

**An Investigation Into the Migratory Behavior of Bull Trout
(*Salvelinus confluentus*) in the Touchet River Basin**

By



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Introduction

The Touchet River originates in a network of deeply incised streams on the northwestern slopes of the Blue Mountains and from seasonal streams draining the Palouse hillsides to the north (Mendel et. al. 2001). Fish habitat has been severely degraded by urban and agricultural development, grazing, tilling, logging, recreational activities and flood control (Mendel et. al. 2001). Historically bull trout were thought to be widely distributed in the Touchet River watershed. Factors which have elevated the water temperatures such as damaged riparian vegetation, increased sedimentation and decreased water flows have also decreased the range of this cold water species (Mongillo 1993).

The Washington Department of Fish and Wildlife (WDFW) has captured and enumerated bull trout at the adult steelhead trap in Dayton, in southeast Washington, each spring for the past several years while trapping steelhead as part of the Lower Snake River Compensation Program (LSRCP). Captured subadult and adult bull trout apparently over winter downstream of Dayton and return to headwater areas within several of the Touchet River tributaries during late spring and early summer to hold over until spawning. Similar movements have been documented in the Tucannon River, which is the adjacent watershed to the east of the Touchet River (Martin et al. 1992 and Underwood et al. 1995). The spatial and temporal distribution of bull trout in the Touchet River during winter and spring is currently unknown.

In the spring of 2000, WDFW proposed a cooperative bull trout radio telemetry project that was implemented in 2001 and 2002. This project was initiated to provide a better understanding of the spatial and temporal distribution of migratory bull trout in the Touchet River. It was anticipated that the study would also assist the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) with a steelhead telemetry study in the Walla Walla River basin, and help identify migratory barriers or passage problems in the Touchet River watershed. Bull trout migration information is critical for identification, prioritization, and selection of habitat protection and restoration efforts in the Touchet River. The project was also intended to help determine whether bull trout populations in the upper Touchet River tributaries are genetically isolated from one another, as well as from Walla Walla Basin populations. This information would be valuable for determining the level of risk of extinction for these populations. This projected 3-4 year radio telemetry study was intended to provide information necessary for determining the river reaches and habitat used by subadult and adult bull trout and adult steelhead, and to identify critical habitat areas for maintaining these populations. By providing information about connectivity and potential genetic exchange among bull trout populations in the Touchet River, and other Walla Walla Basin populations, managers and the public could examine potential risks of population extinction and determine the importance of protecting or expanding small, isolated spawning habitats.

In 2001, WDFW secured a small amount of funding from the USFWS Section 6 funds for bull trout work, and from the Columbia County Conservation District. These funds enabled WDFW to initiate this telemetry project by purchasing surgical supplies, 20 radio tags, a telemetry receiver and yagi antenna in early 2001. Radio tagging and tracking

began in spring 2001.

This project complements several other salmon recovery efforts in the Touchet Watershed and the Walla Walla Basin. It is expected to provide critical data for bull trout and steelhead that would fill data gaps identified in the yet-unpublished *Walla Walla Watershed Assessment Report* (WSU and CTUIR) and in “Chapter 11: Umatilla – Walla Walla Recovery Unit” of the *Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan* (USFWS, 2002). These data gaps have also been identified in the recently completed publication *Salmonid Habitat Limiting Factors Water Resource Inventory Area 32 – Walla Walla Watershed* (Kuttel 2001). This project also complements the BPA funded project *Assessment of Salmonids and Their Habitat Conditions in the Walla Walla River Basin of Washington: 2001 Annual Report* that examines adult bull trout spawning, and juvenile bull trout rearing distribution and relative abundance (Mendel et. al., 1999, 2000, and 2001). The Walla Walla telemetry coordination group that designed and is currently implementing the Walla Walla river basin bull trout and steelhead telemetry projects supports this project. The intent of this study is to fulfill the need for bull trout migratory behavior and over-wintering information in the Touchet River.

This project includes many partnerships, and is partially funded from several sources. The Columbia County Conservation District, the US Fish and Wildlife Service (USFWS) Section 6 monies, the US Forest Service (Pomeroy District), and the Tristate steelheaders provided funding, equipment or materials for this project. WDFW contributed labor to administer the project, to assist with tagging and tracking, and to provide technical oversight. The Touchet bull trout project also contributed to a much larger radio telemetry study in the Walla Walla Basin that includes partnerships with several Irrigation Districts, the Walla Walla Watershed Council in Oregon, the Oregon Dept. of Fish and Wildlife and the CTUIR. Their contributions included funding and donated labor or materials for the bull trout and steelhead radio telemetry study in the mainstem Walla Walla and Mill Creek. They were to supply us with bull trout telemetry data in areas they radio track (including the lower Touchet River, Mill Creek and the Walla Walla River) and we were to provide them with bull trout and steelhead radio telemetry data for the Touchet River upstream of Plucker Road (river mile 14.9). The CTUIR was responsible for radio tagging steelhead in the lower Walla Walla River, Mill Creek, and the lower Touchet River, and summarizing the data obtained. The WDFW was also a member of the technical oversight committee for the larger telemetry effort for steelhead and bull trout in the Walla Walla Basin. WDFW involvement in all projects helped ensure that the proposed Touchet River bull trout project and the other Walla Walla Basin efforts were well coordinated and that resources and data were shared.

This radio telemetry project was an assessment of the movements of migratory bull trout in the Touchet River. The project was proposed to address the following objectives:

- 1) Determine spatial and temporal distribution of migratory bull trout in the Touchet River.
 - 1a) Determine migration timing, distribution, and possibly habitat use downstream of spawning and juvenile rearing areas in the Touchet River,
 - 1b) Determine migration timing and distribution in spawning and rearing areas upstream of Dayton,
 - 1c) Determine whether Touchet River bull trout migrate far enough downstream to enter the Walla Walla or Columbia rivers during winter or spring.
- 2) Determine the level of interaction or isolation among bull trout populations within the Touchet River system, and contribute to a larger study of bull trout movements and interactions for the entire Walla Walla Basin.
- 3) Identify passage problems or delays and movements at fish passage facilities or other obstructions in the Touchet River system.
- 4) Assist CTUIR and their cooperators by collecting supplementary steelhead telemetry data in the Touchet River to contribute to a larger multi-agency and private effort to examine steelhead and bull trout spatial and temporal distribution, movements, and passage in the Walla Walla Basin.

The study design was to capture and radio tag up to 30 bull trout annually from the Touchet River for 2-3 years. Fish were to be captured in an existing trap at a small dam in Dayton, by hook and line, or with electrofishing, if necessary. Selected fish were radio tagged by surgical implantation of digitally encoded transmitters in the abdominal cavity. The tags emit unique codes per fish with an expected tag life of one to two years. Fish were to be tracked with mobile receivers and by several fixed-site receivers deployed at selected sites in the Touchet River basin. Mobile fish tracking was to occur throughout the year at a frequency of approximately 1-3 times per week during periods of intensive tracking, and approximately once every two weeks when fish were not moving extensively. Fixed-site receivers were to be downloaded approximately once every two or three weeks.

Radio telemetry appeared to be the most feasible way to obtain the desired information on migration movements and timing, and to determine interaction or isolation of bull trout populations within the Touchet River drainage and the Walla Walla River basin.

Methods

We received training in bull trout surgical procedures from Idaho Fish and Game Department personnel during the spring of 2001. We practiced surgical methods with them at the Clearwater Hatchery. We also examined protocols, procedures and lists of supplies developed by the Oregon Department of Fish and Wildlife, and the National Marine Fisheries Service in Pasco, WA. We then practiced surgery, tag insertion and suturing on 10 rainbow trout (individual weight approximately 2 lbs) at the Tucannon Fish Hatchery in 2001, and again in the spring of 2002. Additional literature review and contact with personnel throughout the northwest with experience surgically radio tagging bull trout, and a thorough review and discussion of techniques and protocols with the telemetry coordination group in the Walla Walla Basin helped us revise our tagging procedures and ensure more aseptic techniques as part of our tagging protocol for 2002.

