



San Joaquin River  
Altering

Nature's

Course

DFG Photograph by Gerald Hatler





# An Ambitious Multi-agency Effort Attempts to Reshape Waterway

**F**or thousands of years, massive runs of Chinook salmon were a major element of the San Joaquin River watershed, the river's ample current providing a safe haven for the largest population of spring-run salmon in the state. In the past two centuries, however, California became a virtual magnet for everyone who viewed the state as a land filled with gold—or at least one filled with golden opportunities. Shifts in priorities reshaped the state as historic leaders weighed the benefits of a healthy environment—with a thriving fishery—against the demands of a growing population. The flow from the San Joaquin diminished as water managers met the demands and somewhere along the way, the natural role of the river changed.

Today, there are long-term plans to return the river to a more natural role, or at least to restore a balance between the needs of the people, the agricultural and fishing industries and the environment.

From the window of an airplane, previous page, to the satellite imagery, above, it's easy to see the long serpentine twists the San Joaquin River makes as it winds through the Central Valley's patchwork of farmland.

The San Joaquin River Restoration Program is an ambitious multi-agency effort to restore the once-thriving waterway that anchors the southern end of California's Central Valley. The restoration

effort requires numerous fishery, engineering and water management actions that will take place between Friant Dam near Fresno and approximately 150 miles downstream at the confluence with the Merced River.

The massive Central Valley stretches from Shasta County south to the Tehachapi Mountains, from the Sierra Nevada east to the Coast Range and is large enough to hold the Sacramento and the San Joaquin valleys. It encompasses enough land to make it slightly smaller than West Virginia and is home to some of the nation's richest agricultural lands.

"It's important to understand that reintroducing spring-run Chinook salmon in the San Joaquin River is unique to a restoration project of this nature," says Kim Webb, a project manager with the U.S. Fish and Wildlife Service. "Especially when considering the condition of spring-run stocks elsewhere in the state and how the conditions were once here in the San Joaquin."

Spring-run Chinook salmon differ from their fall-run relatives in how long they remain in a river system before they complete their life's mission. Spring-run Chinook salmon ascend rivers during normally high water flows in the spring but, unlike the fall-run salmon, will hold over during the summer. To survive, they must

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find cold-water refuge to build and conserve their strength for spawning later in the year.

Historically, the Sierra Nevada snow pack provided the necessary cold-water sanctuary that supported the spring-run. However, construction of dams and reservoirs essentially stalled the free flow of water and blocked access to higher elevation sanctuaries.

Large land development in California followed on the heels of the gold rush, making it necessary to divert water for agriculture and municipal water supplies. The responsibility fell to the San Joaquin River. By 1873, numerous canals and ditches crossed all of the state's major watersheds with more ready for construction. Repairs and upgrades have kept some of the early diversion dams and water facilities operating.

In 1911, Southern California Edison, one of the primary suppliers of electricity to the south state, launched the Big Creek Hydroelectric Project on the upper San Joaquin River, which, at the time, was world's largest hydropower project. Over the next eight decades, contractors built 27 dams, six reservoirs and nine hydropower plants. The amount of water flowing through the project earned it the catchphrase, "The hardest working water in the state."

One of the main water diversion facilities along the San Joaquin is Friant Dam. Completed by the U.S. Bureau of Reclamation in 1942, the concrete gravity dam holds 520,400-acre feet of water and straddles the foothills of Fresno and Madera counties. It forms Millerton Lake, becoming a permanent barrier for fish on the river. The dam's main purpose is to meet the demands for agricultural water. The water it provides supports an economic engine that produces food and jobs.

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Historical records indicate the spring-run salmon population in the San Joaquin River may have exceeded a half-million returning adults annually. The number dwindled to fewer than 200,000 with consistent declines after 1920, before Friant Dam existed. Once construction finished, in-stream water flows sharply diminished. Historians say the runs fell as low as 56,000 fish—with the San Joaquin River population effectively extinct within a few short years.

"The Department of Fish and Game attempted to protect the valuable resources in the San Joaquin River when Friant Dam was constructed," says Jeff Single, Regional Manager for DFG's Central Region. "But, at that time there was still a perception that natural resources were inexhaustible and the development of reliable water supplies, mostly for agriculture, superseded other concerns. The SJRRP has given us a renewed opportunity to restore and protect valuable fish, plant and wildlife resources associated within the river for many generations to come, while keeping the economic benefits of other water uses."

This long turnaround began in 1988 when attorneys for

the Natural Resources Defense Council (NRDC) filed a lawsuit against the U.S. Bureau of Reclamation, the U.S. Departments of Interior and Commerce and the Friant Water Users Authority. The lawsuit alleged the dam's owners violated the National Environmental Policy Act for impacts on renewal of water supply contracts.

After nearly two decades of legal arguments, a federal judge in 2006 sided with the NRDC, ruling the federal agencies and the water authority violated California's Fish and Game Code and failed to release sufficient water to maintain good conditions for fish downstream from the dam instead of the original alleged violation of the National Environmental Policy Act. The judge ordered a settlement to address the restoration of fish populations below Friant Dam and develop a method of delivering water that does not affect the long-time water customers, such as Central Valley farmers and cities.

