



CALIFORNIA

Big Springs Creek and Shasta River Restoration Project

RESTORATION

Changes in irrigation operations
Cattle excluded from creeks and streams
Native species replanted in riparian zones

MONITORING

Water temperatures decrease and flows increase
Increase in salmon populations

BENEFITS TO PEOPLE AND NATURE

PEOPLE

Fish-friendly irrigation methods for farming
Increased water quality
Sustainable commercial and recreational fishing

NATURE

Increased essential habitat for fish
Increased biodiversity

Project Highlights

- **Goals:** Restore degraded salmon habitat with a long-term goal of demonstrating agricultural practices that benefit both people and fish.
- **Jobs:** This project will stimulate and benefit the economy at both the local and regional level by creating or saving 54 jobs and 18,741 labor hours of employment for construction labor and management, nursery stock providers, landscape laborers, field scientists and irrigation specialists.
- **Habitat Restoration:** The project will restore 70 acres of riparian corridor by restricting cattle from near-river areas and developing solar powered off-stream water sources for livestock. In addition, 20 acres will be planted with 8,000 native trees, 14 acres will be planted with native wetland plants and multiple irrigation system changes will be made including 11 new culverts and irrigation turnouts installed to support sustainable irrigation practices.
- **Progress:** As of April 2010, contracts are in place, permitting is complete and designs are approved. Construction began with riparian restoration in March 2010 with various phases occurring throughout the summer and fall.
- **Measurement:** A scientific monitoring plan has been developed by the Conservancy and consultants to measure both the short and long term success of this project for fish and other species.
- **Partners:** The Nature Conservancy, California Department of Fish and Game, University of California Davis, California Department of Water Resources, Shasta Valley Resource Conservation District, California Trout, U.S. Fish and Wildlife Service, Bureau of Reclamation, California State Resources Agency, Natural Resource Conservation Service, Regional Water Quality Control Board, National Fish and Wildlife Foundation and the State Water Resources Control Board.



Morgan Knechtle, a fisheries biologist for California Fish & Game, with Whitney Crombie, fisheries tech for Shasta Valley Resource Conservation District, counting salmon along a section of the Shasta River where it was previously heavily grazed prior to The Nature Conservancy's purchase of Shasta Big Springs Ranch. ©Bridget Besaw

A Vision for Project Success

Short-term goals: The project will restore 10 miles of critical spawning and rearing streams and more than 100 acres of degraded salmon stream-side habitat by increasing riparian habitat and increasing the survival of spawning and rearing salmon by reducing average summer daily water temperatures.

Long-term goals: Restoring and protecting key places like the Shasta River and Big Springs Creek will help restore fish runs and ultimately could help revive California's salmon fishery as an important source of wild, locally caught salmon and demonstrate sustainable benefits to both humans and nature. The project will also demonstrate sustainable benefits to both people and fish by deploying agricultural practices at working cattle ranches.

Supporting Salmon While Managing Lands

The Klamath River once produced the third largest salmon run on the Pacific Coast of the continental United States, after the Columbia and Sacramento-San Joaquin River Basins. The Shasta River, a small meandering stream at the base of Mount Shasta, remains a critical salmon producing tributary of the Klamath.

The Shasta River historically was a river dominated by migrating salmon at all months of the year. A conservative estimate as to the average number of all species of salmon spawning in the river prior to development of the Valley is 50,000 to 100,000 fish per year.

Today, only about 5,000 Chinook salmon return to spawn in the Shasta each year. In 2008, less than 30 federally listed threatened coho salmon returned as adults to spawn in the Shasta River and Big Springs Creek. These adults constitute less than one percent of estimated historic run size.

Resource experts working in the Klamath River watershed believe the Shasta River is crucial to the restoration of the Klamath Basin salmon populations. Although water resource development has detrimentally affected salmon populations, the cold water springs are still largely intact but their condition has declined.



Salmon returning to spawn in the Shasta River running through The Nature Conservancy's Shasta Big Springs Ranch. ©Bridget Besaw

When restored, these springs can provide good quality habitat and essential flows to the Shasta River. If major restoration actions are not taken, the potential to bring back these natural areas and salmon populations will significantly diminish and perhaps be lost.

Solving a Restoration Challenge

This restoration is a prime example of how conservation supports a healthy and prosperous California. Restoring and protecting key places like Shasta River and Big Springs Creek, while managing the ranch to benefit farmers and fish, will help restore fish runs and ultimately could help revive California's salmon fishery as an important source of wild, locally caught salmon.

Water diversions, dams, inefficient irrigation practices and other conditions (e.g., ocean conditions, overfishing, etc.) have all contributed to the degradation and decline of the once productive Shasta River and Big Spring Creek. Big Springs Creek water quality and habitat is degraded due to cattle in the stream and hot irrigation return flows. While stream flows emerge from the ground at about 54 degrees F, in 2008, stream flows were heated up as high as 77 degrees F at its mouth of the Shasta River just over two miles downstream, creating lethal conditions for rearing salmon.

