

# RECLAMATION

*Managing Water in the West*

**Technical Report for Arrowrock Dam Biological Opinion  
#1009.0405 OALS #00-912 and Upper Snake River Biological  
Opinion # 1009.2700**

## **Arrowrock Dam Outlet Works Rehabilitation Endangered Species Monitoring and Mitigation Project**

**Compilation of 2004 Monthly Summaries for Radio Telemetry  
Investigations for Listed Bull Trout (*Salvelinus confluentus*),**



**Technical Report for Arrowrock Dam Biological Opinion  
#1009.0405 OALS #00-912 and Upper Snake River Biological  
Opinion # 1009.2700**

# **Arrowrock Dam Outlet Works Rehabilitation Endangered Species Monitoring and Mitigation Project**

**Compilation of 2004 Monthly Summaries for Radio Telemetry  
Investigations for Listed Bull Trout (*Salvelinus confluentus*),**

**U.S. Bureau of Reclamation, Snake River Area Office - West  
230 Collins Road, Boise Idaho 83702**

*by*

**Lauri Hostettler, Fishery Technician  
Tammy Salow, Fishery Biologist**



**U.S. Department of the Interior  
Bureau of Reclamation  
Technical Service Center  
Environmental Services Division  
Water Treatment Engineering and Research Group  
Denver, Colorado**

**September 2004**

## TABLE OF CONTENTS

Mid-January (reporting period 12/25/03 through 1/14/04).....	1
End of January (reporting period 1/14/04 through 1/30/04).....	7
Mid-February (reporting period 1/31/04 through 2/17/04).....	10
End of February (reporting period 2/18/04 through 2/29/04).....	14
End of March (reporting period 3/1/04 through 3/31/04).....	18
End of April (reporting period 4/1/04 through 4/30/04).....	21
End of May (reporting period 5/1/04 through 5/28/04).....	25
End of June (reporting period 5/29/04 through 6/30/04).....	29
End of July (reporting period 6/30/04 through 7/29/04).....	33
End of August (reporting period 7/29/04 through 8/31/04) .....	37
End of September (reporting period 9/01/04 through 10/01/04) .....	41
End of October (reporting period 10/02/04 through 10/30/04) .....	46
End of November (reporting period 11/01/04 through 11/30/04) .....	50
End of December (reporting period 12/01/04 through 12/31/04).....	53

## **Mid-January Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 12/25/03 through 1/14/04)**

Five radio tags from the 2002 fall tagging project remain in active, live fish. Fifty-five radio-tagged tagged entered the reservoir area downstream of Willow Creek campground since the beginning of the 2003 construction project.

No fish were confirmed mortalities during this reporting period (this is the second period without reported mortalities). We had some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the easily accessible South Fork area, an area highly used by anglers and osprey.

We had minimal movement this period. Three fish have moved into the residual pool of Arrowrock, all from the South Fork Boise River below Anderson Ranch dam. No new fish have become entrained through Arrowrock dam during this period.

### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The 2003 entrainment rate remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any of the entrained fish this period. Rising reservoir levels combined with ice and snow cover hamper radio signal reception.

### Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 30 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year. There is a cobble bottom with pools, riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. Since then this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice. This fish has remained upstream from Trail creek in an area that has several large pools that may provide cover and shelter from river icing.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year. This area of the river consists of a shifting sand channel with shallow water and minimal structure to provide fish cover. Most of the fish that we have found killed have been located in this area, and bald eagles are consistently observed hunting throughout this area during our surveys.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Two fish

moved through this area to the residual pool. Bald eagles are often observed hunting in this area as well.

Reservoir Pool – 20 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-164, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146, 2-72). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 5-164 and 5-184 moved downstream from the South Fork to the residual pool prior to 1/6. Fish code 3-9 was not found during this period, but was located in the residual pool in late December. The residual pool is covered with ice and snow from Cinch Creek to the dam (Figure 1).



Figure 1. The pool was ice and snow covered from Cinch Creek to the dam on 12/30/03 and 1/6/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue actively moving within the river. Fish codes 5-164 moved 13.5 km downstream from near Willow Creek on the South Fork to the residual pool between 12/22 and 1/6. Fish 5-184 moved 27 km downstream from near Smith creek on the South Fork to the South Fork Gulch on 12/30 then to the residual pool prior to 1/6. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located

since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We have been unable to ground track the areas of the South Fork accessible by vehicle due to adverse weather and poor road conditions during this period.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed as it is a large fish (TL = 498), but we cannot verify this since the site is not accessible by road or trail. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179).

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

#### Summary of the fate of all radio tagged bull trout (radios with battery life extending at least one year)

In 2002 and 2003, we have tagged a total of 102 bull trout with radios tags having a battery life extending through at least one year. Of the fifty fish tagged in 2002, eleven were killed during the fall migration in 2002. Thirty fish survived through July 2003 to begin the migration into river or headwater habitats. Of these fish, 22 actually made it to summer and spawning habitats, two fish never migrated, and two were entrained. Thirteen of the fish that migrated did not spawn. Nine fish entered known spawning habitat during the spawning period. Only five fish tagged in 2002 are still alive with active radios and two radios have had their batteries expire in live fish.

Of the 52 fish tagged in 2003, two have become entrained (total of three fish entrained, but one fish that was entrained has a tag expected to expire in February) and twenty-two fish have been killed during the downstream migration to Arrowrock reservoir or the South Fork Boise River. We currently have 38 radio tags left in live fish, one tag expired, four tags are due to expire in February, two fish are missing, and two fish are entrained into Lucky Peak reservoir.

#### Projected work through January

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. We plan hold project coordination meetings for the 2004 field season in the third week of January. Additional pictures are attached in Figures 2-4 showing conditions in the Boise Basin during this period.



Figure 2. Snow pack along the South Fork Boise River.



Figure 3. South Fork confluence 1/06/04.





Figure 4. Elk unsuccessful at crossing Lucky Peak Reservoir.

## **End of January Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 1/14/04 through 1/30/04)**

Five radio tags from the 2002 fall tagging project remain in active, live fish. Since the beginning of the 2003 construction project, 55 radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground.

Three of our smaller radio tags are due to expire this week or next week. One of them is an entrained fish (6-148), one is in the residual pool (6-146) and one is a possible mortality in the Middle Fork Boise River upstream from Twin Springs (6-142). No fish were confirmed mortalities during this reporting period (this is the third period without reported mortalities). We continue to have some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the areas of the South Fork that are accessible by vehicle.

We had minimal movement this period. No new fish have become entrained through Arrowrock dam during this period.

### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The 2003 entrainment rate remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any entrained fish this period. Rising reservoir levels combined with ice and snow cover hamper radio signal reception. Three of our smaller radio tags are due to expire this week or next week. One of them is an entrained fish (6-148), one is in the residual pool (6-146) and one is a possible mortality in the Middle Fork Boise River upstream from Twin Springs (6-142).

### Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 29 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year. There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. Since 12/22 this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice. This fish has remained upstream from Trail creek in an area that has several large pools that may provide cover and shelter from river icing. This area was a popular holding spot for several fish during the downstream migration.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Two fish moved through this area to the residual pool. Bald eagles are often observed hunting in this area as well.

Reservoir Pool – 18 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 3-9, 2-72, and 5-164 were not found during this period, but had been found in the residual pool in early January. Fish code 3-9 has not been found for five weeks, however we suspect that this tag may have a weak battery or may have been trimmed as it has had a weak signal since implantation. The area has received substantial precipitation (snow) during this period. The residual pool still has some ice and snow (Figure 1).



Figure 1. Snow and ice near the residual pool 1/26/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We were able to ground track the vehicle accessible area of the South Fork on 1/27/04 and check on two of three fish that have not been moving much. We were able to disturb them and validate that they are alive and just inactive.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed since it is a large fish (TL = 498), but cannot validate mortality because the site is not accessible by trail or roads. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179). We have not been able to validate mortality for fish 6-142. It is in unusually fast water for holding, but near cover. We have not been able to get visual validation and will try again this next week.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

#### Projected work into February

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. Boise and Deadwood project planning meetings were held on 1/21/04, and we have a busy year ahead of us. We will be working on completing summary reports and our 2004 permit application during February. Trap and haul from Lucky Peak reservoir is planned to start April 5.

### **Mid-February Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 1/31/04 through 2/17/04)**

Five radio tags from the 2002 fall tagging project remain in active, live fish. Fifty-five radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground since the beginning of the 2003 construction project.

No fish were confirmed mortalities during this reporting period (this is the fourth period without reported mortalities). We continue to have some trouble locating our fish through the ice and snow and traveling to some of the locations on the ground. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. This has occurred in previous years in the areas of the South Fork that are accessible by vehicle.

No new fish have become entrained through Arrowrock dam. Our three smaller radio tags due to expire this week or next week continue to transmit. One of them is an entrained fish (6-148) and was not found this period. The other fish both moved significantly this period. Fish 6-142 moved over one mile downstream from its previous holding area. Fish 6-146, in the residual pool, moved from directly in front of the dam to near Grouse Creek. All of the residual pool fish have moved upstream slightly during this period to a small section of open water near Grouse Creek.

#### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, three fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148). The 2003 entrainment rate for remains at 5.3 %. This is an increase from an entrainment rate of 3% for 2002 at the same time last year. We did not locate any of entrained fish this period. Rising reservoir levels combined with ice and snow cover hamper radio signal reception. We did hear one fish on channel 3, but were unable to get it to code. There is one fish missing in Lucky Peak on this channel, fish 3-81. We have not seen this fish since July 2003. Though we did track Mores Creek, it is possible the fish sought refuge in Grimes or above where we tracked during the summer. We need to confirm the presence of this animal in order to speculate on his over-summer refuge.

Our three smaller radio tags that are due to expire this week or next week continue to transmit. One of them is an entrained fish (6-148) and was not found this period. The other fish both moved significantly this period. Fish 6-142 moved over one mile downstream from its previous holding area. Fish 6-146, in the residual pool, moved from directly in front of the dam to near Grouse Creek. All of the residual pool fish have moved upstream slightly during this period to a small section of open water near Grouse Creek.

#### Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 29 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year. There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. Fish 5-190 moved from upstream of Twin Springs Resort to an area just upstream of Trail Creek prior to 12/22. Since 12/22 this area has received 2-3 feet of snow and the river has a lot of shelf and anchor ice. This fish has moves within a localized area that has several large pools that may provide cover and shelter from river icing. This area was a popular holding spot for several fish during the downstream migration during the fall.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated in October of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Very little predator activity has been observed lately, many of the eagles that were observed hunting through December appear to have moved out of this area.

Reservoir Pool – 19 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-187, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146, 5-164). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish codes 3-9, and 2-72 were not found during this period, but had been found in the residual pool in early January. Fish code 3-9 has not been found for seven weeks, however we suspect that this tag may have a weak battery or may have been trimmed as it has had a weak signal since implantation. The area has received substantial precipitation (snow) during this period. The residual pool still has a lot of ice and snow, with only a small area of open water near the mouth of Grouse Creek where fish appear to be holding (Figure 1).



Figure 1. Snow and ice near the residual pool 2/10/04. Green circle indicates area of open water where fish have been moving.

South Fork Boise River – 9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48 has not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed because it is a large fish (TL = 498), but cannot validate mortality since the site is not accessible by road or trail. One fish has completely disappeared after being tagged. It was never located after it was tagged indicating tag failure or poaching (fish 5-179). We were able to validate survival for fish 6-142, it moved more than one mile downstream from its previous holding area.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

Projected work through the end of February

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos. The construction work on the dam is due for completion by March 1. We hope to release an interim report for the first 18 months of telemetry work on that date as well. We will be working on completing summary reports and our 2004 permit application during February, submitting the 2004 permit application also on March 1. Trap and haul from Lucky Peak reservoir is planned to start April 5.



## **End of February Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 2/18/04 through 2/29/04)**

Five radio tags from the 2002 fall tagging project remain in active, live fish. Fifty-five radio-tagged tagged have entered the reservoir area downstream of Willow Creek campground since the beginning of the 2003 construction project.

No fish were confirmed mortalities during this reporting period (this is the fifth period without reported mortalities). Warming temperatures and increased precipitation have caused increased inflows and fish activity in the residual pool. Though the upstream valve work is complete and the trash racks are in place and have been tested, the contractor continues to set the guides to the valves on the upstream side of the dam. As this work is completed, the water levels will be increased accordingly. However, to maintain water levels, discharge from the dam has exceeded 51 m<sup>3</sup>/s (1800 ft<sup>3</sup>/s) consequently entraining two new fish over the last two weeks.

One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching. Incidents of poaching have occurred in previous years in easily accessible areas below Anderson Ranch Dam.

### Bull Trout in Lucky Peak Reservoir (entrainment)

Two new fish were entrained during this period. Overall, five fish have become entrained from the 2003 tagged sample (1-44, 5-192, 6-148, 5-187, 5-164). The entrainment rate for 2003 increased to 8.7 %. This is an increase from an entrainment rate of 4.2 % for 2002 at the same time last year. We did not locate three of the five entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time), fish 5-192, and fish 6-148. We expect the battery has expired on the tag for fish 6-148. The other two fish remain near the spilling basin of Arrowrock in Lucky Peak reservoir.

### Bull Trout in Arrowrock Reservoir (area normally inundated at full pool)

We tracked 28 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 1 radio tag (fish 5-190). This area is normally not inundated at this time of year.

There is a cobble bottom with pools riffles and runs providing habitat structure and cover for fish. This fish has moved from an area just upstream from Trail creek to an area just downstream of Lambing Creek. This is an area that has several large pools that may provide cover and shelter from river icing. This area was a popular holding spot for several fish during the downstream migration during the fall and prior to the start of the 2003 spring migration.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin is inundated by September of a normal water year.

