

# California

## Coastal Monitoring Program for Salmon and Steelhead



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*California Department of Fish and Wildlife*

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# What is the California Coastal Monitoring Program?

It's the most comprehensive program to date that provides a complete understanding of California's salmon and steelhead populations, utilizing statistically-rigorous modeling in combination with a variety of in-river sampling and survey methods.



*The first of its kind in California....* California's Coastal Monitoring Program is designed to inform salmon and steelhead recovery, conservation, and management activities. California Department of Fish and Wildlife and NOAA Fisheries are leading the implementation of this Program in coastal watersheds from California's border with Mexico north to the Oregon border, including San Francisco and Humboldt Bay tributaries.

With high stakes in resource conservation, species protection, commercial and recreational fishing, tribal relations, climate change, and pressures on land management, it is essential that the Coastal Monitoring Program be implemented to scientifically inform managers and the public regarding decisions to ensure healthy rivers, land, oceans and sustainable fisheries for future generations.

The California Monitoring Program also provides information to the public demonstrating the progress of restoration and recovery efforts and substantiates agency needs to continue pursuing successful conservation of coastal salmon and steelhead.

**Photo Credits:** Background: Klamath River estuary (Del Norte County). © CDFW. Inset: © CDFW.

Angler hooks a steelhead at the Trinity River (Trinity County). Joe Carboni.



## What do *people* get from this Program?

- Healthy rivers for future generations and sustainable fish populations;
- Direct benefits to local economies via competitive grants administered by the Department;
- Information transparency, collaboration, and diverse partnerships;
- Sustainable recreational and commercial fisheries and associated local economic benefits;
- Improved efficiencies in funding and staff time for implementing restoration actions; and
- Sound conservation, restoration, and management of public fisheries resources.

## What do *salmon and steelhead* get from this Program?

- A voice to the public and resource managers (via population status and trend) to communicate whether habitat is healthy and if fish populations are recovering;
- After full-implementation of this Program:*
- More focused protection and / or restoration on key watershed features by refining our understanding of habitat conditions and the relationships with fish populations;
  - More effective restoration by refining our understanding of how specific habitat restoration actions affect fish populations;
  - Improved landscape practices to ensure sustainable fish populations; and
  - Improved hatchery management practices to ensure that the conservation goals of each hatchery are met.



Commercial troller fishes for Chinook salmon off of the California Coast. © CDFW

# Current Activities

## DEVELOPING A STATE-WIDE DATABASE

This database allows information to be entered remotely, quality-controlled, securely stored, and reports to be down-loaded from one's office or home computer. This will allow public viewing of all information collected.

## ESTABLISHING THE SAMPLING FRAMEWORK

We are developing a sampling framework at the appropriate scale that allows us to evaluate adult salmon and steelhead population status over time.

## RESEARCHING AND REFINEMENT OF FIELD METHODS

We are establishing standardized field protocols, data collection, and data reporting to ensure that data are comparable and compatible within and across geographic regions.

## LINKING HABITAT AND FISH RESPONSE

We are generating protocols to improve efficiencies in restoring habitat and managing changing landscapes for fish.

## COMMUNICATING WITH THE PUBLIC

We are producing materials with several goals to: (1) educate the public about the state of salmon and steelhead; (2) demonstrate the progress of restoration and recovery efforts; (3) and get permission to access streams for monitoring.

## BUILDING PARTNERSHIPS

We are working collaboratively and establishing partnerships for stream access, assistance in monitoring and data analysis, funding, and public outreach.

## LOOKING FOR FUNDING

Long term success of this Program is dependent on building a stable and consistently reliable funding base from a broad spectrum of sources, complemented by a fully-trained volunteer force.





