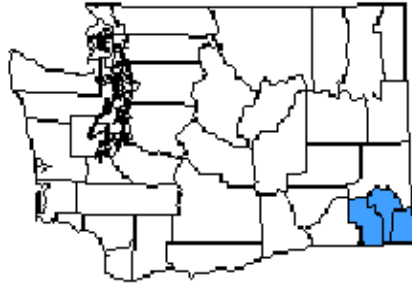


# **Baseline Assessment of Salmonids in Tributaries of the Snake and Grande Ronde Rivers in Southeast Washington**

**2005 Annual Report**



Washington  
Department of  
**FISH and  
WILDLIFE**

By

Glen Mendel, Michael Gembala, Jeremy Trump  
and Chris Fulton

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

For

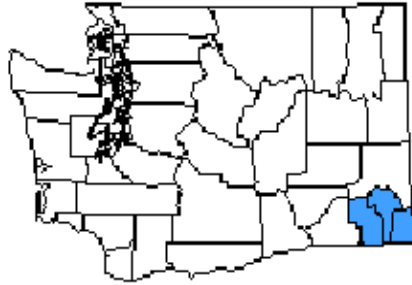
Asotin County Conservation District  
United States Fish and Wildlife Service  
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# Executive Summary

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We collected 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 Basin tributaries within WA, particularly for bull trout information, and 3) continue bull trout monitoring efforts in the Tucannon Basin, 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 sampling efforts and results documented here are mostly from 2005, but some data from previous years are included. The 2005 field efforts provide only partial fulfillment of the goals and objectives of the various projects combined in this report. For example, we were only partially successful obtaining 40 tissue samples that met our genetic sampling protocol from juvenile bull trout in each of seven reaches of the upper Tucannon watershed. Low densities of fish, equipment problems, and restricted access because of a large wildfire precluded us from meeting our sampling goals. In addition, we were unable to electrofish in Butte Creek because of restricted access and safety issues surrounding the 52,000 acre School Fire in 2005.

We were successful in obtaining valuable new baseline information that is useful for assessing salmonid stock status, particularly in portions of the lower Grande Ronde tributaries and the Wenaha basin 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.

Currently we still have streams or stream reaches where we have almost no actual field sampling information. We hope to secure additional funding for each of the next 2-4 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 Basin.



# Introduction

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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. 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 Basin for a collaborative genetic study of metapopulation structure, and 3) monitoring bull trout distribution and relative abundance in the Tucannon and Wenaha Basin in southeast Washington with ESA Section 6 funding from the USFWS. Sampling efforts concentrated on streams suspected of rearing bull trout or rainbow/steelhead. Most of the streams sampled in 2005 have little or no prior documentation of species composition, fish distribution, or stock status.

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.

This report summarizes our efforts from several small studies in 2003, 2004, and 2005 to investigate fish populations and their habitats within the Snake River Basin within southeast Washington. This is a continuation of our previous efforts (Mendel et al. 1999, Mendel et al. 2001, Mendel et al. 2004a). Throughout the 2003, 2004 and 2005 field seasons, district staff continued monitoring efforts in Tenmile Creek, George Creek, and Hefflefinger Gulch within Asotin county, and obtained baseline data for tributaries of the lower Grande Ronde River, and portions of the Asotin basin, the Wenaha watershed, and the Tucannon basin. For most of the selected streams or stream reaches fish or fish habitat data are very limited or are non-existent. Similar surveys have been conducted in the Walla Walla Basin (e.g. Mendel et al. 2003, 2004b).

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

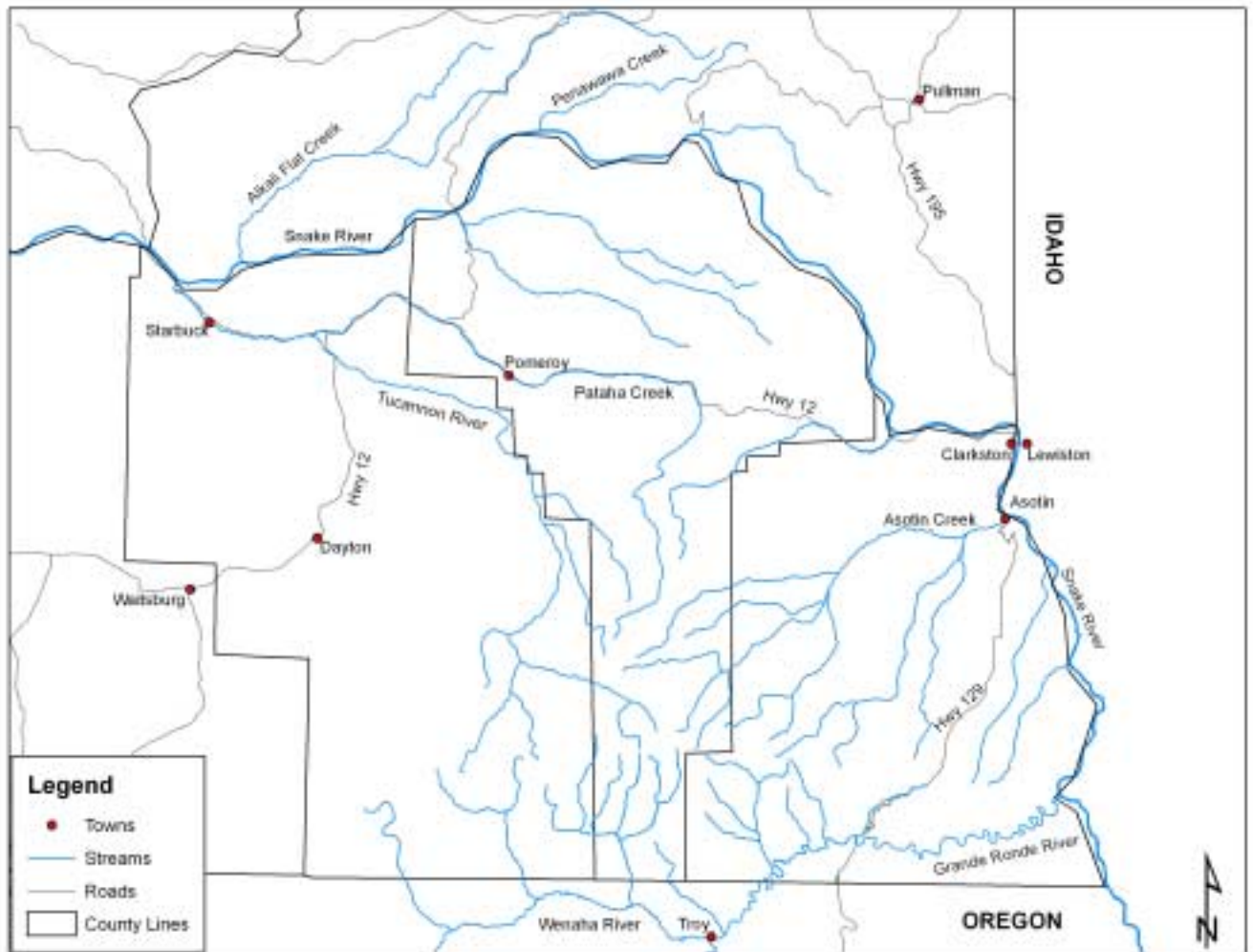
- Conduct steelhead, bull trout, and chinook salmon spawning surveys to determine spawn timing, distribution and relative abundance.
- Establish and monitor constant recording temperature data loggers at selected sites to monitor water temperatures and evaluate their potential effects on salmonid survival, 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 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 samples are collected.

# 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 basin in southeast Washington showing major streams, roads, towns and county boundaries (courtesy of Bill Dowdy, USFS). 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 were reasonably accessible by vehicle or foot travel in remote, difficult terrain areas. Landmarks included towns, roads, bridges, and tributaries.

## **Individual Site Selection**

Some of the study streams are in private ownership; therefore it was necessary to obtain permission from landowners to access potential sites. Property owners were identified from county assessment records or Conservation District managers. Landowners were then contacted for authorization to access the streams. Many of the reaches sampled were on public land, and we coordinated with the appropriate land management representatives at federal and state agencies. Sites are listed and identified in order from upstream to downstream (Appendix A).

River miles were determined by measuring 1:24000 USGS topographic maps using Terrain Navigator software (version 5.03) in WSG 84 datum from the confluence of each stream to the study site. For streams where the mouth is in Oregon, we considered the state line to be river mile 0.0. These locations should be considered approximate due to the limited precision of this method. Global positioning system (GPS) coordinates were recorded in the field, when land terrain features and overhead tree canopy allowed communication with the minimum number of GPS satellites to obtain a position location.

Electrofishing sites were selected randomly from areas we could access. Site lengths were occasionally modified because of safety concerns or to avoid stream features that were difficult to sample, such as deep pools, rapids, or multiple channels.

## **Habitat Assessment**

### **Stream Flows**

Stream discharge was measured manually at selected sites according to standard techniques (Armour and Platts 1983) using a Swiffer model 2100 flow meter. Discharge was calculated in cubic feet per second (cfs) using a Microsoft Excel<sup>®</sup> spreadsheet.

