Protecting and Restoring Salmon and Steelhead Strongholds

The Nature Conservancy's Approach to Salmonid Recovery in California

Enhancing Climate and Habitat Resilience

The future of one of nature's great migrations is at risk along the Pacific Coast, where once-thriving wild salmonid populations are in decline. Chinook and coho salmon, along with steelhead trout, are culturally meaningful and vital to the health of rivers, forests, and wildlife. Across California, The Nature Conservancy (TNC) is working to restore native salmon and steelhead populations, focusing on watersheds that can serve as climate-resilient strongholds. The recovery of these iconic keystone species **contributes to the overall health of our communities and builds resilience for other species that depend on rivers and coastal wetlands.**

California's rivers are under immense pressure from water extraction, current and historical land use, habitat degradation, and climate change. These rivers and the aquifers that support them supply drinking water to over 30 million people and irrigate the state's crops. They support entire ecosystems and watersheds and contribute to California's status as one of the most biologically diverse places in the world. In most places in the state, too much water is being withdrawn, with rights to water that greatly exceed the annual amount of snowpack and rain. As a result, **aquifers are being depleted, and rivers and streams are running dry—putting an immense strain on salmon and steelhead.** In watersheds with dams, altered flow regimes and blocked access to historic spawning grounds endanger salmonid populations. Land degradation across California has reduced the infiltration of rainfall, limiting groundwater recharge that sustains streamflow during dry seasons. The impact of industrial-scale mining, logging, and agriculture have altered entire watersheds, dramatically impacting river, estuary, and floodplain habitat. In many watersheds, the survival of salmon and steelhead in the summer is limited by a lack of instream habitat and water, while the loss of winter habitat in floodplain valleys and estuaries further hinders recovery.

Turning Science Into Solutions

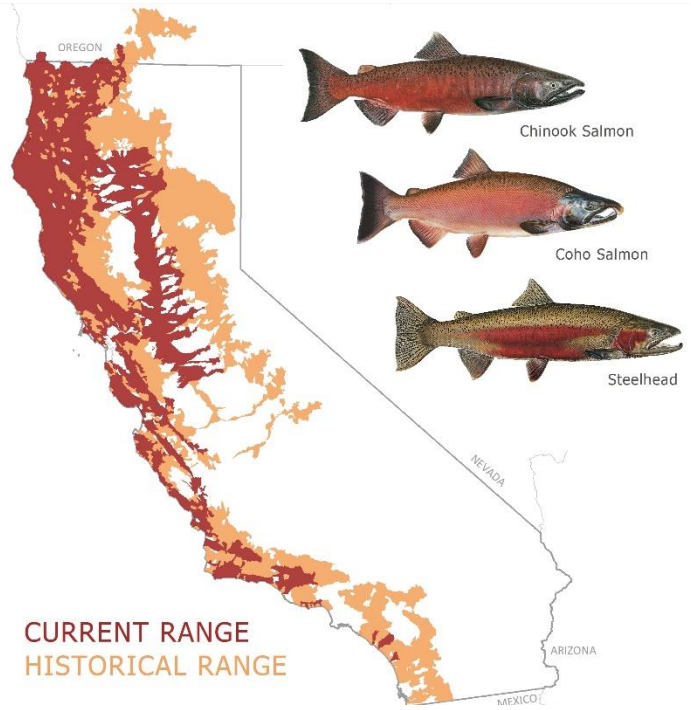
Most of California's rivers and streams are not monitored with gauges, meaning we do not know how much water is in them, let alone how much *should* be in them. TNC and partners did a comprehensive assessment of the state's rivers and streams to develop the California Natural Flows Database, which identifies the flows that rivers would have if humans had not altered them.

We also worked with experts to develop the California Environmental Flows Framework, a system for how to ensure there is enough water in rivers for nature, farmers, and communities, and the Functional Flows Calculator, a tool that helps users quantify the flow metrics required to keep a stream's ecosystem functioning.

These innovations are game changers—they enable data-informed decision-making that was once prohibitively costly and time-consuming.

Advancing Watershed Restoration and Connectivity

Despite these challenges, there is hope. TNC's holistic, science-based, and collaborative approach to salmonid recovery is focused on watersheds where our expertise can address the multiple components of population decline. TNC is focused on addressing both water and land management in key salmon strongholds to recover native populations. In watersheds where agriculture and residential development are extensive, addressing water diversions and groundwater pumping is key to salmonid recovery. Restoring coastal wetlands and floodplains is not only essential for salmon and trout, anadromous fish capable of migrating between freshwater and saltwater environments, but also critical for increasing resilience to sea-level rise and floods. TNC understands what needs to be done and we are seeing successes from our efforts.