Lotek SRX_400 receivers were used for both mobile and stationary receivers. Stationary receivers were deployed at the Snake River Lab trap at RM 54.0 on the Touchet River and near the Bolles Bridge on US Highway 12 at RM 40.5 (Figure 1, see Appendix A for river mile locations). Each stationary telemetry site was equipped with two antennas to determine direction of movement past the site. A four element Yagi manufactured by Cushcraft Corporation was mounted on a pole placed in a stand in the back of a pickup truck for mobile tracking. A small whip antenna was used to determine location when snorkeling.

Radio transmitters purchased in 2001 were manufactured by Lotek which weighed 16g in air (6.2 g in water). Tag length and width dimensions were 46 mm x 16 mm, with an expected tag life of 685 days. Smaller radios were purchased in 2002 so we could tag smaller fish. These radios were 11mm x 36 mm, weighed 6.7 grams in air, with an expected tag life of 376 days.

Bull trout were captured during both years while WDFW personnel conducted adult anadromous salmonid trapping at the Touchet Acclimation Pond intake dam in Dayton, Washington. Bull trout were separated from captured steelhead or spring chinook and hauled approximately 0.5-1.0 mile upstream of the trap in an aerated tank with river water. Fish were anesthetized with a stock solution of 60-80 g/ml of methane tricaine sulfonate (MS-222, Argent Labs) in distilled water, mixed with river water in a large plastic anesthetizing tub. After the fish lost equilibrium it was placed in a wet nylon bag and weighed with a spring scale. Bull trout that met a minimum weight criterion of ≥ 800 g (thereby allowing a transmitter weight at or below 2% of total body weight) were candidates for radio tagging in 2001. The minimum fish body weight criteria for tagging was reduced to 385 g in 2002 because of the purchase of smaller radio tags. Pre-surgery setup consisted of disinfecting surgical instruments, radio tags, PIT tags, PIT tag insertion needles, and the surgeon's hands in Nolvason solution. Transmitter function was checked prior to surgical implantation with a telemetry receiver. We measured length and visually determined the sex of the fish using external examination.

During surgery the fish was placed ventral side up in a cradle. The cradle was set over a cooler filled with the MS-222 solution, and pumped by a battery powered bilge pump to irrigate the fish's gills during surgery. The ventral isthmus between the opercula was gently depressed to facilitate the application of the anesthetic to the gills. The MS-222 water irrigating the gills was monitored closely to ensure no anesthetic reached the incision. Operating water temperatures were monitored closely to ensure they remained approximately the same as river water temperatures, and surgery was not performed when river water temperatures exceeded 15°C (59°F). A small incision was made lateral to the mid line and anterior to the pelvic girdle. A grooved surgical guide (handle of a stainless steel teaspoon) was inserted into the initial incision just under the body wall to prevent accidentally cutting internal organs, etc. and the incision was extended to 25-50 mm in length to allow insertion of the transmitter. The stainless teaspoon handle was then inserted into the incision and extended along the inner surface of the body wall to a position posterior to the pelvic girdle. A hollow needle (size 12 or 14) was used to pierce through the body wall and then slid along the metal guide until the needle was visible within the incision. The transmitter's antenna was inserted into the hollow tip of the needle and fed through the needle until the antenna extended through the needle and outside the body posterior of the pelvic girdle; then the needle was removed. The transmitter was inserted into the body and the antenna was pulled taught. Three to four non-absorbable sutures with 3,3, or 3,3,2, surgical knots were used to close the wound. The antenna was trimmed to match the length of the fish in 2001, but the antenna lengths were not trimmed in 2002. In 2002, we changed our surgery techniques to place the incision more lateral of the mid line than in 2001, and the antenna exit was moved lateral and anterior of the pelvic girdle so that the transmitter antenna would not exit along the ventral surface of the fish. A PIT tag was implanted in the dorsal sinus of most radio tagged bull trout to allow individual identification of potential recaptured fish if the transmitter was lost or failed to function. Surgery generally required seven to ten minutes.

After surgery, the fish was placed in a container of fresh water to begin recovery. Once the fish regained equilibrium and appeared to be swimming normally, we transported it with a PVC carrying container or in an insulated cooler to the river. In 2001, the fish remained for several more minutes in the holding container in fresh river water before it was released into a resting area in the river, but in 2002 the fish was released directly into a calm water section of the river after the fish had regained equilibrium and seemed to be swimming normally.

Results for fish tagged in 2001

Department of Fish and Wildlife (WDFW) staff captured 43 bull trout in the Dayton steelhead trap in 2001, but only eight were large enough to radio tag (Appendix B). We radio tagged 7 bull trout between April 27 and May 23. Trapping was terminated in mid June because of marginal, and rapidly rising river water temperatures. The tagged fish ranged in size from 440- 590 mm, and captured bull trout were as small as 280 mm. We found little relationship between fish length and fish weight.

We radio tracked approximately once each week until the fish reduced their movements in November. From that time until May or June 2002 we tracked approximately once every two weeks. A summary of fish movements and tracking information is presented in Appendix C.

Tagged fish moved upstream in late spring and summer 2001 as water temperatures rose. At times a fish would hold in an area for two weeks or longer, and some fish took up to two months to reach the spawning area. We had one tagged bull trout (code 93) enter the South Fork, four fish (97, 100, 102, 106) moved up the Wolf Fork, and two fish (91 and 105) were detected in the North Fork Touchet River. Only four of these fish (93, 97, 100, and 106) were tracked to the spawning grounds.