### **Stream Temperatures**

We used two methods to collect water temperatures. Water temperature (°F) was measured manually at each site using standard field thermometers. The second method involved the use of temperature data loggers (Onset Corporation, Optic StowAway, or TidbiT Temp Data Logger<sup>®</sup>), which were set to continuously measure temperatures in °F at 30 minute intervals. The monitors were placed at two sites within the study area (Appendix A). WDFW maintained the

temperature monitors and downloaded the data using an Optic Stowaway Shuttle<sup>®</sup>. Temperature data were downloaded from the shuttle into Boxcar 4.0 software. Boxcar 4.0 was used to calculate daily minimum, maximum, and mean temperatures, which were exported to Microsoft Excel<sup>®</sup> spreadsheets. Data in Excel<sup>®</sup> spreadsheets were used to make graphs in Microsoft Word<sup>®</sup> showing minimum, maximum, and mean temperatures (Appendix B). The accuracy of data loggers were evaluated using a certified laboratory calibrated thermometer (Kessler Instruments).

## **Limiting Factor Identification**

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.

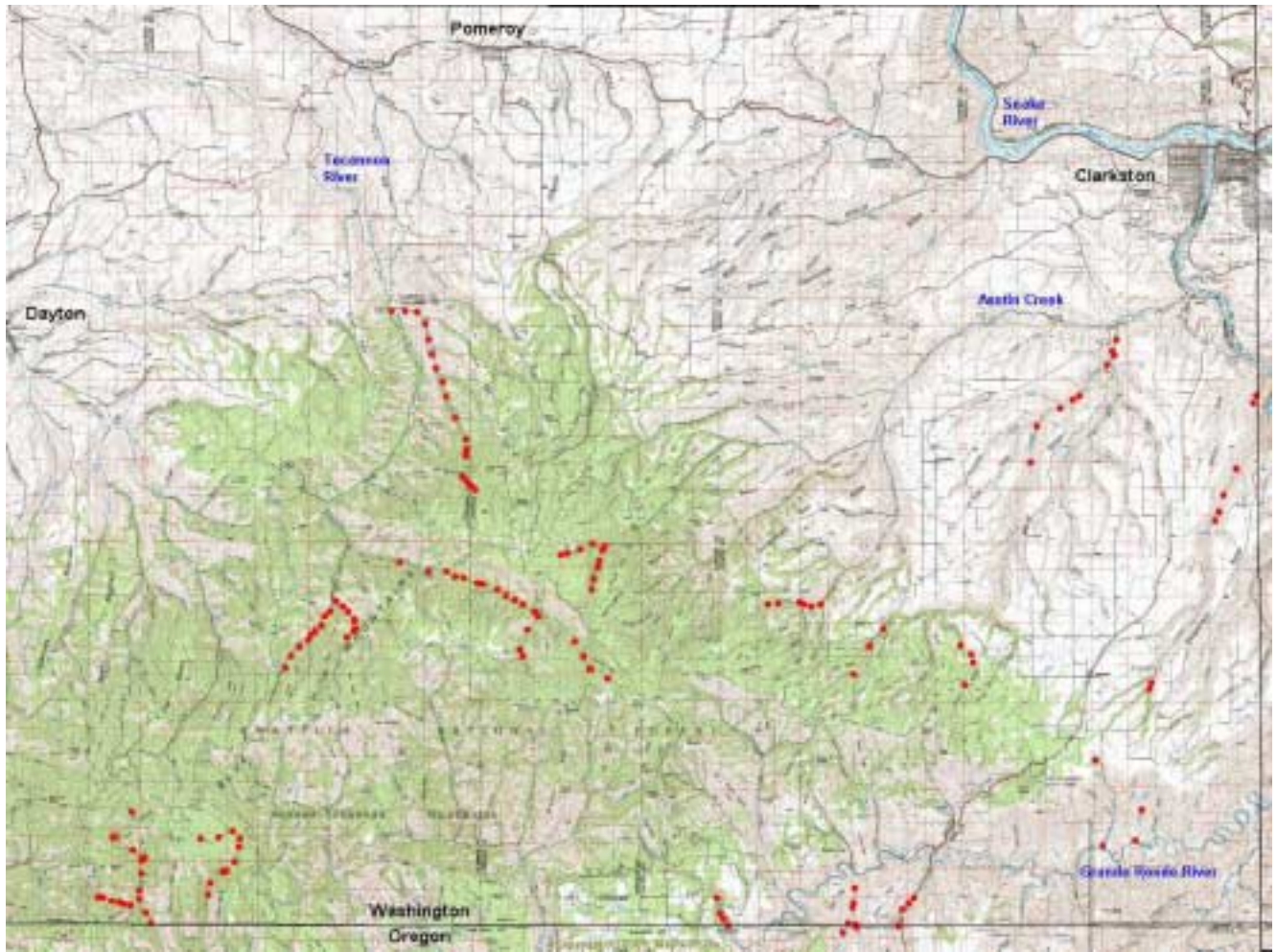
Physiological barriers to salmonid passage and survival, in the form of excessive temperatures, inadequate flows, and degraded habitat were also identified by field observation or examining tables and graphs of data collected by instream temperature monitors and manual sampling. Maximum temperatures, as well as the number of days with temperatures exceeding 75°F (lethal to salmonids if prolonged), and presence or absence of salmonid fishes at study sites, were factors taken into consideration.

## **Fish Stock Assessment**

### **Distribution, Relative Abundance and Species Composition**

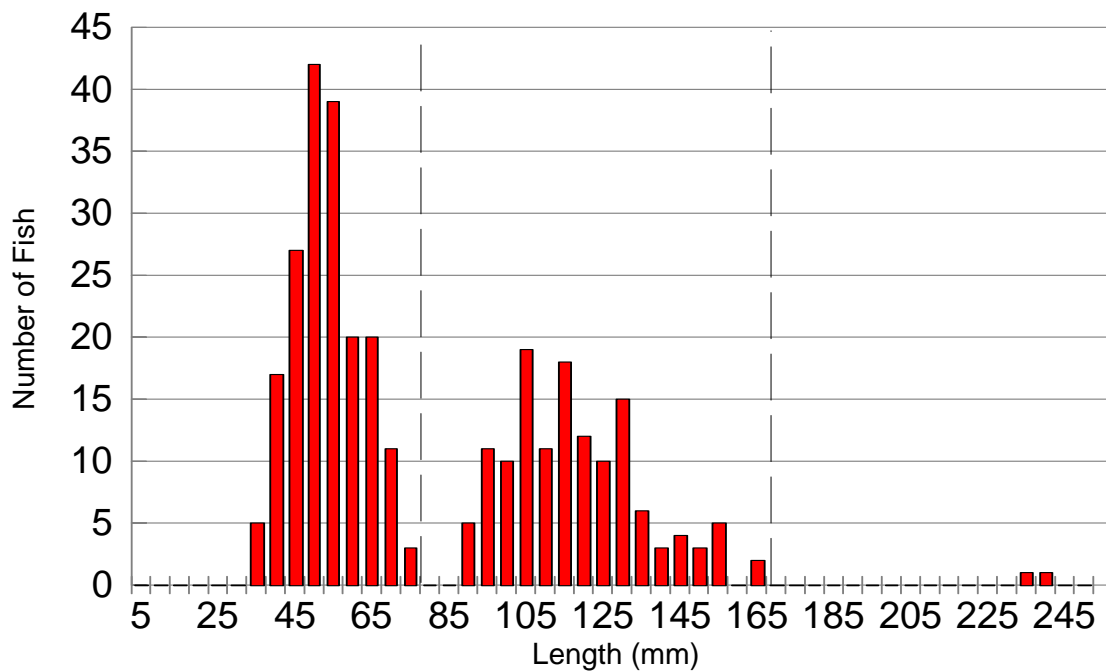
#### **Electrofishing Surveys**

A Smith-Root Model 11A or 12B electrofishing backpack unit (USFWS used a gas powered electrofisher) was used to collect fish at various study sites throughout the study areas (Figure 2). We used pulsed DC (direct current) between 200 and 500 volts. We electrofished at these sites by moving 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).



**Figure 2.** Vicinity map of data collection sites on Snake River and Grande Ronde tributaries in southeast Washington, 2004-2005.

Fork lengths of fish measured during qualitative electrofishing were used to create length frequency histograms. The histograms were used to determine age classes (Figure 3, 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 200mm or larger were grouped as adults in data tables.



**Figure 3.** Example of length frequency and age class delineations for George Creek, from Stringtown Gulch to Rockpile Gulch, 2000 (taken from Mendel et al., 2001).

Fish identification for electrofishing sites included genus and species for all *Salmonidae* (Salmonids) and *Cyprinidae* (minnows); 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 (Appendix C). Relative abundance data were tabulated to provide qualitative comparisons between reaches and species.

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

## Spawning Surveys

Spawning surveys were conducted in the same manner for steelhead, chinook and bull trout. Surveyors walked the stream and visually identified spawning fish and/or redds (nests). Redds



were usually readily identifiable, characterized by an area of clean gravel with a large depression and mound. Each redd observed was assigned a two-part identification (ID) code representing the survey number and the redd number. A flag was hung in adjacent vegetation, and marked with the ID code, the date, and the surveyor's initials, so the same redd would not be counted again in subsequent surveys. Each redd was recorded in a notebook with the date, time, ID code, general description of the redd size (length and width of both the depression and mound), rating of its observability, and its location.

Counts were tallied for each designated stream reach. When possible, we captured adult steelhead with dip nets and sampled fish or carcasses for length, sex, marks (to determine wild or hatchery origin), scales, DNA fin clips and tags.

## **Tissue Sampling**

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 basin.

