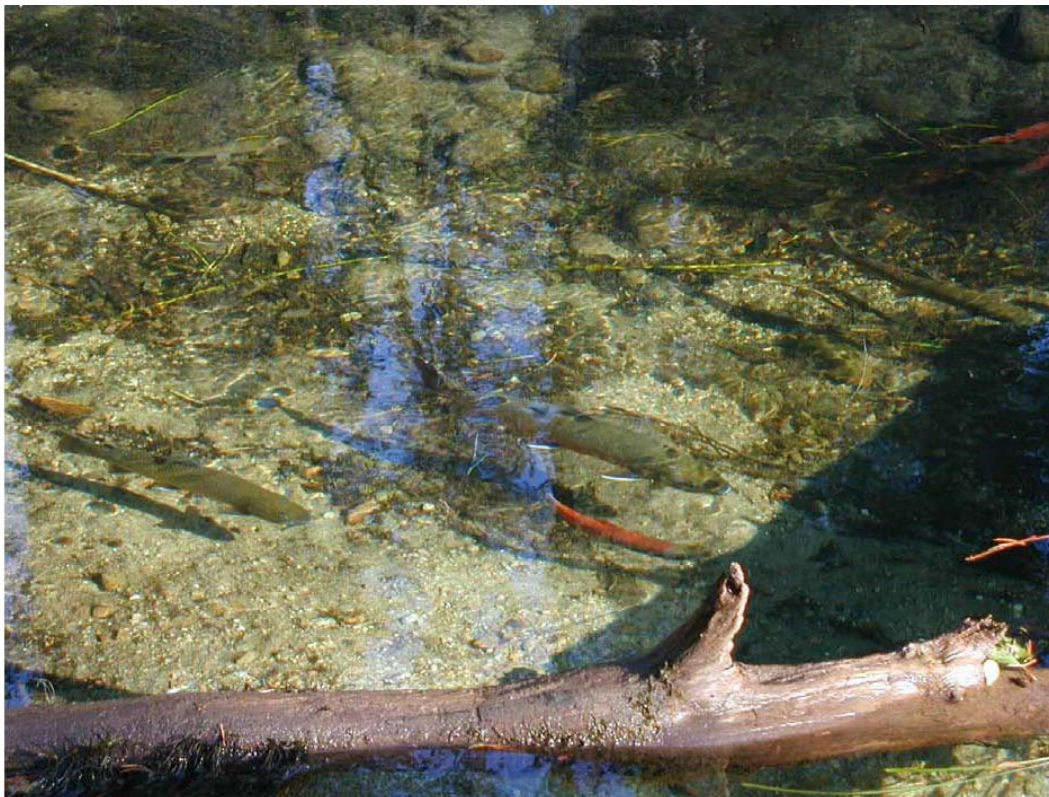


# RECLAMATION

*Managing Water in the West*

## Deadwood River Bull Trout Monitoring Activities

Technical Report for Idaho Department of Fish and Game  
Permit No. F-10-99



U.S Department of the Interior  
Bureau of Reclamation  
Snake River Area Office  
Boise, Idaho

Annual Report  
December 2007

**Submitted to the Idaho Department of Fish and Game, Boise, Idaho**

**by**

**U.S. Bureau of Reclamation  
Endangered Species Act Group**

**Anthony Prisciandaro  
Fishery Biologist**

**and**

**Afton Harbison  
Biological Technician**

#### **ACKNOWLEDGMENTS**

This work was funded by the U.S. Bureau of Reclamation. Special thanks are extended to Reclamation staff members who aided with data collection and reporting: Sarah Moss, Rick Rieber, Dmitri Vidergar, Ryan Hedrick, Gretchen Fitzgerald, and Donna Ralston. Reclamation wishes to thank Boise National Forest Biologists Michael Kellett, Ed Fochtman, and Devon Green as well as Idaho Fish and Game Biologists Lance Hebdon, Allen Sievers, Dustin Howie and Chuck Kiester for their time and assistance with project planning and field work. We also would like to thank the many Forest Service, Idaho Fish and Game, and Bureau of Reclamation employees who provided temporary field assistance and aided with equipment storage and maintenance.

## TABLE OF CONTENTS

Acknowledgements.....	i
Table of Contents.....	ii
List of Tables.....	iii
List of Figures.....	iii
CHAPTER 1 DEADWOOD RIVER BULL TROUT POPULATION MONITORING ACTIVITIES 2007	
Introduction.....	1
Study Area.....	2
CHAPTER 2 FYKE NETTING AND RADIO TAGGING OF BULL TROUT ( <i>SALVELINUS CONFLUENTUS</i> ) IN DEADWOOD RESERVOIR, VALLEY COUNTY, IDAHO	
Study Area.....	3
Methods.....	3
Results.....	5
Discussion.....	7
CHAPTER 3 MONITORING FISH MOVEMENT IN DEADWOOD RESERVOIR USING RADIO TELEMETRY	
Study Area.....	8
Methods.....	8
Results.....	9
Discussion.....	11
CHAPTER 4 INFERENCES FROM WEIR COUNTS OF POPULATION SIZE AND MIGRATION TIMING FOR ADFLUVIAL BULL TROUT ( <i>Salvelinus confluentus</i> ), DEADWOOD RESERVIOR, IDAHO	
Study area.....	12
Methods.....	13
Results.....	13
Discussion.....	13
LITERATURE CITED.....	14

