FISHERY MANAGEMENT INVESTIGATIONS

IDAHO DEPARTMENT OF FISH AND GAME

FISHERY MANAGEMENT ANNUAL REPORT

Virgil K. Moore, Director

SOUTHWEST REGION

2009

Arthur E. Butts, Regional Fishery Biologist
Joseph R. Kozfkay, Regional Fishery Biologist
Chris Sullivan, Fishery Technician
Jeffrey C. Dillon, Regional Fishery Manager

April 2011

IDFG #11-108

SOUTH FORK BOISE RIVER ELECTROFISHING SURVEY

ABSTRACT

We used mark-recapture techniques to estimate abundance of rainbow trout and mountain whitefish in the South Fork Boise River, downstream of Anderson Ranch Reservoir in October 13 – 20th, 2009. A total of 761 rainbow trout were collected during both mark and recapture runs. Fish lengths ranged from 43 - 603 mm and multiple modes were observed within the length distribution. Fewer fish >500 mm were observed in the catch when compared to 2006 data while a greater proportion of fish $\leq$100 mm were observed in 2009. We captured 405 wild rainbow trout greater than 100 mm in the three sections combined. We marked 391 rainbow trout and recaptured 40 of the marked fish. I estimated 870 rainbow trout / km for the 9.6 km section. Mountain whitefish were collected only in the upper section in 2009 to provide trend information. A total of 338 mountain whitefish were collected ranging between 100-530 mm and we marked 194 mountain whitefish and recaptured 25 of the marked fish, resulting in an estimate of 945 mountain whitefish/km for the upper section. Additionally, four rainbow trout fry monitoring sections, established in 1996, were re-sampled in 2009. I estimated overall mean linear fry density to be 3.1 $\pm$ 3.4 fish / m in October 2009.

Author:

Art Butts
Regional Fishery Biologist

INTRODUCTION

Rivers downstream from dams form some of the most valued trout fisheries in the western U.S. The SFBR 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 two fish, none under 20 inches (508 mm). The fishery is supported by a population of wild rainbow trout and mountain whitefish. Migratory bull trout are present at very low densities, and native non-game fish include largescale suckers, northern pikeminnow and sculpin *Cottus sp*.

METHODS

Rainbow trout populations in the SFBR have been monitored in a 9.6 km section every three years since 1994. The section starts at the boat ramp near Reclamation Village (4.2 km downstream from the dam) and ends at the take-out 1.1 km downstream from Cow Creek Bridge (Flatter et al. 2003). Previous surveys used raft mounted electrofishing gear to estimate abundance and size structure for the entire reach. In 2006 we made the decision to more intensively sample shorter reaches within the historic section (Kozfkay 2009). We 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 (Figure 29). 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/min) through an air-stone. Pulsed direct current was produced by a 5,000 watt generator (Honda EG500X). Frequency was set at 60 pulses/s 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 and bull trout were marked in all three sections on October 13 – 14th. Whitefish were only marked in the upper section. Fish were marked with a 7 mm diameter hole from a standard paper punch on the upper and lower section of the caudal fin and anal 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 19 – 20th. 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).

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

$$Eff = (exp(-5+\beta_1 L+ \beta_2 L^2)) /(1+ exp(-5+\beta_1 L+ \beta_2 L^2))$$

where Eff is the probability of capturing a fish of length L, and β_1 and β_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 (Ň) 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).

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

Fry Monitoring

Rainbow trout fry were monitored using a Smith Root Type VII backpack shocker in four sections of the SFBR on October 19, 2009 (Figure 29). The 33-m sections were monitored in 1996 by Elle (1997) to assess relative abundance of rainbow trout fry in relation to whirling disease. The area from the north shoreline out to approximately 4 m was sampled. A single, upstream electrofishing pass was completed at each site. All fish were identified, counted and measured for total length. Fry density estimates and lengths were compared to those collected in 1996.

