

**Monitoring Federally Listed Bull Trout (*Salvelinus confluentus*)
Movements Proximate to Bureau of Reclamation Dams in the
Yakima Basin**

Prepared by:

**Michael Mizell
&
Eric Anderson**

**Washington Department of Fish and Wildlife
1701 South 24th Avenue
Yakima, Washington
98902**

Submitted to:

U.S. Bureau of Reclamation

November 2008

Acknowledgements

This project could not have been completed without the assistance of several agencies and individuals. Thanks to Eric Best and Walt Larrick with the U.S. Bureau of Reclamation (Reclamation) for securing funds for this project. Additional thanks to Eric Best for helping to set up fixed radio receiver stations, assisting with bull trout capture and for procuring radio-tags. We are also thankful to Bill Darrah with Reclamation for providing snow cat transportation to remote receiver sites. Thanks to Judy DeLaVergne with the U.S. Fish & Wildlife Service (USFWS) for technical advice and for providing information for downloading data from the archival tags. Thanks to Denise Hawkins, Maureen Small and Jennifer Von Barga (WDFW) for continuing work on the Yakima Basin bull trout genetics analysis. Thanks to Eric Bertrand (WDFW habitat biologist) for the use of his motorized canoe to track tagged bull trout in Bumping Lake and for assisting with the capture of archival-tagged bull trout. A special thanks to Mike Nelson (WDFW Fisheries Technician) and Jim Cummins (WDFW Special Projects Biologist) for assisting with many aspects of the study including fish capture, surgical transmitter implants, radio tracking and data recording. We appreciate the review and comments on this report provided by John Easterbrooks (WDFW), Eric Best and Scott Willey (Reclamation).

ABSTRACT

It is well known that bull trout (*Salvelinus confluentus*) in western river basins have been negatively impacted by the obstruction of free-flowing rivers and by altered hydrology. The effects include loss of habitat, population fragmentation and genetic isolation. The subsequent decline in bull trout abundance due to these and other factors prompted the U.S. Fish & Wildlife Service (USFWS) to list bull trout as a threatened species in 1998 under the Endangered Species Act (ESA) (USFWS 1998). In the Yakima basin, the Washington Department of Fish & Wildlife (WDFW) has been monitoring bull trout populations since the mid 1980's. The primary focus has been to identify spawning areas and to monitor abundance through annual redd count surveys. In the last several years there has been increased use of radio telemetry techniques to determine movement patterns (migration timing), wintering areas and habitat preferences of bull trout populations. Although this technique has been used for monitoring fluvial bull trout in the Yakima Basin, (Mizell et al. 2008) less was known about adfluvial bull trout movement patterns in the basin reservoirs. The primary purpose of this study was to use radio-telemetry as a tool to obtain information on adfluvial bull trout movements proximate to U.S. Bureau of Reclamation (Reclamation) dams and to determine effects of these structures and operations on bull trout populations. We also collected tissues from bull trout captured on this project to determine the genetic relationships between fluvial and adfluvial fish in the Yakima basin. Additional funds were recently secured thru the USFWS to complete the genetic analysis and to compare the results with samples collected from other populations in the Yakima basin (see Hawkins and Von Bargen 2006). A final genetics report is expected in March 2009. Together, the radio telemetry and genetics information may be useful to Reclamation managers for making decisions about altering their structures and operations to reduce negative impacts on bull trout.

During this study, five adult bull trout were captured and radio-tagged in the N.F. Tieton River between Clear Lake and Rimrock Reservoir, seventeen were captured and tagged in Deep Creek (tributary to Bumping Reservoir) and twelve adult bull trout were captured and tagged from the large pool in the Tieton River below the Tieton (Rimrock Reservoir) dam during a fish salvage operation prior to the installation of hydropower turbines at the dam. All thirty-seven of the salvaged bull trout, including the twelve radio-tagged fish, were transported approximately 22 river miles downstream and released into the large pool below the Wapatox Irrigation Diversion Dam on the main stem Naches River. Of the 17 radio-tagged fish in Deep Creek (Bumping Reservoir system), seven were tagged with archival tags to automatically record depth and temperature. All radio and archival tags were surgically implanted in the body cavity of the fish. We believe that surgical implantation of the Lotek archival (temperature/depth) tags had not been attempted before. Previous studies anchored the tags on the dorsal surface of the fish, but most tags were lost with this external attachment (Kelly Ringel & DeLaVergne 2005). Four of our seven archival-tagged fish also shed their tags and/or died due to predation or complications inherent to surgical implantation of the tags before migrating out of Deep Creek, but three survived and were radio-tracked back to the reservoir. The archival tags of two of these fish were retrieved on the spawning grounds a year later when they returned to spawn. Weekly radio tracks of all tagged fish were conducted using both fixed station and mobile Lotek receiver-antennae tracking units.

None of the radio-tagged bull trout moved out of Bumping Reservoir past the dam either thru the outlet works (sluiceway) or the overflow (spillway) channel. None of the large Yakima basin reservoir dams are conducive to safe and efficient fish passage downstream and none have fish ladders for upstream fish passage. In Bumping Reservoir, tagged fish usually stayed in the upper

(deep) section of the lake during the winter, but became much more active in the spring and summer, occasionally coming in close proximity to the dam. As expected, we detected fish moving towards Deep Creek prior to the spawning period and we tracked fish back up into the spawning area a full year after they were tagged.

Similarly, none of the five radio tagged bull trout in the N. Fork Tieton moved up past the fish ladder at Clear Lake Dam (upstream of Rimrock Reservoir). Instead, within a few months of tagging, these fish moved downstream to Rimrock Reservoir where they over wintered. Some did come in close proximity to the outlet structure at Tieton Dam, but none of our adfluvial tagged fish were tracked below it. However, we did lose the signal for one fish near the dam. It is unknown what became of this fish/tag. The other four-tagged fish moved to the upper end of the reservoir (near the N.F. Tieton River) in May-June. One of these fish moved to the base of Clear Lake Dam by late June and another was tracked to the spawning grounds in Indian Creek (tributary to N. Fork) in September; a little over one year after being tagged in the N. Fork. Indian Creek is one of two major spawning areas for bull trout inhabiting Rimrock Reservoir, the other being the S. Fork Tieton River. We did not track any tagged bull trout into the S. Fork, which lies near the opposite end of the lake from the N. Fork. Later in the fall, the remaining tagged fish moved back to the mid section of Rimrock Reservoir where they over wintered.

Radio tagged bull trout that were salvaged from the Tieton River below Tieton Dam (Rimrock Reservoir) were trucked downstream and released into the Naches River below the confluence of the Tieton River. Only one of these fish ventured back up into the Tieton River, but eventually it moved back to the Naches River where it, along with others migrated upstream to spawning areas in the American River and Rattlesnake Creek. Essentially, these transplanted fish integrated themselves with existing fluvial populations in the Naches River. However, it appears that unless these fish are transported out of the area and placed with other bull trout populations they do not make the journey on their own. During an earlier bull trout tagging operation (Mizell et al. 2008) bull trout were tagged and immediately released below the dam. These fish did not leave the area, but instead they stayed in or near the large pool below Tieton Dam.

Table of Contents

Acknowledgements.....	2
ABSTRACT.....	3
Table of Contents.....	5
List of Figures.....	6
List of Tables.....	6
INTRODUCTION.....	7
Study Purpose and Objectives.....	7
Project Goal.....	7
General Objectives.....	7
Specific Objectives.....	8
STUDY AREA.....	8
METHODS.....	10
Fish Capture.....	10
Radio Tag Implants – Materials & Surgical Procedure.....	10
Archival Tags.....	15
Radio-Tracking.....	17
RESULTS.....	20
Radio-Tagged Fish.....	20
Fish Movement Patterns.....	20
North Fork Tieton River Group.....	20
Tieton River Group below Rimrock Reservoir.....	22
Deep Creek Population – (Bumping Reservoir).....	28
Archival Tags -- Depth & Temperature Preferences.....	32
Genetic Relationships.....	35
DISCUSSION.....	35
Fish Movement Patterns.....	35
Deep Creek Population – (Bumping Reservoir).....	35
Tieton River Group below Rimrock Reservoir.....	37
North Fork Tieton River Group.....	39
Additional Observations and Recommendations.....	41
REFERENCES.....	43
Appendices - attached	
Appendix 1. Summary of radio tagged bull trout.	
Appendix 2. Daily radio tracking data of tagged bull trout.	
Appendix 3. Summary of bull trout redd counts, 1984-2007.	

List of Figures

Figure 1. Naches drainage showing known bull trout distribution and spawning areas. Also shown, is the smaller Ahtanum drainage, which enters the Yakima River a few miles below the Naches.....	9
Figure 2. Picket and panel weir trap used to capture post-spawned bull trout at Deep Creek (Bumping Lake).....	11
Figure 3. Four sizes of radio tags used in bull trout surgical implants. Also shown is the steel catheter needle and copper “stinger” used in guiding the antenna lead through the fish’s body cavity (quarter for size comparison).....	13
Figure 4. Portable surgical kit for implanting radio tags in captured bull trout.....	14
Figure 5. Bull trout radio-tag implant surgery. “Stinger” in use for facilitating catheter insertion and radio tag antennae through the body cavity. Fish is on the surgical “V” trough and anesthesia is being applied to the gill area.....	15
Figure 6. Radio-tagged bull trout showing sutured incision and external antenna.....	16
Figure 7. Archival temperature tag, which was inserted into the fish’s body cavity (quarter for size comparison) (photo courtesy of Judy DeLaVergne).....	16
Figure 8. Mobil radio tracking along the Bumping River with truck mounted three-element yagi antenna.....	18
Figure 9. Snow cat for transporting personnel and equipment to remote sites for radio tracking.....	18
Figure 10. Flight tracking crew with Super Cub.....	19
Figure 11. Radio tracking data being downloading from the fixed station site at Tieton/Naches. A solar panel mounted in a tree at the same station.....	19
Figure 12. One of twelve bull trout being radio-tagged during the Tieton pool fish salvage.....	23
Figure 13. Tag antenna abrasion on fish #22, from Tieton Pool.....	24
Figure 14. Fish #21 at the pool below Tieton Dam, 1.75 pounds, 10/3/2003.....	25
Figure 15. Fish #21 recaptured 2 years later (11/14/2005) at the pool below Tieton Dam, 6.1 pounds.....	25
Figure 16. A pair of adult spawning bull trout on a redd in Deep Creek (Bumping Reservoir). The male fish in the foreground has a radio tag antennae protruding from its body near the anal fin. This fish migrated to the spawning grounds three years, 2005-2007 (September 2007 photo courtesy of Jim Cummins).....	29
Figure 17. One year of temperature and depth data retrieved from an archival tag implanted into Fish 109 (Bumping Reservoir).....	33
Figure 18. One year of temperature and depth data retrieved from an archival tag implanted into Fish 98 (Bumping Reservoir).....	34

List of Tables

Table 1. Lotek radio-tag specifications used in the study.....	11
--	----

INTRODUCTION

Uncertainty regarding the distribution, migratory patterns, and habitat preferences of some populations of adult and sub-adult federally, ESA-listed bull trout (*Salvelinus confluentus*) in the Yakima basin constrains effective management for this species on many levels. The presence of federally listed bull trout at United States Bureau of Reclamation (Reclamation) dams in the basin requires increased monitoring to determine if a change in Reclamations' operations and/or facilities would be beneficial to the species. In order to increase knowledge of "fluvial" (river-dwelling) and "resident" (small stream-dwelling) bull trout populations, a fluvial bull trout radio telemetry study was initiated by the Washington State Department of Fish and Wildlife (WDFW) in the fall of 2003 with funding provided by the United States Fish and Wildlife Service (USFWS). During this earlier study, a few bull trout were tagged in the Tieton River below Rimrock Reservoir (Tieton Dam), in the Bumping River below the Bumping Reservoir Dam, and in the Naches River (Mizell et al. 2008). Subsequent radio tracking and genetics analysis indicated the need to expand the project study to include movement patterns of bull trout above the dams and to collect tissue samples for DNA analysis from "adfluvial" (lake-dwelling) bull trout to compare with the downstream fluvial/resident forms. The fact that bull trout in western river basins have been negatively impacted by the obstruction of free-flowing rivers and altered hydrology, along with loss of habitat, decline in abundance, and population fragmentation spurred the need for additional information. This is especially true in the Yakima basin where Reclamation irrigation storage dams completely block upstream fish passage. This study is designed to increase our knowledge of bull trout movement patterns in close proximity to Reclamation dams, collect tissue samples for DNA analysis, and to collect information on spawning and wintering habitats.

In the spring of 2005 an informal agreement was reached between the WDFW and Reclamation biologists to capture and radio-tag adfluvial bull trout from the Rimrock Lake and Bumping Lake populations and from the discharge pool below Tieton Dam (Rimrock Reservoir). Since WDFW was already contracted to carry out the USFWS funded radio telemetry project for fluvial fish and had the equipment and expertise in place, we proceeded with obtaining the necessary federal permits to tag additional bull trout. It was agreed that Reclamation would provide funding for this effort. Although a contract between WDFW and Reclamation for this additional work was not signed until May 2006, we agreed to begin work during the late summer of 2005 to take advantage of the opportunity to capture and radio-tag bull trout that were migrating into their spawning areas.

Study Purpose and Objectives

Project Goal

Use radio-telemetry as a tool to obtain information on how Reclamation project structures and operations may effect fluvial and adfluvial bull trout populations in the Yakima River basin.

General Objectives

- Observe Reclamation project effects, if any, on fluvial and adfluvial bull trout.

- Document bull trout migration patterns/habits proximate to Reclamation facilities (passage effects).
- Evaluate habitat changes caused by Reclamation facility operation and the resulting effects on bull trout movement/habits (altered hydrology and/or thermal regime)
- Document bull trout habits when displaced (entrained) from an adfluvial (reservoir) to a fluvial (downstream river) environment.
- Determine if Reclamation structures are segregating bull trout populations (genetic relationships).

Specific Objectives

Capture, tag and monitor the movement of five (5) bull trout in the N.F. Tieton River below Clear Lake Dam and overflow spillway/fish ladder. Correlate movements with habitat parameters such as Clear Lake and Rimrock Reservoir volume, inflow, outflow and water temperature.

Capture and tag seventeen (17) post-spawn bull trout in Deep Creek and monitor them after they return to Bumping Lake Reservoir. Seven (7) fish will be tagged with both a radio-tag and an archival tag to record water temperature and depth. Correlate movements with habitat parameters such as reservoir volume, inflow/outflow and water temperature. Recapture surviving tagged fish returning to spawn in Deep Creek in fall, 2006 and retrieve archival tags.

Tag and monitor up to twelve (12) bull trout from the Tieton Dam (Rimrock Reservoir) discharge pool captured during dewatering and fish recovery associated with the construction of the Tieton Hydroelectric Project in November 2005. These fish will be trucked downstream and released in the Naches River below the mouth of the Tieton River (below Wapatox Diversion Dam) and subsequently tracked.

Determine if Reclamation structures have resulted in genetic divergence of segregated (reproductively-isolated) bull trout populations by comparing genetic profiles for adfluvial and downstream fluvial stocks.

STUDY AREA

This study was primarily focused in the Naches River drainage in the area of Bumping Reservoir, Rimrock Reservoir\Tieton Dam and the Naches and Tieton rivers. Figure 1 shows the known bull trout distribution and spawning areas in the drainage. The smaller Ahtanum drainage is also shown which enters the Yakima River a few miles below the confluence of the Naches River.

The Naches River is the largest of the Yakima River basin tributaries and extends approximately 45 miles northwest from the city of Yakima, Washington where it flows into the Yakima River. Major tributaries of the Naches River include the American River, Little Naches River, Bumping River, Rattlesnake Creek and the Tieton River. There are two major irrigation storage reservoirs in the headwater areas of the Naches drainage, Bumping and Rimrock Reservoirs. Bumping

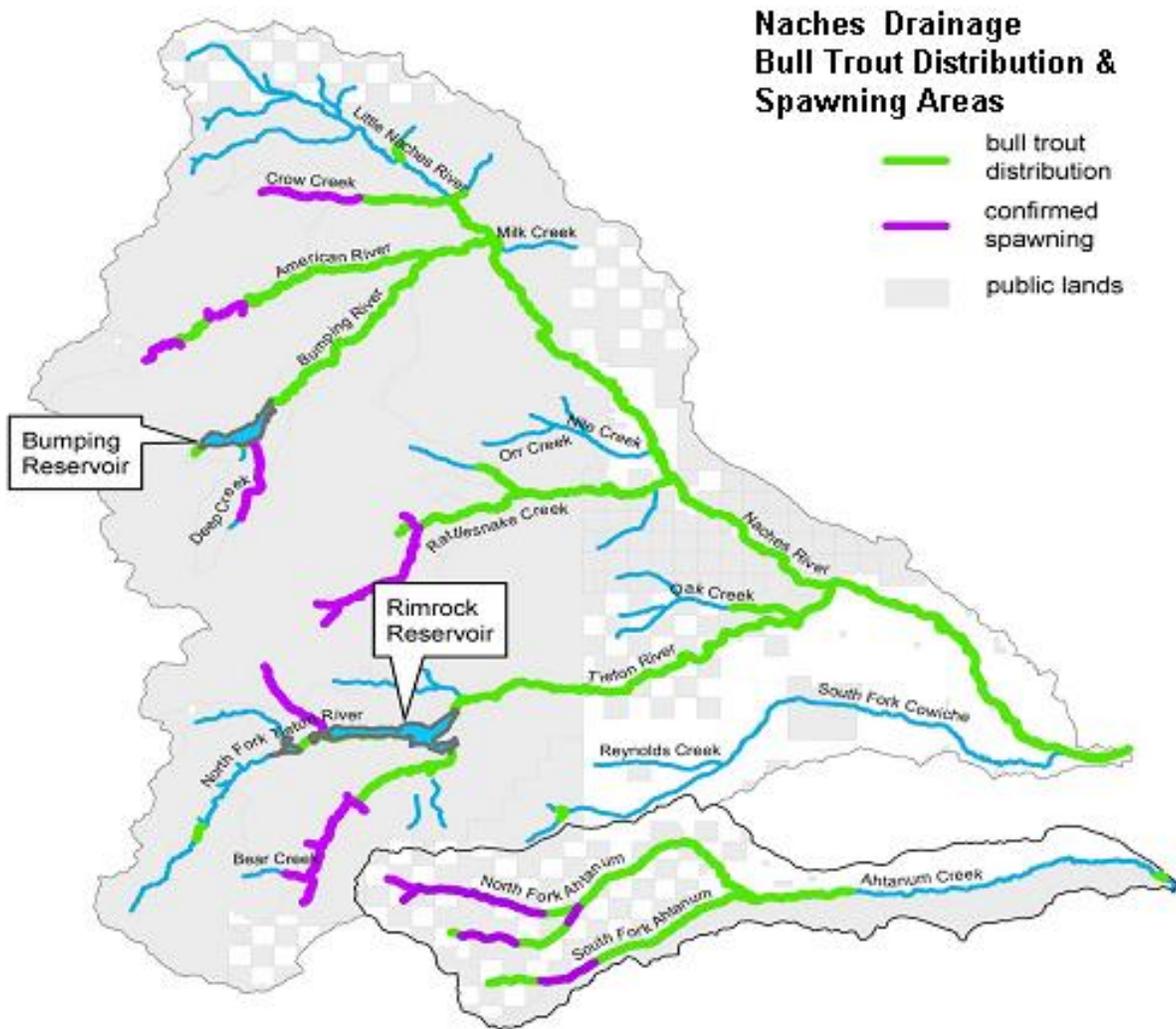


Figure 1. Naches drainage showing known bull trout distribution and spawning areas. Also shown, is the smaller Ahtanum drainage, which enters the Yakima River a few miles below the Naches.

Lake Dam was built in 1909-1910 and has a reservoir capacity of 33,970 acre-feet when full at elevation 3,426 feet (above mean sea level). The drainage area for this reservoir is 68.0 square miles. The reservoir covers an old natural lakebed. Tieton Dam (Rimrock Reservoir) was built in 1917-1925 and has a reservoir capacity of 198,000 acre-feet when full at elevation 2,926 feet. The drainage area for this reservoir is 187.0 square miles. Unlike Bumping Reservoir, there was no lake at Rimrock until Tieton Dam was constructed. Neither dam has fish passage facilities. Both are operated as irrigation storage facilities and hydroelectric turbines were recently installed in the outlet works of Tieton Dam.

METHODS

Fish Capture

Bull trout were captured for radio tagging with sport fishing gear (hook and line) and with traps. We hook and line captured bull trout from the N.F. Tieton River (tributary of Rimrock Reservoir) because the fish were already at the target site and were holding in pools below Clear Lake Dam. We captured five fish in the N. Fork; four in the large pool immediately below the dam and one in the main stem between Clear Lake and Rimrock Reservoir. All were caught on Blue Fox Vibrax® spinners, sizes 3 through 5, and Rapala minnow plugs. Single barbless hooks were used to reduce injury. Fish were quickly landed into a knotless net to minimize de-scaling and were kept in the water as much as possible during de-hooking and transferred to 10” diameter perforated PVC holding tubes. The tubes and fish were then placed in the river for a short time prior to surgery.

Weir traps were used to intercept post-spawned bull trout in Deep Creek (tributary of Bumping Lake). We used a modified “N” style pipe weir that allowed fish to move freely upstream, but would be intercepted when they moved downstream (Figure 2). Several fish were caught multiple times as they moved up and down the area looking for a spawning site, some of which were less than 50 feet above the weir. The pipe weir frame consisted of two steel tripods that supported two lengths of angle iron attached horizontally, one above the other. The angle iron supports were drilled with 1” diameter holes on 1.5” centers to accept vertical pipes (pickets) with 0.5” clear spacing. One-inch O.D. pipes were installed vertically in the weir frame to block fish passage. A set of steel mesh panels was used on one side to help direct upstream migrants around the weir. Downstream migrants were directed into a large PVC tube, which ended in a capture box. Captured fish were inspected to see if they had spawned and to assess their overall condition. Those fish deemed acceptable for radio tagging were held in a large live box until surgery. Surgery usually occurred within 12 hours of capture.

In mid-November 2005 we took advantage of a fish salvage effort at the base of Tieton Dam (Rimrock Reservoir) on the Tieton River. Mountain States Construction Company facilitated the drawdown and dewatering of the pool below the dam to install hydroelectric turbines in the dam outlet conduits. A total of 37 bull trout were captured (seined, netted or electrofished) from the pool (Ackerman, 2005) and we radio-tagged twelve of these. All 37-bull trout were transported and released into a large pool below an irrigation diversion dam (Wapatox Diversion) in the Naches River, approximately 22 river miles downstream.

Tissue samples for DNA analysis were taken from all captured bull trout. Samples were placed in vials of 100% ethanol for preservation. These samples will be combined with others in the basin and genetics work will be conducted at a later date pending funding.

Radio Tag Implants – Materials & Surgical Procedure

Radio-tags for this study were obtained from Lotek Engineering. Specifications are listed in Table 1. Initially, three sizes of tags were purchased; the MCFT-3A which had an air weight of 16grams and a minimum life of 685 days at a five second burst rate, the MCFT-3FM with an air weight of 10grams and a life of 504 days at a five second burst rate, and the MCFT-3EM with an air weight of 8.9 grams and a life of 444 days at a burst rate of eight seconds. The burst rate



Figure 2. Picket and panel weir trap used to capture post-spawned bull trout at Deep Creek (Bumping Lake).

