

## PREDATOR REDUCTION USING FISH TRAPS WITH BAIT ATTRACTION

### Investigators

**Brent Mefford**

*Hydraulic Research Engineer  
Hydraulic Investigations and Laboratory Services  
bmefford@usbr.gov*

**Josh Mortensen**

*Hydraulic Engineer  
Hydraulic Investigations and Laboratory Services  
jmortensen@usbr.gov*

**Fisheries Biologist to be named**

*Fisheries and Wildlife Resources*

### Summary

The Tracy Fish Collection Facility (TFCF) is located at the head of the Delta-Mendota Canal upstream of the Tracy (C.W. Bill Jones) pumping plant. Fish from the San Joaquin Delta are salvaged at the TFCF before they reach the pumping plant and then released into the Sacramento River. Piscivorous fish such as striped bass (*Morone Saxatilis*) reside within all major components the TFCF (Liston 1994). As a result of predation, piscivores likely have significant impacts on fish survival and salvage efficiency for many listed species, including but not limited to, delta smelt (*Hypomesus transpacificus*), Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*Oncorhynchus mykiss*). Recent laboratory studies in TSC's Hydraulics Lab indicate that striped bass may be lured into fish traps using bait (Mortensen, 2013). Using this trap method it may be possible to capture large quantities of predators to reduce predation within the TFCF.

Fish traps are a common, passive fish capture device used as a means of collecting fish for both commercial and scientific use (Murphy and Willis 1996). Typically, localized hydraulic conditions guide fish into the trap. Once captured, trap designs permit fish survival while simultaneously making it difficult for fish to escape, permitting safe and easy capture and relocation/release. This study proposes using existing fish trap designs (Figure 1) and common fish baits as a new technique for removing predators from the TFCF. Most predators use a keen sense of smell, among other senses, to help find prey (Karas 2000). Many types of bait on the market expose predators to smell by adding pheromones and other odor releasing substances as the main attraction. These smelly baits could be used to lure predators from the primary channel into a fish trap at the TFCF. Once in

the trap the fish can easily be removed from the primary and relocated. This is a practical concept that can easily be investigated without excessive testing or equipment design and development.

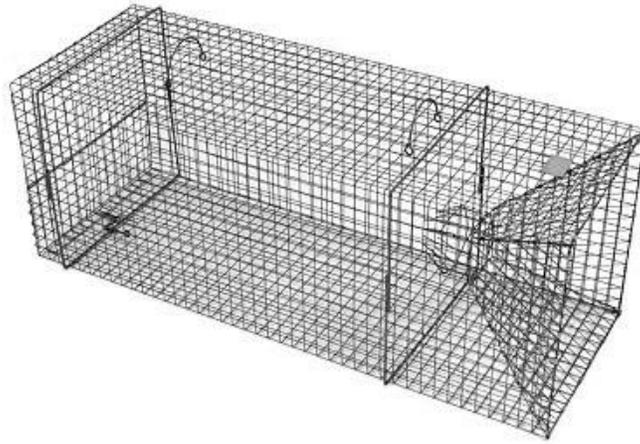


Figure 1.—Example of a common fish trap design.

## Problem Statement

Predation is among the greatest challenges for fish salvage at the TFCF (Liston 1994). Removing predators in the primary channel is particularly challenging due to its large volume of water, flow conditions, and large number of predators. Anecdotal evidence suggests that predators such as striped bass pass through the trash racks as smaller fish and then grow as they feed within the primary channel. Many of these predators likely become resident fish as their size prevents them from returning upstream through the two inch wide spaces in the TFCF trash racks. It is likely that the large number of predators in the primary channel creates a competitive environment for food and the likelihood for salvage of other fish species entering the facility is greatly decreased. While the predator's demand for food is a significant drawback for fish salvage, it may be used advantageously to remove resident predators by baiting them into a fish trap using odor releasing baits.

## Goals and Hypotheses

*Goal:* Field tests will determine the effectiveness of fish baits to attract predators into a fish trap and remove them from the primary channel at the TFCF.

*Hypothesis:* Capturing and removing predators using fish traps with fish baits can reduce predation at the TFCF.

## Materials and Methods

Initial testing for attraction methods is currently being completed at Reclamation's Hydraulics Laboratory in Denver, Colorado as a project for the Science & Technology (S&T) program. In these tests striped bass are tested in similar controlled conditions which include time since last feeding, hydraulics in test flume and fish trap design. Laboratory tests vary only in which brands/types of fish baits are evaluated on their ability to lure fish into the fish trap. Different baits, using olfactory and visual stimulus, are being compared against a control group which experience the same testing procedure without bait in the trap. Preliminary test results indicate that striped bass can be lured into a trap with live bait. Testing using other types of bait will be concluded by September 2013.

In FY2014 the most successful baits from laboratory testing will be used for field tests. Baits will be placed in the same fish trap used in the lab and will be deployed in the primary channel at the TFCF. On site demonstration testing will indicate if results from lab testing are verified in the field and determine if the fish trap concept is effective at the TFCF. A simple hoist system such as a portable winch or hand-lift crane will be used to lift the trap out of the channel to check for captured predators. During testing the trap will be checked daily to determine the number of predators removed from the facility.

## Coordination and Collaboration

It is anticipated that the cost of this study may be shared by Reclamation's S&T program. The study will be coordinated between the TSC, Mid Pacific Region and TFCF staffs and the interagency Tracy Technical Advisory Team (TTAT) through regular updates and meetings.

## Endangered Species Concerns

Permitting may be required for FY 2014 field testing.

## Dissemination of Results (Deliverables and Outcomes)

This study will produce a Tracy Technical Bulletin that summarizes observations, results and recommendations from field testing submitted September 30, 2014.

## Literature Cited

Karas, Nick. 2000. *The Complete Book of Striped Bass Fishing*. The Lyons Press Guilford CT.

Mortensen, J. and B. Mefford. 2013. *Fish Predator Reduction using Fish Traps with Bait Attraction*. Bureau of Reclamation, Technical Service Center, Denver, CO. DRAFT

Murphy, B. and D. Willis. 1996. *Fisheries Techniques, 2<sup>nd</sup> Edition*. Bethesda, MD. 732 p.

Liston, C.R. et al. 1994. *Summary of the Fish Predator Removal Program and Intake Channel Studies, 1991-1992*. Tracy Fish Collection Facility Studies. Volume 1. Bureau of Reclamation, Mid-Pacific Region and Denver Technical Service Center.