Fourteen tailwater hotspots have been identified along Big Springs Creek. Tailwaters draining from irrigated fields entering Big Springs Creek have been measured at times in excess of 90 degrees F.



Only a handful of fish are returning to this stretch of river due to years of cattle grazing in the creek. ©Bridget Besaw

This in addition to excessive water diversions and uncontrolled grazing near river areas have led to water temperatures that are too warm and lethal for fish, degraded creek bank habitat and aquatic vegetation and inadequate rearing and spawning habitat. Of particular concern is the water temperature and quality during the summer months, when juvenile coho salmon need the cold-water habitat to survive the warm summer temperatures.

In order to retain intact and high quality riparian habitat critical to maintaining salmon habitat, The Nature Conservancy purchased the Shasta Big Springs Ranch in March 2009. Adjacent to Conservancy's Nelson Ranch, the combined property totals 6,200 acres including more than 10 miles of critical spawning and juvenile salmon rearing area where restoration will occur.

This project is anticipated to produce measurable conservation results that are tangible and specific. The project proposes to improve 7.8 miles of critical salmon spawning and rearing habitat along the Shasta River and 3.4 miles of Shasta River tributaries-Big Springs Creek by fencing cattle out of all waterways and managing the tailwaters that drain from irrigated fields. By keeping cows out of the creek, a drop in temperature of 13 degrees Fahrenheit was noted in the first year, which provides benefits 15 to 20 miles downstream during the hottest summer months when the salmon need cooler temperatures the most. The fence funded by NOAA will allow this restoration to take place in perpetuity. The project will also restore approximately 90 acres of riparian zone (vegetated creek banks); activities that are critical for providing fish and wildlife habitat as well as maintaining water flows and water quality for cold water fish including salmon.

Salmon Habitat Restoration: Benefits for People and Nature

People: Direct benefits from healthy habitats

- Beyond contributing to the recovery of the \$60 to \$100 million per year fishing industry in Northern California, the project will help stimulate Siskiyou County's struggling ranching and farming community. According to the Siskiyou County 2005 Crop and Livestock Report, the industry contributes more than 3,000 jobs and \$150 million to the regional economy, or about 10 percent of total sales by industry.
- Rising unemployment rates in Siskiyou County suggest that experienced farm workers need work but cannot find it. The Big Springs Restoration project presents an excellent opportunity to put skilled workers, irrigation operators, fence builders and heavy equipment operators back to work.
- In California and Oregon, the commercial and recreational salmon fishery had an average economic value of \$103 million per year between 1979 and 2004.
- From 2001 to 2005, average economic impact to local communities was \$61 million for salmon fisheries: \$40 million in the commercial fishery and \$21 million in the recreational fishery (PFMC news release 2008).

Riparian areas: Interface between land and a stream

- Riparian zones and their unique vegetated structure are important because of their role in soil conservation, biodiversity, and the influence they have on shading of river and creeks which lowers water temperatures.
- Unlimited grazing access to the riparian zone and river have led to lethal maximum average daily water temperatures, degraded riparian habitat and aquatic vegetation and trampled important salmon spawning grounds.
- Of particular concern is the water temperature and quality during the summer months, when coho need the cold water habitat to survive the warm summer temperatures. Vegetation shades creeks and waterways and when that vegetation is removed, water temperatures rise.
- Shallow water is more easily heated by the sun's energy. As the river channel is degraded by cattle grazing, it becomes wide and shallow, moving slower downstream and receiving more sun exposure.

SALMON SPECIES IN THE SHASTA RIVER

Coho salmon: Coho salmon of Southern Oregon/Northern California are in severe decline: down to six percent of their historic abundance. They were listed as federally threatened in 1997 and endangered by the State of California in 2004. Coho fry emerge from the gravels in February and March and generally use the stream for rearing for about one year. One of the main concerns regarding the Shasta River coho is that the juveniles are not staying in the Shasta to rear during the summer months, as they historically did. Improvements in stream conditions during the summer to keep the juveniles in the Shasta as they mature will greatly improve these young fish's chances of survival to return as spawning fish when they are adults.

Fall-run Chinook: Historically spring-run Chinook comprised the majority of the salmon runs of the Shasta River. Today however, the fall-run Chinook is the largest salmon run in the Shasta River and the spring-run Chinook has been extirpated. Run estimates have ranged from nearly 82,000 fish in 1931 to a low of 37 fish in 1948. Since 1978, the run has averaged about 5,600 salmon although runs of less than 1,000 fish were experienced in 1990, 1991 and 1992.

Winter Steelhead: While counts of adult steelhead are lacking for most of the 20th century, they were historically abundant in the river, as indicated by an egg-taking station that was present in the 1930s.

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