## LIST OF TABLES

Table 1 - Number of fish sampled and catch per unit effort (CPUE), Deadwood Reservoir 2007 .....	5
Table 2 - Length, weight, sampling location and date captured of all bull trout handled by Reclamation staff in Deadwood Reservoir 2007.....	6
Table 3 - Migration timing for bull trout captured in Deadwood Reservoir 2006 and 2007 .....	6
Table 4 - Bull trout captured in Deadwood River Below the dam .....	10
Table 5 - Fish captured in fyke net in the stilling basin below the Deadwood Dam on September 26, 2007, rainbow trout, speckled dace and kokanee .....	10

## LIST OF FIGURES

Figure 1 - Deadwood Reservoir drainage area with major tributaries labeled .....	2
Figure 2 - Fyke net used for capturing bull trout .....	4
Figure 3 - Radio tagged bull trout locations in the Deadwood River below Deadwood Dam between October 6 and November 28, 2007.....	11

# Chapter One

## DEADWOOD RIVER BULL TROUT POPULATION MONITORING ACTIVITIES 2007

### INTRODUCTION

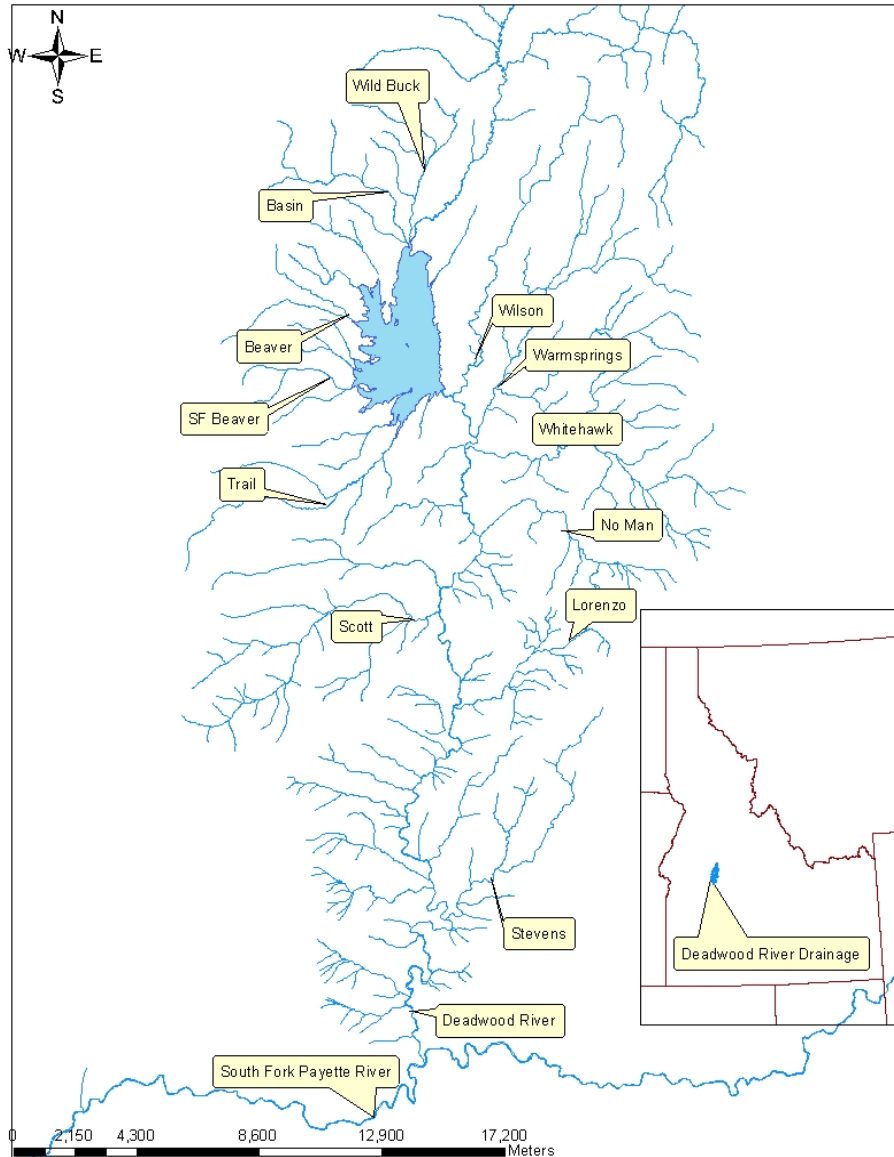
The purpose of this report is to summarize the annual monitoring and mitigation activities carried out by the U. S. Bureau of Reclamation (Reclamation) which occurred under Idaho Department of Fish and Game (IDFG) Scientific Collection Permit No. F-10-99 in the Boise and Deadwood River Basins.

Since the listing of the Columbia River and Klamath River distinct population segment of bull trout (*Salvelinus confluentus*) as threatened under the Endangered Species Act in 1998, serious consideration has been given to range-wide population monitoring and recovery efforts. Section 7 of the Endangered Species Act (ESA) requires that any actions that may be implemented by a federal government entity that could affect federally listed species must be consulted upon through the federal regulatory agencies: the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). Reclamation consulted under Section 7 of the ESA with the FWS on Operations and Routine Maintenance of twelve Reclamation projects in the Snake River Basin above Brownlee Reservoir. The FWS completed the non-jeopardy Biological Opinion (BiOp) in March 2005. The biological opinion contains a 30 year incidental take statement and corresponding reasonable and prudent measures (RPM) that outline non discretionary actions to minimize take of bull trout (*Salvelinus confluentus*) in the Boise project area. Facilities in the Boise Project with adfluvial forms of bull trout present include Arrowrock and Anderson Ranch Dams on the Boise River system, as well as Deadwood Dam on the Payette River system. Reclamation developed a monitoring and implementation plan that outlines the field activities and data collection necessary to address the RPMs, associated terms and conditions, monitoring, and reporting requirements for the BiOp. The monitoring and implementation plan was submitted to the FWS in March, 2006 (USBR 2006).