RESULTS AND DISCUSSION

Low numbers of recaptured fish in the upper and middle sections prevented us from calculating population estimates for the three individual survey sections. Therefore, mark-recapture data for all three sections were pooled for analysis. However, density estimates were calculated for the three individual sections to allow for comparisions with previous estimates.

A total of 761 rainbow trout were collected during both mark and recapture runs. Fish lengths ranged from 43 - 603 mm and multiple modes were observed within the length distributions (Figure 30). Fewer fish >500 mm were observed in the catch when compared to 2006 data while a greater proportion of fish ≤100 mm were observed in 2009. During marking efforts, we captured 405 wild rainbow trout greater than 100 mm in the three sections combined (Figure 30). We marked 391 rainbow trout and recaptured 40 of the marked fish. I estimated 870 rainbow trout / km for the 9.6 km section (Figure 31).

Rainbow trout density estimates were similar between reaches, except for the middle reach (Figure 31). Low numbers of recaptured rainbow trout (n = 5) influenced the population estimate for the middle reach. This reach also includes a number of deep runs where wading is not possible. Sampling in these sections consists of attempting to herd fish to the bottom of the runs, however, many fish are likely escaping capture in these areas.

The number of large rainbow trout in the SFBR has increased over the last 10 years, as indexed by PSD, and the numbers of fish between 129 and 239 mm increased from 2006 (Figure 32). Since 2000, the proportion of rainbow trout between 102-230 mm (4-9 in.) has increased with every sampling event, from 17% in 2000 to 49% in 2009. In contrast, the proportion of fish >406 mm (16 in) decreased with each event, from 49% in 2000 to 33% in 2009. The number of fish exceeding 508 mm (20 in.) has declined from 13% in 2006 to 3% in 2009.

Mountain whitefish were only collected in the upper section in 2009 to provide trend information. A total of 338 whitefish were collected ranging between 100 - 530 mm and length distributions were similar between 2006 and 2009 (Figure 33). We marked 194 mountain whitefish and recaptured 25 of the marked fish. We estimated 945 mountain whitefish/km for the upper section, which was down slightly from an estimated 1,111 fish/km in 2006 (Figure 31).

We captured five bull trout in the upper and middle sections. Bull trout ranged from 275-578 mm, with three fish between 420 - 480 mm (Figure 34). All five fish were marked and one was recaptured but sample size was too small to provide valuable estimates of population size or density.

Rainbow trout populations in the SFBR have been relatively stable, but the 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 relative lack of smaller trout in the survey section. Using the canoe electrofishing gear increased sampling efficiency for smaller fish compared to previous efforts with raft electrofishing (Kozfkay 2009). The bi-modal length distribution is atypical for a wild trout population. One explanation for the missing length groups could be that fish of those sizes occur outside our sampling area. The larger fish could be migrating to the system from Andersen Ranch Reservoir, Arrowrock Reservoir or unsampled river reaches downstream. For example, during the first SFBR survey that occurred in the downstream canyon section in 2008, rainbow trout between 250 - 400 mm were present in higher proportions than what was observed in the tailwater section (Kozfkay et al. 2010). This suggests possible segregation based on size or habitat.

Fry monitoring

We collected 408 rainbow trout fry among the four sections ranging between 33-84 mm. Over half the fry (59%) were collected in section 4, directly above Cow Creek bridge. I estimated overall mean fry density to be 3.1 $\pm$ 3.4 fish/m in October 2009 (Figure 35). This is compared to 2.2 $\pm$ 0.7 fish/m that was estimated in 1996. Though conclusions may be limited from two years of data spaced 13 years apart, fry monitoring may provide valuable information on recruitment and survival if implemented on an annual basis.

MANAGEMENT RECOMMENDATIONS

1. Continue to monitor rainbow trout population trends in the roaded section on 3-year intervals or less.

2. Continue to monitor the downstream canyon section and examine the possibility of pit-tagging smaller fish to see if they migrate upstream to the tailwater section as they grow.