Table 1. Lotek radio-tag specifications used in the study.

TAG	WEIGHT	DIMENSIONS	LIFE	BURST RATE
MCFT-3A	16 grams	16 x 59 mm	685 days	5 seconds
MCFT-3FM	10 grams	11 x 59 mm	504 days	5 seconds
MCFT-3FM	10 grams	11 x 59 mm	567 days	6 seconds
MCFT-3FM	10 grams	11 x 59 mm	579 days	7 seconds
MCFT-3EM	8.9 grams	11 x 49 mm	444 days	8 seconds
NTC-6-2	4.5 grams	9.1 x 30 mm	268 days	8 seconds

refers to the interval (time in seconds) between signals emitted by the tag. For a given tag size, increasing the burst rate increases the battery life of the tag. As the study progressed, smaller tags were needed and tags with different burst rates, so the USBR purchased a set of MCFT-3FM tags with a six second burst rate (life of 567 days), MCFT-3FM tags with a seven second burst rate (life of 579 days), and nine “nano” tags (NTC-6-2) that weighed 4.5 grams in air with an eight second burst rate (life of 268 days). The nano tags were necessary for smaller bull trout encountered in the study. Different burst rates also allowed us to stagger the coding sequence and facilitate quicker acquisition of individual codes when multiple tagged fish were encountered in close proximity to each other (e.g., many fish in one pool). For all tag and fish sizes the “two percent rule” was followed, by which radio-tag weight was kept below 2% of the total body weight of the fish to avoid affecting the fish’s metabolic functions and swimming ability (Wigglesworth, per. com). Figure 3 shows the four sizes of tags used in the surgical implants.

A portable surgical unit was used for radio tag implantation (Figure 4). The unit fit in a backpack and consisted of a tray with surgical tools, a V-shaped fish surgery trough made from very smooth (slick) ABS plastic to prevent abrasions to the fishes skin. The trough was mounted on top of a three gallon bucket, which served as both a stand for the surgical trough and a mixing container for the “knockout”(K.O.) and anesthetic (A) solutions. After mixing, the K.O. solution was transferred to a collapsible K.O. container (tub) constructed from a whitewater raft center float tube.

We carried a pre-mixed stock solution of MS-222 (10g tricane methane sulfonate / 100ml of water) for mixing the K.O. and anesthetic solutions. A 12 ml dose of the “10/100 stock” was mixed with 15 liters of water to make the K.O. solution. Likewise, 3 ml of the “10/100 stock” was mixed with 7.5 liters of water to make the anesthetic solution for use during the surgery. The knockout and anesthetic solutions were then added to the K.O. tub and the anesthesia bucket prior to surgeries. New solutions were made after performing 2-3 fish surgeries. Both solutions were buffered with sodium bicarbonate (baking soda) at 10g baking soda /100ml water mix to match the acidity of the stream. Additional containers and trays for holding the “salt” (antiseptic) and “Nolvason” (surgical scrub) solutions were carried. Nolvason was used to clean hands and tools prior and during the surgical procedure (30mlNolvason/L distilled water). A tablespoon of salt was also mixed in a shallow surgical tray to keep the surgical tools clean. The tools were first put into the “Nolvason” tray to clean and sterilize them, and then moved to the saltwater tray just before the surgical procedure. The salt water was used to clean the Nolvason solution off the tools so that it was not carried into the body cavity of the fish where it could be harmful.

Fish to be implanted with radio tags were kept in a flow-through fish tube made from white 10” PVC pipe with one-inch holes drilled through the side to allow water flow in and out of the device. The holes in the tube were trimmed inside and out so that no sharp edges were present. The ends of the holding tubes had threaded caps to secure the fish and make sure that none were lost prior to tagging. A rope was threaded through both ends of the tube so that it could be tethered from the riverbank.

Only fish that appeared to be in good health and condition were radio-tagged. Initially, fish were immersed in the K.O. solution (80 mg/L solution of buffered MS-222) until anesthetized (about 12 minutes). It was then measured (fork and total length) and weighed. The fish was weighed in a knotless bag with an electronic scale. Approximately one square centimeter of fin tissue was then taken and placed in an individually marked vial of 100% ethanol for future DNA analysis.



Figure 3. Four sizes of radio tags used in bull trout surgical implants. Also shown is the steel catheter needle and copper “stinger” used in guiding the antenna lead through the fish’s body cavity (quarter for size comparison).

The fish was considered completely anesthetized after it made several rapid gulps followed by a much shallower rhythmic opercula movement. Time limits (approximately 10-12 minutes) for each individual fish would vary depending on fish size, water and air temperature, and water condition. The fish was then removed from the knockout solution and placed on its back on the surgical “V” trough. The anesthetic was then administered to the fish’s gills via a plastic syringe (turkey baster). Both opercula were opened and wetted to maintain gill integrity (wetness). The incision area was disinfected with gelled betadine iodine and then wiped clean and dry with Q-tips. Using a curved #12 stainless steel scalpel, a 2-4 cm incision (depending on fish and tag size) was made on the mid-line of the ventral surface, anterior of the ventral fins (pelvic girdle) and approximately $\frac{1}{4}$ - $\frac{1}{2}$ of the distance between the ventral fins and the pectoral fins. The skin was pinched gently between the surgeon’s thumb and forefinger and scored with the blade. Several cutting passes were then made until the abdominal wall was breached. Once the outer skin and scales were cut, 1x2 tooth tissue forceps were used to pull the skin up and away from the internal organs to minimize risk of organ puncture and ensuing peritonitis. The incision was made slightly larger than the tag to allow it to pass through the abdominal wall without tearing, yet leave a small opening for closure. The fish was visually assessed through this incision to determine its sex.



Figure 4. Portable surgical kit for implanting radio tags in captured bull trout.

In earlier surgeries, the surgeon's finger was inserted into the incision to guide the hollow catheter needle for the radio tag/antenna insertion, but this was too invasive and had greater potential for puncturing internal organs, so we used a small copper tube we dubbed "the stinger" instead of our fingers. "The stinger" was slightly curved to match the curved catheter needle that was inserted into it for threading the radio transmitter antenna through the abdominal wall of the fish. The copper "stinger" was beveled on one end and smoothed so there were no sharp edges (see Figure 3). After the incision was made, the copper stinger was inserted into the incision towards the rear flank of the fish following the inside surface of the abdominal wall in the same way as the surgeon's finger was used in previous surgeries (Figure 5). The catheter was then inserted into the tube and pushed through the body wall of the fish from the inside out, adjacent to the pelvic girdle and midway between the ventral surface and the lateral line. The copper tube was then removed from the surgical incision, and the antenna and catheter needle pulled through the outside of the fish. The "stinger" was originally necessary due to the small size of some resident fish that were radio-tagged in the Ahtanum drainage (10-15 inches) (Mizell et al. 2008). The process worked so well that it has been used in all subsequent surgeries, for large and small fish. This new procedural modification allowed for smaller incisions, speeded up recoveries and allowed the radio tag body to be placed further back inside the fish's body away from the incision site, which also helped to combat the tag-shedding problem.



Figure 5. Bull trout radio-tag implant surgery. “Stinger” in use for facilitating catheter insertion and radio tag antennae through the body cavity. Fish is on the surgical “V” trough and anesthesia is being applied to the gill area.

Two to four independent sutures were placed evenly along the incision (Figure 6). Suture knots were done with a 3-2-2 wrap. An FS-1 3/8 24mm surgical needle was used for suturing. Tools and suture material were continually rinsed in saline solution. After trimming the knots of excess suture material and drying the area with Q-tips, “vet bond” surgical glue was applied to the suture site and dried by blowing on it. During this later step the anesthesiologist switched to fresh water to begin reviving the fish. The fish and surgical trough was then removed from the bucket (stand) and placed in the river for a minute or two while the sutures were kept just out of the water, allowing the fish to recover while the Vet Bond could finish drying. The fish was then transferred to the recovery/holding tube where it could fully recover for another 20 minutes or more before being released into a nearby pool in the stream.

Archival Tags

We also surgically implanted Lotek archival tags into the body cavities of bull trout captured from Deep Creek. The tags could record depth and temperature every hour for up to several years. They were approximately one inch by one-half inch by one-quarter inch thick and had holes at both ends for external attachment (Figure 7). Since other studies had not had much success with keeping the tags externally anchored to the fish (DeLaVergne, per. com.), we



Figure 6. Radio-tagged bull trout showing sutured incision and external antenna.



Figure 7. Archival temperature tag, which was inserted into the fish's body cavity (quarter for size comparison) (photo courtesy of Judy DeLaVergne).

decided to surgically implant the archival tag inside the fish's body cavity with the radio tag. The archival tag was simply attached by sliding it onto the radio tag antenna (thru the holes) and then binding it together. Our plan was to recapture the fish a year later, when (if) it returned to spawn and then surgically remove the tag to download the data. We believe that this may be the first time such a procedure has been done on a bull trout.

Radio-Tracking

Tagged fish were radio tracked by fixed station and mobile receiver/antennae units. Mobile tracking was primarily conducted weekly along target streams or lakes by using a truck-mounted and backpack receiver unit (Figure 8). This was occasionally supplemented with aerial (fixed-wing aircraft) tracks especially during periods of widespread fish distribution and/or intense migration periods. We also used a motorized canoe on lakes and a snow cat during the winter when access in remote areas was difficult or impossible with a four-wheel drive truck (Figure 9). Air tracking was accomplished with two different fixed wing aircraft, a Maule M7 at an air speed of 80-100mph, or a Super Cub PA18 (Figure 10) at 80mph. Both aircraft had tracking antennas ("H" style) mounted under the wings at a 20-degree angle. During our surveys the right side "H" antenna was used exclusively, allowing the tracker to see the physical area in conjunction to the GPS coordinates. Tracking flights originated out of the Yakima Airport. Prior to all mobile tracking (and fixed station data downloads) the receiver unit batteries were charged and the unit checked against a test "dummy" transmitter to make sure equipment was functioning properly.

Five Lotek SRX receivers were strategically placed at various fixed station monitoring sites in the study area. Fixed stations were located at Clear Lake Dam, Bumping Lake Dam, mouth of the Tieton River (confluence with Naches River), mouth of Rattlesnake Creek (confluence with Naches River) and at the mouth (junction) of the Bumping and Little Naches Rivers. Receiver units were provided by the USFW, the USBR and the WDFW. Two types of units were used, the W-7 and the W-31. The main difference between the two was that the W-31 could use different gain levels for different channels, which was especially useful at multi-antenna fixed station sites. Both receiver styles were multi-port, DSP compatible, and capable of monitoring a 4-MHz bandwidth with a programmable range of 148-152 MHz. The units were programmed to monitor tags at various burst rates used in the study (i.e., burst rates varied between 5-8 seconds). The Lotek units at the fixed stations were powered by either 120 volt AC sources backed up by large deep cycle DC marine battery - converter systems (Clear and Bumping Lake sites) to ensure continuous operation, or twin 60 watt series wired Toshiba solar panels, attached to a one way solar gauge/charger/converter with battery backup (Tieton, Rattlesnake and Little Naches sites). Data was downloaded from fixed station receiver units directly onto a battery operated laptop computer (Figure 11). Three-element yagi antennas were used, either foldable for mobile operation (e.g., back-pack) or rigid pole mounted antennas on trees and buildings at fixed station sites. Two to three antennas were often mounted at the sites and oriented in such a way as to monitor fish movement up or downstream or above or below the dams. We also used a rigid pole mounted yagi antennae on a 4-wheel drive truck (see Figure 8) for monitoring fish movement between fixed stations. Locations of tagged fish during mobile tracks were noted with a GPS and then converted to a river mile location or were noted by lake section (e.g., near a certain bay, dam or stream, etc.).



Figure 8. Mobil radio tracking along the Bumping River with truck mounted three-element yagi antenna.



Figure 9. Snow cat for transporting personnel and equipment to remote sites for radio tracking.



Figure 10. Flight tracking crew with Super Cub.

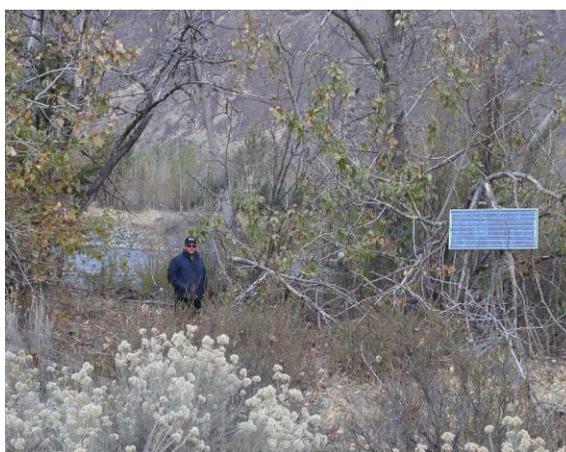


Figure 11. Radio tracking data being downloading from the fixed station site at Tieton/Naches. A solar panel mounted in a tree at the same station.

We also took advantage of other fixed stations in the Yakima basin that was being used in steelhead and salmon radio tracking projects conducted by the Yakama Indian Nation and Reclamation. These stations were located in the lower Naches River (Cowiche Irrigation Diversion Dam) and in the Yakima River. Our transmitter tag frequencies were given to research personnel that monitored these sites to give us additional coverage.

RESULTS

Radio-Tagged Fish

A total of 34 adfluvial bull trout were radio-tagged under the USBR funded project from July thru November 2005 at three capture locations in the Naches drainage (see Appendix 1, Fish Tagging Summary). Fish movement patterns were intensively monitored thru May 2007 (see Appendix 2, Daily Radio Tracking Data). Five bull trout were tagged from the N.F. Tieton River below Clear Lake Dam, 17 were tagged from Deep Creek (Bumping Reservoir) and 12 were tagged from the Tieton River below Rimrock Reservoir (Tieton Dam). The total length (TL) of the five fish (four males, one female) tagged from the N.F. Tieton River ranged from 375 mm to 440 mm (mean TL = 400 mm) and their weight ranged from .8 lbs to 1.6 lbs (mean = 1.2 lbs). The total length (TL) of the 17 fish (nine males, eight females) tagged from Deep Creek ranged from 400 mm to 595 mm (mean TL = 491mm) and their weight ranged from 1.15 lbs to 3.75 lbs (mean = 2.17 lbs). The total length (TL) of the 12 fish (three males, nine females) tagged from the Tieton River below Tieton Dam ranged from 400 mm to 570 mm (mean TL = 477 mm) and their weight ranged from 1.6 lbs to 4.3 lbs (mean = 2.48 lbs).

Fish Movement Patterns

North Fork Tieton River Group

On July 26-27, 2005 five bull trout were captured by hook-and-line from the N.F. Tieton River below Clear Lake Dam. The fish were tagged and released back into the river in excellent condition. Four males and one female were radio tagged (**fish # 85, 86, 87, 90 & 91**). Four of the tagged fish held in the river below the dam through October and then moved down into the upper end of Rimrock reservoir in November. Fish 91 moved into the lake earlier, in mid-September. They all spent the winter of 2005-06 in the mid-lake area near Snug Harbor and the Cove Resort and all were tracked to within a few hundred meters of the outlet tunnel intake structure at Tieton Dam. Tagged fish became more active in the spring, as their fluvial and adfluvial counterparts do in other areas of the basin. By late May to early June 2006, all of the tagged fish had moved back to the upper end of Rimrock Reservoir near the mouth of the N.F. Tieton River. Beginning with initiation of this spring movement pattern in 2006, the individual tracking record for each fish is summarized below.

Fish 85 was tracked to the upper portion of the lake below the confluence of the N.F. Tieton River near Indian Creek Camp Ground by mid May 2006. It stayed in this area until late summer, eventually dropping down a bit as the lake level receded (i.e., irrigation water releases). It was “coded” (i.e. located) in the upper lake area near Silver Beach Resort on Sept. 27. By

October 2 it was coded in the lake near the public boat launch adjacent to Hwy 12, approximately one mile below its summer holding area in the upper lake. On October 10, Fish 85 was back in the upper end of the lake near Snug Harbor and then moved down lake to the first heritage marker above the dam (i.e., near river mile 21.4) on October 18. The fish then moved back upstream to the upper end of the lake on October 24 and remained there until mid-November. On November 5 and 15 this fish was tracked slightly east of Snug Harbor. It was then tracked further down-lake on November 22, back to the area of the first heritage marker above the dam. This movement to the deeper water near the dam may have been to avoid increasing turbidity at the upper end of the lake. High water events created by rain and subsequent snow melt on the exposed lakebed created very turbid, muddy conditions in the lake during this period of time. It appears that fish were moving to avoid this. By November 29, Fish 85 was tracked to an area just below the Cove Resort. It was later tracked below Snug Harbor on December 5 and 20. The reservoir was totally ice covered in December. On December 26 it was tracked down to the first heritage marker above the dam. Fish 85, was coded on January 25, 30 and February 12 holding in the vicinity of the Cove Resort and Snug Harbor (over winter area). Tag expiration occurred in January 2007.

Fish 86 had moved to the upper section of Rimrock Lake in the Indian Creek and Silver Beach Resort area by late May 2006. Throughout most of July to early September 2006, fish 86 was tracked in the area of the reservoir near Indian Creek Camp Ground. It appeared to be following the waterline as the reservoir level receded in September, but it stayed close to the mouth of the N.F. Tieton River (similar to fish 85). However, by September 20, this fish had moved onto the spawning grounds in Indian Creek and was found one mile above Highway 12 where it presumably spawned before it moved back into the upper end of the reservoir near Silver Beach Resort. By October 2, the fish was tracked to the second heritage marker located east of Silver Beach Resort and then on October 10, just above Snug Harbor at the upper end of the lake and then moved above Cove Resort in the middle of the lake by October 18. It then moved to an area near Tieton Dam on October 24. It moved back to the Cove Resort, Snug Harbor area in early November before it moved back down to the dam on November 22, as a possible response to increasing turbidity and muddy water in the mid to upper sections of the lake (similar to fish 85). Fish 86 remained near the dam until December 26 where it was tracked to the Snug Harbor area (over-winter area). It was not coded in January or February. The tag expiration date was December 2006.

Fish 87 was tracked near Snug Harbor on May 1, 2006 and then moved down close to the reservoir intake structure at Tieton Dam on May 15 where it continued to be tracked until May 25, 2006. It was not tracked (located) after that date. It is possible this fish was entrained and the tag damaged or the fish may have been caught and kept by an angler.

Fish 90 was tracked to the upper end of the reservoir by early June 2006 and entered the N.F. Tieton River by mid June. On June 23 it was tracked to an area below the Clear Lake Dam outlet and spillway channel. It was later tracked to the large pool below the dam on July 6. This fish did not move from the dam discharge pool and the tag was eventually found on October 18 on the shoreline under a clump of moss within the "closed water zone". There had been some illegal fishing activity noted in this area prior to retrieval of the tag.

Fish 91 was tracked to the upper end of the reservoir in early May 2006. It was tracked to the area near Silver beach resort on May 31, but was not recorded again until September 20 (near Silver Beach). We do not know where the fish was during this three and half month period. It is

possible that it moved out of range (e.g. down lake or upstream into a tributary) and then later returned and/or the fish's radio tag had a weak signal and was difficult to detect. Our mobile receiver units and the fixed station tracking equipment at the dam on Clear Lake seemed to work fine throughout the study. Regardless, fish 91 was relocated on September 20 near Silver Beach Resort. On October 2, fish 91 had moved approximately one mile down the lake to an area near the public boat ramp (coded near fish 85). From October 10-18 it was located just above Snug Harbor in the upper end of the lake (over-winter area). Fish 91 was not coded from November to January. The tag expiration date was November 2006.

In December 2006, Rimrock Reservoir was totally ice covered. Although we continued to track two of the tagged fish, they didn't appear to move around much (over-wintering area near Cove Resort/Snug Harbor). In March 2007 we received a strong tag signal on the backside of the lake at the Peninsula Campground, but it would not code. This was likely a sign that the tag signal was getting weaker and about to expire, typical of older tags with weak signals. It appeared that there were no more active tags by the end of March 2007.

Tieton River Group below Rimrock Reservoir

In mid-November 2005 we took advantage of a fish salvage effort at the base of Rimrock Reservoir Dam on the Tieton River. Mountain States Construction Company facilitated a drawdown and dewatering of the pool below the dam to install hydroelectric turbines in the outflow pipes. The Tieton Dam discharge pool is approximately 200 feet long, 175 feet wide and had a center depth of 25 feet. Contractors estimated that the pool contained approximately five million gallons of water (S.P. Cramer and Associates). The initial drawdown of the pool began on the evening of November 10 and fish salvage efforts began on the morning of November 13. A total of 37 bull trout were captured from the pool (Ackerman, 2005) and we radio-tagged twelve of these fish (Figure 12). All 37 bull trout were transported and released into a large pool below an irrigation diversion dam (Wapatox Diversion) on the Naches River, approximately 22 river miles downstream.

Two of the salvaged bull trout had been previously tagged during the USFWS-funded fluvial bull trout radio telemetry study (Mizell et al., 2008). During that study, a total of four bull trout had been captured by hook-and-line and tagged in the river below the dam in the fall of 2003. Over the course of two years, these fish never left the Tieton River and all stayed near or in the dam discharge pool where they were tagged. Although tissue samples were taken for DNA analysis and the samples processed in the laboratory (Hawkins and Von Bargaen, 2006), genetic assignments to specific populations are pending completion of the Phase 2 portion of the Yakima basin bull trout genetic analysis (Hawkins and Von Bargaen, 2007). Until that analysis is complete (expected in March 2009), we hypothesize that these fish originated from a Rimrock Reservoir adfluvial population (e.g., S.F. Tieton River or Indian Creek) and the fish were likely entrained out of Rimrock into the Tieton River. The body weight of the two recaptured fish at the time they were tagged in the fall of 2003 was 1.75 pounds each. Their weight at recapture, two years later (2005) was 6.1 pounds each. This equates to a growth rate of over 2 pounds per year. This tremendous growth rate is likely due to a robust food supply of forage fish (i.e., kokanee and rainbow trout) that were also entrained thru the dam and into the tail water pool. By analyzing old tracking data and determining the status of all four previously tagged fish, we were able to determine, through the process of elimination, the tag numbers for both of the



Figure 12. One of twelve bull trout being radio-tagged during the Tieton pool fish salvage.

recaptured bull trout (Fish #'s 21 & 22) even though both tags were inoperable. The tag in fish #22 had turned off two months earlier due to a dead battery. The antenna lead in this fish had created a series of calloused abrasions along the fish's side, mostly at the extrusion hole for the antenna lead (Figure 13); otherwise the fish was in very good condition. The abrasions were healed over and did not appear to affect the fish. The other fish (# 21) also appeared to be in very good condition. A photo of this fish at initial tagging (2003) is shown in Figure 14 and at recapture two years later (2005) in Figure 15. This fish had shed its tag, but still retained some of its surgical tag scars. Although the tag was gone and we could not confirm the fish's movement patterns between the time it had shed the tag and its recapture; we believe this fish had not left the area below the dam since the time it was originally tagged. The thousands of kokanee and rainbow trout that were salvaged from the pool is evidence that food is certainly abundant enough to grow these fish to a large size, but reproductively they appear to be isolated, as they cannot move upstream to their natal spawning ground due to the barrier dam at Rimrock Reservoir.