Reclamation's field and data collection activities are covered by IDFG Scientific Collection Permit No. F-10-99. This technical report describes the results of Reclamation's 2007 field activities and data collection work. This report is formatted into four chapters: Chapter One includes a general introduction and outline of the study area. Chapter Two summarizes the capture and tagging methods for bull trout in Deadwood Reservoir. Chapter Three summarizes capture and tagging methods for bull trout in the Deadwood River below the dam. Chapter Four provides a summary of IDFG's fall weir operations on tributaries to the Deadwood Reservoir.

## STUDY AREA

Deadwood River basin is located in southwestern Idaho and is a major tributary to the South Fork of the Payette River (Figure 1). The river is approximately 70 km long from the headwaters (2124 meters above sea level) to the mouth (1135 meters above sea level). Deadwood Dam, located at river kilometer 36 was constructed in 1929 and is the only dam on the Deadwood River. Deadwood Reservoir has a capacity of 153,992 acre feet with a maximum pool elevation of 1,628 meters and drains 282 km<sup>2</sup> while the river below the dam drains an additional 332 km<sup>2</sup>.



**Figure 1: Deadwood Reservoir Drainage Area with major tributaries labeled.**

## **Chapter Two**

### **FYKE NETTING AND RADIO TAGGING OF BULL TROUT (*Salvelinus confluentus*) IN DEADWOOD RESERVOIR, Valley County, IDAHO**

#### **ABSTRACT**

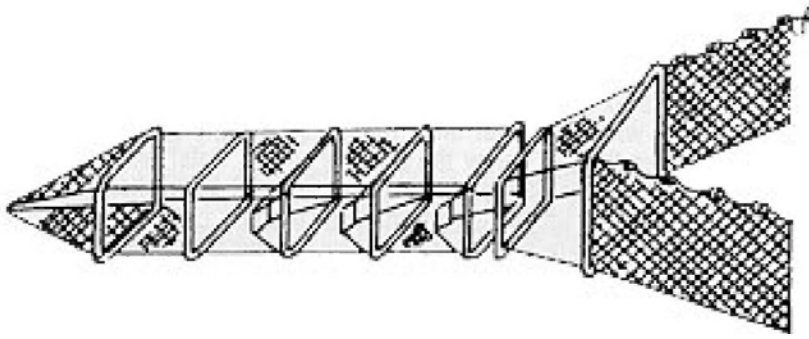
The FWS 2005 Upper Snake BiOp identified that operations at Deadwood Dam cause take of bull trout by entrainment over the spillway. The terms and conditions of RPM 3.e, require Reclamation to minimize entrainment of bull trout due to operations. Understanding bull trout movement and use of the reservoir is the first step in meeting this RPM. Eight bull trout were captured in Deadwood Reservoir using fyke nets and tagged with radio transmitters as part of the entrainment monitoring project. One fish from the IDFG weir operations was also tagged. Fyke netting occurred from early May to mid July. A total of nine fish were tagged in 2007 additionally five bull trout were still being tracked from the 2006 tagging. Confirmed mortalities during this reporting period included seven bull trout that were tagged in 2007 and three bull trout that were tagged in 2006. No tagged bull trout were entrained in 2007. Two bull trout tagged in 2007 as well as one tagged in 2006 were still being tracked in the reservoir as of December 01, 2007.

#### **STUDY AREA**

All of the work discussed in this chapter occurred in Deadwood Reservoir located on the mainstem Deadwood River which flows into the South Fork Payette River in Central Idaho (Figure 1). Deadwood Reservoir stores water from the mainstem Deadwood River as well as several smaller tributaries.

#### **METHODS**

Fish were collected using fyke nets from late May through mid July. Fyke nets were set at the mouth of Trail, Basin and Wild Buck creeks as well as the mainstem. Bull trout were only captured in the Trail creek traps. The fyke nets were set for 24 hour intervals three days per week. Sinking fyke nets (1.22 m x 1.22 m x 0.91 m nets with 30.48 m x 1.22 m lead lines) were treated with an algaecide to prevent decay and had 4 fykes per net (Figure 2). All of the nets had lead core bottom lines that followed the bottom of the reservoir and foam core top lines to maintain the vertical orientation in the water. Each net had 8 kg weights to anchor the bottom line and 20 cm diameter buoys on the top line for marking location and retrieval.



**Figure 2. Fyke net used for capturing bull trout**

All fish captured were identified to species and enumerated. The first five fish of each species captured had muscle plugs taken from just below their dorsal fin for an associated isotope project. Total length (TL) was recorded for all game species. Bull trout were anesthetized using diluted tricaine methanesulfonate (MS-222) (approximately 100 mg/L). When a bull trout was considered anesthetized (could not right itself) it was measured and weighed. Scale samples and fin clips were taken, and the fish was scanned for Passive Integrated Transponder (PIT) tags (Biomark Incorporated, Boise, ID 2007). All bull trout, except two recaptures, were implanted with radio transmitters containing temperature and depth sensors. Lotek Wireless Radio transmitters had temperature ranges of -6.0 to 36°C. and a depth range from zero to 10m. Methods for the bull trout captured in the IDFG weirs are described in Chapter Four.

