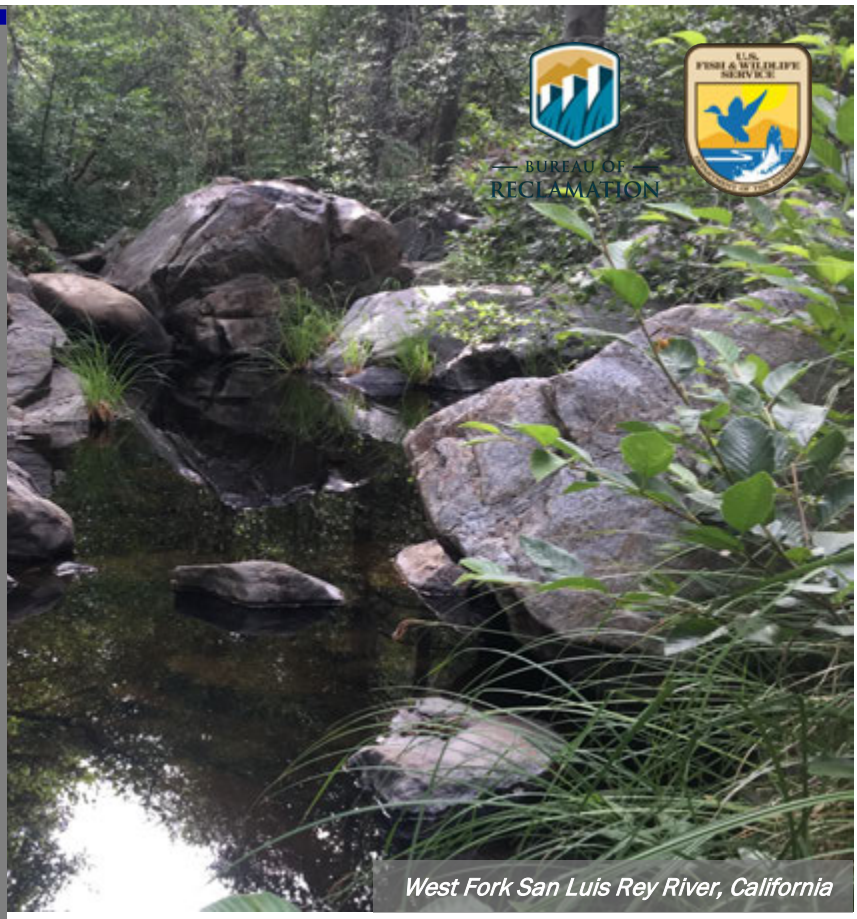
RESTORATION

Bullhead Removal for Coastal Rainbow Trout Conservation in Southern California

The West Fork San Luis Rey River, located just north of San Diego, California, on Palomar Mountain, is home to the southernmost population of native Coastal Rainbow Trout (*Oncorhynchus mykiss irideus*). In 2007, non-native Black Bullhead (*Ameiurus melas*) washed into the stream from a source population in a private stock pond located in the headwaters. While species of catfish are often difficult to eradicate in introduced systems, biologists from California Department of Fish and Wildlife successfully conducted a removal project from 2016-2018 and achieved complete bullhead eradication within this stream.



West Fork San Luis Rey River, California

KEY ISSUES ADDRESSED

The West Fork San Luis Rey River (WF San Luis Rey) contains a unique assemblage of native fishes and amphibians that are susceptible to negative impacts from non-native Black Bullhead. Black Bullhead, native to the central United States, have high invasion potential as they can tolerate a wide range of environmental conditions and prey upon, outcompete, and modify habitat of native aquatic species. Early removal efforts in the WF San Luis Rey were unsuccessful with traditional methods such as backpack electrofishing due to complex pool habitat and logistically challenging site access in remote conditions. To ensure long-term control, efforts focus on monitoring and prevention as bullhead are still present in upstream stock ponds.

PROJECT GOALS

- Eradicate non-native Black Bullhead
- Use bullhead trapping data to estimate the original size of the Black Bullhead population
- Monitor and protect the southernmost native population of Coastal Rainbow Trout in North America

BULLHEAD ERADICATED

After removing over 1,300 Black Bullhead during the first year of surveys in 2016, project members were astonished to catch no bullhead in the following surveys in 2017. No bullhead were detected through 2019.

Casting a Baited Minnow Trap

PROJECT HIGHLIGHTS

Field Coordination: Project managers devised a coordinated plan to sample 16 perennial pools throughout the WF San Luis Rey during multi-day trips. In addition, project managers needed standardized effort metrics (catch per unit effort) for statistical population modeling. Field crews always included three people for multi-night sampling trips. For each trip, the field crew hiked in from the upstream site (at the natural waterfall) and began setting traps at 3 p.m. while hiking downstream.

Bullhead Population Estimate: In 2016, 241 total traps were set, mostly in 16 perennial pools, from August 30th to October 14th. 1,315 Black Bullhead were captured and removed over approximately three river miles. Using this data, sampling effort, and statistical modeling, project managers estimated the total Black Bullhead population prior to removal efforts at 1,361 fish. No bullhead were caught in subsequent sampling trips from 2017-2019.

Bullhead Removal Techniques: Bullhead were captured using Promar collapsible minnow traps (60 by 30cm, with dual 14cm openings and 1cm bar mesh) with tuna-flavored cat treats as bait. Traps were set in the deepest spots of each pool to soak overnight and were checked the following morning.

Collaborators

- California Department of Fish and Wildlife Heritage and Wild Trout Program
- California Trout

LESSONS LEARNED

Baited minnow traps were the most effective method for capturing Black Bullhead in this system, both for their logistical advantage for packing as well as capture efficiency. Because bullhead have a strong sense of smell, project managers hypothesize that cat treats release odor into the pools drawing bullhead out from the substrate.

Following bullhead removal in 2016, project members initially saw a spike in native Coastal Rainbow Trout spawning in 2017, however this also coincided with a large precipitation event with over seven inches of rain falling over a 24-hour period. High flows from this rain may have assisted project members with bullhead removal as any remaining fish were flushed out of the system. Project managers suspect that the right combination of environmental factors and successful minnow trapping enabled Black Bullhead eradication, and that perhaps strong rains are equally if not more important for native Coastal Rainbow Trout populations than competition from bullhead.

Logistically, project managers strongly recommend knowing the dynamics of the particular drainage being studied. The project team mapped out all of the perennial pools before setting traps to figure out the most efficient way of site access and how to cover the entire survey area in one trip.

NEXT STEPS

- Continue annual monitoring to ensure Black Bullhead do not re-invade during high flow events
- Work with a local private landowner for access to the bullhead source population
- Increase Coastal Rainbow Trout genetic diversity

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Coastal Rainbow Trout

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Photos courtesy of California Department of Fish and Wildlife
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