South Fork Confluence to the reservoir pool – no radio tags. This river section consists of shifting sand/clay substrate and fast moving, variable depth water. Very little predator activity has been observed lately; many of the eagles that were consistently observed hunting through December appear to have moved out of this area.

Reservoir Pool – 18 radio tags (1-49, 1-168, 2-1, 2-4, 2-7, 2-63, 2-71, 2-177, 5-178, 5-180, 5-184, 5-188, 5-189, 5-191, 5-199, 5-200, 6-146, 2-72). Fish have been moving actively in the reservoir, between the deep section of the residual pool immediately in front of Arrowrock dam to the mouth of Cinch Creek. Fish code 3-9 was not found during this period. This fish has not been found for eleven weeks, however we suspect that this tag may have a weak battery or may have failed as it has had a weak signal since implantation. Fish codes 5-164 and 5-187 were entrained into Lucky Peak during this period. The area continued to receive substantial precipitation (rain and snow). Much of the ice on the residual pool has melted or collected on the downstream area just in front of the dam and there is a substantial amount of open water (Figure 1).



Figure 1. Arrowrock residual pool 2/24/04.

South Fork Boise River –9 radio tags (1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Fish 1-47 and 2-5 are the farthest upstream just below Anderson Ranch dam. Fish 1-48

has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 4 radio tags (5-166, 5-182, 5-195, 6-142). Three fish remain alive and moving in the Middle and North Fork Boise Rivers upstream of Willow Creek campground. These are some of the smaller fish that were radio tagged in 2003, with total lengths ranging from 258 mm to 364 mm (mean = 324.4, s = 42.6). One fish in the North Fork Boise River has not moved from Meadow Creek since three weeks post tagging (5-182). We presume this fish must have been killed because it is a large fish (TL = 498), but mortality cannot be verified since the site is not accessible by road or trail. One fish has completely disappeared after being tagged. It was never located after it was tagged, indicating tag failure or poaching (fish 5-179).

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

#### Projected work into March

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week and taking aerial reference photos as the reservoir begins to fill. We will be working on completing summary reports and developing a website where this information can be requested and obtained in either electronic or hard copy formats. We will return to a monthly reporting frequency on March 1, 2004. We will begin trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir on April 5.

### End of March Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 3/1/04 through 3/31/04)

No fish were confirmed mortalities during this reporting period. The upstream valve work on Arrowrock dam is complete and the reservoir began to refill on March 1, 2004. The releases from the dam were reduced and water levels have been increasing accordingly (Figure 1).

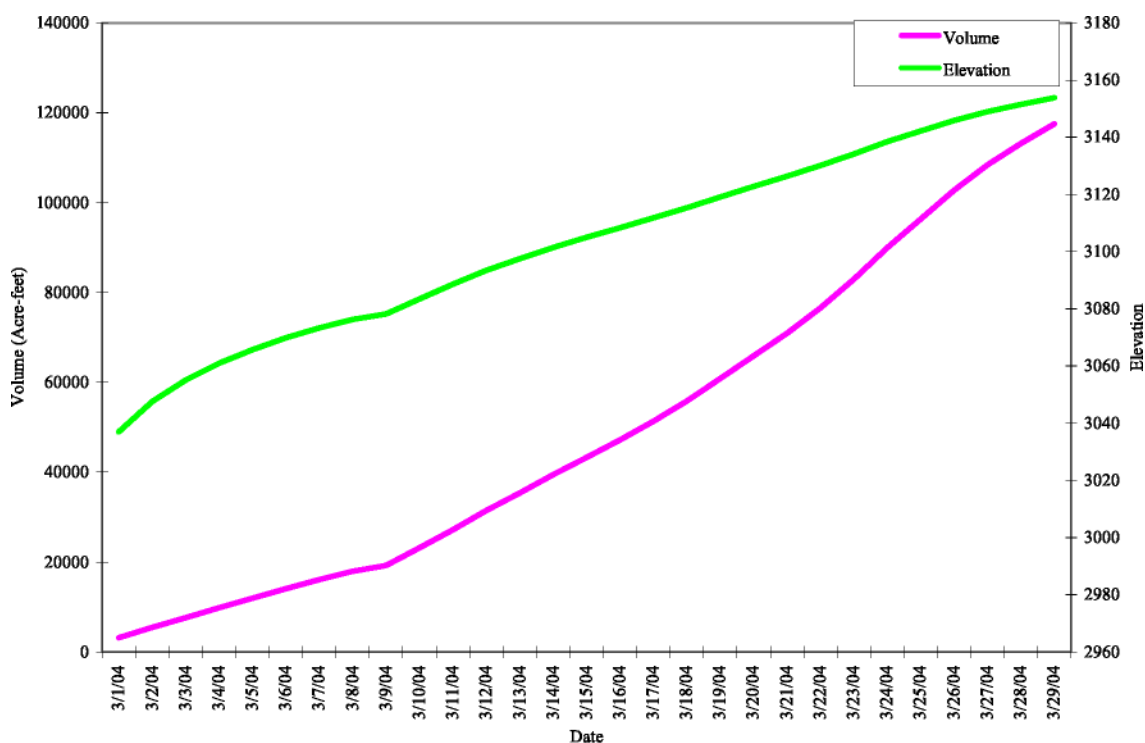


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of March 2004.

The radio tagged bull trout became very active during the month of March as temperatures warmed and stream flows have increased. Several fish followed the reservoir water line as it filled and five fish are in the Middle Fork Boise River upstream of Arrowrock Reservoir. One fish is at the North Fork Boise River confluence. Six fish left the residual pool and moved into the South Fork Boise River as the reservoir volume increased. One fish remains missing from below Anderson Ranch dam, inferring either tag failure or poaching.

#### Bull Trout in Lucky Peak Reservoir (entrainment)

Two new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for 2003 increased to 11.3 % for large

fish and 12.3 % for all fish tagged in 2003. This is an increase from an entrainment rate of 4.2 % for all fish and 4.8% for all fish tagged in 2002 at the same time last year. We did not locate two of the seven entrained fish this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time) and fish 6-148. The battery has expired on the tag for fish 6-148. The five fish that were found have been actively moving throughout Lucky Peak Reservoir, using the mouths of Charcoal and Mores creeks and Browns Gulch.

#### Bull Trout in Arrowrock Reservoir (now inundated)

We tracked 21 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

Upper end of Arrowrock reservoir, from Willow Creek campground to Trail Creek – 4 radio tags (5-180, 5-189, 2-7, 5-190). This area is just recently becoming inundated as the reservoir pool rises. Four fish have moved from the residual pool to an area upstream of Lambing Creek and slightly below Willow Creek. This is an area that has several large pools that may provide cover and shelter from extreme variations in stream flow that can occur during spring run-off. This was an important holding area during both the downstream and upstream migrations in 2003 and appears to remain so in 2004. We did have angler take occurring in this area near the beginning of June in 2003 where several radio tags were found in or adjacent to Willow Creek campground.

Irish Creek campground area, from Trail Creek to the South Fork Confluence- No radio tags. This section of the reservoir basin became inundated at reservoir elevation 3100 ft. around mid-March (comparison in Figure 2).

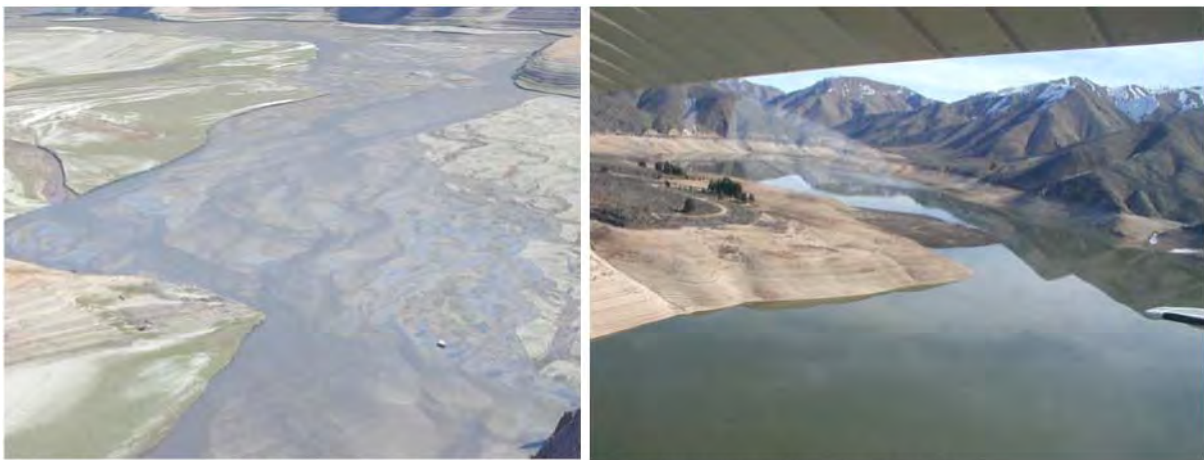


Figure 2. Irish Creek area on October 15, 2003 and on March 22, 2004

South Fork Confluence to the reservoir pool – no radio tags. This area filled quickly and was inundated within the first week of March.

Reservoir Pool – two radio tags (5-191, 5-199) Fish have been moving actively out of the reservoir as the water elevation rises. Fish code 3-9 was not found during this period. This fish has not been found for fifteen weeks, however we suspect that this tag may have a weak battery or may have failed as it has had a weak signal since implantation. Fish code 1-49 was entrained into Lucky Peak during the night on the last day of February. The area did receive some precipitation later in the month and both temperature and stream flows have increased through the month of March.

South Fork Boise River –15 radio tags (2-71, 5-184, 2-72, 5-199, 2-177, 2-63, 1-47, 1175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 5-197). Fish in the South Fork continue to be actively moving within the river. Six fish moved from the residual pool into areas in the South Fork during the month of March. Fish 1-47 and 2-5 continue to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. We conducted snorkel validation for three fish that have not been very active this month. All three fish were disturbed and moved downstream or visually identified.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 3 radio tags (5182, 5-195, 1-168). One fish had moved from the reservoir pool to the confluence of the Middle and North Fork Boise Rivers upstream of Willow Creek campground. Two fish in the North Fork Boise River have not moved from Meadow Creek since three weeks post tagging (5-182, 5-195). We presume one of these fish must have been killed because it is a large fish (TL = 498), but cannot validate mortality since the site is not accessible from roads or trails. One fish has completely disappeared after being tagged. It was never located after it was tagged, indicating tag failure or poaching (fish 5-179). All of the small NTC tags have expired though we expect that the fish were all alive when the tags expired as they were actively moving and generally small fish.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir --

We had no documented mortalities this period!!

#### Projected work into April

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week. We will begin trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir on April 5.

### End of April Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 4/1/04 through 4/30/04)

No fish were confirmed mortalities during this reporting period. The upstream valve work on Arrowrock dam is complete and the reservoir continued to refill through mid-April. Around mid-month, releases from Arrowrock dam were increased to provide irrigation water and begin filling Lucky Peak for recreation. March was one of the driest and warmest months on record, yielding conditions that substantially reduced our snow pack and water levels. The Boise and Payette projects are currently at 74% of their capacity, the overall system is at around 65% of its normal water levels for this time of year, and so far spring run-off has been low. Consequently water levels in Arrowrock have been declining through the last two weeks of April (Figure 1).

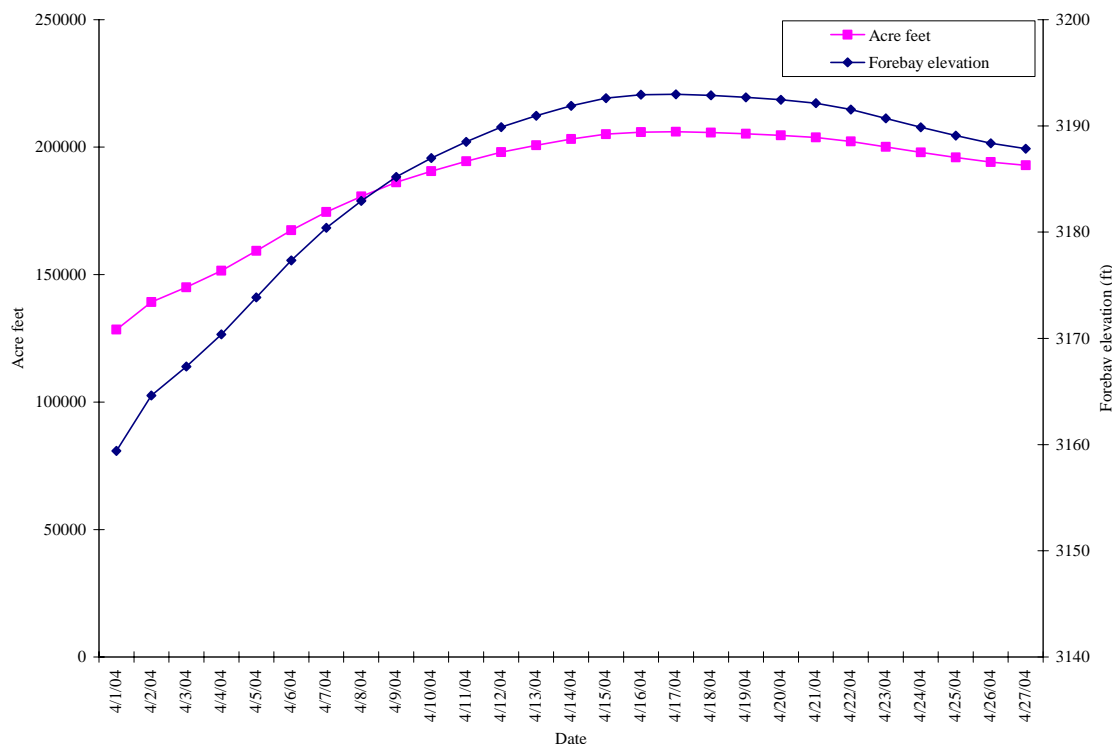


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of April 2004.