Radio tags were implanted using a modified shielded needle technique described by Ross and Kleiner 1982. Bull trout were placed ventral side up in a V-shaped surgery cradle. The gills were bathed in anesthetic solution using a turkey baster throughout the surgery. A small incision (1.0 cm to 2.0 cm) was made parallel to the linea alba, a fibrous structure that runs down the midline of the abdomen composed mostly of collagen connective tissue and a sterilized transmitter was inserted into the peritoneal cavity or the space within the abdomen that contains the intestines, the stomach, and the liver. The antenna exit hole was created using a 12 or 14 gauge 7.6 cm (3.0 in.)-long surgical needle inserted through the body wall below the pelvic girdle onto a 1.0-cm x 7.6-cm (0.4-in. x 3.0-in) long steel spatula. The antenna exited the body approximately 1.5 cm to 2.0 cm (0.6 in. x 0.8 in) posterior to the pelvic girdle and slightly to the side of the mid-ventral line. The incision was closed with Visistat™ 35 Regular or Wide disposable skin staples. Surgical glue was then applied to the incision after staples were in place. Bull trout were held and monitored in live wells until full recovery (minimum 15 minutes), and then released into Deadwood Reservoir near their point of capture. Visible infirmity or injuries such as descaling, frayed fins, or dermal lacerations were noted for all bull trout captured.

Radio tagged fish were tracked weekly (weather permitting) throughout the year. When possible, fish were ground tracked, however, most tracking was performed in a helicopter because of the remote and rugged terrain throughout most of the study area. When a radio tagged fish was located the following data was recorded at that location: time, GPS location, pressure (water depth) and temperature at the fish's location (if the tags were equipped with those sensors) and general comments. For each survey day the following data was also recorded: general weather, surface ice cover for the reservoir and river, reservoir pool elevation, general comments, and if surface ice was present pictures were taken.



Migration timing, during the fall spawning run, was estimated for radio tagged fish leaving the reservoir and returning to the reservoir. Migration timing estimates were based on when the fish were last observed in the reservoir and first observed in the tributaries and visa versa. Exact migration times are not able to be determined because radio tracking only occurred weekly and some weeks fires and/or weather did not allow for tracking.

Fin clips and muscle plugs were collected from all sampled bull trout. Fin clips will be sent to the Abernathy Labs (FWS) for genetic analysis allowing possible assignment to natal streams in the drainage (above or below the reservoir). Muscle plugs are being used in an associated isotope study. The collection of fin clips and muscle plugs were non-lethal and occurred while the bull trout were being fitted with radio tags.

## RESULTS

A total of 751 fish, representing ten species, were captured between early May and mid July using fyke nets (Table 1). Twelve bull trout were captured (two recaptures), which represented 1.3% of the total fish captured. Rainbow/Cutthroat hybrids were the least abundant fish captured. The most abundant fish captured was the Mountain Whitefish (*Prosopium Williamsoni*), comprising 41.1% of all fish captured. Also noteworthy were Speckled Dace (*Rhinichthys osculus*), comprising 32.4% of the total fish captured.

Of the twelve bull trout captured in 2007 eleven were captured in fyke nets at the mouth of Trail Creek, and one was caught in the Deadwood River weir moving downstream presumably after spawning (Table 2). The bull trout ranged from 300 mm to 548 mm TL and 286 g to 1270 g in weight. One of these bull trout was recaptured from 2006 and one was recaptured from 2007. Both of these recaptures already had radio tags. Of the eight bull trout tagged in 2006 five survived through the first winter; three of the remaining bull trout died during the 2007 field season and one is assumed to have had its battery expire. Of the nine bull trout tagged in 2007 seven had died by December 01. Three bull trout (two tagged in 2007 and one tagged in 2006) continue to be tracked in the reservoir as of December 01, 2007.

**Table 1: Number of fish sampled and catch per unit effort (CPUE), Deadwood Reservoir 2007.**

<i>Species</i>	CPUE (mean)	0.1
	Total Fish	751
	Total Hours	877.75
	<i>Number Caught</i>	<i>CPUE</i>
Bull Trout ( <i>Salvelinus confluentus</i> )	10	0.011
Cutthroat Trout ( <i>Oncorhynchus clarki lewisi</i> )	42	0.056
Kokanee ( <i>Oncorhynchus nerka kennerlyi</i> )	8	0.011
Long Nosed Dace ( <i>Rhinichthys cataractae</i> )	40	0.053
Rainbow Trout ( <i>Oncorhynchus mykiss</i> )	83	0.111
Rainbow/Cutthroat hybrid	1	0.001
Red Sided Shiner ( <i>Richardsonius balteatus</i> )	4	0.005
Sculpin <i>Cottus spp.</i>	11	0.015
Speckled Dace ( <i>Rhinichthys osculus</i> )	243	0.324
Mountain Whitefish ( <i>Prosopium williamsoni</i> )	309	0.411

**Table 2: Length, weight, sampling location and date captured of all bull trout handled by Reclamation staff in Deadwood Reservoir or the Deadwood River weir in 2007.**

Date	Site	Fork Length (mm)	Total Length (mm)	Weight (g)
6/1/2007	Trail Creek Fyke Net	n/a	364	360
6/1/2007	Trail Creek Fyke Net.	n/a	548	1270
6/20/2007	Trail Creek Fyke Net	295	312	286
6/25/2007	Trail Creek Fyke Net	345	360	466
6/25/2007	Trail Creek Fyke Net	415	430	724
6/25/2007	Trail Creek Fyke Net	362	387	532
6/27/2007	Trail Creek Fyke Net	380	405	694
6/27/2007	Trail Creek Fyke Net	412	430	724
7/10/2007	Trail Creek Fyke Net	375	392	592
7/10/2007	Trail Creek Fyke Net	458	470	1026
9/24/2007	Deadwood River Weir	449	460	960
6/13/2007	Mortality	n/a	300	n/a