3. Use annual shoreline electrofishing at established sites to monitor spawning success and fry production; relate fry densities to adult abundance, flows, or other environmental variables as data becomes available.

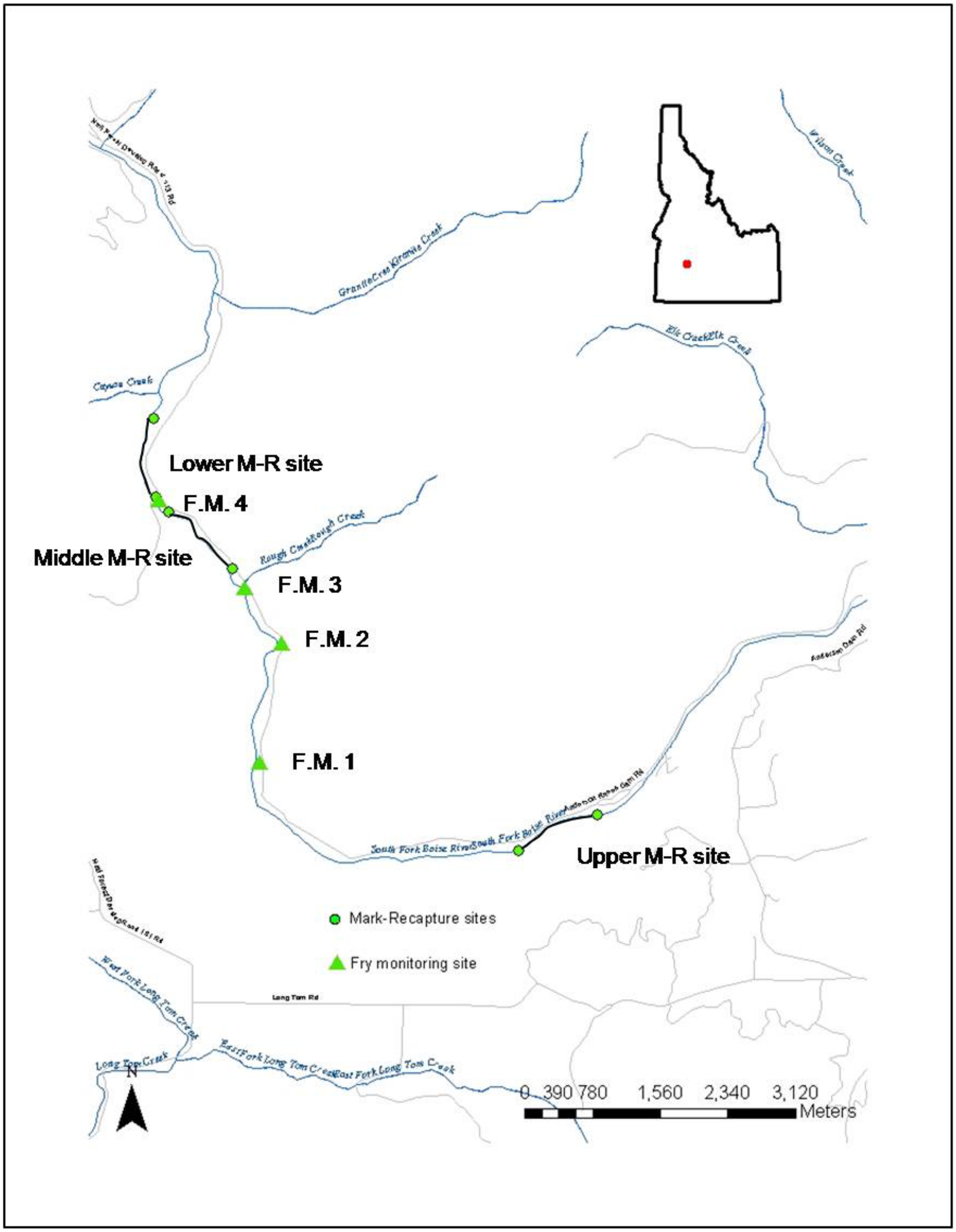

Figure 29. Map of South Fork Boise River, Idaho tailwater sections showing location of 2009 mark-recapture section boundaries and fry monitoring sites.