The radio tagged bull trout continue to be active during the month of April as temperatures continue to warm and stream flows have remained high. Five fish are in the Middle Fork Boise River upstream of Arrowrock Reservoir; one of these fish is already at the mouth of Black Warrior Creek on the Middle Fork. One fish has moved up to Flicker Creek on the North Fork Boise River, one is at Troutdale Forest Work Camp, and two are near Twin Springs (Figure 2).

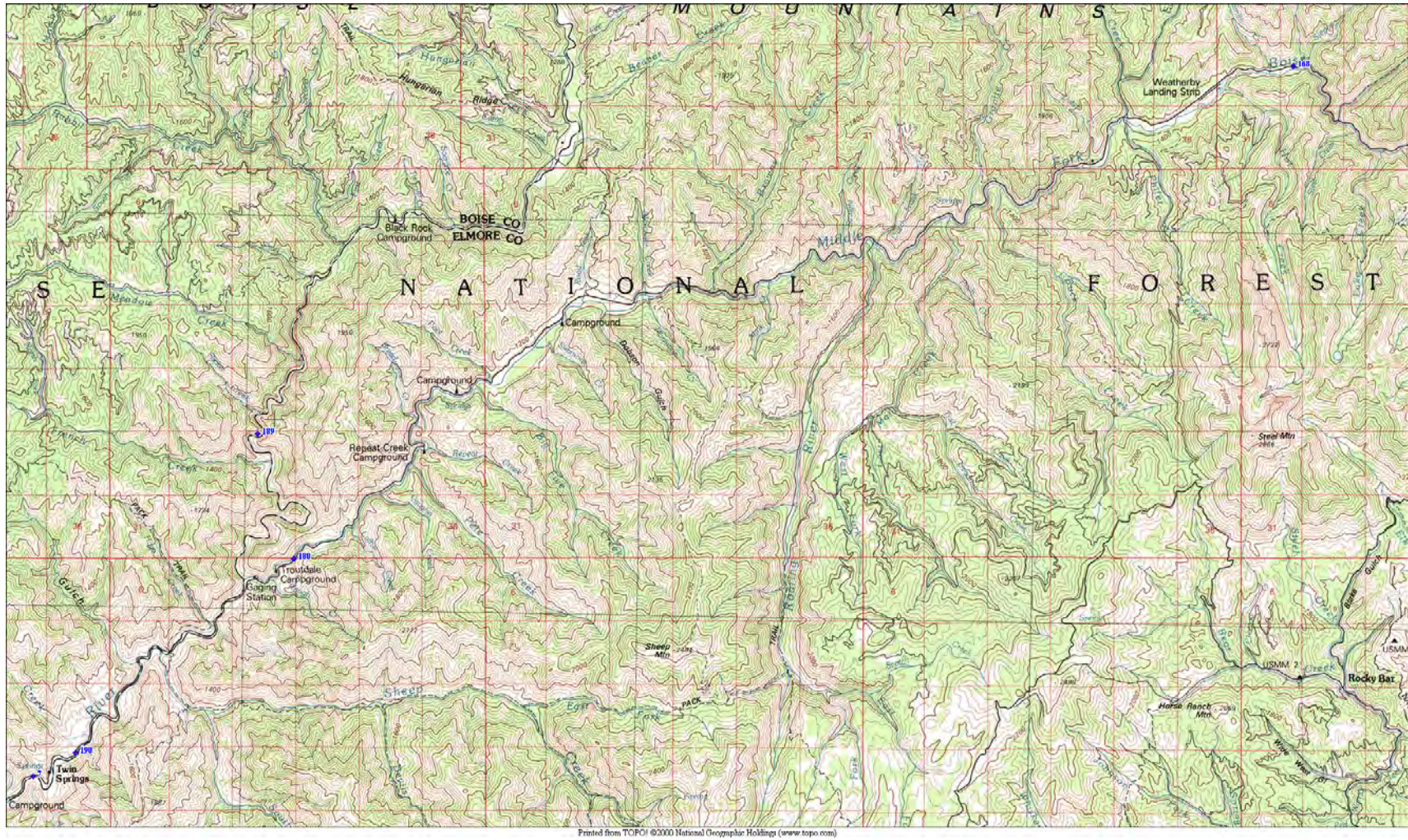


Figure 2. Locations of bull trout that have moved upstream into the Middle Fork and North Fork Boise Rivers (fish Identification and location are show in blue).



### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 %. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year. We did not locate one of the entrained fish with active tags this period: 1-44 (we expect this fish has been killed as its mortality sensor was triggered in late November and the fish did not move after that time). The five fish that were found have been actively moving throughout Lucky Peak Reservoir, using the mouths of Charcoal and Mores creeks and Browns Gulch. One fish has moved upstream into the river section of Mores Creek and was found 2 miles downstream of Dunnigan Creek near Voquelin Gulch.

### Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked 19 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River – 14 radio tags (2-71, 5-184, 2-72, 2-63, 1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177, 5-199). Fish in the South Fork continue to be actively moving within the river. Six fish moved from the residual pool into areas in the South Fork during the month of March and have remained near those areas. One fish has recently moved out of the South Fork and has not been tracked (5-197). We suspect this fish may have entered the reservoir pool. Fish 1-47 and 2-5 continue to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 5 radio tags (5-190, 5-180, 5-189, 2-7, and 1-168). One fish had moved from the confluence of the Middle and North Fork Boise Rivers to Black Warrior Creek on the Middle Fork Boise River. One fish is at Flicker Creek on the North Fork Boise River, one at Troutdale USFS Work Station, and two are near Twin Springs (Figure 2).

### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this period!!

### Lucky Peak Reservoir Trap and Transport Effort

We have captured and moved three bull trout during 106.5 hours of netting in the month of April; two smaller bull trout (350 mm TL) and one relatively large fish (560 mm TL). All three fish were in excellent condition and none were recaptured fish.

Projected work into May

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week. We will continue trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir.

### End of May Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 5/1/04 through 5/28/04)

One fish was confirmed as mortality by raptor predation during this reporting period. Releases from Arrowrock Dam were increased in April to provide irrigation water and begin filling Lucky Peak for recreation. March and April were both very dry and warm months and left us with reduced snow pack and water levels. Snowmelt runoff is rapidly declining. The Boise projects are currently at 82% of their capacity; most of the projects have reached their maximum volume or are beginning to drain for 2004. Water levels in Arrowrock Reservoir have been declining through May as Lucky Peak Reservoir was being filled for recreation (Figure 1). Releases from Arrowrock Dam were reduced on 5/26/04 though as Lucky Peak attained maximum volume. However, the reservoir will continue to be drawn down until it reaches the conservation pool. Lucky Peak Reservoir is anticipated to begin draw down during the first part of August due to low water levels in the basin.

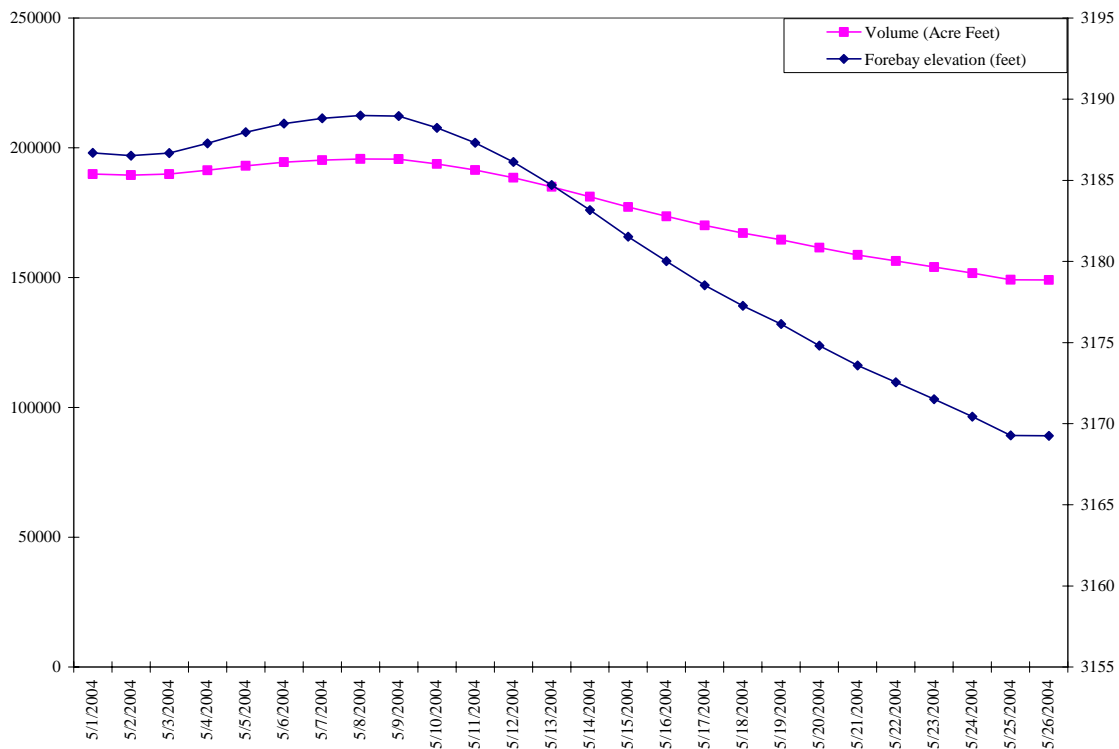


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of May 2004.

The radio tagged bull trout continue to be active during the month of May as water temperatures and stream flows vacillated (Figure 2). Six fish remain in the Middle Fork Boise River upstream of Arrowrock Reservoir. We released two radio tagged bull trout captured in Lucky Peak Reservoir into Arrowrock Reservoir in late May. Both moved upstream to Willow Creek campground within days of their release.



Figure 2. Mean daily water temperature (degrees Fahrenheit) and stream flow ( $\text{ft}^3/\text{s}$ ) of the Middle Fork Boise River at Twin Springs gauging station.

We had some very interesting and somewhat depressing movement from the fish that were residing in the Middle Fork Boise River upstream of Arrowrock Reservoir in April. One of these fish had moved up to Meadow Creek in the North Fork Boise River, turned around and returned to the reservoir. We estimate the fish may have been in the reservoir for a few days before it was taken by a red-tailed hawk (tag found 100 m from active nest in Grouse Creek arm). Of the remaining four fish, one remains moving from Black Warrior Creek to Weatherby landing strip in the Middle Fork, two are in the North Fork Boise River below Barber Flats and one has remained downstream from Willow Creek campground.

### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year. Our catch rates in Lucky Peak Reservoir have nearly doubled from 2003 rates, which adds support to the increased estimate of entrainment between the two years. Entrainment rates were expected to increase during the draw down of Arrowrock Reservoir for the construction this past winter.

There remain three fish with active radio tags moving throughout Lucky Peak Reservoir, one has been using the mouth of Charcoal Creek and another has been near the mouth of Mores Creek near the Highway 21 Bridge. One fish has been tracked near Charcoal Creek and Arrowrock Dam periodically throughout the month, but was missing during our last flight of the month and has not appeared on the logger at Arrowrock Dam for over two weeks. It had last appeared immediately below Arrowrock Dam in mid-May.

### Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked 15 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River –15 radio tags (2-71, 5-184, 2-72, 2-63, 1-47, 1-175, 2-5, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177, 5-179, 5-199). Fish in the South Fork continue to be actively moving within the river. Several of the fish have moved downstream; however these movements were rather short distances (2.5 km or less). Six fish moved from the residual pool into areas in the South Fork during the month of March and have remained near those areas. We found one fish that had not been tracked since it was tagged and we suspect the tag is faulty as the fish was very difficult to track and we were only able to get the tag to code once (5-179). One fish recently moved out of the South Fork and has not been tracked this month (5-197). We suspect it may have entered the reservoir pool. Fish 2-5 continues to be the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 6 radio tags remain (5-190 (mortality, retrieved 5/27/04), 5-180, 5-189, 2-7, 1-49, 5-164 and 1-168). Fish 1-168 moved between Black Warrior Creek and Weatherby landing strip on the Middle Fork Boise River several times this month. One fish is at Meadow Creek on the North Fork Boise River (5-189), one has moved up near Barber Flats (5-180), and three are near Willow Creek Campground (2-7, 1-49, 5-164).

### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had one documented mortality this month. Fish tag 5-190 was found 100 m down a hillside from a red-tailed hawk nest near Grouse Creek.

### Lucky Peak Reservoir Trap and Transport Effort

We captured and moved 16 bull trout during 132.3 hours of netting (0.12 fish per hour) in the month of May. Ten of these fish were smaller bull trout (281 mm to 385 mm TL) and six were relatively large fish (416 mm to 582 mm TL). Most fish were in excellent condition (larger fish tended to be scarred) and four were recaptured fish.

We recaptured three of the radio tagged entrained fish this month, two with active tags. Fish 1-44 (we had previously expected this fish had been killed as its mortality sensor was triggered in late November and the tag did not move after that time) was recaptured the first week of May. The fish had expelled its tag, probably being injured during entrainment. This fish still grew 20 mm in length and gain ~600 g in weight since tagging in the fall. Fish 5-164 was recaptured in late May, and was in very poor condition (expected for this extremely active animal). This was the fish that was rarely ever found in the same place between weekly tracking events and migrated up to the Grimes Creek confluence in Mores Creek in early May. Its weight and length did not change much from tagging. Fish 1-49 was recaptured in late May as well. I had several scars from recent raptor attacks, but still had grown 16 mm TL and gained ~ 300 g in weight.

