

# California's Boom and Bust Cycle

## DYNAMICALLY MANAGING RIVERS, ONE HANDSHAKE AT A TIME



Above: Tehachapi range © Ian Shive; below: Shasta Fall Chinook © Carson Jeffres

In the face of highly variable precipitation patterns, economic and political disruptions, and climate change, resource managers need tools that allow them to be adaptive and responsive. The status quo in California does not meet these needs, and a new, more dynamic approach to water management is essential. The Nature Conservancy is helping to craft this approach.

The approach may look different in different places, depending on how much water is needed and when, and what the agricultural landscape looks like. Solutions could be short-term agreements not to divert water from a stream, water exchange agreements or changes to when water is diverted from streams and rivers. While the specific approaches may vary, the same basic principles apply: working with people to respond to nature's changing and dynamic needs by providing water when and where it's needed most.

Given the boom and bust cycle of California's water supply (extremely wet years followed by extreme droughts) and the migratory nature of many of California's species, approaches need to be dynamic to provide fish with the water they need. TNC is demonstrating how such approaches can be applied statewide, from North Coast streams to the San Joaquin and Sacramento Valleys.

One place where a dynamic approach is meeting the water needs of people and nature is the Klamath Basin's Shasta River.

### The Shasta River's Fall Flow Program

Located in far Northern California, the Shasta River historically produced one of the largest fall runs of Chinook salmon in the Klamath River Basin. Known for its cold springs that bubble year-round out of one of California's tallest peaks, agricultural diversions reduce stream flow and water quality, impact the migration of adult



Freshwater habitats cover less than 1% of earth's surface but support over 10% of the species on the planet.

In North America, extinction rates for freshwater species are 4 to 5 times greater than those for terrestrial species.

Eighty percent of California's native fishes will either be extinct or threatened with extinction within 100 years.

Water allocations in California are currently five times the state's mean annual runoff.

Eighty percent of water used in California is for agriculture.





Chinook salmon in the fall. At the same time that water is needed instream for fish, it is also needed by the agricultural community to irrigate pastures for cattle.

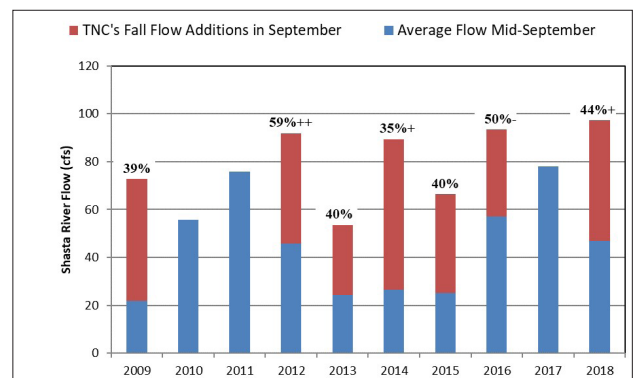
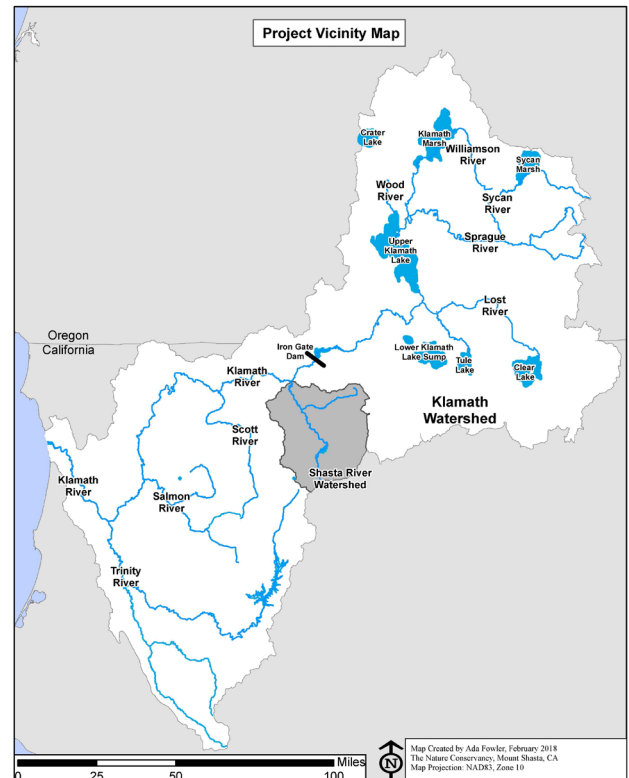
Ten years ago, TNC recognized the need to improve conditions instream for fall-run Chinook salmon while balancing the resource needs of the Shasta Valley's agricultural community. Along with local, federal and state partners, we initiated a community-wide Fall Flow Program. Beginning in late-summer each year, we and our Agency Advisory Committee evaluate river conditions and the estimated salmon run size to determine whether the river needs flow augmentation.