## **Genetic Sampling Protocol for the upper Tucannon Basin**

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 basin (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 basin
  - PIT tag up to 100 fish per reach
  - PIT tag bull trout  $\geq 70$ mm in the abdomen, and  $\geq 200$ mm 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 Basin 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

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This report documents the efforts and results for several concurrent baseline salmonid assessment projects in the Snake River basin within southeast Washington, primarily in 2005, but including some field sampling in 2004. 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 (Grouse, Bear, Buford, Shumaker, and Myers creeks), Tenmile Creek (tributary of the Snake River), and the Asotin Creek drainage (South Fork Asotin Creek and tributary Redhill Gulch, North Fork Asotin Creek and Cougar Canyon, George Creek and Hefflefinger Gulch). We also planned to sample Deer and Deep Canyon creeks that drain north from Oregon into the lower Grande Ronde River, plus Cougar Creek that drains into the Grande Ronde River, but the landowners denied access. We were told that Deep Canyon Creek has a barrier falls or high gradient reach a short distance upstream of its confluence with the Grande Ronde River. The electrofishing surveys on the lower Grande Ronde tributaries were conducted to collect baseline information on species composition and relative abundance. Tenmile Creek surveys were conducted to collect genetic samples and to see if zero age rainbow/steelhead were present to document whether spawning occurred in the spring (lower creek was dry much of the spring due to drought conditions). Surveys in South Fork Asotin Creek, Redhill Gulch, North Fork Asotin Creek, and Cougar Canyon were conducted primarily to collect information about bull trout distribution and abundance. Surveys on George Creek and upper Hefflefinger Gulch were focused on obtaining rainbow/steelhead information, including: species composition, relative abundance, distribution and genetic samples.

The second study area encompasses upper Wenaha River tributaries. Streams included in this study area are the North Fork Wenaha River and tributaries (an unnamed tributary to North Fork Wenaha and Deep Saddle Creek), Butte Creek and tributaries (West Fork Butte Creek, Preacher Creek, and East Fork Butte Creek), and Beaver Creek. Electrofishing surveys were conducted in the North Fork Wenaha River, Deep Saddle Creek, and Beaver Creek to obtain baseline bull trout data, species composition, relative abundance, distribution, and to collect genetic samples for later analysis. Due to the large number of age zero bull trout in the North Fork Wenaha River, spawning surveys were also conducted. Electrofishing surveys scheduled for the Butte Creek system had to be cancelled due to safety concerns related to the nearby 52,000 acre School Fire. The fire was extinguished by early fall, and bull trout spawning surveys were successfully conducted in parts of the Butte Creek watershed.

The final study area encompassed the mainstem Tucannon River and tributaries. The study 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, Cummings Creek, and Kellogg Hollow. Electrofishing on all streams, with the exception of Cummings Creek and

Kellogg Hollow, was conducted primarily for two purposes. 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 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. PIT tag antennas were installed by Biomark and the USACE in the lower Tucannon River in fall of 2005 to monitor movement of PIT tagged bull trout. Bull trout spawning surveys were also conducted by WDFW on most of these streams in 2004 and 2005. Cummings Creek was sampled by WDFW Fish Management personnel in 2004 and Snake River Lab personnel in 2004 and 2005 for species composition, relative abundance, population estimation and distribution information. Sampling in 2005 by Snake River Lab personnel was shortly after the School Fire. In 2003, WDFW Fish Management staff conducted a bull trout spawning survey in Cummings Creek to try and confirm spawning. Results of that survey are included in this report. One site included in this report was sampled in upper Kellogg Creek to evaluate fish presence to provide assistance to the County and a consultant with planning a bridge replacement project.

## **Habitat Assessment**

### **Stream Flows**

Stream discharge measurements were only taken three times throughout the entire study area. The stream flows were taken while conducting other work in the area (spawning surveys or electrofishing), to provide information regarding water availability. One measurement was taken in late spring on George Creek (GG-10) April 21<sup>st</sup>, and measured 14.7 cfs at 13:15 (no temperature was taken). The other two measurements were taken while conducting electrofishing surveys. The first flow was taken on Buford Creek (BU-1) July 6<sup>th</sup> at 12:15pm and measured 0.1 cfs, but no temperature was taken. The second was taken on George Creek (GG-10) August 17<sup>th</sup> at 11:53pm, it measured 0.6 cfs and the temperature was 61 °F. Many of the streams had some degree of dry channel with subsurface flows from late spring to early fall (ie. most small Grande Ronde tributaries, Tenmile, North Fork Asotin, Cougar Canyon, George, and Cummings creeks). We currently do not know if the dry stream reaches we found are typical for these streams most years, or whether it solely reflects the drought that occurred in 2004 and 2005.

### **Stream Temperatures**

Water temperatures seem to follow a trend of cold spring temperatures that rise until the middle of July and then plateau. They remain at these summer highs until late summer or early fall depending on air temperature and the fall rains. Multiple temperature monitors were planned to be used throughout the study area, but due to lack of water (Grande Ronde tributaries), remoteness (Wenaha River tributaries), and malfunctioning of a monitor, only one site was successfully measured and documented over a period of time (Appendix B). Maximum temperatures on lower George Creek (GC-8) reached temperatures that can be lethal to salmonids (75-84°F, Bjornn and Reiser 1991). However, overnight temperatures decreased to

within reasonable physiological limits ( $\leq 65\text{-}70^{\circ}\text{F}$ ). One other temperature monitor was set at Trent Ridge on upper George Creek (GC-3), but the data logger malfunctioned and no data were retrieved.

## **Fish Stock Assessment**

### **Distribution and Abundance**

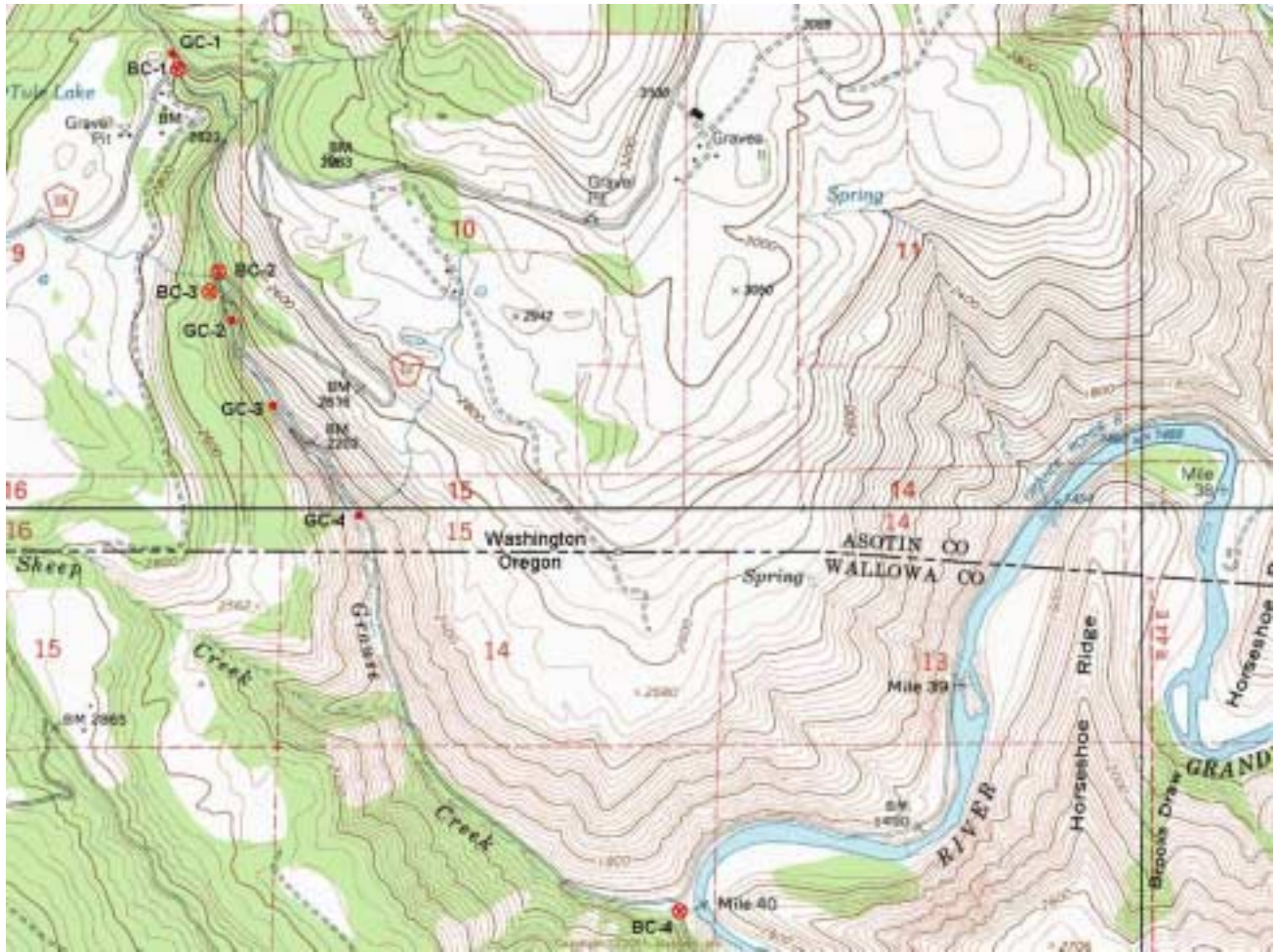
Due to the large amount of area to be surveyed, only single pass electrofishing surveys were conducted (except some efforts by the Snake River Lab. were multiple pass). Density estimates were calculated, but should be considered minimum relative abundance estimates. During electrofishing efforts, a total of three salmonid species were identified; rainbow/steelhead, bull trout, and spring chinook. Rainbow/steelhead were widely distributed, while bull trout were only found in reaches of the North Fork Wenaha River, North Fork Asotin Creek, Cougar Canyon, and the upper Tucannon River basin. Chinook juveniles were only found in Cummings Creek, Bear Creek (Grande Ronde tributary), lower Tenmile Creek, Tucannon River (below Sheep Creek), and the North Fork Wenaha River near the state line, plus one adult chinook carcass was found in Butte Creek near the state line during a bull trout spawning survey.