The decision prompted discussions on restoration needs and water supply impacts. Attorneys from both sides recognized the need to approach state environmental experts for input on the restoration effort. They called for experts from DFG and the Department of Water Resources.

## It's About the Flow

Rivers are now understood as dynamic systems that support vegetation and other fish and wildlife. Rivers are a complex environment that function through seasonal rainfall changes and a natural fluctuation of flows that move gravel and sand, maintain vegetation, and develop a healthy floodplain that supports the fishery and nearby upland plants and wildlife. The river environment results in uniquely adapted plants and animals that thrive in a narrow band of habitat that stretches for miles along a river's course. With flows severely reduced under the control of dams and diversions, the natural river cycle is broken. Plant communities and the wildlife and fish that depend on this complex biologic, hydrologic and geologic system change or disappear in response to changes in the cycle. Often, as is the case with the San Joaquin River, the reduced flows and increased dry perimeter provide the opportunity to further develop adjacent lands for human use. Construction of levees encourages encroachment on the natural flood zone, which reduces the overall footprint and flood capacity of the river.



The court ordered a compromise that forced sharing the water. The negotiated concessions allowed water delivery to water users but withheld enough to sustain a functional river system. The new deal supported Chinook salmon and other natural resources and still supplied longtime buyers who had depended on the water for more than 60 years.

Because the allocation of water resources was court-ordered, attention turned to management actions that would improve two critical aspects of the overall system—the river channel and the water supply infrastructure.

The San Joaquin River project is the largest river restoration undertaken in the Western states, according to Webb, the Fish and Wildlife Service project manager.

“There are smaller restoration projects around the country that are struggling, and if this program succeeds it will serve as a guide and roadmap for how to pull things together in a way that works,” says Webb. “When we look at what other projects are doing around the country, it’s clear that it isn’t enough. Being able to make this program work successfully will be valuable for other restoration projects.”

Webb says the challenge will be with how the diverse set of partners and stakeholders pull together in ways that keep them moving forward.

“There are benefits and risks to everyone involved with the program and pulling them together in a way so that they’re accepting their share of benefits and risks will require finding a balancing point so that it doesn’t tip too far in one direction,” she says.

Funding for the restoration efforts during an era of shrinking state and federal budgets remains a struggle. Constructing the necessary river improvements will cost hundreds of millions—most covered by federal funding and state bonds already approved by California’s voters.

To restore the fisheries within the river, DFG specialists recognize repairs are necessary to fix alterations done to the habitat and watercourse that lies below Friant Dam. They must offset impacts such as seepage and flooding caused by increased water flows from the dam for fish and habitat that exist downstream.

“Understanding how the river currently functions and how it will change as a result of increased flows agreed to in the court settlement will take some time,” says Single. “Introducing a run of the threatened spring-run Chinook salmon requires careful planning and numerous measures to ensure protection for the species. Implementing an adaptive management approach will be crucial to our decision-making process due to the biological uncertainties.”

Measures to introduce spring-run Chinook salmon—currently nonexistent immediately below Friant Dam and largely limited to small populations in the northern Sacramento River system—will require delivering spring-run Chinook stocks from elsewhere in the state. By planting the stock to the waters below the dam, DFG and the federal fish agencies will provide a founding population for the San Joaquin River. This will be accomplished through careful genetic management of founding stocks within a Conservation Facility constructed and operated by DFG. The

extra step ensures the reintroduced stocks can thrive in the restored river.

Plans call for adding floodplain-rearing habitat for salmon, improving spawning habitat, minimizing sources of warm water and isolating traditional salmon predators. Workers will improve fish passage within the watercourse. Ultimately, the end goal becomes fish utilizing the improved environment.

The 2006 settlement calls for the reintroduction of Chinook salmon by the end of 2012 and the implementation of all necessary channel and infrastructure improvements by 2016. Meanwhile, the Department of Water Resources and U.S. Bureau of Reclamation are completing designs to improve water conveyance and reduce seepage.

Everyone involved understands the timeline is ambitious, the challenge formidable. It will take years to reach the construction phase on the channel improvements. It’ll take more time to see if the goals of settlement agreement are being met. In spite of the uncertainties, the river’s restoration project has already achieved one unexpected benefit—collaboration among environmental parties used to fighting are now working cooperatively.

*This story was prepared with the assistance of Gerald Hatler, an Environmental Program Manager with the Department of Fish and Game’s Central Region who works on the San Joaquin River Restoration Program. For more information on the restoration program, please visit the website: <http://www.restoresjr.net/>*

## Fluid Challenges Require Fluid Answers

The experts involved in the restoration of the San Joaquin River face a series of challenges. They include:

**Fix** the degraded portions of the river channel.

**Manage** a sufficient source of cold water from a reservoir with limited storage capacity.

**Manage** the movement of water and the organic, chemical and geologic components it contains to improve the natural function of the river.

**Construct** bypasses and fish passage facilities around large barriers.

**Provide** adequate spawning and rearing habitat.

**Develop** necessary water supplies for fish without affecting other existing water deliveries.

**Maintain** water delivery and flood control functions.

**Minimize** impacts to fish populations in rivers where spring-run Chinook salmon exist in low numbers..