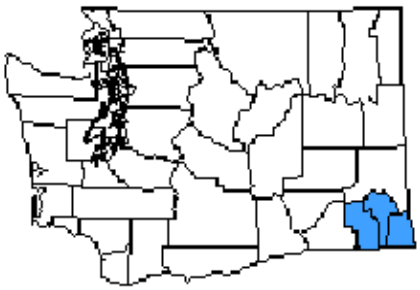
Baseline Assessment of Salmonids in Tributaries of the Snake and Grande Ronde Rivers in Southeast Washington

2006-2007 Final Report



By

Glen Mendel, Jeremy Trump, Michael Gembala, and Chris Fulton

Washington Department of Fish and Wildlife
Fish Program - Fish Management Division
529 West Main Street, Dayton, WA 99328

For

Asotin County Conservation District
United States Fish and Wildlife Service
Washington Department of Fish and Wildlife

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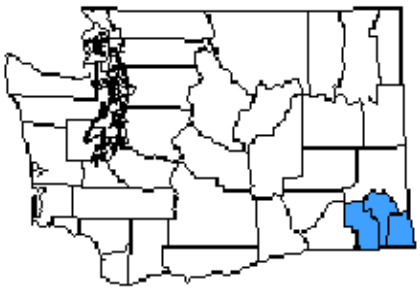

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Acknowledgments

Funding for this study was provided by multiple sources. Jim Uehara, (Washington Department of Fish and Wildlife) provided some funding available from the U. S. Fish and Wildlife Service. Scott Deeds (U. S. Fish and Wildlife Service, USFWS) provided some funding for genetic sampling and analysis of native bull trout populations in the Tucannon Subbasin. The Asotin County Conservation District provided funding from BPA for surveys in Asotin County; special thanks to Megan Stewart. In 2006, Michael Faler (USFWS) provided personnel and field accommodations for Tucannon River bull trout sampling and PIT tagging with U.S. Army Corp of Engineers (USACE) funding (for USFWS activities). The Washington Department of Fish and Wildlife provided additional funding and assistance.

We would like to extend thanks to the following individuals with the Washington Department of Fish and Wildlife who contributed their efforts in collecting, entering, and summarizing data: Derek Gloyn, Steve Jeffers, and Larabee Miller. We would also like to thank Carrie Bretz and the other USFWS personnel for their assistance with Tucannon River sampling in 2006. Thanks to Bill Dowdy and the USFS for assistance with logistics and field sampling in the Wenaha and Grande Ronde River drainages.

Dave and Sas Waldron of Western Life Outfitters provided outfitter services for a portion of the bull trout sampling in the upper Tucannon River subbasin in 2006.

We would also like to thank all of the private landowners for granting access to perform fieldwork on their properties. Without access to the streams on private property, significant portions of these efforts would not have been possible.

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Executive Summary

The data collected for this report and the report itself are a supplement to work done previously in southeast Washington (Mendel et al. 2006). We continued to collect data to provide information regarding distribution, relative abundance, and species composition, while obtaining tissue samples for age and growth or genetic analyses. This effort was part of our salmonid population/stock assessment in selected streams in southeast Washington where data were most limited. Small amounts of funding came from several sources to enable us to combine the following objectives or projects: 1) increase our field sampling of small streams or stream reaches in Asotin County, 2) begin sampling Wenaha River tributaries within WA, particularly for bull trout information, and 3) continue bull trout monitoring efforts in the Tucannon River, and expand those efforts to include collection of tissues for a collaborative genetic evaluation of metapopulation structure and to assist with PIT tagging for evaluation of movements. Most of our efforts were concentrated on fish population assessment, but a limited amount of habitat assessment was included.

The 2006 field efforts completed a portion of the goals and objectives of the various projects combined in this report and the previous report (Mendel et al. 2006). For example, we completed the collection of 40 tissue samples that met our genetic sampling protocol from juvenile bull trout in each of seven reaches of the upper Tucannon watershed. We also completed electrofishing surveys in the Butte Creek watershed, which were delayed in 2005 because of a large wildfire in southeast Washington (Mendel et al. 2006). We were successful in obtaining valuable new baseline information that is useful for assessing salmonid stock status, particularly in lower Joseph Creek and portions of the Wenaha River watershed within Washington State. We were able to obtain tissue samples from many fish from several drainages that will be useful for age, growth, and genetic analyses in the future. In addition, we were able to obtain field data regarding the distribution and relative abundance of tailed frogs (*Ascalphus truei*) in the Blue Mountains.

During 2007 we were able to conduct both steelhead spawning surveys and electrofishing surveys on Alpowa Creek and were able to collect genetic samples. We shifted our sampling slightly out of the Wenaha River Basin, and obtained baseline information on aquatic species and habitat in Wenatchee Creek with the help of other WDFW and USFS staff.

Currently, streams or stream reaches remain where little or no field sampling information is available. We hope to secure additional funding for each of the next two years to enable us to continue this effort to collect baseline data regarding salmonids and their habitats in areas where limited or no data currently exists in southeast Washington. Our ultimate goal is to then use this baseline data to guide development of a comprehensive monitoring and evaluation program that would implement appropriate long-term monitoring of the status and trends of salmonid populations in these small tributaries.

We trust that the information documented here will be useful to fish and habitat managers, as well as subbasin and salmonid recovery planners, for protecting and restoring salmonid resources in southeast Washington tributaries within the Snake River Subbasin.

Introduction

Concerns about the decline of native salmon and trout populations have increased among natural resource managers and the public in recent years. In 1992, the National Oceanic and Atmospheric Administration (NOAA) designated both Snake River fall-run chinook and spring/summer-run chinook (*Oncorhynchus tshawytscha*) as threatened species under the Endangered Species Act (ESA). In 1997, NOAA designated Snake River summer steelhead (*Oncorhynchus mykiss*) as a threatened species. Then, in 1998, the U.S. Fish and Wildlife Service (USFWS) designated bull trout (*Salvelinus confluentus*) as a threatened species in the Columbia Basin.

These listings have emphasized the need for information regarding the status of salmonid populations and their habitats. As a result, a multitude of initiatives have been implemented at the local, state, and federal government levels. These initiatives include completing several management plans (e.g. draft Bull Trout Recovery Plan -USFWS 2002, several Subbasin Plans, and the Snake River Salmon Recovery Plan – SRSRB 2005), and numerous actions intended to conserve and restore salmonid fishes and their habitats.

The Washington Department of Fish and Wildlife (WDFW) is entrusted with "the preservation, protection, and perpetuation of fish and wildlife.... [and to] maximize public recreational or commercial opportunities without impairing the supply of fish and wildlife" (WAC 77.12.010).

In consideration of this mandate, the WDFW District Fish Management staff in Dayton, Washington implemented several projects to investigate the status of salmonid populations and their habitats within Pataha Creek (Mendel et al. 1999), George Creek, Tenmile Creek, and Couse Creek in 2000 (Mendel et al. 1999, Mendel et al. 2001). This effort was expanded in 2001-2003 to include multiple watersheds within Asotin, Garfield, and Whitman counties (Mendel et al. 2004a). In 2004-2005, district staff continued monitoring efforts in southeast Washington streams for three related projects with multiple funding sources, including cost share from WDFW: 1) A contract from the Asotin County Conservation District, with BPA funding to sample small streams in Asotin County, 2) A contract with the Spokane Office of the USFWS to collect tissue samples from juvenile bull trout in upper stream reaches of the Tucannon River Subbasin for a collaborative genetic study of metapopulation structure, and 3) monitoring bull trout distribution and relative abundance in the Tucannon River Subbasin and Wenaha River watershed in southeast Washington with ESA Section 6 funding from the USFWS (Mendel et al. 2006). Sampling efforts concentrated on streams suspected of rearing bull trout or rainbow/steelhead, and these efforts have continued through 2007.

Information collected as part of these projects will be useful to government agencies, citizens, and land managers to guide future decisions regarding fish management, land use, and habitat restoration in southeast Washington. Landowners and managers may also benefit from increased access to conservation funding programs as a result of the documented presence of chinook, steelhead, and bull trout and an assessment of habitat conditions.

Study Purpose and Objectives

The overall purpose of these projects is to provide information as part of a baseline assessment of salmonid populations and their habitats in southeast Washington. The primary emphasis is population status monitoring to determine distribution and relative abundance of salmonids, and to a lesser extent collect scale and tissue samples for age and genetic evaluation. These efforts include: 1) documenting initial baseline data regarding fish in lower Grande Ronde River tributaries in Washington for which little or no data presently exists; 2) continuing baseline assessments that began in 2000 of small Snake River tributaries and selected Asotin subbasin streams; and 3) continuing PIT tagging bull trout, collecting tissue samples, and assessing distribution and relative abundance of salmonids in the upper Tucannon subbasin. In addition, our intent included documenting instream migration barriers and obtaining general habitat information for selected Asotin Creek, Grande Ronde River, Tucannon River, and small Snake River tributaries within Asotin, Garfield, and Columbia counties of southeast Washington. An ancillary benefit of these field sampling efforts was documenting distribution and abundance of tailed frogs and other aquatic species.

This report summarizes our efforts from several small studies in 2006 and 2007 to investigate fish populations and their habitats within the Snake River Subbasin in southeast Washington. This is a continuation of our previous efforts (Mendel et al. 1999, Mendel et al. 2001, Mendel et al. 2004a) and should be considered a supplemental report to Mendel et al. 2006.

The objectives of this project were to perform baseline monitoring of salmonid populations and their habitats. These monitoring efforts included the following tasks:

- Conduct steelhead and bull trout spawning surveys to determine spawn timing, distribution and relative abundance.

- Establish and monitor constant recording temperature data loggers at selected sites to monitor water temperatures and evaluate their potential effects on salmonid survival, passage, spawning and rearing.

- Conduct periodic stream discharge measurements during summer and fall to document the availability of water for fish use at selected sites.

- Conduct electrofishing in the spring or summer to determine fish and tailed frog relative abundance, distribution, and species composition in selected streams.

- Collect general habitat inventory information to help identify limiting factors in each stream, including instream migration barriers.

- Collect tissue samples from rainbow/steelhead and bull trout for use in genetic analysis and stock assessment during electrofishing and spawning surveys. Include Chinook salmon tissues samples if sufficient Chinook are available.

Methods

Study Area

The study area encompasses selected streams within the Snake River drainage of Asotin, Garfield, and Columbia counties in southeast Washington (Figure 1). This included the Tucannon River subbasin, upper portions of the Wenaha River watershed, portions of the Asotin Creek subbasin, and selected tributaries of the lower Grande Ronde and lower Snake Rivers.

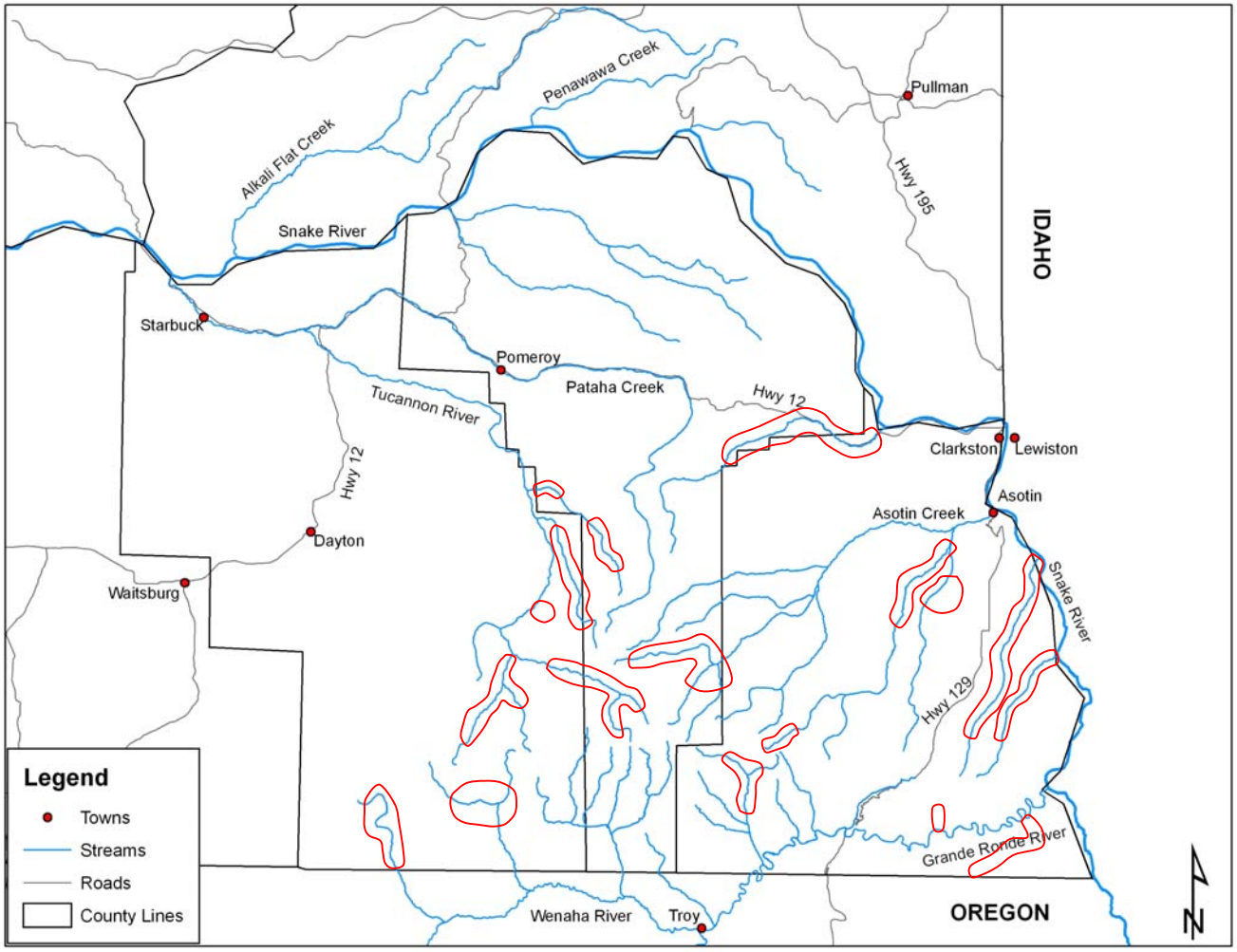

Figure 1. Vicinity map of the Snake River Subbasin in southeast Washington showing major streams, roads, towns and county boundaries (courtesy of Bill Dowdy, USFS). Red circles indicate approximate areas where sampling (electrofishing, spawning surveys, etc.) took place. Note that the Touchet River and other drainages to the west were excluded from the map as they drain to the Walla Walla and Columbia rivers.

Stream Reaches

Representative stream reaches were identified based on general physical characteristics, readily identifiable landmarks, and accessibility. Emphasis was given to those stream reaches that likely contained salmonids of interest and were reasonably accessible by vehicle, or by foot travel in remote, difficult terrain areas. Landmarks included towns, roads, bridges, and tributaries.

Individual Site Selection

Methods for selecting sites were the same in 2006 and 2007 as those reported in Mendel et al. 2006. Sampled sites are listed and identified in order from upstream to downstream (Appendix A).

Habitat Assessment

Stream Flows

Spring or summer stream discharge was measured manually at selected sites according to standard techniques (Armour and Platts 1983) using a Swoffer model 2100 flow meter. Discharge was calculated in cubic feet per second (cfs) using a Microsoft Excel© spreadsheet.

Stream Temperatures

We used two methods to collect water temperatures as described in Mendel et al 2006.

Limiting Factor Identification and Habitat Conditions

One of the study goals was to identify and document physical barriers to salmonid passage, spawning and rearing. Field personnel photographed and noted the presence of possible barriers. We provided the information to local biologists or land managers to consider habitat restoration efforts, as appropriate.

Physiological barriers to salmonid passage and survival, in the form of excessive temperatures, inadequate flows, and degraded habitat were also identified by field observation or examining tables and graphs of data collected by instream temperature monitors and manual sampling.

General habitat conditions (wetted widths, average depths, substrate, embeddedness, riparian vegetation, bank stability, etc.) were recorded at each site and summarized in the stream profiles portion of this report.

Fish Stock Assessment

Distribution, Relative Abundance and Species Composition

Electrofishing Surveys

A Smith-Root Model 11A or 12B electrofishing backpack unit was used to collect fish at various study sites throughout the study area. We used pulse DC (direct current) between 200 and 600 volts. Two different types of electrofishing surveys (quantitative and qualitative) were used during our sampling.

Fish identification for electrofishing sites included genus and species for all *Salmonidae* (Salmonids), *Cyprinidae* (minnows), and *Ascaphidae* (tailed frogs); and genus only for *Cottidae* (sculpins), *Catostomidae* (suckers), and *Petromyzontidae* (lamprey). Our sampling protocol was to collect and measure 10-20 of each non–salmonid species at each site. Non–salmonid species were assigned a relative abundance ranking value (Table 1) based on general observations made during electrofishing at each site. Ranked values were averaged to determine a relative abundance for each species per designated stream reach. Relative abundance data were tabulated to provide qualitative comparisons between reaches and species.

Table 1. Categories of relative abundance (per site) for non–salmonids .

Category	Count (individuals seen)	Ranking Value
Absent	0	0
Rare	1-3	1
Uncommon	4-10	2
Common	11-100	3
Abundant	100+	4

Quantitative

Quantitative electrofishing sites were delimited by placing block nets, spanning the channel, approximately 30 to 50 meters apart. Block nets prevented fish from entering or leaving the site, so that estimates of salmonid populations and densities could be calculated (Platts et al. 1983). The operator usually began at the upstream net and worked downstream, covering the entire wetted width. In sites with heavy sedimentation the operator would begin at the bottom net and work upstream to maintain enough water clarity to efficiently capture fish. One “pass” was completed when the net opposite the start was reached. All sites received at least two sequential passes. A 60% reduction was required between the first and second passes for each salmonid species and estimated age class. If the 60% reduction was not met, a third pass was conducted. Stunned fish were collected with dip nets and held separately in buckets by sampling “pass” until they could be measured and recorded. Collected fish were anesthetized with FINQUEL® (MS-222 tricane methane sulfonate). Once anesthetized the following information was collected; identification (genus or species), fork length (mm), scale and/or genetic samples, and any notation about any marks or tags.

Fork lengths collected during quantitative and qualitative electrofishing were used to create length frequency histograms. The histograms were used to determine age classes of 0+ and 1+ fish (Mendel et al. 1999, Figure 2). Legal size fish were defined as any fish over 200 mm in fork length that would be available to angler harvest under current fishing regulations. Age class groupings were specific for each stream or stream reach, and were spot-checked against results from scale samples taken during electrofishing.

A removal-depletion software program developed by the USFS (Van Deventer and Platts 1983) was used to calculate population densities (#/100m^2) for each salmonid species, by age class. The area sampled was determined by multiplying site length by an average of four or more site width measurements. A brief description of the riparian vegetation, bank stability, substrate, sedimentation, pool/riffle/run ratio, and the presence of large woody debris (LWD) were recorded for each site.

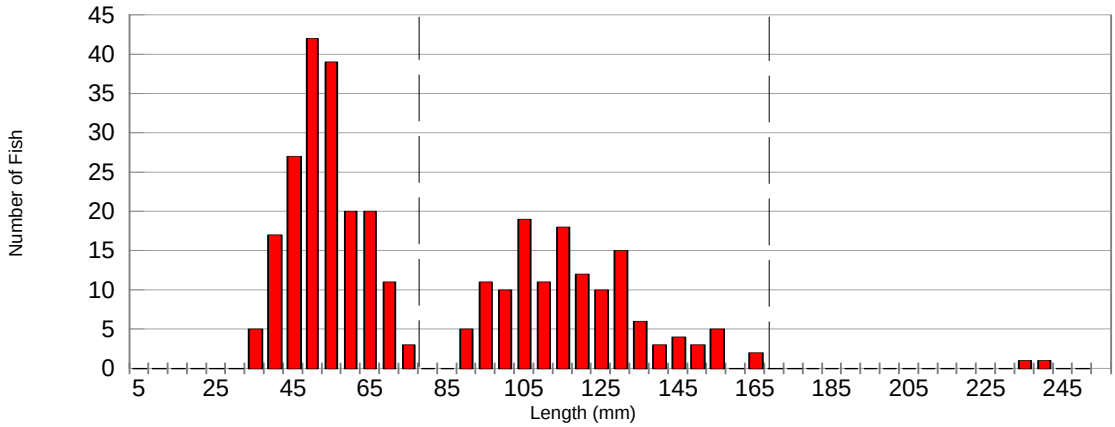

Figure 2. Example of length frequency and age class delineations for George Creek, from Stringtown Gulch to Rockpile Gulch, 2000 (taken from Mendel et al., 2001).

Qualitative

During qualitative electrofishing surveys we moved upstream or downstream capturing fish to determine species presence, size of fish (age class), their relative abundance and to obtain tissue samples. These surveys enabled us to cover large areas relatively quickly as they did not entail the use of block nets or repeat sampling passes. The length and average width of area sampled were recorded as well as a brief description of the riparian area, bank stability, substrate, pools/riffle ratio, and the presence of large woody debris (LWD).

Fork lengths of fish measured during qualitative electrofishing were used to create length frequency histograms. The histograms were used to determine age classes (Figure 2 above, Mendel et al. 1999). Age class groupings specific for each stream or stream reach were used for data summarization. We classified all rainbow/steelhead that were 200 mm in fork length (8 inches) up to 518 mm (20 inches) as legal-sized (legal) trout because they met the minimum size for trout fishing regulations. These fish may have been resident rainbow trout (redband trout) or they may have been steelhead juveniles. Rainbow/steelhead over 518 mm are classified as an

adult steelhead. Bull trout of 200 mm or larger were grouped as adults in data tables, even though some bull trout are adults at ≤ 150 mm.

Spawning Surveys

Spawning surveys were conducted in the same manner in 2006 and 2007 as in previous years (Mendel et al. 2006).

Tissue Sampling and PIT Tagging

Tissue and scale samples were collected from salmonids by WDFW personnel for later genetic analyses and stock assessment purposes. Fin clips were obtained from adult steelhead, juvenile rainbow/steelhead, bull trout, and chinook. Tissue samples were placed in tubes of 100% ethanol for preservation, labeled and retained or transported to the WDFW Genetics Stock Identification Lab in Olympia. Fin clips provide sufficient DNA material for genetic analysis, without killing the fish (Olsen et al. 1996). A non–lethal method of genetic sampling was preferred due to the current ESA listings for wild steelhead and bull trout in the Snake River subbasin. PIT tagging in the Tucannon River was done to assist the USFWS and USACE with an ongoing project to monitor the movements of bull trout from the Tucannon River into the Snake River. Biomark and the USACE installed PIT tag antennas in the lower Tucannon River in fall of 2005 to monitor movement of PIT tagged bull trout.

Genetic Sampling Protocol for the upper Tucannon Subbasin

1. Collect relative abundance, distribution, and species composition information
   --This effort provides samples for the following two tasks by using 15-45 m (50-150 ft) long sites
   --One pass electrofishing (upstream) is used to capture as many fish as possible
   --All salmonids are measured for length, and their species identified. Abundance for all non-salmonids is estimated by abundance categories.
   --Collect scale samples from 5-10 fish per site for comparison to length frequency histograms
   --Measure and record site length and four to five wetted widths, as well as bank full widths

2. Collect genetic samples from seven reaches of the upper Tucannon River subbasin (i.e. above Bear Creek, Bear Creek, from Bear Creek to Sheep Creek, from Sheep Creek. to Panjab bridge, Panjab and Turkey Creek, Meadow Creek, and Cummings Creek).
   --no sampling in the lower 0.25-0.5 miles of each reach to separate reaches
   --collect 40-50 samples (fin clips) from bull trout 35 mm up to 120 mm and place in separate vials of alcohol with individual labels. Record lengths of each fish and unique vial label number.
   --collect no more than 5 samples and no more than 3 of the same size class per site (to reduce chances of sampling siblings)

--size classes are classified as; <70 mm, 71-99 mm, 100-120mm
--collect 40-50 genetic samples for all size classes of O. mykiss

3. PIT tag bull trout from several reaches of the upper Tucannon River subbasin
   --PIT tag up to 100 fish per reach
   --PIT tag bull trout ≥ 70mm in the abdomen, and ≥ 200mm in dorsal sinus
   --use separate or newly sterilized needle per fish
   --record the length of each fish and their PIT tag number on the data sheet

After sampling in the Tucannon Subbasin was completed, we used protocols one and two listed above for the remainder of the field season when collecting genetic samples from bull trout or rainbow/steelhead, relative abundance information, and species composition.

Results and Discussion

This report documents the efforts and results for several concurrent baseline salmonid assessment projects in the Snake River subbasin within southeast Washington, in 2006 and 2007. Results and discussion are grouped mainly by geographic area, with information regarding species, age, tissue samples, and habitat. This report will separate the results into three separate geographic study areas; 1) tributaries of the lower Grande Ronde River, Snake River, and Asotin Creek (all within Asotin County), 2) Wenaha River tributaries in Washington, and 3) Tucannon River and tributaries.

The first study area encompasses the lower Grande Ronde tributaries (Joseph Creek, Shumaker Creek, and Wenatchee Creek and one of its tributaries Indian Tom Creek), three Snake River tributaries (Couse, Tenmile, and Alpowa Creeks), and several streams in the Asotin Creek watershed (North Fork Asotin Creek and its tributaries: Cougar Canyon, Middle Branch of North Fork Asotin, South Fork of the North Fork Asotin; and George Creek and one of its tributaries, Pintler Creek which included two tributaries, Kelly Creek and Ayers Gulch). The electrofishing surveys on Joseph Creek and Wenatchee Creek were conducted to collect baseline information on species composition and relative abundance. Couse Creek was surveyed to collect density information for juvenile rainbow/steelhead. Surveys in North Fork Asotin Creek and several of its tributaries were conducted primarily to collect information about bull trout distribution and abundance, but also to collect genetic samples and obtain general distribution and abundance for other salmonids. Alpowa Creek electrofishing was conducted to collect baseline information on species composition and relative abundance and to collect genetic samples from salmonids.

The second study area encompasses upper Wenaha River tributaries. Streams included in this study area are the North Fork Wenaha River and Butte Creek and tributaries (West Fork Butte Creek, Preacher Creek, Rainbow Creek, and East Fork Butte Creek). Electrofishing surveys were conducted in the North Fork Wenaha River and Butte Creek Watershed to obtain baseline bull trout data, species composition, relative abundance, distribution, and to collect genetic samples for later analysis. North Fork Wenaha surveys were conducted upstream of sampling efforts from 2005 (Mendel et al. 2006).

The final study area encompassed the mainstem Tucannon River and tributaries and includes the following streams or stream reaches: Tucannon River above Bear Creek, Bear Creek, Tucannon River between Bear Creek and Sheep Creek, Tucannon River between Sheep Creek and Panjab Creek, Turkey Creek, Panjab Creek, Meadow Creek, Hixon Canyon, Grub Canyon, Cummings Creek, and Tumalum Creek. Electrofishing on the Tucannon River Watershed in 2006 was a continuation of efforts in 2005 (Mendel et al. 2006). Surveys were conducted for two reasons. The first was to collect genetic samples from bull trout and rainbow/steelhead and to obtain information regarding species composition, distribution and relative abundance. The second purpose for electrofishing surveys was to implant bull trout with PIT tags. Electrofishing in 2007 was conducted in two small tributaries, Grub Canyon and Hixon Canyon, to collect baseline information on species composition and relative abundance. Visual surveys of riparian and fish habitat were conducted on portions of Tumalum Creek in 2007. Rainbow/steelhead trout were observed during these surveys.

Habitat Assessment

Stream Flows

Stream discharge measurements were taken while conducting other work in the area (spawning surveys or electrofishing), to provide information regarding water availability. All stream discharge measurements were taken during 2006 in the first study area (tributaries of the lower Grande Ronde River, Snake River, and Asotin Creek) where most sample sites had easy access from roads, compared to some of the remote sites in the other study areas (Appendix B). No stream flows were taken in the study area in 2007.

Stream Temperatures

Temperature monitors were placed at two sites in 2006, one in upper North Fork Asotin just above the mouth of Cougar Canyon, and one in Cougar Canyon just above the mouth. These loggers were deployed on August 8th, and were pulled for the season on September 17th. The short time that these loggers were in place makes it difficult to draw many conclusions, but we can see that the temperatures were low (<55ºF) and that North Fork Asotin Creek was around 2-3 degrees cooler than Cougar Canyon (Appendix C). No temperature monitors were deployed in the study area in 2007.

Fish Stock Assessment

Distribution and Abundance

Due to the large amount of area to be surveyed and remote nature of the sites, qualitative electrofishing surveys were conducted at the majority of sites in 2006 and 2007. Density estimates were calculated for these sites but should be considered minimum relative abundance estimates. We also conducted more intensive quantitative electrofishing surveys on two streams (Couse Creek and Cummings Creek) in 2006 and one stream (Alpowa Creek) in 2007. During electrofishing efforts, a total of three salmonid species were identified; rainbow/steelhead, bull trout, and spring chinook. Rainbow/steelhead and bull trout were widely distributed in the areas surveyed, while chinook juveniles were only found in Couse Creek, West Fork Butte Creek, Butte Creek, and Cummings Creek, and Alpowa Creek. We also collected relative abundance of several non-salmonid species (Appendix D)

Steelhead spawning surveys were conducted in five streams, while bull trout spawning surveys took place in four streams, and spring chinook spawning surveys were conducted in one stream in 2006. Steelhead spawning surveys were greatly affected by weather in 2006. The presence of a large wildfire (Columbia Complex Fire) limited access to many of the areas we hoped to sample during bull trout spawning. We were able to complete one survey in each of the four streams sampled (North Fork Asotin Creek, Cougar Canyon, West Fork Butte Creek, and North Fork Wenaha River), but were not able to sample in the Tucannon subbasin in 2006. While

conducting electrofishing surveys on Butte Creek, we observed spring chinook salmon redds and conducted one survey through the area where we were sampling.

In 2007, we conducted steelhead spawning surveys on five streams and bull trout spawning surveys on five streams.

1. Lower Grande Ronde Tributaries, Couse Creek, Tenmile Creek, the Asotin Creek Drainage, and Alpowa Creek

Electrofishing Surveys

Electrofishing surveys were conducted throughout much of the study area in 2006 and 2007 (Figures 3-8, Tables 2-5).

Electrofishing surveys were conducted in the summer of 2006 in Joseph Creek, a lower Grande Ronde tributary, Couse Creek, and in North Fork Asotin Creek and three of it's tributaries to assess distribution, relative abundance, and species composition (Table 2 and 4). Quantitative electrofishing surveys were conducted on Couse Creek with densities of rainbow/steelhead ranging from 64.8 to 124.1 fish/100m^2. Age 0+ rainbow/steelhead were the most abundant with a few age 1+ and adult rainbow/steelhead also observed. Juvenile spring chinook were also observed in low densities at the bottom site (Table 2).

Electrofishing surveys in 2007 were conducted in Wenatchee Creek, Indian Tom Creek, Shumaker Creek, George Creek, Pintler Creek, and Alpowa Creek (Table 3 and 5). Quantitative surveys were conducted on Alpowa Creek with total density of rainbow/steelhead between 27.3 and 49.9 fish/100m^2. Age 0+ rainbow/steelhead dominated at all sites with good numbers of age 1+, but no adult rainbow/steelhead were observed. Low numbers of age 0+ chinook were also found at two sites (Table 3).