Steelhead spawning surveys were only conducted on one stream, while bull trout spawning surveys took place on ten streams in 2005. Bull trout surveys were also conducted on seven stream reaches in the Tucannon River basin in 2004. The number of steelhead redds in George Creek was over 4.6 redds per mile in the lower 6.5 miles. The North Fork Asotin Creek had one of the lowest densities of bull trout redds (1.7 redds per mile), while the North Fork Wenaha River had the highest estimate of redds per mile (26.4). The majority of the bull trout redds found in the Butte Creek system were on West Butte Creek (23), while no redds or bull trout were observed on Preacher Creek or East Butte Creek. The Tucannon River basin had a total of approximately 8.6 bull trout redds per mile in both 2004 and 2005.

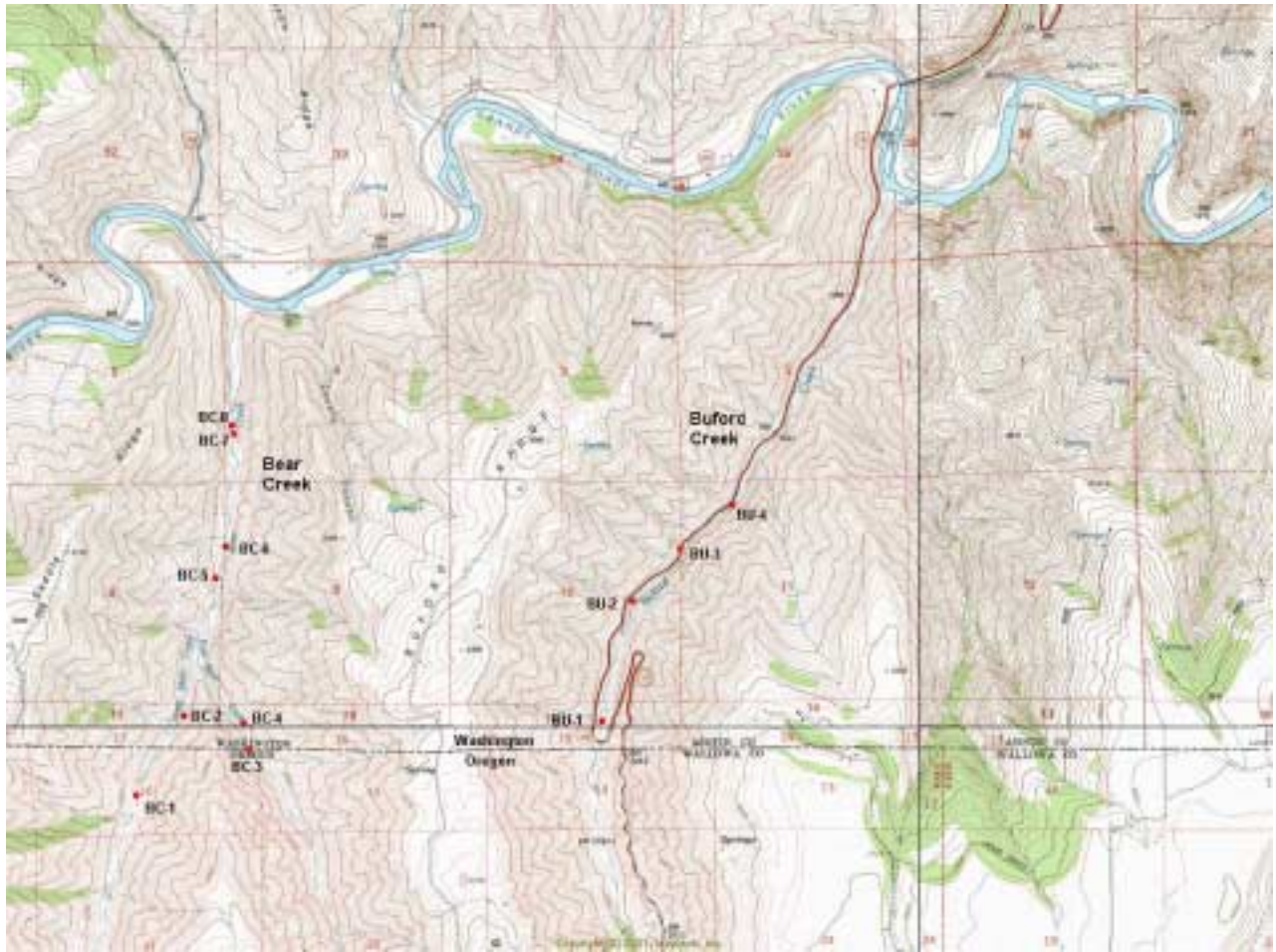
### **1. Lower Grande Ronde Tributaries, Tenmile Creek, and Asotin Creek Drainage**

#### **Electrofishing Surveys**

Electrofishing surveys were conducted in the summer of 2005 in several lower Grande Ronde tributaries, Tenmile Creek, and the Asotin Creek drainage to assess distribution, relative abundance, and species composition. Surveys occurred on twelve streams encompassing 35.3 river miles (Figures 2, 4-8, and Table 2). We attempted to survey Deer, Deep Canyon and Cougar creeks that are lower Grande Ronde tributaries either upstream of Myers and Shumaker creeks or upstream of Rattlesnake Creek, but landowners would not grant us access. According to a landowner, Deep Canyon Creek has a falls just above its confluence with the Grande Ronde River.



**Figure 4.** Electrofishing sites (GC1-4) on Grouse Creek, tributary to Grande Ronde River, 2005. Note barrier culverts (BC-1 through BC-4) posing significant impairment to fish passage.

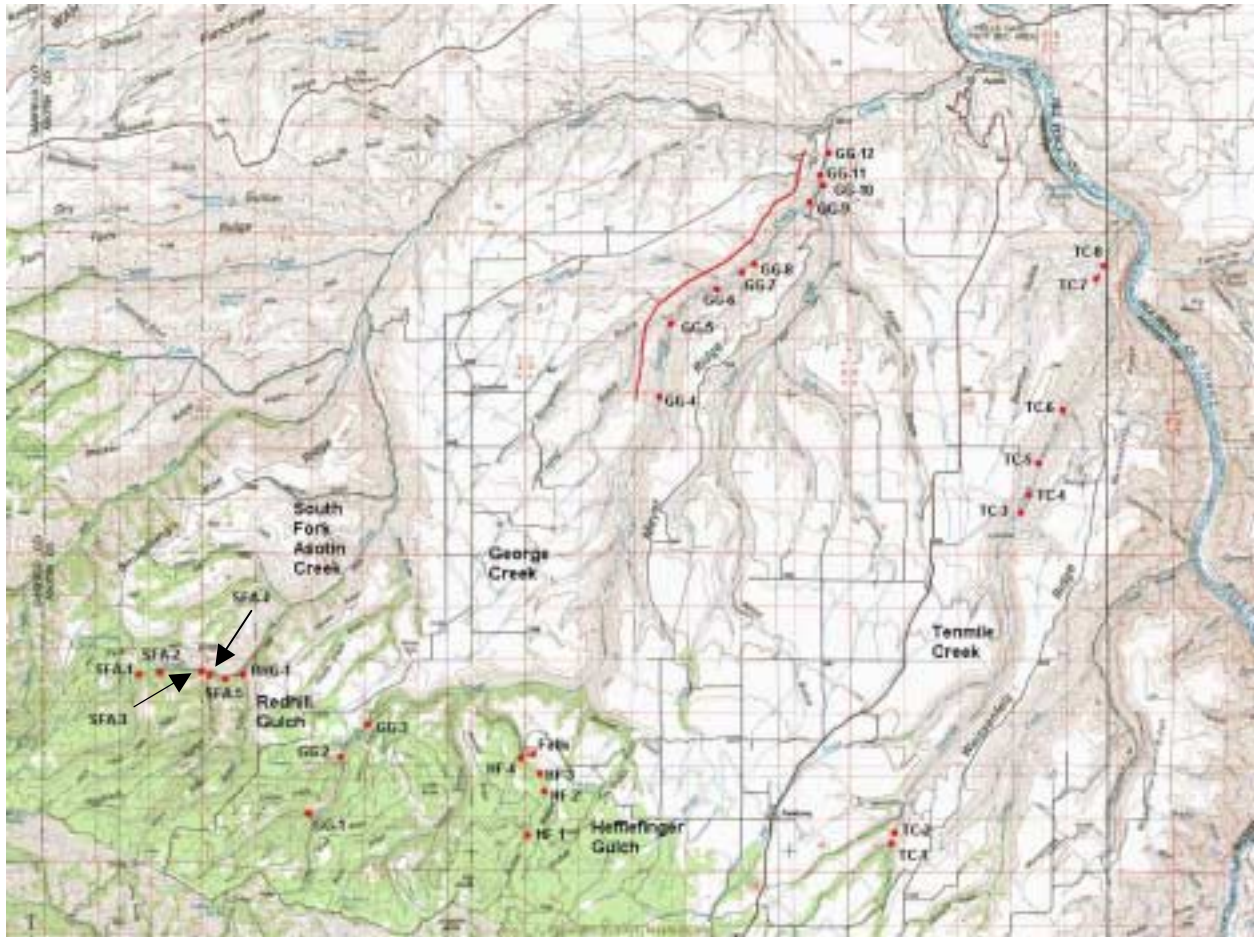


**Figure 5.** Electrofishing sites on Bear Creek (BC1-8) and Buford Creek (BU1-4), tributaries to Grande Ronde River, 2005. Note that on Buford Creek, the stream was intermittent from site BU-1 to BU-4, and downstream of BU-4, the stream was dry.

