

# 2006 South Fork Boise River Electrofishing Survey

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## Introduction

Rivers downstream from dams form some of the most valued trout fisheries in the western U.S. The South Fork Boise River below Anderson Ranch Dam is a highly valued trout fishery and was the first river section in Southwest Idaho to be managed under "Quality Trout" regulations. Regulations restrict terminal tackle to no bait and barbless hooks from Neal Bridge (Forest Road 189) upstream to Anderson Ranch Dam. Rainbow trout harvest is restricted to 2 fish, none under 20 inches. The fishery is supported by a population of wild rainbow trout *Oncorhynchus mykiss* and mountain whitefish *Prosopium williamsoni*. Migratory bull trout *Salvelinus confluentus* are present at very low densities.

## Methods

Rainbow trout populations in the South Fork Boise River have been monitored in a 9.6 km section every three years since 1994. The section starts at the boat ramp near Reclamation Village and ends at the take-out 1.1 km downstream from Cow Creek Bridge (Flatter et al. 2003). Previous surveys on this reach used raft mounted electrofishing gear to estimate abundance and size structure. In 2006 we made the decision to more intensively sample shorter reaches within the historic section. I identified three stream reaches approximately 1 km in length located within the boundaries of the original reach. The upper boundary corresponded to the starting point of the historic section and the end of the lower reach corresponded to the end of the historic section (Table 1). The middle section corresponded to the section sampled for density in 2003. Riffles formed the upper and lower reach boundaries. Section length was determined from 1:24 k topographic maps. Wetted widths were measured with a hand-held laser range finder (Leupold RX series). Section area was estimated by multiplying mean widths and section length. For braided channels mean width was measured across the river excluding any distances across islands.

We used mark-recapture techniques to estimate abundance of trout and mountain whitefish in each section. Fish were collected with a canoe electrofishing unit consisting of a 5.2 m Grumman aluminum canoe fitted with two mobile anodes connected to 15.2 m cables. The canoe served as the cathode and carried the generator, Coffelt VVP-15, and a live well for holding fish. Oxygen was introduced to the live well (2 L/minute) through an air-stone. Pulsed direct current was produced by a 5,000 watt generator (Honda EG500X). Frequency was set at 60 pulses per second and a pulse width of 60-80, with an output of 4-5 amperes. Crews consisted of six to seven people. Two operators managed the mobile anodes, one person guided the canoe and operated the safety switch controlling the output, the remaining crew of four or five people were equipped with dip nets to capture stunned fish. Only trout and whitefish were placed in the live well.

Marking and recapture runs were conducted with a single pass from upstream to downstream. The canoe was held upstream of the anode operators. Anodes were swept through the water or thrown across the stream and retrieved. Crews with dip nets walked backward facing upstream, while staying downstream of the anodes and capturing stunned fish. Fish were placed in the live well. When the live well was judged to be at capacity the crew stopped at the nearest riffle to process fish.

Rainbow trout, mountain whitefish and bull trout were marked on October 19, 20. Fish were marked with a 7 mm diameter hole from a standard paper punch on the upper, middle or lower section of the caudal fin corresponding to their capture reach. Only fish larger than 100 mm were marked. Fish were measured for total length (mm) and a subset were weighed (g). Fish were released 50 to 100 m upstream from the processing site to prevent them from drifting downstream into the next section of water to be sampled. Recapture sampling was completed on October 24-25. During the recapture effort all whitefish and trout greater than 100 mm were captured and placed in the live well. Fish were examined for marks on the caudal fin. All fish were measured for length (mm). All bull trout were scanned for presence of passive integrated transponder tags (PIT).

To account for selectivity of electrofishing gear population estimates (N) were calculated using a maximum likelihood estimation to fit the recapture data. A capture probability function of the form

$$Eff = (\exp(-5+\beta_1L + \beta_2L^2)) / (1 + \exp(-5+\beta_1L + \beta_2L^2))$$

where Eff is the probability of capturing a fish of length L, and  $\beta_1$  and  $\beta_2$  are estimated parameters (MFWP 2004). Then N is estimated by length group where M is the number of fish marked by length group.

$$N = M / Eff$$

Population estimates were calculated for each reach and pooled for a comprehensive estimate expressed as # fish/km for comparison to previous surveys. Three rainbow trout mortalities were excluded from the population estimates.