As previously indicated, all 37 salvaged bull trout, including the twelve radio tagged fish, were taken by tank truck to the release site below the Wapatox Diversion Dam on the Naches River (River Mile 17). The large pool below the diversion dam is a well-known winter and summer holding area for bull trout; as confirmed from our previous radio telemetry tracking data (Mizell et al., 2008). Initially, four of the tagged fish stayed relatively close to the release site, but the other eight moved downstream from 300 yards to five miles. It is not uncommon to see recently tagged fish exhibit this "post surgery drop-down pattern" where they hold for a time, likely recuperating from the surgery, before they begin moving slowly back upstream. None of these



Figure 13. Tag antenna abrasion on fish #22, from Tieton Pool.

Tieton tagged fish moved down to the Yakima River. However, during the previous fluvial radio telemetry study, two bull trout captured and tagged in the Naches River were tracked into the Yakima. One fish was tracked to approximately 800 yards below the confluence of the Yakima/Naches Rivers and the other was tracked into the Yakima River and then upstream near Wenas Creek. Both fish held in the Yakima for only a short time before moving back up into the Naches River. Only one fish was actually tagged in the Yakima River during the earlier telemetry study (fish #46, code 166, tagged on May 25, 2004). This fish was captured and tagged at Roza Dam, upstream of the Yakima/Naches confluence. It was also genetically keyed to the Tieton River bull trout group. After tagging, the fish disappeared within a week and was never tracked again (Mizell et al., 2008). The migration patterns and details of other fluvial bull trout tagged under the USFWS funded project can be found in the report by Mizell et al., 2008. Radio tracking of some of those fish overlapped with fish tagged during this study.

All twelve of the radio tagged bull trout (**fish #'s 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, and 121**) released into the Naches River from the Tieton fish salvage operation overwintered in the lower Naches River. It was not until May 2006, before we noted a major upstream movement of some of these fish, which continued into September, the primary spawning period for bull trout. Daily fish movement patterns varied greatly, with some fish traveling long distances into upper Naches tributaries while others seemed to settle into deep pools of the mainstem Naches River. Some tagged fish moved up the Naches River with adults



Figure 14. Fish #21 at the pool below Tieton Dam, 1.75 pounds, 10/3/2003.



Figure 15. Fish #21 recaptured 2 years later (11/14/2005) at the pool below Tieton Dam, 6.1 pounds.

from other populations, such as those from the Rattlesnake and American River. The individual tracking record for each tagged fish, after they were released below the Wapatox Diversion Dam (River Mile 17) on the Naches River in November 2005, is summarized below.

Fish 110 moved downstream after being released at the Wapatox Diversion Dam. It overwintered in the lower Naches River near the Naches water treatment plant (8-9 miles below the Wapatox Diversion pool) and then slowly moved back up to the diversion pool by mid June. It moved upstream into Rattlesnake Creek in July 2006 where it was tracked and coded 11 miles upstream of the mouth. It stayed in the Rattlesnake until late September, likely spawning with other bull trout in that population. It moved back down to the Naches River where it held for two weeks below the mouth of Rattlesnake Creek (until mid October). It then moved 19-20 miles further downstream to the lower Naches River (RM 7-9). We continued to code this fish in the same location from late October 2006 to late April 2007. The tag was located under large boulders in the river channel. The fish had probably died or shed its tag shortly after moving to its over-wintering location.

Fish 111 remained in the vicinity of the Wapatox Diversion Dam for nine months. The tag was eventually found on the bank below the dam on August 8, 2006 during the summer low river flow. It is likely that the fish had either shed its tag or it was dead during much of this time, as we did not see any movement even during earlier high water events, which often spurs some type of fish movement.

Fish 112 moved a half-mile downstream near the Naches Wonderland Bridge shortly after being released below the diversion dam. The tag from fish 112 was recovered from an exposed river bar under 2 feet of rock and gravel on October 11, 2006. This fish had obviously died or shed the tag within a month or two of its initial release.

Fish 113 also moved downstream after being released below Wapatox Diversion Dam (similar to fish 110). It moved about 15 river miles to an area near Cowiche Creek (lower Naches River). It over-wintered in this area and then in May-early June it moved upstream back to the Wapatox Diversion pool where it stayed for a short time. It then began a rapid upstream movement for 11 miles to an area below the Rattlesnake/Naches River confluence. It was not located for 3 months from mid June to mid September and then was reacquired on Sept. 18, 2006 at the mouth of Rattlesnake Cr. This fish may have moved up into one of the remote, canyon holding pools of Rattlesnake Cr. where we had difficulty tracking and coding fish. It is quite possible it spawned in the upper Rattlesnake in early September and then moved back down to the mouth of the Rattlesnake where we reacquired and coded it in mid-September. Total distance to the Rattlesnake Creek bull trout spawning area from the release site at the Wapatox Diversion Dam is 25-30 river miles. During the rest of September, October and November it stayed in the Naches River, within a mile or two upstream of Rattlesnake Creek. In late November, fish 113 moved 6-7 miles downstream, where it held until mid-December and then moved another 15-16 miles downstream to an area below the Naches Water treatment plant where it over-wintered (lower Naches, RM 7). It moved back up the Naches River in April 2007 to an area between the Tieton River and Rattlesnake Creek (mid-Naches area) where it was last coded on May 17, 2007.

Fish 114 stayed within five miles downstream of its initial release location at Wapatox Diversion Dam (RM 17) until mid May 2006 when it began an upstream migration. By mid June it was in the Bumping River near the confluence with the Little Naches River, over 27 miles upstream of its original release point in the Naches River. It continued to move slowly upstream in June and

July eventually ending up, by late August, in the Mesatchee Creek area of the American River; a known bull trout spawning area. Total migration distance from its original release location was over 47 river miles. The fish likely spawned with other bull trout that had moved into the area and then dropped about 12 miles downstream to an area near Indian Flat Campground on the American River where it held for a few weeks. It was then tracked into the Bumping River in late October where it proceeded up to the base of Bumping Dam. It stayed in the area below Bumping Dam until early December and then it moved back downstream to the Naches River eventually ending up in the area of Horseshoe Bend in the mid section of the Naches River (RM22). It appeared to stay in this location from mid March to mid May 2007.

Fish 115 was only coded one time, approximately one month after its initial release. It was never coded again. It was not coded at any fixed station site upriver or downriver. It is possible the tag malfunctioned and/or a predator or angler destroyed the fish/tag.

Fish 116 moved a half-mile downstream near the Naches Wonderland Bridge shortly after being released at the diversion dam. The tag from this fish was found in the area of the bridge near the bank nine months after initial release. The fish had likely died or shed its tag within a month or two after its initial release as there was no movement from this fish for over 7 months.

Fish 117 moved downstream after its initial release at the diversion dam and generally stayed within five miles of the release site. However, it stopped moving in late May 2006 and the tag was finally recovered from a gravel bar in the river in October 2006. The tag was buried in 10 inches of gravel and rock. It appears that the fish had died or shed its tag five months earlier.

Fish 118 also moved downstream 13 miles after its initial release at the diversion dam. It was tracked in the area of the deep pools below the Cowiche Diversion Dam and in the nearby Nelson Springs area. It overwintered in this area, but by spring very little subsequent activity was noted. It had likely shed its tag or died in May 2006. The tag was finally found on October 24, 2006 buried in river gravel in two feet of water.

Fish 119 initially dropped downstream about 8 miles from the Wapatox Diversion pool and stayed in the lower Naches River. It was tracked at various locations during the winter months between river mile one and nine. By mid July, Fish 119 had migrated back upstream to the pool below Tieton Dam where it was originally captured and tagged (migration distance, 38 river miles from the lower Naches). By late November 2006 it had moved back down to the Naches River and then moved up the Naches. On November 30 it was coded in the Naches River a half mile above the Rattlesnake Creek confluence (RM 28). It overwintered in this area, seldom moving more than a mile. Expected tag end date was May 13. It was last coded on May 29, 2007 at RM 27.5.

Fish 120 was coded in the area of the release site for two months and then it totally disappeared. It was not coded at any fixed station site upriver or downriver. It is possible the tag malfunctioned and/or a predator or angler destroyed the fish/tag.

Fish 121 overwintered below the town of Naches (about 8 miles below the Wapatox Diversion pool) and then moved slowly back upstream to the diversion pool by mid June. It continued to move upstream during July and was five miles up the American River by August 1. On August 30 it was near Lodgepole campground on the American River, near known bull trout spawning areas (about 45 river miles above its original release location). It is quite possible this fish

spawned in the area before it moved downstream to the Bumping River where it was coded on September 18. It continued to move slowly downstream during October and November. It spent most of December in an area of the Naches River below the Woodshed Restaurant (RM 24). It then moved about five miles further downstream to the Oak Flats area where it spent the rest of the winter months. Expected tag end date was May 13. Fish 121 was last coded on May 29, 2007.

Although some tags remained in the same location for long periods of time (i.e., Fish Tag #'s 111, 112, 116, 117, 118) efforts were continuously made to visually locate the fish or to retrieve the tag. After locating the approximate area of the tag by radio telemetry, we would snorkel or search the bank to get a visual on the fish or the tag. This was often difficult or impractical during periods of high turbid water (e.g., spring). However, as flows dropped exposing the riverbanks and gravel bars we were able to better locate and retrieve some tags.

Deep Creek Population – (Bumping Reservoir)

From August 26 to September 14, 2005 seventeen post-spawned bull trout were captured in a “V” style weir picket trap in Deep Creek, a tributary to Bumping Reservoir (see Figure 2). An upstream passage slot was made to accommodate upstream migrants and a trap installed for downstream migrants. Over two-dozen fish were captured in the trap during the two weeks it was functional, and 17 post-spawned bull trout were radio tagged. Seven of these fish were also tagged with an archival temperature tag for recording depth and temperature. Seven of the radio-tagged fish (**fish #'s 93, 95, 96, 101, 103, 105 & 107**), including four with archival temperature tags either shed their radio tags and/or died due to predation or complications inherent to surgical implantation of the tags. These seven fish never made it out of Deep Creek to Bumping Reservoir. The higher mortality rate was likely exacerbated by the fact that we were tagging post-spawned fish, which were already in a weakened condition. The ten remaining tagged fish (**fish #'s 94, 97, 98, 99, 100, 102, 104, 106, 108, & 109**), three of which contained archival temperature tags all survived and were regularly tracked in the reservoir at one to two week intervals except during mid-winter when harsh weather and difficult access prevented mobile tracking.

We relied heavily on our fixed station telemetry site at the Bumping Reservoir Dam for detecting fish moving near the lower end of the lake. This station and our mobile tracking allowed us to obtain multiple bearings to more precisely triangulate the location of radio-tagged bull trout. Most fish were regularly tracked with the exception of a few months in the winter when they were under thick ice and in deep water at the upper end of the reservoir. With few exceptions the tagged fish remained in or very near the deep (upper) section of the lake until May and June when they then moved to the shallower mid-section of the reservoir. The fish generally became more active during and after spring runoff (May 2006). We observed this similar timing and activity level for adfluvial bull trout in Rimrock Reservoir and for fluvial bull trout in the Naches River (this report and Mizell et al. 2008). Several tagged fish were tracked into the shallow area in close proximity to the dam's intake. Six of the tagged fish were observed back on the spawning grounds in Deep Creek a year after being tagged in the creek. One of the tagged males spawned in Deep Creek three consecutive years, 2005 - 2007 (Figure 16). Although the tags were no longer functioning in September 2007, we could determine through fish tracking records that the tagged fish in figure 16 was one of two possible males (Fish # 97 or 104). Both of which had already spawned two consecutive years in Deep Creek. Specific details for individual fish



Figure 16. A pair of adult spawning bull trout on a redd in Deep Creek (Bumping Reservoir). The male fish in the foreground has a radio tag antennae protruding from its body near the anal fin. This fish migrated to the spawning grounds three years, 2005-2007 (September 2007 photo courtesy of Jim Cummins).

movements for those that survived initial tagging efforts in Deep Creek and migrated back to Bumping Reservoir are described below.

After **fish 94** was radio-tagged in Deep Creek (Aug. 28, 2005), it was coded in the upper (deep) section of Bumping Reservoir one and a half months later. It remained in this upper section of the lake until the following spring (May 2006) where it was then coded near the dam at the lower end of the reservoir. The tag was recovered on June 19, 2006 from a piling near the penstock tower (outlet) at the dam. The dam operator said he had recently seen a dead fish in this area. Whether it had died and floated there, or had become stuck in the rack is unknown. We believe the former is more likely as we have not heard of any past problems with fish getting impinged at this location. It is possible that the fish was a post-release mortality from an angler or it may have died from other natural causes.

Fish 97 stayed in Deep Creek for nearly a month after it was tagged (Aug. 31 – Sept 27, 2005). It finally moved to the upper (deep) section of the reservoir in early October. It was coded from the fixed station at the dam in mid-to-late December and then it moved back to the upper end of the lake where it was coded on January 18, 2006. The fish appears to have over-wintered in this upper section of the lake, as it was not coded again from the fixed station at the dam until May 18. It was then coded about mid-lake on June 12 and then it was back in the upper section of the lake on July 10. It was then tracked to the mouth of Deep Creek on August 2. It was coded in

Deep Creek below the Road 1800 double culverts on August 16 and was then tracked above the culverts on August 21 and 28 where it spawned. The fish was later tracked back to the upper (deep) section of Bumping Reservoir on September 26, 2006. It was not coded in October, but this is not unusual, as the fish do not code well when they are in the upper, deep section of the lake. This fish was last coded from the fixed station at the dam on November 18 and 21, 2006.

Fish 98 was coded in the upper section of the reservoir in early October, a month after it was tagged in Deep Creek. It was coded again in early December from the fixed station at the dam and then tracked to the middle of the lake in mid January. It was then coded in the mid to upper section of the lake in March and from the fixed station at the dam in mid May 2006. Multiple fixed and mobile tracks indicated that fish 98 occupied the mid to lower section of the lake during June and then moved back to the upper section of the lake in early July. By late July it was coded approximately 2/3 mile up Deep Creek (400 yards below the USFS Road 1800 stream crossing). The carcass of the fish was found a week later on July 31, approximately 2 miles further upstream (0.3 miles above Copper Creek). As no redds were found in the area, it appears that the fish made an early staging run up into the creek prior to spawning. Spawning in Deep Creek normally occurs in late August to early September, but it is possible that some of these early arriving fish also spawn a bit earlier. Fish 98 had an archival temperature tag, which was surgically implanted the year before. The archival tag was recovered from the carcass and the data downloaded. This provided a full year of data on the temperature and depth in the lake where the fish was residing (see next section on **Archival Tags**).

Fish 99 was coded in the upper end of the reservoir in mid-October, a month and a half after it was tagged in Deep Creek. It was coded in the same area of the upper reservoir in late October and mid January as well. It was not coded again until July 10, 2006 near the mouth of Deep Creek. The fish was coded several more times during August in the reservoir near the mouth of Deep Creek. It was last coded in the reservoir on August 28. It was not coded again until September 18 in Deep Creek in the large pool below the stream culverts at Road 1800. The tag was later found on September 25, 2006 next to a redd about 100 yards above the 1800 Road. No fish remains were found.

Fish 100 was coded in the upper end of the reservoir in early October, about a month after it was tagged in Deep Creek. It continued to be coded in this upper section of the reservoir during the winter months. However, in early March 2006 it was coded from the fixed station at Bumping Dam. On March 20 the fish was coded in the mid reservoir area between the boat ramps. During May, July and August the fish moved around between the upper and mid lake areas. It was coded near the mouth of Deep Creek on August 28, 2006. It was not coded (or found) again until late September in the upper section of the reservoir. As the fish was not coded in Deep Creek it probably did not spawn, but instead likely stayed in the upper end of the reservoir. It was last coded on November 21 near the dam.

Fish 102 was coded in the upper reservoir in late October. It was originally tagged on Sept 1, 2005. It was coded again in the upper reservoir in mid-January 2006. It was not coded again until June 6 in the mid to lower section of the lake near the US Forest Service boat ramp. It was coded again from the fixed station at the dam on June 11. The fish appeared to be in the vicinity of the old river channel about 300 meters above the dam. It continued to be coded in this mid to lower section of the lake during June, July and August 2006. It was last coded in the reservoir about 50 yards off the mouth of Deep Creek on August 28.

Fish 104 was tagged in Deep creek on September 2, 2005 and was later coded in the upper section of Bumping Reservoir in late October and again in mid January. It was not coded again until May 23, 2006 from the reservoir dam. It was located in the mid to lower section of the reservoir near the old river channel. Fish 104 stayed in this mid to lower section of the lake until late July when it then moved into Deep Creek. It was coded in Deep Creek in the large pool below the Road 1800 culverts on July 24, 2006. By August 1 it had moved further upstream to an area near Copper Creek and then it moved back into the reservoir by August 16. It stayed near the mouth of Deep Creek until at least August 28. It was tracked by boat to 50 yards off of the mouth of Deep Creek and was then tracked back into Deep Creek to the Rd 1800 double culverts on August 31, 2006. It was tracked with other bull trout in the large pool below the road culverts. After spawning, fish 104 returned to the lake where it was coded in the upper, deep section of the reservoir on September 26 and lastly on October 26.

Fish 106 was coded in the upper Bumping Reservoir in mid October where it had moved after being tagged in Deep Creek on September 3, 2005. It stayed in the upper reservoir until December 22, where it was then coded in the mid-lake area from the fixed station at the dam. By mid January, fish 106 had moved back to the upper section of the reservoir. In May and June it was coded multiple times by the fixed station in the mid to lower section of the reservoir. In July it was coded in the upper reservoir and then moved back to the middle of the reservoir in August. On August 23, 2006 fish 106 had moved to an area near the mouth of Deep Creek. It was coded in Deep Creek on August 28, where it likely spawned. It was coded back in the reservoir on September 18. Multiple tracks for this fish during October-November 2006 and again in February-March 2007 indicated the fish (tag) location remained constant in the middle portion of the lake out from Deep Creek. As the fish has not moved from this location for many months and does not appear to be in a normal wintering area, we believe the fish died or the tag was shed.

Fish 108 was coded in the upper section of the reservoir in early October. It was initially tagged in Deep Creek on September 5, 2005. It was coded again in the upper section of the reservoir on November 11. The fish likely over-wintered in the upper reservoir, as it was not coded again until mid May 2006 from the dam. May and June track codes showed the fish stayed in the mid to lower section of the reservoir until late July. Fish 108 was coded in Deep Creek on August 1. It eventually moved upstream in Deep Creek to an area about a mile above the Copper Creek confluence. This is where the fish likely spawned and died as the tag was found out of the water up on the bank on September 25.

Fish 109 was tagged after spawning in Deep Creek on September 14, 2005. It subsequently moved out of Deep Creek to the upper section of the reservoir where it was coded in October and November. In early January 2006 it was coded from the fixed station at the dam. It was coded again in mid January back in the upper section of the lake. It was not coded again until July. It was still in the upper section of the lake. We don't know if it had moved out of this area, as it was not coded between January and July. We suspect it was staying in the same general area of the upper lake and we could not get a strong code signal to note its exact location. By August 31 it had moved into Deep Creek to the large pool below the Road 1800 culverts. It then continued to move further upstream where it was captured with block nets on September 5; the archival tag surgically removed and the live fish released back into the creek. The fish was found and captured in the same location where it had been tagged the year before. This is the second fish that we were able to recapture and remove the archival tag to download depth and temperature profile data.

Archival Tags -- Depth & Temperature Preferences

As indicated in the previous section on individual fish movement patterns, archival tags were recovered from two bull trout that had returned to spawn in Deep Creek in 2006. Both fish were originally tagged in 2005. One tag was recovered from the carcass of **fish 98**, a presumed pre-spawn mortality and the other tag was surgically removed from **fish 109**, a post spawned fish. A full year of accumulated temperature and depth data was downloaded from the tags to a special program that enabled us to view the information. Figures 17 and 18 show the water depth and corresponding temperature ranges for these fish in Bumping Reservoir between the time they left Deep Creek in 2005 and the time they returned to the creek in 2006. The red horizontal line in the graph is the fish's daily (24-hour) average depth. The pink vertical lines represent the fish's movements in one-hour increments. The black vertical line graph is an average "time spent" tendency, which plots the movements in a more readable fashion. The black line tends to show the best pattern of movement by discarding short-duration movements above and below the average that lasted less than 60 minutes.

Fish 109 (an adult female) was tagged with an archival temperature tag on September 14, 2005 and then moved out of Deep Creek and into Bumping Reservoir a short time later. The change in temperature and depth are readily observed on the graph in Figure 17 as the fish moved from the colder creek water (7-8 C) to the warm, shallow, lake water near the mouth (10-15 C) and then moved to the cool deeper waters of the lake (9-12 C). This fish spent October and part of November at an average depth of 20 feet, sometimes moving towards the surface, but never going more than 41 feet deep. On November 16, 2005 it began exhibiting a much wider pattern of movement with depths to 85 feet, which is near the deepest part of the lake and water temps recorded at 2.5-4 C during the winter months. Radio telemetry also showed her to be in this deeper section of the lake, which is the area of the old natural lakebed. In May #109 entered shallower depths as the lake began to warm, presumably to forage on the abundant kokanee in the lake. It returned to the shallower lake water near the mouth of Deep Creek in early August before entering the creek to spawn on August 31.

Fish #98 (an adult male) was tagged with an archival tag on September 1, 2005. This fish stayed in Deep Creek (temperature range, 7-8 C) until September 15 and then entered Bumping Lake where it went to 75 feet for a short period of time before rising to the 35-40 foot level (temp. range 8-11 C). A spike in temperature to 15 C was noted during the quick transition from Deep Creek to the deeper lake water. This spike is likely a reflection of the higher temperature on the shallow lake shelf between the mouth of Deep Creek and the colder, deep waters of the lake (see Figure 18). The fish spent the winter at an average depth of 30-40 feet, although fish depth varied from 5 to 90 feet. Water temperatures during this winter period ranged from 2.5-5 C (early Nov – late April). As water temperatures began to warm in April and May the fish spent more time in the 15-20 foot range. By early May the fish had moved to a point further down the lake towards the dam where water depth was shallower. In late June and early July there were two depth recordings at 100 feet and one near 90 feet, which means the fish moved back to the deep part of the lake for a brief period of time before moving to shallow water near Deep Creek in late July prior to spawning.