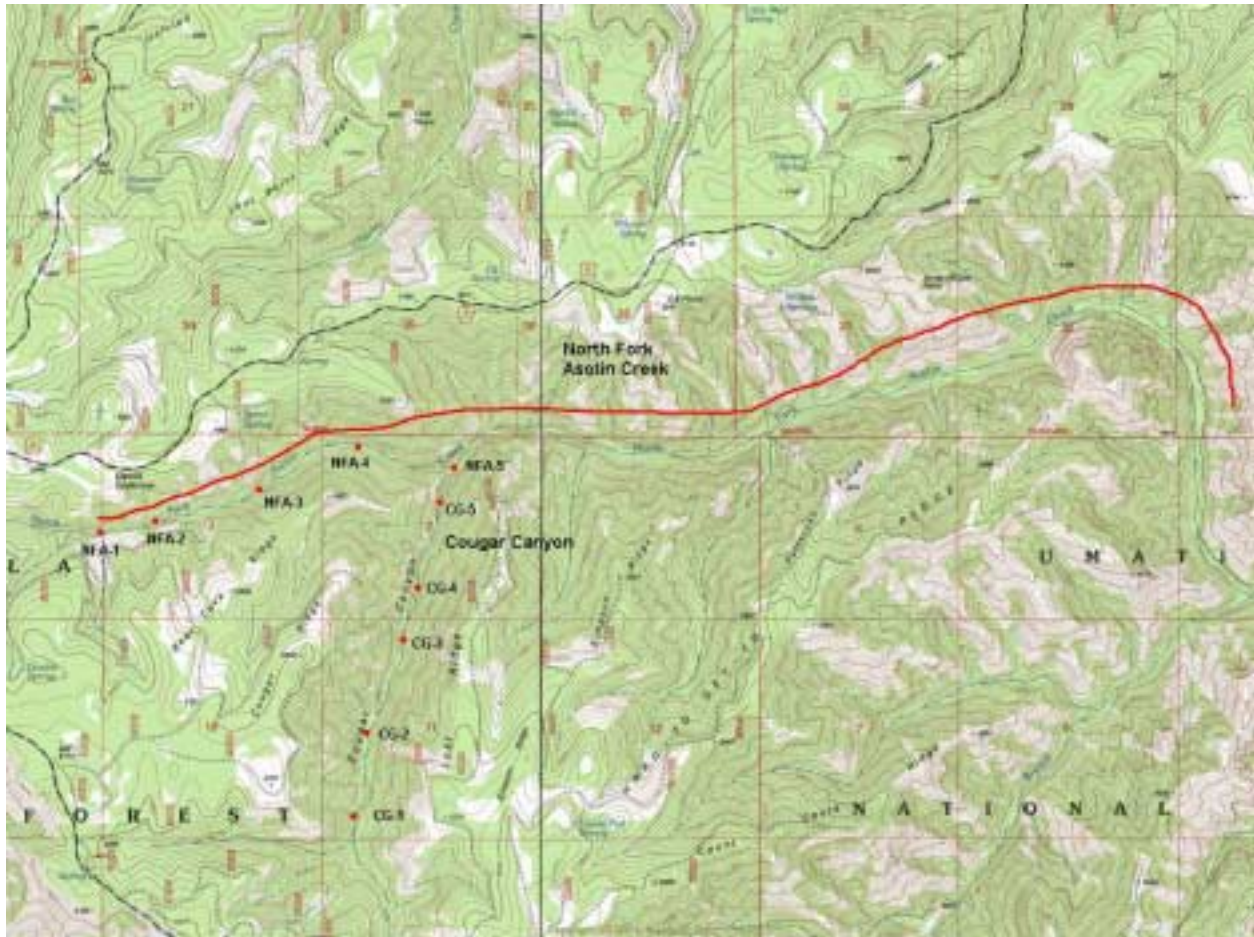


**Figure 6.** Attempted electrofishing sites on Myers Creek (M1-M2) and Shumaker Creek (SC1-SC2), tributaries to Grande Ronde River, 2005. Both streams were dry, with the exception of a trace of water at the head of Shumaker Creek, and midway between sites M-1 and M-2 on Myers Creek.





**Figure 7.** Electrofishing, flow measurement, water temperature data loggers, and fish salvage sites on South Fork Asotin Creek (SFA1-SFA5), Redhill Gulch (RHG 1), George Creek (GG1-GG12), Hefflefinger Gulch (HF1-HF4), and Tenmile Creek (TC1-TC8). (See Appendix A - Table 1). Steelhead spawning surveys were conducted on reaches of stream paralleling the solid (red) line on George Creek.



**Figure 8.** Electrofishing sites on North Fork Asotin Creek (NFA1-NFA5) and Cougar Canyon (CG1-CG5), 2005. Bull trout spawning survey was conducted on reaches of stream paralleling the solid (red) line.

<b>Table 2.</b> Relative abundance and distribution from electrofishing surveys of the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.									
<b>Stream</b>	<b>Site #</b>	<b>Date</b>	<b>Site Length (m)</b>	<b>Ave. width (m)</b>	<b>Area (m<sup>2</sup>)</b>	<b>Ave. Bankfull width (m)</b>	<b>Relative Abundance by size/age class<sup>a</sup></b>	<b>Number of Rainbows/100m<sup>2</sup></b>	<b>Number of Bull Trout/100m<sup>2</sup></b>
<b>Lower Grande Ronde Tributaries</b>									
<b>Grouse Creek</b>	GC-1	7/7	35.0	2.8	98.0	4.8	One age 1+ RBT (199mm), one legal-sized RBT (220mm), CF-present	2.0	0.0
	1.3 miles above WA/OR state line								
	GC-2	7/7	46.0	2.3	105.8	3.1	Six age 1+ RBT's (131-174mm), CF-present	5.7	0.0
	0.6 miles above WA/OR state line								
	GC-3	7/7	57.4	3.3	189.4	5.5	One age 0+ RBT (39mm), one legal-sized RBT (205mm), CF-present	1.1	0.0
	0.4 miles above WA/OR state line								
	GC-4	7/7	48.5	2.6	126.1	3.8	33 age 1+ RBT's (84-144mm) CF-present	26.2	0.0
	Just above WA/OR state line								
<b>Bear Creek</b>	BR-1	7/7	39.0	2.1	81.9	4.6	Three age 1+ RBT's (140-170mm)	3.7	0.0
	0.7 miles up West Fork								
	BR-2	7/7	39.0	2.2	85.8	3.8	Six age 1+ RBT's (120-162mm), three legal-sized (200-215mm) RBT's	10.5	0.0
	0.3 miles up West Fork								
	BR-3	7/7	39.0	2.1	81.9	4.7	Six age 1+ RBT's (124-172mm)	7.3	0.0
	0.5 miles up East Fork								
	BR-4	7/7	39.0	1.6	62.4	3.9	Four age 1+ RBT's (142-172mm)	6.4	0.0
	0.4 miles up East Fork								
	BR-5	7/7	39.0	2.3	89.7	5.1	58 age 0+ RBT's (41-55mm), nine age 1+ RBT's (108-167mm), three age 0+ WCH (77-85mm)	74.7	0.0
	0.4 miles below forks								
	BR-6	7/7	39.0	2.4	93.6	7.1	167 age 0+ RBT's (33-56mm), one age 1+ RBT (185mm)	179.5	0.0
	0.5 miles below forks								
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ , Size/age class is based on fish length. Bull Trout $\geq 200$ mm in fork length are considered adults.									

<b>Table 2. (Cont.)</b> Relative abundance and distribution from electrofishing surveys of the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.									
<b>Stream</b>	<b>Site #</b>	<b>Date</b>	<b>Site Length (m)</b>	<b>Ave. width (m)</b>	<b>Area (m<sup>2</sup>)</b>	<b>Ave. Bankfull width (m)</b>	<b>Relative Abundance by size/age class<sup>a</sup></b>	<b>Number of Rainbows/100m<sup>2</sup></b>	<b>Number of Bull Trout/100m<sup>2</sup></b>
<b>Bear Creek (Cont).</b>	BR-7	7/7	39.0	2.6	101.4	6.0	Four age 0+ RBT's (54-58mm), one age 1+ RBT (162mm), three age 0+ WCH (85-95mm)	4.9	0.0
	BR-8	7/7	50.0	2.6	130.0	N/A	14 age 1+ RBT's (105-190mm), one age 0+ WCH (84mm)	10.8	0.0
<b>Buford Creek</b>	BU-1	7/6	62.0	3.4	210.8	4.8	82 age 1+ RBT's (86-156mm), one legal-sized RBT (200mm)	39.4	0.0
	BU-2	7/6	57.0	3.6	205.2	4.1	Eleven age 1+ RBT's (106-141mm)	5.4	0.0
	BU-3	7/6	63.0	3.1	195.3	6.2	63 age 1+ RBT's (95-197mm), CF-present	32.3	0.0
	BU-4	7/6	50.0	1.7	85.0	5.1	Three age 1+ RBT's (114-132mm)	3.5	0.0
<b>Shumaker Creek</b>	SC-1	7/6	N/A	N/A	N/A	N/A	No fish found, stream was dry	0.0	0.0
	SC-2	7/6	N/A	N/A	N/A	N/A	No fish found, stream was dry	0.0	0.0
<b>Myers Creek</b>	M-1	7/6	N/A	N/A	N/A	N/A	No fish found, stream was dry	0.0	0.0
	M-2	7/6	N/A	N/A	N/A	N/A	No fish found, stream was dry	0.0	0.0
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ , Size/age class is based on fish length. Bull trout $\geq 200$ mm in fork length are considered adults.									