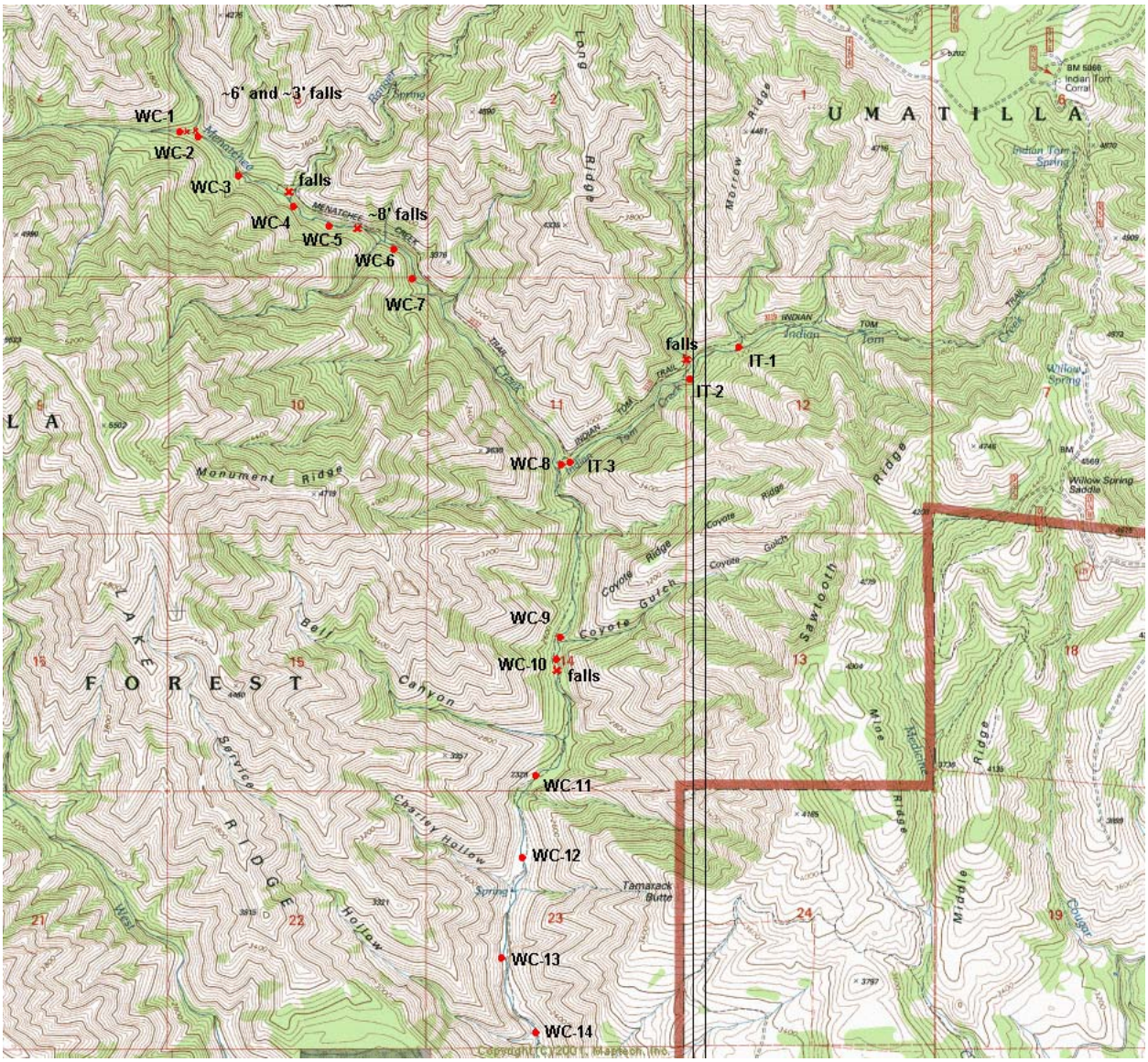

Figure 3. Electrofishing sites on Wenatchee Creek and Indian Tom Creek, 2007.

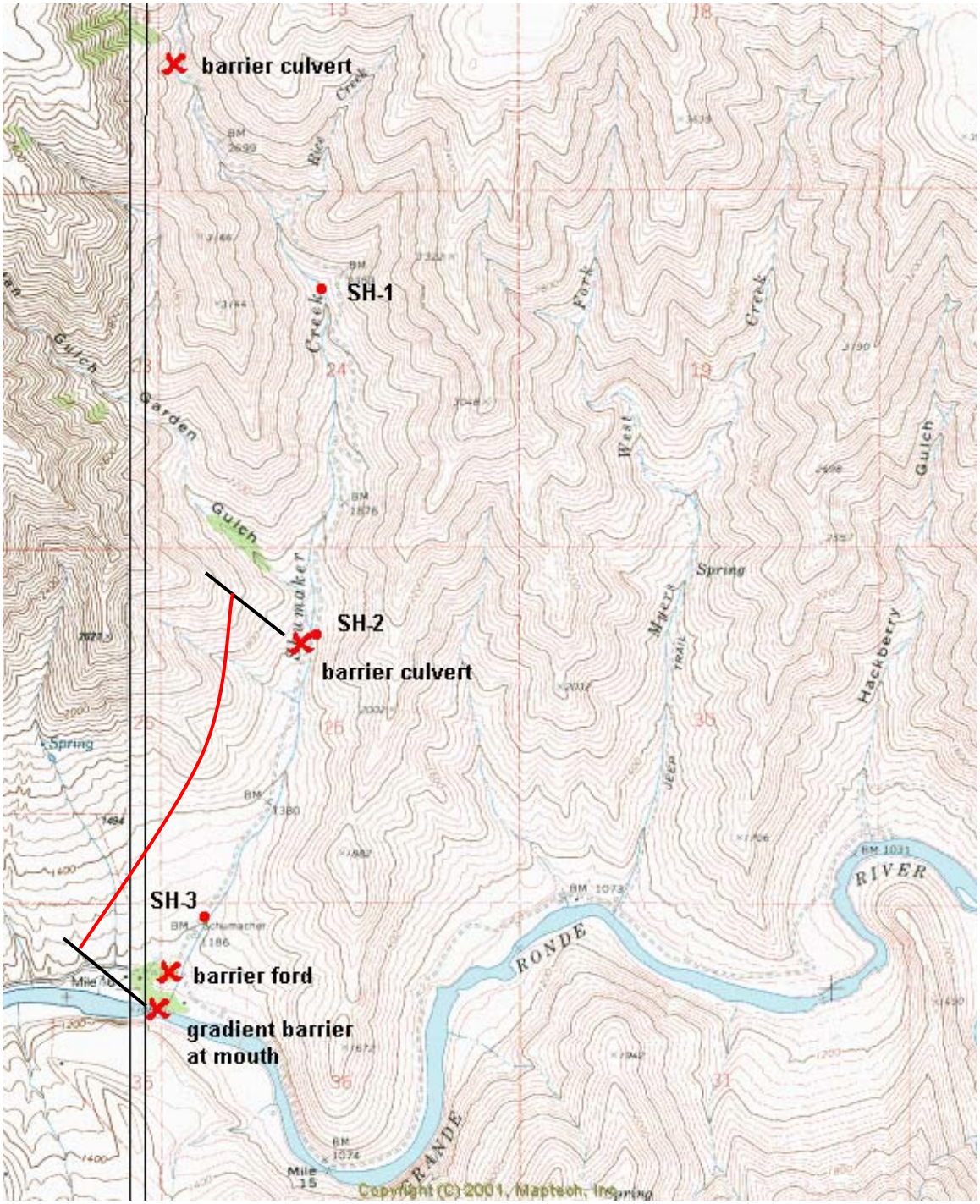

Figure 4. Electrofishing sites on Shumaker Creek, 2007. A steelhead spawning survey was conducted on the section of stream paralleling the red line. Also note that we found four barriers to fish movements.

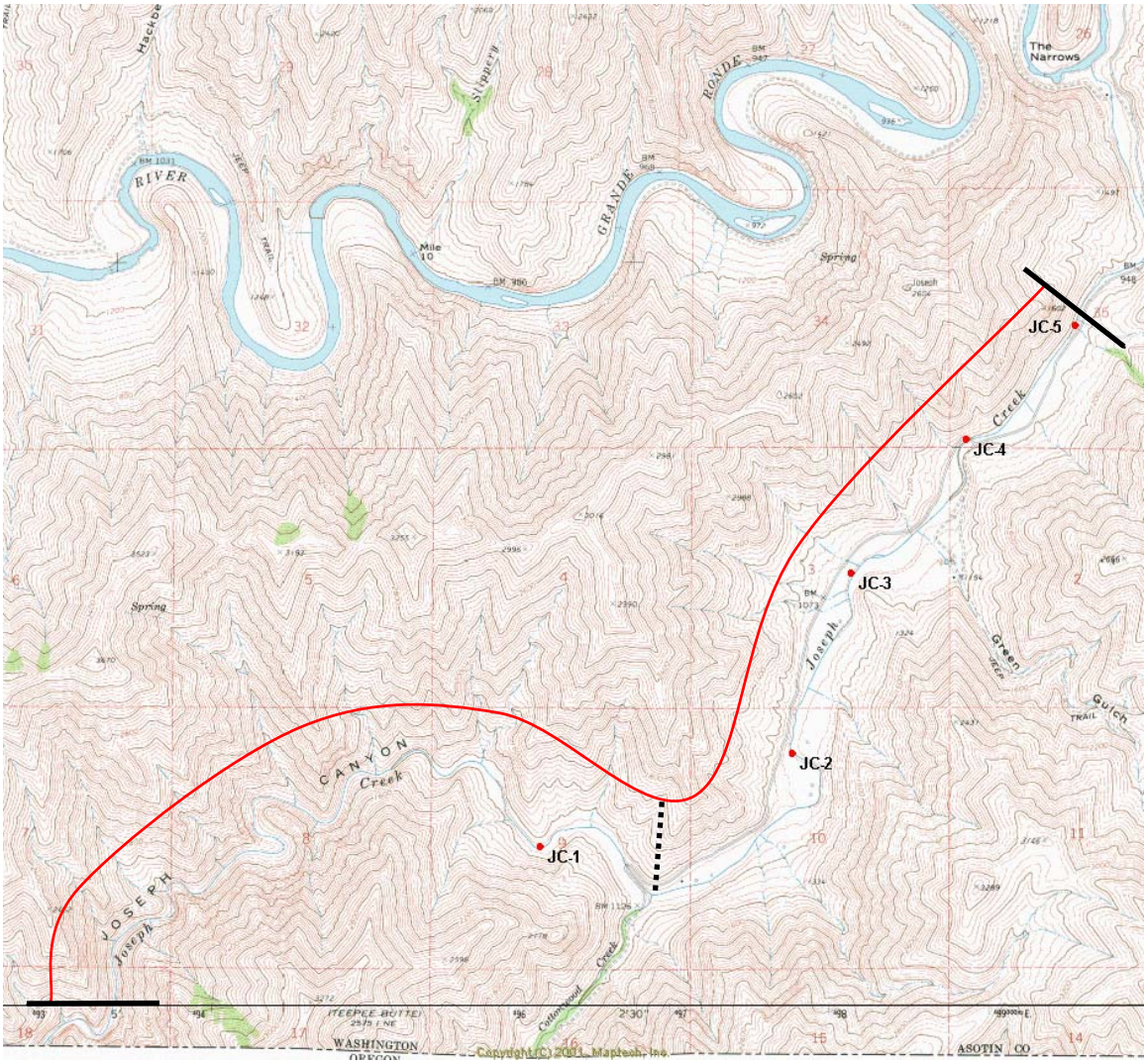

Figure 5. Electrofishing sites on Joseph Creek, a tributary to the Grande Ronde River, 2006. Steelhead spawning survey was conducted on reaches of stream paralleling red line, black dotted line indicates section breaks within the spawning survey area.

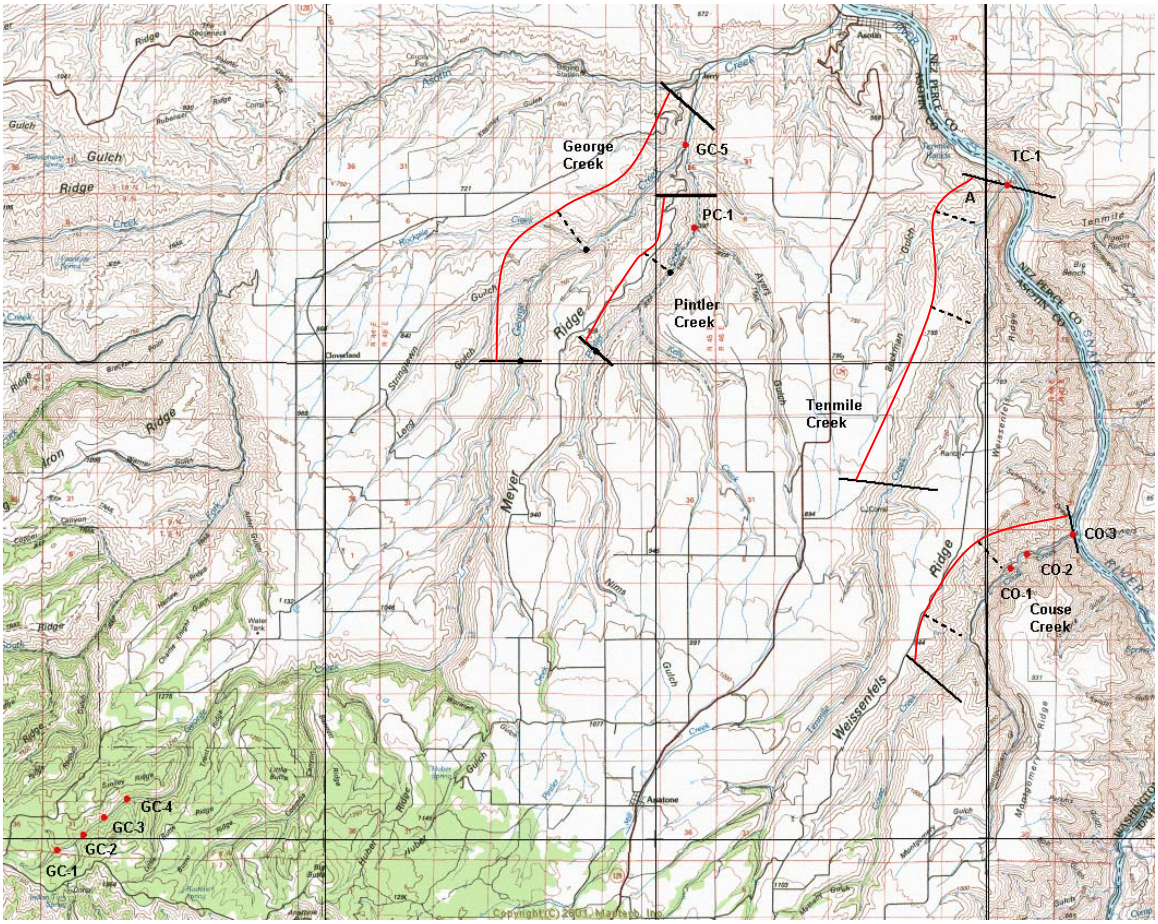

Figure 6. Electrofishing and flow monitoring sites on Couse Creek, Tenmile Creek, George Creek and Pintler Creek, 2006 and 2007. In 2006, steelhead spawning surveys were conducted on all reaches of stream paralleling red line on Couse, Tenmile and George Creeks. In 2007, surveys were done on Tenmile Creek (excluding section A), George Creek and Pintler Creek. Black dotted lines indicate section breaks within the spawning survey area.

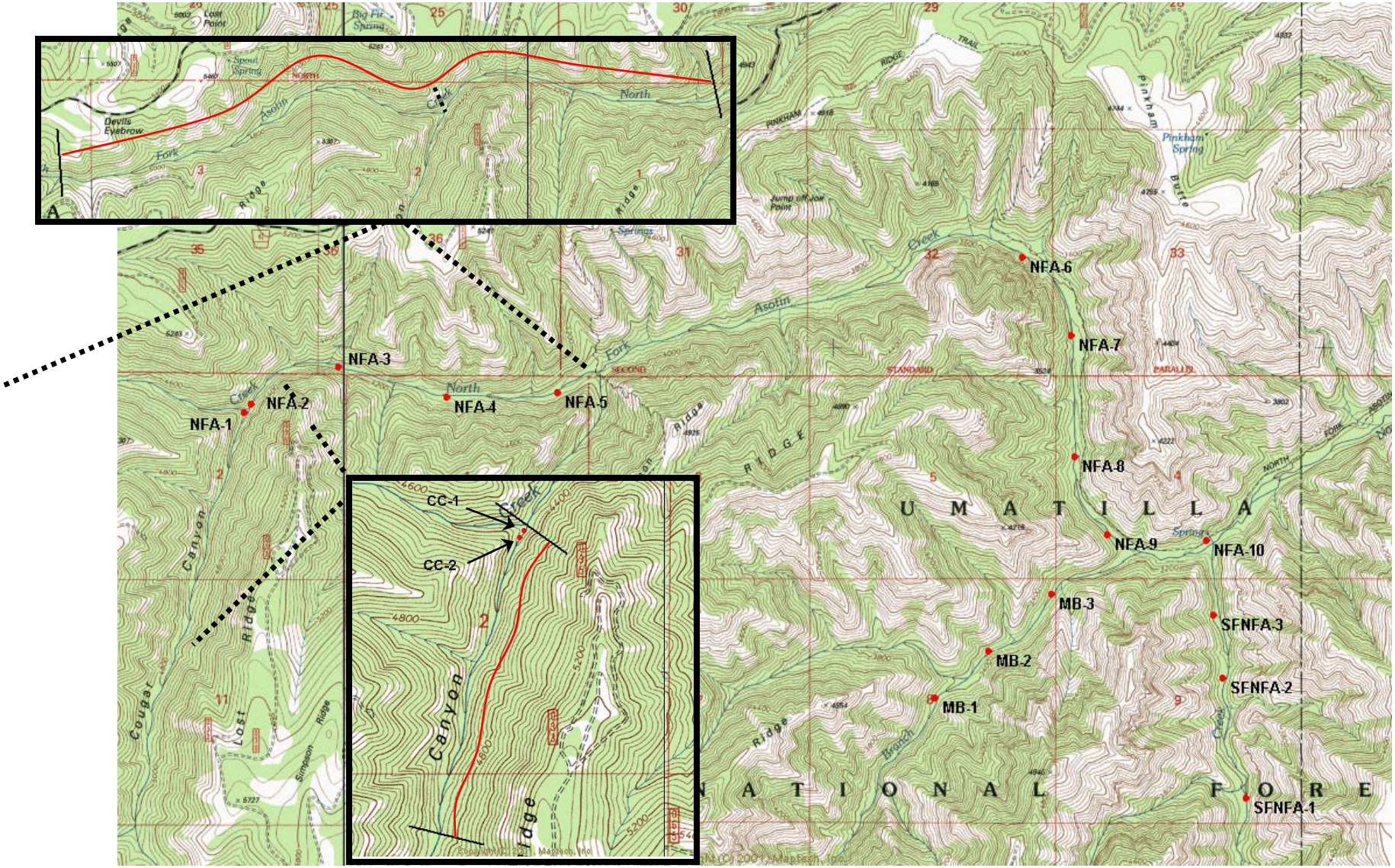

Figure 7. Electrofishing and temperature monitor sites on North Fork Asotin Creek, Cougar Canyon, Middle Branch of North Fork Asotin, and South Fork of the North Fork Asotin, 2006. Enlarged areas show bull trout spawning surveys conducted on reaches of North Fork Asotin and Cougar Canyon paralleling red line, black dotted line indicates section breaks within the spawning survey area.

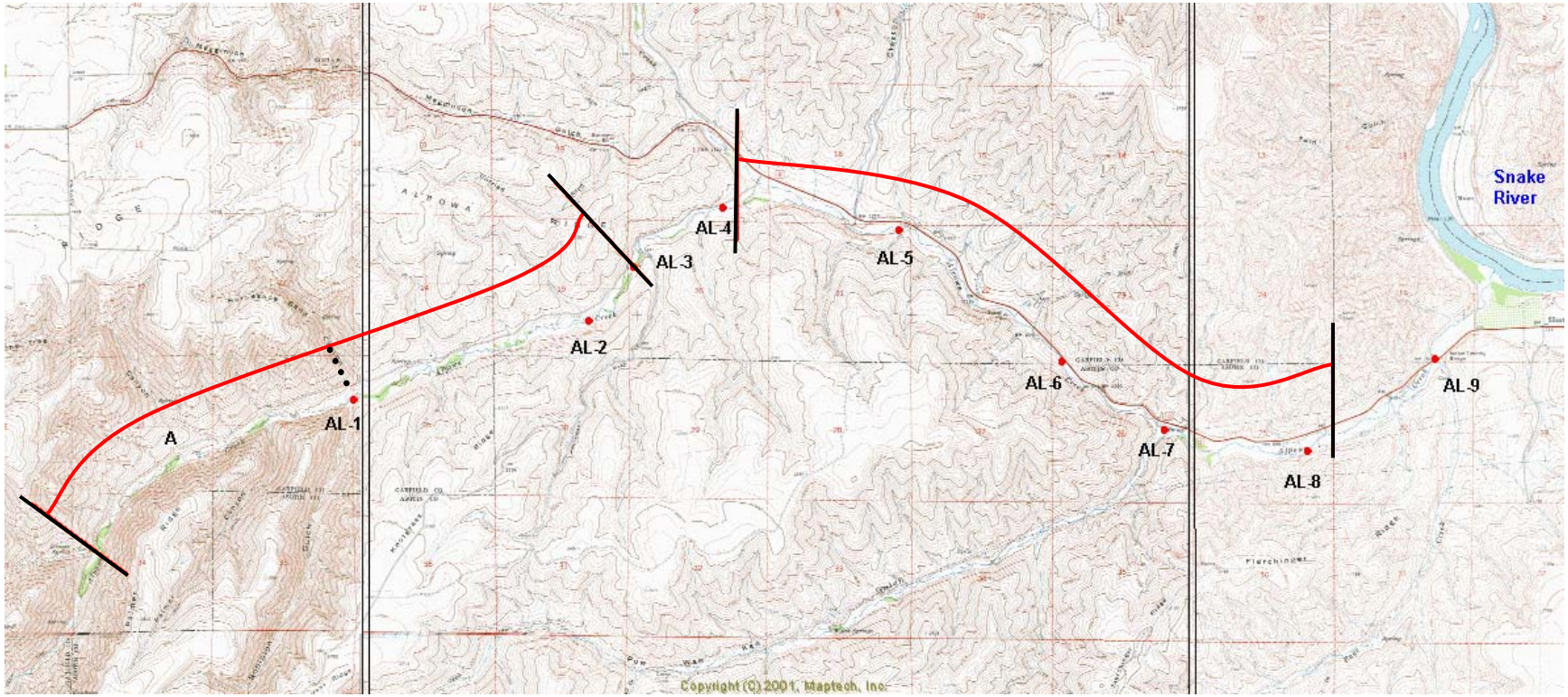

Figure 8. Electrofishing and flow monitoring sites on Alpowa Creek, 2006 and 2007. Steelhead spawning surveys were conducted on all reaches of stream paralleling red line in 2006 and all reaches but section A in 2007, black dotted line indicates section breaks within the spawning survey area.

Table 2. Densities of salmonids from multiple pass quantitative electrofishing sites in Asotin County, summer 2006.

					Densities (#/100m^2)							
					rainbow/steelhead							
Stream Reach	Date	Site Length	Mean Width	Area	Age/Size					Age/Size		
Site Name	(mm/dd/yy)	(m)	(m)	(m^2)	0+	1+	≥8 in	Total	Other Species[a]	0+	1+	≥8 in
Couse Ck.												
CO-1	07/31/06	30	2.9	86.4	64.8	0.0	0.0	64.8				
CO-2	07/31/06	30	3.0	88.8	121.6	0.0	1.1[b]	122.7				
CO-3	07/31/06	30	2.7	79.8	121.6	2.5	0.0	124.1	WCH	5.0	0.0	0.0

[a] WCH=wild chinook
[b] Calculated using the sum of the passes, due to poor reduction between successive passes.

Table 3. Densities of salmonids from multiple pass quantitative electrofishing sites in Asotin and Garfield County, summer 2007.

					Densities (#/100m^2)							
					rainbow/steelhead							
Stream Reach	Date	Site Length	Mean Width	Area	Age/Size					Age/Size		
Site Name	(mm/dd/yy)	(m)	(m)	(m^2)	0+	1+	≥8 in	Total	Other Species[a]	0+	1+	≥8 in
Alpowa Ck.												
AC-1	07/18/07	30.0	3.5	106.2	16.0	11.3	0.0	27.3				
AC-2	07/18/07	34.0	3.2	110.2	29.9	16.3	0.0	46.2				
AC-4	07/18/07	42.0	4.3	178.9	42.5	7.3	0.0	49.8				
AC-6	07/19/07	30.0	3.6	109.2	48.5	11.0	0.0	59.5	WCH	1.8	0.0	0.0
AC-7	07/19/07	50.5	5.0	250.5	45.1	4.8	0.0	49.9	WCH	0.8	0.0	0.0
AC-8	07/19/07	30.0	4.6	138.6	43.3	3.6	0.0	46.9				

[a] WCH=wild chinook

Table 4. Relative abundance and distribution from qualitative electrofishing surveys in tributaries of the Lower Grande Ronde and Asotin Creek, 2006.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Joseph Ck.	JC-1 ~0.6 mi. above Cottonwood Ck mouth	8/1	66.2	8.4	556.1	15.9	No salmonids found. SMB-abundant, SC-common, SD, CMO-rare, CF-present	0.0	0.0
	JC-2 ~1.0 mi. below Cottonwood Ck mouth	8/1	57.6	11.8	679.7	18.3	Two age 1+ RBT (153-155mm), SMB, SC-abundant, LND-uncommon, CMO-rare, CF-present	0.3	0.0
	JC-3 ~1.8 mi. below Cottonwood Ck mouth	8/1	55.0	10.1	555.5	14.8	One age 1+ RBT (164mm), SMB, SC, LND-common, CMO-rare	0.2	0.0
	JC-4 ~2.6 mi. below Cottonwood Ck mouth	8/1	68.0	13.2	897.6	15.9	One age 1+ RBT (187mm), SMB, SC-common, SD, LND-rare, CF-present	0.1	0.0
	JC-5 WDFW lower property boundary	8/1	61.2	15.1	924.1	20.5	One age 1+ RBT (118mm), SMB, SC-common LND-uncommon, SD, BLS-rare, CF-present	0.1	0.0
NF Asotin Creek[b]	NFA-2 ~50 meters below Cougar Canyon mouth	8/8	33.0	4.2	138.6	7.2	Five age 1+ RBT (150-173mm), one legal RBT (210mm), two age 1+ BT (128-147mm), TF-uncommon	4.3	1.4
	NFA-3 ~0.4 mi. below Cougar Canyon mouth	8/8	52.0	3.6	187.2	4.9	One age 0+ RBT (61mm), eight age 1+ RBT (75-185mm), one legal RBT (213mm), one age 1+ BT (161mm), TF-uncommon	5.3	0.5
	NFA-4 ~0.9 mi. below Cougar Canyon mouth	8/8	50.0	4.1	205.0	6.3	One age 0+ RBT (68mm), 15 age 1+ RBT (72-180mm), three age 0+ BT (35-53mm), two age 1+ BT (100-108mm), one adult BT (220mm), TF-rare	7.8	2.9
	NFA-5 ~1.3 mi. below Cougar Canyon mouth	8/8	60.0	4.2	252.0	6.0	Three age 0+ RBT (58-61mm), 28 age 1+ RBT (72-188mm), one age 1+ BT (82mm), TF-uncommon	12.3	0.4
	NFA-6 ~1.4 mi. above Middle Branch mouth	8/9	50.0	3.6	180.0	5.1	One age 0+ RBT (69mm), 15 age 1+ RBT (71-195mm), SC-common, TF-rare	8.9	0.0

[a] BT=bull trout, RBT=rainbow trout, SC=sculpin, SD=speckled dace, CMO=chiselmouth, SMB=smallmouth bass, LND=longnose dace, BLS=bridgelip suckers, TF=tailed frogs, CF=crayfish

[b] Data from length frequency histograms and scale readings were inconclusive in determining the age break between age 0+ and age 1+ RBT. Therefore, an estimate was used.

Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Table 4. (Cont.) Relative abundance and distribution from qualitative electrofishing surveys in tributaries of the Lower Grande Ronde and Asotin Creek, 2006.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
NF Asotin Creek[b] (cont.)	NFA-7 ~1.0 mi. above Middle Branch mouth	8/9	48.0	3.2	153.6	6.0	Eight age 0+ RBT (33-40mm), four age 1+ RBT (144-180mm), SC-common, TF-rare	7.8	0.0
	NFA-8 ~0.5 mi. above Middle Branch mouth	8/9	45.0	3.9	175.5	4.8	Five age 0+ RBT (34-47mm), 14 age 1+ RBT (73-182mm), SC-common	10.8	0.0
	NFA-9 ~0.2 mi. above Middle Branch mouth	8/9	51.0	3.8	193.8	4.7	10 age 0+ RBT (43-70mm), 24 age 1+ RBT (78-185mm), SC-common, CF-present	17.5	0.0
	NFA-10 ~0.3 mi. below Middle Branch mouth	8/8	30.0	N/A	N/A	N/A	Five age 0+ RBT (29-69mm), 14 age 1+ RBT (76-189mm), SC-common	N/A	0.0
Cougar Canyon	CC-1 ~50 meters above mouth	8/8	50.0	3.0	150.0	5.0	Six age 1+ RBT (120-165mm), one age 1+ BT (123mm), TF-uncommon	4.0	0.7
Middle Branch of NF Asotin Creek	MB-1 ~1.1 miles above mouth	8/9	41.0	4.5	184.5	5.9	One age 0+ RBT (70mm), 20 age 1+ RBT (78-188mm), SC, TF-common	11.4	0.0
	MB-2 ~0.8 miles above mouth	8/9	31.0	4.1	127.1	5.5	Two age 0+ RBT (64-67mm), 17 age 1+ RBT (75-186mm), SC-common, TF-rare	14.9	0.0
	MB-3 ~0.4 miles above mouth	8/9	31.0	4.6	142.6	6.7	Two age 0+ RBT (68-69mm), 17 age 1+ RBT (97-180mm), one legal RBT (215mm), SC-common	14.0	0.0
SF of NF Asotin Ck	SFNFA-1 ~1.1 miles above mouth	8/8	35.0	4.2	147.0	6.1	Six age 0+ RBT (38-62mm), 10 age 1+ RBT (73-197mm), SC, TF-common	10.9	0.0
	SFNFA-2 ~0.6 miles above mouth	8/8	51.0	4.3	219.3	5.3	Five age 0+ RBT (58-70mm), 12 age 1+ RBT (72-180mm), SC, TF-common	7.8	0.0
	SFNFA-3 ~0.3 miles above mouth	8/8	30.0	3.9	117.0	5.3	Three age 0+ RBT (63-68mm), 10 age 1+ RBT (99-164mm), SC-common, TF-rare	11.1	0.0

[a] BT=bull trout, RBT=rainbow trout, SC=sculpin, SD=speckled dace, CMO=chiselmouth, SMB=smallmouth bass, LND=longnose dace, BLS=bridgelip suckers, TF=tailed frogs, CF=crayfish

[b] Data from length frequency histograms and scale readings were inconclusive in determining the age break between age 0+ and age 1+ RBT. Therefore, an estimate was used. Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Table 5. Relative abundance and distribution from qualitative electrofishing surveys in tributaries of the Lower Grande Ronde, tributaries of Asotin Creek, and Alpowa Creek, 2007.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankful width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Wenatchee Creek	WC-1 0.1 mi up right bank fork	7/24	40.0	3.7	147.2	N/A	Four age 0+ RBT (60-73mm), 12 age 1+ RBT (78-167), TF-rare	10.9	0.0
	WC-2 Below forks on west edge of section 3	7/24	30.0	3.9	117.0	N/A	16 age 1+ RBT (87-183mm), TF-common	13.7	0.0
	WC-3 0.3 miles above Ranger Creek	7/24	30.5	3.4	104.9	N/A	Two age 0+ RBT (70-72mm), 20 age 1+ RBT (85-174mm), TF-rare	21.0	0.0
	WC-4 ~33 meters below Ranger Creek	7/24	46.0	3.6	164.7	N/A	Two age 0+ RBT (59-65mm), 12 age 1+ RBT (79-174mm), TF-rare	8.5	0.0
	WC-5 0.2 miles below Ranger Creek	7/24	38.0	4.0	150.5	N/A	19 age 1+ RBT (85-177), TF-uncommon	12.6	0.0
	WC-6 0.4 miles below Ranger Creek	7/24	41.0	4.5	182.9	N/A	11 age 1+ RBT (84-172mm)	6.0	0.0
	WC-7 0.6 miles below Ranger Creek	7/24	48.0	3.8	183.4	N/A	One age 0+ RBT (75mm), nine age 1+ RBT (78-189mm), TF, CF-rare	5.5	0.0
	WC-8 Directly above Indian Tom Ck	7/24	30.0	4.1	123.6	N/A	13 age 0+ RBT (40-56mm), 19 age 1+ RBT (97-140mm), SCP-common, CF-present	25.9	0.0
	WC-9 ~60 meters above Coyote Gulch	7/25	25.0	5.4	134.0	N/A	Eight age 0+ RBT (42-75mm), 17 age 1+ RBT (77-161mm), SCP-abundant, CF-uncommon	18.7	0.0
	WC-10 0.1 miles below Coyote Gulch	7/25	29.6	4.9	143.9	N/A	24 age 0+ RBT (36-63mm), 31 age 1+ RBT(82-180mm), SCP-common, CF-uncommon	38.2	0.0
	WC-11 0.2 miles below Bell Canyon	7/25	35.0	6.0	210.7	N/A	17 age 0+ RBT (36-63mm), 43 age 1+ RBT (82-198mm), SCP-abundant, CF-uncommon	28.5	0.0