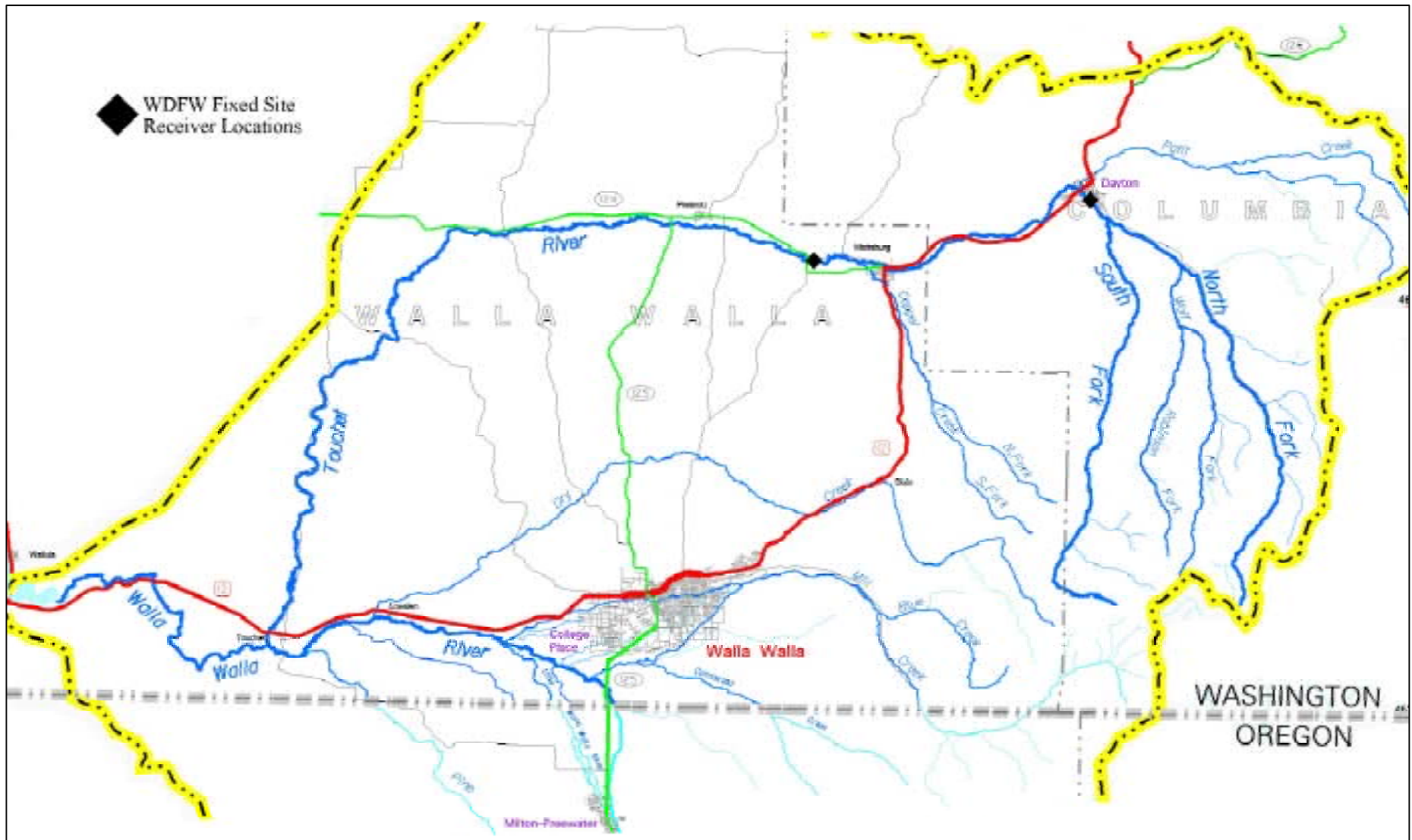


Figure 1. Relative locations of WDFW fixed site telemetry receivers, 2001-2002.

One fish (code 102) could not be located for several weeks after the last detection occurred on May 25, just inside the lower Wolf Fork Touchet River. After repeated unsuccessful attempts to find the tagged fish by using a receiver and a yagi antenna mounted in a truck, the tag was located during a fixed-wing survey flight on June 22, well downstream (RM 49.2 below Rose Gulch Bridge) of its previous location in the Wolf Fork at RM 0.2. A ground search revealed that the tag was buried about 30 m. from the river near a small pond. From animal sign observed in the area it appeared that the area was frequented by a mammalian predator. The cause of death was not determined as no carcass or remains were located after repeated searches.

Two other transmitters (codes 91 and 105) were found in the North Fork Touchet between River mile 6.5 and 7.25 on July 9, with no evidence as to the disposition of these fish. Little tracking data are available for these two fish.

Another fish (code 93) entered the South Fork Touchet River two days after being tagged. It was in the upper South Fork just below the Burnt Fork by June 5. On June 22 it was located on the Burnt Fork during a fixed-wing aerial search about 0.75 miles upstream of the mouth of the Burnt Fork. On July 9, the transmitter was located in a small pool on the Burnt Fork, but the fish was not found. On August 9, during an electrofishing survey in the Burnt Fork, this fish was captured without the transmitter. The fish was alive and appeared to be well. A small scar was visible from the incision and a round scar plug was obvious along the incision from the tag expulsion. The fish was recaptured in mid August so that photographs could be taken of the incision (Figures 2 and 3).



Figure 2. Photograph of a live bull trout (code 93) from the Burnt Fork Touchet River showing the incision and extruded tag scar.



Figure 3. Photograph of a live bull trout (code 93) from the Burnt Fork Touchet River showing the incision and extruded tag scar.

In July we began snorkeling to observe fish condition and determine tag retention for our remaining bull trout. One fish (code 106) was observed to have a large bulge in the area of the transmitter on August 7. On the next tracking and snorkeling survey on August 22 the fish was observed with similar bruising and scarring as the Burnt Fork fish (code 93) and the transmitter was located nearby in the stream. The fish with code 97 had entered the Wolf Fork in mid June after being tagged on May 2. By late June it was upstream of the Wolf Fork, and by July 5 it was near the mouth of Coates Creek. The fish was observed during snorkeling on July 19 and had a bulge in the skin over the radio tag. By early September the tag was detected approximately 0.7 mile upstream within an animal den extending deeply into the soil of the river bank

The fish with radio code 100 entered the Wolf Fork in late May and was upstream of the Robinson Fork by June 7. It moved upstream into the upper Wolf Fork by mid June and was seen while snorkeling several times. It may have spawned in the Wolf Fork just below Newby's stream ford (RM 9.3). By September 20 the fish had descended the Wolf Fork to about 1 mile above the mouth. The fish continued to descend and was detected in the North Fork Touchet River by September 26. It continued its descent and it was detected at the Dayton Trap fixed-site receiver on October 13. By Oct 19 it was located below Patit Creek, near the Golf Course, in a steep gradient, deep riffle where it remained. We tried to disturb the fish in order to cause it to move on February 6 to verify that the fish was alive, but were unsuccessful. At that point we were doubtful that the radio transmitter remained in a live fish because it had been stationary for more than six months in a fast, deep riffle that did not appear to contain suitable holding water for a large bull trout. Surprisingly, on May 3, 2002 the fish was not detected at its overwintering location, but was detected approximately 0.3 miles upstream of the Highway 12 bridge. It moved further upstream and remained below the trap site from May 4 to May 10. The radio tagged fish was recaptured at the Dayton trap on May 10,

2002. It was measured and photographed and released into the Touchet River about 0.5 mile upstream of the dam and trap at river mile 54.5. We noticed that the fish had an indentation along the body posterior to the exit of the antenna from the body cavity. The fish resting on the antenna was apparently the cause of the indentation. The fish appeared to be healthy and had grown 50 mm in length and had increased 345 g in weight in just under one year. On May 13, 2002 this fish had descended to below the Dayton trap and apparently returned to the approximate location where it had spent the winter. The fish was not relocated again, even after repeated searches, until it was detected on June 7 during a fixed-wing survey flight. At this point the signal was located far downstream, at approximately river mile 4.6 of the Touchet River. The tag was recovered from the detritus pile at the Hofer Dam irrigation diversion screen on June 10, 2002.

In summary, of the seven fish radio tagged in 2001, only four of the fish (93, 97, 100, 106) were tracked to spawning grounds. Two of these fish are known to have extruded the transmitters and were observed alive after tag extrusion. The fate of the other three fish (91, 102, 105), from which we recovered tags, is not known. Only one fish (code 100) was tracked through spawning and its descent of the river to where it over-wintered in a deep riffle or cascade below Highway 12 in Dayton, near the Golf Course. We were able to confirm that it was alive and well in the spring of 2002 when it reascended the river and was later recaptured at the Dayton trap. Tag recovery information for radio transmitters implanted in 2001 is presented in Appendix D.

Results for fish tagged in 2002

Twenty-three bull trout were captured at the Touchet River trap in Dayton during the 2002 migration. Nine of these fish were implanted with radio transmitters in 2002 (Appendix E) and one fish that had been radio tagged in 2001 was recaptured. Another bull trout died in the trap. Bull trout began to arrive at the trap on May 1 and trap operations were suspended on June 13 due to marginal, and rising water temperatures and concerns about delaying bull trout downstream of the trap.

One fish (code 119) received a transmitter on May 13 and it continued to migrate upstream to the Wolf Fork (RM 3.6) until after June 28. From that time the transmitter signals remained stationary until the transmitter was recovered on August 21. Transmitter or carcass recovery information is presented in Appendix F.

Code 121 (tagged on May 9) and code 116 (tagged on June 2) emitted signals for two days after implantation, but neither of these fish, nor their transmitters, were relocated during repeated searches. The fish with code 116 moved downstream shortly after tagging and continued to descend the river. Its last location was downstream of Dayton (RM 46.3) on June 5, and it was not detected again for almost seven months. On December 28, 2002, CTUIR staff detected transmitters 116 and 121 in the Columbia River, upstream of the mouth of the Walla Walla River. It is not yet known if these transmitters remain implanted within live fish.