**Table 2. (Cont.)** Relative abundance and distribution from electrofishing surveys of the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Tenmile Creek</b>	TC-1	6/23	30.0	0.8	24.0	N/A	One age 1+ RBT (162mm)	4.2	0.0
			1.0 miles below instream pond						
	TC-2	6/23	100.0	1.9	190.0	N/A	Two age 1+ RBT's (123-168mm)	1.1	0.0
			1.3 miles below instream pond						
	TC-3	6/23	100.0	3.1	310.0	N/A	One age 1+ RBT (98mm), SCP-rare, SD-uncommon	0.3	0.0
			River mile 6.9						
	TC-4	6/23	100.0	5.0	500.0	N/A	122 age 1+ RBT's (82-197mm), BLS-rare SCP, SD-common	24.4	0.0
			River mile 6.5						
TC-5	6/23	95.0	4.4	418.0	N/A	81 age 1+ RBT's (81-183mm), BLS-uncommon, SCP, SD-common	19.4	0.0	
		River mile 5.8							
TC-6	6/23	100.0	4.3	430.0	N/A	Nine age 1+ RBT's (117-188mm), SD-abundant	2.1	0.0	
		River mile 4.6							
TC-7	6/29	100.0	3.5	350.0	N/A	18 age 1+ RBT's (70-165mm), one age 0+ WCH (70mm)	5.1	0.0	
		River mile 1.5							
TC-8	6/29	100.0	3.7	370.0	N/A	34 age 1+ RBT's (80-177mm), SD-common, CF-present	9.2	0.0	
		River mile 1.1							
<b>Asotin Creek Basin</b>									
<b>SF Asotin Creek</b>	SFA-1	6/15	30.0	1.9	57.0	N/A	Nine age 1+ RBT's (80-163mm), TF-rare	15.8	0.0
			2.0 miles above Redhill Gulch						
	SFA-2	6/15	30.0	2.0	60.0	N/A	Twelve age 1+ RBT's (84-173mm)	20.0	0.0
		1.6 miles above Redhill Gulch							
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout $\geq 200$ mm in fork length are considered adults.									

<b>Table 2. (Cont.)</b> Relative abundance and distribution from electrofishing surveys for the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.									
<b>Stream</b>	<b>Site #</b>	<b>Date</b>	<b>Site Length (m)</b>	<b>Average width (m)</b>	<b>Area (m<sup>2</sup>)</b>	<b>Ave. Bankfull width (m)</b>	<b>Relative Abundance by size/age class<sup>a</sup></b>	<b>Number of Rainbows/100m<sup>2</sup></b>	<b>Number of Bull Trout/100m<sup>2</sup></b>
<b>SF Asotin Creek (Cont.)</b>	SFA-3	6/15	63.0	2.1	132.3	N/A	Twelve age 1+ RBT's (61-166mm), TF-rare	9.1	0.0
	0.8 miles above Redhill Gulch								
	SFA-4	6/15	70.0	1.3	91.0	N/A	No fish found	0.0	0.0
~50 meters up right bank tributary									
SFA-5	6/15	60.0	2.9	174.0	N/A	Five age 1+ RBT's (72-135mm), SCP-rare	2.9	0.0	
0.3 miles above Redhill Gulch									
<b>Redhill Gulch</b>	RHG-1	6/15	75.0	1.0	75.0	N/A	Two age 1+ RBT's (92-149mm)	2.7	0.0
~50 meters up Redhill Gulch									
<b>NF Asotin Creek</b>	NFA-1	8/24	30.0	2.2	66.0	2.4	One age 1+ BT (164mm)	0.0	1.5
	Below confluence of Double Springs								
	NFA-2	8/24	35.0	4.2	147.0	5.7	Four age 1+ BT's (111-153mm)	0.0	2.7
	River mile 16.4								
	NFA-3	8/24	30.0	2.6	78.0	3.9	No fish found	0.0	0.0
River mile 15.9									
NFA-4	8/24	31.0	2.0	62.0	3.1	One age 1+ BT (143mm), TF-rare	0.0	1.6	
River mile 15.4									
NFA-5	8/24	30.0	3.4	102.0	6.9	13 age 1+ BT's (87-148mm), six age 1+ RBT's (146-179mm), TF-rare	5.9	12.7	
~50 meters below Cougar Canyon confluence									
<b>Cougar Canyon</b>	CG-1	8/24	38.0	3.1	117.8	N/A	Eight age 1+ RBT's (127-181mm)	6.8	0.0
0.1 miles below forks									
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout $\geq 200$ mm in fork length are considered adults.									

<b>Table 2. (Cont.)</b> Relative abundance and distribution from electrofishing surveys for the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.									
<b>Stream</b>	<b>Site #</b>	<b>Date</b>	<b>Site Length (m)</b>	<b>Average width (m)</b>	<b>Area (m<sup>2</sup>)</b>	<b>Ave. Bankfull width (m)</b>	<b>Relative Abundance by size/age class<sup>a</sup></b>	<b>Number of Rainbows/100m<sup>2</sup></b>	<b>Number of Bull Trout/100m<sup>2</sup></b>
<b>Cougar Canyon (Cont.)</b>	CG-2	8/24	51.0	2.2	112.2	N/A	Three age 1+ RBT's (122-159mm), TF-rare	2.7	0.0
	0.5 miles below forks								
	CG-3	8/24	40.0	3.4	136.0	N/A	Nine age 0+ RBT's (32-46mm), two age 1+ RBT's (127-158mm)	8.1	0.0
	1.0 miles below forks								
	CG-4	8/24	42.0	3.9	163.8	N/A	27 age 0+ BT's (43-58mm), two age 0+ RBT's (21mm) ten age 1+ RBT's (83-174mm), TF-uncommon	7.3	16.5
	1.2 miles below forks								
	CG-5	8/24	45.0	2.3	103.5	N/A	Two age 1+ BT's (92-187mm), 13 age 1+ RBT's (75-158mm), TF-uncommon	12.6	1.9
	1.6 miles below forks								
<b>George Creek</b>	GG-1	6/29	100.0	1.8	180.0	N/A	Two age 1+ RBT's (106-129mm), TF-rare	1.1	0.0
	1.2 miles above Forest Service line								
	GG-2	6/29	100.0	2.0	200.0	N/A	One age 0+ RBT (61mm), 13 age 1+ RBT's (74-174mm), CF-present	7.0	0.0
	0.1 miles below Forest Service line								
	GG-3	6/29	100.0	2.0	200.0	N/A	18 age 1+ RBT's (72-164mm)	9.0	0.0
	Trent Ridge culvert								
GG-4	6/21	100.0	3.5	350.0	N/A	Nine age 0+ RBT's (38-49mm), 44 age 1+ RBT's (92-158mm), SD-common, SCP-rare	15.1	0.0	
Upper end of WDFW property boundary									
GG-5	6/21	100.0	3.5	350.0	N/A	Five age 0+ RBT's (43-48mm), 66 age 1+ RBT's (85-162mm), SD-abundant, SCP-common	20.3	0.0	
~200 meters above Stringtown Gulch									
GG-6	6/21	100.0	4.3	430.0	N/A	21 age 0+ RBT's (30-54mm), 58 age 1+ RBT's (85-155mm), SCP, SD-abundant, CF-present	18.4	0.0	
Rockpile Gulch									
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout $\geq 200$ mm in fork length are considered adults.									

**Table 2. (Cont.)** Relative abundance and distribution from electrofishing surveys for the lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek basin, 2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>George Creek (Cont.)</b>	GG-7	6/21	100.0	4.6	460.0	N/A	24 age 0+ RBT's (36-54mm), 36 age 1+ RBT's (88-160mm), SCP, SD-common	13.0	0.0
			2.4 miles above Meyer Ridge Rd. bridge						
	GG-9	6/21	100.0	6.0	600.0	N/A	58 age 0+ RBT's (28-60mm), 29 age 1+ RBT's (95-170mm), SCP, SD-common	14.5	0.0
			0.3 miles above Meyer Ridge Rd. bridge						
	GG-11	6/21	N/A	N/A	N/A	N/A	One age 0+ RBT (54mm), six age 1+ RBT's (110-160mm). Sampled large pool for DNA only	N/A	0.0
		0.3 miles below Meyer Ridge Rd. bridge							
	GG-12	7/19	~ 804.7	N/A	N/A	N/A	~2000-3000 RBT's, SD-abundant, SCP-uncommon, fish salvage	N/A	0.0
			River mile 0.7 to Meyer Ridge Rd. bridge						
	GG-12	8/17	~ 804.7	N/A	N/A	N/A	~ 200 RBT's, SCP, SD-abundant, CF-present Fish salvage	N/A	0.0
			River mile 0.7 to Meyer Ridge Rd. bridge						
<b>Hefflefinger Gulch</b>	HF-1	6/29	100.0	1.7	170.0	N/A	No fish found	0.0	0.0
			Bennett Ridge Road						
	HF-2	6/29	100.0	2.4	240.0	N/A	No fish found	0.0	0.0
			~ 1.0 miles below Bennett Ridge Road						
	HF-3	6/29	100.0	2.5	250.0	N/A	No fish found	0.0	0.0
			River mile 2.1						
	HF-4	6/29	100.0	2.2	220.0	N/A	No fish found	0.0	0.0
			River mile 1.6						
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout $\geq 200$ mm are considered adults.									