**Table 3: Migration timing for bull trout captured in Deadwood Reservoir 2006 and 2007.**

Year	Last day in reservoir	First day in tributary	Last day in tributary	Back in reservoir
2006	8/12	9/3	9/24	10/11
2007	7/7	7/11	9/23	9/26

In 2007 tagged bull trout migrated into four different tributaries over a wide range of dates. Bull trout were tracked moving upstream as early as June 18 and as late as August 17. This is different from movement in 2006 when all the tagged bull trout migrated into Trail Creek early in the fall. The median survey date of migration out of the reservoir in 2007 was July 07, a month earlier than in 2006. The median survey date bull trout returned to the reservoir in both years, however, was much closer (Table 3).

All of the radio tagged bull trout left the reservoir during the fall spawning period. Bull trout were not extensively ground tracked while in the tributaries in 2007 so no spawning behavior was verified. Once back in the reservoir the tagged bull trout dispersed and moved throughout the reservoir.

Average temperatures (tag readings) for bull trout in the reservoir (pre spawning migration) were 8.0°C in 2007 compared to 10.7°C in 2006. Average temperatures (tag readings) for bull trout during the spawning migration were warmer in 2007, 9.9°C compared to 5.3°C in 2006. Changes in migration timing as well as warmer water temperatures in the reservoir and tributaries in 2007 may have contributed to the observed differences in temperature tag readings between 2007 and 2006. Bull trout temperatures in the reservoir after spawning were similar between the two

years, 6.1°C in 2007 and 6.5°C in 2006. Bull trout in the reservoir tended to utilize deeper habitat as the reservoir warmed and in 2007 some fish exceeded the ten meter maximum detection depth for a radio tag.

Annual mortality of radio tagged bull trout was higher during 2007 than in 2006. Seven of the nine bull trout tagged in 2007 died in 2007 (77%) compared to only three of the eight that were tagged in 2006 dieing in 2006 (38%). Five bull trout that were tagged in 2006 were still alive in the spring of 2007. Three of these bull trout also were also confirmed mortalities in 2007 (60%) (We speculate that natural annual mortality of all bull trout in the basin is normally high and that mortality due to handling is negligible.) Mortality rates were highest during the spawning migration. Seven of the ten mortalities in 2007 occurred while bull trout were not in the reservoir pool.

## **DISCUSSION**

Bull trout in Deadwood Reservoir were mainly captured in the Trail Creek arm of the reservoir, but were tracked moving throughout the rest of the reservoir over time. All of the bull trout captured in fyke nets were caught within 30 m of the transition zone of Trail Creek. The bull trout seemed to be holding in the cooler water coming out of Trail Creek. In 2006 no bull trout were captured or tracked near the mouth of the mainstem Deadwood River, the general thought was that the bull trout had already migrated before our trapping efforts started. In 2007 efforts were made to start trapping earlier in the spring. Fyke netting began in mid May but still no bull trout were caught near the mainstem Deadwood River. The first bull trout in the reservoir wasn't captured until the first of June. Tracking records show that radio tagged bull trout were dispersed throughout the reservoir, usually near the shore, early in the year. As the reservoir warmed the radio tagged fish congregated near the mouths of tributaries. Early trapping efforts did not yield any bull trout in 2006 or 2007, therefore, early trapping efforts are not planned for 2008. Bull trout trapping in 2008 is planned to start in late May or early June once the roads open up.

Higher mortality rates were seen in 2007 than in 2006. This could be attributed to annual fluctuations in water temperature, reservoir water levels, and/or tributary discharge. Further research and an increased sample size is needed to determine the effects of annual variation on bull trout mortality rates. Even with the high mortality rates in 2007 none of the bull trout deaths can be directly related to Reclamation actions such as handling or entrainment. One bull trout was buried during a debris flow from the 2006 Rattlesnake Complex Fire and one bull trout was eaten by a raptor. The other recovered radio tags were found clean with no fish or fish parts in the area. The majority of these tags being found on shore suggest predation of some kind rather than tag loss or death from natural causes. Large numbers of predators; bears and raptors, were seen feeding on kokanee where the tributaries run through the dewatered sections of the reservoir. Reservoir surface water levels dropped much lower this year than last year. Kokanee were seen struggling to swim upstream at the mouth of multiple tributaries and predators congregated in these areas. Even after the kokanee made it past the shallow water in the delta areas the lack of cover made it easy for predators to capture them. No bull trout were seen in these dewatered sections but it can be assumed they have similar problems associated with shallow water and predation. With only two years of data and inconsistencies in bull trout migratory behavior and timing no conclusions can be made at this time. Continued bull trout tagging and tracking in the reservoir in 2008 and 2009 may yield important data on bull trout entrainment and other possible causes of take of bull trout associated with the operations of the dam.

## **Chapter Three**

### **MONITORING BULL TROUT MOVEMENT BELOW DEADWOOD RESERVOIR USING RADIO TELEMETRY**

#### **ABSTRACT**

The FWS 2005 Upper Snake BiOp identified that operations at Deadwood Dam cause harm and harassment to bull trout. Bull trout captured and tagged below Deadwood Dam could help address the terms and conditions associated with Deadwood Dam. The terms and conditions discuss possible harm and harassment associated with low winter stream flows, low summer temperatures, the lack of biologically significant ramping rates, and disruption of migratory cues below the dam as well as entrainment over or through the dam. Bull trout captured below the dam will be tracked during these events to see if there is possible harm or harassment. On September 19, 2007 a Reclamation mechanic caught a bull trout while angling below the dam. This prompted Reclamation with the help of IDFG to organize a sampling effort. Ten more bull trout were caught using a fyke net as well as hook and line sampling. All of these bull trout were caught before October 6 and implanted with radio transmitters, four of which have temperature and depth sensors in them. These ten bull trout are currently being tracked weekly (depending on weather) by helicopter or ground surveys. Tracking is planned through the end of 2009.