## PROGRAM HIGHLIGHTS

# *Southern California*

### **TOPANGA CREEK** *Los Angeles County*

Flexible life history strategies allow steelhead to persist in a wide variety of coastal watersheds, including arroyo-type streams at the southern limit of this species' range, which extends to the Tijuana River at the United States-Mexico border. At Topanga Creek, the Resource Conservation District of the Santa Monica Mountains (District) has been monitoring the Southern California steelhead population since 2001. Over the last several years, the Department has partnered with the District, and together, they expanded the existing monitoring program into a full-blown life cycle monitoring station as per the Coastal Monitoring Program. The District has added tagging, conducted growth and age studies, and has experimented with a sonar camera as a means to enhance our knowledge of steelhead in a small southern California stream. As partners, the District and the Department envision expanding their monitoring efforts to include all coastal streams within the entire Santa Monica Mountains population group.



*Steelhead smolt on its way out to sea in Topanga Creek (Los Angeles County). Resource Conservation District Santa Monica Mountains Stream team.*

### **SANTA YNEZ RIVER** *Santa Barbara County*

Besides being an important watershed for water supply, the Santa Ynez River is key for Southern California steelhead population. Recently, the Department collaborated with the Cachuma Operations and Maintenance Board (Board) which operates Bradbury Dam in partnership with the United States Bureau of Reclamation. To supplement the Board's ongoing monitoring program, the Department will be placing a sonar camera downstream of one of the Board's trap stations to validate fish counts and to enumerate fish that may be missed by the trapping operations during high flow conditions. Jointly, the Department and the Board hope to improve the accuracy of counts of ocean run fish entering the Santa Ynez River and its tributaries. The initial challenge has been designing a mounting system for this deeply incised channel that will withstand high flow events but allow operation without putting staff at risk. This in-house design, if successful, will have applications to areas with similar site constraints and safety issues.



*Southern California steelhead from Mission Creek (Santa Barbara County).  
© NOAA Fisheries.*



## PROGRAM HIGHLIGHTS

# Central California

### **CARMEL RIVER** *Monterey County*

The Carmel River is an important watershed for the survival of the South-Central steelhead population, and it provides an important water supply for private residences, businesses, and tourism of the Monterey Peninsula. Through the Fisheries Restoration Grant Program, the Department partnered with the Monterey Peninsula Water Management District (District) in 2011, and funded the District to enumerate the steelhead run in the Carmel River through use of a sonar camera. So far, the camera has been deployed for two migration seasons and there are plans to deploy it again in 2013 / 2014. Department staff collaborate with the District in monitoring, the data review process, and have developed quality control procedures to ensure data integrity. The Department plans to deploy another camera to monitor adult steelhead on the Big Sur River, another high priority watershed.



*Monterey Peninsula Water Management District staff deploy sonar camera on the Carmel River. Monterey Peninsula Water Management District.*

### **SCOTT CREEK** *Santa Cruz County*

Living on the edge of their natural range, Scott Creek in Santa Cruz County is one of the southern-most streams where coho salmon and steelhead have persisted for centuries. Within the last two decades, the coho salmon population nearly collapsed. While causes for the dramatic decline are being studied, it appears that human-induced impacts in combination with recent poor ocean conditions were the main driving factors.

Monitoring this watershed's coho salmon and steelhead populations is critical in helping fishery biologists and resource managers understand the effects of human activities and natural phenomena on habitat so that we can effectively implement restoration and management strategies to recover these iconic species. Under the Coastal Monitoring Program, scientists from the University of California, Santa Cruz, monitor the life cycle of coho salmon and steelhead populations, generating crucial data on marine and freshwater survival, fish movement throughout the watershed, as well as genetic factors affecting the health of the population.