Rainbow trout population estimates ( $\check{N}$ ) for surveys from 1994 – 2003 were calculated using the Modified Petersen equation for fish >129 mm and >239 mm. In order to make comparisons with the 2006 estimates I used the Modified Petersen equation to estimate the rainbow trout population for the 2006 survey.

$$\check{N} = [(M+1)*(C+1)] / (R+1) - 1$$

Where M is the number of fish marked, C is the number of fish captured and R is the number of fish recaptured. Population estimates and proportional stock density (PSD) values for previous surveys were taken from Flatter et al. (2003). The PSD index was calculated using the equation from Anderson (1976) with rainbow trout values from Anderson and Neumann (1996).

$$PSD = [Rainbow\ trout \geq 400\ mm / Rainbow\ trout \geq 250\ mm] * 100$$

## Results and Discussion

We captured 420 wild rainbow trout and 7 hatchery rainbow trout greater than 100 mm in the three sections combined (Figure 1). We marked 255 rainbow trout and recaptured 30 of the marked fish. I estimated 705 rainbow trout / km for the 9.6 km section (Figure 2). Hatchery rainbow trout were included in the population estimate. Rainbow trout population estimates were similar between reaches (Figure 2). Low numbers of recaptured rainbow trout (n=5) influenced the population estimate for the middle reach. The number of large rainbow trout in the South Fork Boise River has increased over the last 10 years but the numbers of fish between 129 and 239 mm has declined (Figure 3). We captured 5 bull trout in the two sections. Four bull trout were between 331 and 370 mm total length, with one 505 mm. One bull trout had been previously tagged with a PIT tag on September 27, 2005 at a weir operated by the Bureau of Reclamation on the North Fork Boise River. The bull trout was 217 mm and 86 g at tagging and 341 mm and 388 g when recaptured. Population estimates for mountain whitefish will be presented in a separate report as part of a statewide mountain whitefish status review.