[a] BT=bull trout, RBT=rainbow trout, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Table 5. (Cont.) Relative abundance and distribution from qualitative electrofishing surveys in tributaries of the Lower Grande Ronde, tributaries of Asotin Creek, and Alpowa Creek, 2007.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankful width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Wenatchee Creek (cont.)	WC-12 0.2 miles above Charley Hollow	7/25	30.0	5.1	152.4	N/A	23 age 0+ RBT (35-70mm), 40 age 1+ RBT (85-163mm), SCP-abundant, CF-uncommon	41.3	0.0
	WC-13 0.3 miles above Service Hollow	7/25	30.0	4.7	141.6	N/A	16 age 0+ RBT (44-62mm), 24 age 1+ RBT (90-184mm), one legal RBT (212mm), SCP-abundant, CF-uncommon	29.0	0.0
	WC-14 Mouth of Service Hollow	7/25	30.0	5.8	172.8	N/A	33 age 0+ RBT (33-68mm), 30 age 1+ RBT (77-195mm), SCP-abundant	36.5	0.0
Indian Tom Creek	IT-1 0.9 miles above mouth	7/25	7.0	3.0	21.0	N/A	Two age 1+ RBT (94-158mm)	9.5	0.0
	IT-2 0.7 miles above mouth	7/25	30.0	2.5	74.4	N/A	Three age 1+ RBT (115-163mm), CF-rare	4.0	0.0
	IT-3 ~90 meters above mouth	7/25	19.0	3.0	56.0	N/A	Nine age 0+ RBT (42-50mm), 13 age 1+ RBT (87-158mm), SCP-uncommon, CF-rare	39.3	0.0
Shumaker Creek	SH-1 1.0 miles above lowest culvert	4/12	40.0	1.3	52.0	N/A	No fish found.	0.0	0.0
	SH-2 First culvert above mouth	4/12	45.0	1.8	81.0	N/A	No fish found.	0.0	0.0
	SH-3 0.2 miles above lowest stream ford	4/12	45.0	1.6	72.0	N/A	One age 1+ RBT (154mm)	1.4	0.0

[a] BT=bull trout, RBT=rainbow trout, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Table 5. (Cont.) Relative abundance and distribution from qualitative electrofishing surveys in tributaries of the Lower Grande Ronde, tributaries of Asotin Creek, and Alpowa Creek, 2007.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankful width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
George Creek	GC-1 Directly below Arnold Spring	7/17	59.0	1.8	103.8	N/A	Three age 1+ RBT (92-170mm), TF-uncommon	2.9	0.0
	GC-2 ~0.6 miles below Arnold Spring	7/17	42.0	1.7	72.2	N/A	10 age 1+ RBT (83-138mm), TF-uncommon	13.9	0.0
	GC-3 ~1.1 miles below Arnold Spring	7/17	56.0	1.5	81.8	N/A	Two age 1+ RBT (98-157mm), TF-common	2.4	0.0
	GC-4 ~1.7 miles below Arnold Spring	7/17	32.0	2.3	73.6	N/A	Three age 1+ RBT (108-168mm), TF-rare	4.1	0.0
Pintler Creek	PC-1 Mouth of Ayers Gulch	7/11	73.0	2.3	169.4	N/A	20 age 1+ RBT (124-184mm), one legal RBT (221mm), SD-abundant	12.4	0.0
Alpowa Creek	AC-5 1.7 miles above Asotin/Garfield County line	7/18	43.0	4.0	171.1	N/A	27 age 0+ RBT (48-81mm), 16 age1+ RBT (110-180mm), four age 0+ WCH (85-87mm), SCP-common, SD-uncommon	25.1	0.0

[a] BT=bull trout, RBT=rainbow trout, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Steelhead Spawning Surveys

Steelhead spawning surveys were conducted in Joseph Creek, Couse Creek, Tenmile Creek, George Creek, and Alpowa Creek in 2006 (Figures 5, 6, and 8, and Table 6). This was our first attempt to survey Joseph Creek for steelhead spawning in Washington. High spring flows made it very difficult to access, but one survey was completed and no redds or live fish were observed, but one dead fish was sampled. Couse Creek and Tenmile Creek were both surveyed for the first time since 2002. Most of the lowest 4.1 miles of Couse Creek were surveyed with 10 redds and 3 live steelhead observed. Tenmile Creek was surveyed from river mile 7.1 to river mile 0.2, and only seven redds were observed. During our surveys we also encountered 18 live fish and four dead fish. With over a month of time passing between our first and second survey, we assume that some redds were constructed during this time and were not visible during the second survey. We surveyed 6.6 miles of George Creek in 2006, and found 12 redds and three live fish. An emphasis was put on Alpowa Creek in 2006, because of lack of data for this stream. We observed 25 redds, one live fish, and two dead fish in the 11.1 miles surveyed. High turbid flows affected the number of surveys that were conducted in Alpowa Creek and the number of redds should be considered a minimum because of the amount of time between the second and third surveys. In Alpowa Creek the earliest redds were documented in mid February but new redds continued to be documented until early May.

Steelhead spawning surveys in 2007 were conducted on Shumaker Creek, Tenmile Creek, George Creek, Pintler Creek and Alpowa Creek (Figures 6 and 9, Table 7). Tenmile Creek was surveyed one time from river mile 7.1 to 1.1 with nine redds observed. Two surveys were conducted on the same 6.6 miles of George Creek as in 2006, with six redds found. We also conducted one survey late in the season on 3.9 miles of WDFW property on Pintler Creek, but no redds were observed. Again a priority was put on surveys in Alpowa Creek in 2007, but we eliminated the uppermost section from our surveys because no redds were found there in 2006 and there was an uncertainty on landowner access approval. In two surveys we observed 34 redds, 26 live fish, and 5 dead fish (Table 7). While surveys began later and ended earlier in 2007 survey conditions were better than those seen in 2006. In 2006, we had a large data gap (from March 9th until April 27th) during the middle of the spawning season because of high turbid stream flow.

Table 6. Steelhead spawning survey summary for Asotin County, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
Joseph Creek						Live	Dead
5/16	1	(A) River mile 8.0 to river mile 4.4	3.6	0	0.0	0	1
5/16	1	(B) River mile 4.4 to river mile1.2	3.2	0	0.0	0	0
		Totals	**6.8**	**0**	**0.0**	**0**	**1**
Couse Creek							
3/22	1	(C) River mile 4.1 to river mile 3.1	1.0	0	0.0	0	0
3/14	1	(D) River mile 3.1 to river mile 1.6	1.5	0	0.0	0	0
3/14	1	(E) River mile 1.6 to river mile 0.1	1.5	7	4.7	2	0
4/21	2	(C) River mile 4.1 to river mile 3.1	1.0	0	0.0	0	0
3/22	2	(D) River mile 3.1 to river mile 1.6	1.5	0	0.0	0	0
3/22	2	(E) River mile 1.6 to river mile 0.1	1.5	2	1.3	1	0
4/21	3	(D) River mile 3.1 to river mile 1.6	1.5	0	0.0	0	0
4/21	3	(E) River mile 1.6 to river mile 0.1	1.5	1	0.7	0	0
5/9	4	(E) River mile 1.6 to river mile 0.1	1.5	0	0.0	0	0
		Totals	**4.0**	**10**	**2.5**	**3**	**0**
Tenmile Creek							
3/14	1	(F) River mile 7.1 to river mile 3.3	3.8	2	0.5	3	0
3/14	1	(G) River mile 3.3 to river mile 1.1	2.2	0	0.0	3	0
3/14	1	(H) River mile 1.1 to river mile 0.2	0.9	0	0.0	1	0
4/25	2	(F) River mile 7.1 to river mile 3.3	3.8	4	1.1	5	3
4/25	2	(G) River mile 3.3 to river mile 1.1	2.2	1	0.5	2	0
5/9	3	(F) River mile 7.1 to river mile 3.3	3.8	0	0.0	1	0
5/9	3	(G) River mile 3.3 to river mile 1.1	2.2	0	0.0	3	1
		Totals	**6.9**	**7**	**1.0**	**18**	**4**
George Creek							
3/8	1	(I) River mile 7.4 to river mile 4.4	3.0	0	0.0	0	0
3/8	1	(J) River mile 4.4 to river mile 1.5	2.9	0	0.0	0	0
3/21	1	(K) River mile 1.5 to river mile 0.8	0.7	0	0.0	0	0
3/21	2	(I) River mile 7.4 to river mile 4.4	3.0	10	3.3	1	0
3/21	2	(J) River mile 4.4 to river mile 1.5	2.9	2	0.7	0	0
5/4	2	(K) River mile 1.5 to river mile 0.8	0.7	0	0.0	0	0
5/4	3	(I) River mile 7.4 to river mile 4.4	3.0	0	0.0	0	0
5/4	3	(J) River mile 4.4 to river mile 1.5	2.9	0	0.0	2	0
		Totals	**6.6**	**12**	**1.8**	**3**	**0**

[a] A: 0.4 miles below state line to mouth of Cottonwood Creek, B: Mouth of Cottonwood Creek to RM 1.2, C: 0.9 miles above Montgomery Gulch mouth to first brg. on Couse Creek Rd., D: First bridge on Couse Creek Rd. to 1.5 miles above Snake River Road bridge, E: 1.5 miles above Snake River Road bridge to Snake River Road bridge, F: RM 7.1 to 2.2 miles above Weissenfels Ridge Road bridge, G: 2.2 miles above Weissenfels Ridge Road bridge to Weissenfels Ridge Road bridge, H: Weissenfels Ridge Road bridge to Snake River Road bridge, I: 1.9 miles above Stringtown Gulch to mouth of Rockpile Creek, J: Mouth of Rockpile Creek to Meyer Ridge Rd. bridge, K: Meyer Ridge Rd. bridge to RM 0.8

Table 6. (Cont.) Steelhead spawning survey summary for Asotin County, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
Alpowa Creek[b]						Live	Dead
2/16	1	(L) River mile 13.1 to river mile 10.4	2.7	0	0.0	0	0
2/16	1	(M) River mile 10.4 to river mile 7.6	2.8	0	0.0	0	0
2/16	1	(N) River mile 6.6 to river mile 3.4	3.2	1	0.3	0	0
2/16	1	(O) River mile 3.4 to river mile 1.0	2.4	3	1.3	0	0
3/9	2	(L) River mile 13.1 to river mile 10.4	2.7	0	0.0	0	0
3/9	2	(M) River mile 10.4 to river mile 7.6	2.8	1	0.4	0	0
3/9	2	(N) River mile 6.6 to river mile 3.4	3.2	2	0.6	0	0
3/9	2	(O) River mile 3.4 to river mile 1.0	2.4	12	5.0	0	0
4/27	3	(L) River mile 13.1 to river mile 10.4	2.7	0	0.0	0	0
4/27	3	(M) River mile 10.4 to river mile 7.6	2.8	2	0.7	0	0
4/27	3	(N) River mile 6.6 to river mile 3.4	3.2	3	0.9	1	1
4/27	3	(O) River mile 3.4 to river mile 1.0	2.4	0	0.0	0	0
5/10	4	(L) River mile 13.1 to river mile 10.4	2.7	0	0.0	0	0
5/10	4	(M) River mile 10.4 to river mile 7.6	2.8	0	0.0	0	0
5/10	4	(N) River mile 6.6 to river mile 3.4	3.2	1	0.3	0	0
5/10	4	(O) River mile 3.4 to river mile 1.0	2.4	0	0.0	0	1
		Totals	**11.1**	**25**	**2.3**	**1**	**2**

[a] L: Mouth of Dresser Spring to mouth of Robinson Gulch, M: Mouth of Robinson Gulch to 2nd bridge on Alpowa Creek Rd., N: 0.8 miles below 1st bridge on Alpowa Ck. Rd. to 0.1 miles downstream of Garfield County Line, O: 0.1 miles downstream of Garfield County Line to 1.0 miles above Hwy 12 bridge.

[b] Alpowa Creek surveys were conducted in both Asotin and Garfield counties.

Table 7. Steelhead spawning survey summary for Asotin County, 2007.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
Shumaker Creek						Live	Dead
4/11	1	(A) River mile 1.2 to river mile 0.0	1.2	0	0.0	0	0
		Totals	**1.2**	**0**	**0.0**	**0**	**0**
Tenmile Creek							
4/2	1	(B) River mile 7.1 to river mile 3.3	3.8	4	1.1	0	0
4/2	1	(C) River mile 3.3 to river mile 1.1	2.2	5	2.3	0	0
		Totals	**6.0**	**9**	**1.5**	**0**	**0**
George Creek							
3/21	1	(D) River mile 7.4 to river mile 4.4	3.0	1	0.3	1	0
3/21	1	(E) River mile 4.4 to river mile 1.5	2.9	0	0.0	0	0
3/21	1	(F) River mile 1.5 to river mile 0.8	0.7	0	0.0	0	0
4/4	2	(D) River mile 7.4 to river mile 4.4	3.0	4	1.3	0	0
4/4	2	(E) River mile 4.4 to river mile 1.5	2.9	1	0.3	0	0
4/4	2	(F) River mile 1.5 to river mile 0.8	0.7	0	0.0	0	0
		Totals	**6.6**	**6**	**0.9**	**1**	**0**
Pintler Creek							
4/18	1	(G) River mile 5.0 to river mile 2.8	2.2	0	0.0	0	0
4/18	1	(H) River mile 2.8 to river mile 1.1	1.7	0	0.0	0	0
		Totals	**3.9**	**0**	**0.0**	**0**	**0**
Alpowa Creek[b]							
3/29	1	(I) River mile 10.4 to river mile 7.6	2.8	6	2.1	4	0
3/29	1	(J) River mile 6.6 to river mile 3.4	3.2	8	2.5	8	1
3/29	1	(K) River mile 3.4 to river mile 1.0	2.4	17	7.1	10	2
4/13	2	(I) River mile 10.4 to river mile 7.6	2.8	3	1.1	2	0
4/13	2	(J) River mile 6.6 to river mile 3.4	3.2	0	0.0	2	2
4/13	2	(K) River mile 3.4 to river mile 1.0	2.4	0	0.0	0	0
		Totals	**8.4**	**34**	**4.0**	**26**	**5**

[a] A: First Culvert to mouth, B: River mile 7.1 to 2.2 miles above Weissenfels Ridge Road bridge, C: 2.2 miles above Weissenfels Ridge Road bridge to Weissenfels Ridge Road bridge, D: 1.9 miles above Stringtown Gulch to mouth of Rockpile Creek, E: Mouth of Rockpile Creek to Meyer Ridge Rd. bridge, F: Meyer Ridge Rd. bridge to RM 0.8, G: Top of WDFW property to river mile 2.8, H: River mile 2.8 to bottom of WDFW property, I: Mouth of Robinson Gulch to 2nd bridge on Alpowa Creek Rd., J: 0.8 miles below 1st bridge on Alpowa Ck. Rd. to 0.1 miles downstream of Garfield County Line, K: 0.1 miles downstream of Garfield County Line to 1.0 miles above Hwy 12 bridge.
[b] Alpowa Creek surveys were conducted in both Asotin and Garfield counties.

Bull Trout Spawning Surveys

Bull trout spawning surveys were conducted in the North Fork Asotin Creek and Cougar Canyon in 2006 (Figure 7, Table 8). The survey covered a total of 3.2 miles on North Fork Asotin Creek and 0.5 miles on Cougar Canyon. The survey areas were walked only once, and surveyors observed nine redds and four live bull trout in North Fork Asotin Creek, and three redds and one live fish in Cougar Canyon.

No bull trout spawning surveys were conducted in this portion of the study area in 2007.

Table 8. Bull trout spawning survey summary for the North Fork Asotin Creek and Cougar Canyon, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
North Fork Asotin Creek						Live	Dead
9/8	1	(A) River mile 16.9 to river mile 15.0	1.9	7	3.7	2	0
9/8	1	(B) River mile 15.0 to river mile 13.7	1.3	2	1.5	2	0
		Total	**3.2**	**9**	**2.8**	**4**	**0**
Cougar Canyon							
9/8	1	(C) River mile 0.5 to river mile 0.0	0.5	3	6.0	1	0
		Total	**0.5**	**3**	**6.0**	**1**	**0**

[a] A: Mouth of Double Spring to mouth of Cougar Canyon, B: Mouth of Cougar Canyon to 1.3 miles below Cougar Canyon mouth, C: 0.5 miles above mouth to mouth

Tissue Sampling

Fin clips were collected from a total of 139 salmonids in this study area in 2006. Sixteen of these samples were taken from adult steelhead during spawning surveys, 113 samples were taken from juvenile rainbow/steelhead during electrofishing surveys, plus one sample was collected from a legal sized rainbow/steelhead, eight samples were collected from juvenile bull trout, and one sample was collected from an adult bull trout from late July through early August (Table 9). We applied the bull trout tissue sampling protocol to juvenile rainbow/steelhead as well.

Adult steelhead samples were collected as follows, one from Joseph Creek, two from Couse Creek, eleven from Tenmile Creek, one from lower George Creek, and one from Alpowa Creek during steelhead spawning surveys in 2006. These 16 samples are not included in the totals on Table 9.

In 2007, fin clips were collected from 180 salmonids in this study area. Thirteen of the samples were collected from adult steelhead during spawning surveys on Alpowa Creek and are not included in Table 10. The other 167 samples were collected from juvenile rainbow/steelhead during electrofishing surveys.

Table 9. Tissue samples collected in lower Grande Ronde tributaries, Couse Creek, and Asotin Creek drainage, 2006 (excluding adult steelhead).

Stream	# of Bull Trout fin clips	# of Bull Trout fin clips within protocol	# of Bull Trout Scale Samples	# of Rainbow/Steelhead fin clips	# of Rainbow/Steelhead fin clips within protocol	# of Rainbow/Steelhead Scale Samples
Joseph Creek	0	0	0	5	1	5
Couse Creek	0	0	0	19	9	17
North Fork Asotin Creek	8	4	7	40	15	50
Cougar Canyon	1	0	1	0	0	0
Middle Branch of NF Asotin Creek	0	0	0	25	12	36
South Fork of the NF Asotin Creek	0	0	0	25	14	28
Totals	**9**	**4**	**8**	**114**	**51**	**136**

Table 10. Tissue samples collected in lower Grande Ronde tributaries, Asotin Creek drainage, and Alpowa Creek, 2007 (excluding adult steelhead).

Stream	# of Bull Trout fin clips	# of Bull Trout fin clips within protocol	# of Bull Trout Scale Samples	# of Rainbow/Steelhead fin clips	# of Rainbow/Steelhead fin clips within protocol	# of Rainbow/Steelhead Scale Samples
Wenatchee Creek	0	0	0	79	66	0
Indian Tom Creek	0	0	0	13	2	0
George Creek	0	0	0	15	7	0
Alpowa Creek	0	0	0	60	32	0
Totals	**0**	**0**	**0**	**167**	**107**	**0**

Stream Profiles of Lower Grande Ronde Tributaries

Wenatchee Creek

Electrofishing surveys were conducted for the first time by WDFW fish management staff at 14 sites in Wenatchee Creek, over a two day period in 2007 (July 24th and 25th, Photos 1-24). Surveys covered ~4.7 miles of stream from just above the forks (river mile 8.7) to the mouth of Service Hollow (river mile 4.1). Qualitative electrofishing was conducted to cover as much area as possible in a short amount of time, and because of the remote access. A primary goal of these surveys was to locate bull trout, but no bull trout were found. Rough estimates of total density per site for rainbow/steelhead ranged from 5.5 to 41.3 fish per $100m^2$ (Table 5).

Wenatchee Creek had good riparian vegetation of conifers and deciduous trees or brush, some LWD, good bank stability, light sediment, medium to large cobble and many large boulders, with some areas of bedrock. Stream temperatures ranged from 51-57°F above Indian Tom Creek, and from 57-62°F below Indian Tom Creek. Average stream width ranged from 3.88 meters above Indian Tom Creek and 5.32 meters below Indian Tom Creek.

Photo 1. Wenatchee Creek ~0.1 mile up right bank fork looking upstream (WC-1), July 2007.

Photo 2. Wenatchee Creek ~0.1 mile up right bank fork looking downstream (WC-1), July 2007.

Photo 3. Wenatchee Creek looking upstream at 5-6 foot falls ~100 meters up right bank fork, July 2007.

Photo 4. Wenatchee Creek looking up from mouth of right bank fork, July 2007.

Photo 5. Just above mouth of left bank fork of Wenatchee Creek, July 2007. (Note the beginning of long steep chute covered by dense brush in center of photo)

Photo 6. Wenatchee Creek just below forks looking up into right bank fork (WC-2), July 2007. (Left bank fork is entering to the right of the boulder in the center of the photo.)

Photo 7. Wenatchee Creek ~0.3 mile above Ranger Creek looking upstream at 2-3 foot tall boulder chute (WC-3), July 2007.

Photo 8. Wenatchee Creek ~0.3 mile above Ranger Creek looking downstream (WC-3), July 2007.

Photo 9. Tailed Frog transforming from tadpole found in Wenatchee Creek in the first site below Ranger Creek (WC-4), July 2007.

Photo 10. Tailed Frog transforming from tadpole found in Wenatchee Creek in the first site below Ranger Creek (WC-4), July 2007.

Photo 11. Tailed Frog tadpoles found in Wenatchee Creek in the first site below Ranger Creek (WC-4), July 2007.

Photo 12. Looking upstream at 8 foot tall falls on Wenatchee Creek below Ranger Creek between sites WC-5 and WC-6, July 2007.

Photo 13. Wenatchee Creek ~60 meters above Coyote Gulch looking upstream (WC-9), July 2007.

Photo 14. Wenatchee Creek 0.1 mile below Coyote Gulch looking upstream near top of site (WC-10), July 2007.

Photo 15. Wenatchee Creek 0.1 mile below Coyote Gulch just above falls in photo 16 looking upstream (WC-10), July 2007.

Photo 16. Looking upstream at ~5 foot tall falls that were the bottom of site WC-10 on Wenatchee Creek, July 2007.

Photo 17. Wenatchee Creek 0.2 mile below Bell Canyon looking upstream (WC-11), July bottom2007.

Photo 18. Wenatchee Creek 0.2 mile below Bell Canyon looking downstream (WC-11), July 2007.

Photo 19. Wenatchee Creek 0.2 mile above Charley Hollow looking upstream (WC-12), July 2007.

Photo 20. Wenatchee Creek 0.2 mile above Charley Hollow looking downstream (WC-12), July 2007.

Photo 21. Wenatchee Creek 0.3 mile above Service Hollow looking upstream (WC-13), July 2007.

Photo 22. Wenatchee Creek 0.3 mile above Service Hollow looking downstream (WC-13), July 2007.

Photo 23. Wenatchee Creek near the mouth of Service Hollow looking upstream (WC-14), July 2007.

Photo 24. Wenatchee Creek near the mouth of Service Hollow looking downstream (WC-14), July 2007.

Indian Tom Creek

Electrofishing surveys were conducted at three sites in the lowest mile of Indian Tom Creek (a tributary of Wenatchee Creek) on July 25th, 2007 (Photos 25-27). We used qualitative electrofishing but we had difficulty conducting surveys in the upper portion of the stream because of lack of open water. Low streamflows, numerous logjams, aquatic vegetation or grass all limited our ability to conduct electrofishing surveys. Wetted stream width and depth was quite small between the upper and middle sites, but increased below that point. Rough estimates of total density per site ranged from 4.0 to 39.3 fish per 100m^2 for rainbow/steelhead (Table 5).

Indian Tom Creek had some small gravel with boulders and bedrock, good riparian vegetation, good bank stability, a lot of LWD, and high amounts of sediment. Temperatures in Indian Tom Creek Ranged from 53-57°F, and stream width averaged 2.83 meters.

Photo 25. Narrow canyon on upper Indian Tom Creek, note brown area in center of circle is a dipper nest (IT-1), July 2007.

Photo 26. Lower Indian Tom Creek looking upstream near top of site (IT-3), July 2007.

Photo 27. Lower Indian Tom Creek looking upstream near bottom of site (IT-3), July 2007.

Shumaker Creek

We conducted a steelhead spawning survey in Shumaker Creek from the first culvert to the mouth on April 12th, 2007. No redds or fish were found, but water levels were very low and no passage was available at the mouth.

Three electrofishing surveys were conducted in the lowest 2.2 miles of Shumaker Creek on April 12th, 2007. One age 1+ rainbow/steelhead was found at the lowest site, but no fish were found at the other two sites (Table 5, Photos 28-35). We also found three dead and one live rainbow/steelhead juveniles around 140-160mm in the rocks along the bottom side of the stream ford ~0.1 mile above mouth (Photos 36-39). It was not apparent if these fish were trying to move upstream or downstream

All three sites on Shumaker Creek were described as 100% riffle/plunge pool with medium to large cobble and boulders, poor bank stability, high sediment and poor to fair riparian vegetation. Stream width at our electrofishing sites averaged 1.57 meters. We also noted four passage barriers that included; the first two culverts above the mouth (Photos 30-32 show 1st culvert), the stream ford ~0.1 mile above the mouth (Photo 37), and the mouth of Shumaker had an approximately four foot delta with very little water as it entered the Grande Ronde River (Photos 40 and 41).

Photo 28. Shumaker Creek 1.0 mile above first culvert looking upstream (SH-1), April 2007.

Photo 29. Shumaker Creek 1.0 mile above first culvert looking downstream (SH-1), April 2007.

Photo 30. Shumaker Creek at first culvert above mouth looking upstream through the top of the culvert (SH-2), April 2007. (Note only part of the water appears to be entering culvert and part flowing under the culvert.)

Photo 31. Shumaker Creek at first culvert above mouth looking up into culvert (SH-2), April 2007.

Photo 32. Shumaker Creek at first culvert above mouth looking at gap in two sections of culvert (SH-2), April 2007.

Photo 33. Shumaker Creek at first culvert above mouth looking out of the bottom of the culvert (SH-2), April 2007.

Photo 34. Shumaker Creek just below first culvert above mouth looking downstream (SH-2), April 2007.

Photo 35. Shumaker Creek 0.2 mile above lowest stream ford looking downstream (SH-3), April 2007.

Photo 36. Shumaker Creek looking upstream from stream ford ~0.1 mile above mouth, April 2007.

Photo 37. Stream ford on lower Shumaker Creek, April 2007. (Note the passage barrier as water filters through rocks below ford. Stream flows from left to right in the photo.)

Photo 38. Dead rainbow/steelhead trout found on the downstream side of ford in Photo 47 where water was filtering through rocks below stream ford, one live fish was also observed and moved to pool below stream ford, April 2007.

Photo 39. Two dead rainbow/steelhead trout found on the downstream side of ford in Photo 47 where water was filtering through rocks below stream ford, one live fish was also observed and moved to pool below stream ford, April 2007.

Photo 40. Shumaker Creek looking upstream at mouth, April 2007. (Note there was little water filtering through the grass, and very steep gradient, this is at least a partial passage barrier at low flows.)

Photo 41. Shumaker Creek mouth as it enters the Grande Ronde River, April 2007. (Note the formation of a gravel delta into the Grande Ronde.)

Joseph Creek

We had hoped to have multiple walks on Joseph Creek but high stream flows eliminated attempts at earlier surveys. We attempted our first survey on March 22nd with the streamflow at

150 cfs according to online flow gauges, but water clarity was poor so no survey was conducted. The only steelhead spawning survey was conducted on May 16th, at the very end of the spawning season and covered 6.8 miles in lower Joseph Creek within Washington State (Photos 42-45). The survey was conducted on a bright sunny day with very good water clarity, no redds were observed but one dead fish was sampled during the survey.

Qualitative electrofishing surveys produced rough density estimates that ranged from 0.0 to 0.3 fish/100m^2 and fish size ranged from 118-187 mm (Table 4, Photos 46-58). Small mouth bass from 33 mm up to 287 mm in length were found common to abundant at all sites. Several other fish species were also found during these surveys (Appendix D).

No notes on habitat were given for the upper survey section from 0.4 mile below the stateline to the mouth of Cottonwood Creek. From the mouth of Cottonwood Creek downstream to river mile 1.2 habitat conditions ranged widely throughout the survey. Substrate consisted of cobble, boulder, bedrock, and gravel. Riparian vegetation ranged from strictly grass, to shrubs, and in some areas dense galleries of alder and cottonwood. Stream banks in many areas were incised and actively eroding, with others areas lined with boulders and cobble and not contributing to sediment delivery. There was very little large woody debris within this stream section. Most of this section of stream consisted of riffle and run, with a few deep pools and rapids observed.

Streamflow during summer electrofishing was a lot less than that observed during steelhead spawning surveys. During electrofishing surveys average stream 11.72 meters, and stream temperatures ranged from 62-69°F. Riparian vegetation at electrofishing sites was listed as fair to good. Substrate consisted of large to medium cobble with boulders at one site, bank stability was fair, and sedimentation was moderate. No notes were made on presence or absence of LWD.

Photo 42. Joseph Creek, upper spawning survey section, looking upstream at riffle, May 2006.

Photo 43. Joseph Creek, upper spawning survey section, slow deep run (below riffle in Photo 1), May 2006.

Photo 44. Joseph Creek, upper spawning survey section, looking upstream at slow deep run, May 2006.

Photo 45. Joseph Creek, upper spawning survey section, looking downstream from top end of survey, May 2006.

Photo 46. Joseph Creek, ~0.6 mile above the mouth of Cottonwood Creek looking upstream (JC-1), August 2006.

Photo 47. Joseph Creek, ~0.6 mile above the mouth of Cottonwood Creek looking downstream (JC-1), August 2006.

Photo 48. Joseph Creek, taken from bridge just below the mouth of Cottonwood Creek looking upstream, August 2006. (Note the mouth of Cottonwood Creek in lower left corner of photo.)

Photo 49. Joseph Creek, taken from bridge looking upstream at the mouth of Cottonwood Creek that enters in the left center of photo, August 2006.

Photo 50. Joseph Creek, taken from bridge just below the mouth of Cottonwood Creek looking downstream, August 2006.

Photo 51. Joseph Creek, ~1.0 mile below the mouth of Cottonwood Creek looking upstream (JC-2), August 2006.

Photo 52. Joseph Creek, ~1.0 mile below the mouth of Cottonwood Creek looking downstream (JC-2), August 2006.

Photo 53. 164 mm rainbow/steelhead found in Joseph Creek, ~1.8 miles below the mouth of Cottonwood Creek (JC-3), August 2006.

Photo 54. 234 mm smallmouth bass found in Joseph Creek, ~1.8 miles below the mouth of Cottonwood Creek (JC-3), August 2006.

Photo 55. Joseph Creek, ~1.8 miles below the mouth of Cottonwood Creek looking downstream (JC-3), August 2006.

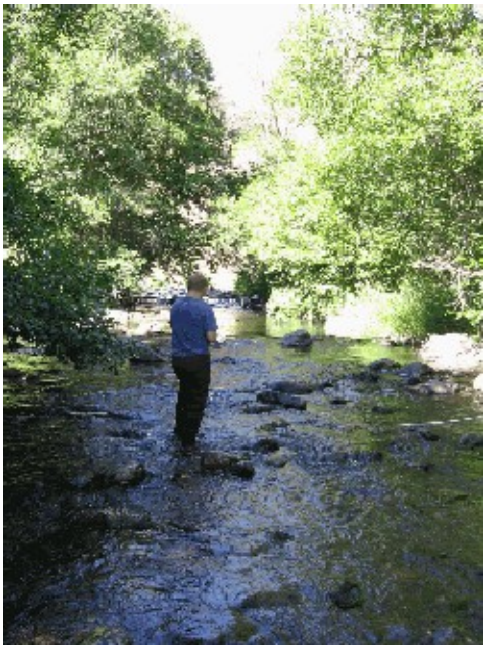

Photo 56. Joseph Creek, ~1.8 miles below the mouth of Cottonwood Creek looking upstream (JC-3), August 2006.

Photo 57. Joseph Creek, ~2.6 miles below the mouth of Cottonwood Creek looking downstream (JC-4), August 2006.