The remaining six fish are all believed to be dead, with the recovery of four transmitters and the known location of the other two. One transmitter was not recovered due to high water and low visibility and the other because of lack of access on private lands to gain access to the river.

In summary, of the nine fish radio tagged in 2002, and the one recaptured radio tagged fish from 2001 (code 100), only the second fish tagged in 2002 (code 119) moved upstream after release. We do not know what caused 9 of 10 radio tagged fish to descend the river and potentially expose themselves to potentially lethal water temperatures in the middle and lower Touchet River. We are uncertain whether they were injured or overly stressed during tagging and handling, but we believe that is unlikely for more than a small percentage of handled fish. Over the winter of 2001-02 we had examined the procedures of many other researchers that were successfully radio tagging bull trout so that we could improve our tagging procedures and reduce the mortality or transmitter loss that we experienced in 2001. The radio tagged fish from 2001 that was recaptured in the trap in 2002 (code 100) did not experience surgery or extensive handling in 2002, yet it descended the river after handling much like 8 other fish that were radio tagged in 2002. Additionally, we used the same tagging techniques employed on the Touchet River in 2002 to radio tag many of the 41 bull trout tagged in the nearby Tucannon River in 2002. The fish in the Tucannon River did not experience serious transmitter loss, nor were there high mortalities. Therefore, we suspect that the losses we documented on the Touchet River were not a result of our handling and surgery techniques, but instead were a result of some water quality problem. Regardless, we suspended our trapping and handling of bull trout in mid June 2002 because we were alarmed by the behavior and loss of radio tagged bull trout.

There is circumstantial evidence that a chemical spill may have occurred about the time that we were radio tagging fish and this may have injured or killed these fish, or forced them to descend the river in an attempt to avoid poor water quality. Our enforcement agents had reported fish kills in the lower Walla Walla and lower Touchet rivers in May of 2003. They documented 23 dead carp as well as several other species of fish in the lower rivers without any evidence of what caused these mortalities. Within a few days after the trout fishery opened on June 1, we began hearing from anglers and landowners upstream of Dayton that they thought something was wrong because there were much fewer fish in the river than they expected or they considered "normal". A few weeks later our enforcement personnel were notified by an informant about persons allegedly pouring chlorine bleach into area streams in an attempt to kill and collect northern pikeminnow for the bounty paid by the Bonneville Power Administration.

It appears that some fish, which were detected far downstream, were alive for much or all of their downstream movement. Otherwise, it is unlikely that carcasses or tags would have successfully descended as far downstream in the Touchet or Columbia rivers.

Conclusions and Recommendations

Prior to the initiation of this project we believed that only small resident bull trout existed in the South Fork Touchet River drainage, particularly in the Burnt Fork, because only a few small redds were found in 2000 (Mendel et al., 2001). However, in 2001 we successfully tracked a large bull trout that migrated up the South Fork Touchet River into the Burnt Fork, where it was later found alive without its transmitter.

This study enabled us to obtain some information on timing of movements of bull trout to and from their spawning areas, although our sample size was small and complicated by fish and tag loss.

Only one fish (code 100) was radio tracked after spawning and through the winter, which was a primary objective of this study. This fish began moving downstream in mid to late September, shortly after apparently spawning in the Wolf Fork. It entered the North Fork downstream of the Wolf Fork by late September and it was detected at the trap site in Dayton on October 13. It moved approximately ½ mile downstream of Highway 12 in Dayton and remained in a high gradient, deep, fast riffle all winter. In February we tried to disturb the fish and cause it to move, which would have confirmed that it was alive, but were unsuccessful. The wintering area contained high velocities and a few large submerged boulders. In early May this fish left its wintering area and began to re-ascend the Touchet River. The fish was recaptured in the trap at the Touchet Acclimation Pond intake dam on May 10, 2002 and it appeared to be healthy. It had increased in length by 50 mm and 345 g in weight in just less than one year.

Bull trout in this study experienced unacceptable levels of tag rejection and fish mortality after capture, tagging and release at the trap in Dayton. This problem may have been exacerbated in 2002 by a possible chemical spill. The project has been suspended because of high loss of fish in 2002 and probably should not be reactivated unless fish are captured further upstream in cooler water. We make this recommendation based on the acceptable tagging results in the upper Walla Walla River in 2002 after poor success in the lower Walla Walla River in marginal water quality in 2001, and our apparent tagging success in the upper Tucannon River in 2002.

The fate of the two fish whose transmitters were recently detected in the Columbia River is unknown at present, but CTUIR staff will monitor the transmitter locations over the next couple of months.

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Appendix A: River mile locations for the Touchet river basin bull trout telemetry study area.

STREAM	SITE	RM	STREAM	SITE	RM	
Touchet River	confluence of NF & SF Touchet	54.9	SF Touchet	confluence of Burnt Fk and Green Fk	15.4	
	WDFW fish trap, Dayton	54.0		Kolke stream ford	14.8	
	Highway 12 bridge in Dayton	53.3		mouth of Griffen Fk	14.2	
	Poor Farm Rd bridge	51.3		Camp Nancy Lee bridge	8.4	
	Rose Gulch bridge	49.5		bridge above Pettyjohn Grade	3.1	
	Lewis and Clark State Park bridge	48.0		Pettyjohn Grade bridge	2.5	
	Gallaher Road bridge	46.4		Harting Grade bridge	1.4	
	Mouth of Whiskey Ck	45.9		Gephart Road	0.5	
	Highway 12 bridge in Waitsburg	44.3		NF Touchet	Bluewood culvert	19.1
	Bolles bridge west of Waitsburg	40.5			1st culvert below Bluewood	16.5
	Hart Road bridge east of Prescott	36.6	mouth of Spangler Creek		14.2	
	Brown Road bridge in Prescott	35.5	stream ford below Spangler Creek		14.0	
	HWY 125 bridge west of Prescott	34.3	USFS boundary		13.0	
	Pettyjohn Road west of Prescott	30.6	bridge above Lewis Creek		11.1	
	bridge at Harsha	26.1	mouth of Lewis Creek		11.0	
	Luckenbill Road bridge	19.7	2nd bridge above Jim Creek		9.3	
	1st brg going south on Touchet North Road	15.4	1st bridge above Jim Creek		8.7	
	2nd brg going south on Touchet North Road	13.9	mouth of Jim Creek		7.6	
	Simms Road bridge	11.6	mouth of Rogers Gulch	4.5		
	Bridge above Hofer Dam	7.3	Wolf Fork Road bridge	4.1		
Hofer Dam	4.1	Vernon Lane bridge	2.1			
Cummins Road bridge	1.5	South Fork Touchet Road bridge	0.4			
Highway 12 bridge, west of Touchet	0.6					
Wolf Fork	Upper meadow (spawning surveys)	13.5				
	USFS boundary	12.0				
	Tate Creek	10.7				
	stream ford on Newby property	9.8				
	old cabin (2nd bridge below Newby property)	8.7				
	mouth of Whitney Creek	7.5				
	mouth of Coates Creek	7.3				
	bridge below yellow gate	6.9				
	3rd bridge on Wolf Fork Road	5.1				
	2nd bridge on Wolf Fork Road	4.5				
	1st bridge on Wolf Fork Road	3.5				
	Robinson Fork stream mouth	2.7				
	bridge at end of pavement on Wolf Fork Rd	2.9				
Holmberg Road bridge	1.8					

Appendix B: Bull trout trapping and radio tag implant summary, WDFW Touchet river trap (RM 54.0), 2001.