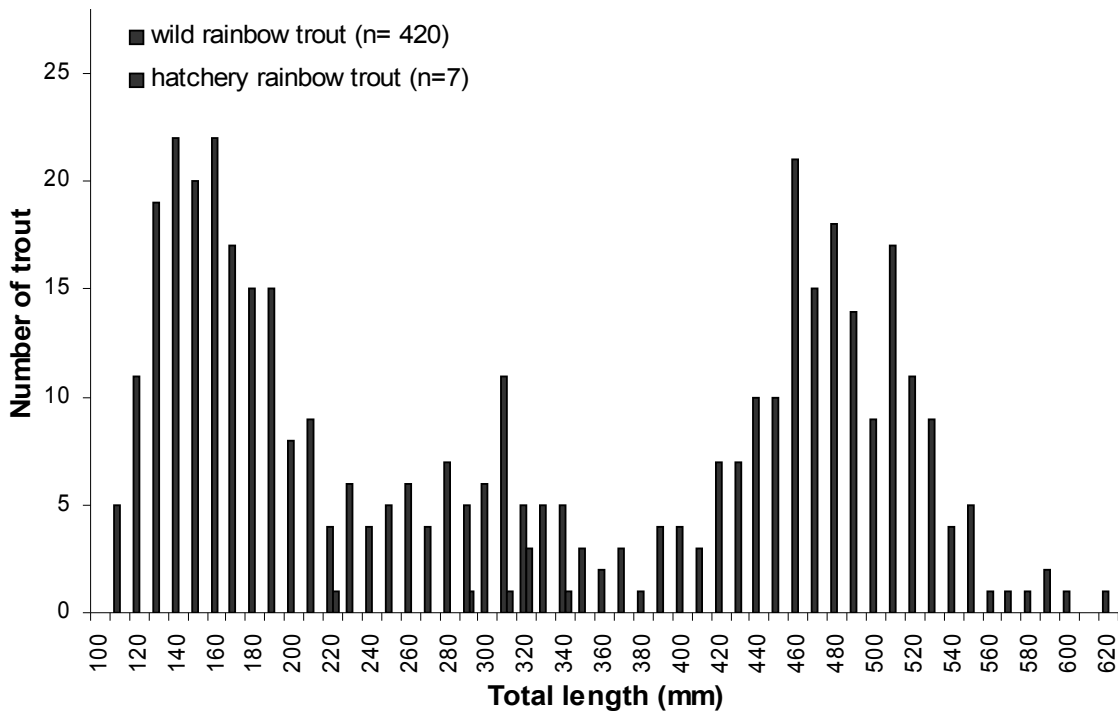


Figure 1. Length of rainbow trout captured by electrofishing on the South Fork Boise River downstream from Andersen Ranch Dam in 2006. Only trout greater than 100 mm total length are included.

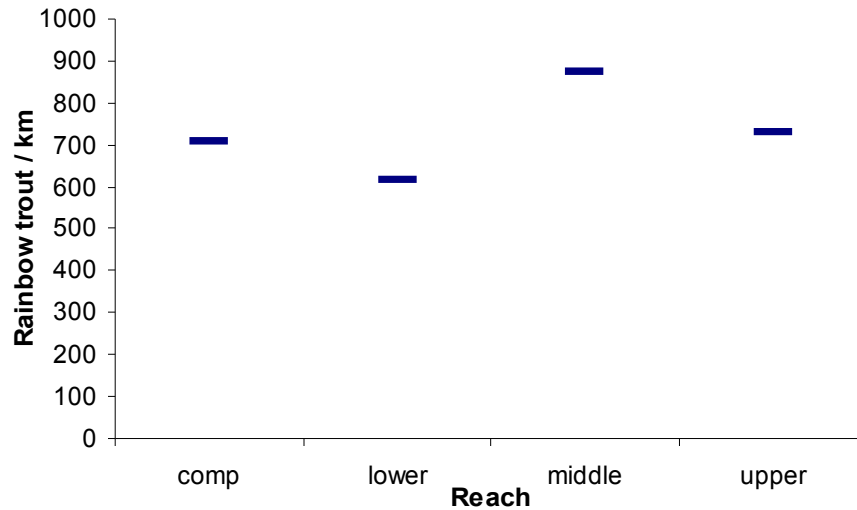


Figure 2. Linear density estimates for rainbow trout (>100mm) by reach for the South Fork Boise River in 2006 from maximum likelihood estimation. Comp is the estimate from pooling the data from all three reaches.