Photo 58. Joseph Creek, bottom of WDFW property looking upstream (JC-5), August 2006.

Stream Profiles of Lower Snake and Asotin Creek Tributaries

Couse Creek (Lower Snake River Tributary)

We conducted steelhead spawning surveys on Couse Creek in 2006, for the first time since 2002. Sections were walked from two to four times. The first survey was conducted on March 14th, from the first bridge up Couse Creek Rd. to the Snake River Rd. The second and third surveys were conducted on March 22nd and April 21st, and were from 0.9 miles above the mouth of Montgomery Gulch to the Snake River Rd. bridge (Photos 59 and 60). The last survey area was

from 1.5 miles above Snake River Rd. bridge to Snake River Rd. bridge. All ten redds and three live fish observed during the surveys were in the lowest section (1.5 miles above Snake River Rd. bridge to Snake River Rd. bridge) (Table 6). Two genetic samples were obtained from unmarked fish during these surveys.

Quantitative electrofishing surveys conducted in Couse Creek in 2006 had density estimates for rainbow/steelhead that ranged from 64.8 to 124.1 fish per 100m^2 (Table 2). Age 0+ rainbow/steelhead dominated at all sites with age 1+ and Legal size rainbow/steelhead each in low densities at one site. Age 0+ chinook were also observed in low densities at the bottom site. While densities appear high in this stream overall production may be low. All adult steelhead, steelhead redds, and electofishing sites were in the lowest 1.6 miles of the stream. Fish may have concentrated here because this area maintains flow during summer and has a mature riparian zone (Photo 63); there is a lack of water above this section especially during summer months (Photos 61 and 62).

Couse Creek has previously been described (Mendel et al. 2001 and 2004). The biggest change has been the improvements to riparian areas enrolled in the Conservation Reserve Enhancement Program (CREP). During electrofishing surveys we collected stream temperatures that ranged from 61-65°F and multiple widths per site that averaged 2.87 meters.

Photo 59. Couse Creek upper steelhead spawning survey section, showing a thin, dense band of maturing cottonwood trees, March 2006.

Photo 60. Couse Creek lowest steelhead spawning survey section, showing well developed riparian buffer just above Snake River Rd. bridge, March 2006.

Photo 61. Couse Creek just above bridge on Couse Creek Rd. looking upstream, note dry channel, July 2006.

Photo 62. Couse Creek just below bridge on Couse Creek Rd. looking downstream, note dry channel, July 2006.

Photo 63. Couse Creek ~0.9 mile above Snake River Rd. bridge, during electrofishing surveys looking downstream (CO-2), July 2006.

<u>Tenmile Creek (Lower Snake River Tributary)</u>

Seven redds, 18 live fish and four dead fish were observed during the three steelhead spawning surveys in Tenmile Creek in 2006 (Table 6). The first survey on March 14th, was from river mile 7.1 to the Snake River Rd. bridge, while the second and third surveys on April 25th and May 9th, were from river mile 7.1 to the first bridge up Weissenfels Ridge Rd. DNA samples were collected from 11 unmarked adult steelhead during the surveys (Photo 64).

One steelhead spawning survey was conducted from river mile 7.1 to Weissenfels Ridge Rd. bridge on Tenmile Creek on April 2nd, 2007. Nine redds were found, but no live fish or dead fish were observed during the survey.

Tenmile Creek has previously been described (Mendel et al. 2001, 2004, and 2006). The biggest changes since our previous surveys were the large debris jams found during steelhead spawning surveys (Photos 65 and 66), and the growth of trees that had been planted in the flood-scared area (Photo 67).

Photo 64. Tenmile Creek 625 mm wild male steelhead, March 2006.

Photo 65. First debris jam on upper spawning survey section looking downstream, March 2006.

Photo 66. Second debris jam on upper spawning survey section looking downstream, March 2006.

Photo 67. Tree plantings in flood-scared area just above where the road pulls away from creek, March 2006.

North Fork Asotin Creek

Electrofishing surveys on North Fork Asotin Creek in 2006 were meant to supplement data collected in 2005 (Mendel et al. 2006). The surveys took place from just below Cougar Canyon at river mile 15.0 (bottom site in 2005), downstream to ~0.3 miles below the Middle branch of

North Fork Asotin Creek at river mile 9.8 (Photos 68-78). Bull trout were only found at the four upper sites in low densities, 0.4 to 2.9 fish per $100m^2$. Rainbow/steelhead were found at densities of 4.3 to 17.5 fish per $100m^2$, with age 1+ dominating at all sites and age 0+ present at all but the uppermost site (Table 4).

One bull trout spawning survey was conducted on North Fork Asotin Creek on September 8th, 2006 from 1.3 miles below the mouth of Cougar Canyon to the Mouth of Double Spring. A total of 9 redds and four live fish were observed during the survey, with two redds and two fish below Cougar Canyon, and seven redds and two fish above Cougar Canyon (Table 8).

North Fork Asotin Creek habitat features included good riparian vegetation and LWD, fair bank stability, low sediment and substrate consisting of small to large cobble, with boulders and areas of spawning gravel. Stream temperatures in the top four sites of the North Fork Asotin Creek ranged from 50-56°F, while in the bottom five sites it ranged from 53-59°F. Average stream width of the upper four sites was 4.03 meters, but was 3.63 meters in the bottom five sites.

Photo 68. 220 mm bull trout from North Fork Asotin Creek, electrofishing site NFA-4, August 2006.

Photo 69. Clearcuts on Cougar Canyon near mouth and downstream on North Fork Asotin Creek, August 2006.

Photo 70. Clearcuts looking up Cougar Canyon, August 2006.

Photo 71. North Fork Asotin Creek just below mouth of Cougar Canyon looking upstream (NFA-2), August 2006.

Photo 72. North Fork Asotin Creek ~0.4 mile below the mouth of Cougar Canyon looking downstream (NFA-3), August 2006.

Photo 73. North Fork Asotin Creek ~0.9 mile below the mouth of Cougar Canyon looking upstream (NFA-4), August 2006.

Photo 74. North Fork Asotin Creek ~1.3 miles below the mouth of Cougar Canyon looking upstream (NFA-5), August 2006.

Photo 75. North Fork Asotin Creek ~1.0 mile above the mouth of Middle Branch looking downstream (NFA-7), August 2006.

Photo 76. North Fork Asotin Creek ~0.5 mile above the mouth of Middle Branch looking downstream (NFA-8), August 2006.

Photo 77. North Fork Asotin Creek ~0.2 mile above the mouth of Middle Branch looking downstream (NFA-9), August 2006.

Photo 78. North Fork Asotin Creek ~0.3 mile below the mouth of Middle Branch looking upstream (NFA-10), August 2006.

Cougar Canyon

Six age 1+ rainbow/steelhead and one age 1+ bull trout were found during the qualitative electrofishing survey at the only site sampled (Table 4, Photos 79 and 80).

One brief bull trout spawning survey was conducted on September 8th, from the mouth upstream 0.5 mile. Three redds and one live bull trout were observed during the survey. Access was difficult and the area was remote, therefore more area could not feasibly be surveyed with the time available.

The habitat on this section was part of the area surveyed in 2005 and was described in Mendel et al. 2006. One electrofishing site in Cougar Canyon had a temperature of 54°F and an average stream width of 3.00 meters.

Photo 79. Cougar Canyon just above mouth looking upstream (CC-1), August 2006.

Photo 80. Cougar Canyon just above mouth looking downstream (CC-1), August 2006.

Middle Branch of North Fork Asotin Creek

Three sites were electrofished and no bull trout were found, but rainbow/steelhead were common at all sites (Table 4). Age 1+ rainbow/steelhead dominated at all sites, age 0+ rainbow/steelhead were found in low numbers at all sites, and one legal rainbow/steelhead was found at the lowest site (Photos 81 and 82).

Middle Branch of North Fork Asotin Creek had good riparian vegetation, some LWD, fair bank stability, low sediment, medium to large cobble, boulders and some areas of bedrock (Photos 83-89). A bedrock stepped falls ~5 feet tall (photo 87) was found at the lowest site and may be a barrier to juvenile fish especially at low flows, but should not be a barrier to adults. Middle Branch of North Fork Asotin had an average stream width of 4.40 meters and ranged in temperature from 52-56 meters.

Photo 81. Middle Branch ~106 mm rainbow/steelhead ~0.8 mile above mouth (MB-2), August 2006.

Photo 82. Middle Branch 215 mm rainbow/steelhead ~0.4 mile above mouth (MB-3), August 2006.

Photo 83. Middle Branch ~1.1 miles above mouth looking upstream from middle of site (MB-1), August 2006.

Photo 84. Middle Branch ~1.1 miles above mouth looking upstream from bottom of site (MB-1), August 2006.

Photo 85. Middle Branch ~0.8 mile above mouth looking upstream (MB-2), August 2006.

Photo 86. Middle Branch ~0.8 mile above mouth looking downstream (MB-2), August 2006.

Photo 87. Middle Branch ~0.4 mile above mouth (MB-3), note ~5 foot tall stepped bedrock falls may be barrier to juvenile fish, August 2006.

Photo 88. Middle Branch ~0.4 mile above mouth looking downstream (MB-3), August 2006.

Photo 89. Mouth of Middle Branch entering from the middle left, August 2006.

South Fork of North Fork Asotin Creek

Three sites were electrofished in 2006, but no bull trout were found (Table 4) at any of the sites. Age 1+ rainbow/steelhead dominated at all sites, age 0+ rainbow/steelhead were found in low numbers at all sites (Photos 90 and 91).

South Fork of North Fork Asotin Creek had good riparian vegetation, some LWD, fair bank stability, low sediment, and small to large cobble and boulders (Photos 92-97). South Fork of the North Fork Asotin Creek had temperatures ranging from 56-58°F and an average stream width of 4.13 meters.

Photo 90. South Fork of North Fork Asotin ~110 mm rainbow/steelhead ~0.3 mile above mouth (SFNFA-3), August 2006.

Photo 91. South Fork of North Fork Asotin ~157 mm rainbow/steelhead ~0.3 mile above mouth (SFNFA-3), August 2006.

Photo 92. South Fork of North Fork Asotin ~1.1 miles above mouth looking upstream (SFNFA-1), August 2006.

Photo 93. South Fork of North Fork Asotin ~1.1 miles above mouth looking upstream (SFNFA-1), August 2006.

Photo 94. South Fork of North Fork Asotin ~0.6 mile above mouth looking upstream (SFNFA-2), August 2006.

Photo 95. South Fork of North Fork Asotin ~0.6 mile above mouth looking downstream (SFNFA-2), August 2006.

Photo 96. South Fork of North Fork Asotin ~0.3 mile above mouth looking upstream (SFNFA-3), August 2006.

Photo 97. Mouth of the South Fork of North Fork Asotin entering from middle left, August 2006.

<u>George Creek</u>

Steelhead spawning surveys were conducted on George Creek in both 2006 and 2007 (Tables 6 and 7, Photos 98-103). One DNA sample was collected from an unmarked adult steelhead during the surveys (Photo 98).

Qualitative electrofishing surveys in the headwaters of George Creek produced minimum density estimates between 2.4 and 13.9 fish per $100m^2$ for rainbow/steelhead (Table 5, Photos 104-109). No bull trout were observed.

George Creek has previously been described (Mendel et al. 2001, 2004, and 2006). The biggest change since our last surveys is the channel reconstruction area on lower Pintler Creek and George Creek below Meyer Ridge Rd. (Photos 101-103). Electrofishing surveys in upper

George Creek in 2007 had temperatures ranging from 49-58°F and an average width of 1.83 meters.

Photo 98. George Creek 740 mm unmarked male steelhead, March 2006.

Photo 99. Beaver dam/debris jam on George Creek found in spawning section between Rockpile Gulch to Meyer Ridge Rd. bridge, March 2007.

Photo 100. Debris jam just above stream ford ~0.1 mile above Meyer Ridge Rd. bridge, March 2007.

Photo 101. Channel reconstruction at mouth of Pintler Creek (entering from top) during high flow, April 2006.

Photo 102. George Creek looking upstream at the mouth of Pintler Creek (entering from left) during high flow event, April 2006.

Photo 103. George Creek looking downstream just below the mouth of Pintler Creek at channel reconstruction during high flow event, April 2006.

Photo 104. Headwaters of George Creek directly below Arnold Spring looking upstream (GC-1), July 2007.

Photo 105. Headwaters of George Creek directly below Arnold Spring looking downstream (GC-1), July 2007.

Photo 106. George Creek 0.6 mile below Arnold Spring looking upstream (GC-2), July 2007.

Photo 107. George Creek 1.1 miles below Arnold Spring looking upstream (GC-3), July 2007.

Photo 108. George Creek 1.7 miles below Arnold Spring looking upstream in middle of site (GC-4), July 2007.

Photo 109. George Creek 1.7 miles below Arnold Spring looking upstream from bottom of site (GC-4), July 2007.

Pintler Creek

No redds or adult steelhead were observed during the only spawning survey conducted on Pintler Creek on April 18th, 2007 (Table 7). This survey had not been planned and was conducted on short notice as part of the evaluation of the WDFW Pilot Grazing Program. 1) Livestock /large grazer impacts were obvious in several areas of Pintler Creek. 2) Stream photos and detailed notes are available in WDFW district files. The survey was conducted very late in the spawning season and it is possible that there were redds in this area that were no longer detectable.

As a component of the evaluation of the WDFW Pilot Grazing Project an electrofishing survey was conducted in Pintler Creek at the mouth of Ayers Gulch on July 11th, 2007 (Photos 110-113). Twenty age 1+ and one legal size rainbow steelhead were found at the site (Table 5). A stream ford just above the mouth of Ayers Gulch was constructed with some large boulders and may be a partial barrier to fish. We also looked at Pintler Creek near the mouth of Kelly Creek,

it was dry except for one isolated pool just upstream of the mouth. The pool was full of gasping, dying fish, including many large suckers.

A narrow band of riparian brush and trees existed along the creek channel. One electrofishing survey in lower Pintler Creek in 2007 had a temperature of 62°F and an average width of 2.30 meters.

Photo 110. Rainbow/steelhead captured during electrofishing on Pintler Creek at the mouth of Ayers Gulch (PC-1), July 2007.

Photo 111. Rainbow/steelhead captured during electrofishing on Pintler Creek at the mouth of Ayers Gulch (PC-1), July 2007.

Photo 112. Pintler Creek looking upstream from stream ford just above mouth of Ayers Gulch (PC-1), July 2007.

Photo 113. Pintler Creek looking downstream from stream ford just above mouth of Ayers Gulch (PC-1), July 2007.

Alpowa Creek

Four steelhead spawning surveys were conducted in 2006 (Table 6, Photos114-132). Between March 9th and April 27th the stream could not be surveyed because of high turbid flows. Therefore we undoubtedly missed redds and fish so our totals for the season should be considered incomplete. One DNA sample was collected from an unmarked adult steelhead during the surveys in 2006.

In 2007, we conducted steelhead spawning surveys again on Alpowa Creek to try to achieve a more complete count during the peak of the spawning season than in 2006 (Table 7). We had intended to start surveys earlier in 2007, but we were delayed while trying to obtain access to private lands. We kept the section breaks the same as in 2006, but eliminated the uppermost section because no redds were observed in that section and there were some issues with obtaining access from a landowner. We also collected 13 DNA samples and two scale samples during these surveys (Photo 114).

Electrofishing surveys were conducted at eight sites on Alpowa Creek in 2007 (Tables 3 and 5, Photos 133-144). These were the first electrofishing surveys on Alpowa Creek since 1998 (Mendel 1999). Seven of the surveys in 2007 were quantitative surveys, and the other was done qualitatively to supplement the DNA collections. Age 0+ rainbow/steelhead dominated at all sites with densities ranging from 16.0 to 48.5 fish/100m^2, age 1+ were also present at all sites with densities between 3.6 and 16.3 fish/100m^2, and no legal size rainbow/steelhead were observed. We did find low numbers of juvenile chinook at three of the electrofishing sites (the qualitative site and two of the quantitative sites). This is the first time WDFW has ever documented chinook juveniles in Alpowa Creek.

Photo 114. 901 mm wild male steelhead caught near the Asotin/Garfield county line, March 2007.

Photo 115. Dresser Spring (tributary of Alpowa Creek) at mouth looking upstream, March 2006.

Photo 116. Alpowa Creek looking upstream at the mouth of Dresser Spring (entering from right) top of upper steelhead spawning survey section, March 2006.

Photo 117. Bottom of upper steelhead spawning survey section on Alpowa Creek near Robinson Gulch looking upstream, March 2006.

Photo 118. Bottom of upper steelhead spawning survey section on Alpowa Creek near Robinson Gulch looking downstream, March 2006.

Photo 119. Steelhead spawning survey section from 2nd bridge on Alpowa Creek Rd. to Robinson Gulch, looking upstream at area of very thin riparian and actively eroding bank, March 2006.

Photo 120. Alpowa Creek just below Photo 119 looking downstream at area with no mature riparian, March 2006.

Photo 121. Alpowa Creek above 2nd bridge on Alpowa Creek Rd. looking upstream showing thin riparian belt of mature alders, March 2006.

Photo 122. Alpowa Creek above2nd bridge on Alpowa Creek Rd. looking downstream showing thin riparian belt of mature alders, March 2006.

Photo 123. Alpowa Creek a short distance below Alpowa Creek Rd. looking downstream, February 2006.

Photo 124. Alpowa Creek ~0.3 mile above the Asotin/Garfield county line looking downstream, February 2006.

Photo 125. Alpowa Creek a short distance above the Asotin/Garfield county line looking downstream, February 2006.

Photo 126. Alpowa Creek at Asotin/Garfield county line looking upstream, February 2006.

Photo 127. Alpowa Creek at top of lowest steelhead spawning survey section looking downstream, February 2006.

Photo 128. Alpowa Creek in lowest steelhead spawning survey section at redd SH 1-2 looking upstream, February 2006.

Photo 129. Alpowa Creek in lowest steelhead spawning survey section at redd SH 1-2 looking downstream, February 2006.

Photo 130. Alpowa Creek in lowest steelhead spawning survey section looking upstream at mature alder and cottonwood riparian buffer and some LWD in the stream, February 2006.

Photo 131. Alpowa Creek in lowest steelhead spawning survey section looking downstream at mature alder and cottonwood riparian buffer, February 2006.

Photo 132. Alpowa Creek in lowest steelhead spawning survey section looking upstream at mature alder and cottonwood vegetation, February 2006.

The habitat conditions were generally noted during the steelhead spawning surveys. They were divided into four sections; from the mouth of Dresser Spring downstream to Robinson Gulch (Photos 115-118), from Robinson Gulch downstream to the second bridge on Alpowa Creek Rd. (Photos 119-122), from 0.8 miles below the first bridge on Alpowa Creek Rd. to 0.1 mile below the Asotin/Garfield county line (Photos 123-126), and from 0.1 mile below the Asotin/Garfield county line to 1.0 mile above the Highway 12 bridge (Photos 127-132). The upper survey section from Dresser Spring to Robinson Gulch had a thin to moderate (20-75 ft.) riparian area consisting of mainly young alder and cottonwood, with the upper third of the survey recently enrolled in the Conservation Reserve Enhancement Program (CREP). The stream was 90% riffle with a few pools and runs, substrate was primarily small to medium cobble with high sediment along the banks with many areas of actively eroding banks, moderate to high embeddedness, and little LWD (Photos 115 and 116). The section from Robinson Gulch to the 2nd bridge on Alpowa

Creek Road had a thin mature riparian belt of alder and cottonwood throughout most of the survey. These areas had grass and brush understory, fair bank stability with occasional areas of actively eroding banks, small to medium cobble, moderate sedimentation in most areas but high in pools, and some recruitment of LWD (Photos 121 and 122). There was ~0.5 mile in the middle of this survey section that had very limited riparian vegetation. It consisted of young 6-8 foot tall willows (or other deciduous trees), 100% riffle with uniform width and depth, small to medium cobble, no LWD, and little sedimentation (Photos 119 and 120). The surveys from 0.8 mile below first bridge on Alpowa Creek Rd. to 0.1 mile Asotin/Garfield county line had a very narrow riparian belt consisting of mainly cottonwoods and some brush undersotry. Bank stability was fair, substrate was mainly small to medium cobble and mud with most pools and slack water areas filled with sediment, embeddedness was moderate, and woody debris was fair to good. The area surveyed in Asotin County from the Asotin Garfield County line to 1.0 mile above the Highway 12 bridge consisted of moderate riparian vegetation with an alder and cottonwood overstory with little grass and brush understory. This section was primarily riffle and run with some average pools, high sedimentation, moderate LWD, some good areas of usable spawning gravel, and areas of high animal use. Stream temperatures during electrofishing surveys ranged from 62-68°F and stream width averaged 4.03 meters. This stream had been previously surveyed and described in 1998 (Mendel 1999).

Photo 133. Alpowa Creek near the mouth of Robinson Gulch looking downstream (AL-1), July 2007.

Photo 134. Alpowa Creek 0.6 mile above 2nd bridge on Alpowa Creek Road looking upstream (AL-2), July 2007.

Photo 135. Alpowa Creek 0.6 mile above 2nd bridge on Alpowa Creek Road looking downstream (AL-2), July 2007.

Photo 136. Alpowa Creek 0.7 mile below 1st bridge on Alpowa Creek Road looking upstream (AL-4), July 2007.

Photo 137. Alpowa Creek 0.7 mile below 1st bridge on Alpowa Creek Road looking downstream (AL-4), July 2007.

Photo 138. Alpowa Creek 1.7 miles above Asotin/Garfield county line looking upstream (AL-5), July 2007.

Photo 139. Alpowa Creek 1.7 miles above Asotin/Garfield county line looking downstream (AL-5), July 2007.

Photo 140. Alpowa Creek directly above Asotin/Garfield county line looking upstream (AL-6), July 2007.

Photo 141. Alpowa Creek 0.2 mile above Pow-Wah-Kee Gulch looking upstream (AL-7), July 2007.

Photo 142. Alpowa Creek 0.2 mile above Pow-Wah-Kee Gulch looking downstream (AL-7), July 2007.

Photo 143. Alpowa Creek 1.0 mile below Pow-Wah-Kee Gulch looking upstream (AL-8), July 2007.

Photo 144. Alpowa Creek 1.0 mile below Pow-Wah-Kee Gulch looking downstream (AL-8), July 2007.

2. Wenaha River Tributaries in Washington State

Electrofishing Surveys

Electrofishing surveys were conducted from late July through late August of 2006, on six streams including the North Fork Wenaha River, and the Butte Creek drainage (Figures 9 and 10, and Table 11).

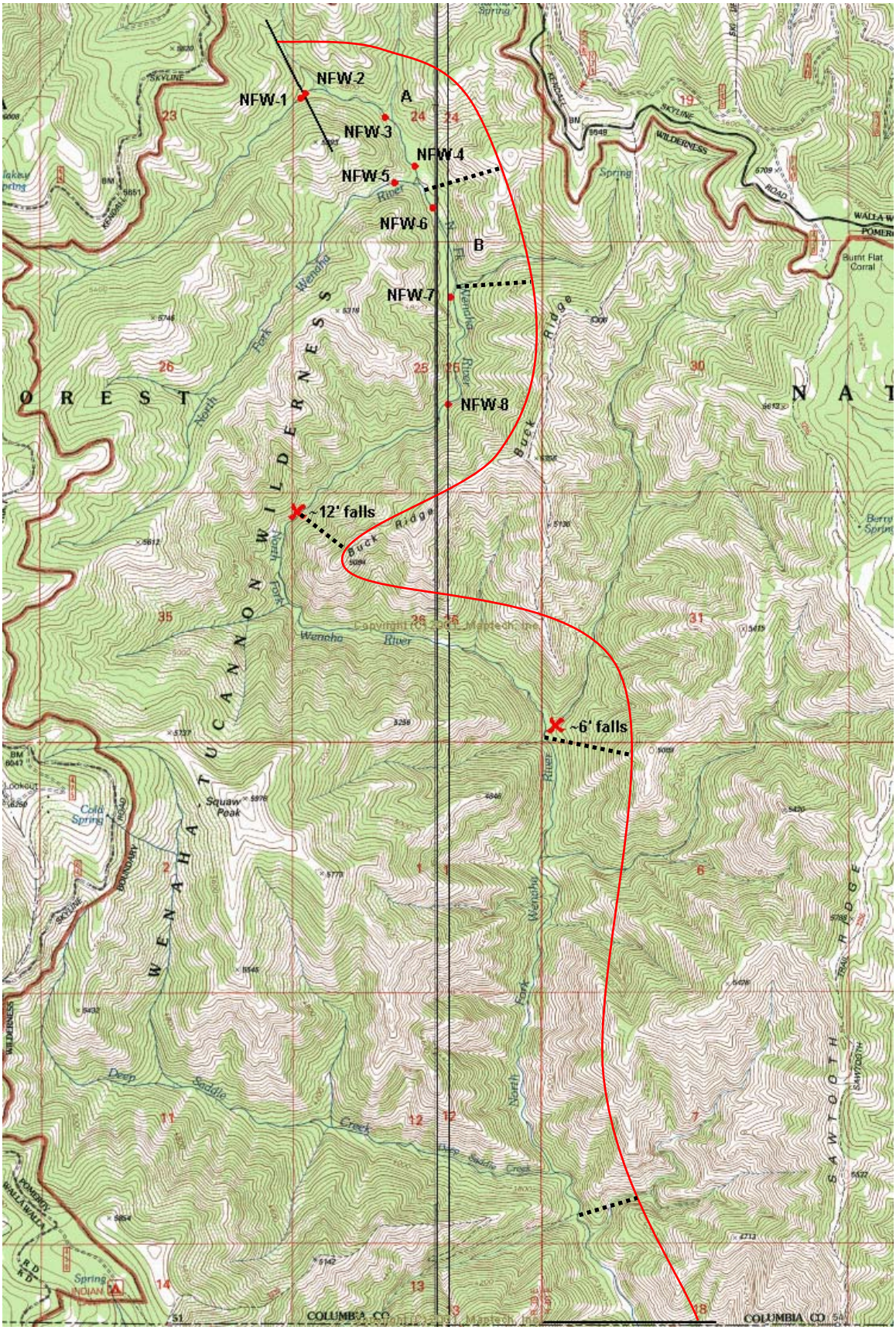

Figure 9. Electrofishing sites on North Fork Wenaha, 2006. Bull trout spawning surveys were conducted on all reaches of stream paralleling red line in 2006 and all sections except A and B in 2007. Black dotted lines indicate section breaks within the spawning survey area.

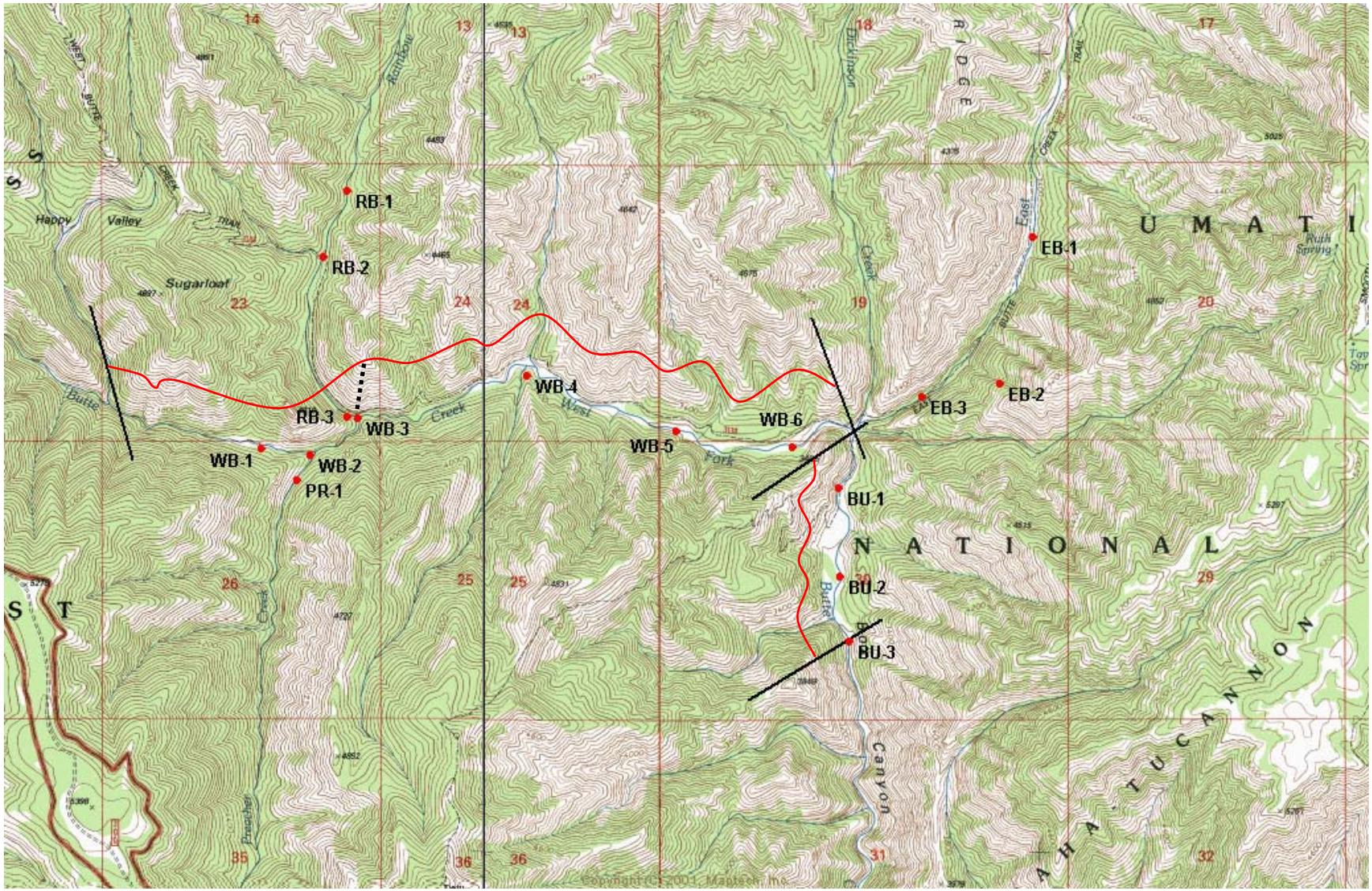

Figure 10. Electrofishing sites on West Fork Butte Creek, Preacher Creek, Rainbow Creek, East Fork Butte Creek, and Butte Creek, 2006. Bull trout spawning surveys parallel red line on West Fork Butte Creek, and spring chinook spawning surveys parallel red line on Butte Creek. Black dotted line indicates section breaks within the spawning survey area.

Table 11. Relative abundance and distribution from electrofishing surveys in the Wenaha River Watershed in Washington State, 2006

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
North Fork Wenaha River	NFW-1 ~0.7 mile up left bank fork	7/26	20	3.7	74	N/A	No fish found	0.0	0.0
	NFW-2 ~0.7 mile up left bank fork	7/26	58	3.7	214.6	5.4	11 age 1+ BT (124-190mm), one adult BT (215mm), TF-rare	0.0	5.6
	NFW-3 ~0.3 mile up left bank fork	7/26	73	3.5	255.5	3.8	Five age 1+ BT (103-192mm), one adult BT (238mm)	0.0	2.3
	NFW-4 ~0.1 mile up left bank fork	7/26	53	5.2	275.6	6.3	10 age 1+ BT (73-169mm)	0.0	3.6
	NFW-5 ~0.1 mile up right bank fork	7/26	42	2.7	113.4	3.5	No fish found, TF- abundant	0.0	0.0
	NFW-6 ~0.1 mile below forks	7/26	200	5.0	1000	N/A	Nine age 1+ BT (76-158mm), TF-common	0.0	0.9
	NFW-7 ~0.5 mile below forks	7/26	81	4.9	396.9	6.3	Five age 1+ BT (79-187mm), one adult BT (242mm), TF-uncommon	0.0	1.5
	NFW-8 ~1.0 mile below forks	7/26	53	5.5	291.5	7.6	10 age 1+ BT (77-192mm), TF-rare	0.0	3.4
West Fork Butte Ck.	WB-1 ~0.2 miles above mouth of Preacher Ck.	8/21	39	4.5	175.5	5.7	16 age 1+ BT (54-199mm), one adult BT (231mm), three age 1+ RBT (134-174mm), TF-rare	1.7	9.7
	WB-2 Preacher Ck. mouth	8/21	48	6.4	307.2	7.6	11 age 1+ BT (50-140mm), 16 age 1+ RBT (85-193mm), one legal RBT (220mm), TF-rare	5.5	3.6
	WB-3 Rainbow Ck. mouth	8/21	39	7.3	284.7	8.9	Eight age 1+ BT (56-118mm), two age 0+ RBT (40-42mm), 28 age 1+ RBT (78-190mm), two legal RBT (200-205mm), SCP, TF-rare	11.2	2.8

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults. Rainbow trout ≥ 200mm in fork length are considered legals.

