Genetic Composition Assessment and Barrier Design for California Golden Trout Recovery

State(s): California
Managing Agency/Organization: Trout Unlimited
Type of Organization: Non-profit
Project Status: Ongoing
Project type: WNTI Project
Project action(s): Barrier construction, population assessment, and monitoring. One barrier will be designed, with 16 stream miles and one population of California Golden Trout assessed.
Trout Species Benefitted: California Golden Trout
Population: South Fork Kern River

Project summary: The protection of California Golden Trout (CAGT) is a high priority for anglers and natural resource managers alike. Currently, this iconic subspecies faces familiar yet dire threats. Significant numbers of Brown Trout, and likely hybrid Rainbow x Golden trout, were detected in the South Fork Kern River (SFKR) between Ramshaw and Tempelton barriers. This leaves Ramshaw Barrier to hold the line in the SFKR, protecting pristine habitat and keeping it free of nonnative trout in the historic range of CA Golden Trout.

Brown Trout have been established in the SFKR below the Templeton Barrier for many years. Survey data from that reach of the river reflect severely depressed population estimates, on the order of <10% of those at survey sites above Templeton Barrier (CDFW unpublished data). This surrogate reach of the SFKR serves as a harbinger of what to expect if the Brown Trout incursion goes unmitigated.

Currently, we are identifying data gaps (e.g., the genetic composition of the population between Ramshaw and Schaeffer Barriers, a reach bisected by the Templeton Barrier). Filling these gaps is a crucial step in properly weighing the suite of options for addressing the problem and recovering CAGT in its native range.

Problem the Project Addresses: Brown Trout, and likely Golden Trout x Rainbow Trout hybrids, have invaded a reach of the South Fork Kern River previously protected by the Templeton Barrier. While it's feasible to visually identify Brown Trout, hybrid fish detection will require laboratory analyses to determine the presence or absence of nonnative Rainbow Trout DNA. Evidence gathered to date indicates that there are multiple pathways through which this could happen. Trail cameras aimed at the barrier captured flows that likely facilitated passage over it during peak runoff. CDFW has also documented the deterioration of the Templeton Barrier over the last several years, and while the barrier's structural integrity currently appears intact, it will require future repair. Additionally, modeling results indicate that there is a 50% chance in any given year that the headwaters of Strawberry Creek and an unnamed tributary to the SFKR will connect and facilitate unobstructed passage around Templeton Barrier. This connection is noted in the 2004 Conservation Strategy and will require an engineering solution to adequately address. The money requested for contracting the services of an engineering firm will be used to determine a suite of options for addressing fish passage issues threatening the long-term persistence of CAGT in this reach of river.

We are in the process of gathering information to inform sound management decisions to eradicate nonnative trout to restore CAGT in their native range. One potential solution for addressing the Brown Trout, and likely hybrid, incursion above Templeton Barrier is to pursue a chemical treatment to eradicate the nonnative species of trout. Before that option can be fully vetted and weighed against other nonnative removal options, it is necessary to revisit the genetic composition of the hybridized CAGT. The most current results that we have on the genetic composition of the fish in the reach of SFKR in question is from 2016. Since 2016, we have experienced three abnormally high-water years, creating conditions that facilitated passage around Templeton

Barrier. This, in turn, raises the possibility that our understanding of the genetic composition of the population differs from that of the population currently residing in that reach of the SFKR.

Objectives:

- Leverage habitat assessment data in-hand to inform design options for barrier enhancement and/or replacement to stymie future nonnative trout incursions above Templeton Barrier and once again secure this reach of the SFKR for CAGT.
- Using a spatially balanced sampling approach (e.g., Generalized Random Tessellation Stratified sampling or GRTS), conduct a comprehensive tissue collection effort between Ramshaw and Schaeffer barriers.
- Analyze tissue samples to determine the genetic composition of the CAGT populations, identify the source of any nonnative native Rainbow Trout DNA, and produce genetic health metrics.
- Expand outreach efforts in Tulare and Inyo counties (and statewide). This includes improving the flow of information from agency to agency (or interested party to interested party) and creating opportunities to educate the public about the perils of unauthorized live fish transplants and the vulnerabilities and threats facing California's freshwater fish.

Partners:

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

Project Monitoring: Success will be judged by our ability to generate information to inform solutions for addressing the breach of habitat formerly secured for the protection of CAGT. Successful execution of work will yield feasible solutions and barrier designs aimed at halting the upstream movement of fish around the Templeton Barrier. A successful tissue collection effort will be measured by completing a spatially balanced sampling effort generating samples from >200 individuals. Successful genetic analyses will yield current estimates of the proportion of nonnative DNA in the population and common genetic health metrics (e.g., He, Ho, Fst, Fis, etc.). Successful outreach will be measured by the number of new signs, the number of presentations and public meetings we hold, and web analytics metrics from partner websites dedicated to CAGT recovery and fishing opportunities. Should we fail to meet objectives, we will evaluate the information collected and use it to inform a revised approach. We fully expect this recovery work to be an iterative process. There will be unsuccessful attempts or investigations, so we will consistently evaluate our approach and follow the best available science. Additionally, the work conducted in this study fits within a broader effort to restore the SFKR for CAGT. Each step of the process provides opportunities for feedback and evaluation.

Funding Source(s): National Fish Habitat Action Plan
Project cost: WNTI $49,996 Total $100,377
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