#### **STUDY AREA**

All of the work discussed in this chapter occurred on the lower Deadwood River between the dam and the South Fork of the Payette River (Figure 1).

#### **METHODS**

No bull trout were captured during the extensive sampling effort on the Deadwood River below Deadwood Dam in the fall of 2006. No sampling was planned below the dam in 2007 until a Reclamation mechanic caught two bull trout within a week directly below the dam. An informal sampling effort followed involving setting one fyke net in the tailwater of the stilling basin and several hours of angling. Due to time constraints with weir operations in the reservoir, the fyke net below the dam was only periodically set for 24 hour periods. The fyke net was a sinking 1.22 m x 1.22 m x 0.91 m net with a 30.48 m x 1.22 m lead line (Figure 2). The net had a lead core bottom line that followed the bottom of the river and a foam core top line to maintain the vertical orientation in the water. The net was secured to the bridge at the upstream end and the lead line was stretched downstream and anchored with an 8 kg weight.

Captured bull trout were anesthetized using diluted tricaine methanesulfonate (MS-222) (approximately 100 mg/L). When a bull trout was considered anesthetized (could not right itself) it was measured and weighed. Scale samples and fin clips were taken, and the bull trout was scanned for Passive Integrated Transponder (PIT) tags (Biomark Incorporated, Boise, ID 2007). The first five bull trout had muscle plugs taken for an associated isotope study. All bull trout were implanted with radio transmitters, four of which contained temperature and depth sensors. Bull trout were placed ventral side up in a V-shaped surgery cradle. The gills were

bathed in anesthetic solution using a bilge pump and shower system throughout the surgery. The surgical methodology used was a modified shielded needle technique (Ross and Kleiner 1982). A small incision (1.0 cm to 2.0 cm) was made parallel to the linea alba, a fibrous structure that runs down the midline of the abdomen composed mostly of collagen connective tissue and a sterilized transmitter was inserted into the peritoneal cavity or the space within the abdomen that contains the intestines, the stomach, and the liver. The antenna exit hole was created using a 12 or 14 gauge 7.6 cm (3.0 in.)-long surgical needle inserted through the body wall below the pelvic girdle onto a 1.0-cm x 7.6-cm (0.4-in. x 3.0-in) long steel spatula. The antenna exited the body approximately 1.5 cm to 2.0 cm (0.6 in. x 0.8 in) posterior to the pelvic girdle and slightly to the side of the mid-ventral line. The incision was closed using absorbable surgical sutures. Surgical glue was then applied to the incision after sutures were in place. Bull trout were held and monitored in live wells until full recovery (minimum 15 minutes), and then released back into the Deadwood River below the dam near their point of capture. Visible infirmity or injuries such as descaling, frayed fins, or dermal lacerations were noted for all bull trout captured.

Radio tagged fish were tracked weekly (weather permitting) throughout the year. When possible, fish were ground tracked, however, most tracking was performed in a helicopter because of the remote and rugged terrain throughout most of the study area. When a radio tagged fish was located the following data was recorded at that location: time, GPS location, pressure (water depth) and temperature at the fish's location (if the tags were equipped with those sensors) and general comments. For each survey day the following data was also recorded: general weather, surface ice cover for the reservoir and river, reservoir pool elevation, general comments, and if surface ice was present pictures were taken.

Fin clips were collected from all sampled bull trout and muscle plugs were collected from the first five bull trout captured. Fin clips were sent to the Abernathy Labs (FWS) for genetic analysis allowing possible assignment to natal streams in the drainage (above or below the reservoir). Muscle plugs are being used in an associated isotope study. The collection of fin clips and muscle plugs were non-lethal and occurred while the bull trout were being fitted with radio tags.

## **RESULTS**

A total of eleven bull trout were captured using a fyke net and hook and line sampling in the stilling basin below Deadwood Dam between September 18 and October 06 (Table 4). Captured bull trout ranged from 250 mm to 379 mm TL and 148 g to 514 g in weight. Ten of these bull trout were implanted with radio transmitters, four of which had temperature and depth sensors in them. These ten bull trout continue to be tracked weekly (weather permitting) by helicopter or ground surveys. Tracking activities are planned to be ongoing through the end of 2009.

Kokanee, rainbow trout, and speckled dace were also captured in the fyke net while angling produced whitefish and rainbow trout. Due to limited time and resources, counts and lengths for species other than bull trout were only taken for one fyke net set (Table 5). All of the tagged bull trout stayed between the dam and Wilson Creek until the week of November 7<sup>th</sup>, a month after the last bull trout was tagged. Four of the ten bull trout moved downstream and dispersed throughout the Deadwood River (Figure 3). Fin clips from all eleven bull trout have been sent to Abernathy Labs for genetic analysis, results are expected in January 2008.