## Steelhead Spawning Surveys

Steelhead spawning surveys were conducted in George Creek in 2005 (Figure 7, Table 3). The last time this area was surveyed was in April of 2001. The survey covered a total of 6.5 miles of known spawning habitat. The majority of the area surveyed was walked three times to obtain a cumulative redd count. However, the lower 0.7 miles was walked only once on the final survey to see if steelhead were using this area. Extremely low stream flows and multiple dry areas that did not allow fish passage were observed during the first survey. Stream flows had increased by the second survey and allowed passage for adult steelhead. Surveyors observed 23 redds and 13 live adult steelhead during this survey. During the final survey, seven redds, five live steelhead, and five dead steelhead were observed.

Reach/ Date	Survey	Stream Section <sup>a</sup>	Surveyed Miles	Redds	Redds per mile	Fish Observed	
3/18	1	(A) River mile 7.2 to river mile 4.3 <sup>b</sup>	2.9	0	0.0	0	0
3/18	1	(B) River mile 4.3 to river mile 1.4 <sup>c</sup>	2.9	0	0.0	0	0
4/21	1	(C) River mile 1.4 to river mile 0.7	0.7	1	1.4	0	0
4/6	2	(A) River mile 7.2 to river mile 4.3	2.9	4	1.4	4	0
4/6	2	(B) River mile 4.3 to river mile 1.4	2.9	19	6.6	9	0
4/21	3	(A) River mile 7.2 to river mile 4.3	2.9	2	0.7	2	3
4/21	3	(B) River mile 4.3 to river mile 1.4	2.9	4	1.4	3	2
<b>Total</b>			<b>6.5</b>	<b>30</b>	<b>4.6</b>	<b>18</b>	<b>5</b>

<sup>a</sup> A: river mile 7.2 (upper end of WDFW lands) downstream to Rockpile Gulch, B: Rockpile Gulch downstream to Meyer Ridge Rd. bridge, C: Meyer Ridge Rd. bridge to river mile 0.7 (lower end of channel reconstruction site below Pintler Creek).  
<sup>b</sup> No possible passage to this section due to dry areas in sections downstream  
<sup>c</sup> Multiple dry sections and extreme low flows did not allow passage to spawning areas at this time

## Bull Trout Spawning Surveys

Bull trout spawning surveys were conducted in North Fork Asotin Creek in 2005 (Figure 8, Table 4). The survey covered a total of 5.8 miles of known, or suspected spawning habitat. The survey area was walked only once due to extremely low stream flows. Surveyors observed two redds and one live fish in the lower section of the survey area. A limited amount of spawning habitat was noted in this section. In the upper section of the survey area, eight redds and four live bull trout were observed. This was unexpected by surveyors due to multiple dry areas and low flows present in this section. The lowest bull trout observed in the basin was approximately one mile below Cougar Canyon, while the lowest redd in the basin was observed approximately 0.5 miles below Cougar Canyon. The uppermost bull trout observed during the survey was located approximately 0.7 miles above Cougar Canyon, while the uppermost redd was observed approximately 1.4 miles above Cougar Canyon. Cougar Canyon, (a small tributary to North Fork Asotin Creek), also contains known spawning habitat. However, this area was not surveyed due to multiple dry areas and the absence of mature bull trout observed during earlier electrofishing surveys. Average redd mound size on the North Fork Asotin Creek was

approximately 33.5 x 36.6 cm (1.1 by 1.2 ft) for the five redds measured. The five fish observed were 152-250 mm (6-10 inches) in length.

**Table 4.** Bull trout spawning survey summary for the North Fork Asotin Creek, 2005 (see Figure 8).

Reach/ Date	Survey	Stream Section <sup>a</sup>	Surveyed Miles	Redds	Redds per mile	Fish Observed
9/8	1	(A) River mile 16.9 to river mile 15.0	1.9	8	4.2	4
9/8	1	(B) River mile 15.0 to river mile 11.1	3.9	2	0.5	1
<b>Total</b>			<b>5.8</b>	<b>10</b>	<b>1.7</b>	<b>5</b>

<sup>a</sup> A: Forks downstream to mouth of Cougar Canyon, B: Mouth of Cougar Canyon downstream to one mile above Middle Branch.

## Tissue Sampling

Fin clips were collected from a total of 277 salmonids in this study area in 2005 (Table 5). Eleven of these samples were taken from adult steelhead during spawning surveys, 246 samples were taken from juvenile rainbow/steelhead during electrofishing surveys, and 20 samples were collected from juvenile bull trout during electrofishing surveys from mid June through late August. We applied the bull trout sampling protocol to rainbow trout as well.

All adult steelhead samples were collected from lower George Creek (river mile 7.2 to river mile 0.7) in April of 2005. These 11 samples are not included in the totals on Table 5.

**Table 5.** Tissue samples collected in lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek drainage, 2005.

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
Grouse Ck.	0	0	0	24	7	19
Bear Ck.	0	0	0	45	7	23
Buford Ck.	0	0	0	35	15	20
Tenmile Ck.	0	0	0	41	11	21
SF Asotin Ck.	0	0	0	23	15	17
NF Asotin Ck.	15	9	11	4	0	3
Cougar Canyon	5	4	2	24	8	17
George Ck.	0	0	0	50	30	45
<b>Totals</b>	<b>20</b>	<b>13</b>	<b>13</b>	<b>246</b>	<b>93</b>	<b>165</b>

## Stream Profiles of Lower Grande Ronde Tributaries

### Grouse Creek

Surveyors conducted electrofishing at four sites on July 7<sup>th</sup> from the state line upstream 1.3 miles. Multiple age classes of rainbow/steelhead from 39mm to 220mm were found (Table 2). The majority of the fish (33 of 43) were found in one site directly above the state line. Tissue samples were collected from some fish (Table 5). We also found crayfish in this stream

(Appendix C). Water temperatures taken at the four sites ranged between 55-60 °F between 0900 and 1230 hrs.

Grouse Creek is a small tributary to the Grande Ronde River located approximately 3.9 miles northeast of Troy, Oregon. The lower 3.25 miles are in Oregon, as is the confluence with the Grande Ronde River. Habitat features noted during the surveys include a high gradient, substrate of large cobble and boulders, moderate to high sedimentation, and a thin band of fair to good riparian vegetation. The close proximity of the county road has likely caused the unnatural confinement of the stream, thus contributing to the high gradient. Grouse Creek also contains four culverts (photos 1,2, 4) in the surveyed area that are likely passage barriers. The lower culvert, about 100 m upstream of the mouth, and the steep gravel delta into the Grande Ronde makes access difficult for fish entering this stream. Much of the stream channel was dry with water filtering through the rocks and among the boulders.



**Photo 1.** Lower culvert with a steep delta and rock weirs in lower Grouse Creek that is 100 meters or more upstream of the Grande Ronde River during summer.



**Photo 2.** Lower Culvert (in Photo 1) and its relative size at roadway to Troy, Oregon.



**Photo 3.** One of the better habitat areas (GC-4, a short distance upstream of the state line) between the lower two culverts on Grouse Creek.



**Photo 4.** Long, steep culvert (Second culvert upstream of mouth of Grouse Creek) that is rusted through 0.5 meters from the downstream end. Much of the water during low flow goes under the lower portion of the culvert instead of discharging at the bottom lip of the culvert. This culvert is in need of replacement.

### **Bear Creek**

Surveyors rafted across the Grande Ronde River to conduct electrofishing at eight sites on Bear Creek on July 7<sup>th</sup>, 2005. Sites sampled in both the East Fork (2 sites) and West Fork (2 sites) of Bear Creek, and just below the forks to the mouth (4 sites). Multiple age classes and sizes of rainbow/steelhead (from 33-215mm) were found, along with a seven Chinook (77-95mm) in the lower sites (Table 2). We found large phenotypic differences between some of the rainbow/steelhead captured in Bear Creek (Photos 7 and 8). Genetic samples were collected from a portion of the juvenile rainbow/steelhead (Table 5). No bull trout were observed or non-salmonids were observed (Appendix C).

Bear Creek is a small tributary located on the south side of the Grande Ronde River approximately 4.2 miles above Washington highway 129. The stream appears to be seasonally water limited with areas that are completely dry in the summer. As with other small streams in the region, lack of riparian cover coincides with dewatered reaches. Both forks contain a narrow

riparian belt consisting of cottonwoods with a brush understory and an occasional conifer. Riffle and plunge pools with medium and large cobble dominated the four sites within the forks. The most noticeable feature below the forks was the lack of riparian cover. From the forks to the mouth approximately two-thirds of the streambed was dry and lacked riparian vegetation. A delta at the mouth, and upstream for about a half mile, was completely dry at the time of surveys. The stream would benefit from riparian restoration, as vegetation seems to correlate with increased flows and the presence of fish.



**Photo 5.** Mainstem Bear Creek ~0.5 miles above mouth.



**Photo 6.** West fork of Bear Creek ~0.3 miles above mouth.



**Photo 7.** Rainbow/steelhead from West Fork Bear Creek ~0.3 miles above mouth, notice the difference between this fish and the one in Photo 8.



**Photo 8.** Rainbow/steelhead from West Fork Bear Creek ~0.3 miles above mouth, notice the difference between this fish and the one in Photo 7.