Date	Radio Tag Code	Pit Tag ID	Length (mm)	Weight (g)	Comments	Age (from scale analysis)	Scale Number	DNA Sample Number
04/01/01			360					
04/06/01			310					
04/15/02			N/A					
04/17/01			290					
04/17/01			340					
04/17/01			410					
04/18/01			440					
04/18/01			340					
04/20/01			310	250				
04/20/01			330	360				
04/20/01			310	250				
04/25/01			335	436				
04/25/01			300	302				
04/25/01			280	238.6				
04/26/01			285	208.2				
04/27/01	93		500	1250	caudal punch, cloudy left eye			BT01FM-1
04/27/01	105		500	1540	caudal punch			BT01FM-2
05/02/01	97	3D9.1BF11E94B4	472	1290	caudal punch		FM1-3	FM-4
05/02/01		3D9.1BF0F5F7FB	332	340	not tagged (undersize)		FM1-2	
05/02/01	91	3D9.1BF11B9CAC	1060	471	caudal damage, PIT tag right dorsal sinus		FM1-1	FM-3
05/08/01		3D9.1BF0ED5E5F	425			4	BT2-1	
05/10/01		3D9.1BF11EC702	410	700			FM1-4	
05/12/01	100	3D9.1BF11B9E12	450	880	2 caudal punches		FM1-5	FM-5
05/14/01		3D9.1BF0EDB5B8	360	515				
05/14/01		3D9.1BF11135F6	330	345				
05/14/01		3D9.1BF1107490	328	360				
05/14/01		3D9.1BF0EDD0F2	355	390				
05/14/01	102	3D9.1BF11B89CA	590	2480			FM2-1	BT01FM-6
05/15/01		Not PIT-tagged	270		length only			
05/23/01	106	3D9.1BF0EDBD4C	440	930	eroded top caudal		FM2-3	BT01FM-7
05/23/01		3D9.1BF11BF98E	270					
05/24/01		3D9.1BF0ED5003	300					
05/24/01		3D9.1BF0E99D83	340					
05/25/01		3D9.1BF0F8CA8D	305					
05/29/01		3D9.1BF0ED6885	315					
05/29/01		3D9.1BF0EDD5A7	295					
05/29/01		3D9.1BF0EDCE80	355					
05/29/01		3D9.1BF0ED02B2	330					
05/29/01		3D9.1BF0EC5D70	330					
05/29/01		3D9.1BF0EDA19D	285					
05/30/01		3D9.1BF0E7E271	330					
06/11/01		3D9.1BF0EDB198	335			3	BT2-2	DB198
06/18/01		3D9.1BF0EDA754	330			4	BT3-4	

Appendix C: Summary of 2001-2002 radio telemetry location and movement data for Touchet River basin radio tagged bull trout. All fish were captured in the WDFW fish trap at river mile (RM) 54.0, surgically implanted with radio tags transmitting at 150.210 Mhz (channel 0), and released at RM 54.5. Individual transmitter locations were determined at periodic intervals using a Lotek® telemetry receiver.

Code	Date	Location and Comments	RM
91	5/02/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/03/01	North Fork Touchet river; near end of dike.	0.2
	5/05/01	North Fork Touchet river; upstream of log jam near dike.	0.3
	5/09/01	North Fork Touchet river; near gravel pile at Vernon Lane.	2.2
	5/11/01	North Fork Touchet river; upstream of Vernon Lane.	2.3
	5/15/01	North Fork Touchet river; upstream of Vernon Lane.	2.3
	5/18/01	North Fork Touchet river; upstream of Vernon Lane.	2.3
	5/25/01	North Fork Touchet river; near North Touchet Road milepost 7.5.	6.5
	5/31/01	North Fork Touchet river; near 828 North Touchet Road.	7.2
	6/07/01	North Fork Touchet river; upstream of milepost 8.	6.75
	6/12/01	North Fork Touchet river; upstream of milepost 8.	6.75
	6/15/01	North Fork Touchet river; upstream of milepost 8.	6.75
	6/18/01	North Fork Touchet river; upstream of milepost 8.	6.75
	6/22/01	North Fork Touchet river; located near 828 North Touchet Road during telemetry flight.	7.25
	6/27/01	North Fork Touchet river; near 828 North Touchet Road.	7.25
	7/05/01	North Fork Touchet river; near 828 North Touchet Road.	7.25
	7/09/01	North Fork Touchet river; tag recovered near 828 North Touchet Road, fish not found.	7.25
93	4/27/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	4/29/01	South Fork Touchet river; near Steinhoff property.	0.51
	4/30/01	South Fork Touchet river; near Steinhoff property.	0.51
	5/02/01	South Fork Touchet river; near Steinhoff property.	0.51
	5/3/01	South Fork Touchet river; near Steinhoff property.	0.51
	5/05/01	South Fork Touchet river; upstream of bridge on Harting Grade.	1.5
	5/09/01	South Fork Touchet river; upstream of bridge on PettyJohn Grade.	2.6
	5/11/01	South Fork Touchet river; South Touchet Road milepost 3.	3.4
	5/15/01	South Fork Touchet river; near a point 0.85 miles upstream of the end of pavement on the South Touchet Road.	6.45
	5/18/01	South Fork Touchet river; near a point on the South Touchet Road 3.6 miles upstream of the bridge over Pettyjohn Grade.	6.75
	5/25/01	South Fork Touchet river; near a point on the gravel road into the CTUIR Rainwater Wildlife Area 1.7 miles upstream of Camp Nancy Lee.	9.75
	6/05/01	South Fork Touchet river; ~100 yards downstream of cabin on Kolke property.	14.7
	6/22/01	Burnt Fork; tag detected ~0.75 miles upstream of stream mouth during telemetry flight.	1.0
	7/09/01	Burnt Fork; tag recovered, fish not found.	1.5
	8/09/01	Burnt Fork; fish captured while electrofishing. Fish blind in left eye but otherwise appeared healthy. Scar and small healing wound apparent on ventral surface where tag had been expelled.	1.5
97	5/02/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/03/01	Touchet River; near post-surgery release site.	54.75
	5/5/01	Touchet River; near post-surgery release site.	54.75
	5/09/01	North Fork Touchet river; near 214 North Touchet Road.	0.46

	5/11/01	North Fork Touchet river; near 214 North Touchet Road.	0.46
	5/15/01	North Fork Touchet river; near bridge on Baileysburg Road.	1.0
	5/18/01	North Fork Touchet river; near bridge on Baileysburg Road.	1.0
	5/25/01	North Fork Touchet river; near the intersection of Crall Hollow and North Touchet road.	1.48
	5/31/01	North Fork Touchet river; near the intersection of Crall Hollow and North Touchet road.	1.48
	6/7/01	North Fork Touchet river; near Warren Orchards.	3.0
	6/12/01	North Fork Touchet river; at a point near the intersection of Hatley Gulch Road and North Touchet Road.	3.8
	6/15/01	North Fork Touchet river; at a point near the intersection of Hatley Gulch Road and North Touchet Road.	3.8
	6/18/01	North Fork Touchet river; at a point near the intersection of Hatley Gulch Road and North Touchet Road.	3.8
	6/22/01	Wolf Fork; tag detected on Holmberg property during telemetry flight.	2.2
	6/27/01	Wolf Fork; at a point on Wolf Fork Road 3 miles upstream of the mouth of Robinson Fork.	5.7
	7/05/01	Wolf Fork; near the mouth of Coates Creek.	7.0
	7/09/01	Wolf Fork; at a point near the first bridge upstream of the bridge over Whitney Creek on the private access road behind the locked gate at the end of Wolf Fork Road.	7.6
	7/19/01	Wolf Fork; near a point on the private access road 0.8 miles upstream of the locked gate at the end of Wolf Fork Road. Fish also observed while snorkeling – appeared healthy, but radio tag bulging under skin on right side of fish.	7.8
	8/07/01	Wolf Fork; fish observed while snorkeling ~150' upstream of the log weir falls. Fish appeared healthy.	8.9
	8/22/01	Wolf Fork; fish observed while snorkeling near a point on the private access road 0.1 mile upstream of Newby's Ford. Fish appeared to be in good condition.	9.5
	9/6/01	Wolf Fork; 30 meters downstream of the mouth of Tate Creek.	10.2
	9/20/01	Wolf Fork, downstream of Tate Creek. Tag seems to be within underwater animal den in riverbank.	10.2
	9/24/01	Wolf Fork, downstream of Tate Creek. Tag seems to be within underwater animal den in riverbank. Fish (or carcass) not recovered.	10.2
100	5/12/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/15/01	South Fork Touchet river; near where Gephart Road leads into the Steinhoff property.	0.51
	5/18/01	South Fork Touchet river; near where Gephart Road leads into the Steinhoff property.	0.51
	5/25/01	North Fork Touchet river; near the gravel road leading into Warren Orchards.	3.0
	5/31/01	Wolf Fork; near a point on Wolf Fork Road 0.8 miles upstream of the intersection of Robinson Fork Road and Wolf Fork Road.	3.5
	6/07/01	Wolf Fork; near a point on Wolf Fork Road 2.1 miles upstream of the intersection of Robinson Fork Road and Wolf Fork Road.	4.8
	6/12/01	Wolf Fork; near the downstream side of the fourth bridge.	6.6
	6/15/01	Wolf Fork; near the downstream side of the fourth bridge.	6.6
	6/18/01	Wolf Fork; near the downstream side of the fourth bridge.	6.8
	6/22/01	Wolf Fork; tag detected near Green Fly Canyon during a telemetry flight.	10.0
	6/27/01	Wolf Fork; near the private access road 0.8 miles upstream of the locked gate at the end of Wolf Fork Road.	8.0
	7/05/01	Wolf Fork; near the private access road 0.1 mile downstream of Newby's Ford.	9.3