Salmonid Range of Salmonids in California © Joseph Tomelleri

TNC's efforts across the state are part of a broader, collaborative vision for recovery that includes local agencies, conservation groups, and community stakeholders. The Salmon and Steelhead Coalition in Northern California advances science and policy that leads to more streamflow restoration projects. The Southern Steelhead Coalition coordinates restoration efforts, and provides a forum for sharing lessons, priorities, resources, and recovery strategies. TNC is not only helping to bring back salmon to more watersheds but also **building resilience for entire regions in the face of climate change and increasing development pressure.** From the northernmost watershed in California to rivers in Southern California, our goal is to create the conditions in these strongholds that allow salmon to recover and thrive for decades to come.

Stronghold Regions

Klamath Watershed

The Klamath River once supported one of the most prolific salmon runs on the Pacific Coast, but today, more than 90% of its populations have vanished. This dramatic decline is the result of a century of dam construction, agricultural water diversions, and widespread habitat degradation. In particular, the Shasta and Scott Rivers—once the primary spawning grounds for salmon in the watershed—now run dry during the summer months, leaving Chinook and coho salmon, steelhead trout, and Pacific lamprey without the cold, flowing water they need to survive. TNC is working to reverse this trend by **restoring ecological function and streamflow in these critical tributaries.**

Scott and Shasta Rivers

The 2024 removal of four major dams on the Klamath River has opened the door to a new era of recovery, and TNC is seizing this opportunity to help repopulate the upper river with native fish. Through a strategy of acquiring, restoring, and reselling key properties, TNC is returning water to streams and rebuilding habitat. At Parks Creek Ranch and Miners Creek Ranch, TNC is restoring over 40 miles of stream and riparian habitat, using senior water rights and cold-water springs to improve flows and conditions for fish.

As both a landowner and a water rights holder, TNC's role in the Klamath is unique—we can **demonstrate how voluntary water transactions and habitat restoration can support both ecological and agricultural resilience.** TNC is also deeply

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engaged in shaping California's flow regulations, by providing data and insights that help balance the needs of nature and local communities. By working collaboratively with local landowners, Tribes, and state and federal agencies, TNC is working to build trust and align on shared goals for a water-resilient future. With partnerships and policies in place, the Klamath River watershed can once again become a thriving stronghold for salmon and a beacon of hope for river restoration throughout the West.

North Coast

California's North Coast is one of the least developed regions of the state, with plentiful rainfall and rugged rivers and streams that historically supported abundant salmon runs. However, the region has endured a long history of environmental degradation, particularly from the intensive logging of redwood forests in the 19th and 20th centuries. These practices, which included industrial-scale clearcutting and the use of rivers to store and transport logs, dramatically altered the region's watersheds. River channels and floodplains were reshaped, and habitats were extensively degraded. Yet, despite this legacy, the region remains one of the most promising places for salmonid recovery, with watersheds that are home to wild runs of salmon and large undeveloped tracts of land that have tremendous potential for habitat restoration.

Using an approach combining science, land stewardship, and policy advocacy, TNC is focused on restoring strongholds for endangered coho salmon and steelhead trout through large-scale habitat enhancement and streamflow restoration. Our goal is to **rebuild winter rearing habitat, restore ecological function, and address streamflow impairment in key watersheds along the Mendocino coast**, including the Ten Mile, Navarro, and Garcia rivers. These watersheds offer some of the best opportunities in California to support the recovery of wild salmon populations.

TNC and partners permanently protected the Ten Mile River estuary. ©Thomas Dunklin

Ten Mile, Garcia, and Navarro Rivers

In the Ten Mile River estuary, TNC has conserved nearly 4,000 acres through conservation easements and land acquisitions, creating one of the most protected estuaries in the state. TNC is now in the process of systematically restoring habitat across this protected landscape. Since 2018, six large-scale projects have been constructed and have contributed to recent **record-breaking returns of adult coho salmon in the watershed**, resulting in surpassing the National Oceanic and Atmospheric Administration's (NOAA) recovery target for spawning adults in the winters of 2023/24 and 2024/2025.