### Projected work into June

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week. We will also continue flying the area once per week. We will continue trapping bull trout entrained into Lucky Peak reservoir and moving them to Arrowrock reservoir through mid-June. We start our Deadwood River and Boise River migration corridor and rearing habitat telemetry and survey work in the end of June and continue this through July.

## End of June Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 5/29/04 through 6/30/04)

One fish was confirmed as mortality by raptor predation, one by angling, and one by otter during this reporting period. Releases from Arrowrock Dam were increased in June to provide irrigation water; salmon flow augmentation water, and maintain Lucky Peak for recreation. We received substantial precipitation in May however with the low snow pack, water levels remain low. Water levels in Arrowrock Reservoir have increased in the beginning of June with spring run-off and now have started to decline through as water is discharged for irrigation, salmon augmentation flows, and Lucky Peak recreation (Figure 1). Lucky Peak Reservoir is anticipated to begin draw down the first part of August due to low water levels in the basin.

We received a series of heavy thunderstorms and precipitation that washed out the Hot Creek fire creeks (Steel, Lake and Bear Creeks.) and the Middle Fork Boise River road to Atlanta over the last few days in June. Because of flooding USFS road 268 past Swanholm to Atlanta is once again closed.

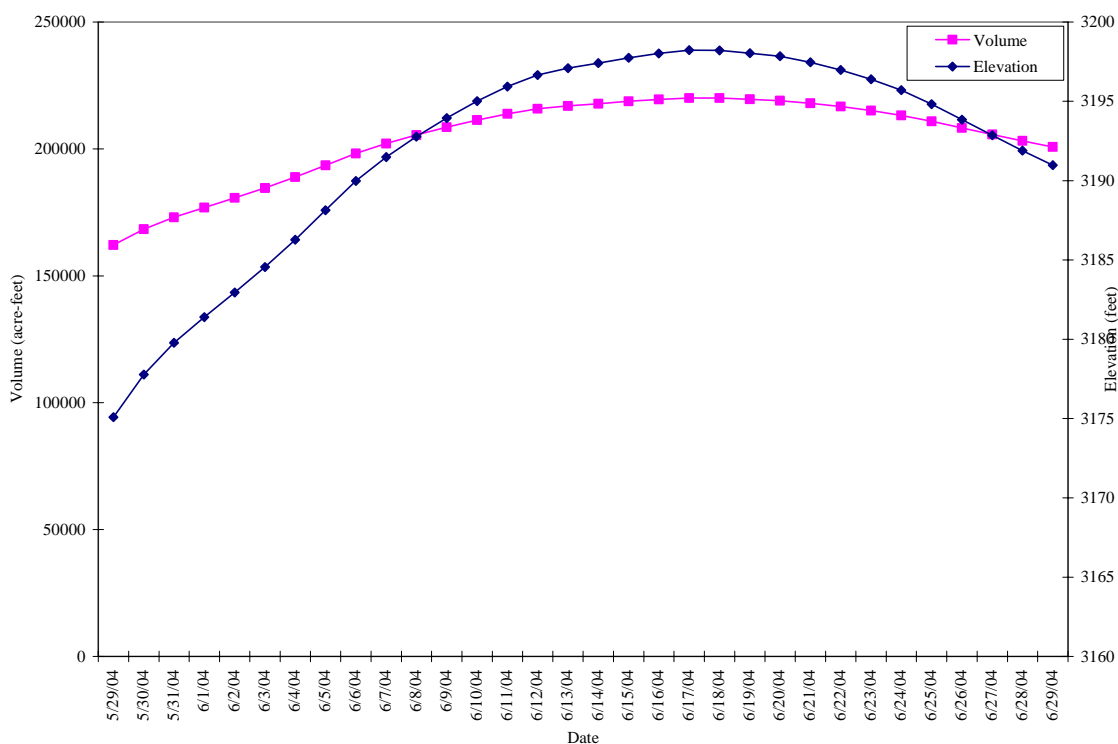


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of June 2004.

The radio tagged bull trout have become more active during the month of June as water temperatures increased and stream flows declined (Figure 2). Seven fish have moved into the Middle Fork Boise River upstream of Arrowrock Reservoir. We released two radio tagged bull trout captured in Lucky Peak Reservoir into Arrowrock Reservoir in late May. They both moved upstream rather quickly and now reside in the North Fork Boise River near Deer Park Guard station.

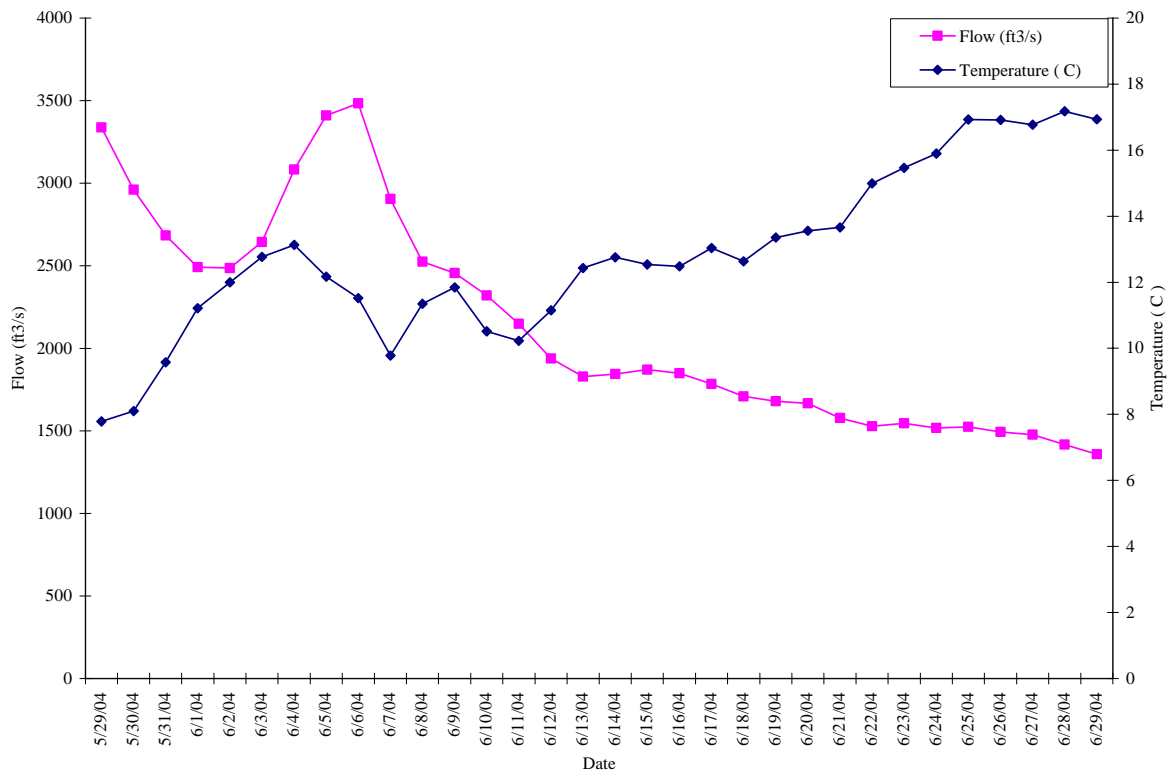


Figure 2. Mean daily water temperature (degrees C) and stream flow (ft<sup>3</sup>/s) of the Middle Fork Boise River at Twin Springs gauging station during June 2004.

We had some very interesting and somewhat depressing movement from the fish that were residing in the Middle Fork Boise River upstream of Arrowrock Reservoir in May. One of these fish had moved up to Willow Creek campground in the Boise River, and was found killed, presumably by an otter we observed feeding in the area. Of the remaining fish, one remains moving from Black Warrior Creek to Weatherby landing strip in the Middle Fork, the rest are in the North Fork Boise River, one is below Barber Flats, one just slightly above and the other four are near or upstream of Deer Park.



### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year. Our catch rates in Lucky Peak Reservoir have doubled from 2003 rates, which supports the increased estimate of entrainment between the two years. Entrainment rates were expected to increase during the draw down of Arrowrock Reservoir for the construction this past winter.

There remain two fish with active radio tags moving throughout Lucky Peak Reservoir, one has been using the mouth of Charcoal Creek but has since been lost. We have checked Mores Creek to Idaho City but not found this fish. The other has been near the mouth of Mores Creek near the Highway 21 Bridge in a pile of wood at the mouth of a small creek. We believe this fish is still alive as it moves when we boat near it.

We found one radio tag in a tree at Spring Shores Marina that could be from raptor predation, but also could be angling. We had one angler turn in a radio tag to Idaho Fish and Game hoping for a reward for the fish he had filleted. He was issued a warning, as he obviously did not know he had killed a federally listed species. He did generate some discussion for us concerning our education program: he had to pass several of the 4'x3' signs and the fishing regulations clearly illustrate bull trout are illegal to harvest. What other methods can we use to get the word out to the public? Most of our angling take occurs in Lucky Peak and downstream of Anderson Ranch dam in the South Fork Boise River.

### Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked 12 bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River –12 radio tags (5-184, 2-63, 1-47, 1-175, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177, 5-179, 5-199). Fish in the South Fork continue to be actively moving within the river. Several of the fish have moved downstream; however these movements were rather short distances (2.5 km or less). Six fish moved from the residual pool into areas in the South Fork during the month of March and have remained near those areas. One fish recently moved out of the South Fork and has not been tracked for two months (5-197). We suspect it may have entered the reservoir pool. Fish 5-175 is the farthest upstream just below Anderson Ranch dam. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. Fish 2-72 and 2-5 moved from the South Fork Boise River upstream into the North Fork Boise River within 7 days during the first two weeks of June.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – 7 radio tags remain (2-72, 2-5, 5-180, 5-189, 1-49, 5-164 and 1-168). Fish 1-168 moved between Black Warrior Creek and Weatherby landing strip on the Middle Fork

Boise River several times this month. One fish is at Meadow Creek on the North Fork Boise River (2-72), one has moved upstream of Barber Flats (5-49), and four are near Deer Park Guard station. One fish was a mortality confirmed 6/24/04 near Willow Creek Campground (2-7), presumably from the otters we saw feeding there.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had three documented mortalities this month, two in Lucky Peak and one in Arrowrock Reservoir. Fish tag 5-178 was found in a tree at Spring Shores Marina, and fish 3-85 was turned in to Idaho Department of Fish and Game. Fish 2-7 was found downstream of Willow Creek campground.

#### Lucky Peak Reservoir Trap and Transport Effort

We captured and moved 3 bull trout during 84.7 hours of netting (0.12 bull trout per hour) in the month of June. One fish was killed when its gills were impinged in the net. The other two fish were small (< 400 mm TL) and none of the fish were recaptured fish.

The spring we captured 22 bull trout, four of which were recaptured fish and one fish was killed in the nets. We netted 323.5 hours for a catch per unit effort of 0.07 bull trout per net hour. This was the second highest CPUE in five years of netting. Our best year was 2000, where the CPUE was 0.08 bull trout per net hour. Mortality rates in all five years for bull trout remain between 4-5% of the total bull trout captured. This work will be summarized and added to the 2002 report.

#### Deadwood angling work

We had 17 anglers help out at the Deadwood angling project, but were unable to catch any bull trout. Overall our catch per unit effort was very low and we caught a few rainbow trout and whitefish. We also saw very few fish when snorkeling. Water temperatures downstream of the dam were very cold: daily means were 7-9 C. Macroinvertebrate densities were much lower in areas where we fished downstream of the dam compared to the river above the dam.

#### Projected work into July and August

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week in the Boise River system. We will also continue flying the area once per week. We start stream surveys in the Deadwood and Boise River tributaries on the sixth of July and will continue stream surveys into mid-August. The Boise River weirs go in on August 25<sup>th</sup> and 26<sup>th</sup> and the Deadwood trap goes in on September 8<sup>th</sup>. We're always looking for help with weir installations so mark your calendars!!

### End of July Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 6/30/04 through 7/29/04)

No new fish were confirmed as mortalities during this reporting period. Water levels in Arrowrock Reservoir have continued to decline as water is discharged for irrigation, salmon augmentation flows, and Lucky Peak recreation (Figure 1). Lucky Peak Reservoir is anticipated to begin draw down the first part of August due to low water levels in the basin.

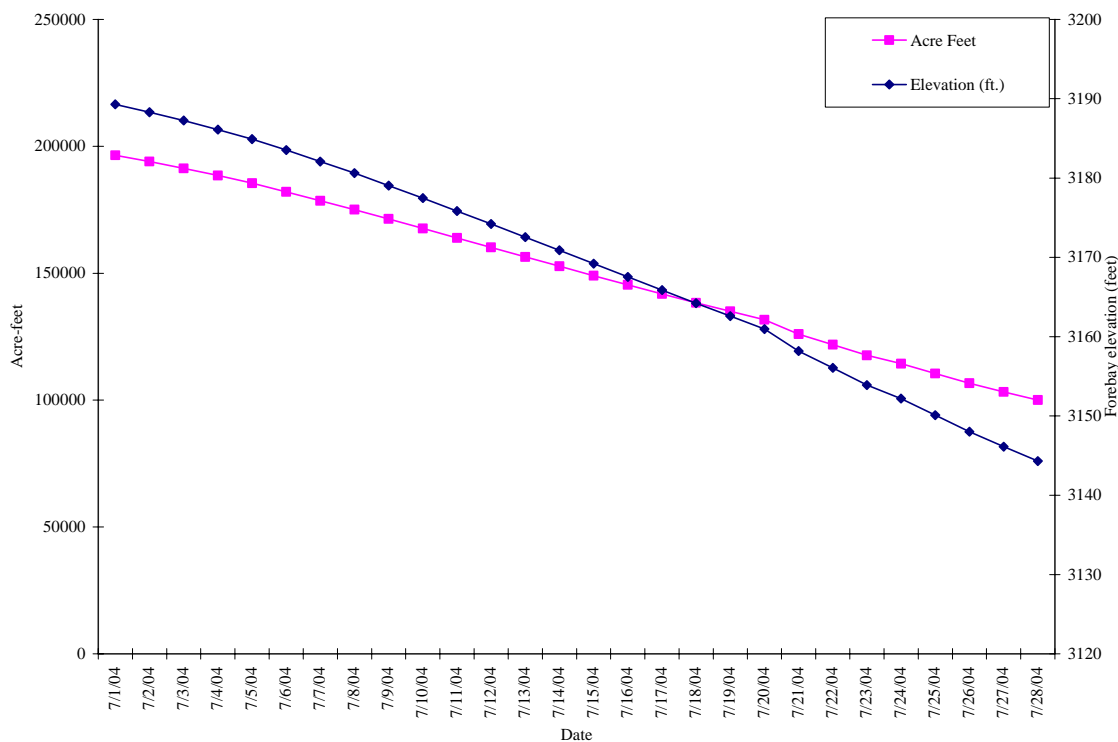


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of July 2004.