7/09/01	Wolf Fork; observed fish while snorkeling near the private access road 0.1 mile downstream of Newby's Ford. Fish appeared healthy.	9.3
7/19/01	Wolf Fork; near the private access road 0.1 mile downstream of Newby's Ford. Fish location visually verified while snorkeling; fish appeared healthy.	9.3
8/07/01	Wolf Fork; near the private access road 0.1 mile downstream of Newby's Ford. Observed fish while snorkeling; appeared healthy.	9.3
8/22/01	Wolf Fork; near the private access road 0.1 mile downstream of Newby's Ford. Observed fish while snorkeling; appeared to be in good condition.	9.3
9/06/01	Wolf Fork; near the private access road 0.1 mile downstream of Newby's Ford. Newly constructed bull trout redd observed near this fish.	9.3
9/20/01	Wolf Fork; behind pond on Gibbon property.	1.0
9/26/01	North Fork Touchet river; near and upstream of Vernon Lane.	2.5
9/28/01	North Fork Touchet river; near the irrigation pump at Vernon Lane.	2.0
10/02/01	North Fork Touchet river; near the irrigation pump at Vernon Lane.	2.0
10/05/01	North Fork Touchet river; in deep hole in stream near Crall Hollow Road.	1.54
10/08/01	North Fork Touchet river; in deep hole in stream near Crall Hollow Road.	1.54
10/10/01	North Fork Touchet river; in deep hole in stream near Crall Hollow Road.	1.54
10/12/01	North Fork Touchet river; in deep hole in stream near Crall Hollow Road.	1.54
10/13/01	Touchet river; tag detected on stationary telemetry receiver located at WDFW fish trap.	54.0
10/19/01	Touchet river; near public golf course.	52.8
10/23/01	Touchet river; near public golf course.	52.8
10/26/01	Touchet river; near public golf course.	52.8
10/31/01	Touchet river; located between the dead ends on Patit Street and Dayton Avenue, respectively.	53.0
11/6/01	Touchet river; near public golf course.	52.8
11/13/01	Touchet river; near public golf course.	52.8
11/16/01	Touchet river; near public golf course.	52.8
11/21/01	Touchet river; near public golf course.	52.8
11/28/01	Touchet river; in riffle slightly upstream of public golf course.	52.8
12/05/01	Touchet river; in riffle slightly upstream of public golf course.	52.8
12/06/01	Touchet river; in riffle slightly upstream of public golf course. Entered stream and seemed to be able to startle fish into moving. Believe fish to be alive and still carrying tag.	
12/13/01	Touchet river; near public golf course.	52.8
1/4/02	Touchet river; near public golf course.	52.8
1/22/02	Touchet river; near public golf course.	52.8
2/6/02	Touchet river; near public golf course. Walked in the river around the area trying to move fish. Tag didn't seem to move; at this point in time suspect fish may have ejected the tag.	52.8
2/23/02	Touchet river; near public golf course.	52.8
3/15/02	Touchet river; near public golf course.	52.8
3/27/02	Touchet river; near public golf course.	52.8
4/19/02	Touchet river; near public golf course.	52.8
5/3/02	Touchet river; near the flagpole on the Dayton high school football field.	53.5
5/4/02-5/10/02	Touchet river; in pool below the WDFW fish trap. Tag detected by fixed-site receiver located at the WDFW fish trap.	53.8
5/10/02	Touchet river; fish captured in WDFW fish trap. Fish appears to be in good condition.	53.8
5/11/02	Touchet river; signal fading as transmitter is moving downstream of the fixed telemetry receiver at the WDFW fish trap. Tag signal detected on the stationary receiver from 3:30-19:46.	53.8
5/12/02	Tag not detected while scanning upstream of trap.	
5/13/02	Touchet river; near public golf course.	52.8

	5/14/02	Tag not found; stopped tracking at Lewis and Clark State Park.	
	5/21/02	Tag not found; tracked from Dayton municipal water treatment plant to Wolf Fork Road.	
	5/23/02	Tag not found.	
	5/24/02	Tag not found; tracked from Dayton to Waitsburg.	
	5/30/02	Tag not found; tracked from bridge on Bolles Road to junction of North Fork Touchet and South Fork Touchet.	
	5/31/02	Tag not found; tracked from WDFW fish trap to locked gate at end of public road paralleling Wolf Fork.	
	6/4/02	Tag not found.	
	6/7/02	Touchet river; tag detected at Hofer dam approximately 2 miles upstream of city of Touchet during telemetry flight.	4.6
	6/10/02	Touchet river; recovered tag and carcass on trash screen at Hofer irrigation dam. Cause of death unknown.	4.6
102	5/14/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/15/01	Touchet river; near release site.	54.75
	5/18/01	Touchet river; near release site.	54.75
	5/25/01	Wolf Fork; near stream mouth on Fairchild property.	0.2
	6/22/01	Tag detected downstream of Rose Gulch road during telemetry flight. Later, while ground tracking same day after flight, tag location determined to be near pond ~30 meters from river.	49.2
	7/15/01	Recovered tag under debris on shoreline of pond; fish carcass not found.	49.2
105	4/27/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	4/29/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	4/30/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/02/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/03/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/05/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/09/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/11/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/15/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/18/01	North Fork Touchet river; at a point near the upstream end of the city dike, near the confluence of the North Touchet and South Touchet rivers.	0.2
	5/25/01	North Fork Touchet river; near the gravel pile along Vernon Lane.	2.75
	5/31/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	6/07/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	6/12/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	6/15/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	6/18/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	6/22/01	NF Touchet (747 N Touchet Rd., fly over)	6.5
	6/27/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	7/05/01	North Fork Touchet river; near 747 North Touchet Road.	6.5
	7/09/01	North Fork Touchet river; near 747 North Touchet Road. Found tag without fish.	6.5

