is a statewide system that enables data sharing of water quality and aquatic resources related monitoring data.