TNC is working with landowners to improve water and land management practices to ensure that rivers have streamflow, particularly in the dry season. We also partner with local governments, like Sonoma County, to develop local groundwater permitting approaches that protect instream flows from future degradation. In the Navarro River watershed, TNC is working with rural communities, farmers, and wine growers to shift water diversions from summer to winter, improving streamflow during critical salmon rearing periods. We are also **working with landowners to restore groundwater recharge that provides water for summer base flows that is drought resilient.** And in the Garcia River, TNC is **leading floodplain restoration efforts and developing new designs for large-scale habitat improvement**. Together, these efforts span full watersheds—from headwaters to estuaries—ensuring a comprehensive approach to salmon recovery.

Chinook Salmon © Jeffrey Rich

TNC collaborates with local landowners, timber companies, Tribes, the Mendocino County Resource Conservation District, Trout Unlimited, and state and federal agencies. Our priorities align with state and federal restoration priorities and attract significant investments. By demonstrating success in these priority watersheds through increasing population returns, TNC is building a replicable model for salmon recovery that can be applied across California's coastal landscapes.

Sacramento River Tributaries

The Sacramento River and its tributaries once supported some of the most diverse and abundant salmon runs in North America. Today, these rivers are at the heart of efforts to recover endangered Chinook salmon and steelhead trout, species that depend on cold, spring-fed waters that flow from Mount Shasta and Mount Lassen to complete their life cycles. TNC is working across three key tributaries—Battle Creek, Mill Creek, and the McCloud River—to **restore access to historic spawning grounds, improve streamflow, and build resilience in the face of climate change**.

McCloud River, Battle Creek, and Mill Creek

On Battle Creek, one of the most promising salmon recovery sites in California, TNC is advancing efforts to remove outdated dams to restore streamflow and fish passage. In partnership with California Trout and others, TNC is advancing work to **reconnect up to 46 miles of historic habitat by removing diversion dams and restoring natural flows**. TNC has provided funding to local community groups and other organizations to build the capacity and technical expertise needed to engage in the long process to de-license and remove dams.

Further north, **TNC's Kerry Landreth Preserve on the McCloud River** plays a vital role in the reintroduction of winter-run Chinook salmon. Once extirpated from their native spawning grounds by the construction of Shasta Dam, these salmon were returned to the McCloud River in 2022 for the first time in 80 years through a partnership between the Winnemem Wintu Tribe, California Department of Fish and Wildlife, and NOAA. The Preserve, which protects 2,300 acres along the cold, spring-fed river, partnered with NOAA and University of California researchers who are monitoring their reintroduction, including studies to assess outcomes for juvenile salmon.

In the Lassen Foothills, TNC is working to protect flows in Mill Creek, another critical tributary for spring-run Chinook salmon and steelhead trout. Mill Creek is one of only three rivers of an original 18 that still support independent spring-run Chinook salmon populations in the Central Valley. **TNC's Dye Creek Preserve includes a tributary to Mill Creek** and we have acquired additional land and water on Mill Creek to ensure that water remains in the creek during summer months to protect riparian vegetation and habitat when fish may still be migrating upstream and agricultural demand is high. As a local landowner, TNC is also supporting efforts led by the state to set protective year-round instream flow requirements for Mill Creek and other important tributaries in the foothills of Mount Lassen. Together, these projects represent a comprehensive strategy to recover salmon in the Sacramento River system—one that blends science, policy, and community partnerships to restore its ecological integrity.

South Coast

Southern California's coastal streams once formed a vibrant network connecting inland ecosystems to the Pacific Ocean.

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These waterways supported a rich diversity of life, including the iconic Southern California steelhead. Over the past two centuries, however, this interconnected system has been severely fragmented by dams, culverts, levees, and other infrastructure and dewatered by diversions and well pumping. Today, with less than half of the historic watersheds containing steelhead trout, the Southern California steelhead is listed as endangered, with its populations teetering on the brink of extinction from the Santa Maria River to the Mexican border. TNC is working with partners to advance the resilience of the Southern California steelhead, by restoring habitat and connectivity.

Jalama Creek

At the heart of TNC's Southern California steelhead recovery efforts is the **Jack and Laura Dangermond Preserve, a 24,000-acre coastal property that protects 94% of the Jalama Creek watershed** in coastal Santa Barbara County. With nearly the entire watershed within TNC's protection, TNC has a rare opportunity to restore ecosystem processes at a landscape scale. Historically, Jalama Creek supported a thriving steelhead run, but two major barriers—remnants of the preserve's ranching era—blocked fish from accessing upstream spawning grounds for over 50 years. Smaller barriers, such as road culverts and agricultural dams, further disrupted the natural flow of water and sediment, severing the connection between streams and their estuaries. Steelhead trout have not been observed in Jalama Creek since the 1990s.