The radio tagged bull trout in the Middle Fork and North Fork Boise River have continued their movement into spawning and rearing habitats during the month of July. Several of the fish in the South Fork Boise River downstream of Anderson Ranch Dam have moved toward the mouth of the South Fork and one fish has entered Arrowrock Reservoir. Their movement this year is much later than what we observed last year. This is probably related to the temperature differences between years due to the small construction project that required surface spill at Anderson Ranch Dam in 2003 (Figure 2).

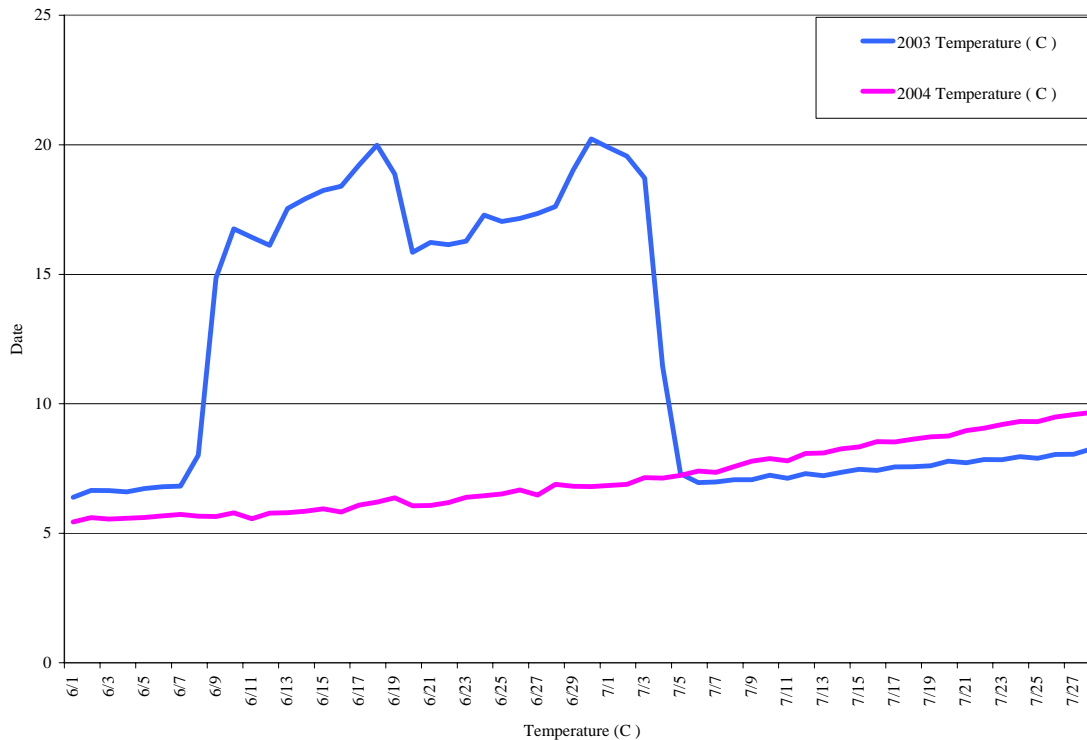


Figure 2. Mean daily water temperature (degrees C) of the South Fork Boise River from June 1 to July 29<sup>th</sup> in 2003 (blue) and 2004 (pink).

#### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, seven fish have become entrained from the 2003 tagged sample (six large and one small fish; 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 11.3 % for large fish and 12.3 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year

No fish with active radio tags remain moving in Lucky Peak Reservoir, the two remaining live fish with active tags have been lost. We have checked Mores Creek from its mouth to Idaho City but have not found these fish.

#### Bull Trout in Arrowrock Reservoir (currently inundated)

We tracked ten bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River –10 radio tags (5-184, 1-47, 2-59, 2-60, 3-89, 5-181, 5-185, 2-177, 5-179, 5-199). Fish in the South Fork continue to be actively moving within the river. Three fish recently moved out of the South Fork and have not been tracked (5-197, 2-63, 1-175). We suspect they may have entered the reservoir pool. Fish 2-59 is the farthest upstream near Reclamation Village. Fish 1-48 has

still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. Fish have become more active in the South Fork Boise River during the month of July. No fish left the South Fork to enter the Middle Fork during the month of July.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – Six radio tags remain (2-5, 5-180, 5-189, 1-49, 5-164 and 1-168) in active, live fish. Fish 1-168 moved to the mouth of Black Warrior Creek this week (week 7/26/04). One fish disappeared from the mouth of Meadow Creek on the North Fork Boise River (2-72), has not passed any logging stations, and has been missing from three flights. We will check some side tributaries in the area for this fish. The remaining five fish in the North Fork have all moved passed Deer Park Guard Station into the upper North Fork Boise River. We will collect spawning/rearing habitat data for these fish during the month of August.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this month.

#### Deadwood and Boise River Electrofishing Surveys

We have completed all surveys in the Boise River Basin for this year. Surveys were conducted on Black Warrior, West Warrior, Bald Mountain, and Eagle Creeks and throughout Roaring River. We captured and tagged sixteen bull trout in these areas. We discovered a new debris jam which created a falls in Bald Mountain Creek (Figure 3) and newly 'fish-less' habitats above it. Roaring River bull trout numbers were quite reduced from 1994 data and their distribution appeared more limited. Black Warrior Creek had the highest numbers of bull trout captured, but we did not get into spawning and rearing habitat until we were above 1800 m elevation.



Figure 3. Debris jam and water fall on Bald Mountain Creek in the Boise River Basin (1 inch = ~ 3 feet).

We have completed over two-thirds of the Deadwood survey sites, capturing and tagging 43 bull trout. Scott Creek continues to have one of the strongest populations in the watershed. We will be working in the upper Deadwood River and the western reservoir tributaries next week to complete the Deadwood River surveys.

#### Projected work into August

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week in the Boise River system. We will also continue flying the area once per week. We will complete the stream surveys in the Deadwood River tributaries during the first week of August and start spawning habitat work on the Boise River system. The Boise River weirs go in on August 25<sup>th</sup> and 26<sup>th</sup> and the Deadwood trap goes in on September 8<sup>th</sup>. We're always looking for help with weir installations so mark your calendars!!

## End of August Arrowrock Reservoir and Boise River Bull Trout Movement Update (period 7/29/04 through 8/31/04)

No new fish were confirmed as mortalities during this reporting period. Water levels in Arrowrock Reservoir reached the minimum pool volume and water has begun to be released from Lucky Peak Reservoir (Figure 1). Lucky Peak and Anderson Ranch Reservoirs will continue to provide water for irrigation through September before water release in the Boise River is reduced to winter levels.

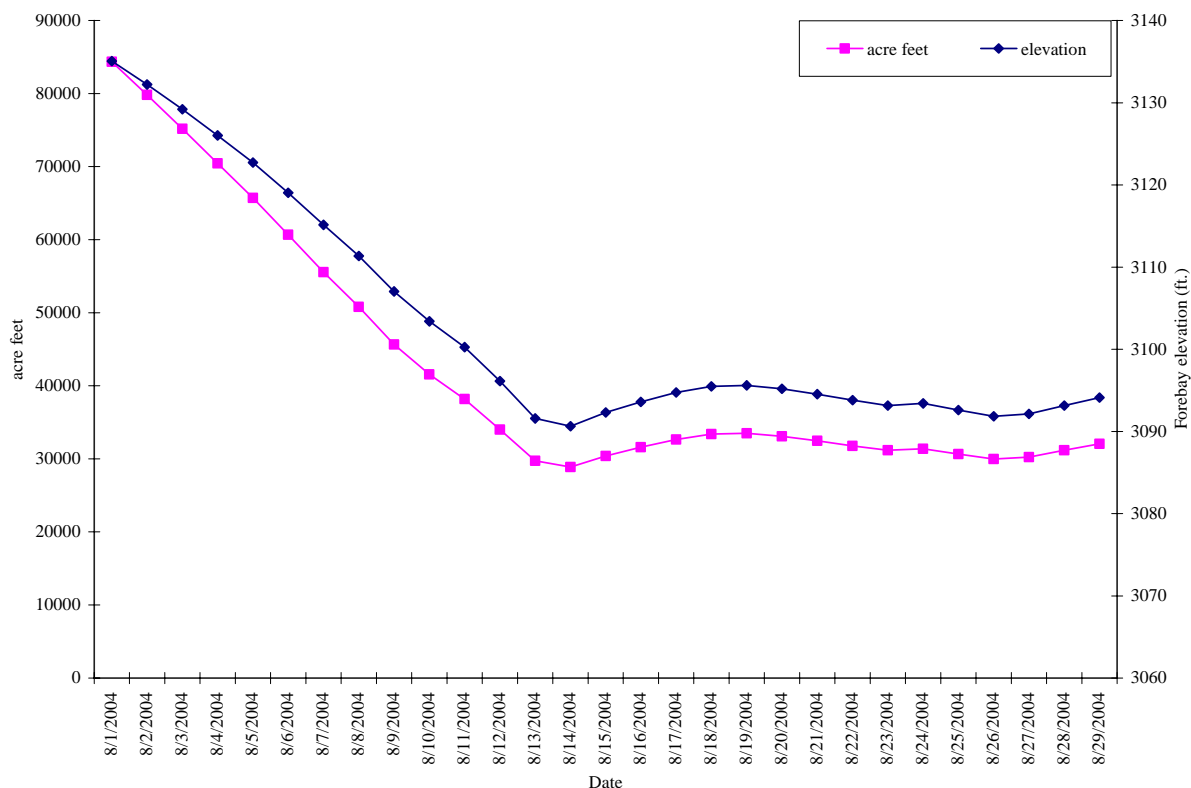


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of August 2004.

The radio tagged bull trout in the Middle Fork and North Fork Boise River have completed their migration to spawning and rearing habitats during the month of August. We completed spawning surveys in the upper North Fork and observed fish holding in the mainstem Middle Fork Boise River during the month of August. Several of the fish in the South Fork Boise River downstream of Anderson Ranch Dam moved out of the South Fork to Arrowrock Reservoir or back upstream toward Anderson Ranch Dam during the last week of August when temperatures reached near record lows in the basin. The South Fork overwintering group behaved differently this summer than what was observed last year. Only approximately half of the fish left the river to move into the Middle and North Fork Boise Rivers or Arrowrock Reservoir during this summer season. Only two fish remained during the summer season of 2003. This is possibly related to

the temperature differences between years due to the small construction project that required surface spill at Anderson Ranch Dam in 2003 and the poor overwintering habitat (possibly fewer fish in good condition and high mortality in large fish) available in Arrowrock due to the construction in the winter or 2003-2004.

#### Bull Trout in Lucky Peak Reservoir (entrainment)

One new fish was entrained during this period. Fish 2-59 was entrained on August 10<sup>th</sup> at 6:30 PM. Overall, eight fish have become entrained from the 2003 tagged sample (seven large and one small fish: 2-59, 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 13.2 % for large fish and 14.1 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year

The newly entrained fish has an active radio tag with a mortality sensor and has been actively moving about below Arrowrock Dam, the other two remaining live fish with active tags have been lost. We have checked Mores Creek from its mouth to Idaho City but have not found these fish.

#### Bull Trout in Arrowrock Reservoir (currently at minimum pool)

We tracked nine bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

South Fork Boise River –9 radio tags (5-184, 1-47, 2-60, 5-181, 5-185, 5-175, 2-71, 5-179, 5-199). Fish 3-89 had the tag expire during the month of August. Fish 1-48 has still not been located since disappearing from the boat ramp area just downstream of Anderson Ranch dam after 11/19. Fish have continued to be relatively active in the South Fork Boise River during the month of August. Several fish have moved from the dam to the mouth of the river or to Arrowrock Reservoir and one moved through Arrowrock Reservoir and became entrained. Other fish have moved upstream to immediately below Anderson Ranch Dam where they overwintered in 2003-2004. One fish left the South Fork to enter the Middle Fork during the month of August, fish 2-63.

Middle and North Fork Boise Rivers upstream of Arrowrock reservoir – Seven radio tags remain (2-5, 5-180, 5-189, 1-49, 5-164, 1-168 and 2-63) in active, live fish. Fish 1-168 moved to the mouth of Black Warrior Creek this week (week 7/26/04). Fish 2-63 moved to the mouth of the Queens River and then returned to the mouth of Black Warrior Creek during the month of August. One fish disappeared from the mouth of Meadow Creek on the North Fork Boise River (2-72), has not passed any logging stations, and has been missing from seven flights. We will continue to check side tributaries in the area for this fish. The remaining five fish in the North Fork have all moved passed Graham Guard Station into the upper North Fork Boise River. We have been collecting spawning/rearing habitat data for these fish during the month of August and have observed them in their spawning habitats.



### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this month.

### Deadwood and Boise River Electrofishing Surveys

We have completed all electrofishing surveys in the Boise and Payette River Basins for this year. Surveys were conducted on Black Warrior, West Warrior, Bald Mountain, and Eagle Creeks and throughout the Roaring River in the Boise River Basin. Surveys were completed in Warm Springs, Scott, Trail, Beaver, Basin, Deer, No Man, Whitehawk Creeks and the Upper Deadwood River. We captured and tagged over 100 bull trout in the Deadwood River basin. We discovered a log dam that acts as a barrier to fish with only bull trout and frogs found above it (Figure 2).



Figure 3. Log dam above the East Fork Deadwood River on the main Deadwood River.

### Boise River Weir traps

We installed the North Fork Boise River trap on August 25<sup>th</sup> and caught our first bull trout on August 27<sup>th</sup>. We did not install the Middle Fork trap yet due to poor conditions in the Middle Fork from flooding. We hope to install the trap on September 15<sup>th</sup>. So far we have caught five bull trout in the North Fork trap, two large fish in excellent condition going upstream (Figure 3) and three smaller fish going downstream.



Figure 3. Tammy Salow with a large adult bull trout captured in the North Fork Boise River weir trap on September 2nd.

#### Projected work into September

We will continue to ground track and check on fish that have not moved within the reservoir and river sections twice per week in the Boise River system. We will also continue flying the area once per week. We have installed our acoustic tag hydrophones and will complete the installation of the remote station on Arrowrock Reservoir, more information to come on this project as we complete it. The Middle Fork Boise River weir goes in on September 15<sup>th</sup> and the Deadwood trap goes in on September 9<sup>th</sup>. We're always looking for help with weir installations so mark your calendars!!

### End of September Update: Boise/Deadwood Bull Trout Monitoring Projects Reporting period 9/01/04 through 10/01/04

The fisheries teams have been busy operating weirs on the North Fork Boise and Deadwood Rivers. In addition, we have continued the telemetry tracking flights and weekly ground surveys on the Boise River system. Field crews also collected temperature data from numerous tributaries on the Boise and Deadwood River basins.

No new fish were confirmed as mortalities during this reporting period. Water levels in Arrowrock Reservoir reached the minimum pool volume and started to refill. Water was released from Lucky Peak Reservoir for a maintenance project at Lucky Peak Dam. Lucky Peak Reservoir will be drained for that work. Anderson Ranch Reservoir and Arrowrock will continue to provide water for irrigation through October 15<sup>th</sup>.

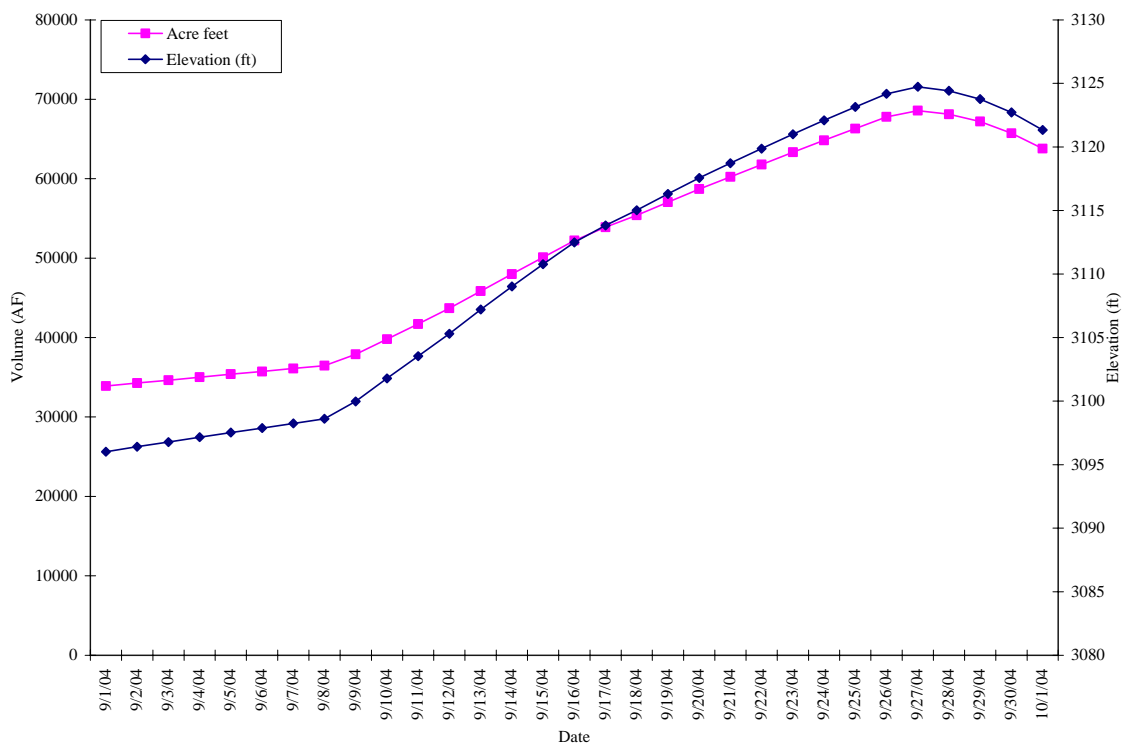


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of September 2004.

The radio tagged bull trout in the Middle Fork and North Fork Boise River started their downstream migration, returning to Arrowrock Reservoir and the South Fork Boise River. We completed spawning surveys in the upper North Fork and observed fish holding in the mainstem Middle Fork Boise River during the month of September. Many of the fish that spent the summer in the South Fork Boise River downstream of Anderson Ranch Dam moved further upstream toward Anderson Ranch Dam during the month of September.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, eight fish have become entrained from the 2003 tagged sample (seven large and one small fish: 2-59, 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 13.2 % for large fish and 14.1 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year

The newly entrained fish has a radio tag with a mortality sensor and has moved downstream past Spring Shores since its entrainment, one of the other two remaining fish with active tags have been lost and the other is a suspected mortality downstream of Arrowrock Dam. We have checked Mores Creek from its mouth to Idaho City but have not found the missing fish.

#### Bull Trout in Arrowrock Reservoir downstream of Willow Creek Campground

We tracked six bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

##### *South Fork Boise River*

Six radio tags (5-184, 1-47, 5-181, 5-185, 5-175, 2-71). Fish have started to move further upstream in the South Fork Boise River during the month of September. Several fish have ceased movement during the month of September and we will be checking on them as stream flows and reservoir elevations allow access in October.

#### Middle and North Fork Boise Rivers upstream of Arrowrock reservoir

Seven radio tags remain (2-5, 5-180, 5-189, 1-49, 5-164, 1-168 and 2-63) in active, live fish. Fish 2-63 moved up into the Queens River approximately 5 miles from the mouth during this month. One fish disappeared from the mouth of Meadow Creek on the North Fork Boise River (2-72), has not passed any logging stations, and has been missing from several months. We will continue to check side tributaries in the area for this fish. Three of the five fish that moved into the upper North Fork have been recaptured at the North Fork weir. Two fish remain above the weir trap. We have been collecting spawning/rearing habitat data for these fish during the month of September and have observed them in their spawning habitats (Figure 2).



Figure 2. Carl Stiefel points out bull trout in spawning habitat in Ballentyne Creek on the North Fork Boise River.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this month.

#### North Fork Boise River weir trap

We installed the North Fork Boise River trap on August 25<sup>th</sup> and caught our first bull trout on August 27<sup>th</sup>. We have been unable to install the Middle Fork trap due to poor conditions in the river from flooding and road construction. So far we have caught over 80 bull trout in the North Fork trap, mostly sub-adult fish moving downstream with the rain in early September. We have tagged 13 bull trout, 12 with acoustic tags.

#### Habitat use and movement patterns of bull trout in Arrowrock Reservoir: Acoustic Tags

During the winter of 2004 and 2005 Carl Stiefel will be conducting research on the movements and habitat use of bull trout in Arrowrock Reservoir as part of his graduate work at Boise State University. Carl's objectives are to monitor the fall and winter habitat use and movement patterns of fish implanted with acoustic tags. This will be the first use of acoustic tags as part of the Boise River telemetry project.

We hope to implant thirty bull trout with acoustic tags captured at the North Fork Boise River weir trap for Carl's study. Based on data from previous years, it has been

estimated that 15 – 20 of these bull trout will use Arrowrock Reservoir this coming winter. We plan to track fish weekly using a boat-mounted hydrophone. In addition to the boat work, two remote hydrophones have been deployed in Arrowrock Reservoir (Figures 3 and 4).



Figure 3. Carl Stiefel preparing to launch a wireless hydrophone in the South Fork Arrowrock Reservoir.

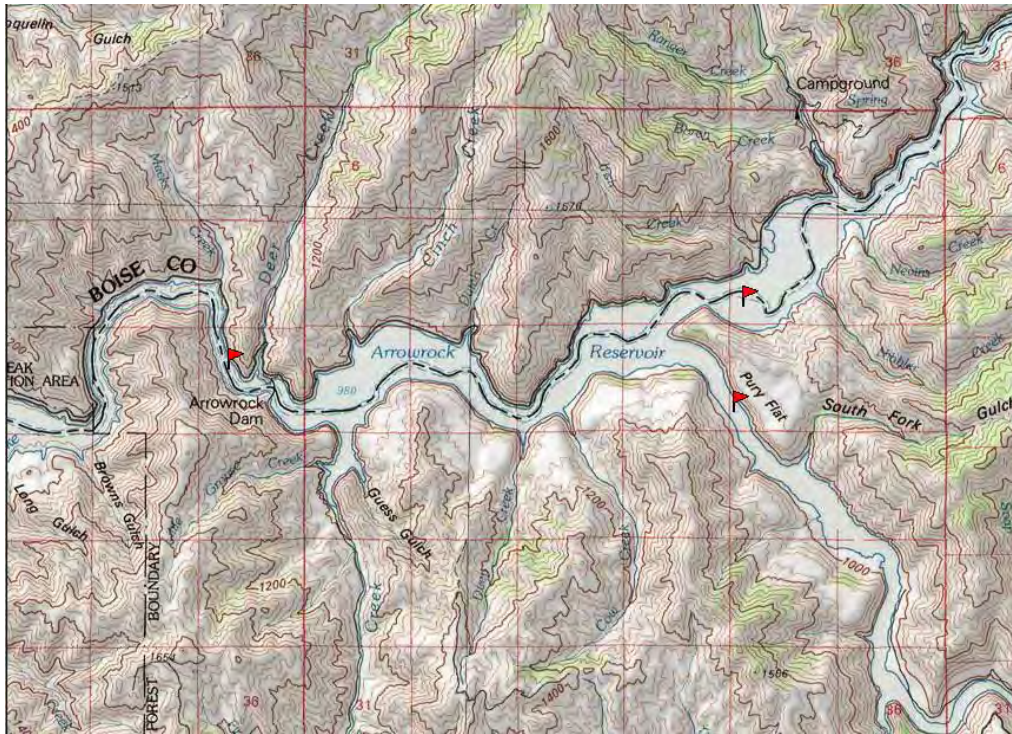


Figure 4. Locations of wireless hydrophones in Arrowrock and Lucky Peak Reservoirs.

As of October 4, twelve acoustic tags have been implanted in bull trout ranging in size from 302 to 590 mm. We began boat surveys to collect location data in Arrowrock Reservoir on October 1. The wireless hydrophone in the main stem of Arrowrock Reservoir became operational on September 7 and the both hydrophones were operational on September 21 (Figure 4). The Lucky Peak hydrophone will be installed below Arrowrock Dam when water levels permit.

#### Deadwood River weir trap

The Deadwood River weir was installed on September 9<sup>th</sup>. No bull trout have been captured in the Deadwood weir trap. We have captured approximately 25 fish: rainbow trout, whitefish, and long nosed dace. Several kokanee carcasses have also been found on the weir pickets.

#### Projected work into October

We will continue to ground track and check on fish that have not moved within the reservoir and river sections once per week in the Boise River system. We will also continue flying the area once per week. We will continue our acoustic tag sampling in Arrowrock Reservoir weekly until ice cover restricts access. As part of the weekly surveys, we plan to gather data on the diel movement patterns of bull trout in the reservoir.

The Deadwood River weir trap will be removed on October 14<sup>th</sup> and the North Fork Boise River trap will be removed on October 27<sup>th</sup>. We're always looking for help with weir removals so mark your calendars!!

### End of October Update: Boise/Deadwood Bull Trout Monitoring Projects Reporting period 10/02/04 through 10/30/04

The fisheries teams removed the Deadwood River weir on October 14<sup>th</sup> and the North Fork Boise River weir on October 26<sup>th</sup>. Both traps were easily removed in 3-4 hours. In addition, we have continued the telemetry tracking flights, boat tracking and weekly ground surveys on the Boise River system. Fields crews collected temperature data from numerous loggers in the Boise River basin.

No new fish were confirmed as mortalities during this reporting period. Water levels in Arrowrock Reservoir have started to refill. Water was released from Lucky Peak Reservoir for a maintenance project at Lucky Peak Dam. Lucky Peak Reservoir was drained to its dead pool for that work. Anderson Ranch Reservoir and Arrowrock are storing water for refill at Lucky Peak when the maintenance project at Lucky Peak Dam is complete.