106	5/23/01	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/25/01	Touchet river; below the release point.	54.5
	5/31/01	North Fork Touchet river; near Crall Hollow	1.5
	6/07/01	Wolf Fork; behind Gibbons property.	1.0
	6/12/01	Wolf Fork; between Gibbons and Holmberg properties.	1.4
	6/15/01	Wolf Fork; between Gibbons and Holmberg properties.	1.4
	6/18/01	Wolf Fork; between Gibbons and Holmberg properties.	1.4
	6/22/01	Wolf Fork; tag located between Gibbons and Holmberg properties during telemetry flight.	1.4
	6/27/01	Wolf Fork; streamflow measurement site on Nelson property.	4.4
	7/05/01	Wolf Fork; 4 th bridge on Wolf Fork Road (4.1 road miles upstream of junction of Wolf Fork Road and Robinson Fork Road).	6.7
	7/09/01	Wolf Fork; fish observed while snorkeling in stream near a point on Wolf Fork Road 4.8 miles upstream of the junction of Wolf Fork Road and Robinson Fork Road.	7.7
	7/19/01	Wolf Fork; fish observed while snorkeling near and upstream of first bridge on private access road behind locked gate at end of Wolf Fork Road. Flesh appeared bruised at incision site on abdominal wall.	7.8
	8/07/01	Wolf Fork; fish observed ~50' upstream of log weir while snorkeling. Transmitter bulging from abdominal wall under thin, tightly stretched overlayer of flesh. Suspect fish may expel transmitter soon.	8.9
	8/22/01	Wolf Fork; tag recovered while snorkeling near Newby's Ford. Fish observed while snorkeling. Fish appeared healthy, with a round, red scar at tag expulsion site.	9.4
108	5/17/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/21/02	Touchet river; slightly upstream of the WDFW fish trap.	53.9
	5/23/02	Touchet river; near WDFW fish trap. Tag detected on fixed-site receiver located at WDFW fish trap.	54.0
	5/23/02	Behind Long's elevator – weak signal	50.3
	5/24/02	Lewis and Clark State Park campsite #9	48.4
	5/30/02	Not found; tracked from Bolles Road to the confluence of the North Fork Touchet river and South Fork Touchet river.	
	5/31/02	Not found; tracked from Touchet river dike in Dayton to the locked gate at the end of Wolf Fork Road, and to the confluence of Spangler Creek and North Fork Touchet river.	
	6/4/02	Not found	
	6/7/02	Signal detected during telemetry flight immediately downstream of Prescott.	33.4
	6/10/02	Piper Canyon Road	33.4
	6/18/02	Found radio on cobble deposit ~10' from water's edge; fish or carcass not found.	33.4
115	5/30/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/30/02 – 5/31/02	Fish moved downstream of fixed-site receiver located at WDFW fish trap, not detected on fixed-site receiver.	54.0
	5/31/02	Lower Weinhard Rd. at the hilltop.	52.6
	6/4/02	Not found	
	6/7/02	Tag located ~1.5 mi upstream of Prescott during telemetry flight.	37.5
	6/19/02	Tag recovered on sediment deposition, left bank, slightly upstream of Prescott ~1/4 mile down farm access road at end of Turnagain Rd. Fish or carcass not found.	37.7
116	6/2/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5

	6/2/02 - 6/4/02	Fish moved downstream of fixed-site receiver located at WDFW fish trap, not detected on fixed-site receiver.	54.0
	6/4/02	At end of Patit St. between Golf course and bridge.	53.3
	6/5/02	Tag signal detected in AM slightly upstream of bridge on Hogeye Hollow; later same day an attempt was made to recover tag but no signal was found.	
	6/7/02	Not found during telemetry flight.	
	12/28/02	CTUIR personnel detected signal near Boise-Cascade paper mill on Columbia river, upstream of mouth of Walla Walla river during tracking flight.	
117	5/31/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/31/02 - 6/4/02	Fish moved downstream of fixed-site receiver located at WDFW fish trap, not detected on fixed-site receiver.	54.0
	6/4/02	Not found	
	6/5/02	Tag recovered ~200 meters upstream of bridge on Poor Farm Road, downstream of Dayton. Fish or carcass not found.	51.3
119	5/13/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/14/02	Release site	54.75
	5/21/02	At the bench immediately below operation sight	54.6
	5/23/02	At the bench immediately below operation sight	54.6
	5/30/02	Upper end of dike above the trap	56.1
	5/31/02	North Fork Touchet mouth	0.0
	6/4/02	North Fork Touchet river; upstream of South Touchet Road bridge.	0.5
	6/7/02	Signal detected during telemetry flight near South Touchet Road.	0.5
	6/16/02	Near lower end of gravel road leading into Warren Orchards.	2.4
	6/28/02	Wolf Fork, 1 mile upstream of the mouth of Robinson Fork.	3.6
	7/9/02	Wolf Fork Road, near milepost 5.7	6.1
	7/23/02	Wolf Fork Road, near milepost 5.7	6.1
	7/30/02	Wolf Fork Road, near milepost 5.7	6.1
	8/12/02	Wolf Fork Road, near milepost 5.7	6.1
	8/21/02	Tag recovered on stream bottom immediately upstream of partially submerged rootwad on right bank. Tag in excellent condition, no evidence of fish.	6.1
120	5/20/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/20/02 - 5/21/02	Touchet river; fish in vicinity of the WDFW fish trap. Tag detected on fixed-site receiver located at WDFW fish trap.	54.0
	5/21/02	Above golf course but below Highway 12 bridge in Dayton.	53.3
	5/23/02	Behind Long's grain elevator, weak signal	50.3
	5/24/02	Not found.	
	5/30/02	Not found; tracked from Bolles Road to confluence of North Fork Touchet river and South Fork Touchet river.	
	5/31/02	Not found; tracked from Touchet river dike, Dayton, upstream to the locked gate at the end of Wolf Fork Road and the confluence of Spangler Creek and North Fork Touchet river.	
	6/4/02	Not found	
	6/7/02	Touchet river; tag detected between first two bridges on Touchet North Road during telemetry flight.	15.0
	6/10/02	At Lewis and Clark campsite on Touchet North Road; several recovery attempts made, but unable to recover tag due to high water and low visibility.	15.25
121	5/9/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/10/02	½ mile downstream of release site	54.0

	5/11-5/12/02	Touchet river; fish is slightly upstream of WDFW fish trap. Tag detected on fixed-site receiver located at WDFW fish weir from 23:36-17:36.	53.8
	5/12/02	Slightly upstream of WDFW fish weir.	54.0
	5/13/02	Tag not detected.	
	5/14/02	Tag not detected; tracked from footbridge over Touchet river, Dayton, downstream to Lewis and Clark State Park.	
	5/21/02	Tag not detected.	
	12/28/02	CTUIR personnel detected signal near Boise-Cascade paper mill on Columbia river, upstream of mouth of Walla Walla river during tracking flight.	
122	5/17/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/17/02 – 5/21/02	Touchet river; fish in vicinity of the WDFW fish trap. Tag detected on fixed-site receiver located at WDFW fish trap.	54.0
	5/21/02	Tag not found; tracked from Dayton wastewater treatment plant to junction of North Touchet Road and Wolf Fork Road.	
	5/23/02	Tag not found.	
	5/24/02	Tag not found.	
	5/30/02	Tag not found; tracked from Bolles Road to confluence of North Fork Touchet river and South Fork Touchet river.	
	5/31/02	Tag not found; tracked from Touchet river dike, Dayton, upstream to the locked gate at the end of Wolf Fork Road and the confluence of Spangler Creek and North Fork Touchet river.	
	6/4/02	Tag not found.	
	6/7/02	Tag located downstream of Lamar during telemetry flight.	27.4
	6/20/02	Recovered tag in wheat field, left bank, ~200 yards and ~40 elevational feet from water 1.4 river miles downstream of the point at which the Touchet river diverges from highway 124. Tag and antenna damaged by what appeared to be multiple bite marks. Fish or carcass not found.	24.8
123	5/14/02	Fish captured in WDFW fish trap (RM 54.0) radio tagged, and released ½ mile upstream.	54.5
	5/20/02	Touchet river; fish in vicinity of WDFW fish trap. Tag detected on fixed-site receiver located at WDFW fish trap.	54.0
	5/21/02	Touchet river; downstream of Highway 12 bridge, Dayton.	53.3
	5/23/02	Touchet river; directly behind Long's grain elevator	50.3
	5/24/02	Highway 12 bridge at Lewis and Clark State Park.	48.0
	5/30/02	Transmitter signal not detected; tracked from Bolles Road to confluence of North Fork Touchet river and South Fork Touchet river..	
	5/31/02	Transmitter signal not detected; tracked from Touchet river dike, Dayton, upstream to the locked gate at the end of Wolf Fork Road and the confluence of Spangler Creek and North Fork Touchet river..	
	6/4/02	Transmitter not found.	
	6/7/02	Tag located downstream of Lamar during telemetry flight.	~24.0
	7/9/02	Fish assumed dead; transmitter remains unrecovered pending landowner contacts.	