**Table 4: Bull trout captured in Deadwood River (DWD) below the dam.**

<b>Date</b>	<b>Site</b>	<b>Fork Length (mm)</b>	<b>Total Length (mm)</b>	<b>Weight (g)</b>
9/19/2007	DWD river below Dam	299	319	288
9/26/2007	DWD river below Dam	283	300	249
9/27/2007	DWD river below Dam	315	334	286
10/6/2007	DWD river below Dam	358	379	514
10/6/2007	DWD river below Dam	315	332	338
10/6/2007	DWD river below Dam	235	250	148
10/6/2007	DWD river below Dam	313	330	370
10/6/2007	DWD river below Dam	304	319	294
10/6/2007	DWD river below Dam	252	261	202
10/6/2007	DWD river below Dam	300	316	326

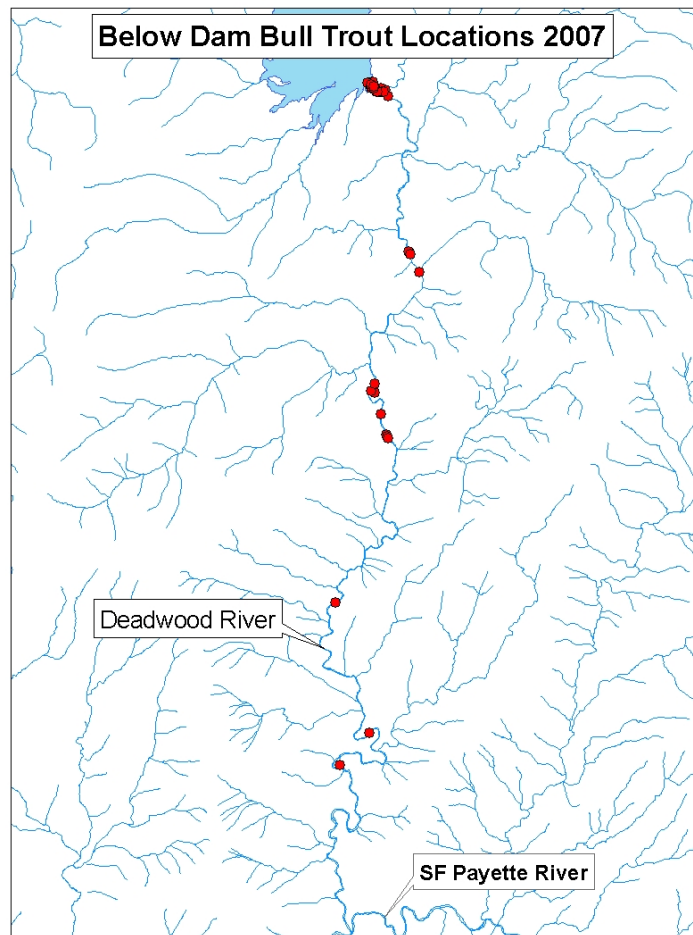
**Table 5: Fish captured in fyke net in the stilling basin below Deadwood Dam on September 26, 2007, Rainbow Trout (RB), Speckled Dace (SPD) and Kokanee (KOK).**

<b>Species</b>	<b>Total Length (mm)</b>
RB	259
RB	246
RB	214
SPD	110
SPD	127
SPD	100
SPD	80
SPD	105
SPD	101
SPD	101
SPD	98
SPD	103
SPD	105
SPD	100
SPD	93
SPD	87
SPD	90
KOK	230
KOK	250
KOK	225
KOK	168
KOK	218
KOK	180

## DISCUSSION

This is the first year Reclamation caught bull trout below the dam. It is unclear if these bull trout were entrained through the dam or if they originated in tributaries below the dam. Past genetic studies have been done that include the majority of known resident bull trout populations in the South Fork Payette drainage. The FWS Abernathy lab will be working to genetically assign the eleven bull trout captured below the dam to tributaries in the South Fork Payette drainage either above or below the dam with results scheduled to come out in January of 2008. Tracking is planned in 2008 to investigate bull trout movement in the river below the dam related to operations.

Bull trout captured below the dam, on average, were smaller than their counterparts captured in the reservoir. Bull trout captured in the reservoir averaged 421 mm TL and 750 g, while fish captured below the dam averaged 314 mm TL and 302 g. All of the bull trout captured in the stilling basin looked healthy. One fish looked as if it may have suffered a broken back at some point but was healthy and swimming fine at the time of capture. Reclamation plans to continue fyke netting and angling efforts below the dam in 2008.



**Figure 3: Radio tagged bull trout locations in the Deadwood River below Deadwood Dam between October 6 and November 28.**

## **Chapter Four**

### **SUMMARY OF ADFLUVIAL BULL TROUT (*Salvelinus confluentus*) HANDLED BY THE IDAHO DEPARTMENT OF FISH AND GAME, DEADWOOD RESERVIOR, IDAHO**

#### **ABSTRACT**

The Idaho Department of Fish and Game was contracted by Reclamation to capture bull trout (*Salvelinus confluentus*) using steel frame picket weir traps set across five tributaries to Deadwood Reservoir including Basin Creek, South Fork Beaver Creek, Beaver Creek, Trail Creek, and the Deadwood River itself. Trapping occurred between August 8 and October 15. A total of nine bull trout were handled by IDFG personnel. This was the second year in a three year contract with IDFG.

