

Decision support tools for salmon health

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September 25th, 2017



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Drought and Fisheries

- Reduced flows
- Increase disease
- Reduced food
- Reduced habitat
- Poor water quality (temperature)

Protecting fish from California's extreme drought

Winter 2014

It seems intuitive that fish need water, but with California facing its driest two-year period on record, water is becoming harder and come by. To ensure California's threatened and endangered fish populations survive the drought, NOAA is working hand-in-hand with state and other federal agencies on water, fisheries and wildlife strategies.

Historically, salmon and steelhead populations were geographically widespread throughout the central and northern California coast. Habitats were pristine, connected, and better able to withstand natural drought cycles. Today most populations stand at a mere fraction of their historical size due to habitat degradation and other factors. They are more vulnerable to extreme weather conditions than ever.

The impacts of the current drought are widespread and include low river flows, reservoir levels, and snow packs. The limited water poses challenges for water managers tasked with balancing the needs of ranchers and farmers with bustling urban centers. It also challenges fish and wildlife managers, including NOAA, to revisit protections for vulnerable fish species.

NOAA's efforts to safeguard threatened and endangered salmon and sturgeon are guided by the Endangered Species Act, typically through two main vehicles: 1) biological opinions, which provide guidance to federal agencies to ensure their actions avoid harming listed species, and 2) species recovery plans, which include longer-term strategies to recover the species to healthy numbers, at which point they no longer need ESA protections. The protective measures contained within both these documents account for inherent variability in environmental conditions.



Source: <http://www.westcoast.fisheries.noaa.gov>

Winter-run in Sacramento Watershed



- Historical range blocked by dams
- Spawning grounds shifted downstream into warmer conditions
- Early life history impacted

Source: Central Valley draft Recovery Plan; NMFS 2009

Drought effects on winter-run Chinook

2011

SHASTA DAM

2,048,000
eggs

RED BLUFF DIVERSION DAM

849,000
juveniles
survived
to pass
Red Bluff

41%
survival

DELTA

Drought conditions reduce survival of endangered winter-run salmon. In the summer months, winter-run egg and fry in the upper Sacramento rely on cold-water releases from Shasta Reservoir to keep the river cool enough for them to survive.

In years of high flow, there is plenty of water to cool the river. In 2011, over 41% of the eggs laid in the upper river survived to pass Red Bluff Dam as juveniles.

In 2015, record drought left very little cold water in Shasta to cool the upper Sacramento. Despite the many eggs laid by returning adult salmon, only 3% survived to reach Red Bluff. Those few survivors face further high mortality as they continue through the Delta and into the ocean.

Many decisions about Central Valley and State Water Project operations are designed to help endangered winter-run salmon survive to reach the Delta. NOAA Fisheries is closely monitoring juvenile winter-run as they migrate through the Delta to minimize additional loss.

2015

SHASTA DAM

9,744,000
eggs

RED BLUFF DIVERSION DAM

318,000
juveniles
survived
to pass
Red Bluff

3%
survival

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Using models to aid stakeholder decisions



About CVTEMP

Watershed Model

Reservoir Model

River Model

Meteorology

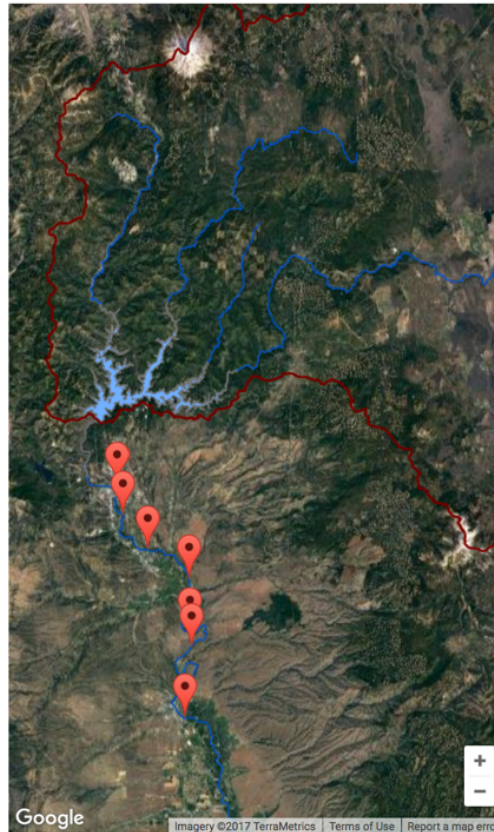
Download

References

BETA - Web Site Under Development

This website is the public interface for modeled and observed water temperature and flow data for the Sacramento River associated with Shasta Reservoir, Bureau of Reclamation, NASA, and NOAA Fisheries.

Model Stations and Regions



Sacramento River Gage Stations:

- A. SAC (SAC)
- B. Above Clear Creek confluence (CCR)
- C. Airport Road (AND)
- D. Balls Ferry (BSF)
- E. Jellys Ferry (JLF)
- F. Bend Bridge (BND)
- G. Red Bluff (RDB)

Sacramento River Model Regions (check to highlight):

- Sacramento River below Keswick Dam
- Shasta Reservoir
- Keswick Reservoir
- Watershed
- Sacramento River above Shasta Reservoir
- McCloud River
- Pit River
- Squaw Creek

Note: website has text describing models, sources of data, and other pertinent information

Go to CVTEMP website

oceanview.pfeg.noaa.gov/CVTEMP



CVTEMP

Central Valley Temperature Mapping and Prediction (CVTEMP)

Thank you for listening!

Successful temperature management of Shasta Reservoir in 2016 was estimated to reduce temperature-dependent mortality to approximately 2% from the 77% and 85% estimate in 2014 and 2015 brood year respectively.

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