Appendix D: Touchet River Transmitter and Fish Recoveries, 2001.

Tag Code	Date of Recovery	Date Tagged	Final Location	RM	River	Last Date of fish movement	Previous Location	Tag Condition.	Comments (temp)
105	7/9/01	4/27/01	N46 15.127 W117 52.435 House #747 1 st house on left after Cahill Mt. Rd.	6.5	NF Touchet	5/25/01	Behind Warren's Orchard, approx. Rm 2.75 of the NF Touchet		70.5@16:00 at final location for over a month.
91	7/9/01	5/02/01	N46 14.625 W117 52.019 m.p. ~8.25 N. Touchet Rd, at downstream end of Frame property	7.2	NF Touchet	5/25/01	@5/25 was in the Rd mi 7.5 area	No detritus. Covered with algae	70.5@16:00 found in pool no sign or indication of fish or cause of death. This fish had moved regularly prior to this location.
93	7/9/01	4/27/01	Canyon Crossing	2.0	Burnt Fk	6/05/01	@6/05/01 observed at Kolke cabin on SF. On 6/22 in fly over thought to be one mile up Burnt Fork	No detritus or other organic matter	55@ 10:30 found tag in small pool with no apparent cause of death; fish carcass not in vicinity.*
102	7/15/01	5/14/01	between grain elevator and state park on lower Touchet	49.5	Touchet	5/25/01	At mouth of Wolf Fork on 5/25	Unknown. Tag may be in an animal den.	narrowed down to small pond near river. Indication of a predator den in the area.
106	8/22/01	5/23/01	Newby's Ford	9.8	Wolf Fork	8/7/01	immediately below the log weir falls on the Wolf Fork	good, no algae	8/7/01 Looked like large bulge @incision whitish yellow. Expelled tag. Saw fish during snorkel, looked similar to the Burnt Fork fish: red dot, flesh somewhat transparent, otherwise healthy.
97	9/20/01	5/02/01	Tate Creek	10.7	Wolf Fork	9/6/01	30 M. below Tate Creek parking area @final resting place	not recovered	The tag is located deep in an undercut bank on dry land about two meters from stream edge. Unable to observe the condition of fish or tag.

*This fish was confirmed alive on 8/9/01 while electrofishing.

Appendix E: Bull trout trapping and radio tag implant summary, WDFW Touchet river trap (RM 54.0), 2002.

Date	Code	PIT Tag Number	Length (mm)	Weight (g)	Comments	Scale Age*	Scale Sample Number	DNA Sample number	Temp (°f)
04/02/02		N/A	320	N/A			N/A	N/A	N/A
04/09/02		N/A	350	N/A			N/A	N/A	N/A
04/09/02		N/A	340	N/A			N/A	N/A	N/A
05/01/02		3D9.1BF0F634AC	340	350	Too small to tag		Tou1-1	BT02-TO01	49
05/09/02	121	3D9.1BF0EDC5F6	330	380			Tou1-2	TO02	43
05/10/02	100	3D9.1BF11B9E12	500	1225	Tagged in 2001		Tou1-3		46
05/10/02		N/A	370	560	Mort in trap		Tou1-4	TO03	46
05/13/02	119	3D9.1BE11E9FFD	380	550			Tou1-5	TO04	46
05/14/02	123	3D9.1BF0ED614A	360	540			Tou1-6	TO05	45
05/17/02	108	3D9.1BF0ED5E5F	510	1400	PIT tag from previous year		Tou2-1	TO06	46
05/17/02	122	3D9.1BF11ABB66	380	600	2 puncture wounds on back		Tou2-2	TO07	46
05/20/02	120	3D9.1BF123980C	348	470			Tou3-1	TO08	49
05/22/02		3D9.1BF11EA809	320	400	Too small to tag		Tou3-3	TO10	49
05/25/02		N/A	240	130	Too small to tag		N/A	TO11	49
05/30/02	115	3D9.1BF11ABC04	350	480			Tou3-4	TO12	50
05/31/02		3D9.1BF11EBE01	270	340	Too small to tag		Tou3-5	TO13	50
05/31/02	117	3D9.1BF11AC1B6	372	540			Tou3-6	TO14	50
06/02/02		N/A	270	180	Too small to tag		Tou3-7	TO15	55
06/02/02	116	N/A	340	440	Left & right caudal peduncle descaled		Tou3-8	TO16	55
06/05/02		N/A	335	420			Tou3-9	TO17	
06/12/02		3D9.1BF11E9DC4	380	N/A			N/A	N/A	N/A
06/13/02		3D9.1BF123A317	310	N/A	End of trapping season		N/A	N/A	N/A

2002.

*Age data not yet available.

Appendix F: Touchet River Transmitter and Fish Recoveries, 2002.

Date of Recovery	Date tagged	Tag code	Final location	RM	River	Previous Location	Tag Condition	Comments
6/10/02	5/12/01	100	Hofer Dam irrigation canal	4.1	Touchet	Golf course hole in Dayton, 5/13/02	Found with carcass	In detritus cleaned from screen
6/18/02	5/17/02	108	Piper Canyon Rd area near river	33.4	Touchet	Behind Long's grain elevator, downstream of Ward Rd. 5/23/02	Without carcass and in fair condition	Found on cobble deposition 10 ft. from water at current level.
6/5/02	5/31/02	117	200m above the Ward Rd. bridge.	51.3	Touchet	Surgery and release site 5/31/02	Without carcass	Found in a deposition area amongst cobble at end of island.
6/19/02	5/30/02	115	End of Turnagain Rd. (Hinchliffe)	37.7	Touchet	Lower Weinhard Rd. 5/31/01	No carcass	obvious teeth marks on antenna, found on LB in deposition area.
6/20/02	5/17/02	122	1.5 mi. beyond the gate @ Lamar	24.8	Touchet	In the Lamar area during flyover 6/7/02	Very poor, no carcass	Tag is very chewed up. Found about 40 elevational feet above River in a wheat field
N/A	5/20/02	120	Lewis and Clark sign on Touchet North Rd.	15.25	Touchet	Behind Long's grain elevator 5/23/02	Not recovered	Was unable to recover tag due to high water and poor visibility.
N/A	5/14/02	123	Between Lamar and Luckenbill Rd.	?	Touchet	Hiway 12 bridge by Lewis-Clark State Park. 5/24/02	Not recovered	Transmitter remains unrecovered pending Landowner contacts
N/A	5/13/02	119	Wolf Fork RD milepost 5.7	3.6	Wolf Fork of North Fork Touchet River	1 mile upstream of Robinson Fork mouth in Wolf Fork	Excellent. No damage of any kind	Tag recovered in slackwater pool immediately upstream of submerged rootwad, right bank, near cabin. No evidence of fish.
N/A	12/28/02	116	Near Boise-Cascade paper mill on Columbia river	53.3	Touchet	End of Patit Street between golf course and bridge, Dayton	Not recovered.	No signal detected from this transmitter since 6/5/02, including during telemetry flight on 6/7/02.
N/A	12/28/02	121	Near Boise-Cascade paper mill on Columbia river	54	North Touchet	Upstream of WDFW fish trap, Dayton	Not recovered.	Signal from this transmitter was last detected on 5/12/02. No signal was detected after that date.