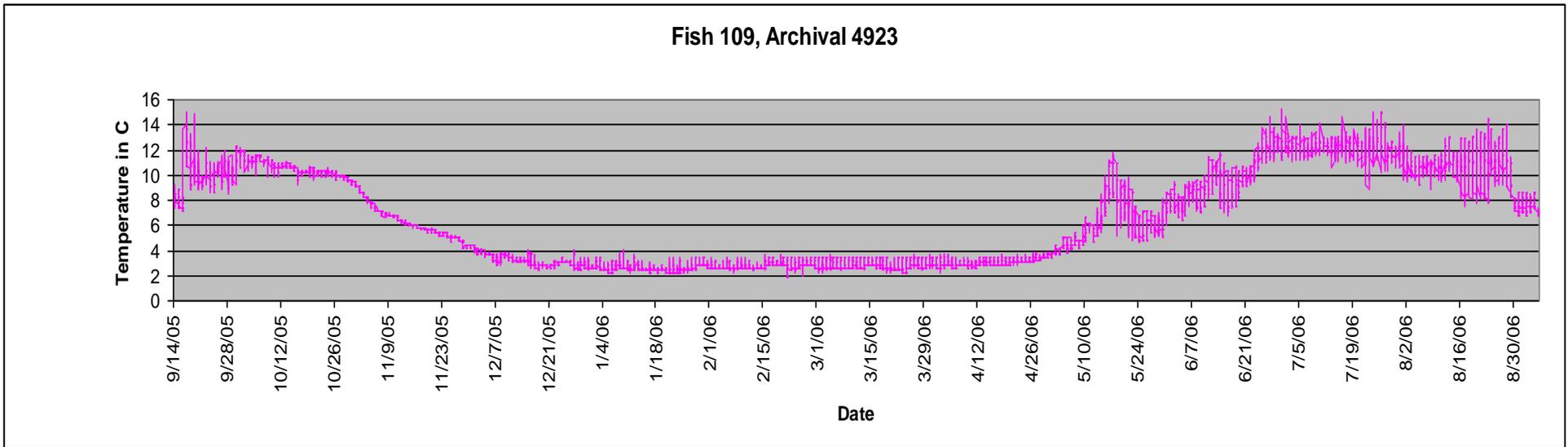
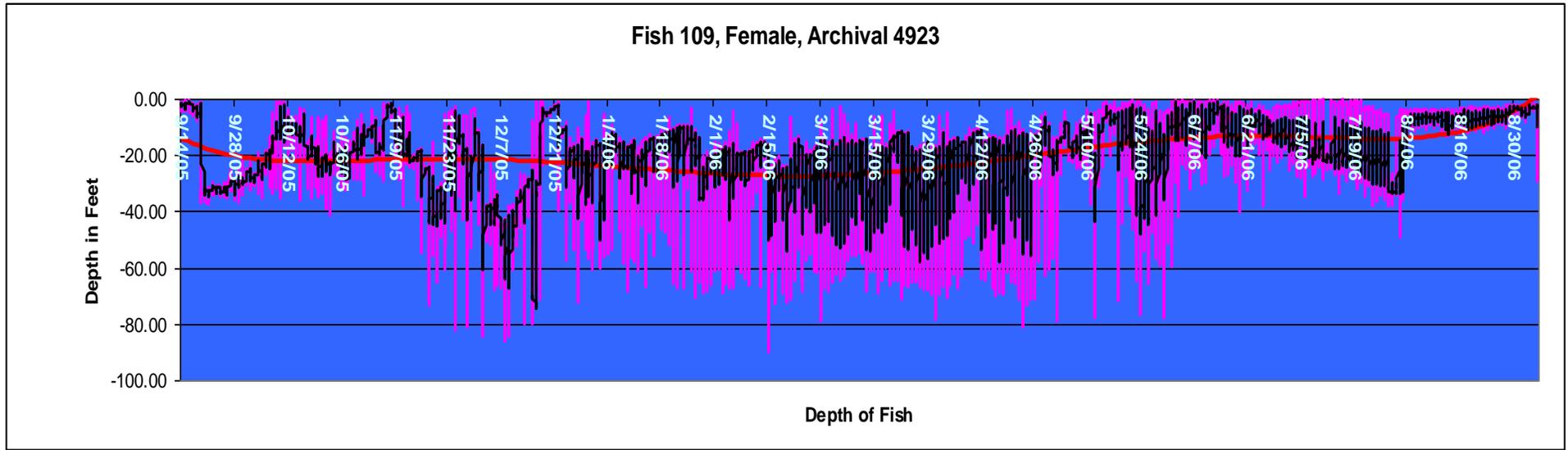


Figure 17. One year of temperature and depth data retrieved from an archival tag implanted into Fish 109 (Bumping Reservoir).

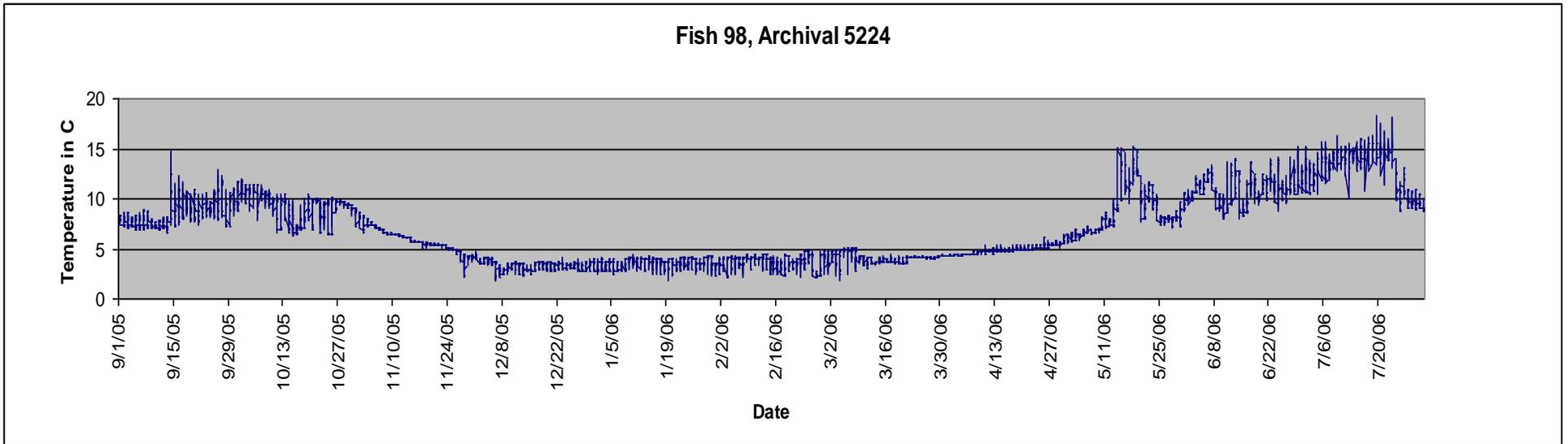
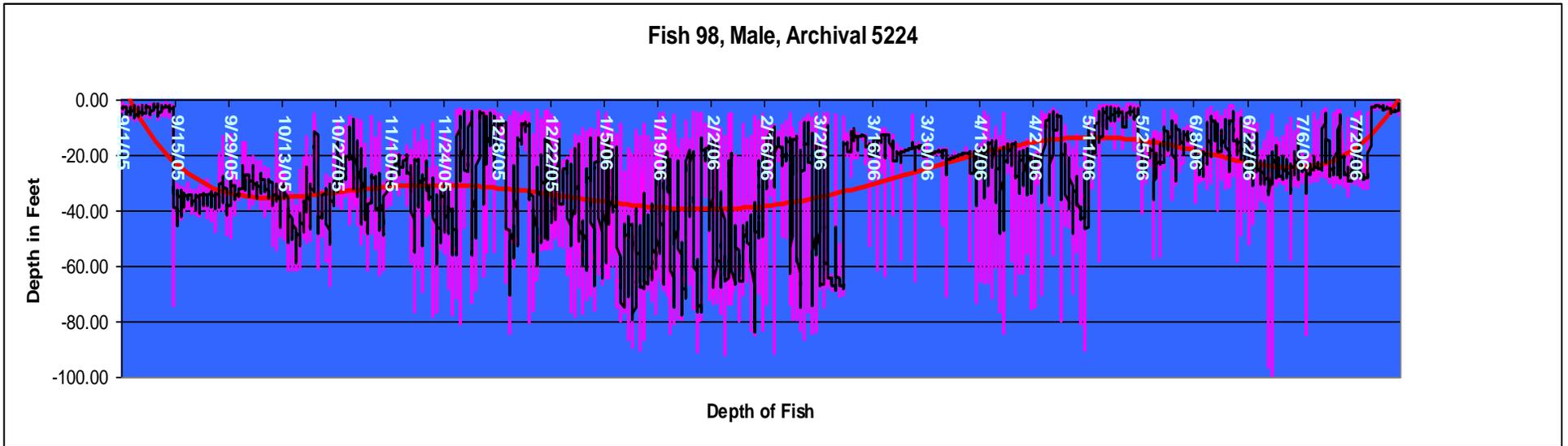


Figure 18. One year of temperature and depth data retrieved from an archival tag implanted into Fish 98 (Bumping Reservoir).

Genetic Relationships

Tissue samples for DNA analysis were collected from all bull trout captured during this study. Laboratory analysis for these samples has been conducted (Hawkins & Von Bargaen, 2007), but a final report is pending. Additional funding was needed to complete the analysis for the rest of the adfluvial bull trout samples in the Yakima basin. Once the samples are analyzed, they will be combined with the results of samples collected during this Phase 2 study (Hawkins & Von Bargaen, 2007) and from fluvial samples collected and analyzed under Phase 1 (Hawkins & Von Bargaen, 2006). Phase 1 analysis was from the earlier fluvial bull trout radio telemetry study (Mizell et. al. 2008). The pending analysis and report will provide a more complete picture of the genetic relationships of bull trout populations in the Yakima basin.

Funds were recently secured thru the USFWS ESA Section 6 Program (spring, 2008) to continue analyzing the adfluvial bull trout samples. Until all the samples have been analyzed and a final report completed (expected in March 2009), we hypothesize that the bull trout salvaged from the pool below Tieton Dam originated from either the S.F. Tieton River and/or the Indian Creek populations, both of which reside as adfluvial fish in Rimrock Lake. These fish were likely entrained through the dam and into the Tieton River. The bull trout captured in Deep Creek should show up as a distinct population segment for that area and the bull trout captured in the N.F. Tieton below Clear Lake will likely show a close relationship to the nearby Indian Creek population.

DISCUSSION

Fish Movement Patterns

Deep Creek Population – (Bumping Reservoir)

Adult bull trout occupying Bumping Reservoir spend most of their time in the reservoir with only a short spawning migration into Deep Creek. Some adults begin staging at the mouth of Deep creek in early July with a few fish moving onto the spawning grounds by late July. However, the primary movement of adults into the creek occurs in mid to late August with active spawning from late August to early September. It appears that some fish that move onto the spawning grounds early will move back down to the mouth and hold with the larger group of fish in the lake before returning to spawn later. These forays onto the spawning grounds almost seem like scouting ventures. Some of these early moving fish can become stranded in the upper reaches of Deep Creek if they stay on the spawning grounds long enough and if portions of the creek downstream become dewatered. This of course is more problematic during drought years. These dewatered areas limit the extent of the spawning area for the rest of the adult spawning population as they begin moving upstream. Some fish that become stranded in the upper reaches may spawn early, as evidenced by old looking redds encountered during past surveys. After

spawning, they must wait for the fall rains to reconnect the creek before moving back to the reservoir. This may not happen until late October or early November, which leave the fish more susceptible to predation. Fortunately, it appears that most adults do not move into the creek early enough to become stranded or the adult spawners move downstream of the section before it becomes dewatered. Most of the spawning occurs below the dewatered sections, but during high water years there is a good distribution of fish and redds throughout Deep Creek clear up to the barrier falls (approximately 3.7 river miles).

By mid September most adults have moved out of the creek and back to the reservoir where they remain until the following spawning season. Some adults were radio tracked back onto the spawning grounds a full year after being tagged and one fish was observed back on the spawning grounds for three consecutive years (see Figure 16). Not all adults spawn every year. Some skip a spawning cycle and stay in the reservoir. It is not known what percentage of the population does this. With the exception of a USFS reported sighting of a single bull trout redd in the upper Bumping River in 1994, there have not been any documented bull trout spawning in any Bumping Reservoir tributaries other than Deep Creek. Nor did we track any radio tagged bull trout into any Bumping Reservoir tributary other than Deep Creek.

While in the reservoir, adult bull trout over winter in the upper (deep) section of the lake. Occasionally, we noted that a tagged fish would move into the shallower mid or lower lake area for a short period of time, but would move back to the upper lake. As there are no fish passage facilities at the dam, moving to the lower end of the lake does not confer any special advantage for adult bull trout, especially during harsh winter conditions with thick ice cover on the reservoir. Since they cannot move freely out of the reservoir into the lower Bumping River or Naches River over-wintering areas used by the Naches Basin fluvial populations, they must seek refuge in deeper water habitats of the upper lake where they have more stable water temperatures and a reliable forage base (e.g., kokanee, etc.).

As the winter ice cover receded and the mountain snowmelt increased flow into the reservoir, fish activity and movement also increased. By May, radio tagged bull trout were moving around the lake more. During the warmer spring and early summer period, zooplankton and insect production increases along with increased feeding activity of fish. Kokanee salmon are present in the reservoir and are an important food source for bull trout. Kokanee are planktivorous, feeding on tiny zooplankton that vertically migrates in the water column. As bull trout forage on kokanee and other species, their movement patterns often reflect a similar diel vertical type of movement pattern in the reservoir. Some studies have shown that this movement can occur often between deep and shallow water and between littoral and pelagic areas (Stables 2002, Goetz et al. 2004, Kelly Ringel & DeLaVergne 2005). The choice between night and day, shallow and deep is likely a reflection of forage availability and cover. In Bumping Reservoir, the archival temperature and depth tag data that we recovered from two of our radio-tagged bull trout also reflected this type of movement pattern.

Although some of the tagged bull trout were coded near the dam at the lower (outlet) end of the reservoir, none were detected moving past the dam either thru the outlet works (sluiceway) or over the spillway (overflow) channel. During high flow/runoff periods there is some sheet flow over the old spillway channel, but it is dry most of the year and offers no passage for fish out of the lake. The primary pathway is through the dam outlet works, which requires that fish pass under the control gate and through a high velocity sluiceway. If fish volitionally follow the flow under the gate or are involuntarily entrained, this is a one-way trip to the lower Bumping River. Upstream passage back into the reservoir through the outlet works is not possible and there is no fish ladder at this dam. The connection between the old natural lake and the downstream river environment was severed nearly a century ago when the dam was completed in 1910. This has resulted in an isolated adfluvial bull trout population in the reservoir.

By triangulating the location of tagged bull trout between the fixed station receiver at the dam and mobile receivers on either shoreline, we could ascertain the location of tagged fish that ventured into the mid and lower lake areas near the dam. This showed that tagged bull trout were following the old, inundated river channel as they moved towards the dam. As this was the natural migration corridor for adults before the dam was built, it was natural for fish to follow this route. The capability for adults to travel freely in and out of the lake (pre-dam) would have conferred potential advantages to the bull trout population, including additional winter/summer habitat in lower river areas of the Bumping and Naches Rivers, additional (seasonal) food supplies and genetic exchange with other bull trout populations. Unrestricted migration between the Wenatchee River and Lake Wenatchee has been very beneficial to bull trout populations in the Wenatchee Basin, as reflected by a more diverse and robust bull trout population (see Kelly Ringel & DeLaVergne 2005). Likewise, upstream/downstream fish passage facilities at Bumping Reservoir and other Yakima basin dams would benefit salmon, steelhead and bull trout populations.

Tieton River Group below Rimrock Reservoir

The Tieton River group of bull trout over-wintered in the lower Naches River where they were released after being salvaged from the pool below Tieton Dam in November 2005. We hypothesize that these fish originated from Rimrock Reservoir, were entrained in the reservoir outlet works, and were deposited into the Tieton River pool below the dam. Genetic analysis of tissue samples collected from fish above and below the dam will provide additional insight on the origin of these fish. That analysis is pending, but should be complete by March 2009. The genetic analysis will determine whether these fish originated from adfluvial populations in Rimrock Lake (i.e., S.F. Tieton River or Indian Creek populations) or if they originated from fluvial populations in the Naches, or a combination of both. Past fish entrainment monitoring efforts below Tieton Dam by the USBR, Central Washington University (CWU), and S.P. Cramer & Associates, as well as information obtained during this study, suggests that bull trout are entrained through the dam at Rimrock Lake. Those that survive entrainment appear to hold in the pool below the dam where they feed on the thousands of kokanee, rainbow trout and mountain

whitefish that are also entrained through the dam. It is not known how entrainment through the new hydroelectric project turbines may effect bull trout survival.

Based on information collected during the previous radio telemetry study (Mizel et. al., 2008), radio tagged bull trout from the Tieton River did not move around much. They tended to stay in the vicinity of the stilling basin pool below the dam. However, during this study, five of the twelve bull trout that we captured, radio tagged and relocated to the Naches River 22 miles downstream exhibited a different movement pattern than what we had seen in fish that were not relocated. Most of these tagged fish did not move back to the pool below the dam where they were originally captured, but instead they over-wintered in the Naches River near or downstream of their release location (pool below Wapatox Diversion Dam). The following May (2006), five Tieton radio-tagged bull trout moved up the Naches River with other radio-tagged fluvial bull trout from the earlier USFWS study. Mizell et al. (2008) had previously documented that radio tagged bull trout from the Naches fluvial populations over-wintered in the same area and slowly moved upstream during the following spring high water period. Some bull trout salvaged from the Tieton Dam stilling pool and relocated to the Naches River appeared to adopt the same migration characteristics of the Naches Basin fluvial populations. Two of our radio tagged fish moved into the Rattlesnake Creek where they likely spawned with the Rattlesnake population. One tagged fish moved further up the Naches system into the American River spawning area where it likely spawned. Another tagged fish moved up the Naches into the Bumping River, but was not tracked to a known spawning area. Only one of the 12 radio tagged bull trout migrated the 22 miles back up the Tieton River to the pool below Tieton Dam where it was originally captured. However, even this fish (Fish #119) later moved back to the Naches River where it migrated up the Naches River. The remaining seven tagged bull trout either shed their tags or died, most within several months of their initial tagging. Radio tags were recovered from various locations near or downstream of the Naches River pool where the tagged fish were initially relocated.

It is likely that a good portion of the other 25 salvaged and relocated bull trout that were not radio tagged also migrated into upriver spawning locations with the Naches fluvial bull trout populations in 2006. Evidence of this occurring includes observations of increased numbers of adult bull trout above the Mesatchee Creek trailhead in the American River (upper portion of the spawning area) and increased redd counts in both the Rattlesnake and American Rivers (see Appendix 3, Bull Trout Redd Count Summary). The American River had a record number of redds in 2006 (55 redds). Although the redd count in Rattlesnake Cr. was not a record in 2006 (40 redds), it was higher than the previous two years, 32 redds in 2004 and 15 redds in 2005. How much of this increase can be attributed to fish salvaged from the Tieton pool or normal fluctuations in spawner recruitment is unknown. Crow Creek, another spawning tributary in the upper Naches fluvial system did not show an increase in redd abundance over previous years---8 redds in 2006, compared to 9 redds in 2003, 6 in 2004, 4 in 2005. The lower redd counts in 2005 were likely exacerbated by the low snow pack, low water conditions during that year (considered one of the worst water years in recent history). Also, by virtue of the much smaller bull trout population in Crow Creek, there are considerably fewer fish to integrate with. Hence the salvage fish appeared to integrate

and migrate with the larger fluvial bull trout populations in Rattlesnake Creek and the American River.

North Fork Tieton River Group

None of the five radio-tagged bull trout in the N. Fork Tieton River moved up thru the fish ladder or spillway channel at Clear Lake Dam. Instead, they moved downstream to Rimrock Reservoir where they stayed most of the year. This downstream movement to the reservoir occurred within several months after the fish were initially radio tagged. This group of tagged fish was smaller than those tagged in the other study groups. Three of the five were a pound or less in size and the other two were about 1.5 pounds. The smaller fish were indicative of fish transitioning between sub-adults to adult life stages. They were likely feeding on an abundant food supply of hatchery planted rainbow trout fry that drift out of Clear Lake. Later, in August and September, kokanee salmon migrate into the N. Fork to spawn. This continues to provide a large forage base for bull trout (both fish and kokanee eggs). The bull trout we captured probably originated from Indian Creek, a nearby natal bull trout tributary stream. As juvenile bull trout move downstream and out of Indian Creek, they encounter the larger and more productive waters of the N.F. Tieton River and upper Rimrock Reservoir where they continue to feed and grow to maturity.

While in Rimrock Reservoir, some of the tagged fish came in close proximity (several hundred meters) to the outlet structure at Tieton Dam, but none were tracked below the reservoir. All five tagged fish over-wintered in the mid-lake area. By late spring/early summer (May – June), four of the tagged fish had moved back to the upper end of the reservoir near the N.F. Tieton River and Indian Creek confluence. The signal for the fifth fish disappeared. It was last recorded in the lake near Tieton Dam in late May 2006. It is possible that it went thru the outlet works of the dam and was destroyed, an angler or some other predator may have caught it, or the tag just malfunctioned. It is plausible that the fish exited the lake thru the dam outlet works as thousands of kokanee and other fish have been documented in the pool below the dam. However, fish entrainment at Tieton Dam usually occurs in the late fall in years when the reservoir is drawn down to low levels and fish (kokanee, bull trout, etc.) are concentrated near the outlet works intake tower---not in May when the lake is full or nearly full. Whether they survive or not, it is a one-way trip thru the dam as there is no fish ladder for fish to return to the reservoir. Of the four fish that moved to the upper end of the reservoir, one was tracked back to the pool below Clear Lake Dam in early July 2006, almost a full year after it was originally tagged near the same location. It remained in this spot until the tag was found, along the shore, in mid October. It had probably died (potential angling mortality) or shed its tag sometime during this period (July-October). Another tagged fish was tracked to the spawning grounds in Indian Creek in September 2006, where it spawned with other Indian Cr. bull trout. By the fall of 2006 the three surviving fish returned to their over-wintering area in Rimrock Reservoir.

Based on radio tracking results, it appears that bull trout move into the area of the upper lake in May-June. Some will continue to move into the N. Fork Tieton up to Clear Lake Dam. It is not known if any bull trout continue upstream over the spillway into Clear Lake. None of our five tagged fish successfully ascended the spillway. The movement of bull trout into the upper lake and N. Fork area appears to be related to both spawning and feeding opportunity. Not all bull trout that move into the area will spawn. Those that do, move into Indian Creek, a tributary to the N. Fork, in late August to early September. Adult bull trout may also move directly from Rimrock Reservoir into Indian Creek if the lake levels remain high and the N. Fork is inundated. However, there have been times in past drought years when the reservoir level is drawn down earlier (August), which creates braided channels and sheet flow conditions at the mouth of Indian Creek where it crosses the dry lakebed. This can create a barrier to bull trout passage into Indian Creek.

Based on past spawning ground surveys (see Appendix 3) and information from this telemetry study, there appears to be only two bull trout spawning tributaries connected to Rimrock Reservoir, Indian Creek and the S.F. Tieton River. Although only a small sample of fish was tagged from the N. Fork, it seems likely these fish originated from the nearby Indian Creek. Pending genetics analysis should confirm this (report due in March 2009). However, recent snorkeling surveys conducted by the USFWS, USFS and WDFW have confirmed the presence of bull trout in the upper N. Fork above Clear Lake and recent spawning surveys have confirmed the presence of adult spawners in the headwaters of the N.F. Tieton River. A spawning survey conducted by the USFWS and USFS in 2004 and another in 2006 encountered one redd in each year. However, these surveys may not have been complete, or were done too late to observe newly formed redds with adult bull trout. The upper N.F. Tieton River is strongly influenced by turbid, glacial runoff and redds can be obscured within a short period of time. However, in mid-September 2007 WDFW and USFWS personnel conducted another survey, which, by chance, coincided with the peak spawning period. A total of 37 redds were counted and we observed large adfluvial-sized bull trout on these redds. This was an important discovery of a previously unknown (undocumented) bull trout population, but it posed new questions about the origin and migration timing of these fish. Presumably, these large bull trout are coming up from Rimrock Reservoir, or Clear Lake, or both.