Table 11. (Cont.) Relative abundance and distribution from electrofishing surveys in the Wenaha River Watershed in Washington State, 2006

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
West Fork Butte Creek (cont.)	WB-4 ~1.3 miles above confluence with Butte Ck.	8/22	39	6.1	237.9	7.3	17 age 1+ BT (60-150mm), 15 age 0+ RBT (33-50mm), 16 age 1+ RBT (83-183mm), one legal RBT (208mm), SCP-uncommon, TF-rare	13.5	7.1
	WB-5 ~0.7miles above confluence with Butte Ck.	8/22	31	5.1	158.1	6.8	Three age 1+ BT (81-140mm), six age 0+ RBT (42-51mm), seven age 1+ RBT (103-177mm), one legal RBT (220mm), SCP-common, TF-rare	8.9	1.9
	WB-6 ~0.2 miles above confluence with Butte Ck.	8/22	43	5.9	253.7	7.2	Four age 1+ BT (73-187mm), 10 age 0+ RBT (40-57mm), 15 age 1+ RBT (96-197mm), six age 0+ WCH (62-85mm), SCP-common	9.9	1.6
Preacher Creek	PR-1 ~ 0.1 miles above mouth	8/21	27	3.8	102.6	5.5	Three age 0+ RBT (45-50mm), 11 age 1+ RBT (73-178mm), TF-rare	13.6	0.0
Rainbow Creek	RB-1 ~ 0.2 above trail crossing	8/21	32	3.9	124.8	4.8	Six age 0+ RBT (37-51mm), five age 1+ RBT (98-147mm), SCP-common, TF-uncommon	8.8	0.0
	RB-2 Trail crossing	8/21	30	3.0	90.0	4.6	14 age 0+ RBT (39-49mm), six age 1+ RBT (85-168mm), SCP-uncommon, TF- rare	22.2	0.0
	RB-3 0.1 miles above mouth	8/21	40	3.3	132.0	4.4	29 0+ age RBT (31-65mm), nine age 1+ RBT (75-186mm), SCP-uncommon, TF-rare	28.8	0.0
East Fork Butte Ck.	EB-1 ~1.0 miles above confluence with Butte Ck.	8/21	31	4.9	151.9	6.9	Two age 1+ BT (105-138mm), 17 age 0+ RBT (32-51mm), 17 age 1+ RBT (80-149mm), TF-rare	22.4	1.3
	EB-2 ~0.7 miles above confluence with Butte Ck.	8/21	41	4.1	168.1	5.0	Four age 1+ BT (57-143mm), eight age 0+ RBT (38-53mm), 12 age 1+ RBT (81-167mm), one legal RBT (209mm), SCP-uncommon, TF-rare	12.5	2.4
	EB-3 ~0.3 miles above confluence with Butte Ck.	8/21	60	3.9	234.0	4.9	One age 1+ BT (70mm), 32 age 0+ RBT (38-65mm), 28 age 1+ RBT (76-190mm), SCP-common	25.6	0.4

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull trout ≥ 200mm in fork length are considered adults. Rainbow trout ≥ 200mm in fork length are considered legals.

Table 11. (Cont.) Relative abundance and distribution from electrofishing surveys in the Wenaha River Watershed in Washington State, 2006

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m^2)	Ave. bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Butte Ck.	BU-1 ~0.2 miles below East and West Fork Butte Ck.	8/22	33	10.6	349.8	12.9	29 age 0+ RBT (32-58mm), 32 age 1+ RBT (78-188mm), four age 0+ WCH (64-73mm), SCP-common, TF-rare	17.4	0.0
	BU-2 ~0.6 miles below East and West Fork Butte Ck.	8/22	47	9.0	423.0	13.6	One age 1+ BT (73mm), 52 age 0+ RBT (38-62mm), 29 age 1+ RBT (88-180mm), one legal RBT (204mm), four age 0+ WCH (73-77mm), one age 1+ WCH (135mm), SCP-common	19.4	0.2
	BU-3 ~0.8 miles below East and West Fork Butte Ck.	8/22	48	7.0	336.0	8.3	36 age 0+ RBT (43-62mm), 33 age 1+ RBT (96-191mm), one legal RBT (215mm), 11 age 0+ WCH (65-78mm), SCP-abundant	20.8	0.0

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish

Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101. Size/age class based on fish length. Bull trout ≥ 200mm in fork length are considered adults. Rainbow trout ≥ 200mm in fork length are considered legals.

Bull Trout Spawning Surveys

Bull trout spawning surveys were conducted in the North Fork Wenaha River in 2006 and 2007, and in the West Fork Butte Creek in 2006 (Figures 9 and 10, and Tables 12, 13, 14). The surveys in 2006 covered a total of 12.8 miles of known and presumed spawning habitat but the Columbia Complex Fire delayed access to these areas. In 2007, the surveys covered 5.9 miles of known spawning areas in the North Fork Wenaha River

The North Fork Wenaha was surveyed once during September of 2006, with a total of 82 redds (11.7 redds per mile) and 9 live bull trout were observed (Table 12). During this survey it was obvious from recent water lines and debris that very high flows had preceded our survey by about a week or so. We expect that some redds were erased and fish displaced before we conducted our survey, and our survey should be considered incomplete and the number of redds we observed was less than likely existed before the high water event. In 2007, we conducted two surveys in mid September and early October and observed 86 redds (14.6 redds/mile) and 71 live bull trout (Table 13). The number of redds in 2007 may have been reduced due to a man-made rock dam just below the mouth of Deep Saddle Creek.

Table 12. Bull trout spawning survey summary for the North Fork Wenaha River in Washington State, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
North Fork Wenaha						Live	Dead
9/26	1	(A) River mile 7.0 to river mile 6.3	0.7	1	1.4	3	0
9/26	1	(B) River mile 6.3 to river mile 5.9	0.4	1	2.5	0	0
9/26	1	(C) River mile 5.9 to river mile 4.5	1.4	0	0.0	2	0
9/26	1	(D) River mile 4.5 to river mile 2.8	1.7	29	17.1	2	0
9/26	1	(E) River mile 2.8 to river mile 0.5	2.3	38	16.5	2	0
9/26	1	(F) River mile 0.5 to river mile 0.0	0.5	13	26.0	0	0
		Total	**7.0**	**82**	**11.7**	**9**	**0**

[a] A: 0.7 miles above forks to the forks, B: Forks to 0.4 miles below forks, C: 0.4 miles below forks to falls, D: Falls to 2.0 miles above Deep Saddle Ck., E: 2.0 miles above Deep Saddle Ck. to 0.5 miles above state line, F: 0.5 miles above state line to state line

Table 13. Bull trout spawning survey summary for the North Fork Wenaha River in Washington State, 2007.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
North Fork Wenaha						Live	Dead
9/18	1	(A) River mile 5.9 to river mile 4.5	1.4	3	2.1	1	0
9/18	1	(B) River mile 4.5 to river mile 2.8	1.7	26	15.3	23	0
9/18	1	(C) River mile 2.8 to river mile 0.5	2.3	30	13.0	32	0
9/18	1	(D) River mile 0.5 to river mile 0.0	0.5	5	10.0	11	0
10/4	2	(A) River mile 5.9 to river mile 4.5	1.4	2	1.4	1	0
10/4	2	(B) River mile 4.5 to river mile 2.8	1.7	2	1.2	1	0
10/4	2	(C) River mile 2.8 to river mile 0.5	2.3	11	4.8	1	0
10/4	2	(D) River mile 0.5 to river mile 0.0	0.5	7	14.0	1	0
		Total	**5.9**	**86**	**14.6**	**71**	**0**

[a] A: 0.4 miles below forks to falls, B: Falls to 2.0 miles above Deep Saddle Ck., C: 2.0 miles above Deep Saddle Ck. to 0.5 miles above state line, D: 0.5 miles above state line to state line

Since the majority of the Butte Creek watershed spawning was observed on the West Fork of Butte Creek in 2005 (23 redds and 17 live bull trout, Mendel et al. 2006), this is where we focused our efforts in 2006. West Fork Butte Creek was surveyed once in late September and a total of 32 redds and 2 live bull trout were observed (Table 14, Figure 10). While only 3.1 miles of stream was surveyed the total one-day trip (on foot) for this survey was approximately 16 miles.

Table 14. Bull trout spawning survey summary for West Fork Butte Creek, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
West Fork Butte Creek						Live	Dead
9/28	1	(A) River mile 3.1 to river mile 2.1	1.0	2	2.0	0	0
9/28	1	(B) River mile 2.1 to river mile 0.0	2.1	30	14.3	2	0
		Total	**3.1**	**32**	**10.3**	**2**	**0**

[a] A: Falls to mouth of Rainbow Creek, B: Mouth of Rainbow Ck. to mouth of West Fork Butte Creek

Spring Chinook Spawning Surveys

During our electrofishing surveys on August 21, 2006 a spring chinook redd was observed on Butte Creek just below our camp at the confluence of East Fork and West Fork Butte Creeks. Therefore, we conducted a spawning survey in the area. A total of three spring chinook redds were noted. The uppermost chinook redd was observed approximately 5.3 miles above the Oregon border (Table 15). No chinook adults or carcasses were observed. Apparently, spring chinook spawn a week or more earlier than our survey on 22 August in Butte Creek.

Table 15. Chinook spawning survey summary for Butte Creek in Washington State, 2006.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
Butte Creek						Live	Dead
8/22	1	(A) River mile 5.3 to river mile 4.5	0.8	3	3.8	0	0
		Total	**0.8**	**3**	**3.8**	**0**	**0**

[a] A: Forks to 0.8 miles below the forks

Tissue Sampling

Fin clips were collected from a total of 220 salmonids in this study area in 2006. All the samples were collected during electrofishing surveys that were conducted from late July through late August. The samples included 124 juvenile and 5 legal size rainbow/steelhead along with 75 juvenile, 3 adult bull trout, and 13 juvenile chinook (Table 16).

Table 16. Tissue samples collected in Wenaha River tributaries in Washington State, 2006.								
Stream	**# of Bull Trout fin clips**	**# of Bull Trout fin clips within protocol**	**# of Bull Trout scale samples**	**# of Rainbow/ Steelhead fin clips**	**# of Rainbow/ Steelhead fin clips within protocol**	**# of Rainbow/ Steelhead scale samples**	**# of Chinook fin clips**	**# of Chinook fin clips within protocol**
North Fork Wenaha River	40	17	40	0	0	0	0	0
West Fork Butte Creek	30	20	16	39	13	23	0	0
Preacher Creek	0	0	0	4	0	0	0	0
Rainbow Creek	0	0	0	24	9	18	0	0
East Fork Butte Creek	7	5	4	27	15	21	0	0
Butte Creek	1	1	0	35	15	17	13	9
Totals	**78**	**43**	**60**	**129**	**52**	**79**	**13**	**9**

Stream Profiles of Upper Wenaha River Tributaries

North Fork Wenaha River

Eight electrofishing surveys were conducted in the upper North Fork Wenaha River in 2006 (Photos 145-167). These surveys encompassed the upper portion of the area surveyed in 2005, plus upstream into the two upper forks. Of the eight sites, four were conducted in the left bank fork, one in the right bank fork, and three below the forks. These surveys were to check an area above an impassible falls that was found during surveys in 2005. We intend to compare genetic composition of bull trout above and below this barrier in the near future. In 2006, a total of 53 bull trout were sampled, no other salmonids were observed in this section. Tailed frogs were found at five of the eight sites surveyed. The upper sites on the left bank fork (NFW-1 and NFW-2) were separated by a falls (Photo 152). This falls appears to be a barrier to fish passage at this time. No fish were found at the site above the falls, but 11 age 1+ and one adult bull trout were captured in the site just below the falls.

Bull trout spawning surveys were conducted one time in 2006 from the state line to the forks, and up the left bank fork to the falls (~0.7 mile). Only one survey was conducted because of delayed access because of the Columbia Complex Fire, and because a high water event had preceded our survey by about a week and reduced redd numbers. A total of 82 redds and nine live bull trout were observed during the survey (Photo 168, Table 12).

Bull trout spawning surveys in 2007 covered 5.9 miles from 0.4 mile above the forks down to the state line. Surveys were conducted on September 18th and October 4th, and 86 redds and 71 live fish were observed (Table 13, Photos 169-178). A man-made dam was found during the first survey that appeared to be a barrier to fish passage though redds and fish were observed above this dam (Photos 172-175). Surveyors observed bull trout staged in the pool below the dam and notched the dam to restore fish passage on September 18th (Photo 176).

The section of North Fork Wenaha from the top of the 2005 bull trout spawning survey (NFW-7) downstream was described in Mendel et al. 2006. Above this point the stream has good riparian vegetation conditions consisting of mature conifers with young alder lining the banks. Bank

stability was good to excellent and so was the amount of LWD. The substrate consisted of small to large cobble with limited areas of bedrock and low to moderate sedimentation. Areas of spawning gravel were also noted at four of the six electrofishing sites. Electrofishing surveys showed an average stream width of 4.28 meters and temperatures ranging from 45-54°F. We also noted a falls at ~0.7 mile up the left bank fork that appeared to be a barrier to fish passage. Twelve bull trout from 126mm to 215mm were found in a site just below the falls, but no fish were found in a site just above the falls.

Photo 145. North Fork Wenaha River ~168 mm bull trout ~0.1 mile up the left bank fork (NFW-4), July 2006.

Photo 146. North Fork Wenaha River ~145 mm bull trout ~0.1 mile up the left bank fork (NFW-4), July 2006.

Photo 147. North Fork Wenaha River ~175 mm bull trout ~1.0 mile below the forks (NFW-8), July 2006.

Photo 148. North Fork Wenaha River ~173 mm bull trout ~1.0 mile below the forks (NFW-8), July 2006.

Photo 149. North Fork Wenaha River ~77 mm bull trout ~1.0 mile below the forks (NFW-8), July 2006.

Photo 150. North Fork Wenaha River ~0.7 mile up left bank fork looking upstream above the falls (NFW-1), July 2006. (No fish present.)

Photo 151. North Fork Wenaha River ~0.7 mile up left bank fork looking upstream from top of falls (NFW-1), July 2006. (No fish present.)

Photo 152. North Fork Wenaha River ~0.7 mile up left bank fork looking upstream at 5 to 6 foot falls that divide NFW-1 and NFW-2, July 2006.

Photo 153. North Fork Wenaha River ~0.7 mile up left bank fork looking upstream (below falls, NFW-2), July 2006.

Photo 154. North Fork Wenaha River ~0.7 mile up left bank fork looking downstream (below falls, NFW-2), July 2006.

Photo 155. North Fork Wenaha River ~0.3 mile up left bank fork looking upstream at bedrock chutes near top of site (NFW-3), July 2006.

Photo 156. North Fork Wenaha River ~0.3 mile up left bank fork looking upstream near the bottom of the site (NFW-3), July 2006.

Photo 157. North Fork Wenaha River ~0.3 mile up left bank fork looking downstream near bottom of site (NFW-3), July 2006.

Photo 158. North Fork Wenaha River ~0.1 mile up left bank fork looking upstream (NFW-4), July 2006.

Photo 159. North Fork Wenaha River ~0.1 mile up left bank fork looking downstream (NFW-4), July 2006.

Photo 160. North Fork Wenaha River looking upstream at the mouth of left bank fork, July 2006.

Photo 161. North Fork Wenaha River ~0.1 mile up right bank fork looking upstream (NFW-5), July 2006.

Photo 162. North Fork Wenaha River ~0.1 mile up right bank fork looking downstream (NFW-5), July 2006.

Photo 163. North Fork Wenaha River looking upstream at the mouth of right bank fork, July 2006.

Photo 164. North Fork Wenaha River at confluence of left bank and right bank forks, July 2006.

Photo 165. North Fork Wenaha River ~0.5 mile below forks looking upstream (NFW-7), July 2006.

Photo 166. North Fork Wenaha River ~0.5 mile below forks looking downstream (NFW-7), July 2006.

Photo 167. North Fork Wenaha River ~1.0 mile below forks looking upstream (NFW-8), July 2006.

Photo 168. North Fork Wenaha River ~0.5 mile above Deep Saddle Creek showing bull trout or spring chinook redd, September 2006.

Photo 169. Bedrock chute below falls in North Fork Wenaha River, September 2007.

Photo 170. Bull trout redd in North Fork Wenaha River ~1.9 miles above Deep Saddle Creek, September 2007.

Photo 171. Bull trout in front of redd in the North Fork Wenaha River ~0.2 mile above Deep Saddle Creek, September 2007.

Photo 172. Man-made rock dam in the North Fork Wenaha River ~250 feet below the mouth of Deep Saddle Creek found during a bull trout spawning survey on September 18th, 2007.

Photo 173. Upstream view of man-made rock dam seen in Photo 172, with surveyor in front of dam, September 2007.

Photo 174. Side view of man-made rock dam seen in Photo 172, note grass growing on top of the dam, September 2007.

Photo 175. Side view of man-made rock dam seen in Photo 172 with surveyor showing depth of pool, September 2007.

Photo 176. Man-made rock dam in the North Fork Wenaha River after surveyors notched it for fish passage, September 2007.

Photo 177. Bull trout redd in the North Fork Wenaha River ~0.3 mile below Deep Saddle Creek, September 2007.

Photo 178. Two bull trout on first redd found in the North Fork Wenaha River just above the Washington/Oregon state line, September 2007.

West Fork Butte Creek

Planned electrofishing surveys were canceled in 2005 because of restricted access due to the School Fire. The rescheduled surveys were conducted at six sites in West Fork Butte Creek in 2006 (Photos 179-191). Sites were conducted from ~0.2 mile above the mouth of Preacher Creek down to ~0.2 mile above the confluence with East fork Butte Creek. A total of 123 rainbow/steelhead, 60 bull trout, and 6 juvenile chinook were observed during these surveys (Table 11). Sculpin and tailed frogs were also observed during these surveys.

Bull trout spawning surveys were conducted again in 2006. The spawning survey covered the same sections as in 2005, from the falls at river mile 3.1 to the mouth of Rainbow Creek and from the mouth of Rainbow Creek to the confluence with the East Fork Butte Creek. Redd distribution differed substantially between the upper and lower sections in 2005 and 2006. The upper section had 16 redds in 2005 but only 2 redds in 2006, while the lower section had 7 redds in 2005 and 30 redds in 2006 (Table 14, Mendel et al. 2006). One large beaver dam was found ~1.7 miles above the confluence with the East Fork Butte Creek (Photos 192-194), but 11 of the 30 redds in the lower section were above this dam. It doesn't appear that the dam is a complete barrier, but it may have influenced the distribution of spawning in 2006.

The West Fork was surveyed in 2005 for bull trout and habitat conditions and described in 2006 (Mendel et al. 2006). West Fork Butte Creek above Rainbow Creek had stream temperatures between 48-50°F degrees and an average width of 5.45 meters, while below Rainbow Creek stream temperatures were between 51-54°F with an average stream width of 6.10 meters.

Photo 179. West Fork Butte Creek 220 mm rainbow/steelhead ~0.6 mile above mouth (WB-5), August 2006.

Photo 180. West Fork Butte Creek 143 mm rainbow/steelhead ~0.3 mile above mouth (WB-6), August 2006.

Photo 181. West Fork Butte Creek ~0.2 mile above Preacher Creek looking upstream, (WB-1), August 2006.

Photo 182. West Fork Butte Creek ~0.2 mile above Preacher Creek looking downstream (WB-1), August 2006.

Photo 183. West Fork Butte Creek looking upstream at the mouth of Preacher Creek (WB-2), August 2006.

Photo 184. West Fork Butte Creek at the mouth of Rainbow Creek looking upstream (WB-3), August 2006.

Photo 185. West Fork Butte Creek at the mouth of Rainbow Creek looking downstream (WB-3), August 2006.

Photo 186. West Fork Butte Creek ~1.3 miles above confluence with East Fork Butte Creek looking upstream (WB-4), August 2006.

Photo 187. West Fork Butte Creek ~1.3 miles above confluence with East Fork Butte Creek looking downstream (WB-4), August 2006.

Photo 188. West Fork Butte Creek ~0.7 mile above confluence with East Fork Butte Creek looking upstream (WB-5), August 2006.

Photo 189. West Fork Butte Creek ~0.7 mile above confluence with East Fork Butte Creek looking downstream (WB-5), August 2006.

Photo 190. West Fork Butte Creek ~0.2 mile above confluence with East Fork Butte Creek looking upstream (WB-6), August 2006.

Photo 191. West Fork Butte Creek ~0.2 mile above confluence with East ForkButte Creek looking downstream (WB-6), August 2006.

Photo 192. West Fork Butte Creek looking upstream at large beaver dam found during bull trout spawning surveys ~1.7 miles above mouth, September 2006.

Photo 193. Looking upstream of beaver dam in Photo 192 at impounded water, September 2006.

Photo 194. Side view of beaver dam in Photo 192, September 2006

Preacher Creek

One electrofishing survey was conducted ~0.1 mile above the mouth of Preacher Creek on August 21st (Photo 195). No bull trout were found, but 14 rainbow/steelhead were observed along with one tailed frog (Table 11).

In the only electrofishing site conducted on Preacher Creek the temperature was 56°F and the average width was 3.80 meters. This area was part of the area surveyed for bull trout spawning in 2005 and was described in Mendel et al. 2006.

Photo 195. Preacher Creek ~0.1 mile above mouth looking upstream (PR-1), August 2006.

Rainbow Creek

Electrofishing surveys canceled in 2005 because of the School Fire were conducted at three sites in Rainbow Creek in 2006 (Photos 196-203). Sites were from ~0.2 mile above the West Fork Butte Creek trail crossing downstream to ~0.1 mile above the mouth. A total of 69 rainbow/steelhead and no bull trout were observed during these surveys. Sculpin and tailed frogs were also observed during these surveys (Table 11).

Rainbow Creek sites had good riparian vegetation conditions, small to medium cobble, low amounts of sediment, good LWD, poor to good bank stability depending on the site. Data collected during electrofishing surveys on Rainbow Creek showed an average width of 3.40 meters and temperatures ranging from 51-54°F.

Photo 196. Rainbow Creek 186 mm rainbow/ steelhead ~0.1 mile above mouth (RB-3), August 2006.

Photo 197. Rainbow Creek ~0.2 mile above trail crossing looking upstream (RB-1), August 2006.

Photo 198. Rainbow Creek ~0.2 mile above trail crossing looking downstream (RB-1), August 2006.

Photo 199. Rainbow Creek at West Butte Creek trail crossing looking upstream (RB-2), August 2006.

Photo 200. Rainbow Creek at West Butte Creek trail crossing looking downstream (RB-2), August 2006.

Photo 201. Rainbow Creek ~0.1 mile above mouth looking upstream (RB-3), August 2006.

Photo 202. Rainbow Creek ~0.1 mile above mouth looking downstream (RB-3), August 2006.

Photo 203. Mouth of Rainbow Creek as it enters West Fork Butte Creek, August 2006.

East Fork Butte Creek

A total of seven bull trout, and 115 rainbow/steelhead were collected at the three sites electrofished between river mile 1.0 and the mouth (Photo 204-208). No other salmonids were observed, but sculpin and tailed frogs were also found (Table 11).

The area surveyed in 2006 included the 0.5 miles that was surveyed for bull trout spawning in 2005, plus the 2006 surveys extended upstream to river mile 1.0. The extended survey area featured habitat similar to that described in Mendel et al. 2006. East Fork Butte Creek had

temperatures ranging from 54-58°F and an average width of 4.30 meters during our electrofishing surveys.

Photo 204. East Fork Butte Creek 208 mm rainbow/steelhead ~0.7 mile above confluence with West Fork Butte Creek (EB-2), August 2006.

Photo 205. East Fork Butte Creek ~0.7 mile above confluence with West Fork Butte Creek looking upstream (EB-2), August 2006.

Photo 206. East Fork Butte Creek ~0.7 mile above confluence with West Fork Butte Creek looking downstream (EB-2), August 2006.

Photo 207. East Fork Butte Creek ~0.3 mile above confluence with West Fork Butte Creek looking upstream (EB-3) note gabion bank protection in background, August 2006.

Photo 208. East Fork Butte Creek ~0.3 mile above confluence with West Fork Butte Creek looking downstream (EB-3), August 2006.

Butte Creek

Three electrofishing surveys were conducted on Butte Creek from the confluence of the East Fork and West Fork Butte Creeks downstream ~0.8 mile (Photo 209-214). One bull trout, 213 rainbow/steelhead, and 20 chinook were observed during the surveys. Sculpin were prevalent at all three sites while tailed frogs were found in low numbers at one site (Table 11).

Electrofishing surveys on Butte Creek had temperatures from 50-52°F and an average stream width of 8.87 meters. Habitat descriptions for this area were included in Mendel et al. 2006.

Photo 209. Butte Creek ~0.2 mile below East and West Fork Butte Creek confluence looking upstream (BU-1), August 2006.

Photo 210. Butte Creek ~0.2 mile below East and West Fork Butte Creek confluence looking downstream (BU-1), August 2006.

Photo 211. Butte Creek ~0.6 mile below East and West Fork Butte Creek confluence looking upstream (BU-2), August 2006.

Photo 212. Butte Creek ~0.6 mile below East and West Fork Butte Creek confluence looking downstream (BU-2), August 2006.

Photo 213. Butte Creek ~0.8 mile below East and West Fork Butte Creek confluence looking upstream (BU-3), August 2006.

Photo 214. Butte Creek ~0.8 mile below East and West Fork Butte Creek confluence looking downstream (BU-3), August 2006.

3. Tucannon River Drainage

Electrofishing Surveys

Electrofishing surveys were conducted in the summer of 2006 in the Tucannon River Drainage to assess distribution, relative abundance, species composition, obtain tissue samples for genetic studies and to implant bull trout with PIT tags to aid in an ongoing bull trout movement study (Figures 11, 12, and 14, and Tables 17, 18). Two quantitative electrofishing surveys were conducted on Cummings Creek in 2006 to try and sample bull trout. We found zero bull trout, but rainbow/steelhead densities were between 39.5 and 147.7 fish/100m^2 (Table 17). The electrofishing surveys were intended to spot check abundance of rainbow/steelhead in the area affected by the School Fire, as well as to try and capture bull trout for genetic sampling.

Six qualitative surveys were conducted in 2007 on two small tributaries of the upper Tucannon River to assess distribution, relative abundance, species composition, and the effects of the School Fire of 2005 (Figure 13, Table 19). WDFW had not sampled these two small tributaries previously.

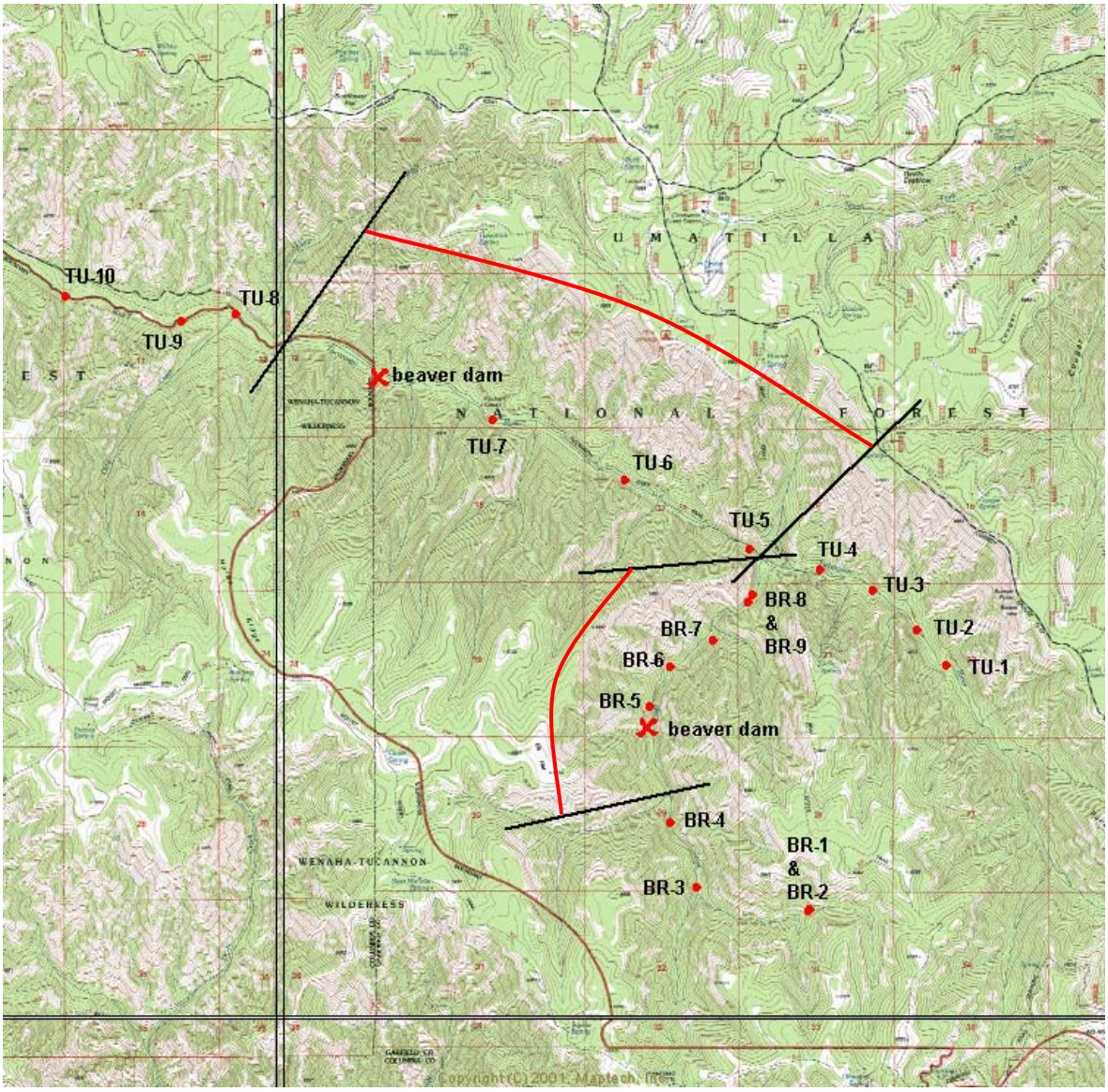

Figure 11. Electrofishing sites on the Tucannon River and Bear Creek, 2006. Bull trout spawning surveys were conducted on stream reaches paralleling the red lines in 2007.