Annual fish counts in the Shasta River suggested that the last two weeks of September were when water quality conditions, coupled with the density of large adult fish, typically declined to the point that a disease outbreak was a major concern. Thus, the window of time during which additional water was needed instream was relatively short.

In 2009, TNC asked the local agricultural community to voluntarily cease or reduce agricultural diversions during this time. Community members had strong memories of the 2002 Klamath River fish kill and were anxious to prevent a disease outbreak in the Shasta River, so they agreed to leave more than 50 cubic feet per second of water instream, tripling the amount of water that would otherwise have been instream at this time.

For the past decade, TNC has been working collaboratively with the agricultural community to dynamically manage nature's need for water, doing so in a way that respects and supports the community.

In this Fall Flow Program, water instream is either donated by water rights holders or leased to TNC through short-term lease agreements. These simple contracts are executed quickly and describes how much water is being left instream, how long it will be left there, and how much TNC will pay using private and public funding for the non-diversion of the water. Prices for water are pre-negotiated and are based on the fair market value of water in the Klamath Basin.



Photos, clockwise: Cows at Shasta Big Springs Ranch © Carson Jeffres; Cowboy © Amy Campbell; Cowboy in Shasta © Val Atkinson; Map of Klamath Basin and graph © Ada Fowler/TNC





© Ken Geiger/TNC

## Using Science to Quantify Instream Needs

The water being left instream is economically valuable to the agricultural community, but what is its value to wildlife? To find out, TNC partnered with the UC Davis Center for Watershed Sciences on a study that quantified the benefits these additional flows have to migrating salmon. This study, published in the *Journal of Water Resources Planning and Management*, indicated that the additional flows not only increased the holding capacity of pools in the river, which benefits fish, but improved water quality conditions and reduced the likelihood of disease transmission among adult salmon.

Now TNC is partnering with the UC Cooperative Extension to evaluate the potential impacts of ceasing irrigation during the late fall on pasture production in the Shasta Valley. The results of this investigation will help us assess the economic impact that producers experience when they participate in this program and adjust the Fall Flow Program accordingly.

Over the last 10 years, the Fall Flow Program has directly benefited between 40% and 60% of the overall fall run of Chinook salmon (see table). In wet years (i.e., 2010–2011 and 2017), there was enough water instream to satisfy instream flow needs. In dry years, TNC acquired additional flows from water rights holders to boost the amount of water instream. Given the dynamic nature of California's water supply, it is essential to apply tools such as short-term transactions and other dynamic management approaches to managing our streams and rivers.

While these tools are not a silver bullet that can solve all of California's complex resource problems, they do provide opportunities to stay nimble, dynamic and flexible so that we can respond to California's changing climate, and they strengthen our ability to protect the water resources on which both people and nature rely.



Salmon in river with Mt. Shasta © Carson Jeffres

## Overcoming Barriers to Statewide Water Management

The Fall Flow Program is working for the Shasta River, and we can apply that dynamic approach elsewhere.

However, funding and policy barriers limit the broad application of this approach throughout the state. For example, there is insufficient public funding to support short-term water transactions, and government agencies lack the capacity to process water transfer agreements.

In the last five years, California voters have approved over \$285 million to enhance stream flows. However, only a small fraction of this funding has been made available for short-term transactions.

We need policy changes that will support the increased funding of dynamic water management strategies so that we as Californians can be armed with a variety of tools to prepare us for the climate changes to come.

The Nature Conservancy 

For more information, contact:

**Amy Campbell**

*Project Manager, Instream Flows*

[acampbell@tnc.org](mailto:acampbell@tnc.org)

(530) 926-3281

[nature.org](https://www.nature.org)

### References for page 1 sidebar:

- Howard, J, Klausmeyer K, Fesenmeyer, K et.al. 2015. Patterns of Freshwater Species Richness, Endemism and Vulnerability in California. *PLOS ONE*/DOI:10.1371/journal/one0130710
- Moyle, P., Lusardi, R., Samuel, P. and J. Katz. 2017. State of the Salmonids: Status of California's Emblematic Fishes. UC Davis Center for Watershed Sciences. August 2017.
- Mount, J. and Ellen Hanak. 2016. Water Use in California. Public Policy Institute of California. July 2016. [www.ppic.org/publication/water-use-in-california](http://www.ppic.org/publication/water-use-in-california)