Except for these recent spawning surveys, there is very little information about bull trout above Clear Lake Dam. There have been a few anecdotal reports of bull trout in the lake and virtually no confirmation of fish caught in the sport fishery. Bull trout were undoubtedly present in the N.Fork Tieton River and portions of Clear Creek before Clear Lake Dam was built. The dam, which formed the relatively shallow Clear Lake when it was completed in 1914, likely isolated the population. As there were no fish passage facilities constructed at Clear Lake Dam and it seemed unlikely that adults could migrate over the steep, natural rock spillway channel, bull trout likely dwindled in abundance. A small remnant, isolated population may have existed. In 1987 there was a large fish salvage effort in Rimrock Reservoir initiated in response to a major draw down of the lake's water supply. Trawl nets were used to capture kokanee (the primary target), but rainbow trout and bull trout were also captured in these trawls and airlifted by helicopter

to Clear Lake where the fish were released. There is no information on how many fish were released, but it was probably thousands of kokanee with far fewer bull trout (100's or less). Assuming many of these fish survived the release into Clear Lake, some bull trout would have found a new home, perhaps only temporary if they moved back down to Rimrock Reservoir via the spillway channel.

In the early 1990's, Clear Lake Dam was refurbished and the natural spillway channel was upgraded to provide fish passage. An Alaska steep-pass fish way and a series of pools/weirs were constructed in the spillway channel. Subsequent investigations by Central Washington University for the USBR indicated that the pool/weir fish way section constructed in the upper portion of the spillway channel appeared to be passable. However, it was uncertain whether the steep-pass ladder in the lower portion of the spillway was passable. There was also speculation that the colder water exiting from the base of Clear Lake Dam through the outlet works provided preferred attraction water for bull trout instead of the warmer surface waters of Clear Lake which flows over the spillway. Radio-telemetry information indicates that some bull trout migrate into upper Rimrock Reservoir and into the N. Fork in May or June, potentially early enough to move over the spillway at Clear Lake Dam while the flows are still high and cold. Regardless, questions remain about whether bull trout pass over the spillway and into Clear Lake, and if so, under what range of spillway flows passage is possible.

Additional Observations and Recommendations

1. Migratory corridors are critically important to maintaining the integrity of bull trout populations. This is particularly important between adult holding areas (over-winter & foraging) and spawning areas. The deep-water sections of lakes and large, deep pools in rivers are commonly used as over-wintering habitat. However, adults will often move outside of these areas to shallower waters in search of forage, especially during the spring and early summer, as water temperature and flows increase.
2. Adults are very active thru the spring and summer as they continue to forage. Foraging activity continues as they slowly move toward the spawning areas. In fluvial environments like the Naches River, their upstream movement appears to coincide with the upstream movement of spring chinook salmon. The bull trout likely feeding on drifting salmon eggs during the chinook spawning period. By mid-to-late summer, after the chinook have spawned, adult bull trout move upstream to their respective spawning areas, often holding for a period of time below the spawning areas before engaging in active spawning. During this pre-spawn staging period (and during spawning) the adults are highly susceptible to harassment, angling, and poaching. They often congregate at the mouth of a tributary stream. Adults may hold in these areas for up to a month or more. During the bull trout-spawning season, most streams are at their lowest flows and water clarity can be excellent. The adults are easily exposed in these environments during this period.
3. Active spawning usually occurs relatively quickly, within a couple of weeks and the adults usually spend less time leaving than they did arriving on the spawning

grounds. Post-spawners usually move quickly back to the deeper water environments of the reservoir or river, foraging as they go. In reservoir environments, post-spawned bull trout may forage on spawning kokanee as they move from their spawning tributary back to the reservoir. Sub-adult and adult bull trout can be observed below or within areas where kokanee spawn, feeding on drifting eggs and small kokanee for extended periods of time before returning to the deeper water, over-wintering area of the reservoir. This is especially true in the N.F. Tieton River below Clear Lake Dam where there is a large concentration of spawning kokanee.

4. It is important to consider all of the migration characteristics and habitats that bull trout use to effectively manage them to recovery. These are migratory fish that require a connected environment with a good supply of spawning, wintering foraging and refuge habitats. The more diverse and connected these environments are the better off the populations will be. Bull Trout populations in areas with less fragmentation between fluvial/adfluvial life history forms fare much better than populations that are fragmented (e.g., Wenatchee vs. Yakima systems).
5. Barrier dams with no fish passage facilities, such as those in the Yakima Basin, are huge impediments to bull trout population connectivity. Migration corridors and passage needs to be provided at Bumping Dam to re-establish the connectivity between fluvial and adfluvial bull trout life history forms in that portion of the drainage. Passage would also benefit anadromous fish and further benefit bull trout and resident fish populations by increasing ocean-derived nutrients in the Bumping Reservoir drainage.
6. Additional evaluation is needed at Clear Lake Dam to determine if bull trout are effectively passing up and down the spillway. Flows may need to be adjusted and/or modifications to the spillway made in order to provide consistent and efficient passage of bull trout above the dam over a wide range of spillway flows. Otherwise, serious consideration should be given to funding and installing a fully operational fish ladder at the site. It is important to investigate and improve passage at Clear Lake Dam/spillway, because of the discovery of 37 bull trout redds in the upper N.F. Tieton River above Clear Lake in 2007 (and 27 redds in 2008). Presumably, these fish are from Rimrock Reservoir and/or Clear Lake.
7. Bull trout entrained thru Tieton Dam cannot migrate back into Rimrock Reservoir because there are no fish ladders. Essentially these fish are lost to the adfluvial population. Apparently, they do not move downstream or integrate themselves with other bull trout populations on their own. Also, there is no bull trout-spawning habitat in the Tieton River for these fish to complete their life cycle and to produce additional progeny. However, when captured and transported to another system with other bull trout, they seemingly integrate themselves into that population, migrating and spawning with the donor population. If passage facilities cannot be provided at Tieton Dam and if screening or some other device to prevent entrainment cannot be achieved, then entrained bull trout should be captured and released back into the reservoir. These fish may also potentially be used as a donor stock to rejuvenate other critical populations in the Yakima basin.

8. There needs to be a new entrainment study done at Tieton Dam now that hydropower has been installed. The survival rate of bull trout thru the turbines at this facility has not been determined.

REFERENCES

Ackerman, N. K. 2005. Fish Salvage from the Tieton Dam Stilling Basin, Tieton River, Washington. Report for Tieton Hydropower, LLC, Goldendale, WA. Prepared by S.P. Cramer & Associates, Inc., Gresham, Oregon. 13 p.

DeLaVergne, J. 2006. Personal communication. Archival tag attachment. U.S. Fish & Wildlife Service.

Goetz, F. A., E. Jeanes and E. Beamer. 2004. Bull trout in the near shore. U.S. Army Corps of Engineers, Seattle District, Seattle Washington. 143 p.

Hawkins, D. and J. Von Bargen. 2006. Microsatellite Analysis of Yakima Basin Bull Trout (*Salvelinus confluentus*). Final report. Washington Dept. Fish & Wildlife, Genetics Lab, 600 Capitol Way N., Olympia, WA. 39p.

Hawkins, D. and J. Von Bargen. 2007. Phase 2: Genetic Analysis of Yakima Basin Bull Trout (*Salvelinus confluentus*). Progress report. Washington Dept. Fish & Wildlife, Genetics Lab, 600 Capitol Way N., Olympia, WA. 17p.

Kelly Ringel, B. and J. DeLaVergne. 2005. Movement patterns of Adult Bull Trout in the Wenatchee River Basin, Washington. U.S. Fish and Wildlife Service, Leavenworth, Washington.

Mizell, M., E. Anderson and J. Cummins. 2008. *Report In Prep.* An Investigation into the Migratory Behavior, Habitat Use and Genetic Composition of Bull Trout (*Salvelinus confluentus*) in the Yakima River Basin. Washington Department of Fish and Wildlife.

Stables, B. 2002. Hydroacoustic survey of Lake Wenatchee, Washington May 16-17, 2002 with emphasis on sockeye fry spatial distribution. Report to Yakama Indian Nation, Toppenish, Washington. 16p.

(USFWS) U.S. Fish and Wildlife Service. 1998. Bull trout status and summary and supporting documents lists: Klamath River and Columbia River bull trout population segments.

Wigglesworth, P. 2005. Personal communication. Radio tag weights and sizes. Lotek Engineering.

Appendix 1. Summary of bull trout tagged under the USBR funded radio telemetry project in the Yakima basin.

Fish Number	Tag Code	Surgery Location	Date of Surgery	Surgeon	Method	Status	Sex	F.L. mm	Total Length mm	Weight Pounds	Population	Spawning Area 05	Wintering Area 05-06	Notes
85	161	Clear Lake Pool	7/26/05	M. Mizell	New Project		Male	425	440	1.6	Unkn.	Unkn.	Rimrock Lake	
86	124	Clear Lake Pool	7/26/05	M. Mizell	New Project		Male	380	393	1.05	Unkn.	Unkn.	Rimrock Lake	
87	69	Clear Lake Pool	7/26/05	M. Mizell	New Project		Male	365	380	1.05	Unkn.	Unkn.	Rimrock Lake	
90	181	Clear Lake Pool	7/27/05	M. Mizell	New Project		Female	400	410	1.5	Unkn.	Unkn.	Rimrock Lake	
91	63	Clear Lake Pool	7/27/05	M. Mizell	New Project		Male	365	375	0.8	Unkn.	Unkn.	Rimrock Lake	
93	144	U. Deep Creek	8/26/05	M. Mizell	New Project	Pred. Death	Female	535	555	3	Deep Creek	Deep Creek	Bumping Lake	archival 4920
94	147	U. Deep Creek	8/28/05	M. Mizell	New Project		Female	485	500	2.05	Deep Creek	Deep Creek	Bumping Lake	
95	145	U. Deep Creek	8/31/05	M. Mizell	New Project	Pred. Death	Male	615	595	4	Deep Creek	Deep Creek	Bumping Lake	archival 5225
96	143	U. Deep Creek	8/31/05	M. Mizell	New Project	pred or shed	Female	430	450	1.45	Deep Creek	Deep Creek	Bumping Lake	paired with 142
97	142	U. Deep Creek	8/31/05	M. Mizell	New Project		Male	470	490	1.7	Deep Creek	Deep Creek	Bumping Lake	paired with 143
98	209	U. Deep Creek	9/1/05	M. Mizell	New Project		Male	575	590	3.75	Deep Creek	Deep Creek	Bumping Lake	archival 5224
99	185	U. Deep Creek	9/1/05	M. Mizell	New Project		Female	415	430	1.3	Deep Creek	Deep Creek	Bumping Lake	
100	186	U. Deep Creek	9/1/05	M. Mizell	New Project		Female	420	400	1.25	Deep Creek	Deep Creek	Bumping Lake	
101	187	U. Deep Creek	9/1/05	M. Mizell	New Project	Pred. Death	Male	570	590	3.75	Deep Creek	Deep Creek	Bumping Lake	archival 4916
102	184	U. Deep Creek	9/1/05	M. Mizell	New Project		Female	395	415	1.15	Deep Creek	Deep Creek	Bumping Lake	archival 4921
103	70	U. Deep Creek	9/2/05	M. Mizell	New Project		Male	485	505	2.25	Deep Creek	Deep Creek	Bumping Lake	
104	183	U. Deep Creek	9/2/05	M. Mizell	New Project		Male	395	410	1.35	Deep Creek	Deep Creek	Bumping Lake	
105	67	U. Deep Creek	9/3/05	M. Mizell	New Project		Male	410	420	1.4	Deep Creek	Deep Creek	Bumping Lake	
106	190	U. Deep Creek	9/3/05	M. Mizell	New Project		Male	450	465	1.75	Deep Creek	Deep Creek	Bumping Lake	
107	149	U. Deep Creek	9/4/05	M. Mizell	New Project	Pred. Death	Female	460	480	1.7	Deep Creek	Deep Creek	Bumping Lake	archival 5227
108	205	U. Deep Creek	9/5/05	M. Mizell	New Project		Male	485	490	1.7	Deep Creek	Deep Creek	Bumping Lake	
109	189	U. Deep Creek	9/14/05	M. Mizell	New Project		Female	540	560	3.3	Deep Creek	Deep Creek	Bumping Lake	archival 4923
110	206	Tieton Pool	11/13/05	M. Mizell	New Project		Female	460	485	2.7	Unkn.	Unkn.		
111	188	Tieton Pool	11/13/05	M. Mizell	New Project		Male	440	450	2	Unkn.	Unkn.		
112	207	Tieton Pool	11/13/05	M. Mizell	New Project		Female	550	570	4	Unkn.	Unkn.		
113	187	Tieton Pool	11/13/05	M. Mizell	New Project		Male	465	475	2.5	Unkn.	Unkn.		
114	177	Tieton Pool	11/13/05	M. Mizell	New Project		Female	510	525	2.65	Unkn.	Unkn.		
115	179	Tieton Pool	11/13/05	M. Mizell	New Project		Female	525	530	4.3	Unkn.	Unkn.		
116	176	Tieton Pool	11/13/05	M. Mizell	New Project		Female	470	490	2.85	Unkn.	Unkn.		
117	150	Tieton Pool	11/13/05	M. Mizell	New Project		Male	430	440	1.6	Unkn.	Unkn.		
118	146	Tieton Pool	11/14/05	M. Mizell	New Project		Female	395	400	1.8	Unkn.	Unkn.		
119	148	Tieton Pool	11/14/05	M. Mizell	New Project		Female	420	430	1.75	Unkn.	Unkn.		
120	167	Tieton Pool	11/14/05	M. Mizell	New Project		Female	475	490	1.7	Unkn.	Unkn.		
121	208	Tieton Pool	11/14/05	M. Mizell	New Project		Female	425	435	1.95	Unkn.	Unkn.		

Appendix 2. Daily Radio Tracking Data for Bull Trout Tagged under the USBR Funded Radio-T Project in the Yakima basin.

Bull trout location by dates tracked are recorded in this table to the nearest .1 river mile (RM). Locations were determined from GPS data (longitude and latitude), descriptions of landmarks (sometimes highway mile post [MP] markers), Terrain Navigator map software (USGS maps), and the River Mile Index, Yakima River (1964), Hydrology Subcommittee Columbia Basin Inter-agency Committee. GPS readings from the air, and from the ground were sometimes not precise, but the combination of information described above resulted in determining relative locations. River channel changes through the years and a delay by USGS in mapping those changes result in imprecise RM data. Site descriptions are general in nature, and may appear to be a few tenths of a mile from the RM. Even with the RM imprecision, RM based on longitude and latitude is the most precise location described in the table. Although sometimes not evident when recording data to the nearest .1 mile, radio tagged fish that remained in the same general area for several weeks or months moved up and down short distances, as opposed to staying in a single pool or riffle. Finally, GPS derived lat/longs often reflect the location of the best parking area And may not accurately indicate that a fish moved a short distance. That is why GPS data is not in this table.

Fish # 85 Code 161	Date Tagged 07/26/05	Sex Male	Status Active	Where Tagged Clear Lake Dam Pool	Population Rimrock Lake
Date Found	River Name	R M	Track	Site Description	Comments
08/04/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/09/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/15/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/23/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/30/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/07/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/12/05	N.F. Tieton		Air	Clear Lake Dam outlet pool	By Air
09/21/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/26/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/30/05	N.F. Tieton		Fixed	Clear Lake Dam station	coded from 9:30 A.M. to 4:13 P.M.
10/03/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/10/05	N.F. Tieton		Mobile	down river of North Clear Lake C.G.	pool
10/17/05	N.F. Tieton		Mobile	down river of North Clear Lake C.G.	1st site on right off of Rd1200, spur 746
10/24/05	N.F. Tieton		Mobile	near spur 746 of 1700 rd	pool
10/31/05	N.F. Tieton		Mobile	near spur 746 of 1700 rd	pool
11/21/05	Rimrock Lake		Mobile	down from Snug Harbor	
11/28/05	Rimrock Lake		Mobile	down from the Cove Resort	
12/27/05	Rimrock Lake		Mobile	by the Cove Resort	
01/03/06	Rimrock Lake		Mobile	down from Snug Harbor	

01/09/06	Rimrock Lake		Mobile	Rimrock Res.	
01/17/06	Rimrock Lake		Mobile	Rimrock Res.	
01/30/06	Rimrock Lake		Mobile	down from the Cove Resort	
02/06/06	Rimrock Lake		Mobile	down from the Cove Resort	
02/14/06	Rimrock Lake		Mobile	down from the Cove Resort	
02/27/06	Rimrock Lake		Mobile	down from the Cove Resort	
03/07/06	Rimrock Lake		Mobile	down from the Cove Resort	
03/14/06	Rimrock Lake		Mobile	down from the Cove Resort	
03/21/06	Rimrock Lake		Mobile	down from the Cove Resort	
03/27/06	Rimrock Lake		Mobile	down from the Cove Resort	
04/11/06	Rimrock Lake		Mobile	down from the 1st Heritage Marker	
04/19/06	Rimrock Lake		Mobile	GPS & coded from the back road	
04/24/06	Rimrock Lake		Mobile	down from Snug Harbor	
05/01/06	Rimrock Lake		Mobile	up from Snug Harbor	
05/09/06	Rimrock Lake		Mobile	GPS & coded from the back road	
05/15/06	Rimrock Lake		Mobile	upper end of the lake by river inlet	
05/25/06	Rimrock Lake		Mobile	up from Silver Beach Resort	high water event
05/31/06	N.F. Tieton		Mobile	at Indian creek rec. area	
06/08/06	N.F. Tieton		Mobile	at Indian creek rec. area	
06/26/06	N.F. Tieton		Mobile	at Indian creek rec. area	
07/05/06	N.F. Tieton		Mobile	at Indian creek rec. area	
07/11/06	N.F. Tieton		Mobile	at Indian creek rec. area	fish middle of res.
08/02/06	Rimrock Lake		Mobile	in the headwaters of the res.	moving down with the water level
08/08/06	Rimrock Lake		Mobile	in the headwaters of the res.	moving down with the water level
08/15/06	Rimrock Lake		Mobile	behind Indian Creek C.G.	moving down with the water level
08/22/06	Rimrock Lake		Mobile	behind Indian Creek C.G.	
09/20/06	Rimrock Lake		Mobile	at 2nd Heritage marker	in the headwater of the res.
09/27/06	Rimrock Lake		Mobile	at 2nd Heritage marker	in the headwater of the res.
10/02/06	Rimrock Lake		Mobile	at the public boat ramp	in the lake, 1 mile down from its headwater
10/10/06	Rimrock Lake		Mobile	up from Snug Harbor	at the upper end of the lake
10/18/06	Rimrock Lake		Mobile	at the 1st Heritage Marker	moved down
10/24/06	Rimrock Lake		Mobile	down from Snug Harbor	moved back up
10/30/06	Rimrock Lake		Mobile	down from Snug Harbor	
11/05/08	Rimrock Lake		Mobile	down from Snug Harbor	high water event -- lake is very muddy
11/15/06	Rimrock Lake		Mobile	down from Snug Harbor	high water event -- lake is very muddy
11/22/06	Rimrock Lake		Mobile	at the 1st Heritage Marker , above the dam	lake is very muddy
11/29/06	Rimrock Lake		Mobile	down from the Cove Resort	the lake is still muddy

12/05/06	Rimrock Lake		Mobile	down from Snug Harbor	
12/20/06	Rimrock Lake		Mobile	down from Snug Harbor	
12/26/06	Rimrock Lake		Mobile	at the 1st Heritage Marker , above the dam	
01/25/07	Rimrock Lake		Mobile	1/2 way between Cove Resort & Snug Harbor	lake is totally froze over
01/30/07	Rimrock Lake		Mobile	1/2 way between Cove Resort & Snug Harbor	coded from the road, backside of the lake
02/12/07	Rimrock Lake		Mobile	right above the Cove Resort	also coded from the road, backside of the lake

Fish # 86 Code 124	Date Tagged 07/26/05	Sex Male	Status Active	Where Tagged Clear Lake Dam Pool	Population Rimrock Lake
Date Found	River Name	R M	Track	Site Description	Comments
08/04/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/09/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/15/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/23/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/30/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/07/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/12/05	N.F. Tieton		Air	Clear Lake Dam outlet pool	By Air
09/21/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/26/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/30/05	N.F. Tieton		Fixed	Clear Lake Dam station	9/30/05 coded from 7:44 to 5:09 on 10/3/05
10/03/05	N.F. Tieton		Mobile	Clear Lake Dam Spill Pool	pool
10/10/05	N.F. Tieton		Mobile	Clear Lake Dam Spill Pool	pool
10/17/05	N.F. Tieton		Mobile	Clear Lake Dam Spill Pool	pool
10/24/05	N.F. Tieton		Mobile	Clear Lake Dam Spill Pool	pool
10/31/05	N.F. Tieton		Mobile	Clear creek proper	?
11/21/05	Rimrock Lake		Mobile	down from Snug Harbor	
12/27/05	Rimrock Lake		Mobile	down from Snug Harbor	
01/17/06	Rimrock Lake		Mobile	Rimrock Res.	
01/23/06	Rimrock Lake		Mobile	down from the Cove Resort	
01/30/06	Rimrock Lake		Mobile	down from the Cove Resort	
02/06/06	Rimrock Lake		Mobile	up from the Rimrock Dam	
02/14/06	Rimrock Lake		Mobile	down from Snug Harbor	
03/27/06	Rimrock Lake		Mobile	down from MP 161	
04/24/06	Rimrock Lake		Mobile	down from Snug Harbor	

05/09/06	Rimrock Lake		Mobile	coded from the back road	
05/15/06	Rimrock Lake		Mobile	at 1st heritage marker	
05/25/06	Rimrock Lake		Mobile	down from Silver Beach Resort	high water event
06/08/06	Rimrock Lake		Mobile	up from the 1st public boat ramp	
06/20/06	Rimrock Lake		Mobile	up from the 2nd Heritage marker	
07/06/06	Rimrock Lake		Mobile	up past Silver Beech, end of res.	
07/11/06	Rimrock Lake		Mobile	above Indian creek campground	fish in middle--at upper end of res.
07/24/06	Rimrock Lake		Mobile	above Indian creek campground	fish in middle--at upper end of res.
08/02/06	Rimrock Lake		Mobile	in the headwater of the res.	moving down with the water level
08/08/06	Rimrock Lake		Mobile	in the headwater of the res.	moving down with the water level
08/15/06	Rimrock Lake		Mobile	behind Indian Creek C.G.	moving down with the water level
08/22/06	Rimrock Lake		Mobile	behind Indian Creek C.G.	
08/29/06	Rimrock Lake		Mobile	behind Indian Creek C.G.	
09/20/06	Indian Creek		Foot	in Indian creek, 1 mile above the Hy. 12 bridge	
09/27/06	Rimrock Lake		Mobile	at 2nd Heritage Marker before Silver Beach	in the headwaters of the lake
10/02/06	Rimrock Lake		Mobile	at 2nd Heritage Marker before Silver Beach	up 1/4 mile above its headwater
10/10/06	Rimrock Lake		Mobile	up from Snug Harbor	at the upper end of the lake
10/18/06	Rimrock Lake		Mobile	up from the Cove Resort	in the middle of the lake
10/24/06	Rimrock Lake		Mobile	above the dam	moved down
11/05/06	Rimrock Lake		Mobile	down from Snug Harbor	high water event -- water is very muddy
11/15/06	Rimrock Lake		Mobile	down from the Cove Resort	high water event -- water is very muddy
11/22/06	Rimrock Lake		Mobile	at 1st heritage marker , above the dam	water is very moddy
11/29/06	Rimrock Lake		Mobile	above the dam	Lake is still muddy
12/20/06	Rimrock Lake		Mobile	at 1st heritage marker , above the dam	
12/26/06	Rimrock Lake		Mobile	down from Snug Harbor	moved up