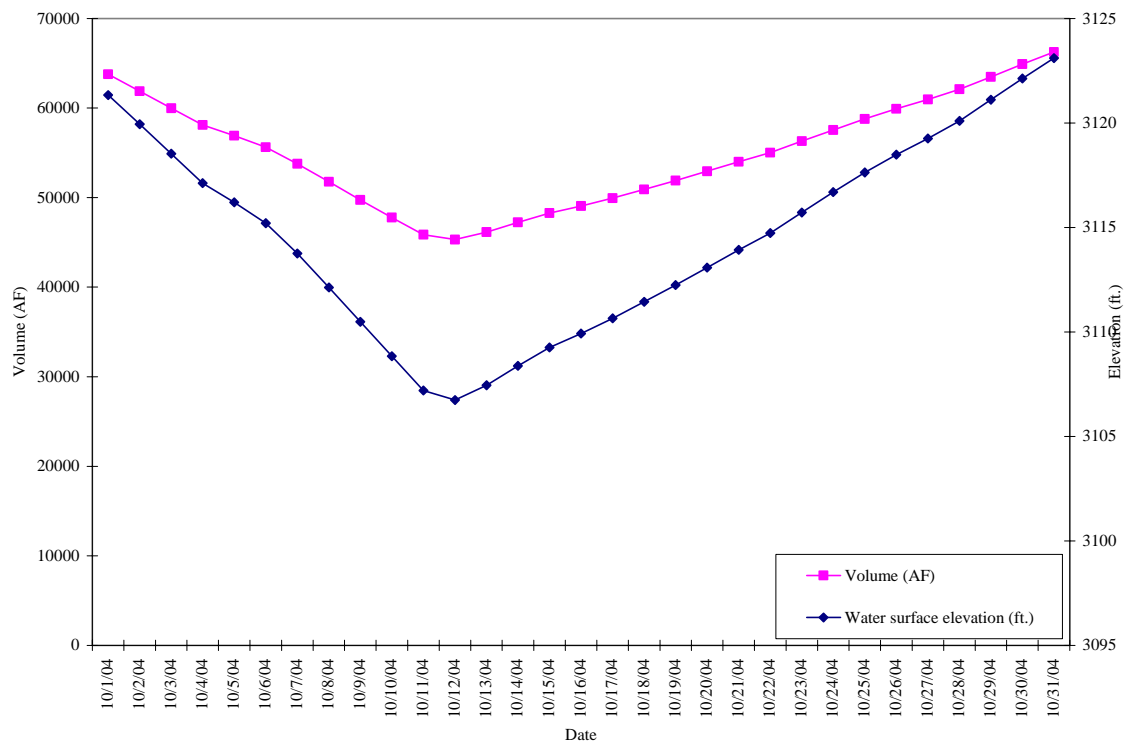


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of October 2004.

The radio tagged bull trout in the Middle Fork and North Fork Boise River pretty much completed their downstream migration, returning to Arrowrock Reservoir and the South Fork Boise River. We completed spawning surveys in the upper North Fork and observed fish holding in the mainstem Middle Fork Boise River during the month of October. One fish was tagged at the North Fork Boise River weir, moved downstream



into the Middle Fork Boise River, moved upstream in the Middle Fork Boise River and has just now started to move downstream to Arrowrock Reservoir.

#### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, eight fish have become entrained from the 2003 tagged sample (seven large and one small fish: 2-59, 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 13.2 % for large fish and 14.1 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year.

The newly entrained fish has vanished from Spring Shores one month after its entrainment, one of the other two remaining fish with active tags have been lost and the other is a suspected mortality downstream of Arrowrock Dam. We have checked Mores Creek from its mouth to Idaho City but have not found the missing fish. We will continue to try to locate them during tracking.

#### Bull Trout in Arrowrock Reservoir downstream of Willow Creek Campground

We tracked six bull trout that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

##### *Arrowrock Reservoir*

Two fish (codes 5-164, 5-189) have been holding in Arrowrock Reservoir. Both radio and acoustic tagged fish have been actively using the Irish Creek, Cottonwood Creek confluence area.

##### *South Fork Boise River*

Four radio tags (5-184, 1-47, 5-175, 2-71) were tracked in active, live fish in the South Fork Boise River downstream of Anderson Ranch Dam. Fish have continued to move further upstream in the South Fork Boise River during the month of October. One fish has disappeared and several fish have ceased movement during the months of September and October. We will be checking on these fish as stream flows and reservoir elevations allow access in November.

#### Middle and North Fork Boise Rivers upstream of Arrowrock reservoir

Two radio tags remain (3-3, 1-168) in active, live fish. Three fish are expected to be post-spawning mortalities (2-5, 5-180, 2-63) as they have ceased movement in the spawning habitats. We have been unable to access these areas to confirm the location and possible cause of mortality.

#### Mortalities/Tag Expulsions within Arrowrock Reservoir

We had no documented mortalities this month. Three fish are expected to be post-spawning mortalities in the headwater tributaries of the North and Middle Fork Boise River.

#### North Fork Boise River weir trap

We removed the North Fork Boise River trap on October 26<sup>th</sup>, tagging 17 fish with acoustic tags, one fish with a radio tag, and 96 fish with PIT tags. We were unable to install the Middle Fork trap due to poor conditions in the river from flooding and road

construction. Catch rates for adult size (> 300 mm TL) adfluvial bull trout declined dramatically this year at the North Fork Weir trap (Figure 2). We attribute the declines from 2003 to the 2004 season primarily to the reservoir drawdown in 2004. Previous declines in large fish captured could be attributed to drought, fires, and flooding conditions.

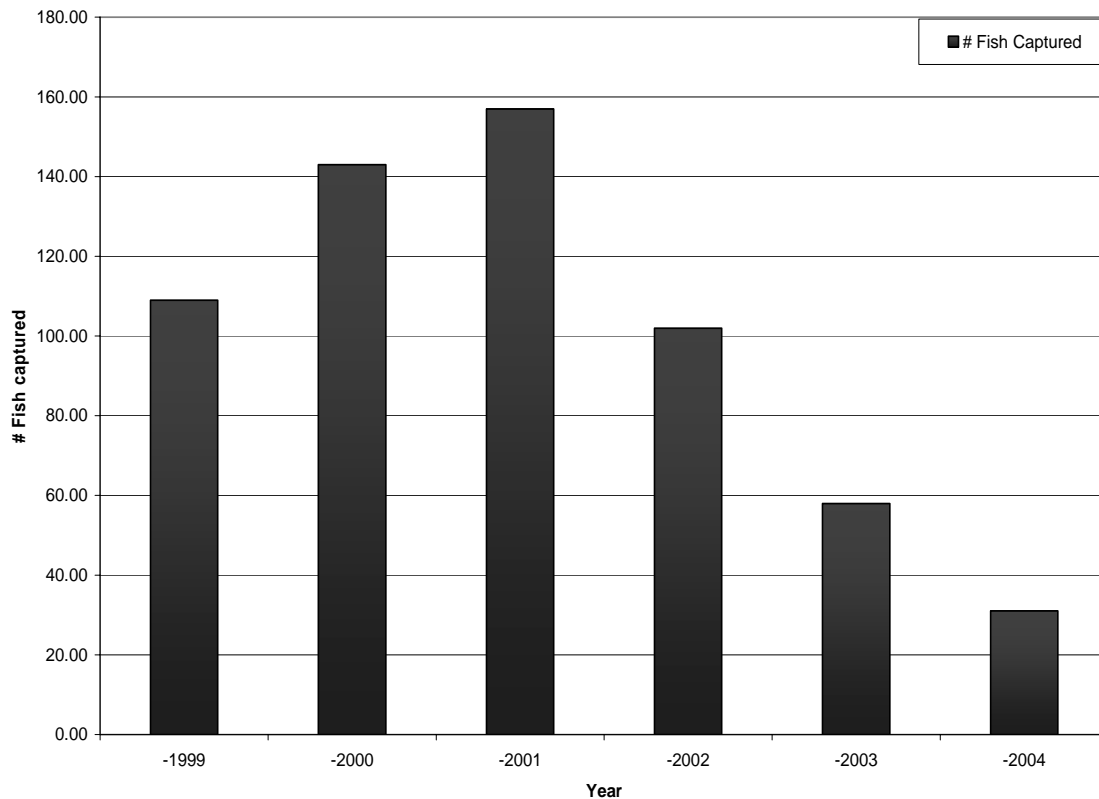


Figure 2. Number of bull trout captured each year of operation at the North Fork Boise River weir trap > 300 mm in total length.

#### Acoustic Tracking: Habitat use in Arrowrock Reservoir

Bull trout have been most frequently found in or near the transition zone the Boise River and Arrowrock Reservoir (codes 4, 14, 22, 23, 25, 26, 28, 30). These fish were actively moving and other fish were observed feeding at the surface in the same area. In addition several fish (codes 11, 14, 16, 24, 25, 27, 28, 30) have been detected in the South Fork Arm of the reservoir. It does not appear that fish use these areas for extended periods of time. No fish had been observed in the lower section of the reservoir near Arrowrock Dam until the last survey (28 October) when fish codes 11 and 22 were found near the high water boat ramp.

Nine acoustic tags have not been detected in Arrowrock Reservoir during boat surveys. Four tags have not been detected in the reservoir (codes 2, 3, 20, 29) and these fish are likely still located upstream of the reservoir in the Boise River. Four fish (codes 16, 21, 24, and 27) were last detected by the hydrophone in the South Fork Arm and have

likely moved into the South Fork Boise River. Fish code 11 was observed moving into the South Fork of the Boise River during the survey on 13 October. Fish codes 11 and 16 have re-entered the reservoir and were found during the 28 October survey. Fish code 11 was located in the lower section of Arrowrock Reservoir near Dutch Creek and fish code 16 was located in the South Fork Arm of the reservoir near South Fork Gulch. When water levels permit, a survey will be conducted in Lucky Peak Reservoir to determine if any fish have been entrained.

Four fish have been located multiple times during surveys to monitor diurnal movement patterns (codes 11, 16, 24, 28). These fish were located every 30 minutes for 1.5 to 3 hours. Based on fine-scale tracking, it appears bull trout in the reservoir can move as much as 880 meters in one hour. However, this estimate reflects the minimum distance moved by a meandering fish.

#### Deadwood River weir trap

The Deadwood River weir was removed on September 14th. No bull trout were captured in the weir trap. We did capture small numbers of rainbow trout, whitefish, and long nosed dace. Several kokanee carcasses were also been found on the weir pickets.

#### Projected work through November

We will continue to ground track and check on fish that have not moved within the reservoir and river sections once per week in the Boise River system. We will also continue flying the area once per week. We will continue our acoustic tag sampling in Arrowrock Reservoir weekly until ice cover restricts access. As part of the weekly boat surveys, we will continue to gather data on the fine scale movement patterns of bull trout in the reservoir. We hope to track Lucky Peak reservoir by boat as soon as access is available to investigate potential entrainment of the acoustic tagged fish.

We will be working on completing the field data summaries for the 2004 season and setting up the project planning meetings with our Forest Service cooperators in January. We hope to have the annual reports posted on our website (<http://www.usbr.gov/pn/programs/usrb/index.html>) by February.

**End of November Update: Boise/Deadwood Bull Trout Monitoring Projects**  
**Reporting period 11/01/04 through 11/30/04**

Two fish were confirmed as mortalities during this reporting period. Water levels in Arrowrock Reservoir have continued to refill (Figure 1) and Lucky Peak Reservoir has started to refill after the maintenance project.

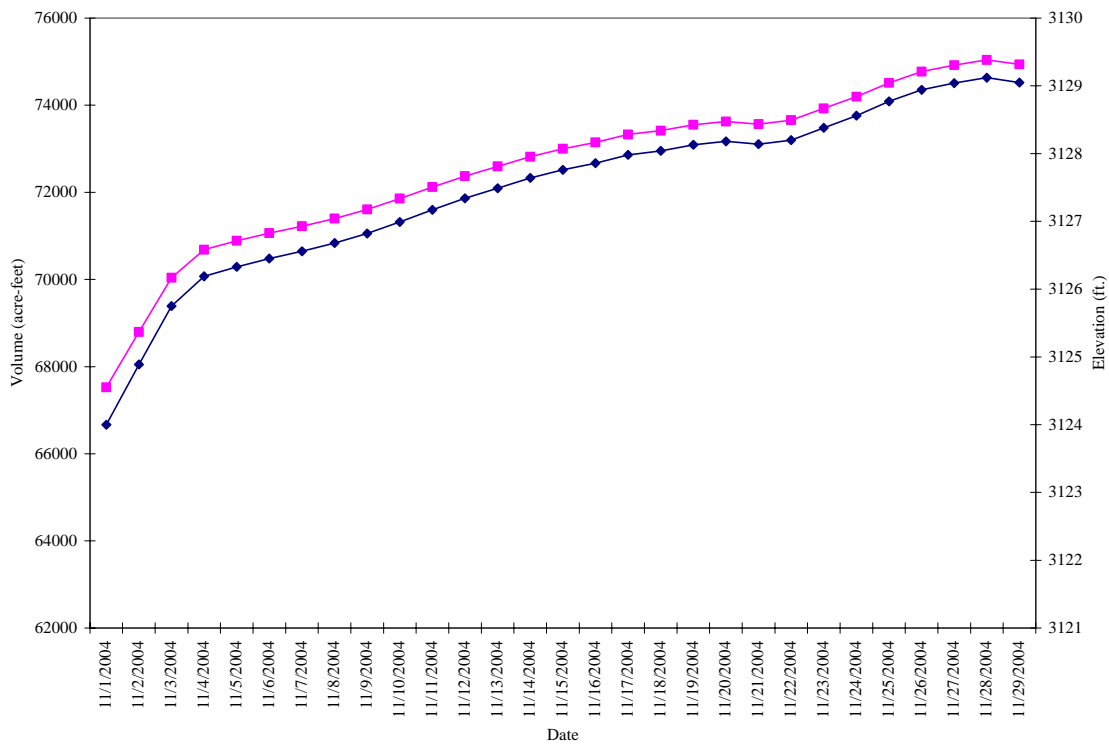


Figure 1. Arrowrock Reservoir storage (acre-feet) and elevation during the month of November 2004.