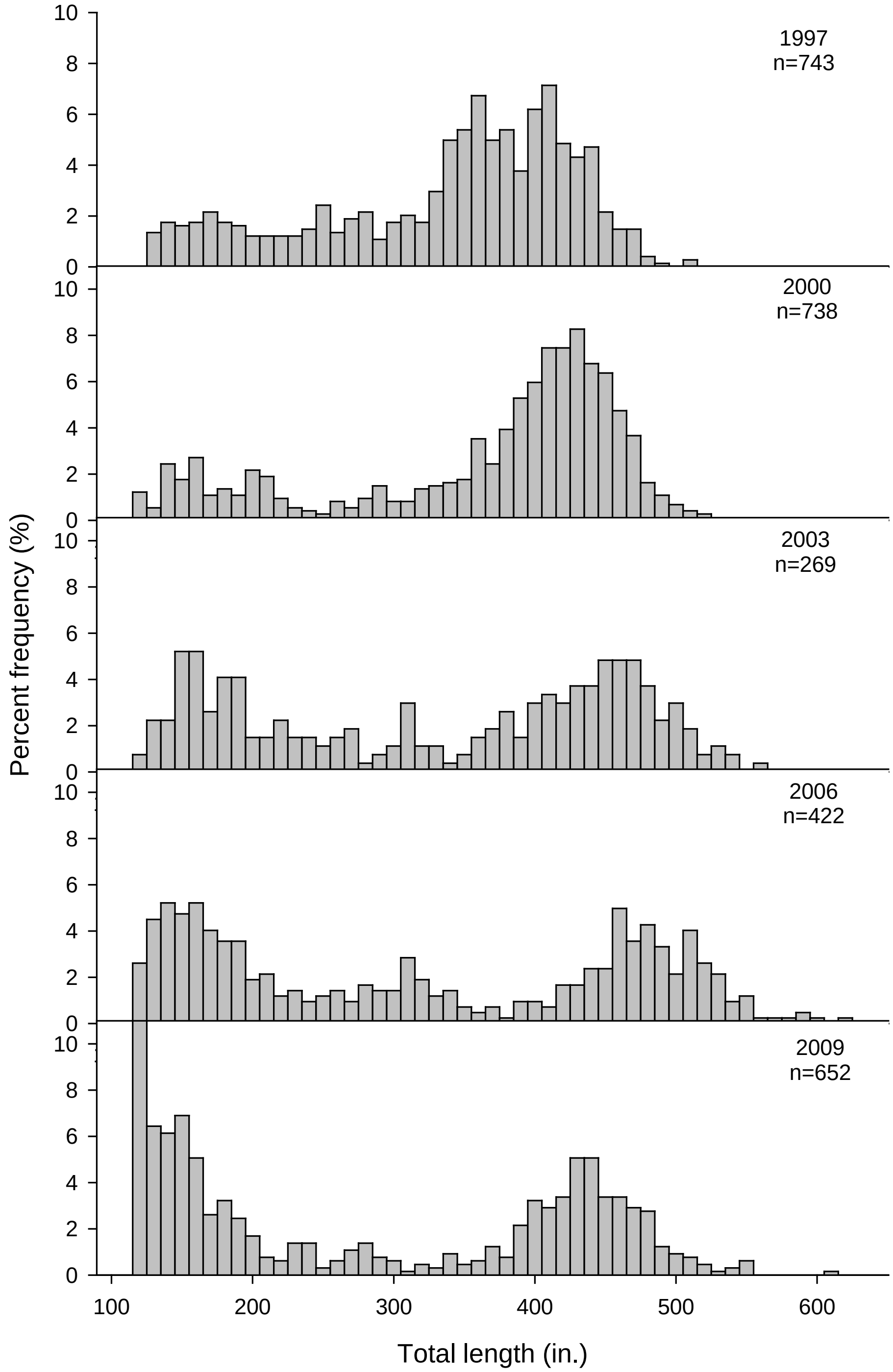

Figure 30. Length distributions of rainbow trout, calculated as proportion of total catch, during population surveys at the South Fork Boise River below Anderson Ranch Reservoir between 1997 and 2009. Only trout larger than 100 mm are included.