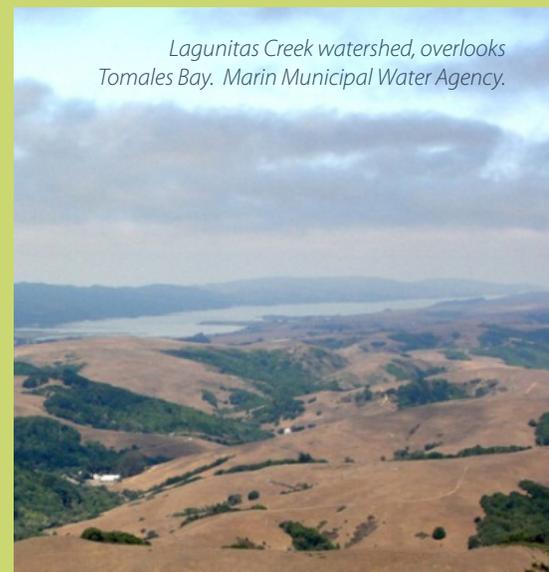


*Scott Creek coho salmon and steelhead. NOAA Fisheries.*

### **LAGUNITAS CREEK** *Marin County*

As in other coastal streams of central California, spawning populations of coho salmon and steelhead have declined significantly from historic numbers in Lagunitas Creek. The declines in abundance have been documented in Lagunitas Creek for almost 20 years.

There is still hope--Within the last three years, coho salmon have experienced improved survival and abundance. Additionally, with the recent implementation of the California Monitoring Program at Lagunitas Creek, fisheries managers at the California Department of Fish and Wildlife and NOAA Fisheries are better able to track the status of the population and make decisions on watershed restoration and coho salmon recovery activities. Monitoring of salmon and steelhead in Lagunitas Creek is a coordinated effort involving many entities, including the Department, NOAA Fisheries, National Park Service, Marin Municipal Water District, and the Salmon Protection and Watershed Network.



*Lagunitas Creek watershed, overlooks Tomales Bay. Marin Municipal Water Agency.*



# PROGRAM HIGHLIGHTS

## Northern California

### PUDDING CREEK *Mendocino County*

The Pudding Creek Salmon and Steelhead Life Cycle Monitoring Station is a component of the larger Mendocino County Coastal Salmonid Monitoring Project. This Station was conceptualized by the Department and Campbell Timberland Management, with oversight from NOAA's Southwest Fisheries Science Center, and in association with the Pacific States Marine Fisheries Commission. This Project's goals include determining marine and freshwater survival of salmon and steelhead, as well as estimating the ratio of redds (salmon and steelhead nests) to adult fish so that a total population estimate can be determined for the broader Mendocino County Region. The monitoring work began in fall 2005 and includes methods such as adult trapping, spawning surveys, tagging, electro-fishing, and smolt (juveniles migrating to ocean) trapping.

In 2011, the Department, in collaboration with its partners, expanded this study to include researching the linkages between implementing specific restoration actions (i.e. adding large woody debris to streams) and increasing fish abundance at Mendocino County streams. The ultimate goal is to improve efficiencies of restoring fish habitat to gain increases in fish populations over time. For this study, additional collaborators, The Nature Conservancy and Trout Unlimited, joined the effort. Other collaborators involved in this monitoring include two Humboldt State University graduate student projects, the National Council for Air and Stream Improvement, the United States Geological Survey, California Department of Fire, United States Forest Service, and NOAA's Stream Restoration Center. This broad coalition is critical for adaptive management of these endangered salmon and trout.



*Campbell Timberlands Management Fisheries Technician releasing male Coho Salmon at the Pudding Creek fish ladder. ©CDFW*

### MENDOCINO COUNTY REGIONAL MONITORING

The Mendocino County Coastal Salmonid Monitoring Project is the first of its kind on the California coast, enabling the Department to calculate with statistical certainty how many salmon and steelhead return to spawn in these regional streams. This Project's goal is to scientifically estimate the number of spawners each year (status) and to monitor their numbers over the long term to understand population trends.

The Life Cycle Monitoring Stations (located at Caspar Creek, South Fork Noyo River, and Pudding Creek) are operated to understand survival in the ocean to calibrate and interpret this status and trend information.

The Department, in collaboration with Campbell Timberland Management, NOAA's Southwest Fisheries Science Center, and the Pacific States Marine Fisheries Commission, launched the three year pilot study for the monitoring project in 2005. In 2009, the Department and its partners expanded monitoring to include all salmon and steelhead streams in coastal Mendocino County and it expanded its partnership to include Mendocino Redwood Company. In fall 2013, Mendocino Redwood Company will implement Life Cycle Monitoring on the North Fork Navarro River.