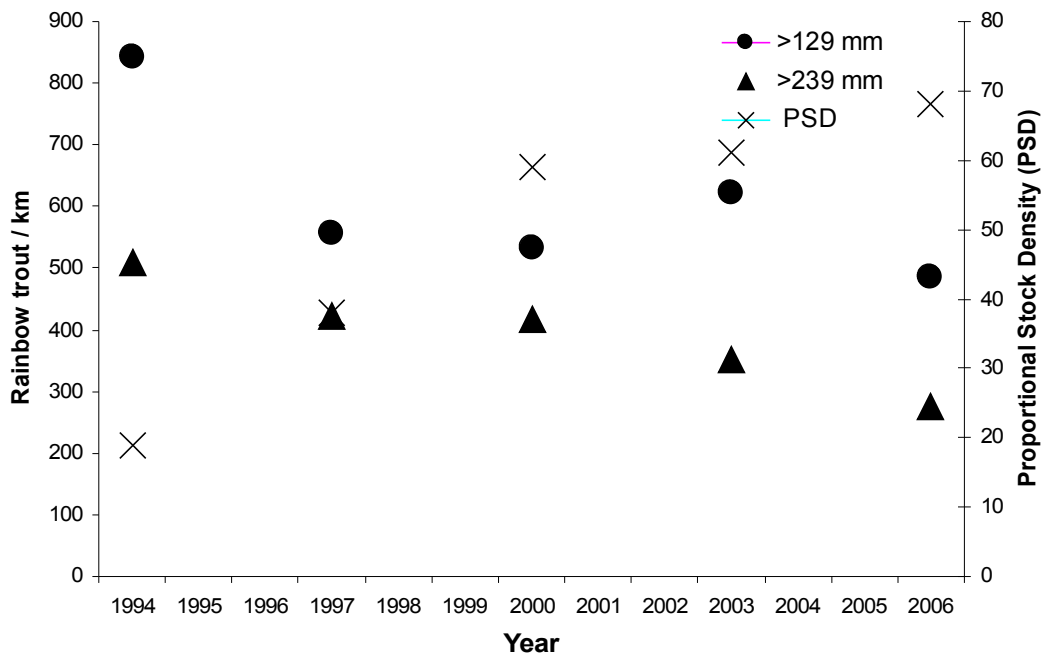


Figure 3. Linear density and Proportional Stock Density (PSD) for rainbow trout on the South Fork Boise River downstream from Andersen Ranch Dam between 1994 and 2006. Estimates for 2006 were for rainbow trout > 130 mm and > 240 mm.

Rainbow trout populations in the South Fork Boise River have been relatively stable, but the relative absence of trout in the 200 to 400 mm length range is puzzling. The numbers of trout greater than 400 mm are currently providing an excellent fishery despite the decline of smaller trout in the survey section. Using the canoe electrofishing gear increased sampling efficiency for smaller fish (Figure 4). The peculiar bi-modal length frequency plot is atypical of what would be considered a normal population. The

explanations for the missing length groups could be attributed to fish of those sizes occurring outside our sampling area or the larger fish could be migrating to the system from Andersen Ranch Reservoir, Arrowrock Reservoir or unsampled reaches downstream.

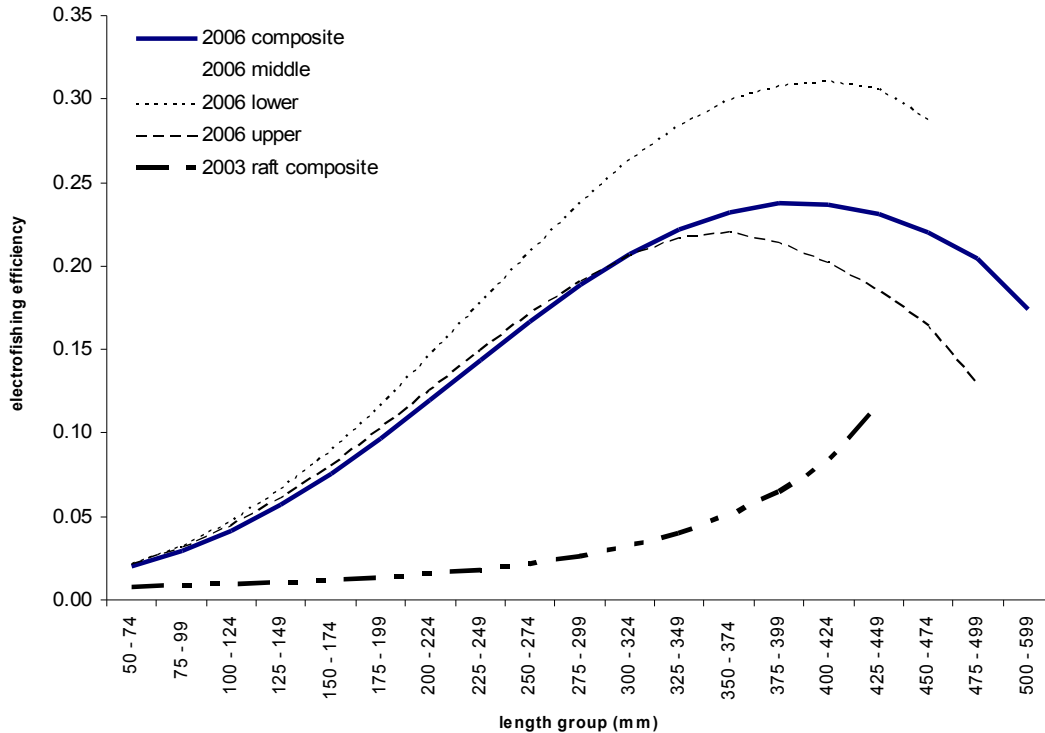


Figure 4. Sampling efficiency curves for 2006 canoe electrofishing sampling and for 2003 raft electrofishing sampling by section.

### References

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