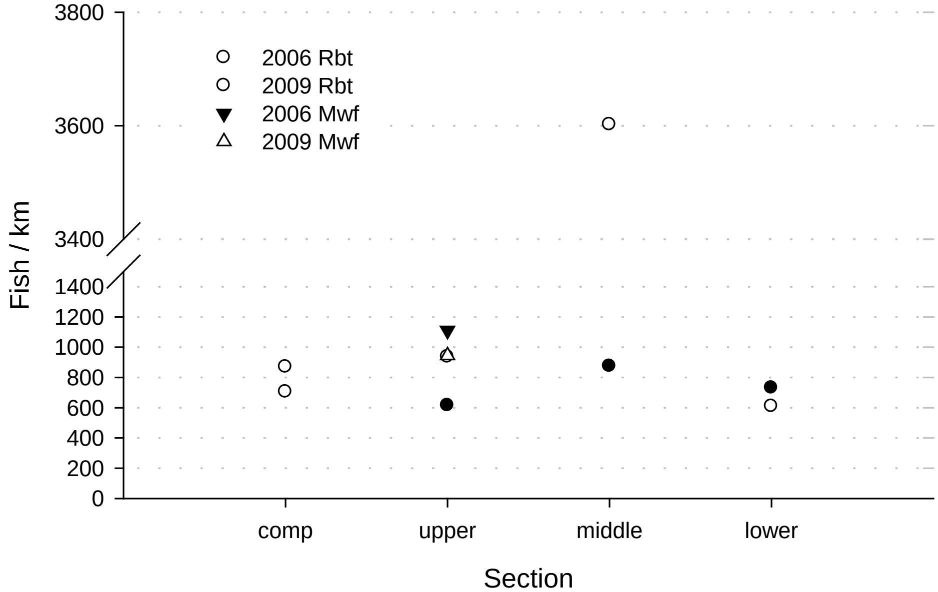

Figure 31. Linear density estimates for rainbow trout (>100mm) by reach for the South Fork Boise River in 2009 from maximum likelihood estimation. Comp is the estimate from pooling the data from all three reaches.