The radio tagged bull trout in the Middle Fork and North Fork Boise River have completed their downstream migration, returning to Arrowrock Reservoir and the South Fork Boise River. We were able to check on several fish that have not moved in the main channels of the North Fork and Middle Fork Boise River during the month of November. Two fish were documented mortalities, though we expect, from the location of the tags, that these fish were killed in late summer. One of these fish had been observed prior to the flooding of the Middle Fork in August and was in actively moving. The tag was found buried under sediment close to the area where the stream scours occurred. The second tag was found in shallow fast water downstream from a fishing access site.

Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, eight fish have become entrained from the 2003 tagged sample (seven large and one small fish: 2-59, 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 13.2 % for large fish and 14.1 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year

All of the entrained fish have either vanished or the tags have been retrieved from areas within Lucky Peak Reservoir. We have checked Mores Creek from its mouth to Idaho City but have not found the missing fish. We will continue to try to locate them during tracking.

#### Bull Trout with radio tags in Arrowrock Reservoir or South Fork Boise River

We tracked seven bull trout with radio tags that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

##### *Arrowrock Reservoir*

Three fish (codes 5-164, 5-189, and 2-3) have been holding in Arrowrock Reservoir near Irish Creek Campground and the Trail Creek confluence. Both radio and acoustic tagged fish have been actively using the Irish Creek, Cottonwood Creek confluence area.

##### *South Fork Boise River*

Four radio tags (1-49, 1-47, 5-175, 2-71) were tracked in active, live fish in the South Fork Boise River downstream of Anderson Ranch Dam. Fish have continued to move further upstream in the South Fork Boise River during the month of October. One fish has disappeared and several fish have ceased movement during the months of September and October. We have checked all of our fish that were accessible in the South Fork Boise River during November. Four of the fish checked were alive and active. One fish still has retained its temperature depth archival tag (> 16 months). We will attempt to get this tag from the fish by angling for it in December.

#### Radio Tagged Fish in the Middle and North Fork Boise Rivers

Three fish are expected to be post-spawning mortalities (2-5, 5-180, 2-63) as they have ceased movement in the spawning habitats. We have been unable to access the areas to confirm the location and possible cause of mortalities, but expect predation and stress from spawning. One tag was retrieved from near Weatherby airstrip and may have been killed by flooding and poor water quality conditions in August.

#### Acoustic Tagged Fish Tracking: Habitat use in Arrowrock Reservoir

Fourteen of 17 acoustically tagged fish were observed in Arrowrock Reservoir in November. Fish codes 20 and 29 immigrated to the reservoir from the Boise River and fish codes 24 and 29 have re-entered the reservoir from South Fork Boise River. Most fish have been detected near the confluence of Cottonwood Creek at least once in November (fish codes 4, 14, 16, 20, 23, 25, 26, 28, 29, 30). Fish codes 4, 14, 20, 25, 26, 28, and 29 have not left this area since arriving in the reservoir. Some fish have been observed near South Fork Gulch (fish codes 11, 16, 24, 27) and between Deep Creek and

Grouse Creek (codes 11, 22, 23), but not for extended periods of time. To date no fish have been located within 1.5 km of Arrowrock Dam. Fish codes 2 and 3 have not migrated into Arrowrock Reservoir. Fish 21 was last detected on the South Fork hydrophone and is likely in South Fork Boise River.

Five bull trout were located multiple times to monitor fine scale movement and displayed a variety of movement patterns. Fish 11 was located in the same position four times and then moved 565 m to the other side of the reservoir. It is not believed the fish was disturbed because the wind was used to drift the boat over the fish's location with minimal correction from an electric trolling motor. Fish 4 moved through a relatively small area not venturing further than 134 m from where it was initially found traveling a minimum of 712 meters. Fish 22 traveled more than a kilometer from its initial location, crossing the reservoir twice traveling more than 2 km.

Winter conditions are making boat surveys more difficult and hazardous. On 11 November ice was found in Arrowrock Reservoir upstream from Cottonwood Creek. Although the ice was thin, tracking in these areas proved impossible because disturbed ice created too much interference to identify tag codes. In order to reduce the time that field crews are exposed to winter weather, fine scale movement surveys will end after the second week of December. Weekly seasonal movement surveys will continue through the winter as weather permits.

#### Projected work through December

We will continue to ground track and check on fish that have not moved within the reservoir and river sections once per week in the Boise River system. We hope to capture fish 175 and retrieve the archival tag that it has been carrying for over 16 months. We have only seven fish with active radio tags, so we will reduce our aerial surveys to bi-weekly or once every three weeks as movement declines and batteries expire on tags. We will continue our acoustic tag sampling in Arrowrock Reservoir weekly until ice cover restricts access. As part of the weekly boat surveys, we will continue to gather data on the fine scale movement patterns of bull trout in the reservoir through mid-December. We hope to track Lucky Peak reservoir by boat as soon as access is available to investigate potential entrainment of the acoustic tagged fish.

We will be working on completing the field data summaries for the 2004 season and setting up the project planning meetings with our Forest Service cooperators in January. We hope to have the annual reports posted on our website (<http://www.usbr.gov/pn/programs/usrb/index.html>) by February.

#### NEWS FOR NOVEMBER:

Reclamation released its final Biological Assessment for Bureau of Reclamation Operations and Maintenance in the Snake River Basin Above Brownlee Reservoir on November 30<sup>th</sup>, 2004. An electronic version of the assessment is available on Reclamation's website: <http://www.usbr.gov/pn/programs/UpperSnake/index.html> The assessment includes discussions of the operations of Arrowrock, Anderson Ranch, and Deadwood Dams in the Boise and Payette basins and the impacts of those operations on federally protected species.

**End of December Update: Boise/Deadwood Bull Trout Monitoring Projects**  
**Reporting period 12/01/04 through 12/31/04**

There were no confirmed mortalities during this reporting period. Water levels in Arrowrock Reservoir have continued to rise (Figure 1) and Lucky Peak Reservoir has started to refill after the maintenance project.

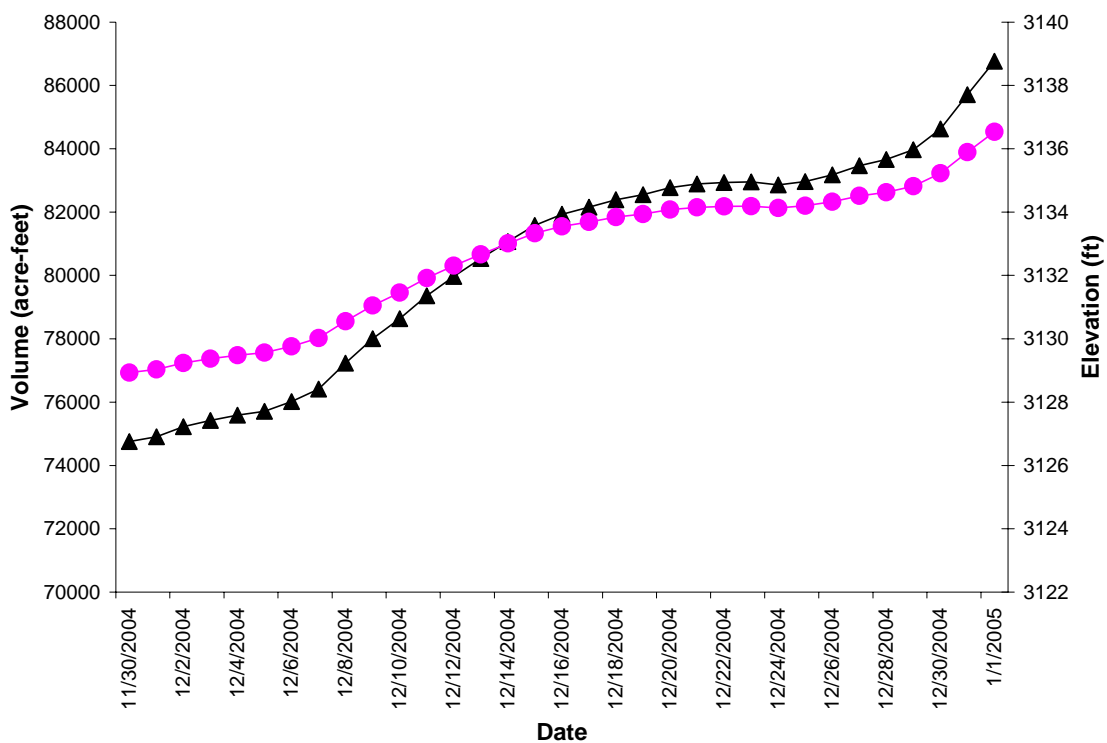


Figure 1. Arrowrock Reservoir storage volume ( ▲ ) and forebay surface elevation ( ● ) during the month of December 2004.

The radio-tagged bull trout in the Middle Fork and North Fork Boise River completed their downstream migration in November, returning to Arrowrock Reservoir and the South Fork Boise River.

### Bull Trout in Lucky Peak Reservoir (entrainment)

No new fish were entrained during this period. Overall, eight fish have become entrained from the 2003 tagged sample (seven large and one small fish: 2-59, 1-44, 1-49, 5-192, 6-148, 5-187, 5-164, 5-178). The entrainment rate for fish tagged in 2003 is 13.2 % for large fish and 14.1 % for all tagged fish. This is an increase from an entrainment rate of 4.2 % for large fish and 4.8% for all fish tagged in 2002 at the same time last year.

Two entrained fish (5-164 and 1-44) were returned to Arrowrock Reservoir during the spring 2004 trap and haul effort. Fish code 1-44 lost its radio transmitter shortly after entrainment but was identified by its PIT tag code during trap and haul. The battery life has expired on two radio transmitters (5-192 and 6-148). Of the remaining tagged fish, 3 are currently missing (2-59, 1-49 and 5-178). We have checked Mores Creek from its mouth to Idaho City but have not found the missing fish. We will continue to try to locate them during tracking.

### Bull Trout with radio tags in Arrowrock Reservoir or South Fork Boise River

We tracked six bull trout with radio tags that appear alive and active in the Arrowrock reservoir basin (including the South Fork Boise River downstream of Anderson Ranch dam) downstream of Willow Creek campground during this reporting period.

#### *Arrowrock Reservoir*

Four fish (codes 1-49, 5-164, 5-189, and 2-3) have been holding in Arrowrock Reservoir near Irish Creek Campground and the Trail Creek confluence. Both radio and acoustic tagged fish have been actively using the Irish Creek, Cottonwood Creek confluence area. Fish code 1-49 entered Arrowrock Reservoir on 30 November from the South Fork Boise River. This fish has remained in Arrowrock throughout December near the mouth of the South Fork Boise River.

#### *South Fork Boise River*

Two radio tags (5-175, 2-71) were tracked in active, live fish in the South Fork Boise River downstream of Anderson Ranch Dam. One fish (code 5-175) still has retained its temperature depth archival tag (> 17 months). We will continue attempts to retrieve this tag from the fish by angling for it in January. Fish code 1-47 was not located in December; however, a faint signal was heard on 28 December near Anderson Ranch Dam where this fish was previously located.

### Radio Tagged Fish in the Middle and North Fork Boise Rivers

Three fish are expected to be post-spawning mortalities (2-5, 5-180, 2-63) as they have ceased movement in the spawning habitats. We have been unable to access the areas to confirm the location and possible cause of mortalities, but expect predation and stress from spawning.

### Acoustic Tagged Fish Tracking: Habitat use in Arrowrock Reservoir

Ten of 17 acoustically tagged fish were observed in Arrowrock Reservoir in December. Most fish moved within localized areas of the reservoir in December. For example, fish codes 4, 16, 20, 23, and 25 were found between Cottonwood Creek and Irish Creek, fish code 27 was found near the confluence of the South Fork Boise River, fish code 22 was found near Deep Creek, and fish 11 was found near South Fork Gulch.



Early in December fish code 30 moved from Deep Creek to South Fork Gulch where it remained through December. Fish code 24 was last located upstream of South Fork Gulch in early December and has likely moved back into South Fork Boise River.

The lack of locations for some fish is likely the result of fish not using Arrowrock Reservoir or ice preventing boat access to areas that bull trout frequent. Fish codes 2 and 3 have not been detected in Arrowrock Reservoir. Fish code 21 was last detected on the South Fork hydrophone in September and is likely in South Fork Boise River. Ice covers Arrowrock Reservoir above Cottonwood Creek and most of the bay between Cottonwood Creek and Irish Creek. Four fish (fish codes 14, 26, 28, 29) have only been located above Cottonwood Creek prior to ice forming in late November. Acoustic signals were detected under the ice near Cottonwood Creek, but most could not be identified due to weak signal strength and/or interference from ice disturbance. Weekly seasonal movement surveys will continue through the winter as weather permits.

Fine scale movement surveys ended on 10 December. From 8 October through 10 December, 11 fine scale movement surveys were conducted. Analysis to determine if there is a relationship between light intensity and movement will begin in January.

#### Projected work through January

We will continue to ground track and check on fish that have not moved within the reservoir and river sections once per week in the Boise River system. We hope to capture fish 5-175 and retrieve the archival tag that it has been carrying for over 17 months. We have only seven fish with active radio tags, so we will reduce our aerial surveys to bi-weekly or once every three weeks as movement declines and batteries expire on tags. Weekly acoustic tag sampling will continue in Arrowrock Reservoir until ice cover restricts access. We hope to track Lucky Peak Reservoir by boat as soon as access is available to investigate potential entrainment of the acoustic tagged fish.

We will be working on completing the field data summaries for the 2004 season and setting up the project planning meetings with our Forest Service cooperators in January. We hope to have the annual reports posted on our website (<http://www.usbr.gov/pn/programs/usrb/index.html>) by February.