Fish # 87 Code 69	Date Tagged 07/26/05	Sex Female	Status Active	Where Tagged Clear Lake Dam Pool	Population Rimrock Lake
Date Found	River Name	R M	Track	Site Description	Comments
08/04/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/09/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/15/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/23/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/30/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool

09/07/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/12/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	Air
09/21/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/26/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/30/05	N.F. Tieton		Fixed	Clear Lake Dam station	coded at 5:34 P.M.
10/03/05	N.F. Tieton		Mobile	down from North Clear Lake C.G.	has moved out of pool and down and out of pool
10/10/05	N.F. Tieton		Mobile	down from North Clear Lake C.G.	
10/17/05	N.F. Tieton		Mobile	down from North Clear Lake C.G.	
10/24/05	N.F. Tieton		Mobile	w/code 161 746/ 1200 rd spur	
10/31/05	Rimrock Lake		Mobile	clear creek proper	moving downwards
11/28/05	Rimrock Lake		Mobile	below the Cove Resort	
12/19/05	Rimrock Lake		Mobile	up from South Fork Tieton Rd.	by dam. Located from road across res.
12/27/05	Rimrock Lake		Mobile	by MP 165 far side of lake	
01/09/06	Rimrock Lake		Mobile	Rimrock Lake	
01/30/06	Rimrock Lake		Mobile	down from the Cove Resort	
03/14/06	Rimrock Lake		Mobile	down from Snug Harbor	
05/01/06	Rimrock Lake		Mobile	down from Snug Harbor	
05/15/06	Rimrock Lake		Mobile	down in front of the dam	
05/25/06	Rimrock Lake		Mobile	in lake in front of the dam	high water event

Fish # 90 Code 181	Date Tagged 07/27/05	Sex Female	Status N/A	Where Tagged Clear Lake Dam Pool	Population Rimrock Lake
Date Found	River Name	R M	Track	Site Description	Comments
08/04/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/09/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/15/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/23/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
08/30/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/07/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/12/05	N.F. Tieton		Air	Clear Lake Dam outlet pool	Air
09/20/05	N.F. Tieton		Fixed	Clear Lake Dam station	9/20/05 coded from 7:57 P.M. to 6:12 A.M. on 9/29/05
09/21/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
09/26/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/01/05	N.F. Tieton		Fixed	Clear Lake Dam station	10/1/05 coded from 2:02 P.M. to 7:04 P.M. on 10/2/05

10/03/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/06/05	N.F. Tieton		Fixed	Clear Lake Dam station	10/6/06 coded from 7:01 P.M. to 9:52 P.M. On 10/24/05
10/10/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/17/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/24/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
10/31/05	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	pool
11/21/05	Rimrock Lake		Mobile	below Snug Harbor	
11/28/05	Rimrock Lake		Mobile	down from the Cove Resort	
12/05/05	Rimrock Lake		Mobile	up from Rimrock Dam	
12/27/05	Rimrock Lake		Mobile	at center of lake	by the Cove Resort
01/03/06	Rimrock Lake		Mobile	down from Snug Harbor	
01/17/06	Rimrock Lake		Mobile	Rimrock Res.	
05/09/06	Rimrock Lake		Mobile	Rimrock Res.	
05/15/06	Rimrock Lake		Mobile	by Snug Harbor	
05/25/06	Rimrock Lake		Mobile	at 1st heritage marker up from dam	high water event
05/31/06	Rimrock Lake		Mobile	at 1st heritage marker up from dam	
06/08/06	Rimrock Lake		Mobile	above the 1st boat ramp	coded from the back road
06/20/06	N.F. Tieton		Mobile	by the 1st camp ground below Clear Lake	
06/23/06	N.F. Tieton		Fixed	Clear Lake Dam station	6/23/06 coded from 10:59 P.M. to 8:03 A.M. on 6/29/06
06/26/06	N.F. Tieton		Mobile	by the 1st camp ground below Clear Lake	
07/03/06	N.F. Tieton		Fixed	Clear Lake Dam station	7/3/06 coded from 10:59 P.M. to 11:55 P.M. on 7/17/06
07/06/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
07/11/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	above the bridge --before the dam pool
07/18/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	above the bridge --before the dam pool
07/19/06	N.F. Tieton		Fixed	Clear Lake Dam station	7/19/06 coded from 2:38 A.M. to 4:03 P.M. on 7/21/06
07/24/06	N.F. Tieton		Fixed	Clear Lake Dam station	7/24/06 coded from 1:34 A.M. to 3:17 A.M. on 7/25/06
07/24/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	above the bridge --before the dam pool
08/02/06	N.F. Tieton		Fixed	Clear Lake Dam station	8/2/06 coded from 2:11 A.M. to 9:16 P.M. on 8/7/06
08/02/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/08/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/09/06	N.F. Tieton		Fixed	Clear Lake Dam station	8/9/06 coded from 9:25 P.M. to 9:17 A.M. on 8/11/06
08/13/06	N.F. Tieton		Fixed	Clear Lake Dam station	8/13/06 coded from 12:43 A.M. to 8:05 on 8/14/06
08/15/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/22/06	N.F. Tieton		Fixed	Clear Lake Dam station	8/22/06 coded from 12:37 A.M. to 11:35 P.M. on 8/23/06
08/22/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
08/26/06	N.F. Tieton		Fixed	Clear Lake Dam station	8/26/06 coded from 4:03 P.M. to 10:48 P.M. on 9/20/06
08/29/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	

09/20/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
09/22/06	N.F. Tieton		Fixed	Clear Lake Dam station	9/22/06 coded from 7:05 A.M. to 10:39 A.M. on 9/26/06
09/27/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
09/30/06	N.F. Tieton		Fixed	Clear Lake Dam station	9/30/06 coded from 11:22 A.M. to 9:12 A.M. on 10/1/06
10/02/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	
10/03/06	N.F. Tieton		Fixed	Clear Lake Dam station	10/3/06 coded from 12:51 A.M. to 12:40 P.M. on 12/4/06
10/08/06	N.F. Tieton		Fixed	Clear Lake Dam station	coded from 9:58 A.M. to 11:56 A.M.
10/10/06	N.F. Tieton		Mobile	Clear Lake Dam outlet pool	in same location, since 7/03/06 -- (3 months)
10/11/06	N.F. Tieton		Fixed	Clear Lake Dam station	coded at 5:19 A.M.
10/14/06	N.F. Tieton		Fixed	Clear Lake Dam station	10/14/06 coded from 1:46 P.M. to 10:56 A.M. On 10/17/06
10/18/06	N.F. Tieton		Foot	retrieved tag at Clear Lake Dam outlet pool	left bank, in water, lower pool edge, under the moss

Fish # 91 Code 63	Date Tagged 07/27/05	Sex Male	Status Active	Where Tagged 1/4 mile below Clear Lake Dam	Population Rimrock Lake
Date Found	River Name	R M	Track	Site Description	Comments
08/04/05	N.F. Tieton		Mobile	below north Clear Lake C.G. #6 & #7	
08/09/05	N.F. Tieton		Mobile	moved down river	closer to the edge of the lake
08/15/05	N.F. Tieton		Mobile	moved down closer to Rimrock Lake	still moving down, as the lake level recedes
08/23/05	N.F. Tieton		Mobile	at the end of Indian Creek Dispersed CG	
09/12/05	Rimrock Lake		Mobile	Upper Rimrock Lake - By Air	
09/26/05	Rimrock Lake		Mobile	at 2nd Heritage Marker	
10/03/05	Rimrock Lake		Mobile	at 2nd Heritage Marker before Silver Beach	
10/10/05	Rimrock Lake		Mobile	up from Snug Harbor	following the lake down as it recedes
10/17/05	Rimrock Lake		Mobile	1st pullout above Snug Harbor, Hwy 12	
10/24/05	Rimrock Lake		Mobile	at Snug Harbor	at Mp 162.5
10/31/05	Rimrock Lake		Mobile	Rimrock lake proper in deeper	
11/28/05	Rimrock Lake		Mobile	down from Snug Harbor	
12/27/05	Rimrock Lake		Mobile	at center of lake	
01/03/05	Rimrock Lake		Mobile	down from the Cove Resort	
01/09/06	Rimrock Lake		Mobile	at lower end of the lake	
01/17/06	Rimrock Lake		Mobile	up from Snug Harbor Resort	following the lake down as it recedes
01/23/06	Rimrock Lake		Mobile	down from Snug Harbor	
01/30/06	Rimrock Lake		Mobile	down from Snug Harbor	
02/06/06	Rimrock Lake		Mobile	down from Snug Harbor	

02/14/06	Rimrock Lake		Mobile	down from Snug Harbor	
03/07/06	Rimrock Lake		Mobile	down from Snug Harbor	
03/14/06	Rimrock Lake		Mobile	down from Snug Harbor	
05/01/06	Rimrock Lake		Mobile	at 2nd Heritage Marker	
05/09/06	Rimrock Lake		Mobile	down from Indian creek	
05/15/06	Rimrock Lake		Mobile	up from MP 160	
05/25/06	Rimrock Lake		Mobile	down from Silver Beach	high water event
05/31/06	Rimrock Lake		Mobile	down from Silver Beach	
09/20/06	Rimrock Lake		Mobile	at 2nd Heritage Marker	in the head water of the lake
10/02/06	Rimrock Lake		Mobile	at the public boat ramp, in the lake	1 mile down from its headwater
10/10/06	Rimrock Lake		Mobile	up from Snug Harbor	at the upper end of the lake
10/18/06	Rimrock Lake		Mobile	up from Snug Harbor	at the upper end of the lake

Fish # 93 Code 144	Date Tagged 08/26/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/12/05	Deep Creek		Air	Deep Creek - Near Lake	BY Air
09/15/05	Deep Creek		Foot	Lower Deep Creek	
09/27/05	Deep Creek		Foot	Lower Deep Creek	
10/04/05	Deep Creek		Foot	Lower Deep Creek, at mouth	in same location, since 7/12/05 -- (1 month)
10/12/05	Deep Creek		Foot	retrieved tag and arch.	tag found on top of gravel bar

Fish # 94 Code 147	Date Tagged 08/28/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
10/12/05	Bumping Lake		Boat	upper Bumping Lake	
10/19/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
05/18/06	Bumping Lake		Fixed	Bumping Dam Station	Coded at 6:10 P.M.
05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast

05/24/06	Bumping Lake		Fixed	Bumping Dam Station	5/24/06 coded from 9:10 P.M. to 7:45 A.M. on 5/25/06
06/06/06	Bumping Lake		Mobile	coded from top of dam	
06/12/06	Bumping Lake		Foot	coded from end of road past Bumping store	
06/16/06	Bumping Lake		Fixed	Bumping Dam Station	6/16/06 coded from 5:52 A.M. to 1:35 P.M. on 6/19/06
06/19/06	Bumping Lake		Foot	tag by 1st piling on catwalk to penstock tower	possibly dead, Darrah said he seen a dead fish there
06/20/06	Bumping Lake		Foot	Dill Darrah (B.O.R.) retrieved the tag	He gave the tag to Walt Larrick. Got tag back 06/29/06

Fish # 95 Code 145	Date Tagged 08/31/05	Sex Male	Status N/A	Where Tagged Lower Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	directly above upper Deep Creek Weir	in pool
10/04/05	Deep Creek		Foot	below lower Deep Creek weir site	
06/19/06	Deep Creek		Foot	1/2 mile above Rd. 1800 on Rd. 1808	pred. Death ? - bite marks on antenna
06/22/06	Deep Creek		Foot	1/2 mile above Rd. 1800 - found tag and Arch.	Above twin culverts, under wash out in right bank.

Fish # 96 Code 143	Date Tagged 08/31/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/15/05	Deep Creek		Foot	lower Deep Creek	
09/27/05	Deep Creek		Foot	lower Deep Creek	
10/20/05	Deep Creek		Foot	retrieved tag---found on log	in same location, since 5/19/05 -- (1 month)

Fish # 97 Code 142	Date Tagged 08/31/05	Sex Male	Status Active	Sex Male	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/27/05	Deep Creek		Foot	lower Deep Creek	
10/06/05	Bumping Lake		Mobile	upper end of Bumping lake	

10/12/05	Bumping Lake		Boat	upper Bumping Lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
11/22/05	Bumping Lake		Mobile	upper end of Bumping lake	
12/16/05	Bumping Lake		Fixed	Bumping Dam Station	coded at 9:38 A.M.
12/21/05	Bumping Lake		Fixed	Bumping Dam Station	12/21/05 coded from 6:31 P.M. to 3:59 P.M. on 12 /22/05
12/24/05	Bumping Lake		Fixed	Bumping Dam Station	coded from 1:47 P.M. to 3;41 P.M.
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
05/18/06	Bumping Lake		Fixed	Bumping Dam Station	coded at 6:06 P.M.
05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast - fish farther uplake
06/12/06	Bumping Lake		Foot	coded from end of road past Bumping store	
07/10/06	Bumping Lake		Foot	coded from above Lily Lake	fish at upper end of lake
08/02/06	Bumping Lake		Mobile	in res. up from deep creek outlet	
08/03/06	Bumping Lake		Foot	coded from end of road past Bumping store	
08/16/06	Deep Creek		Mobile	coded from twin culverts--deep creek	fish in lower deep creek
08/21/06	Deep Creek		Mobile	up stream from the twin culverts	deep creek
08/28/06	Deep Creek		Mobile	up stream from the twin culverts	
08/30/06	Deep Creek		Mobile	in the pool, at the twin culverts --deep creek	the fish was with 6 other bull trout
09/26/06	Bumping Lake		Foot	coded from above Lily Lake	fish at upper end of lake
11/18/06	Bumping Lake		Fixed	Bumping Dam Station	11/18/06 coded from 8:28 P.M. to 3:41 A.M. on 11/19/06
11/21/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 1:31 A.M. to 2:26 A.M.

Fish # 98 Code 209	Date Tagged 09/01/05	Sex Male	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Mobile	In pool below culvert	
10/06/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/12/05	Bumping Lake		Boat	upper Bumping Lake	
10/19/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
11/22/05	Bumping Lake		Mobile	upper end of Bumping lake	
12/06/05	Bumping Lake		Fixed	Bumping Dam Station	12/6/05 coded from 5:23 P.M. to 12:01 A.M. on 12/9/05
12/12/05	Bumping Lake		Fixed	Bumping Dam Station	12/12/05 coded from 8:04 P.M. to 7:42 A.M. on 12/15/05
01/18/06	Bumping Lake		Mobile	middle of lake	
03/13/06	Bumping Lake		Mobile	where deep creek runs into lake	tracked from dam

03/23/06	Bumping Lake		Foot	coded from above Lily Lake	upper end of Bumping
05/16/06	Bumping Lake		Mobile	coded from top of dam	high water event
5?17 06	Bumping Lake		Fixed	Bumping Dam Station	coded from 3:46 A.M. to 9:36 A.M.
05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast - fish farther uplake
06/06/06	Bumping Lake		Mobile	coded from the F.S. boat ramp	
06/12/06	Bumping Lake		Foot	coded from end of road past Bumping store	
06/22/06	Bumping Lake		Mobile	coded from top of dam	
06/30/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 12:26 P.M. to 12:40 P.M.
07/04/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 7:10 A.M. to 7:11 A.M.
07/10/06	Bumping Lake		Foot	coded from above Lily Lake	fish at upper end of lake
07/24/06	Deep Creek		Mobile	coded from road --before turn off to Deep Creek	2/3 the way up deep creek--before the twin culvert
07/31/06	Deep Creek		Foot	up from copper creek - found tag & Arch.	in 2" water towards right bank.--still in entral remains

Fish # 99 Code 185	Date Tagged 09/01/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
10/19/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
07/10/06	Bumping Lake		Foot	coded from above Lily Lake	fish in lake , Out from Deep Creek inlet
08/07/06	Bumping Lake		Foot	coded from end of road, past Bumping store	
08/16/06	Deep Creek		Mobile	coded from twin culverts---deep creek	
08/21/06	Bumping Lake		Mobile	coded from F.S. boat ramp	
08/23/06	Bumping Lake		Foot	coded from deep creek outlet into lake	fish in lake , Out from Deep Creek inlet
08/28/06	Bumping Lake		Mobile	in lake, by deep creek	
09/18/06	Deep Creek		Mobile	in deep creek, below the culverts	
09/25/06	Deep Creek		Foot	found tag about 100 yds. above culverts	in 2 to 3 in. of water, right bank, next to a redd

Fish # 100 Code 186	Date Tagged 09/01/05	Sex Female	Status Active	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments

10/06/05	Bumping Lake	Mobile	upper end of Bumping lake	
10/12/05	Bumping Lake	Boat	upper Bumping Lake	
10/19/05	Bumping Lake	Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake	Mobile	upper end of Bumping lake	
11/22/05	Bumping Lake	Mobile	upper end of Bumping lake	
01/18/06	Bumping Lake	Mobile	upper end of Bumping lake	
03/03/06	Bumping Lake	Fixed	Bumping Dam Station	3/3/06 coded from 8:39 A.M. to 1:17 P.M. on 3/4/06
03/20/06	Bumping Lake	Mobile	between both boat ramps - in middle of Res.	from road on dam
03/23/06	Bumping Lake	Foot	coded from above Lily Lake	upper end of Bumping
05/23/06	Bumping Lake	Mobile	coded from top of dam	high water - overcast
07/10/06	Bumping Lake	Foot	coded from above Lily Lake	fish in middle of lake., off from the point
08/07/06	Bumping Lake	Foot	coded from end of road,past Bumping store	
08/16/06	Bumping Lake	Foot	coded from end of road,past Bumping store	
08/21/06	Bumping Lake	Mobile	coded from F.S. boat ramp	
08/28/06	Bumping Lake	Mobile	in lake, by deep creek	
09/26/06	Bumping Lake	Foot	coded from above Lily Lake	fish moving towards upper end of lake
10/26/06	Bumping Lake	Foot	coded from above Lily Lake	
11/21/06	Bumping Lake	Mobile	coded from the dam	

Fish # 101 Code 187	Date Tagged 09/01/05	Sex Male	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	down stream of lower Deep Creek Weir	
09/15/05	Deep Creek		Foot	Deep Creek	
09/27/05	Deep Creek		Foot	lower Deep Creek	
10/04/05	Deep Creek		Foot	lower Deep Creek, at mouth	
10/12/05	Deep Creek		Foot	retrieved tag in water next to a redd	in same location, since 9/27/05 -- (1 month)

Fish # 102 Code 184	Date Tagged 09/01/05	Sex Female	Status Active	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments

09/06/05	Deep Creek		Foot	up stream of lower Deep Creek Weir	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
06/06/06	Bumping Lake		Mobile	coded from the F.S. boat ramp	
06/11/06	Bumping Lake		Fixed	Bumping Dam Station	coded at 2:56 P.M.
06/12/06	Bumping Lake		Foot	coded from end of road past Bumping store	
07/05/06	Bumping Lake		Mobile	coded from the F.S. boat ramp	
08/16/06	Bumping Lake		Foot	coded from end of road past Bumping store	
08/21/06	Bumping Lake		Mobile	coded from the F.S. boat ramp	
08/28/06	Bumping Lake		Mobile	in lake, by deep creek	

Fish # 103 Code 70	Date Tagged 09/02/05	Sex Male	Status N/A	Sex Male	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	right above lower Deep Creek Weir	
09/15/05	Deep Creek		Mobile	at culvert at Deep Creek	
09/27/05	Deep Creek		Foot	below lower weir - Deep Creek	
10/04/05	Deep Creek		Foot	below lower weir - Deep Creek	
12/26/05	Bumping Lake		Fixed	Bumping Dam Station	coded at 10:20 A.M.
10/20/06	Deep Creek		Foot	on gravel next to stream, bite marks on antenna	in same location, since 9/27/05 -- (13 months)

Fish # 104 Code 183	Date Tagged 09/02/05	Sex Male	Status Active	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Mobile	pool below culvert	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast
05/30/06	Bumping Lake		Mobile	coded from top of dam	
06/06/06	Bumping Lake		Mobile	coded from top of dam	
06/12/06	Bumping Lake		Foot	coded from end of road past Bumping store	

07/10/06	Bumping Lake		Mobile	coded from F. S. boat ramp	fish up towards the point
07/24/06	Deep Creek		Mobile	in deep creek pool at the twin culverts	just under the left culvert
08/01/06	Bumping Lake		Foot	down stream of copper creek bridge	moved up
08/16/06	Bumping Lake		Foot	coded from end of road past Bumping store	moved back out of deep creek - into lake
08/21/06	Bumping Lake		Mobile	coded from F. S. boat ramp	
08/23/06	Bumping Lake		Foot	coded at deep creek outlet into lake	fish by outlet in lake
08/28/06	Bumping Lake		Foot	in lake, by deep creek	
08/31/06	Deep Creek		Mobile	in pool at twin culverts	with other bull trout
09/26/06	Bumping Lake		Foot	coded from above lily lake	towards upper end of lake
10/26/06	Bumping Lake		Foot	coded from above lily lake	towards upper end of lake

Fish # 105 Code 67	Date Tagged 09/03/05	Sex Male	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	In pool directly above Upper Deep Creek Weir	
09/15/05	Deep Creek		Foot	lower Deep Creek	
08/23/06	Deep Creek		Foot	lower deep creek, --- tag not recovered	in same location, since 9/15/05 -- (11 months)

Fish # 106 Code 190	Date Tagged 09/03/05	Sex Male	Status Active	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	pool above culvert	
10/12/05	Bumping Lake		Boat	upper Bumping Lake	
10/19/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
12/22/05	Bumping Lake		Fixed	Bumping Dam Station	coded at 1:01 P.M.
12/27/05	Bumping Lake		Fixed	Bumping Dam Station	coded from 1:15 P.M. to 1:32 P.M.
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
05/12/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 6:16 A.M. to 1:48 P.M.
05/15/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 7:05 P.M. to 7:58 P.M.
05/16/06	Bumping Lake		Mobile	coded from top of dam	high water event