Using a science-based research and management approach to scalable solutions to species recovery, TNC works at Dangermond Preserve to restore natural processes, reconnect fragmented habitats, improve habitats for aquatic and riparian species, and build resilience for both wildlife and people in the face of a changing climate. TNC has made significant strides in restoring critical habitat in Jalama Creek watershed, and with the recent removal of the two major barriers, 13 miles of Jalama Creek are now open to migrating steelhead. This achievement marks an important milestone in the effort to bring steelhead trout back to Jalama Creek and recover resilience for Southern California steelhead.

Moving forward, TNC will continue to **restore instream and riparian habitat conditions and connectivity by addressing additional barriers** and adaptively managing cattle operations to benefit fish and wildlife at a watershed scale. By partnering with academic researchers to characterize watershed health and steelhead habitat quality while monitoring ecological responses to restoration and adaptive management in the watershed, TNC will track the long-term progress of these restoration efforts and whether steelhead and other native species return to Jalama Creek.

Jalama Creek on the Jack and Laura Dangermond Preserve. © Laura Riege

Santa Clara River

The Santa Clara River stretches 84 miles from the San Gabriel Mountains to the Pacific Ocean and is one of the last relatively unaltered rivers in Southern California. This rare ecological gem supports a rich mosaic of habitats that sustain 18 threatened or endangered species, including the iconic Southern California steelhead. TNC has been working for over two decades to restore the ecological

integrity of the Santa Clara River, protecting 4,500 acres (including approximately 21 river miles) in Ventura County. Habitat restoration along the river corridor has focused on the removal of the highly invasive, water-intensive giant reed and restoration of native riparian vegetation. TNC and our local partner Central Coast Alliance United for a Sustainable Economy (CAUSE) celebrated the opening of **the Santa Clara River Preserve in 2024, a nearly 1,000-acre property that spans two miles of the Santa Clara River** corridor and provides free public access.

TNC's work to restore the preserve includes removing invasive species, reestablishing native vegetation, and improving hydrological connectivity to ensure that fish can access spawning and rearing habitats throughout the watershed. TNC partners with the California Wildlife Conservation Board, California State Coastal Conservancy, U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, and Caltrans, and to date has restored nearly 250 acres to native riparian scrub and forest, providing critical habitat for a suite of sensitive species.

The river channel itself supports the endangered Southern California steelhead, and the Santa Clara River is considered critical to its recovery by NOAA Fisheries and the California Department of Fish and Wildlife. Restoring steelhead habitat in the Santa Clara River is significant because the portions of Ventura and Los Angeles counties through which it flows consist primarily of agricultural and open space, with much of its headwaters located in the Los Padres and Angeles National Forests. TNC is partnering with the Ventura County Resource Conservation District, to streamline permitting processes for restoration through the statewide "Cutting the Green Tape" initiative. The Santa Clara River offers one of the best remaining opportunities for Southern California steelhead recovery in the region and TNC's restoration can serve as **a model for floodplain protection across the region**.

Conclusion

Once tremendously abundant, California wild salmonid populations have declined drastically. In many watersheds, the survival of coho and Chinook salmon and steelhead trout in the summer is limited by a lack of instream habitat, which is coupled with the loss of winter habitat in floodplain valleys and estuaries.

TNC and partners are working to protect and restore native salmon and steelhead populations, focusing on key watersheds across the state that can serve as climate-resilient strongholds. Our work to protect and restore functional flows in rivers and to repair landscape connectivity needed for survival and adaptation is changing the status quo in California and providing hope and the solutions needed to ensure a thriving future for salmon and steelhead.

The Santa Clara River, home to Southern California Steelhead © Barbara Wampole

Additional Resources

Healthy Rivers - Fact Sheet

Groundwater is Streamflow - Fact Sheet

The State of California Salmon - Website

Klamath Acquisitions - Fact Sheet

Hope Runs Deep: Shasta Valley - StoryMap

North Coast Restoration - Strategic Plan

The North Coast | Places We Protect - Website

Ten Mile River | Places We Protect - Website

Garcia River | Places We Protect - Website / Garcia River - Video

Dangermond Preserve- Website

Dangermond Preserve Freshwater Resilience - Fact Sheet

One Dam Down - Notes from the Field

The Santa Clara River Preserve | Places We Protect - Website

The Santa Clara River Preserve | Places We Protect - Video