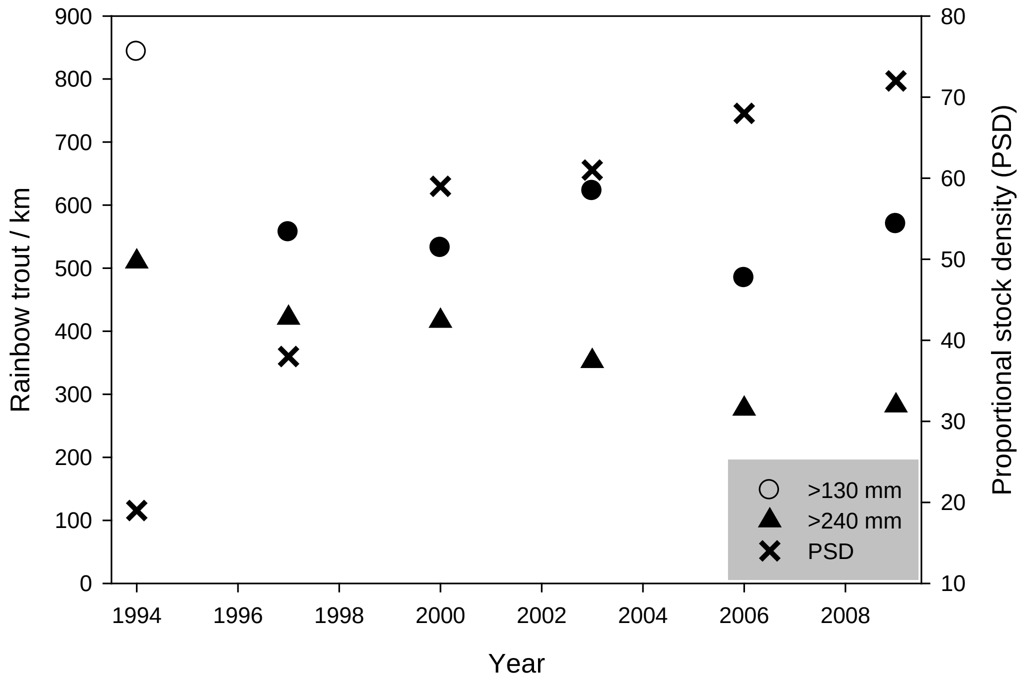

Figure 32. Linear density (# fish/km) and Proportional Stock Density (PSD) for rainbow trout on the South Fork Boise River downstream from Andersen Ranch Dam between 1994 and 2006. Estimates for 2006 were for rainbow trout > 130 mm and > 240 mm.

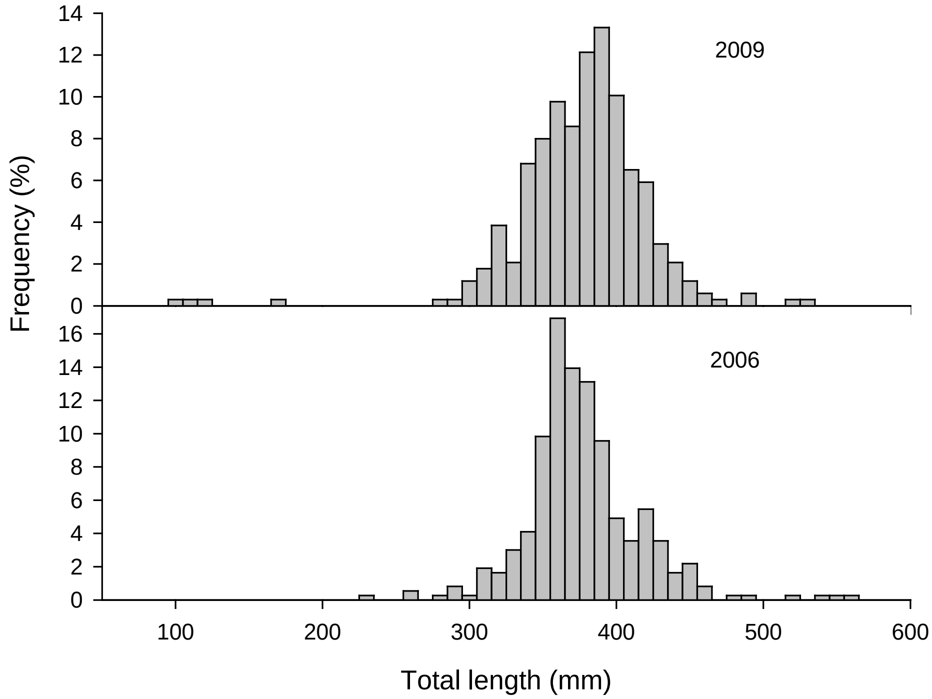

Figure 33. Length distributions of mountain whitefish, calculated as proportion of total catch, during population surveys at the South Fork Boise River below Anderson Ranch Reservoir in 2006 and 2009. Only whitefish larger than 100 mm are included.