05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast
05/29/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 9:22 P.M. to 9:29 P.M.
05/30/06	Bumping Lake		Mobile	coded from top of dam	
06/06/06	Bumping Lake		Mobile	coded from top of dam	
06/10/06	Bumping Lake		Fixed	Bumping Dam Station	10:32 P.M. to 10:47 P.M.
06/22/06	Bumping Lake		Fixed	Bumping Dam Station	coded from 6:23 A.M. to 6:25 A.M.
07/10/06	Bumping Lake		Foot	coded from above Lily lake	fish off from middle point in lake
08/01/06	Bumping Lake		Mobile	in lake up from deep creek outlet	
08/07/06	Bumping Lake		Foot	coded at end of road, past Bumping store	
08/16/06	Bumping Lake		Foot	coded at end of road, past Bumping store	
08/21/06	Bumping Lake		Mobile	coded from F.S. boat ramp	
08/23/06	Bumping Lake		Foot	coded from deep creek outlet into lake	fish by outlet in lake
08/28/06	Deep Creek		Mobile	in deep creek, up from lake	
09/18/06	Bumping Lake		Mobile	coded from dam, fish in lake by deep creek	
09/25/06	Bumping Lake		Foot	coded at end of road, past Bumping store	towards upper end of lake
09/26/06	Bumping Lake		Foot	coded from above Lily lake	by deep creek outlet , out in the lake
10/09/06	Bumping Lake		Foot	coded at end of road, past Bumping store	by deep creek outlet , out in the lake
10/17/06	Bumping Lake		Mobile	coded from top of dam	by deep creek outlet , out in the lake
10/23/06	Bumping Lake		Mobile	coded from top of dam	by deep creek outlet , out in the lake
10/30/06	Bumping Lake		Mobile	coded from top of dam	by deep creek outlet , out in the lake
11/08/06	Bumping Lake		Mobile	coded from top of dam -- high water	by deep creek outlet , out in the lake
11/22/06	Bumping Lake		Mobile	coded from top of dam	fish location the same, has not moved ?
02/08/07	Bumping Lake		Mobile	coded from top of dam	fish off from middle point in lake, by deep creek outlet
03/20/07	Bumping Lake		Mobile	coded from top of dam	fish off from middle point in lake, by deep creek outlet
03/28/07	Bumping Lake		Mobile	coded from top of dam	fish off from middle point in lake, by deep creek outlet

Fish # 107 Code 149	Date Tagged 09/04/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/15/05	Deep Creek		Mobile	below culvert -Deep Creek	
09/27/05	Deep Creek		Foot	below lower weir site - Deep Creek	
10/04/05	Deep Creek		Foot	Deep Creek at lower weir site	
05/08/06	Deep Creek		Mobile	coded from top of dam, by station	
05/30/06	Deep Creek		Mobile	coded from Deep Creek road	coded just before turn off to Rd 1800

06/19/06	Deep Creek		Mobile	coded from Deep Creek road	in same location, since 9/27/05 -- (9 months)
06/22/06	Deep Creek		Foot	coded from Deep Creek road	Tag up under log jam close to bank. Tracked 10/12/05

Fish # 108 Code 205	Date Tagged 09/05/05	Sex Male	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/06/05	Deep Creek		Foot	In pool directly above Upper Deep Creek Weir	
10/06/05	Bumping Lake		Mobile	end of Bumping lake	
11/22/05	Bumping Lake		Mobile	upper end of Bumping lake	
05/23/06	Bumping Lake		Mobile	coded from top of dam	high water - overcast
06/22/06	Bumping Lake		Mobile	coded from top of dam	
08/01/06	Deep Creek		Foot	just up from twin culverts--deep creek	in deep creek
08/16/06	Deep Creek		Mobile	about 1 mile above copper creek	
08/21/06	Deep Creek		Mobile	above copper creek	
09/18/06	Deep Creek		Foot	in deep creek, 1 mile up, past copper creek	
09/25.06	Deep Creek		Foot	found tag 1 mile up past copper creek	on left bank, out of the water, in deep creek

Fish # 109 Code 189	Date Tagged 09/14/05	Sex Female	Status N/A	Where Tagged Upper Deep Creek	Population Bumping Lake
Date Found	River Name	R M	Track	Site Description	Comments
09/15/05	Deep Creek		Foot	Deep Creek - on redd with smaller male	With 2-juveniles & a larger male - in pool
10/06/05	Bumping Lake		Mobile	end of Bumping lake	
10/12/05	Bumping Lake		Boat	upper Bumping Lake	
10/19/05	Bumping Lake		Mobile	upper end of Bumping lake	
10/25/05	Bumping Lake		Mobile	upper end of Bumping lake	
11/22/05	Bumping Lake		Mobile	upper end of Bumping lake	
01/04/06	Bumping Lake		Fixed	Bumping Dam Station	1/4/06 coded from 3:51 P.M. to 10:41 A.M. on 1/6/06
01/18/06	Bumping Lake		Mobile	upper end of Bumping lake	
07/10/06	Bumping Lake		Foot	coded from above Lily Lake	fish at upper end of lake
08/01/06	Bumping Lake		Mobile	up, off from point, from deep creek inlet	
08/16/06	Bumping Lake		Foot	coded from above Lily Lake	

08/23/06	Bumping Lake		Foot	coded from deep creek outlet into lake	fish by outlet in lake
08/28/06	Bumping Lake		Mobile	in lake, by deep creek	
08/31/06	Deep Creek		Foot	down stream of the pool at twin culverts	at deep creek
09/02/06	Deep Creek		Mobile	in pool at twin culverts--deep creek	fish with about 10 other bull trout
09/05/06	Deep Creek		Foot	fish just up stream of the original tag site	surgically removed tag and arch. & released the fish

Fish # 110 Code 206	Date Tagged 11/13/05	Sex Female	Status Active	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/12/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/19/05	Naches	16.0	Mobile	down river of Wapataux Diversion Dam	
01/09/06	Naches	9.1	Mobile	up river of Naches Water Treatment Plant	
01/17/06	Naches	9.2	Mobile	up river of Naches Water Treatment Plant	
01/23/06	Naches	9.1	Mobile	up river of Naches Water Treatment Plant	
01/30/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
02/06/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
02/14/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
02/21/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
02/27/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
03/07/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
03/13/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
03/20/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
03/28/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
04/03/06	Naches	9.3	Mobile	up river of Naches Water Treatment Plant	
04/10/06	Naches	9.3	Mobile	down river of Naches Water Treatment Plant	
04/18/06	Naches	9.3	Mobile	down river of Naches Water Treatment Plant	
04/24/06	Naches	9.3	Mobile	down river of Naches Water Treatment Plant	
05/01/06	Naches	9.6	Mobile	across from old Naches power plant	
05/15/06	Naches	9.6	Mobile	across from old Naches power plant	
05/25/06	Naches	9.6	Mobile	across from old Naches power plant	high water event
05/31/06	Naches	9.6	Mobile	across from old Naches power plant	

06/07/06	Naches	9.6	Mobile	across from old Naches power plant	
06/13/06	Naches	11.2	Mobile	up river of Cleman's Sports Complex	
06/20/06	Naches	16.0	Mobile	down river of Wonderland bridge	
07/02/06	Naches	17.5	Fixed	Tieton/Naches station	coded from 12:19 P.M. to 2:16 P.M.
07/05/06	Naches	21.2	Mobile	above MP 112	
07/08/06	Rattlesnake	27.8	Fixed	Rattlesnake/Naches station	7/8/06 coded from 12:25 A.M. to 12:27 A.M. on 7/9/06
07/19/06	Rattlesnake	6.0	Mobile	up the Rattlesnake 6 miles	
07/24/06	Rattlesnake	6.5	Mobile	up the Rattlesnake 6 1/2 miles	
08/02/06	Rattlesnake	6.5	Mobile	up the Rattlesnake 6 1/2 miles	
08/22/06	Rattlesnake	6.5	Mobile	up the Rattlesnake 6 1/2 miles	
08/29/06	Rattlesnake	6.5	Mobile	up the Rattlesnake 6 1/2 miles	
09/06/06	Rattlesnake	6.5	Mobile	up the Rattlesnake 6 1/2 miles	
09/12/06	Rattlesnake	10.0	Mobile	at the Rattlesnake trail head	
09/21/06	Rattlesnake	11.0	Foot	coded from rock peak, above Rd. 1504 washout	off from the Bethel ridge road
09/25/06	Rattlesnake	27.8	Fixed	Rattlesnake/Naches station	coded from 4:44 A.M. to 2:44 P.M.
09/26/06	Naches	27.7	Mobile	down river of the Rattlesnake station	
10/04/06	Naches	27.7	Mobile	down river of the Rattlesnake station	
10/09/06	Naches	27.7	Mobile	down river of the Rattlesnake station	
10/17/06	Naches	27.7	Mobile	down river of the Rattlesnake station	
10/23/06	Naches	17.0	Mobile	at Wapataux -- in pool	Did not code at the Tieton/Naches fixed station
10/26/06	Naches	12.0	Mobile	coded from top of the Naches grade	
10/30/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	
11/05/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	high water event
11/13/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	high water event
11/21/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	high water event
11/29/06	Naches	7.8	Foot	1/2 mile up river from Naches Hatchery	in slower moving channel of river , on the right bank
12/05/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	
12/12/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	
12/18/06	Naches	7.8	Mobile	1/2 mile up river from Naches Hatchery	
12/26/06	Naches	8.5	Mobile	1 mile up river from Naches Hatchery	moved up
01/10/07	Naches	8.5	Mobile	1 mile up river from Naches Hatchery	
01/18/07	Naches	8.5	Mobile	1 mile up river from Naches Hatchery	
01/23/07	Naches	8.5	Mobile	1 mile up river from Naches Hatchery	
01/30/07	Naches	8.5	Mobile	1 mile up river from Naches Hatchery	
02/05/07	Naches	7.8	Mobile	1/2 mile up river from the Naches Hatchery	
02/12/07	Naches	7.8	Mobile	1/2 mile up river from the Naches Hatchery	
02/20/07	Naches	8.5	Mobile	1 mile up river from the Naches Hatchery	

02/26/07	Naches	8.5	Mobile	1 mile up river from the Naches Hatchery	
03/05/07	Naches	8.5	Mobile	1 mile up river from the Naches Hatchery	this tag still in same area since 10/30/06
03/12/07	Naches	8.5	Foot	1 mile up river from the Naches Hatchery	High water event-by edge of channel (in the rocks?)
03/22/07	Naches		Foot	Same as--GPS taken next to river channel	High water-Tracked to same location as on 11/29/07
03/28/07	Naches		Foot	same as-tracked to rock edge of the river channel	tag is under the big boulders at the channels edge
04/10/07	Naches		Foot	same as-tracked to rock edge of the river channel	tag is under the big boulders at the channels edge
04/12/07	Naches		Foot	same as-tracked to rock edge of the river channel	tag is under the big boulders at the channels edge
04/19/07	Naches		Foot	same as-tracked to rock edge of the river channel	tag is under the big boulders at the channels edge
04/27/07	Naches		Foot	same as-tracked to rock edge of the river channel	tag is under the big boulders at the channels edge

Fish # 111 Code 188	Date Tagged 11/13/05	Sex Male ?	Status N/A	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/12/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/19/05	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
12/27/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/03/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/09/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/17/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/23/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/30/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
02/06/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
02/13/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
02/21/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
02/27/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
03/07/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
03/13/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
03/20/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
03/27/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
04/03/06	Naches	17.1	Mobile	up river of Wapataux Diversion Dam	
04/10/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	

04/18/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
04/24/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
05/01/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
05/15/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
05/25/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	high water event
05/30/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
06/07/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
06/12/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
06/20/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
07/05/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
07/10/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
07/18/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
07/24/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
08/01/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
08/07/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	in same location, since 11/16/05 -- (9 months)
08/08/06	Naches	17.0	Foot	found tag on right bank, just below the div. Dam	up in the rocks, about 5' above the water

Fish # 112 Code 207	Date Tagged 11/13/05	Sex Female	Status N/A	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/12/05	Naches	16.8	Mobile	down river of Wapataux Diversion Dam	
12/19/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/27/05	Naches	16.7	Mobile	down river of Wapataux Diversion Dam	
01/03/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/09/06	Naches	16.4	Mobile	up river from the Naches river bridge	
01/17/06	Naches	16.4	Mobile	up river from the Naches river bridge	
01/23/06	Naches	16.4	Mobile	up river from the Naches river bridge	
01/30/06	Naches	16.4	Mobile	up river from the Naches river bridge	
02/06/06	Naches	16.4	Mobile	up river from the Naches river bridge	
02/13/06	Naches	16.4	Mobile	up river from the Naches river bridge	
02/21/06	Naches	16.4	Mobile	up river from the Naches river bridge	
02/27/06	Naches	16.4	Mobile	up river from the Naches river bridge	

03/07/06	Naches	16.4	Mobile	up river from the Naches river bridge	
03/13/06	Naches	16.4	Mobile	up river from the Naches river bridge	
03/20/06	Naches	16.4	Mobile	up river from the Naches river bridge	
03/27/06	Naches	16.4	Mobile	up river from the Naches river bridge	
04/03/06	Naches	16.4	Mobile	up river from the Naches river bridge	
04/10/06	Naches	16.4	Mobile	up river from the Naches river bridge	
04/18/06	Naches	16.4	Mobile	up river from the Naches river bridge	
04/24/06	Naches	16.4	Mobile	up river from the Naches river bridge	
05/01/06	Naches	16.4	Mobile	up river from the Naches river bridge	
05/15/06	Naches	16.4	Mobile	up river from the Naches river bridge	
06/13/06	Naches	16.4	Mobile	up river from the Naches river bridge	
06/20/06	Naches	16.4	Mobile	up river from the Naches river bridge	
07/05/06	Naches	16.4	Mobile	up river from the Naches river bridge	
07/24/06	Naches	16.4	Mobile	up river from the Naches river bridge	
08/01/06	Naches	16.4	Mobile	up river from the Naches river bridge	
08/15/06	Naches	16.4	Mobile	up river from the Naches river bridge	
08/21/06	Naches	16.4	Mobile	up river from the Naches river bridge	
08/29/06	Naches	16.4	Mobile	up river from the Naches river bridge	
09/06/06	Naches	16.4	Mobile	up river from the Naches river bridge	
09/18/06	Naches	16.4	Mobile	up river from the Naches river bridge	
09/26/06	Naches	16.4	Mobile	up river from the Naches river bridge	
10/02/06	Naches	16.4	Mobile	up river from the Naches river bridge	
10/09/06	Naches	16.4	Foot	the tag is above the Naches bridge	in same location, since 6/13/06 -- (4 months)
10/11/06	Naches	16.4	Foot	recovered tag---1/4 mile up from bridge	on middle gravel bar, 2 feet under the rocks and gravel

Fish # 113 Code 187	Date Tagged 11/13/05	Sex Male	Status Active	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	1.0	Mobile	at 40th ave./ Hy. 12 intersection	
12/06/05	Naches	1.0	Mobile	at 40th ave./ Hy. 12 intersection	
12/12/05	Naches	1.0	Mobile	at 40th ave./ Hy. 12 intersection	
12/19/05	Naches	1.0	Mobile	at 40th ave./ Hy. 12 intersection	

01/09/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
01/30/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
02/06/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
02/14/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
02/21/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
02/27/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
03/07/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
03/14/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
03/20/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
03/28/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
04/03/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
04/10/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
04/18/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
04/24/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
05/01/06	Naches	2.2	Mobile	at 40th ave./ Hy. 12 intersection	
05/08/06	Naches	3.1	Mobile	moved up river, above 40th ave.	
05/15/06	Naches	6.0	Mobile	down river from the Naches Hatchery	
05/25/06	Naches	6.0	Mobile	down river from the Naches Hatchery	high water event
05/31/06	Naches	9.5	Mobile	between Naches water & power plant	
06/07/06	Naches	12.2	Mobile	down river of 1st Fruit stand in Naches	moving up
06/11/06	Naches	17.7	Fixed	Tieton/Naches station	coded from 6:20 P.M. to 7:26 P.M.
06/12/06	Naches	17.0	Mobile	at Wapataux spillway	
06/19/06	Naches	24.5	Mobile	above M.P.111	
06/20/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 3:41 A.M. to 6:51 P.M.
09/18/06	Naches	27.8	Fixed	Rattlesnake/Naches station	9/18/06 coded from 11:56 P.M. to 2:44 P.M. on 9/25/06
09/26/06	Naches	27.9	Mobile	by the rattlesnake station	
10/04/06	Naches	28.1	Mobile	1/2 mile up river of the Rattlesnake station	
10/09/06	Naches	28.1	Mobile	1/2 mile up river of the Rattlesnake station	
10/17/06	Naches	28.1	Mobile	1/2 mile up river of the Rattlesnake station	
10/23/06	Naches	29.0	Mobile	1 mile up river of the Rattlesnake station	
10/30/06	Naches	29.0	Mobile	1 mile up river of the Rattlesnake station	
11/08/06	Naches	29.0	Mobile	at Mp 107 - up river of Rattlesnake station	high water event
11/13/06	Naches	29.7	Mobile	at Mp 107 - up river of Rattlesnake station	high water event
11/21/06	Naches	29.9	Mobile	down river of Pleasant Valley gravel site	
11/27/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded at 11:08 P.M.
11/27/06	Naches	27.7	Mobile	by the Rattlesnake station	
11/30/06	Naches	22.9	Mobile	at Mp112 - down river of lower Nile road	

12/05/06	Naches	23.4	Mobile	3.5 miles down river of the Woodshed Rest.	
12/12/06	Naches	23.4	Mobile	3.5 miles down river of the Woodshed Rest.	
12/18/06	Naches	8.2	Mobile	down river of Naches Water Treatment Plant	Did not code at the Tieton/Naches fixed station
12/26/06	Naches	7.1	Mobile	down river of Naches Water Treatment Plant	
01/10/07	Naches		Mobile	down river of Naches Water Treatment Plant	
01/18/07	Naches		Mobile	down river of Naches Water Treatment Plant	
01/23/07	Naches		Mobile	down river of Naches Water Treatment Plant	
01/30/07	Naches		Mobile	by Eschback Park	coded from back road at Eschback Park
02/05/07	Naches		Mobile	1 mile up river from the Naches Hatchery	moving down
02/12/07	Naches		Mobile	1 mile up river from the Naches Hatchery	
02/20/07	Naches		Mobile	down river of the Naches Water Treatment Plant	moved back up
02/26/07	Naches		Mobile	down river of the Naches Water Treatment Plant	
03/05/07	Naches		Mobile	down river of the Naches Water Treatment Plant	
03/12/07	Naches		Mobile	down river of the Naches Water Treatment Plant	high water event
03/22/07	Naches		Foot	down river of the Naches Water Treatment Plant	GPS reading taken next to the river---High water event
03/28/07	Naches		Mobile	down river of the Naches Water Treatment Plant	
04/05/07	Naches	8.2	Mobile	down river of the Naches Water Treatment Plant	Near Kershaw Road
04/10/07	Naches	9.9	Mobile	.5 mile upriver Power Plant outfall	
04/12/07	Naches	11.0	Mobile	.25 mile upriver Highway 12/Locust Rd	
04/19/07	Naches	11.0	Mobile	.25 mile upriver Highway 12/Locust Rd	
04/27/07	Naches	15.5	Mobile	Little Red Schoolhouse	
05/17/07	Naches	24.2	Mobile	1/2 mile upriver from MP 111	

Fish # 114 Code 177	Date Tagged 11/13/05	Sex Female	Status Active	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/12/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/19/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/27/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/10/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	
01/23/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	

01/30/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	
02/06/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	
02/14/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	
02/21/06	Naches	11.8	Mobile	Downriver of Naches, 2/4 lane change	
02/27/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	moved down
03/07/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	
03/13/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	
03/20/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	
03/28/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	
04/03/06	Naches	12.0	Mobile	up river of Clemans Sports Complex	
04/10/06	Naches	12.7	Mobile	up river from the Naches bridge	
04/18/06	Naches	12.7	Mobile	up river from the Naches bridge	
04/24/06	Naches	12.3	Mobile	down river of the Naches bridge	
05/01/06	Naches	14.5	Mobile	up river of Layman Lumber	
05/15/06	Naches	17.0	Mobile	Wapataux	
05/23/06	Naches	19.2	Mobile	at MP 110	Did not code at the Tieton/Naches fixed station
05/30/06	Naches	25.0	Mobile	up river from MP 115 - Hy 410	still moving up
05/31/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 3:33 P.M. to 3:49 P.M.
06/06/06	Naches	38.3	Mobile	upper Jefferson pool	still moving up
06/12/06	Bumping	43.9	Mobile	above Halfway Flats C.G. in Bumping river	Did not code at the Bumping/Little Naches fixed station
06/19/06	American	2.0	Mobile	before M.P.87, just up past Bumping Road	
07/17/06	American	13.2	Mobile	1/2 mile before Lodgepole C.G.	
07/24/06	American	13.2	Mobile	1/2 mile before Lodgepole C.G.	
08/01/02	American	15.2	Mobile	at Mestachee creek road	
08/07/06	American	15.2	Mobile	at Mestachee creek road	
08/30/06	American	15.2	Mobile	at Mestachee creek road	
09/06/06	American	15.2	Mobile	at Mestachee creek road	
09/12/06	American	13.6	Mobile	behind Lodgepole C.G.-- at the spring	
09/18/06	American	10.9	Mobile	down river of Union creek	
09/25/06	American	2.7	Mobile	behind Indian Flats Res. Site	
10/03/06	American	2.8	Mobile	up river from Indian Flats Res. Site	GPS taken next to the river
10/09/06	American	2.8	Mobile	up river from Indian Flats Res. Site	
10/17/06	American	2.8	Mobile	up river from Indian Flats Res. Site	
10/23/06	American	2.8	Mobile	up river from Indian Flats Res. Site	walked down to river and checked on fish
10/30/06	Bumping	6.4	Mobile	2 1/4 miles up the Bumping river	
11/02/06	Bumping	17.0	Fixed	Bumping Dam Station	11/2/06 coded from 8:42 P.M. to 5:34 P.M. on 11/5/06
11/08/06	Bumping	16.9	Mobile	in pool , at Bumping dam outlet	high water event

11/13/06	Bumping	16.9	Mobile	in pool , at Bumping dam outlet	high water event
11/14/06	Bumping	17.0	Fixed	Bumping Dam Station	11/14/06 coded from 5:45 A.M. to 8:56 P.M. on 11/15/06
11/17/06	Bumping	17.0	Fixed	Bumping Dam Station	coded from 6:27 A.M. to 12:23 P.M.
11/19/06	Bumping	17.0	Fixed	Bumping Dam Station	coded at 8:50 A.M.
11/21/06	Bumping	17.0	Fixed	Bumping Dam Station	coded from 2:32 A.M. to 7:47 P.M.
11/23/06	Bumping	17.0	Fixed	Bumping Dam Station	11/23/06 coded from 11:10 A.M. to 6:31 P.M. on 12/3/06
11/21/06	Bumping	16.9	Mobile	down river of Bumping dam spillway pool	high water event
11/30/06	Bumping	16.9	Mobile	down river of Bumping dam spillway pool	
12/05/06	Bumping	16.9	Mobile	in pool , below Bumping dam outlet	Bumping/little Naches fixed station -N/A
12/27/06	Bumping	0.3	Mobile	1/2 mile up river of the Little Naches station	in the Bumping river
01/18/07	Naches		Mobile	2-1/2 miles up river of Whistling Jacks	above MP 94
01/23/07	Naches		Mobile	2-1/2 miles up river of Whistling Jacks	above MP 94
01/31/07	Naches		Mobile	2-1/2 miles up river of Whistling Jacks	above MP 94
02/08/07	Naches		Mobile	7/10ths mile down river of Sawmill Flats C,G.	
02/14/07	Naches		Mobile	7/10ths mile down river of Sawmill Flats C,G.	
02/22/07	Naches		Mobile	7/10ths mile down river of Sawmill Flats C,G.	
02/27/06	Naches		Mobile	7/10ths mile down river of Sawmill Flats C,G.	
03/06/07	Naches		Mobile	7/10ths mile down river of Sawmill Flats C,G.	On track-3/13/07-did not code at R/N fixed station
03/13/07	Naches		Mobile	down river from the upper Nile road	High water event - moved down river about 11 miles
03/20/07	Naches	22.0	Mobile	upriver of Horseshoe bend,1/2 mile above Mp113	High water event - still moving down river
03/28/07	Naches	22.0	Mobile	upriver of Horseshoe bend,1/2 mile above Mp113	High water event - still moving down river
04/05/07	Naches	22.0	Mobile	upriver of Horseshoe bend,1/2 mile above Mp113	
04/19/07	Naches	22.0	Mobile	upriver of Horseshoe bend,1/2 mile above Mp113	
05/17/07	Naches	22.0	Mobile	upriver of Horseshoe bend,1/2 mile above Mp113	