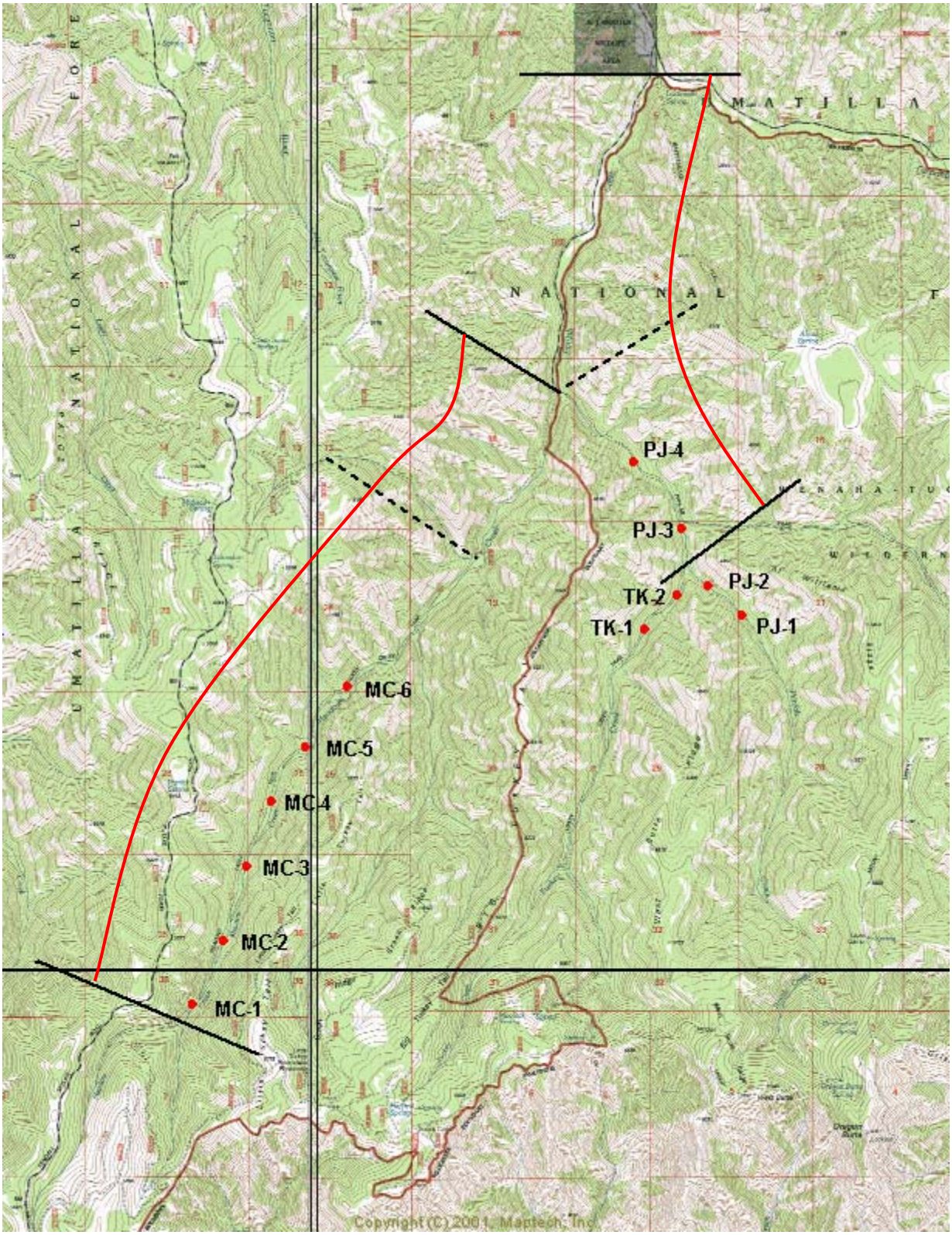

Figure 12. Electrofishing sites on Panjab Creek, Turkey Creek, and Meadow Creek, 2006. Bull trout spawning surveys were conducted on stream reaches paralleling the red lines in 2007, black dotted line indicates section breaks within the spawning survey area.

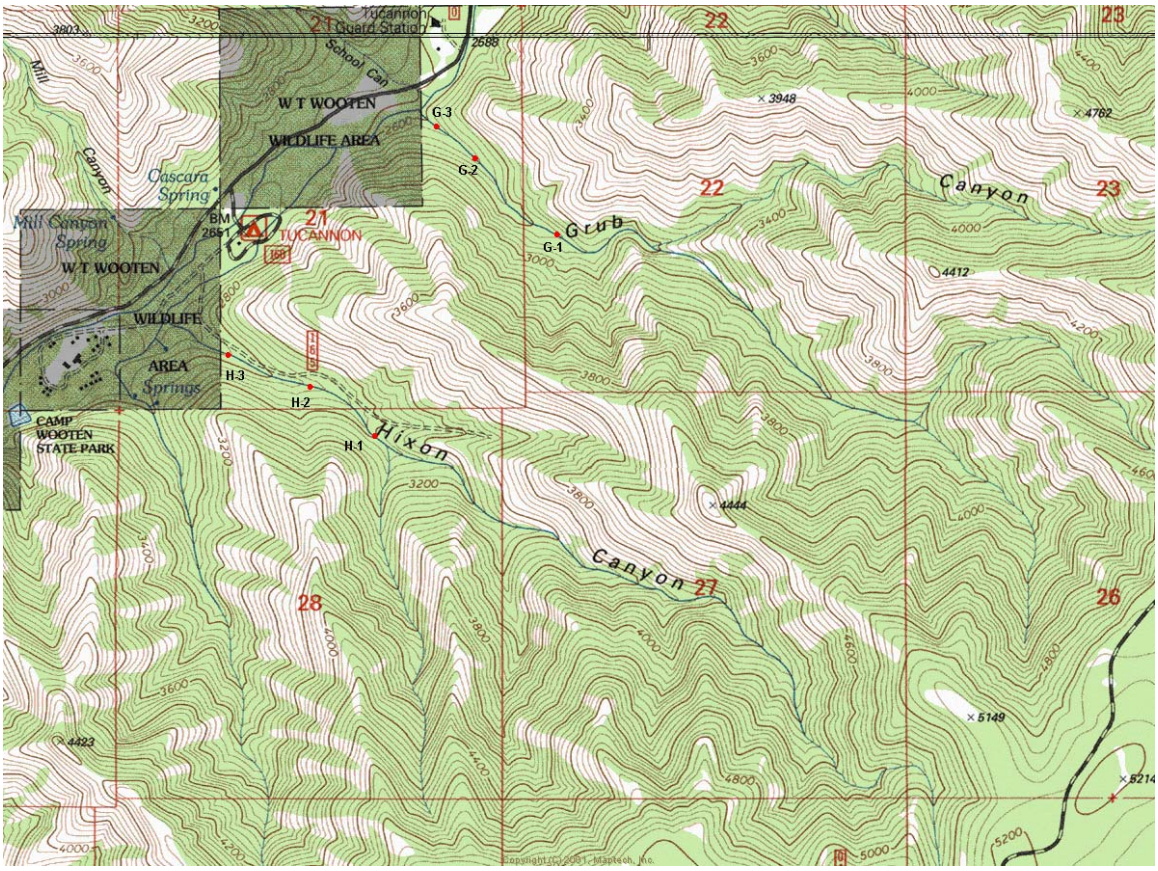

Figure 13. Electrofishing sites on Hixon Canyon and Grub Canyon (Tucannon River tributaries) in 2007.

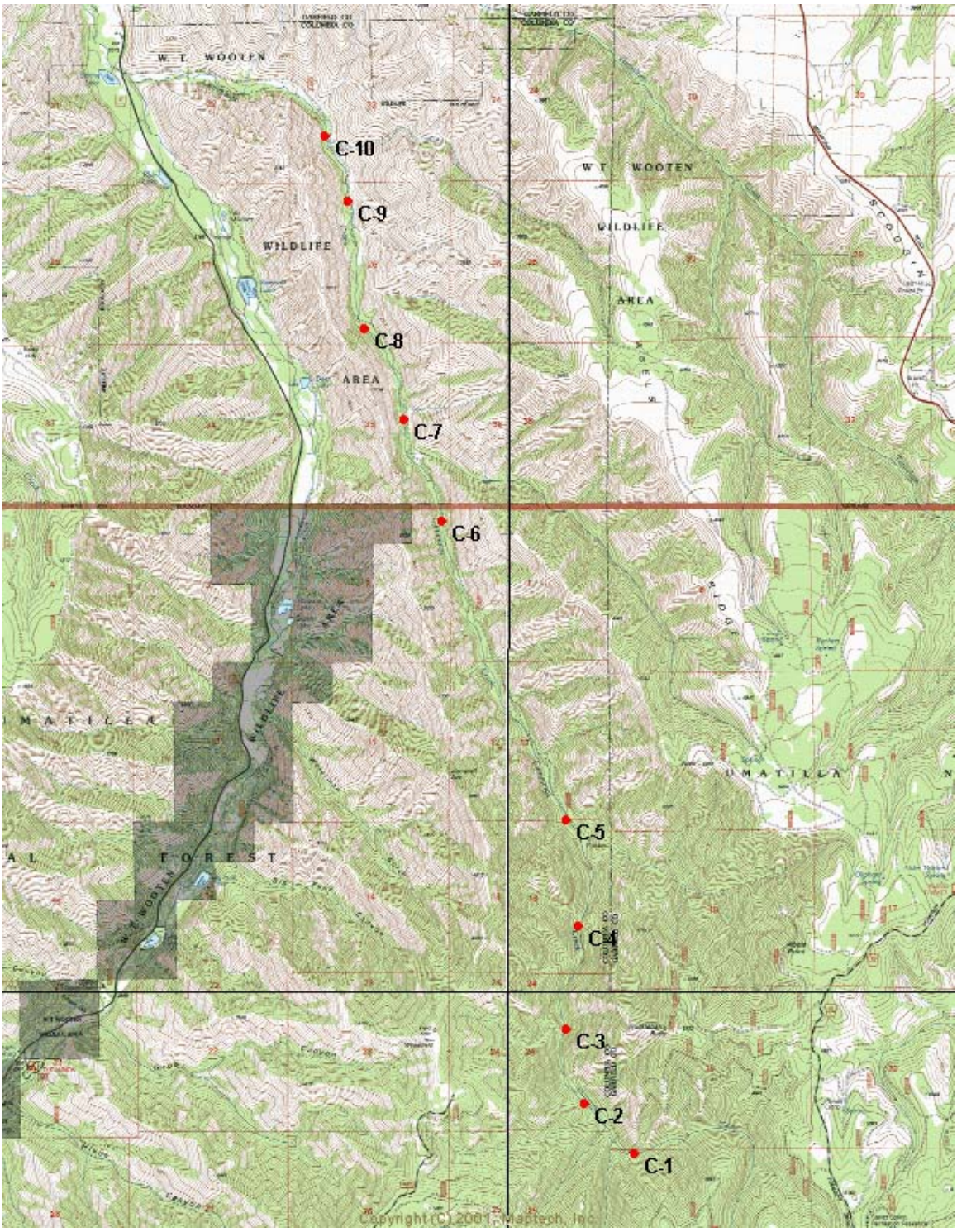

Figure 14. Electrofishing sites on Cummings Creek, 2006.

Table 17. Densities of salmonids from multiple pass quantitative electrofishing in Cummings Creek, 2006.

					Densities (#/100m^2)							
					rainbow/steelhead							
Stream Reach	Date	Site Length	Mean Width	Area	Age/Size					Age/Size		
Site Name	(mm/dd/yy)	(m)	(m)	(m^2)	0+	1+	≥8 in	Total	Other Species[a]	0+	1+	≥8 in
Cummings Creek												
CC-6	7/19/06	30.0	3.7	111.0	35.0	1.8	2.7	39.5				
CC-7	7/19/06	38.0	3.8	144.4	142.8	4.9	0.0	147.7				

Table 18. Relative abundance and distribution from electrofishing surveys in the Tucannon River and tributaries, 2006.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Tucannon River	TU-1 ~1.5 miles above mouth of Bear Ck.	7/17	68	4.7	319.6	5.6	Seven age 1+ BT (69-128mm)	0.0	2.2
	TU-2 ~1.2 miles above mouth of Bear Ck.	7/17	60	5.2	312.0	6.0	One age 0+ BT (36mm), 11 age 1+ BT (67-157mm)	0.0	3.8
	TU-3 ~0.8 miles above mouth of Bear Ck.	7/17	60	5.6	336.0	7.4	18 age 1+ BT (71-179mm)	0.0	5.4
	TU-4 ~0.4 miles above mouth of Bear Ck.	7/17	35	4.1	143.5	6.6	One age 0+ BT (36mm), six age 1+ BT (84-161mm)	0.0	4.9
	TU-5 ~0.1 miles below mouth of Bear Ck.	7/18	50	6.2	310.0	9.4	One RBT (no length or size class given), One age 1+ BT (130mm), one adult BT (490mm)	0.3	0.6
	TU-6 ~1.0 miles below mouth of Bear Ck.	7/18	42	6.0	252.0	9.4	One age 1+ RBT (180mm), one legal RBT (260mm), three age 0+ BT (37-38mm), two age 1+ BT (93-120mm), SCP-rare	0.8	2.0
	TU-7 ~2.0 miles below mouth of Bear Ck.	7/18	60	6.1	366.0	9.6	One age 1+ RBT (155mm), six age 1+ BT (98-175mm), SCP-rare	0.3	1.6
	TU-8 Mouth of Cold Ck.	7/18	30	8.4	252.0	10.1	Two age 1+ RBT (62-129mm), one age 0+ BT (46mm), SCP-common, TF-common	0.8	0.4
	TU-9 ~0.5 miles below mouth of Cold Ck.	7/18	30	8.2	246.0	10.1	10 age 1+ RBT (64-184mm), one age 1+ BT (92mm), SCP-common, TF-uncommon	4.1	0.4
	TU-10 ~1.2 miles below mouth of Cold Ck.	7/18	35	7.4	259.0	10.0	17 age 1+ RBT (64-189mm), SCP-common	6.6	0.0
Bear Ck.	BR-1 River mile 3.4	7/17	30	4.1	123.0	5.5	No fish found	0.0	0.0
	BR-2 River mile 3.4-just below site BR-1	7/17	34	3.7	125.8	5.3	Four age 1+ BT (118-144mm)	0.0	3.2

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.

Table 18. (Cont.) Relative abundance and distribution from electrofishing surveys in the Tucannon River and tributaries, 2006.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Bear Ck. (Cont.)	BR-3 River mile 2.5	7/17	41	2.7	110.7	6.1	One age 0+ BT (53mm), seven age 1+ BT (64-165mm)	0.0	7.2
	BR-4 River mile 2.1	7/17	30	4.1	123.0	5.5	Three age 1+ BT (133-169mm)	0.0	2.4
	BR-5 River mile 1.3	8/16	58	3.7	214.6	5.6	Three age 0+ BT (35-50mm), seven age 1+ BT (88-154mm)	0.0	4.7
	BR-6 River mile 1.0	8/16	60	4.9	294.0	7.9	Three age 0+ BT (38-44mm), nine age 1+ BT (74-156mm), one adult BT (237mm), TF-uncommon	0.0	4.4
	BR-7 River mile 0.7	8/16	57	5.0	285.0	6.0	Nine age 0+ BT (33-48mm), 11 age 1+ BT (78-128mm), TF-uncommon	0.0	7.0
	BR-8 River mile 0.3	8/16	60	4.8	288.0	5.6	Six age 0+ BT (37-43mm), 15 age 1+ BT (78-173mm), TF-rare	0.0	7.3
	BR-9 River mile 0.2	8/3	28	6.2	173.6	9.0	One age 0+ RBT (62mm), six age 0+ BT (33-39mm), two age 1+ BT (77-85mm)	0.6	4.6
Turkey Ck.	TK-1 ~0.5 miles above mouth	7/18	50	2.4	120.0	3.4	One age 1+ RBT (104mm), one age 0+ BT (55mm), one age 1+ BT (100mm), TF-uncommon	0.8	1.7
	TK-2 ~0.2 miles above mouth	7/18	50	3.4	170.0	4.3	One age 0+ RBT (67mm), one age 1+ RBT (93mm), one age 1+ BT (153mm), TF-uncommon	1.2	0.6
Panjab Ck.	PJ-1 ~0.5 miles above Turkey Ck. mouth	7/18	50	2.4	120.0	3.3	Two age 1+ RBT (98-118mm), one age 1+ BT (81mm), TF-common	1.7	0.8
	PJ-2 ~0.2 miles above Turkey Ck. mouth	7/18	45	2.2	99.0	3.3	One age 1+ BT (116mm), TF-uncommon	0.0	1.0
	PJ-3 ~0.2 miles below Turkey Ck. mouth	7/18	50	3.9	195.0	5.8	One age 0+ RBT (68mm), one age 1+ RBT (138mm), one age 0+ BT (32mm), two age 1+ BT (68-75mm), TF-common	1.0	1.5

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull trout ≥ 200mm in fork length are considered adults.

Table 18. (Cont.) Relative abundance and distribution from electrofishing surveys in the Tucannon River and tributaries, 2006.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m^2)	Ave. bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Panjab Ck. (Cont.)	PJ-4 ~0.8 miles below Turkey Ck. mouth	7/18	50	4.4	220.0	7.0	Two age 0+ RBT (61-63mm), five age 1+ RBT (128-178mm), one legal RBT (224mm), TF-rare	3.6	0.0
Meadow Ck.	MC-1 ~3.5 miles above Meadow Ck. Campground	7/17	50	3.9	195.0	5.6	One age 1+ RBT (134mm), five age 1+ BT (65-118mm), TF-rare	0.5	2.6
	MC-2 ~3.1 miles above Meadow Ck. Campground	7/17	50	5.4	270.0	6.9	Three age 1+ RBT (133-161mm), 10 age 1+ BT (75-125mm), TF-rare	1.1	3.7
	MC-3 ~2.6 miles above Meadow Ck. Campground	7/17	50	5.0	250.0	6.7	Two age 0+ RBT (58-67mm), two age 1+ RBT (94-135mm), two age 1+ BT (69-106mm), TF-common	1.6	0.8
	MC-4 ~2.1 miles above Meadow Ck. Campground	7/17	50	4.0	200.0	6.4	Six age 0+ RBT (54-74mm), four age 1+ RBT (83-147mm), one age 1+ BT (158mm), TF-common	5.0	0.5
	MC-5 ~1.7 miles above Meadow Ck. Campground	7/17	50	3.4	170.0	6.5	12 age 0+ RBT (57-75mm), seven age 1+ RBT (105-145mm), TF-common	11.2	0.0
	MC-6 ~1.2 miles above Meadow Ck. Campground	7/17	50	3.0	150.0	5.0	Six age 0+ RBT (58-72mm), one age 1+ RBT (150mm), six age 1+ BT (94-158mm), TF-common	4.7	4.0
Cummings Ck.	C-1 ~2.3 miles above the end of the road	8/7	47	1.7	79.9	2.3	Eight age 1+ RBT (80-145mm)	10.0	0.0
	C-2 ~1.8 miles above the end of the road	8/7	48	2.6	124.8	6.3	Three age 1+ RBT (142-170mm)	2.4	0.0
	C-3 ~1.3 miles above the end of the road	8/7	55	3.4	187.0	4.7	19 age 1+ RBT (78-157mm)	10.2	0.0
	C-4 ~0.6 miles above the end of the road	8/7	51	3.5	178.5	4.8	11 age 0+ RBT (38-45mm), 15 age 1+ RBT (77-190mm), one age 1+ BT (110mm), SCP-rare	14.6	0.6
	C-5 ~0.1 miles below the end of the road	8/7	50	3.3	165	4.6	10 age 0+ RBT (33-72mm), 14 age 1+ RBT (80-175mm), SCP-common	14.5	0.0

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101. Size/age class based on fish length. Bull trout ≥ 200mm in fork length are considered adults.

Table 18. (Cont.) Relative abundance and distribution from electrofishing surveys in the Tucannon River and tributaries, 2006.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Cummings Ck. (cont.)	C-8 ~2.9 miles above the gate on Cummings Ck.	7/19	50	3.3	165	5.0	46 age 0+ RBT (38-63mm), 16 age 1+ RBT (80-187mm), SCP-common, CF-present	37.6	0.0
	C-9 ~2.0 miles above the gate on Cummings Ck.	7/19	50	3.4	170	4.9	41 age 0+ RBT (30-61mm), 14 age 1+ RBT (93-157mm), SCP-common	32.4	0.0
	C-10 ~1.6 miles above the gate on Cummings Ck.	7/19	50	3.5	175	7.2	17 age 0+ RBT (28-54mm), 12 age 1+ RBT (93-180mm), one age 0+ WCH (65mm), SCP-common	16.6	0.0

[a] BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101. Size/age class based on fish length. Bull trout ≥ 200mm in fork length are considered adults.

Table 19. Relative abundance and distribution from electrofishing surveys in the Tucannon River and tributaries, 2007.

Stream	Site #	Date	Site Length (m)	Ave. width (m)	Area (m^2)	Ave. Bankfull width (m)	Relative Abundance by size/age class[a]	Number of Rainbows/ $100m^2$	Number of Bull Trout/ $100m^2$
Hixon Canyon	H-1 ~67 meters below forks in section 28	7/10	21.0	1.0	21.0	N/A	No salmonids found. TF-rare	0.0	0.0
	H-2 0.5 miles above logging road culvert	7/10	35.0	1.2	42.0	N/A	No fish found.	0.0	0.0
	H-3 0.3 miles above logging road culvert	7/10	32.0	1.1	35.2	N/A	Six age 1+ RBT (75-141mm).	17.0	0.0
Grub Canyon[b]	G-1 River mile 0.5	7/10	37.0	1.8	66.6	N/A	One age 0+ RBT (30mm), 16 age 1+ RBT (95-162mm), one legal RBT (208mm). CF-rare	27.0	0.0
	G-2 River mile 0.2	7/10	33.0	1.8	59.4	N/A	Two age 0+ RBT (41-43mm), one age 1+ RBT (170mm). CF-uncommon	5.1	0.0
	G-3 River mile 0.1	7/10	35.0	2.3	80.5	N/A	Two age 1+ RBT (137-186mm), two legal RBT (208mm).	5.0	0.0

[a] BT=bull trout, RBT=rainbow trout, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish
Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101, Size/age class is based on fish length. Bull Trout ≥ 200mm in fork length are considered adults.
[b] All fish in Grub Canyon over 165mm were all left green elastomer tagged fish.

Bull Trout Spawning Surveys

No bull trout surveys were conducted in the Tucannon River drainage in 2006, because of the Columbia Complex Fire.

Bull trout spawning surveys covered 14.0 miles in the Tucannon River watershed in 2007 (Table 20). Most areas surveyed are considered index areas. They were generally surveyed three times; 23 redds and 4 live bull trout were observed. One survey was added early in the season on lower Meadow Creek and lower Panjab Creek to look for spawning and to assess any possible barriers to fish migration. This lower area has a recent history of many man-made dams and blocked fish passage. This lower river survey was to ensure passage and to help us evaluate the index spawning surveys upstream.

The total redds observed in the upper Tucannon and Bear Creek is the lowest that we have documented since 1990 (Table 21). In the Panjab/Meadow Creek basin this was the lowest redd count since 2000 (when only a small section of Meadow Creek was surveyed), but may be more comparable to the low numbers seen in 1997 (Table 22). Please refer to my email and bull trout alert sent to USFWS and USFS for more discussion here.

Table 20. Bull trout spawning survey summary for the Tucannon River Watershed, 2007.

Reach/ Date	Survey	Stream Section[a]	Surveyed Miles	Redds	Redds per mile	Fish Observed	
Tucannon River						Live	Dead
9/11	1	(A) River mile 56.2 to river mile 52.6	3.6	3	0.8	2	0
9/25	2	(A) River mile 56.2 to river mile 52.6	3.6	9	2.5	0	0
10/9	3	(A) River mile 56.2 to river mile 52.6	3.6	1	0.3	0	0
		Total	**3.6**	**13**	**3.6**	**2**	**0**
Bear Creek							
9/11	1	(B) River mile 1.9 to river mile 0.0	1.9	4	2.1	0	0
9/25	2	(B) River mile 1.9 to river mile 0.0	1.9	0	0.0	0	0
10/9	3	(B) River mile 1.9 to river mile 0.0	1.9	0	0.0	0	0
		Total	**1.9**	**4**	**2.1**	**0**	**0**
Meadow Creek							
9/13	1	(C) River mile 4.9 to river mile 1.3	3.6	4	1.1	2	0
9/13	1	(D) River mile 1.3 to river mile 0.0	1.3	0	0.0	0	0
9/27	2	(C) River mile 4.9 to river mile 1.3	3.6	1	0.3	0	0
10/11	3	(C) River mile 4.9 to river mile 1.3	3.6	0	0.0	0	0
		Total	**4.9**	**5**	**1.0**	**2**	**0**
Panjab Creek							
9/13	1	(E) River mile 3.6 to river mile 2.1	1.5	0	0.0	0	0
9/13	1	(F) River mile 2.1 to river mile 0.0	2.1	0	0.0	0	0
9/27	2	(E) River mile 3.6 to river mile 2.1	1.5	1	0.7	0	0
10/11	3	(E) River mile 3.6 to river mile 2.1	1.5	0	0.0	0	0
		Total	**3.6**	**1**	**0.3**	**0**	**0**

[a] A: Mouth of Bear Ck. to mouth of Sheep Ck., B: Forks in NE ¼ of section 29 to mouth of Bear Ck., C: Forks to Meadow Ck. campground, D: Meadow Ck. campground to mouth, E: Turkey Creek mouth to Meadow Ck mouth, F: Mouth of Meadow Ck. to mouth.

Table 21. Bull trout spawning survey summary with redd counts (number of times surveyed) for the Tucannon River and three tributaries, 1990-2007.

	Reach Surveyed[a]																	
	Tucannon			Bear Creek			Right Bank Fork to Bear Ck.	Tucannon				Sheep Creek	Cold Creek	Tucannon			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
Year	RM 60.4-58.4	RM 58.4-56.8	RM 56.8-56.2	RM 0.0-1.0	RM 1.0-1.9	RM 1.9-2.6	RM 0.4-0.0	RM 56.2-55.4	RM 55.4-54.7	RM 54.7-54.0	RM 54.0-52.6	RM 0.0-0.6	RM 0.0-0.8	RM 52.6-50.0	RM 50.0-47.2	RM 47.2-46.3	Total Redds
1990[b]								21(1)	0(1)	32(6)	9(6)			1(6)			63
1991[b]			11(4)					21(4)	5(5)	10(5)	11(5)						58
1992[b]			9(4)					41(4)		12(4)	4(4)						66
1993[c]																	0
1994[d]				10(3)				99(3)[f]						22(3)			131
1995[d]				5(1)				63(1)[f]						37(1)			105
1996[d]		31(1)	21(3)	25(3)				78(2)						15(2)			170
1997[d]		11(1)	2(1)	23(1)				25(1)						13(3)			74
1998[d]				4(1)				78(2)[f]						10(2)	16(2)	0(1)	108
1999[d]		36(1)	6(3)	26(1)				57(3)				2(1)	2(1)	24(1)	12(1)		165
2000[e]	26(1)			49(2)				52(2)						11(1)	3(1)	3(1)	144
2001[d]								68(2)									68
2002[e]	11(1)		3(1)	32(2)				20(1)						10(1)	3(1)		79
2003[e]	59(3)			49(3)				37(5)						26(2)			171
2004[e]	36(3)			51(3)			5(1)	55(4)				4(2)	0(2)	34(5)			185
2005[e]				47(3)[g]		1(2)		63(3)						23(4)[h]			134
2006[c]																	0
2007[e]				4(3)				13(3)									17

[a] A: Jeffereys Spring to Buckley Ck, B: Buckley Ck. to Jelly Spring, C: Jelly Spring to Bear Ck, D: Mouth to river mile (RM) 1.0, E: RM 1.0 to lower forks, F: Lower forks to upper forks, G: Right bank fork river mile 0.4 to mouth, H: Bear Ck. to 3/4 mi. below Bear Ck, I: 3/4 mi. below Bear Ck. to Tinman Camp, J: Tinman Camp to Rucherts Camp, K: Rucherts Camp to Sheep Ck, L: Mouth to falls, M: Mouth to first large spring, N: Sheep Ck. to Ladybug Flat Campground, O: Ladybug Flat Campground to Panjab Br., P: Panjab Br. to Cowcamp Br.

[b] Surveys conducted by Martin and Underwood.

[c] No surveys.

[d] Surveys conducted by US Forest Service Personnel.

[e] Surveys conducted by WDFW Fish Management Personnel.

[f] Includes redds from section C.

[g] Survey actually stopped at river mile 1.4 the third walk due to large impassable beaver dam.

[h] All redds observed and noted during spring chinook surveys by Snake River Lab personnel in 2005, they have also contributed to redd counts in this section in previous years.

Table 22. Bull trout spawning survey summary with redd counts (number of times surveyed) for the Panjab and Meadow Creek basins, 1995-2007.

	Reach Surveyed[a]													
	Panjab Creek					Meadow Creek					Turkey Creek	Turkey Tail		
	A	B	C	D	E	F	G	H	I	J	K	L	M	
Year	RM 4.5-3.9	RM 3.9-3.6	RM 3.6-3.3	RM 3.3-2.1	RM 2.1-0.0	RM 4.9-4.0	RM 4.0-2.2	RM 2.2-1.3	RM 1.3-1.0	RM 1.0-0.0	RM 2.1-0.0	RM 3.4-2.8	RM 2.8-0.0	Total Redds
1995[b]					7(1)					2(1)				9
1996[b]					9(1)					5(1)				14
1997[b]				2(2)	2(1)		0(2)							4
1998[b]					0(1)					0(1)				0
1999[c]		9(1)		6(1)	1(1)	25(1)			0(1)		8(1)	8(1)		57
2000[c]								7(1)						7
2001[d]														0
2002[c]			3(2)		0(2)			8(2)	0(2)					11
2003[c]			6(3)		5(3)	3(3)			0(3)		3(1)		0(1)	17
2004[c]	19(4)				0(2)	19(4)			1(2)		6(4)			45
2005[c]			0(2)			8(3)			5(2)					13
2006[d]														0
2007[c]			1(3)		0(1)	5(3)			0(1)					6

[a] A: river mile (RM) 4.5 to RM 3.9, B: RM 3.9 to mouth of Turkey Ck, C: Mouth of Turkey Ck. to trail crossing, D: Trail crossing to mouth of Meadow Ck, E: Mouth of Meadow Ck. to mouth, F: Forks to RM 4.0, G: RM 4.0 to RM 2.2, H: RM 2.2 to Meadow Ck. Campground, I: Meadow Ck. Campground to RM 1.0, J: RM 1.0 to mouth, K: Forks to mouth, L: RM 3.4 to RM 2.8, M: RM 2.8 to mouth.

[b] Surveys conducted by US Forest Service Personnel.

[c] Surveys conducted by WDFW Fish Management Personnel.

[d] No survey done.

Tissue Sampling

Fin clips were collected from a total of 212 salmonids in this study area in 2006 (Table 23). These samples were collected during electrofishing surveys as follows, 104 juvenile bull trout, 104 juvenile rainbow/steelhead and four legal size rainbow/steelhead. The following numbers of bull trout fin clips were collected from these streams; 36 from the Tucannon River, 45 from Bear Creek, 16 from Meadow Creek, 2 from Turkey Creek, 4 from Panjab Creek, and 1 from Cummings Creek (2004). The following numbers of rainbow/steelhead samples were collected from these streams; 26 juvenile and one legal from the Tucannon River, 1 juvenile from Bear Creek, 28 juveniles from Meadow Creek, 3 juveniles from Turkey Creek, 11 juveniles from Panjab Creek, and 35 juveniles and three legal size from Cummings Creek (Table 23). PIT tags were also implanted in 92 bull trout during sampling efforts in order to assist the USFWS and USACE with an ongoing study of bull trout movement from the Tucannon River into the Snake River.

No tissue samples were collected in this study area in 2007.

Table 23. Tissue samples collected in the Tucannon River subbasin, 2006.

Stream	# of Bull Trout fin clips	# of Bull Trout fin clips within protocol	# of Bull Trout scale samples	# of Rainbow/ Steelhead fin clips	# of Rainbow/ Steelhead fin clips within protocol	# of Rainbow/ Steelhead scale samples
Tucannon River above Bear Creek	25	18	26	0	0	0
Bear Creek	45	27	32	1	0	0
Tucannon from Bear Creek to Sheep Creek	10	5	10	3	0	3
Tucannon from Sheep Creek to Ladybug Flat Campground	1	1	1	24	11	13
Meadow Creek	16	16	17	28	16	28
Turkey Creek	2	2	2	3	1	3
Panjab Creek	4	4	4	11	5	11
Cummings Creek	1	1	1	38	18	52
Totals	**104**	**74**	**93**	**108**	**51**	**110**

Stream Profiles of the Tucannon River Subbasin

Tucannon River

The joint electrofishing sampling by the WDFW and USFWS that was conducted in 2005 (Mendel et al. 2006) was continued in 2006. Sampling included the Tucannon River (three sections), Bear Creek, Turkey Creek, Panjab Creek, Meadow Creek, and Cummings Creek. The USFWS conducted sampling in the upper portions of the basin to PIT tag bull trout. Data collected by the USFWS in 2007 is not included here.

Upper Tucannon River (Buckley Ridge to Bear Creek)

Four electrofishing surveys were conducted on the upper Tucannon River (above Bear Creek) on July 17th, 2006 (Table 18, Photos 215 and 216). We sampled two age 0+ and 42 age 1+ bull trout. No other salmonids were observed, but we did sample low numbers of tailed frogs at each site.

During our electrofishing surveys stream temperature ranged from 51-52°F and the average stream width was 4.90 meters. Habitat conditions for this section of the Tucannon River were described in Mendel et al. 2006.

Photo 215. Tucannon River above Bear Creek juvenile bull trout, July 2006.

Photo 216. Tucannon River above Bear Creek juvenile bull trout, July 2006.