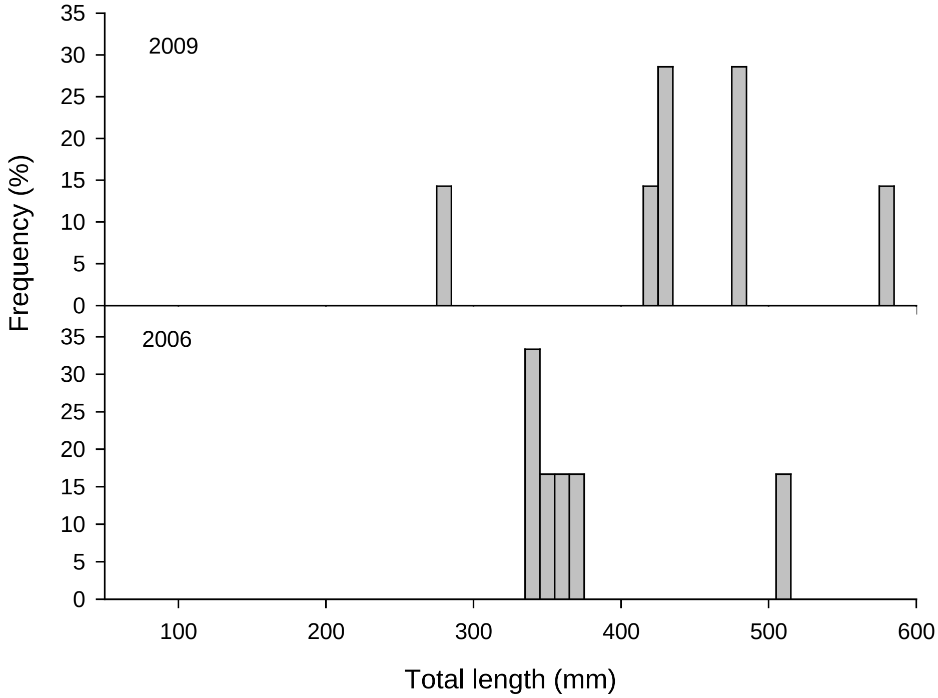

Figure 34. Length distributions of bull trout, calculated as proportion of total catch, during population surveys at the South Fork Boise River below Anderson Ranch Reservoir in 2006 and 2009.

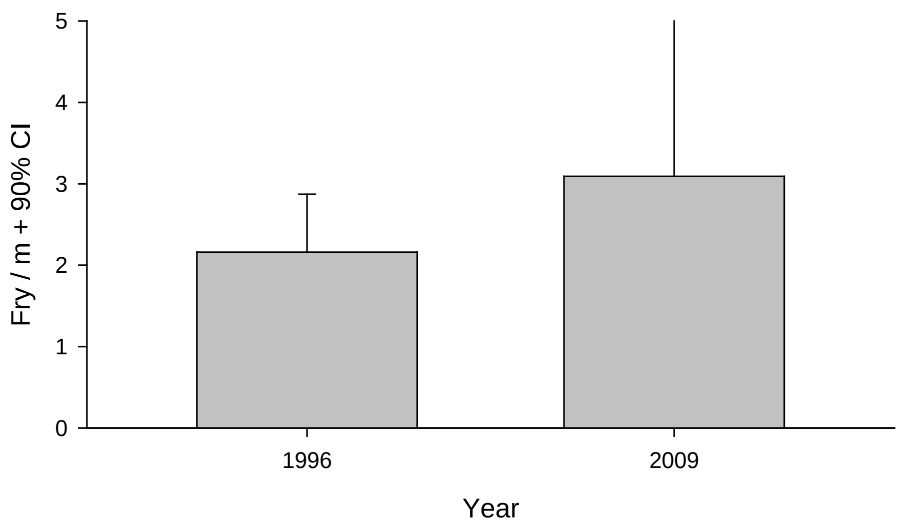

Figure 35. Comparison of mean rainbow trout fry linear density (fry/km) of fish collected at four 33-m long shoreline trend sections in 1996 and 2009 at the South Fork Boise River, Idaho.