Fish # 115	Date Tagged	Sex	Status	Where Tagged	Population
Code 179	11/13/05	Female	N/A	Tieton Pool	???
Date Found	River Name	R M	Track	Site Description	Comments
12/12/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	coded this fish only once

Fish # 116	Date Tagged	Sex	Status	Where Tagged	Population
------------	-------------	-----	--------	--------------	------------

Code 176	11/13/05	Female	N/A	Tieton Pool	???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
01/03/06	Naches	16.2	Mobile	down river of Naches Wonderland bridge	
01/09/06	Naches	16.2	Mobile	down river of Naches Wonderland bridge	
01/30/06	Naches	16.3	Mobile	down river of Naches Wonderland bridge	
02/06/06	Naches	16.3	Mobile	down river of Naches Wonderland bridge	
02/21/06	Naches	14.8	Mobile	down river of Naches Wonderland bridge	Moved down
04/03/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
04/10/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
04/18/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
04/24/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
05/01/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
05/15/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
05/25/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	high water event
05/30/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
06/07/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
06/12/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
06/20/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
07/05/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
07/11/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
07/19/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
07/24/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	
08/02/06	Naches	16.4	Mobile	down river of Naches Wonderland bridge	in same location, since 1/3/06 -- (7 months)
08/09/06	Naches	16.3	Foot	found tag down from the Wonderland bridge	found on left bank, about 4' from water

Fish # 117	Date Tagged	Sex	Status	Where Tagged	Population
Code 150	11/13/05	Male	N/A	Tieton Pool	???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	16.5	Mobile	down river of Wapataux Diversion Dam	
12/12/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	

12/19/05	Naches	17.6	Mobile	up river of Wapataux Diversion Dam	
12/27/05	Naches	13.0	Mobile	up river from the Naches river bridge	
01/03/06	Naches	12.5	Mobile	up river from the Naches river bridge	
01/09/06	Naches	12.3	Mobile	up river of Clemans Sports Complex	
01/17/06	Naches	12.3	Mobile	up river of Clemans Sports Complex	
01/23/06	Naches	12.3	Mobile	up river of Clemans Sports Complex	
01/30/06	Naches	11.8	Mobile	up river of Clemans Sports Complex	
02/06/06	Naches	11.8	Mobile	up river of Clemans Sports Complex	
02/14/06	Naches	11.8	Mobile	up river of Clemans Sports Complex	
02/21/06	Naches	12.1	Mobile	up river of Clemans Sports Complex	
02/27/06	Naches	13.3	Mobile	down river from Layman Lumber	moved up
03/07/06	Naches	13.3	Mobile	down river from Layman Lumber	
03/13/06	Naches	13.6	Mobile	up river from Layman Lumber	
03/20/06	Naches	13.6	Mobile	up river from Layman Lumber	
03/27/06	Naches	13.6	Mobile	up river from Layman Lumber	
04/03/06	Naches	13.6	Mobile	up river from Layman Lumber	
04/10/06	Naches	13.6	Mobile	up river from Layman Lumber	
04/18/06	Naches	13.6	Mobile	up river from Layman Lumber	
04/24/06	Naches	13.6	Mobile	up river from Layman Lumber	
05/01/06	Naches	13.6	Mobile	up river from Layman Lumber	
05/15/06	Naches	14.9	Mobile	up river from Layman Lumber	
05/25/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	high water event
05/31/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
06/07/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
06/13/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
06/20/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
07/05/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
07/11/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
07/19/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
07/24/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
08/01/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
08/15/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
08/21/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
08/29/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
09/06/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
09/18/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
09/26/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	

10/02/06	Naches	14.9	Mobile	up river of 1st fruit stand, above Naches	
10/04/06	Naches	14.9	Foot	located tag area,dug for the tag, could not find	in same location, since 5/25/06 -- (5 months)
10/11/06	Naches	14.9	Foot	recovered tag --- at the Clark diversion dam	under 10" of gravel and rock. On gravel bar--left bank--

Fish # 118 Code 146	Date Tagged 11/14/05	Sex Female	Status N/A	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	10.2	Mobile	down river of Clemans Sports Complex	
12/06/05	Naches	10.2	Mobile	down river of Clemans Sports Complex	
12/27/05	Naches	3.6	Mobile	by Nelson Springs	down river of Cowichie Diversion Dam
01/09/06	Naches	3.6	Mobile	by Nelson Springs	
01/17/06	Naches	3.6	Mobile	by Nelson Springs	
01/23/06	Naches	3.6	Mobile	by Nelson Springs	
01/30/06	Naches	3.6	Mobile	by Nelson Springs	
02/06/06	Naches	3.6	Mobile	by Nelson Springs	
02/13/06	Naches	3.6	Mobile	by Nelson Springs	
02/21/06	Naches	2.6	Mobile	down river from 40th ave.	moved down
02/27/06	Naches	3.5	Mobile	by Nelson Springs	Moved back up towards bridge
03/07/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
03/14/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
03/20/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
03/28/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
04/03/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
04/10/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
04/18/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
04/24/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
05/01/06	Naches	3.7	Mobile	at Cowiche Diversion Dam	
05/08/06	Naches	2.7	Mobile	between dam and 40th ave.	
05/15/06	Naches	2.7	Mobile	above 40th ave.	
05/25/06	Naches	2.7	Mobile	above 40th ave.	high water event
05/31/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
06/07/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	

06/13/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
06/20/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
07/05/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
07/11/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
07/17/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
07/24/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
08/01/06	Naches	3.6	Mobile	by Nelson Springs	down river of Cowichie Diversion Dam
08/15/06	Naches	3.6	Mobile	by Nelson Springs	
08/21/06	Naches	3.6	Mobile	by Nelson Springs	
08/29/06	Naches	3.6	Mobile	by Nelson Springs	
09/18/06	Naches	3.6	Mobile	by Nelson Springs	
09/26/06	Naches	3.6	Mobile	by Nelson Springs	
10/02/06	Naches	3.6	Mobile	by Nelson Springs	
10/09/06	Naches	3.3	Foot	tag is on the left bank, on gravel bar	behind Nelson Springs
10/10/06	Naches	3.3	Foot	tag is under 2' of water, under the gravel	in same location, since 3/7/06 -- (7 months)
10/24/06	Naches	3.3	Foot	tag is under 2' of water, under the gravel	Found Tag, under the rocks-gravel. Under a big rock

Fish #	Code	Sex	Status	Where Tagged	Population
119	148	Female	Active	Tieton Pool	???
Fish #	River Name	R M	Track	Site Description	Comments
11/15/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	9.2	Mobile	down river of Naches Water Treatment Plant	
12/06/05	Naches	9.2	Mobile	down river of Naches Water Treatment Plant	
12/12/05	Naches	9.2	Mobile	down river of Naches Water Treatment Plant	
12/19/05	Naches	8.7	Mobile	down river of Naches Water Treatment Plant	
12/27/05	Naches	7.5	Mobile	by the Naches Hatchery	
01/10/06	Naches	7.3	Mobile	down river from the Naches Hatchery	
01/23/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
01/30/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
02/06/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
02/13/06	Naches	2.7	Mobile	at Mp 199 above 40th ave.	
02/21/06	Naches	2.0	Mobile	down river 40th ave.	
02/27/06	Naches	0.9	Mobile	up river 16th ave.	

03/07/06	Naches	0.9	Mobile	at end of 16th ave.	
03/14/06	Naches	0.9	Mobile	at end of 16th ave.	
03/20/06	Naches	0.9	Mobile	at end of 16th ave.	
03/28/06	Naches	0.9	Mobile	at end of 16th ave.	
04/03/06	Naches	0.9	Mobile	at end of 16th ave.	
04/10/06	Naches	2.0	Mobile	at end of 40th ave.	moved back up
04/19/06	Naches	6.0	Mobile	down river from the Naches Hatchery	moved up
04/24/06	Naches	6.0	Mobile	down river from the Naches Hatchery	
05/01/06	Naches	6.0	Mobile	down river from the Naches Hatchery	
05/08/06	Naches	6.0	Mobile	down river from the Naches Hatchery	
05/15/06	Naches	9.7	Mobile	by Naches power plant	
05/25/06	Naches	11.3	Mobile	down river from Clemans Sports Complex	high water event
05/31/06	Naches	14.0	Mobile	between Layman's & the 1st fruit stand	
06/07/06	Naches	12.0	Mobile	up river of Clemans sports Complex	
06/13/06	Naches	14.0	Mobile	up river of Layman's lumber	
06/20/06	Naches	17.5	Fixed	Tieton/Naches station	coded from 10:10 P.M. to 10:43 P.M.
06/20/06	Naches	13.5	Mobile	up river of Layman's lumber	
06/24/06	Tieton	0.1	Fixed	Tieton/Naches station	6/24/06 coded from 11:14 P.M. to 1:45 A.M. on 6/25/06
07/06/06	Tieton	14.2	Mobile	at Tieton diversion dam	
07/11/06	Tieton	18.0	Mobile	behind Hause Creek campground	
07/18/06	Tieton	21.5	Mobile	At Tieton Pool	
07/24/06	Tieton	21.5	Mobile	At Tieton Pool	
08/02/06	Tieton	21.5	Mobile	At Tieton Pool	
08/15/06	Tieton	18.0	Mobile	before Hause Creek C.G.	moved down 3 miles
08/22/06	Tieton	21.5	Mobile	At Tieton Pool	moved back up
08/29/06	Tieton	16.0	Mobile	behind Willows camp ground	moved down, below hause C.G.
09/04/06	Tieton	0.1	Fixed	Tieton/Naches station	coded from 2:48 P.M. to 6:56 P.M.
09/20/06	Tieton	16.0	Mobile	behind Willows camp ground	
09/27/06	Tieton	19.5	Mobile	2 miles down river from Tieton pool	
10/02/06	Tieton	21.5	Mobile	At Tieton Pool	
10/10/06	Tieton	21.5	Mobile	At Tieton Pool	
10/18/06	Tieton	21.5	Mobile	At Tieton Pool	
10/30/06	Tieton	21.5	Mobile	At Tieton Pool	
11/08/06	Tieton	21.5	Mobile	At Tieton Pool	high water event
11/15/06	Tieton	21.5	Mobile	At Tieton Pool	high water event
11/21/06	Naches	26.0	Mobile	1-mile down river of the Woodshed Restaurant	came from the tieton pool- river down & muddy
11/21/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 4:25 P.M. to 4:36 P.M.

11/30/06	Naches	28.3	Mobile	1/2 mile up river of the Rattlesnake station	in the Naches river
12/05/06	Naches	28.3	Mobile	1/2 mile up river of the Rattlesnake station	
12/12/06	Naches	28.3	Mobile	1/2 mile up river of the Rattlesnake station	
12/18/06	Naches	28.3	Mobile	1/2 mile up river of the Rattlesnake station	
12/27/06	Naches	28.3	Mobile	1/2 mile up river of the Rattlesnake station	
01/10/07	Naches	28.3	Mobile	up river of the Rattlesnake station	
01/15/07	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 11:33 P.M. to 11:35 P.M.
01/18/07	Naches	27.5	Mobile	Blue Nile Church Pool	
01/23/07	Naches	27.5	Mobile	Blue Nile Church Pool	
01/31/07	Naches	27.5	Mobile	Blue Nile Church Pool	
02/07/07	Naches		Mobile	Blue Nile Church Pool	
02/14/07	Naches		Mobile	Blue Nile Church Pool	
02/22/07	Naches		Mobile	between Blue Nile Church & the Woodshed Rest.	
02/27/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
03/06/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
03/13/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	high water event
03/20/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	high water event
03/28/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	high water event
04/05/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
04/10/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
04/19/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
04/27/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
05/17/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	
05/29/07	Naches		Mobile	2/10 mile up stream of Woodshed Rest.	

Fish # 120 Code 167	Date Tagged 11/14/05	Sex Female	Status Active	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/19/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/27/05	Naches	15.8	Mobile	down river of Naches Wonderland Bridge	
01/03/06	Naches	15.8	Mobile	down river of Naches Wonderland Bridge	

01/10/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
----------	--------	------	--------	--------------------------------------	--

Fish # 121 Code 208	Date Tagged 11/14/05	Sex Female	Status Active	Where Tagged Tieton Pool	Population ???
Date Found	River Name	R M	Track	Site Description	Comments
11/16/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
11/21/05	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
12/05/05	Naches	8.7	Mobile	down river of Clemans Sports Complex	
12/12/05	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
12/19/05	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
12/27/05	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
01/03/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
01/09/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
01/17/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
01/23/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
01/30/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
02/06/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
02/14/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
02/21/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
02/27/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
03/07/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
03/13/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	at Mp 89
03/20/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
03/28/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
04/03/06	Naches	8.8	Mobile	down river of Naches Water Treatment Plant	
04/10/06	Naches	9.0	Mobile	at the Naches Water Treatment Plant	
04/18/06	Naches	9.4	Mobile	up river of Naches Water Treatment Plant	moved up with code #206
04/24/06	Naches	10.4	Mobile	moved up, across from Rowe Fruit	
05/15/06	Naches	10.6	Mobile	moved up, across from Rowe Fruit	
05/25/06	Naches	13.3	Mobile	up river from Many's market	high water event
05/31/06	Naches	13.9	Mobile	up between Layman's & the 1st fruit stand	
06/07/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
06/13/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	
06/20/06	Naches	17.0	Mobile	down river of Wapataux Diversion Dam	

06/26/06	Naches	17.5	Fixed	Tieton/Naches station	coded from 10:48 P.M. to 11:00 P.M.
07/02/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 1:52 P.M. to 10:13 P.M.
07/05/06	Naches	30.0	Mobile	behind Pleasant Valley gravel site	
07/10/06	Naches	38.0	Mobile	across from Gold Creek--Jefferson pool	
07/13/06	Bumping	0.1	Fixed	Bumping/Little Naches station	coded from 11:01 P.M. to 11:27 P.M.
07/24/06	American	2.0	Mobile	up river of the Bumping bridge turn off	in American river
08/01/06	American	4.7	Mobile	up river from MP 85	
08/07/06	American	6.9	Mobile	up river from MP 83	
08/21/06	American	11.5	Mobile	at union creek hole	
08/30/06	American	13.7	Mobile	at MP 77 above Lodgepole C.G.	
09/18/06	Bumping	5.3	Mobile	1 1/2 up in the Bumping river	
09/25/06	Bumping	5.3	Mobile	1 1/2 up in the Bumping river	
09/26/06	Bumping	5.3	Mobile	1 1/2 up in the Bumping river	
10/03/06	Bumping	0.1	Fixed	Bumping/Little Naches station	10/3/06 coded from 11:56 P.M. to 12:35 A.M. on 10/4/06
10/03/06	Naches	44.0	Mobile	up river of the Halfway Flats bridge	
10/09/06	Naches	41.3	Mobile	up river of the Camp Roganunda bridge	
10/17/06	Naches	33.9	Mobile	at Squaw rock	
10/23/06	Naches	33.9	Mobile	at Squaw rock campground	
10/30/06	Naches	33.9	Mobile	at Squaw rock campground	
11/13/06	Naches	31.0	Mobile	at the upper Nile road	high water event
11/13/06	Naches	27.8	Fixed	Rattlesnake/Naches station	coded from 1:28 P.M. to 1:34 P.M.
11/21/06	Naches	26.6	Foot	down river of the bridge at Woodshed Rest.	in a smaller channel, on the right bank
11/30/06	Naches	24.2	Mobile	2.5 miles below the Woodshed restaurant	
12/05/06	Naches	24.2	Mobile	2.5 miles below the Woodshed restaurant	
12/12/06	Naches	24.2	Mobile	2.5 miles below the Woodshed restaurant	
12/18/06	Naches	24.2	Mobile	2.5 miles below the Woodshed restaurant	
12/27/06	Naches	24.2	Mobile	2.5 miles below the Woodshed restaurant	
01/10/07	Naches		Mobile	at the Selah Diversion Dam	
01/18/07	Naches		Mobile	3/10 mile above the Selah Diversion Dam	
01/23/07	Naches		Mobile	by city of Yakima - Oak Flats Intake	still moving up
01/31/07	Naches		Mobile	by city of Yakima - Oak Flats Intake	
02/07/07	Naches		Mobile	at city of Yakima - Oak Flats Intake	
02/14/07	Naches		Mobile	up river of old Selah Valley Canel intake	moved up about 1/4 mile
02/22/07	Naches		Mobile	up river of old Selah Valley Canel intake	
02/27/07	Naches		Mobile	up river of old Selah Valley Canel intake	
03/06/07	Naches		Mobile	up river of old Selah Valley Canel intake	
03/13/07	Naches		Mobile	up river of old Selah Valley Canel intake	high water event

03/20/07	Naches		Mobile	by the old Selah Valley Canel intake	high water event
03/22/07	Naches		Foot	50 yards downriver of old Selah Diversion	high water event
03/28/07	Naches		Mobile	by old Selah Diversion	high water event
04/05/07	Naches		Mobile	by old Selah Diversion (upper Oak Flat)	
04/19/07	Naches	19.5	Mobile	slightly upriver of oak Flat	
04/27/07	Naches	19.5	Mobile	slightly upriver of oak Flat	
05/01/07	Naches	19.5	Mobile	slightly upriver of oak Flat	
05/29/07	Naches	19.5	Mobile	slightly upriver of oak Flat	

Summary of bull trout spawning surveys (redd counts) in index areas of the Yakima sub-basin, 1984-2015.

(R=Resident, F=Fluvial, F/R=Fluvial/Resident, AD=adfluvial). WDFW Files, Yakima, WA.

	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
<u>Yakima River (F)</u>																																
Keechelus to Easton Reach *																2	1		1				3	1				0				
<u>Ahtanum Creek (R)</u>																																
N.F. Ahtanum Cr. (Shellneck Cr.)										9	14	6	5	7	5	7	11	20	17	12	8	6	7	8	1	3	0	1	2	2	1	0
M.F. Ahtanum Cr. *												1	1			0	10	1	6	8	11	5	6	5	3	9	15	11	8	7	6	4
S.F. Ahtanum Cr. *																5	14	13	7	5	3	4	5	3	6	2	4	2	1	2	0	
<u>Naches River (F)</u>																																
Rattlesnake Cr. * (L.Wildcat Cr., Shell Cr.)							2				4	26	38	46	53	44	45	57	69	54	32	15	40	13	37	36	64	42	42	32	23	28
American R. (Union Cr., Kettle Cr.)												25	24	31	30	44	36	27	30	40	35	55	31	22	29	47	40	54	54	37	31	
Crow Cr.																19	26	6	9	9	6	4	8	8	2	5	9	7	9	5	2	5
<u>Rimrock Lake (AD)</u>																																
S.F. Tieton R. * (Bear Cr.)							32			38	167	95	226	177	142	161	144	158	141	178	178	205	189	152	266	259	194	234	226	151	192	160
Indian Cr. * (+spring tribs)	29	69	16	35	25	39	69	123	142	140	179	201	193	193	212	205	226	117	100	101	50	91	106	58	130	200	144	147	174	10	28	49
N.F. Tieton (upper)* (Hellbender Cr.)																					1		1	37	28	15	18	11	17	10	19	27
<u>Bumping Lake (AD)</u>																																
Deep Cr. *					17	15	84	78	45	12	101	46	126	98	107	147	51	120	57	97	73	95	130	145	178	199	192	169	108	78	22	
Bumping River (upper)										1	0					0					0			0	0	2	0	0	0		0	
<u>N.F. Teanaway River (F/R)</u>																																
NF Teanaway/DeRoux Cr. *													2									2	1	0	0	1	0	0	0	1	0	
<u>Kachess Lake (AD)</u>																																
Box Canyon Cr.	5	4	3	0	0	0	5	9	5	4	11	4	8	10	16	17	10	14	15	8	19	8	8	2	8	21	30	31	9	6	10	8
Kachess R (upper) *															0		15	14	0	16	8	3	0	22	2	2	15	33	8	13	9	5
<u>Keechelus Lake (AD)</u>																																
Gold Cr.	2	2	21	15	12	3	11	16	14	11	16	13	51	31	36	40	19	15	31	9	20	7	8	6	40	29	23	7	7	12	19	3
<u>Cle Elum & Waptus Lks (AD)</u>																																
Cle Elum R.(up) & Waptus R*													0	0	0		0	0	0	0			0	0	0	0						
Summary	36	75	40	50	37	59	134	232	239	247	404	446	595	615	593	630	704	504	548	490	475	457	531	478	687	795	760	760	727	412	426	342

* Incomplete survey; index area not fully defined or adequately monitored: Yakima R. 2000, 2001, 2003, 2006. M.F. Ahtanum 1996-2001, 2008, 2012. S.F. Ahtanum 2000. Rattlesnake 1990-1995, 2007, 2008, 2011, 2012. S.F. Tieton 1990-1993, 1995, 2010, 2013, Indian 1984-1987, 2013, Deep 1989-1990, N.F. Teanaway 1996, 2005, 2006, 2008. Kachess 1998, 2005, 2006, 2012, 2015. Cle Elum 1996, 2000-2002, 2006, 2007, Waptus 1997, 1998, N.F. Tieton 2004, 2006, 2010, 2013, 2014. Bumping 1994, 2000, 2004, 2008. Box 2007, 2012, 2014. Gold 2007, 2012, 2014, 2015. Crow 2008, 2010, 2011, 2012, 2013, 2014. (Redds in small tribs (parenthesis) included in total stream count.)
 * S.F. Tieton redd counts outside of the standard index area not included in above totals: 1995=0, 1996=7, 1997=1, 1998-2002 not checked, 2003=14, 2004=2, 2005=6, 2006=22, 2007 & 2008 not checked, 2009=30, 2010=6, 2011=19, 2012=33, 2013=11, 2014=4. Exploratory redd survey in lower Bumping in 2014 - 0, Lower Crow in 2015 - 0.
 * Exploratory redd count surveys conducted in 2009: N.F. Little Naches - 0, Quartz & N.F. Quartz - 0, Nile - 0, upper Crow (above barrier falls) - 0. 2015 - Lower SF Tieton - 0 redds.