*Pacific States Marine Fisheries Commission Fisheries Technicians conduct spawning surveys on the Garcia River. ©CDFW*





## PROGRAM HIGHLIGHTS

# Northern California

### SHASTA RIVER *Siskiyou County*

The Department is currently monitoring adult and juvenile salmon and steelhead in the Shasta River Watershed. A video weir is utilized to count returning adult Chinook and coho salmon during the fall, and an outmigrant trap is operated from late winter through early summer to estimate numbers of outmigrant juveniles. The pairing of adult and juvenile data allows for estimation of the number of salmon and steelhead produced within the Shasta River basin compared to those produced outside of the basin. The out-of-basin production ratios are integral in providing context to adult abundance, and the in-river production ratios are critical for evaluating changes to freshwater conditions for salmon and steelhead. Recently, research at the Shasta River has grown to include a tagging study which allows the Department to identify key rearing locations so that survival estimates can be determined by stream reach and time, as well as to elucidate seasonal movements of juveniles within the watershed. This information has greatly improved our understanding of juvenile salmon and steelhead needs in this area. To improve estimates of returning adult steelhead which enter the river later than Chinook and coho salmon, the Department has deployed a sonar camera for the past two years at the mouth of the Shasta River in addition to operating the video camera.



*PIT tagging allows analysis of seasonal movement of juvenile coho salmon. ©CDFW*



*South Fork Smith River during the winter near Big Flat Campground. ©CDFW*

### SMITH RIVER *Del Norte and Siskiyou Counties*

The Smith River, recognized for its exceptional water quality year-round, was incorporated into the Coastal Monitoring Program in 2011. Already, a variety of surveys have been conducted and the results are available.

Monitoring includes salmon and steelhead spawner surveys to estimate annual abundance over time in this watershed. Survey data from the first two years indicate coho salmon currently have a very restricted spawning distribution relative to Chinook salmon or steelhead. A juvenile out-migrant trap will be installed near the mouth of Mill Creek, a major tributary to the Smith River, to estimate the number of salmon and steelhead smolts leaving Mill Creek sub-basin. Abundance estimates from this trap will be used to track productivity and survival. The Department recently deployed a sonar camera in the lower basin to determine effectiveness of this new technology in obtaining basin-wide adult salmon and steelhead population estimates for large rivers. Using this technology, over 60,000 adult salmon and steelhead counted over two seasons from the fall of 2010 and the spring of 2012, providing a baseline estimate of returning adult salmon and steelhead to the Smith River. Current monitoring partnerships with the Department include National Parks Service, California State Parks, and the Smith River Alliance.



California is the only state on the West Coast without a permanent monitoring budget.

# Organization of California's Coastal Monitoring Program

## PARTNERS

The Department and NOAA Fisheries are the primary agencies responsible for the conservation of salmon and steelhead and for implementing this Program. We work with diverse partners and collaborators in support of salmon and steelhead conservation, including other state and federal agencies, Tribal Nations, water resource agencies and local governments, private industries, academic institutions, conservation organizations, and recreational fishing groups, etc.

A partial list of partners includes:

*Pacific States Marine Fisheries Commission; Trout Unlimited; CalTrout; The Nature Conservancy; Santa Monica Mountains Resource Conservation District; Cachuma Operations and Maintenance Board; Casitas Municipal Water District; United Water Conservation District; South Coast Habitat Restoration; Tri County FISH Team; Monterey Peninsula Water Management District; University of California, Santa Cruz; Marin Municipal Water District; Salmon Protection and Watershed Network (SPAWN); Point Reyes National Seashore Association; National Park Service; University of California Extension; Sonoma County Water Agency; University of California Cooperative Extension / California Sea Grant; Humboldt State University; Humboldt Redwood Company, LLC; Gualala River Watershed Council; Mendocino Redwood Company; Campbell Timberland Management; National Council for Air and Stream Improvement; California Department of Fire; California Department State Parks; and the Smith River Alliance.*

## GEOGRAPHIC AREA & FISH SPECIES

We are taking a phased-approach to implement the Program. In the initial phase, we are including the coastal watersheds extending geographically from the California border with Mexico north to the Oregon border. Our vision is to expand the Program geographically from California's coastal streams to soon incorporate Central Valley watersheds. Likewise, we expect to expand our target species from salmon and steelhead to also include other species such as coastal cutthroat trout, green and white sturgeon as well as Pacific lamprey.