#### **INTRODUCTION**

The FWS Draft Recovery Plan (FWS 2002) includes guidelines for management agencies to facilitate bull trout recovery. The federal bull trout recovery team has outlined several important objectives for bull trout recovery. These are: 1) maintenance and restoration of the distribution of bull trout 2) maintenance and restoration of habitat for all life history forms 3) conservation of genetic diversity, and 4) implementation of recovery actions and assessment of their success (FWS 2002). Meeting recovery objectives requires that accurate estimates of population size, assessments of distribution, and trends in abundance are known for bull trout populations within each recovery unit. The Deadwood River below the dam is in the Southwest Basin Recovery Unit. In 2005, Reclamation, IDFG and Boise National Forest (BNF) developed a cooperative program to begin gathering baseline data to be used to meet the recovery objectives. Work began in July 2005 and is ongoing through the 2007 field season. The purpose of the work is to assess temperature, precipitation, reservoir conditions and stream discharge conditions as they relate to bull trout movement, population size, and survival on a large-watershed scale. Weirs were first installed on the tributaries to the Deadwood River to capture kokanee in 1986. In 2006 kokanee operations were expanded and the time frame was extended in an attempt to capture adfluvial bull trout as they returned to the reservoir after spawning.

#### **STUDY AREA**

All of the work discussed in this chapter occurred in tributaries to Deadwood Reservoir located in Central Idaho (Figure 1). Deadwood Reservoir stores water from the mainstem Deadwood River as well as several smaller tributaries.



## METHODS

Weirs were operated across the major migratory corridors into Deadwood Reservoir: Basin Creek, South Fork Beaver Creek, Beaver Creek, Trail Creek, and the Deadwood River between August 8 and October 15. A steel picket style weir with upstream and downstream traps was constructed across the full width of each tributary. The weirs were constructed of angle iron frames with steel conduit pickets spaced 1.25 cm (0.5 in.) apart. Operating time was during the post spawning migration of bull trout.

All fish captured were identified to species and enumerated. Bull trout were anesthetized using tricaine methanesulfonate (MS-222) (80 mg/L dilution). When the bull trout were considered anesthetized (could not right itself) their total length and weight were recorded. Scale samples and fin clips were taken, and the fish were scanned for Passive Integrated Transponder (PIT) tags (AVID computer corporation, Norco, CA 1999). All bull trout > 100 mm TL which did not carry tags were tagged with 2.5 mm x 14 mm, 125 kHz PIT tags. Bull trout were held and monitored in live wells until full recovery (minimum 15 minutes), and then returned to the river. Bull trout captured moving downstream were released downstream of the weir and bull trout moving upstream were released upstream of the weir. Direction of migration as well as date and time of capture was noted.

## RESULTS

IDFG personnel handled a total of 9 bull trout in 2007. One bull trout captured at the weirs in 2007 was implanted with a radio tag for the associated tracking study. Complete results will be in the 2007 DEADWOOD TRIBUTARY WEIR OPERATIONS FINAL REPORT BULL TROUT *Salvelinus confluentus* POPULATION MONITORING from IDFG.

## DISCUSSIONS

Very low catch efficiencies due to multiple breaching events at the weirs along with only one recapture makes it impossible to estimate a population size. More modifications to the weir structures and placement may minimize blowouts in the future. More discussion will be found in the 2007 DEADWOOD TRIBUTARY WEIR OPERATIONS FINAL REPORT BULL TROUT *Salvelinus confluentus* POPULATION MONITORING from IDFG.

## LITERATURE CITED

- Annear, T. C. 1987. Snake River instream flow studies. Wyoming Game and Fish Department, Fish Division. Administrative report IF-1087-09-8701.
- Armantrout, N.B. (compiler). 1998. Glossary of aquatic habitat inventory terminology. American Fisheries Society, Bethesda, Maryland. 136 p.
- Burton, T. 1999. Bull trout fisheries monitoring plan for the North Fork Boise River. Boise National Forest. Boise, Idaho.
- Flatter, B. 2000. Life history and population status of migratory bull trout in Arrowrock Reservoir, Idaho. Masters Thesis. Boise State University. Boise, Idaho.
- Fraley, J.J.; Shepard, B.B. 1989. Life History, ecology, and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake River system, Montana. Northwest Science. 63(4):133-143
- Overton, C.K. and S.P. Wollrab, B.C. Roberts [and others]. 1997. R1/R4 (Northern/Intermountain Regions) fish and fish habitat standard inventory procedures handbook. INT-GTR-346. Ogden, Utah: USDA Forest Service: 1-72.
- Rieman, B. E. and J. D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124: 285-296.
- Rieman, B. E., D. C. Lee, and R. F. Thurow. 1997. Distribution, status, and likely future trends of bull trout within the Columbia River and Klamath River Basins. North American Journal of Fisheries Management 17: 1111-1125.
- Salow, T. 2001. Population Structure and Movement Patterns of Adfluvial Bull Trout (*Salvelinus confluentus*) in the North Fork Boise River Basin, Idaho. Masters Thesis. Boise State University, Boise, Idaho.
- Salow, T. and L. Hostettler. 2004. Movement and Mortality Patterns of Adult Adfluvial Bull Trout (*Salvelinus confluentus*) in the Boise River Basin, Idaho. Summary report submitted to the Arrowrock Bull Trout Advisory Group, U.S. Bureau of Reclamation, Snake River Area Office, Boise, Idaho.
- U.S. Bureau of Reclamation. 2004. Bureau of Reclamation operations and maintenance activities in the Snake River Basin upstream of Lower Granite Dam. Biological Assessment submitted to the U.S. Fish and Wildlife Service.
- U.S. Bureau of Reclamation. 2001. Arrowrock dam outlet works rehabilitation. Final Environmental Impact Statement. U. S. B. R. Pacific Northwest Region Snake River Area Office. Boise, Idaho.

U.S. Fish and Wildlife Service. 2002. Draft recovery plan for bull trout (*Salvelinus confluentus*). Region 1.

U.S. Fish and Wildlife Service. 2005. Biological Opinion for the Bureau of Reclamation Operation and Maintenance Activities in the Snake River Basin upstream of Lower Granite Dam. Region 1.