Bear Creek

Bear Creek was sampled multiple times in 2006. On July 17th, WDFW and USFWS staff dropped in from the headwaters and sampled four sites between river mile 3.4 and 2.1. This sampling effort was higher in the basin than anticipated, and above a barrier falls. Only 15 bull trout were captured during these surveys. WDFW returned on August 3rd to attempt to collect more bull trout genetic samples, but only one site was completed due to an equipment malfunction (Photos 217 and 218). Eight juvenile bull trout and one juvenile rainbow/steelhead were collected from the site. WDFW again returned on August 16th to finish collection of bull trout genetic samples. On this last trip four electrofishing sites were completed and 64 bull trout were handled (21 age 0+, 42 age 1+, and one adult).

Three bull trout spawning surveys were conducted from the forks at river mile 1.9 to the mouth in 2007 (Photos 219-223). Surveys were conducted on September 11th and 25th and October 9th. Only four redds were found during these surveys (Table 20). This is the lowest total since 1998 when four redds were found during one survey of the lowest mile of Bear Creek (Table 21). Check this against my memo and ensure it is correct.

The area sampled on July 17th was upstream of any prior sampling conducted on Bear Creek and was all above a barrier falls. The area consisted of a dense, mature riparian overstory (spruce, larch, and white fir), high amounts of LWD and good bank stability. The substrate in the upper two sites was medium to large cobble, while in the lower two sites it was small to medium cobble with gravel noted in the tailouts of pools in the lowest site. Sedimentation was low in all sites, with some small accumulations in pools. The area sampled on August 3rd and 16th was within the area sampled and described in 2005 (Mendel et al. 2006). The top four electrofishing sites on Bear Creek had temperatures ranging from 47-51°F and an average width of 3.15 meters. The bottom five electrofishing sites had a temperature range of 46-50°F and an average stream width of 4.92 meters.

Photo 217. Bear Creek ~0.2 miles above mouth looking upstream (BR-9), August 2006.

Photo 218. Bear Creek ~0.2 miles above mouth looking downstream (BR-9), August 2006.

Photo 219. Old beaver dam on Bear Creek, September 2007. (Note water flows out under logs on left side of photo.)

Photo 220. Old beaver dam on Bear Creek, September 2007. (Note water flowing on right side of photo.)

Photo 221. Bull trout redd found in Bear Creek ~1.4 miles above the mouth, September 2007.

Photo 222. Bull trout redd found in Bear Creek ~1.3 miles above the mouth, September 2007.

Photo 223. Bull trout redd found in Bear Creek ~1.0 mile above the mouth, September 2007.

Tucannon River (Bear Creek to Sheep Creek)

Electrofishing surveys were conducted at three sites in the Tucannon River between the mouths of Bear Creek and Sheep Creek on July 18th 2006. Low numbers of rainbow/steelhead and bull trout were found in this reach. A total of four rainbow/steelhead (two age 1+, one legal, and one of unknown size) and 13 bull trout (three age 0+, nine age 1+, and one adult) were collected at these sites.

Three bull trout spawning surveys were conducted from the mouth of Bear Creek to the mouth of Sheep Creek on the Tucannon River in 2007. Thirteen redds were found during the three surveys (Table 20, Photo 224). This is the lowest total that has been documented since surveys began in 1990 (Table 21). A large beaver dam was found in 2007 in this section, but it is unclear whether this had an impact on spawning distribution or not (Photos 225- 228). WDFW sent a memo to the USFWS and USFS concerning the dramatic declines in bull trout seen at the fish hatchery trap, and redd numbers in 2007 (Mendel, 2007).

A temperature range of 48-52°F and an average width of 6.10 meters was collected from electrofishing surveys in this section. Habitat conditions for this area of the Tucannon River were described in Mendel et al. 2006.

Photo 224. Bull trout redd found in the Tucannon River ~1.8 miles above Sheep Creek, September 2007.

Photo 225. Looking downstream at large pool created by beaver dam on Tucannon River, September 2007.

Photo 226. Left bank of main channel showing part of beaver dam, September 2007.

Photo 227. Center of main channel showing part of beaver dam, September 2007.

Photo 228. Looking upstream at flooded area on left bank above beaver dam, September 2007.

Tucannon River (Sheep Creek to Ladybug Flat Campground)

Electrofishing surveys were conducted at three sites in the Tucannon River between the mouth of Sheep Creek and Ladybug Flat Campground. Two salmonid species (bull trout and rainbow/steelhead) and two other species (sculpin and tailed frogs) were observed during these surveys. Age 1+ rainbow/steelhead were the most common, with 29 being observed, while only one age 0+ and one age 1+ bull trout were observed (Table 18).

This section of the Tucannon River from Sheep Creek to Ladybug Flat Campground had a temperature range of 50-54°F and an average stream width of 8.00 meters. This area was sampled and described as part of the sampling conducted in 2005 (Mendel et al. 2006).

Turkey Creek

Two electrofishing surveys were conducted in the lowest 0.5 mile of Turkey Creek on July 18th, 2006 (Photos 229-232). Three rainbow/steelhead and three bull trout were observed during the surveys, along with low numbers of tailed frogs (Table 18).

Stream width on Turkey Creek averaged 2.90 meters and temperatures ranged from 47-48°F. This area was sampled and described as part of the sampling conducted in 2005 (Mendel et al. 2006).

Photo 229. Turkey Creek ~0.5 mile above mouth looking upstream (TK-1), July 2006.

Photo 230. Turkey Creek ~0.5 mile above mouth looking downstream (TK-1), July 2006.

Photo 231. Turkey Creek ~0.2 mile above mouth looking upstream (TK-2), July 2006.

Photo 232. Turkey Creek ~0.2 mile above mouth looking downstream (TK-2), July 2006.

Panjab Creek

Four surveys above the mouth of Meadow Creek were also conducted on Panjab Creek on July 18th, 2006, (Photos 233-240). Thirteen rainbow/steelhead (three age 0+, nine age 1+, and 1 legal) and five bull trout (two age 0+, and three age 1+) were sampled (Table 18). Tailed frogs were also found in varying numbers at all four sites.

Bull trout surveys were conducted three times from the mouth of Turkey Creek to the mouth of Meadow Creek, and once from the mouth of Meadow Creek to the mouth of Panjab in 2007. Only one redd and no live fish were observed during these surveys (Table 20).

Panjab Creek above Turkey Creek had an average width of 2.30 meters and temperatures from 52-54°F, while below Turkey Creek average width was 4.15 meters and temperatures ranged from 50-54°F. The habitat conditions on this section of Panjab Creek were described in Mendel et al. 2006.

Photo 233. Panjab Creek ~0.5 mile above Turkey Creek mouth looking upstream (PJ-1), July 2006.

Photo 234. Panjab Creek ~0.5 mile above Turkey Creek mouth looking downstream (PJ-1), July 2006.

Photo 235. Panjab Creek ~0.2 mile above Turkey Creek mouth looking upstream (PJ-2), July 2006.

Photo 236. Panjab Creek ~0.2 mile above Turkey Creek mouth looking downstream (PJ-2), July 2006.

Photo 237. Panjab Creek ~0.2 mile below Turkey Creek mouth looking upstream (PJ-3), July 2006.

Photo 238. Panjab Creek ~0.2 mile below Turkey Creek mouth looking downstream (PJ-3), July 2006.

Photo 239. Panjab Creek ~0.8 mile below Turkey Creek mouth looking upstream (PJ-4), July 2006.

Photo 240. Panjab Creek ~0.8 mile below Turkey Creek mouth looking downstream (PJ-4), July 2006.

Meadow Creek

Two age groups of rainbow/steelhead (26 age 0+ and 18 age 1+) and one age group of bull trout (24 age 1+) were found during the surveys at six sites in Meadow Creek on July 17th, 2006 (Table 18, Photos 241-250).

Meadow Creek was surveyed three times from the forks (river mile 4.9) to the Meadow Creek campground and once from the campground down to the mouth in 2007. Surveys found five redds and two live fish, all in the upper survey section (Table 20). Two small man-made dams

were also found and notched for fish passage (Photos 251-254). A cooperative process between Dayton High School, USFS, NRCS and WDFW allowed a student at the high school to remove recreational dams in the Tucannon River basin as his senior project.

Electrofishing surveys showed Meadow Creek with an average width of 4.12 meters and temperatures ranging from 46-55°F. Habitat conditions for this section were collected during electrofishing and bull trout spawning surveys in 2005 (Mendel et al. 2006).

Photo 241. Meadow Creek ~3.5 miles above Meadow Creek campground looking upstream (MC-1), July 2006.

Photo 242. Meadow Creek ~3.5 miles above Meadow Creek campground looking downstream (MC-1), July 2006.

Photo 243. Meadow Creek ~3.1 miles above Meadow Creek campground looking upstream (MC-2), July 2006.

Photo 244. Meadow Creek ~3.1 miles above Meadow Creek campground looking downstream (MC-2), July 2006.

Photo 245. Meadow Creek ~2.6 miles above Meadow Creek campground looking upstream (MC-3), July 2006.

Photo 246. Meadow Creek ~2.6 miles above Meadow Creek campground looking downstream (MC-3), July 2006.

Photo 247. Meadow Creek ~2.1 miles above Meadow Creek campground looking upstream (MC-4), July 2006.

Photo 248. Meadow Creek ~2.1 miles above Meadow Creek campground looking downstream (MC-4), July 2006.

Photo 249. Meadow Creek ~1.2 miles above Meadow Creek campground looking upstream (MC-6), July 2006.

Photo 250. Meadow Creek ~1.2 miles above Meadow Creek campground looking downstream (MC-6), July 2006.

Photo 251. Upper man-made dam on Meadow Creek, September 2007.

Photo 252. Upper man-made dam on Meadow Creek after it had been notched for fish passage, September 2007.

Photo 253. Lower man-made dam on Meadow Creek, September 2007.

Photo 254. Lower man-made dam on Meadow Creek after it had been notched for fish passage, September 2007.

Hixon Canyon

Three electrofishing surveys were conducted on Hixon Canyon on July 10th, 2007 (Table 19, Photo 255 and 256). Surveys were conducted in the lower 1.2 miles of stream to assess salmonid distribution and abundance. Six rainbow/steelhead were found at the lowest site, but no other fish were found.

The stream consisted of 90-100% riffle and plunge pool at all three sites, small to large cobble, heavy sediment, fair bank stability and good amounts of LWD. Average width of Hixon Canyon was 1.10 meters and temperatures ranged from 53-54°F. The middle site had a good riparian vegetation, while the upper and lower sites had dead standing burned trees with tall grass and brush understory. This area was severely burned during the School Fire in 2005.

Photo 255. Hixon Canyon 0.3 mile above logging road culvert (H-3), July 2007.

Photo 256. Hixon Canyon 0.3 mile above logging road culvert looking up canyon (H-3), July 2007.

Grub Canyon

Electrofishing surveys were conducted at three sites on July 10th, 2007 (Photos 257-265). These surveys were done to assess salmonid distribution and abundance. Rainbow/steelhead were found at all three sites with rough densities from qualitative sites at 5.0 to 27.0 fish/100m^2 (Table 19). Five fish of over 165mm FL were captured during these surveys. All of them were left green elastomer tagged fish from the endemic hatchery steelhead program.

Habitat conditions in Grub Canyon varied widely depending on site location. Riparian vegetation at the top site had been highly affected by the 2005 School Fire and was now mostly grass and weeds, but riparian was fair to good at the other two sites. Grub Canyon had and average width of 1.97 meters and temperatures ranged from 57-61°F. Substrate varied from mud up to large cobble, bank stability was fair at all sites, and sediment was moderate to heavy.

Photo 257. 162 mm rainbow/steelhead found in Grub Canyon at river mile 0.5 (G-1), July 2007.

Photo 258. Grub Canyon at river mile 0.5 looking upstream (G-1), riparian vegetation burned in the 2005 School Fire, July 2007.

Photo 259. Grub Canyon at river mile 0.5 (G-1), July 2007.

Photo 260. Grub Canyon at river mile 0.5 looking riparian trees burned in the 2005 School Fire (G-1), July 2007.

Photo 261. Grub Canyon at river mile 0.2 looking upstream (G-2), July 2007.

Photo 262. Grub Canyon at river mile 0.2 looking downstream (G-2), July 2007.

Photo 263. Grub Canyon at river mile 0.1 looking at pool above debris jam (G-3), July 2007.

Photo 264. Grub Canyon at river mile 0.1 looking upstream (G-3), July 2007.

Photo 265. Mouth of Grub Canyon as it enters the Tucannon River, July 2007.

Cummings Creek

Two days of electrofishing surveys were conducted on Cummings Creek in 2006 (Photos 266-289). The first set of surveys was conducted on July 19th. They were from the ~4.3 miles above the gate (near the mouth) to ~1.6 miles above the gate. There were five surveys conducted in the first set consisting of two quantitative and three qualitative sites (Tables 17 and 18). No bull trout were observed in this first set of surveys but large numbers of juvenile rainbow/steelhead (especially age 0+) were found (Table 18). We also observed one age 0+ chinook in the lowest site. Total densities for rainbow/steelhead from the two qualitative sites were 39.5 and 147.7 fish/100m^2 with 0+ densities at 35.0 and 142.8 fish/100m^2 (Table 17). In the qualitative sites we observed 104 age 0+ and 42 age 1+ rainbow/steelhead, and one age 0+ chinook. The second set of electrofishing surveys consisted of five sites in upper Cummings Creek sampled on August 7th, 2006 (Table 18). Age 1+ rainbow/steelhead dominated at all sites, followed by age 0+ rainbow/steelhead, and one age 1+ bull trout was found at one site. A total of 44 rainbow/steelhead and one bull trout were observed, along with some sculpin at the lowest two sites.

Habitat conditions were described for Cummings Creek in Mendel et al. 2006. The top four electrofishing sites on Cummings Creek had an average stream width of 2.80 meters and temperatures ranging from 54-57°F, while the lower six sites had and average width of 3.50 meters and temperatures ranging between 60-69°F.

Photo 266. Cummings Creek legal size rainbow/steelhead, July 2006.

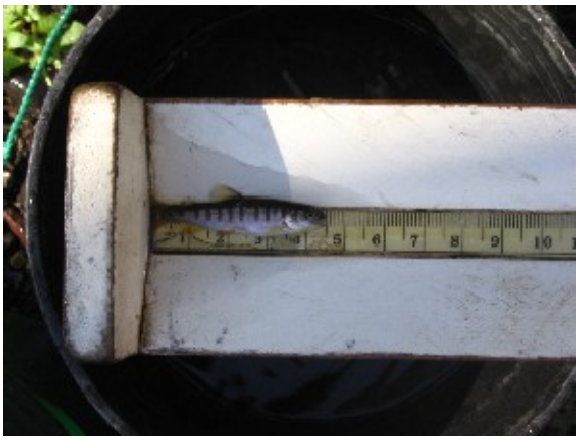

Photo 267. Cummings Creek juvenile rainbow/steelhead, July 2006.

Photo 268. Cummings Creek ~2.3 miles above the end of the road looking upstream (C-1), August 2006.

Photo 269. Cummings Creek ~2.3 miles above the end of the road looking downstream (C-1), August 2006.

Photo 270. Cummings Creek ~1.8 miles above the end of the road looking upstream (C-2), August 2006.

Photo 271. Cummings Creek ~1.8 miles above the end of the road looking downstream (C-2), August 2006.

Photo 272. Cummings Creek ~1.3 miles above the end of the road looking upstream (C-3), August 2006.

Photo 273. Cummings Creek ~1.3 miles above the end of the road looking downstream (C-3), August 2006.

Photo 274. Cummings Creek burned riparian area ~1.3 miles above the end of the road (C-3), August 2006.

Photo 275. Cummings Creek ~0.6 mile above the end of the road looking upstream (C-4), August 2006.

Photo 276. Cummings Creek ~0.6 mile above the end of the road looking downstream (C-4), August 2006.

Photo 277. Cummings Creek ~0.1 mile below the end of the road looking upstream (C-5), August 2006.

Photo 278. Cummings Creek ~0.1mile below the end of the road looking downstream (C-5), August 2006.

Photo 279. Cummings Creek burned area near river mile 5.0, August 2006.

Photo 280. Cummings Creek ~4.3 miles above the gate looking upstream (C-6), July 2006.

Photo 281. Cummings Creek ~4.3 miles above the gate looking downstream (C-6), July 2006.

Photo 282. Cummings Creek ~3.6 miles above the gate looking upstream (C-7), July 2006.

Photo 283. Cummings Creek ~3.6 miles above the gate looking downstream (C-7), July 2006.

Photo 284. Cummings Creek ~2.9 miles above the gate looking upstream (C-8), July 2006.

Photo 285. Cummings Creek ~2.9 miles above the gate looking downstream, (C-8), July 2006.

Photo 286. Cummings Creek ~2.0 miles above the gate looking upstream (C-9), July 2006.

Photo 287. Cummings Creek ~2.0 miles above the gate looking downstream (C-9), July 2006.

Photo 288. Cummings Creek ~1.6 miles above the gate looking upstream (C-10), July 2006.

Photo 289. Cummings Creek ~1.6 miles above the gate looking downstream (C-10), July 2006.

Tumalum Creek

Two tours were taken on portions of Tumalum Creek in 2007. The first tour was a walking survey in May. It began on the upper portion of East Fork Tumalum on USFS property and continued downstream into WDFW's WT Wooten Wildlife Area (Figure 15). The second tour was a vehicle and walking tour with the Pomeroy Conservation District on lower Tumalum Creek. The Conservation District secured access on private land.

On May 17, 2007, we surveyed the East Fork of Tumalum Creek within the School Fire (2005) area to evaluate regrowth after the fire and stream habitat conditions. We dropped off the ridge and entered a small tributary canyon off the East Fork of Tumalum Creek. When we first encountered the channel it was dry, but shortly downstream we began to find water (Site 1, on Figure 15). Within a short distance the stream began to look like good fish habitat (Photos 290 and 291) near the confluence of this small tributary and the East Fork Tumalum. The East Fork

had ¾ or more of the total stream flow. The first fish was seen at Site 2, below the confluence of these streams. Brief glimpses of several trout were noted as we progressed downstream. A photo was taken of a 5-6 inch trout in a pool with woody debris (Photo 292). About 50 ft. above this site we had seen several small, likely, resident trout redds, and possibly one old steelhead redd. Site 3 is the USFS boundary and fence line. Site 4 is where a stream ford was used during fence building. Regrowth of grasses and brush was impressive after the School Fire of 2005. Dense stands of grass existed and brush was resprouting in abundance. No trees survived.

Photo 293 is a stream section along an old road that constrains the creek. Here the creek channel is straight and relatively simple, with larger cobbles. Photo 294 shows a nearby logjam, just upstream of Photo 293. Trout were commonly observed (may be 15-25 total so far), and 3-4 resident trout redds were seen that were new. Another 3-6 possible redds were noted that appeared older (but too old to be positive they were redds). At Site 5, we noted some alders that had survived the fire along the creek. Upstream of that point we had not seen any live trees or new tree growth anywhere. Two new resident trout redds that were about 8-10 inches across were noted here. We watched for several minutes as two trout actively spawned and were building a redd in the tail-out of a pool. At Site 6, two trout were observed and photographed spawning at the tail-out of a pool (Photos 296 and 297). Downstream we observed many other resident trout redds and fish (at every pool tail-out). In the vicinity of Site 7 there was a lack of woody debris in the stream and very few pools. At the confluence of the East and West Forks the flow appeared to be about equal from each fork. We ascended the ridge on the east side of the confluence to the spur road off the Mountain Road to return to the vehicle. Additional surveys are recommended in the West Fork, upstream of our contact with the East Fork, and downstream of the confluence to evaluate fish use and habitat conditions in those areas.

Throughout the surveyed area we observed good, dense, grass growth with much of the grass about waist deep. We also saw many brush species that were regrowing. No live trees were seen upstream of Site 5. Below there the riparian vegetation was generally in good condition (lightly burned, if at all). Tree planting should include additions to the riparian vegetation upstream of Site 5, along both forks for several miles.

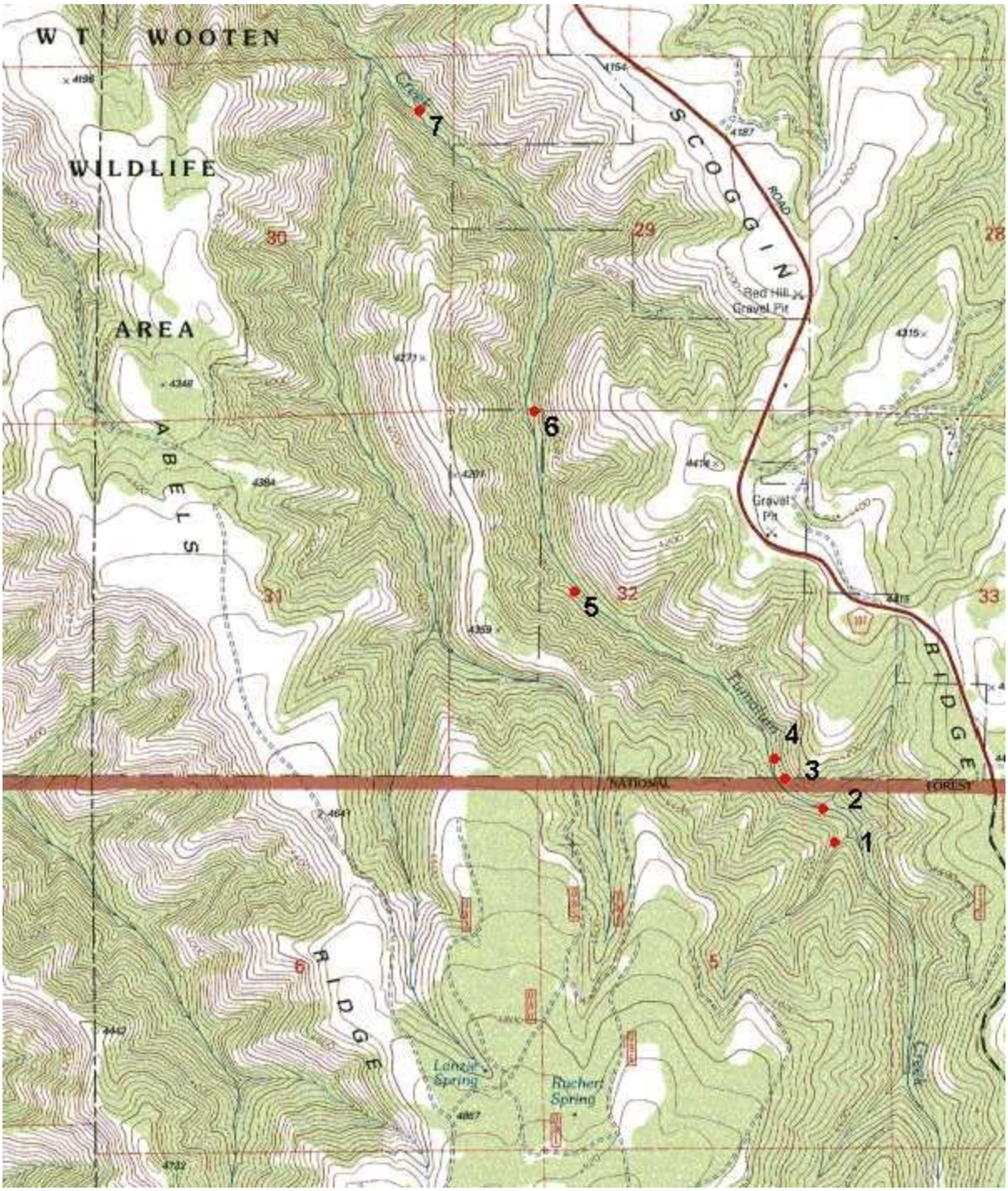

Figure 15. Site locations and survey area on East Fork of Tumalum Creek.

Photo 290. Large woody debris (with Dave Karl) and stream condition in the upper portion of the East Tumalum Creek drainage looking upstream, May 2007.

Photo 291. Just upstream of photo 290, showing woody debris and flat gradient with spawning gravels or pea gravel looking upstream, May 2007.

Photo 292. A 5-6 inch redband trout in a small pool with woody debris, May 2007.

Photo 293. Large woody debris and complex habitat in a good pool near Photo 292, May 2007.

Photo 294. A relatively straight and simple habitat area of the East Fork looking downstream, May 2007.

Photo 295. Large woody debris and pool development below Photo 294 looking upstream, May 2007.

Photo 296. Two resident redband trout spawning in the tail-out of a pool. The female is the fish on the left, May 2007.

Photo 297. Same two resident trout as in Photo 296. Female is about 4-5 inches and the male is 7-8 inches. Note the gravel size and cleared area where the redd is being built, May 2007.

Part of lower Tumalum Creek was surveyed with the Pomeroy Conservation District (CD) on Sept. 25, 2007.

We drove upstream of the gate near the base of Blind Grade (sec. 10, T10N, R41E). The stream was fenced at this point and young riparian vegetation that had been planted about 10 yrs ago by the CD was mostly about 4-6 ft tall. Riparian vegetation was present but had very slow growth over the past 10 yrs. The stream channel was dry. Upstream where the access road turns south the riparian was slightly taller and denser than downstream where we first started the tour. We got out and walked some of this area (Photo 298 looking up the canyon). This location was a short distance upstream of the large canyon that enters from the east with a dry stream channel (sec. 11, T10N, R41E).

Photo 298. Looking up canyon in lower Tumalum Creek, note the young thin riparian vegetation, September 2007.

Upstream the riparian was still young and fairly sparse for a ways, but continued to improve (Photos 299 and 300). We drove across a stream ford into a reach where the cattle were allowed access to the creek for 100-300 ft. The riparian vegetation was not nearly as tall or abundant where cattle had access to it. We saw numerous head of cattle in the canyon, and a few had gotten through the riparian fences and were in the riparian area.

Photo 299. Looking downstream, note the riparian vegetation is more mature than in Photo 298, September 2007.

Photo 300. Looking upstream in the dry stream channel section, September 2007.

The photo below is where the riparian vegetation was much taller and thicker (Photo301). It was where surface water existed for about a half mile upstream of this point. Trout were observed in each of the pools where there was surface water. Some pools had several trout of 3-6 inches. The location of the lower end of the surface water was roughly near the west section line of section 13, although it may have still been in the east part of section 14. The riparian vegetation was 8-25 ft tall and a few pines existed as well. The downstream most extent of surface water was about 0.8-1.3 miles below the WDFW fence line (in the northeast part of section 24). We walked much of that area upstream from another stream ford and old campsite/meadow to the

WDFW fence line. Most of this area had water in the stream and trout were present, but a short distance below the WDFW fence line, and upstream into the WDFW lands, the stream was dry.

Photo 301. Where surface water existed and trout were present. Just down to the right of this photo (downstream) the surface water vanished, September 2007.

As we returned downstream we crossed the creek where cattle had access to the stream channel. This was downstream of the surface flow portion of the channel. We stopped to look at a well and watering tank. The three photos below show the fence line with cattle exclusion upstream, and cattle access downstream of the fence (Photos 302-304). The stream channel was completely dry. This was an area of 100-300 ft or so where cattle could access the creek and the road crossed the creek twice. Very little woody vegetation existed below the fence line for a few hundred feet until we reached the lower fence line that again excluded cattle from the stream channel and riparian area. Photo 304 shows the stream channel and lack of riparian vegetation downstream of the road crossing (looking downstream). This photo was taken by just turning and shooting downstream of the previous two photos.

Photo 302. Note the fence line and riparian vegetation upstream where cattle are excluded compared with below where cattle have access, September 2007.

Photo 303. Another photo of the fence line, similar to Photo 302, September 2007.

Photo 304. No riparian vegetation and dry channel of Tumalum Creek where cattle have access in a stream ford area, September 2007. Note the edge of the vehicle and the road on the left of the photo.

Conclusions and Recommendations

We were successful in obtaining new baseline information useful for assessing salmonid stock status, particularly in portions of the lower Grande Ronde tributaries and the Wenaha River watershed within Washington State, as well as some portions of upper Asotin Creek and tributaries of the upper Tucannon River. We were able to obtain tissue samples from many fish from several drainages that will be useful for age and growth or genetic analyses in the future. Results reported here are from our sampling in 2006 and 2007, but some data from our earlier sampling efforts have been included for comparisons.

We view this report as an another step in our efforts to complete baseline surveys in most streams in southeast Washington for salmonid presence, distribution, relative abundance, species composition, and collection of tissue samples for use in stock status monitoring. Currently we still have streams or stream reaches where we have almost no actual field sampling information. We hope to secure additional funding to continue this stock status sampling in streams or stream reaches of SE WA where we have little or no previous field sampling efforts or data. We hope to resample streams or stream reaches on a periodic basis (every 5-10 yrs) in areas where we are not doing intensive monitoring (e.g. intensive monitoring in the mainstem Tucannon River). Our ultimate goal is to then use this baseline data for determining current stock status, as well as to guide development of a comprehensive monitoring and evaluation program that would implement appropriate long-term monitoring of the status and trends of salmonid populations in these small tributaries.

Tours of Tumalum Creek showed that the stream was intermittent or dry below WDFW lands during summer (especially during a drought year such as 2007). The riparian restoration project that planted trees and fenced most of the channel about 10 years ago has begun to restore the channel and riparian vegetation. The vegetation is now at a stage where it should grow rapidly if precipitation is better than average for a year or two, and especially upstream of the dry tributary from the east. Some cattle were getting access to parts of the revegetated and protected areas in the upper end of the private lands by getting through the fence, but it was limited. However, the Conservation Reserve Enhancement Program (CREP) contract is about to expire and cattle may once again be allowed full access to the riparian vegetation in the near future. Having cattle grazing in the riparian area because of an expired CREP contract would jeopardize all the past efforts to restore riparian vegetation and could limit retaining or restoring surface flows during summer. Cattle should continue to be excluded from the riparian areas along this stream to enable it to be continue to develop a good riparian vegetation buffer, a stabilized channel, and overland stream flows.

For 2008, we have the following recommendations for additional field sampling:

1) Continue collecting bull trout genetic samples in Tucannon River tributaries (Cummings and Little Tucannon) to provide adequate sample sizes to complete the genetic assessment with the USFWS and develop a better understanding of metapopulation structure and appropriate conservation planning in this drainage.

2) Continue conducting bull trout spawning surveys in index areas of the Tucannon River Basin to monitor these bull trout populations annually.

3) Continue, and expand, our electrofishing sampling and bull trout spawning surveys in the Wenaha River watershed and the lower Grande Ronde Subbasin tributaries in Washington to try and eventually complete sampling in all drainages. High priority areas for sampling in 2008 include Crooked Creek and its tributaries.

4) Continue to monitor steelhead distribution and relative abundance in parts of George Creek in Asotin County. Additional information on fish distribution and relative abundance is needed in Pintler Creek and its tributaries (e.g. Ayers and Kelly creeks). Steelhead spawning surveys should be conducted in Pintler Creek in 2008.

5) Conduct steelhead spawning surveys in Little Tucannon and Tumalum creeks. Possibly, conduct electrofishing in portions of these streams to add to our baseline stock status information. We currently have inadequate data regarding spawning distribution, spawn timing and relative abundance in these streams.

6) Electrofishing portions of lower river tributaries of the Tucannon River (e.g. Kellog Creek) to determine fish distribution and use during low flows.

7) Attempt to secure funding and collaboration for genetic analyses of a portion of the bull trout samples from Asotin Creek and Wenaha tributaries to compare with Tucannon and Walla Walla bull trout genetic characteristics.

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Appendix A. Study Sites, 2006-2007

Appendix A. Table 1. Study site locations for Asotin County, 2006-2007.