## LONG TERM PLAN FOR MONITORING AND CONSERVING FISH

We base the duration of the Coastal Monitoring Plan on two factors. The first factor is a 100-year time-frame that federal scientists have determined is necessary for the evaluation of salmon and steelhead risk of extinction (McElhany et al. 2000). The second factor is the variation and age composition of spawning adult salmon and steelhead. Long term trend analysis provides resource managers and the public context for the annual population estimates with respect to status of recovery, efficacy of restoration actions, sustainability, as well as responses to the changing landscape and changing climate.

## VISION FOR THE FUTURE

We will work collaboratively, maintain our diverse partnerships, look for new partnering opportunities, and make our data easily accessible to the public. We will continue our focus on fish population dynamics and habitat conditions. Future expansion of the Program will address assessment and monitoring of habitat restoration efficacy, fisheries management, and populations sustainability.



Fall-run Chinook salmon in the Shasta River (Siskiyou County). © CDFW

# Supporting the California Coastal Monitoring Program

This Program is based in science and all protocols used by the Program go through rigorous internal and external scientific review to produce statistically meaningful information for a complete understanding of salmon and steelhead populations in the state.

Through competitive grants administered by the Department, the Department works with grantees to restore habitat, measure restoration efficacy, and monitor fish populations. With this Program, there are direct benefits to local economies.

The Department is the sole state agency mandated to implement and integrate species monitoring, resource recovery actions, resource management, habitat restoration, and enforcement. There are direct benefits to fish and ultimately their population recovery to sustainable levels for their intrinsic value and for their use and enjoyment by the public.

## Getting Involved

### CONTACTS

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### FOR MORE INFORMATION

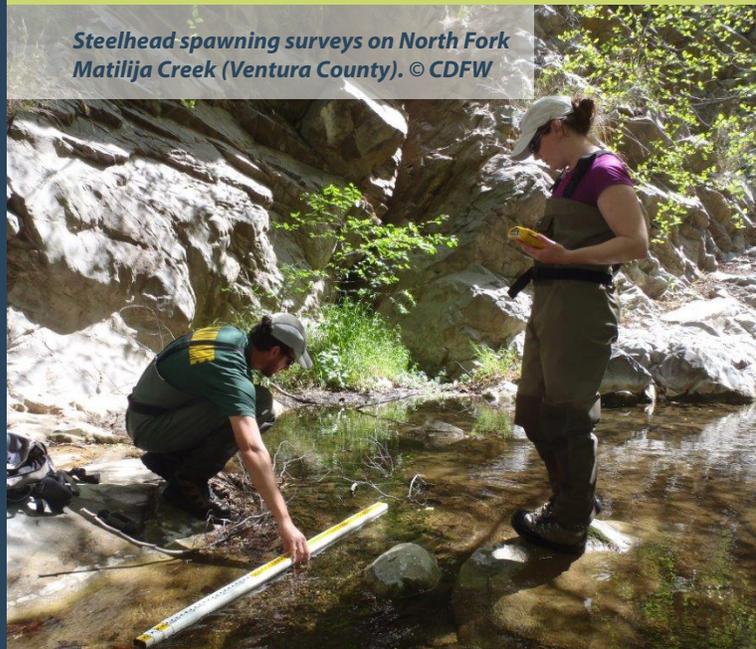
The Department's Fish Bulletin 180: California Coastal Salmonid Monitoring: Strategy, Design and Methods.

Program Websites:

<http://www.dfg.ca.gov/Fish/cmp>

<http://www.calfish.org/cmp>

Steelhead spawning surveys on North Fork Matilija Creek (Ventura County). © CDFW





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