Stream.	Year	Site #	RM[a]	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type[b]	GPS Coordinates[c] North	GPS Coordinates[c] West	Comments
Wenatchee Creek	2007	WC-1	0.1	T7N, R43E, Sect 3, NW¼, SW¼	EL	46.11021	117.41752	0.1 mile up right bank fork
	2007	WC-2	8.7	T7N, R43E, Sect 3, NW¼, SW¼	EL	46.10990	117.41601	Forks on west edge of section 3
	2007	WC-3	8.5	T7N, R43E, Sect 3, NE¼, SW¼	EL	46.10774	117.41276	0.3 mile above Ranger Creek mouth
	2007	WC-4	8.2	T7N, R43E, Sect 3, SE¼, SW¼	EL	46.10600	117.40831	~33 meters below Ranger Creek mouth
	2007	WC-5	8.0	T7N, R43E, Sect 3, SW¼, SE¼	EL	46.10493[d]	117.40546[d]	0.2 mile below Ranger Creek mouth
	2007	WC-6	7.8	T7N, R43E, Sect 3, SE¼, SE¼	EL	46.10359	117.40017	0.4 mile below Ranger Creek mouth
	2007	WC-7	7.6	T7N, R43E, Sect 10, NE¼, NE¼	EL	46.10194	117.39872	0.6 mile below Ranger Creek mouth
	2007	WC-8	6.6	T7N, R43E, Sect 11, NE¼, SW¼	EL	46.09148[d]	117.38663[d]	Directly above mouth of Indian Tom Creek
	2007	WC-9	5.8	T7N, R43E, Sect 14, SW¼, NE¼	EL	46.08167	117.38674	~60 meters above Coyote Gulch
	2007	WC-10	5.7	T7N, R43E, Sect 14, SW¼, NE¼	EL	46.08039	117.38703	0.1 mile below Coyote Gulch
	2007	WC-11	5.2	T7N, R43E, Sect 14, SE¼, SW¼	EL	46.07385	117.38870	0.2 mile below Bell Canyon
	2007	WC-12	4.8	T7N, R43E, Sect 23, SE¼, NW¼	EL	46.06927	117.38979	0.2 mile above Charley Hollow
	2007	WC-13	4.4	T7N, R43E, Sect 23, NE¼, SW¼	EL	46.06362	117.39153	0.3 mile above Service Hollow
	2007	WC-14	4.1	T7N, R43E, Sect 23, SE¼, SW¼	EL	46.05937	117.38875	Mouth of Service Hollow
Indian Tom Creek	2007	IT-1	0.9	T7N, R43E, Sect 12, SW¼, NW¼	EL	46.09804	117.37221	0.9 mile above mouth
	2007	IT-2	0.7	T7N, R43E, Sect 12, SW¼, NW¼	EL	46.09629[d]	117.37621[d]	0.7 mile above mouth
	2007	IT-3	0.1	T7N, R43E, Sect 11, NW¼, SE¼	EL	46.09158	117.38599	~90 meters above mouth
Shumaker Creek	2007	SH-1	2.2	T7N, R45E, Sect 24, SE¼, NW¼	EL	46.07049	117.11452	1.0 mile above first culvert
	2007	SH-2	1.2	T7N, R45E, Sect 25, SE¼, NW¼	EL	46.05613	117.11484	First culvert above mouth
	2007	SH-3	0.3	T7N, R45E, Sect 36, NW¼, NW¼	EL	46.04445[d]	117.12113[d]	0.2 mile above lowest stream ford
Joseph Creek	2006	JC-1	5.0	T6N, R46E, Sect 9, SE¼, NW¼	EL	46.00873	117.05023	~0.6 mile above Cottonwood Ck mouth
	2006	JC-2	3.4	T6N, R46E, Sect 10, NE¼, NW¼	EL	46.01398	117.02974	~1.0 mile below Cottonwood Ck mouth
	2006	JC-3	2.6	T6N, R46E, Sect 3, NW¼, SE¼	EL	46.02414	117.02504	~1.8 miles below Cottonwood Ck mouth
	2006	JC-4	1.8	T7N, R46E, Sect 35, SW¼, SW¼	EL, F	46.03171	117.01572	~2.6 miles below Cottonwood Ck mouth
	2006	JC-5	1.2	T7N, R46E, Sect 35, NE¼, SW¼	EL	46.03808	117.00691	WDFW lower property boundary
Couse Creek	2006	CO-1	1.5	T8N, R46E, Sect 1, NW¼, SW¼	EQ	46.19583	116.99116	~1.4 miles above Snake River Road brg
	2006	CO-2	1.0	T8N, R46E, Sect 1, SW¼, NE¼	EQ	46.19956	116.98478	~0.9 mile above Snake River Road brg
	2006	CO-3	0.1	T8N, R47E, Sect 6, NE¼, NW¼	EQ, F	46.20476	116.96776	Snake River Road bridge
Tenmile Creek	2006	TC-1	0.2	T10N, R46E, Sect 36	F	46.29661[d]	116.99206[d]	~15 meters above Snake River Rd bridge
North Fork Asotin Creek	2006	NFA-1	15.0	T8N, R42E, Sect 2, NW¼, NE¼	T	46.20443[d]	117.50937[d]	~15 meters above Cougar Canyon mouth
	2006	NFA-2	15.0	T8N, R42E, Sect 2, NW¼, NE¼	EL[e]	46.20486[d]	117.50873[d]	~50 meters below Cougar Canyon mouth
	2006	NFA-3	14.6	T9N, R42E, Sect 36, SW¼, SW¼	EL	46.20712	117.50132	~0.4 mile below Cougar Canyon mouth
	2006	NFA-4	14.1	T8N, R42E, Sect 1, NE¼, NW¼	EL	46.20529	117.49215	~0.9 mile below Cougar Canyon mouth
	2006	NFA-5	13.7	T8N, R42E, Sect 1, NE¼, NE¼	EL	46.20560	117.48276	~1.3 miles below Cougar Canyon mouth
	2006	NFA-6	11.5	T9N, R43E, Sect 32, NE¼, SE¼	EL	46.21356	117.44315	~1.4 miles above Middle Branch mouth

[a] River Mile
[b] T-Temperature; F-Flow; EL-Qualitative Electrofishing; EQ-Quantitative Electrofishing
[c] GPS were taken with Garmin II plus, in WSG 84 datum and in D.D^{o}
[d] GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum
[e] Same as previous year

Appendix A. Table 1. Study site locations for Asotin County, 2006-2007.

Stream	Year	Site #	RM[a]	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type[b]	GPS Coordinates[c] North	GPS Coordinates[c] West	Comments
North Fork Asotin	2006	NFA-7	11.1	T9N, R43E, Sect 33, SW¼, SW¼	EL	46.20893	117.43902	~1.0 mile above Middle Branch mouth
Creek (Cont.)	2006	NFA-8	10.6	T8N, R43E, Sect 4, SW¼, NW¼	EL	46.20173	117.43871	~0.5 mile above Middle Branch mouth
	2006	NFA-9	10.3	T8N, R43E, Sect 4, SW¼, SW¼	EL	46.19710	117.43597	~0.2 mile above Middle Branch mouth
	2006	NFA-10	9.8	T8N, R43E, Sect 4, SW¼, SE¼	EL	46.19677	117.42753	~0.3 mile below Middle Branch mouth
Cougar Canyon	2006	CC-1	0.0	T8N, R42E, Sect 2, NW¼, NE¼	EL	46.20402[d]	117.50932[d]	~50 meters above mouth
	2006	CC-2	0.0	T8N, R42E, Sect 2, NW¼, NE¼	T	46.20430[d]	117.50907[d]	~15 meters above mouth
Middle Branch of	2006	MB-1	1.1	T8N, R43E, Sect 8, SW¼, NE¼	EL	46.18747	117.45061	~1.1 miles above mouth
NF Asotin Creek	2006	MB-2	0.8	T8N, R43E, Sect 8, SE¼, NE¼	EL	46.19021	117.44602	~0.8 mile above mouth
	2006	MB-3	0.4	T8N, R43E, Sect 8, NE¼, NE¼	EL	46.19361	117.44071	~0.4 mile above mouth
South Fork of	2006	SFNFA-1	1.1	T8N, R43E, Sect 9, SE¼, SE¼	EL	46.18152	117.42426	~1.1 miles above mouth
NF Asotin Creek	2006	SFNFA-2	0.6	T8N, R43E, Sect 9, SE¼, NE¼	EL	46.18864	117.42623	~0.6 mile above mouth
	2006	SFNFA-3	0.3	T8N, R43E, Sect 9, NW¼, NE¼	EL	46.19237	117.42702	~0.3 mile above mouth
George Creek	2006	GC-5	1.5	T10N, R45E, Sect 36, NE¼, NW¼	F[d]	46.30735	117.11365	Meyer Ridge Road bridge
	2007	GC-1	23.3	T8N, R44E, Sect 31, SE¼, SW¼	EL	46.12203	117.35064	Directly below Arnold Spring
	2007	GC-2	22.7	T8N, R44E, Sect 31, NE¼, SE¼	EL	46.12614	117.34085	0.6 mile below Arnold Spring
	2007	GC-3	22.2	T8N, R44E, Sect 32, SW¼, NW¼	EL	46.13059	117.33270	1.1 miles below Arnold Spring
	2007	GC-4	21.6	T8N, R44E, Sect 29, SW¼, SE¼	EL	46.13554	117.32426	1.7 miles below Arnold Spring
Pintler Creek	2007	PC-1	1.7	T9N, R45E, Sect 1, NW¼, SE¼	EL	46.28555	117.11026	Mouth of Ayers Gulch
Alpowa Creek	2006	AL-3	7.6	T11N, R44E, Sect 20, SW¼, NW¼	F	46.42167	117.33480	2nd bridge on Alpowa Creek Road
	2006	AL-9	0.0	T11N, R45E, Sect 19, SW¼, SE¼	F	46.41188	117.21345	Highway 12 bridge
	2007	AL-1	10.5	T11N, R43E, Sect 26, SE¼, NE¼	EQ	46.40760	117.37721	Mouth of Robinson Gulch
	2007	AL-2	8.3	T11N, R44E, Sect 19, NW¼, SE¼	EQ	46.41603	117.34166	0.6 mile above 2nd bridge on Alpowa Creek Road
	2007	AL-4	6.7	T11N, R44E, Sect 17, SW¼, SE¼	EQ	46.42782	117.32130	0.7 mile below 1st bridge on Alpowa Creek Road
	2007	AL-5	5.2	T11N, R44E, Sect 21, NW¼, NW¼	EL	46.42551	117.29446	1.7 miles above Asotin/Garfield County Line
	2007	AL-6	3.5	T11N, R44E, Sect 23, SW¼, SW¼	EQ	46.41155	117.26995	Directly above Asotin/Garfield County Line
	2007	AL-7	2.5	T11N, R44E, Sect 26, SE¼, NE¼	EQ	46.40437	117.25442	0.2 mile above Pow-Wah-Kee Gulch
	2007	AL-8	1.3	T11N, R44E, Sect 25, NE¼, SE¼	EQ	46.40217	117.23278	1.0 mile below Pow-Wah-Kee Gulch

[a] River Mile
[b] T-Temperature; F-Flow; EL-Qualitative Electrofishing; EQ-Quantitative Electrofishing
[c] GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°
[d] GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum
[e] Same as previous year

Appendix A. Table 2. Study site locations for the Wenaha River Watershed in Washington State, 2006-2007.

Stream	Year	Site #	RM[a]	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type[b]	GPS Coordinates[c] North	GPS Coordinates[c] West	Comments
North Fork Wenaha River	2006	NFW-1	7.0	T7N, R39E, Sect. 24, SW¼, NW¼	EL	46.07113[d]	117.88719[d]	~0.7 miles above right bank fork (above falls)
	2006	NFW-2	7.0	T7N, R39E, Sect. 24, SW¼, NW¼	EL	46.07138	117.88682	~0.7 miles above right bank fork (below falls)
	2006	NFW-3	6.6	T7N, R39E, Sect. 24, SE¼, NW¼	EL	46.07004	117.88024	~0.3 miles above right bank fork
	2006	NFW-4	6.4	T7N, R39E, Sect. 24, NE¼, SW¼	EL	46.06719	117.87774	~0.1 miles above right bank fork
	2006	NFW-5	0.1	T7N, R39E, Sect. 24, SE¼, SW¼	EL	46.06624	117.87947	~0.1 up the right bank fork
	2006	NFW-6	6.2	T7N, R39E, Sect. 24, SW¼, SE¼	EL	46.06478	117.87623	~0.1 miles below the right bank fork
	2006	NFW-7	5.8	T7N, R39E, Sect. 25, NW¼, NE¼	EL	46.05962	117.87471	~0.5 miles below the right bank fork
	2006	NFW-8	5.3	T7N, R39E, Sect. 25, NW¼, SE¼	EL	46.05334	117.87489	~1.0 miles below the right bank fork
West Fork Butte Creek	2006	WB-1	2.5	T7N, R40E, Sect. 26, NW¼, NE¼	EL	46.06251	117.76750	~0.2 miles above mouth of Preacher Ck.
	2006	WB-2	2.3	T7N, R40E, Sect. 26, NW¼, NE¼	EL	46.06219	117.76388	Preacher Ck. mouth
	2006	WB-3	2.1	T7N, R40E, Sect. 23, SE¼, SE¼	EL	46.06415	117.76028	Rainbow Ck. mouth
	2006	WB-4	1.3	T7N, R40E, Sect. 24, NW¼, SE¼	EL	46.06640	117.74767	~1.3 miles above confluence with Butte Ck.
	2006	WB-5	0.7	T7N, R41E, Sect. 19, SW¼, SW¼	EL	46.06342	117.73646	~0.7 miles above confluence with Butte Ck.
	2006	WB-6	0.2	T7N, R41E, Sect. 30, NE¼, NW¼	EL	46.06259	117.72774	~0.2 miles above confluence with Butte Ck.
Preacher Creek	2006	PR-1	0.1	T7N, R40E, Sect. 26, NW¼, NE¼	EL	46.06087	117.76489	~0.1 miles above mouth
Rainbow Creek	2006	RB-1	0.9	T7N, R40E, Sect. 23, NE¼, NE¼	EL	46.07601[d]	117.76109[d]	~0.2 miles above trail crossing
	2006	RB-2	0.7	T7N, R40E, Sect. 23, SE¼, NE¼	EL	46.07257	117.76291	West Butte Creek Trail crossing
	2006	RB-3	0.1	T7N, R40E, Sect. 23, SE¼, SE¼	EL	46.06426	117.76115	~0.1 miles above mouth
East Fork Butte Creek	2006	EB-1	1.0	T7N, R41E, Sect. 19, NE¼, NE¼	EL	46.07365	117.70982	~1.0 miles above confluence with Butte Ck.
	2006	EB-2	0.7	T7N, R41E, Sect. 19, NE¼, SE¼	EL	46.06598	117.71226	~0.7 miles above confluence with Butte Ck.
	2006	EB-3	0.3	T7N, R41E, Sect. 19, SW¼, SE¼	EL	46.06528	117.71816	~0.3 miles above confluence with Butte Ck.
Butte Creek	2006	BU-1	5.1	T7N, R41E, Sect. 30, NE¼, NW¼	EL	46.06044	117.72429	~0.2 miles below East and West Fork Butte Ck.
	2006	BU-2	4.7	T7N, R41E, Sect. 30, SE¼, NW¼	EL	46.05585	117.72426	~0.6 miles below East and West Fork Butte Ck.
	2006	BU-3	4.5	T7N, R41E, Sect. 30, NE¼, SW¼	EL	46.05247	117.72352	~0.8 miles below East and West Fork Butte Ck.

[a] River Mile
[b] EL-Qualitative Electrofishing
[c] GPS were taken with Garmin II plus, in WGS 84 datum and in D.D^{o}
[d] GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum

Appendix A. Table 3. Study site locations for the Tucannon River Subbasin, 2006-2007.

Stream	Year	Site #	RM[a]	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type[b]	GPS Coordinates[c] North	GPS Coordinates[c] West	Comments
Tucannon River	2006	TU-1	57.7	T8N, R42E, Sect. 22, NE¼, SW¼	EL	46.15787	117.53538	~1.5 miles above Bear Creek
	2006	TU-2	57.3	T8N, R42E, Sect. 22, SW¼, NW¼	EL	46.16114	117.53936	~1.2 miles above Bear Creek
	2006	TU-3	56.9	T8N, R42E, Sect. 21, NE¼, NE¼	EL	46.16490	117.54533	~0.8 miles above Bear Creek
	2006	TU-4	56.6	T8N, R42E, Sect. 16, SW¼, SE¼	EL	46.16690	117.55234	~0.4 miles above Bear Creek
	2006	TU-5	56.0	T8N, R42E, Sect. 16, SW¼, SW¼	EL	46.16880	117.56198	~0.1 miles below Bear Creek
	2006	TU-6	55.1	T8N, R42E, Sect. 17, SE¼, NW¼	EL	46.17540	117.57869	~1.0 miles below Bear Creek
	2006	TU-7	54.1	T8N, R42E, Sect. 7, SW¼, SE¼	EL	46.18101	117.59661	~2.0 miles below Bear Creek
	2006	TU-8	52.1	T8N, R41E, Sect. 12, NW¼, NW¼	EL	46.19097[d]	117.63126[d]	Cold Creek mouth
	2006	TU-9	51.8	T8N, R41E, Sect. 11, NE¼, NE¼	EL	46.19028	117.63869	~0.5 miles below Cold Creek
	2006	TU-10	50.9	T8N, R41E, Sect. 11, NW¼, NW¼	EL	46.19260[d]	117.65425[d]	~1.2 miles below Cold Creek
Bear Creek	2006	BR-1	3.4	T8N, R42E, Sect. 33, NE¼, NW¼	EL	46.13495	117.55385	River mile 3.4
	2006	BR-2	3.4	T8N, R42E, Sect. 33, NE¼, NW¼	EL	46.13486	117.55393	River mile 3.4 just below BR-1
	2006	BR-3	2.5	T8N, R42E, Sect. 29, SW¼, SE¼	EL	46.13711	117.56896	River mile 2.5
	2006	BR-4	2.1	T8N, R42E, Sect. 29, NW¼, SE¼	EL	46.14318	117.57257	River mile 2.1
	2006	BR-5	1.3	T8N, R42E, Sect. 20, SE¼, SW¼	EL	46.15401	117.57531	River mile 1.3
	2006	BR-6	1.0	T8N, R42E, Sect. 20, NW¼, SE¼	EL	46.15778	117.57251	River mile 1.0
	2006	BR-7	0.7	T8N, R42E, Sect. 20, SE¼, NE¼	EL	46.16017	117.56694	River mile 0.7
	2006	BR-8	0.3	T8N, R42E, Sect. 21, NW¼, NW¼	EL	46.16385	117.56218	River mile 0.3
	2006	BR-9	0.2	T8N, R42E, Sect. 21, NW¼, NW¼	EL	46.16445	117.56150	River mile 0.2
Turkey Creek	2006	TK-1	0.5	T8N, R41E, Sect. 20, NE¼, SW¼	EL	46.15512[d]	117.70794[d]	~0.5 miles above mouth
	2006	TK-2	0.2	T8N, R41E, Sect. 20, SW¼, NE¼	EL	46.15839	117.70386	~0.2 miles above mouth
Panjab Creek	2006	PJ-1	4.1	T8N, R41E, Sect. 21, NW¼, SW¼	EL	46.15655	117.69554	~0.5 miles above mouth of Turkey Ck
	2006	PJ-2	3.8	T8N, R41E, Sect. 20, SE¼, NE¼	EL	46.15915	117.69996	~0.2 miles above mouth of Turkey Ck
	2006	PJ-3	3.4	T8N, R41E, Sect. 20, NW¼, NE¼	EL	46.16421	117.70324	~0.2 miles below mouth of Turkey Ck
	2006	PJ-4	2.8	T8N, R41E, Sect. 17, NE¼, SW¼	EL	46.17021	117.70927	~0.8 miles below mouth of Turkey Ck
Meadow Creek	2006	MC-1	4.8	T8N, R40E, Sect. 35, SW¼, SE¼	EL	46.12186	117.76583	~3.5 miles above Meadow Ck. C.G.
	2006	MC-2	4.3	T8N, R40E, Sect. 35, NE¼, SE¼	EL	46.12741	117.76191	~3.1 miles above Meadow Ck. C.G.
	2006	MC-3	3.8	T8N, R40E, Sect. 35, NE¼, NE¼	EL	46.13412	117.75893	~2.6 miles above Meadow Ck. C.G.
	2006	MC-4	3.4	T8N, R40E, Sect. 25, NW¼, SW¼	EL	46.13993	117.75569	~2.1 miles above Meadow Ck. C.G.
	2006	MC-5	3.0	T8N, R40E, Sect. 25, SE¼, NW¼	EL	46.14471	117.75136	~1.7 miles above Meadow Ck. C.G.
	2006	MC-6	2.5	T8N, R40E, Sect. 24, SW¼, SE¼	EL	46.15003	117.74619	~1.2 miles above Meadow Ck. C.G.
Hixon Canyon	2007	H-1	1.2	T9N, R41E, Sect. 28, NW¼, NE¼	EL	46.23566	117.68179	~67 meters below forks in NE¼ of Sect 28
	2007	H-2	1.0	T9N, R41E, Sect. 21, SE¼, SW¼	EL	46.23782	117.68492	0.5 mile above logging road culvert
	2007	H-3	0.8	T9N, R41E, Sect. 21, SE¼, SW¼	EL	46.23851	117.68938	0.3 mile above logging road culvert

[a] River Mile
[b] EL-Qualitative Electrofishing; EQ-Quantitative Electrofishing
[c] GPS were taken with Garmin II plus, in WSG 84 datum and in D.D^{o}
[d] GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum

Appendix A. Table 3. Study site locations for the Tucannon River Subbasin, 2006-2007.

Stream	Year	Site #	RM[a]	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type[b]	GPS Coordinates[c] North	GPS Coordinates[c] West	Comments
Grub Canyon	2007	G-1	0.5	T9N, R41E, Sect. 22, NW¼, SW¼	EL	46.24261	117.67260	River mile 0.5
	2007	G-2	0.2	T9N, R41E, Sect. 21, SE¼, NE¼	EL	46.24581	117.67642	River mile 0.2
	2007	G-3	0.1	T9N, R41E, Sect. 21, NE¼, SE¼	EL	46.24657	117.67871	River mile 0.1
Cummings Creek	2006	C-1	8.8	T9N, R42E, Sect. 30, NW¼, NW¼	EL	46.23517	117.60933	~2.3 miles above the end of the road
	2006	C-2	8.4	T9N, R41E, Sect. 24, SE¼, SE¼	EL	46.23962	117.61592	~1.8 miles above the end of the road
	2006	C-3	7.8	T9N, R41E, Sect. 24, NW¼, NE¼	EL	46.24642	117.61821	~1.3 miles above the end of the road
	2006	C-4	7.1	T9N, R41E, Sect. 13, NE¼, SE¼	EL	46.25582	117.61664	~0.6 miles above the end of the road
	2006	C-5	6.4	T9N, R41E, Sect. 13, NW¼, NE¼	EL	46.26542	117.61829	~0.1 miles below the end of the road
	2006	C-6	4.3	T9N, R41E, Sect. 2, NE¼, NE¼	EQ	46.29264	117.63447	~4.3 miles above gate on Cummings Ck
	2006	C-7	3.6	T10N, R41E, Sect. 35, SW¼, NE¼	EQ	46.30200	117.63949	~3.6 miles above gate on Cummings Ck
	2006	C-8	2.9	T10N, R41E, Sect. 26, SE¼, SW¼	EL	46.31024	117.64459	~2.9 miles above gate on Cummings Ck
	2006	C-9	2.0	T10N, R41E, Sect. 26, NE¼, NW¼	EL	46.32183	117.64691	~2.0 miles above gate on Cummings Ck
	2006	C-10	1.5	T10N, R41E, Sect. 23, NW¼, SW¼	EL	46.32776	117.64986	~1.6 miles above gate on Cummings Ck

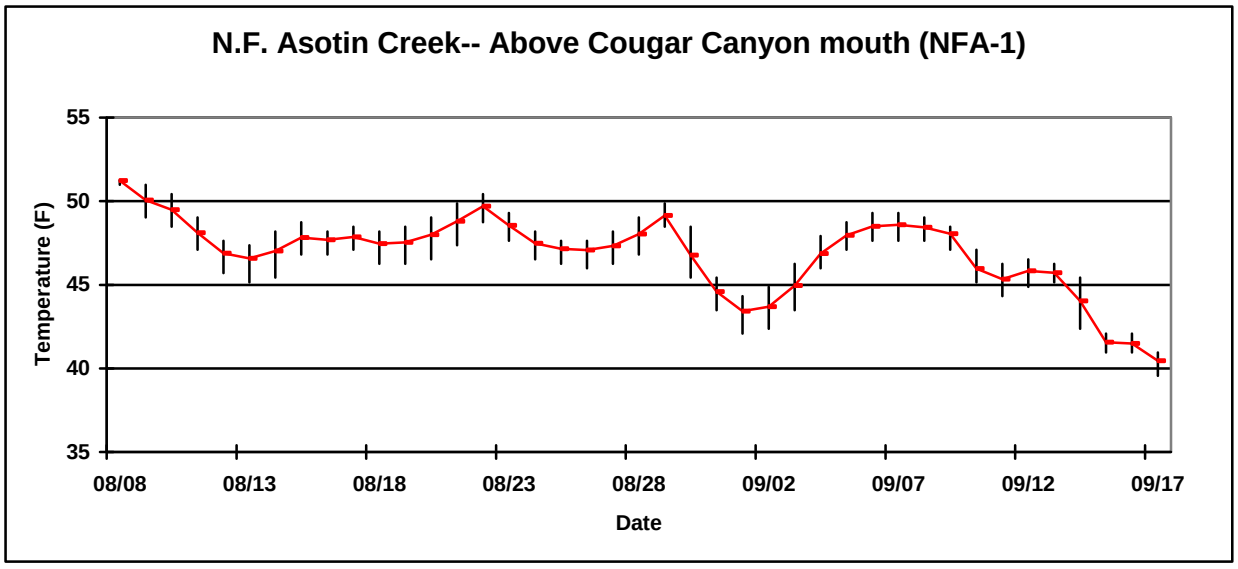
[a] River Mile
[b] EL-Qualitative Electrofishing; EQ-Quantitative Electrofishing
[c] GPS were taken with Garmin II plus, in WSG 84 datum and in D.D^{o}
[d] GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum

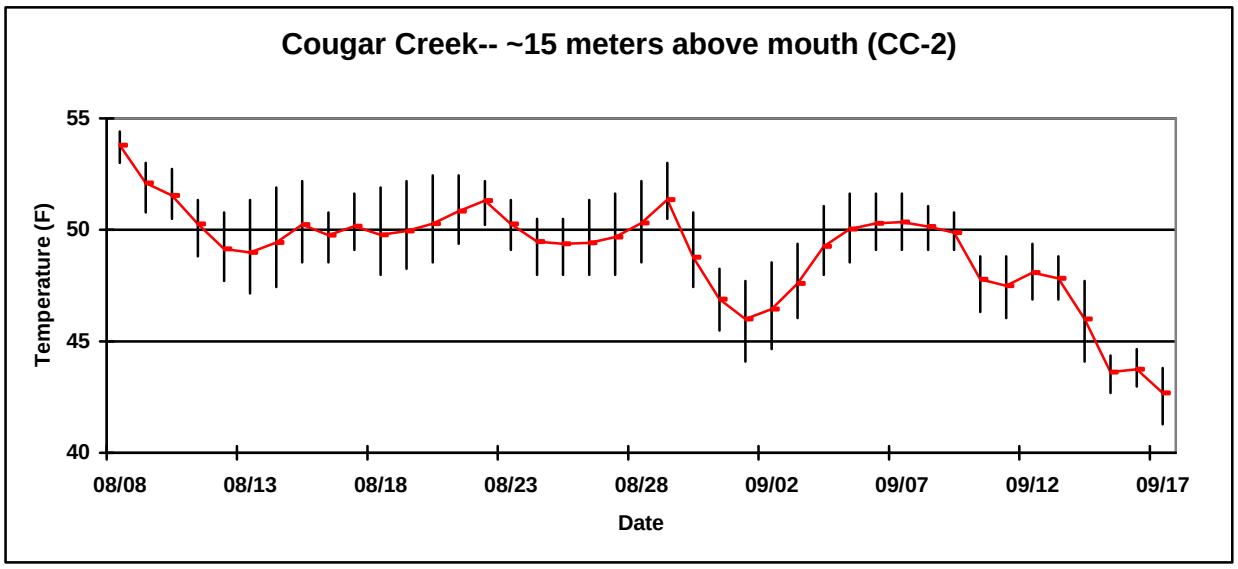
Appendix B. Discharge Data, 2006

Appendix B. Table 1. Manual discharge measurements for Asotin County, 2006.

Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Joseph Creek	JC-4	14.0	8/1	11.2	67.0	11:34	~2.6 mi below Cottonwood Creek mouth
Couse Creek	CO-3	3.0	3/14	3.8	47.0	14:59	Snake River Road bridge
		5.2	4/13	8.1	52.0	10:27	
		5.2	4/21	9.7	48.0	10:27	
Tenmile Creek	TC-1	4.3	3/14	11.8	40.0	13:56	Snake River Road bridge
		8.2	4/13	32.6	50.0	10:53	
		8.0	4/25	14.4	54.0	14:19	
		2.6	7/31	0.4	67.0	15:20	
George Creek	GC-1	5.0	3/8	41.3	41.0	13:16	Meyer Ridge Road bridge
		N/A	4/13	N/A	N/A	N/A	Flow too high to be taken safely
		4.1	7/31	1.0	67.0	15:20	
Alpowa Creek	AL-1	2.7	3/9	8.2	42.0	12:15	2nd bridge on Alpowa Creek Road
	AL-2	3.6	4/13	8.7	54.0	12:04	Highway 12 bridge near mouth

Appendix C. Stream Temperature Graphs (ºF), 2006


N.F. Asotin Creek-- Above Cougar Canyon mouth (NFA-1)
Temperature (F)
55
50
45
40
35
08/08
08/13
08/18
08/23
08/28
09/02
09/07
09/12
09/17
Date


Cougar Creek-- ~15 meters above mouth (CC-2)
Temperature (F)
55
50
45
40
08/08
08/13
08/18
08/23
08/28
09/02
09/07
09/12
09/17
Date

Appendix D. Relative Abundance of Non-Salmonids, 2006-2007

Appendix D. Table 1. Relative abundance of non-salmonids from electrofishing surveys in Asotin County, 2006-2007.

	Wenatchee Creek ↑ Indian Tom Creek	Wenatchee Creek ↓ Indian Tom Creek	Indian Tom Creek	Shumaker Creek	Joseph Creek	Couse Creek	Upper NF Asotin	Lower NF Asotin	Cougar Canyon	Middle Branch of North Fork Asotin	South Fork of North Fork Asotin	George Creek	Pintler Creek	Alpowa Creek
Cyprinidae Speckled dace *Rhinichthys osculus*	0	0	0	0	1	1	0	0	0	0	0	0	4	2
Longnose dace *Rhinichtys cataractae*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chiselmouth *Acroheilus alutaceus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Catostomidae Bridgelip suckers *Catostomus columbianus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cottidae Sculpin[a] *Cottus spp.*	3[b]	4	1	0	3	0	0	3	0	3	3	0	0	3
Centrarchidae Smallmouth bass *Micropterus dolomieu*	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Tailed Frogs *Ascalphus truei*	1	0	0	0	0	0	2	1	2	1	2	2	0	0
Crayfish[a] *Pacifastacus spp.*	P	P	P	0	P	P	0	P	0	0	0	0	0	P

[a] Noted by genus only, not identified by species.
[b] Only found at lowest site just above mouth of Indian Tom Creek.

Appendix D. Table 2. Relative abundance of non-salmonids from electrofishing sites on Wenaha River watershed tributaries in Washington State, 2006.

	North Fork Wenaha	West Butte Creek ↑ Rainbow Creek	West Butte Creek ↓ Rainbow Creek	Preacher Creek	Rainbow Creek	East Butte Creek	Butte Creek
Cottidae Sculpin[a] *Cottus spp.*	0	0	2	0	2	2	3
Tailed Frogs *Ascalphus truei*	1	1	1	1	1	1	1

[a] Noted by genus only, not identified by species.

Appendix D. Table 3. Tucannon River Subbasin relative abundance of non-salmonids from electrofishing sites, 2006-2007.

	Tucannon River ↑ Bear Creek	Tucannon River from Bear Creek to Sheep Creek	Tucannon River ↓ Sheep Creek	Bear Creek	Turkey Creek	Panjab Creek	Meadow Creek ↑ Campground	Hixon Canyon	Grub Canyon	Cummings Creek
Cottidae Sculpin[a] *Cottus spp.*	0	1	3	0	0	3[c]	0	0	0	3[d]
Tailed Frogs *Ascalphus truei*	1	0	2	2[b]	2	3	2	1	0	0
Crayfish[a] *Pacifastacus spp*	0	0	0	0	0	0	0	0	P	0

[a] Noted by genus only, not identified by species.
[b] Tailed frogs were only found in three sites located in the lower 0.9 miles.
[c] Sculpin were only found at the lowest site.
[d] Sculpin were not found in the top three sites.