## **Buford Creek**

Five electrofishing surveys were conducted on Nez Perce Tribal Lands along Buford Creek on July 6<sup>th</sup>, 2005 (Table 2). The surveys were conducted from just above the culvert at the state line (river mile 3.0) down about 1.6 miles. One cursory survey was conducted wherever there was adequate water above the culvert near the state line to document the presence of fish. Multiple age classes of rainbow/steelhead were found during this survey, although no individual fish data were collected or recorded in Table 2. During the remaining four surveys, we found a total of 159 age 1+ rainbow/steelhead ranging from 86-197mm, plus one legal-sized rainbow/steelhead ( $\geq 200$ mm or 8 in). We collected tissues from many of these fish (Table 5). Water temperatures at four of the sites ranged from 57-64 °F between 1100 and 1450 hrs. Crayfish were observed in this stream (Appendix C).

Buford Creek is a small tributary to the Grande Ronde River that follows Highway 129 along its entire 3.0 mile length in Washington State. Like many other small streams in southeast Washington, lack of riparian areas coincide with dry stream reaches. A stream flow measurement was taken at the state line and measured 0.11 cfs. A culvert under Highway 129 directly below the state line has baffles and a fish passage apron installed (Photo 9). It appears to provide some passage, although it probably does not meet passage criteria. From the state line downstream approximately a mile, the stream consists of medium cobble and large boulder substrate, moderate sedimentation, a moderate riparian zone, and mostly riffle with large plunge pools. Below this area the stream takes on a slightly different look. The riparian vegetation becomes much more sporadic and stream flows and the channel gradient appear to decrease. The stream is completely dry for the much of this area. Buford Creek would benefit from restoration of riparian vegetation and improved stream flows.



**Photo 9.** Culvert (6-8 ft in diameter) and fish passage apron just downstream of the Oregon state line on Washington Highway 129 (becomes Oregon Highway 3) on Buford Creek. Large deep pool below culvert upstream of site BU-1.



**Photo 10.** Downstream of pool at culvert on upper Buford Creek shown in Photo 9 upstream of Site BU-1.



**Photo 11.** About 100 m downstream of culvert near state line in photo 9 on Buford Creek (Site BU-1)



**Photo 12.** Site BU-3 on Buford Creek. Note large boulders and a few plunge pools. Much of the rest of the stream is dry or nearly dry.



**Photo 13.** Downstream of site BU-4 on Buford Creek. Much of this stream channel is dry.

### **Shumaker Creek**

Electrofishing surveys were attempted on Shumaker Creek on July 6<sup>th</sup>, 2005. However, due to the lack of water, no actual electrofishing surveys were conducted. Most of the stream was searched for water but only a few locations had any water.

Shumaker Creek is a small spring fed tributary located on the north side of the Grande Ronde River south of the town of Asotin. The most noted habitat features were the lack of water and riparian vegetation. The stream was completely dry in the majority of the surveyed area (3.7 miles), and areas that were wet did not have enough water to support fish. The riparian vegetation consisted of scattered deciduous trees and a sparse brush understory. It is unclear whether fish use Shumaker Creek during years with more stream flow.



**Photo 14.** Near the mouth of Shumaker Creek.



**Photo 15.** Lower Shumaker Creek near the mouth.



**Photo 16.** Culvert on upper Shumaker Creek at low flows. It appears to be a total barrier, even if flows were higher.



## Myers Creek

Electrofishing surveys were attempted on Myers Creek on July 6<sup>th</sup>, 2005. However, due to the lack of water, no actual electrofishing surveys were conducted. Most of the stream was searched for water but only a few locations had any water.

Myers Creek is a small tributary located on the north side of the Grande Ronde River on WDFW lands. A survey was conducted from the forks to the mouth (1.2 miles). The most noticeable features of Myers Creek are the lack of riparian vegetation and water, and an extremely steep gradient. Only occasional small trees and brush were present and the streambed was completely dry throughout the majority of the surveyed area. The mouth of Myers Creek looks to be impassable even with high flows due to a steep drop (approximately ten feet) in the lower fifteen feet of stream. The probability for fish use (even seasonally) appears to be extremely low.



**Photo 17.** Looking downstream from the forks on Myers Creek.



**Photo 18.** Looking upstream into the East Fork of Myers Creek.

## **Stream Profiles of Lower Snake and Asotin Creek Tributaries**

### **Tenmile Creek (Lower Snake River Tributary)**

Electrofishing surveys were conducted on Tenmile Creek on June 23<sup>rd</sup> and June 29<sup>th</sup>, 2005, primarily to collect genetic samples from rainbow/steelhead juveniles (Table 5). The eight sites were sampled from the headwaters to a mile above the mouth (Table 2). The eight sites

produced 268 age 1+ rainbow/steelhead (81-197mm), plus one of the lower sites contained one age 0+ chinook (70mm). Age 0+ rainbow/steelhead were not observed during electrofishing, which suggests that spawning may not have occurred in the spring due to extremely low flows and poor access for adult steelhead. Temperatures at two sites in upper Tenmile were 58 °F between 1230 and 1330 hrs. The middle sites sampled in Tenmile produced water temperatures of 58 and 78 between 1200 and 1410 hrs. The lower sites had water temperatures of 65 and 66 between 1430 and 1530 hrs. Speckled dace and crayfish were also observed here (Appendix C).

Tenmile Creek is a small Snake River tributary located southeast of the town of Asotin. This stream has been described previously in Mendel et al. 2001 and 2004. The headwaters consist of scattered pines and hawthorns with a brush understory. Other habitat features noted include high sedimentation, moderate bank stability, and large cobble with boulders. An extreme lack of water was also noted. Habitat conditions in the middle portion of Tenmile Creek include scattered riparian belts (mainly cottonwoods), fair bank stability, and moderate to high sedimentation. The lower two sites consisted of a narrow riparian vegetation belt, moderate to high sedimentation, and good bank stability. Like many other small southeast Washington stream, lack of adequate water appears to be the largest limiting factor for summer rearing.

### **South Fork Asotin Creek**

Electrofishing surveys were conducted on the upper South Fork of Asotin Creek on June 15<sup>th</sup>, 2005 to determine bull trout use and collect genetic and scale samples from both bull trout and rainbow/steelhead. Five electrofishing sites were conducted from river mile 9.1 to river mile 10.9. A total of 38 rainbow/steelhead were collected (Table 2) and of those there were 21 genetic samples and 15 scale samples collected (Table 5). Bull trout were not collected or observed in the five survey sites sampled, but that does not necessarily mean that bull trout do not use this stream, as only a small area was surveyed.

The South Fork of Asotin Creek is a tributary to Asotin Creek located southwest of the town of Asotin. The area surveyed consisted of a dense coniferous and deciduous riparian area containing pines, firs, cottonwoods, and alders as well as a thick brush understory. Other habitat attributes were little to moderate sedimentation, good bank stability, small to large cobble with some boulders, and moderate amounts of large woody debris. Water temperatures were low, averaging 44.6°F (range of 43-47 from 1330-1530 hrs), which is optimal for bull trout use. For the month of June it seemed there was little water, which is consistent with the other southeast Washington streams sampled in the low water year of 2005.

### **Redhill Gulch**

One electrofishing survey was conducted on lower Redhill Gulch on June 15<sup>th</sup>, 2005 to determine fish use while conducting surveys on the South Fork of Asotin Creek (Table 2). There were only two rainbow/steelhead collected (92 and 149mm). Both of the fish collected were sampled for genetics and scales. A water temperature measurement of 42 °F was recorded at about 1200 hrs. Sculpins and tailed frogs were also observed in the upper portion of this stream (Appendix C).

Redhill Gulch is a small tributary to the South Fork of Asotin Creek located approximately at river mile 8.8. The habitat in the area surveyed consisted of small to medium cobble, good riparian, moderate amounts of large woody debris, and high sedimentation. There was little water, frequent plunge pools, and a possible barrier just upstream of the mouth.

### **North Fork Asotin Creek**

Five electrofishing surveys were conducted on North Fork Asotin Creek on August 24<sup>th</sup>, 2005 (Table 2). The purpose of these surveys was to collect bull trout genetic samples and determine species composition, distribution and relative abundance. The surveys took place from just below the mouth of Cougar Canyon upstream to just below Double Springs. A total of 19 age 1+ bull trout (87-164mm) and six age 1+ rainbow/steelhead (146-179mm) were sampled. Genetic samples were obtained from fifteen bull trout and four rainbow/steelhead (Table 5). Bull trout distribution included the highest and lowest sites sampled. Water temperatures ranged from 44-48 °F between 1115 and 1715 hrs. Tailed frogs were observed in the upper North Fork (Appendix C).

A bull trout spawning survey was conducted on North Fork Asotin Creek on September 8<sup>th</sup>, 2005 (Table 4). The survey started approximately one mile above the Middle Branch of the North Fork Asotin Creek and ended 1.9 miles above Cougar Canyon. Due to the very limited water and few redds only one survey was conducted. A total of ten redds and five bull trout were observed during the survey. Two redds and one bull trout were observed just below Cougar Canyon and the other eight redds and four bull trout were observed above Cougar Canyon. Water temperature of 48° F was recorded at about 1000 hrs.

The North Fork of Asotin Creek is a tributary to Asotin Creek located west-southwest of the town of Asotin. Habitat features noted below Cougar Canyon include a scattered conifer riparian forest with a dense alder and brush understory, moderate to high sedimentation, abundant woody debris, and small to large cobble with scattered boulders. Above Cougar Canyon habitat features include a scattered conifer riparian forest with a dense alder understory, moderate to high sedimentation, small to medium cobble with scattered areas of gravel and boulders, and fair woody debris. The riparian vegetation becomes quite narrow in multiple areas due to clearcut areas from past logging operations. The most noted habitat feature above Cougar Canyon was limited water. There were areas of dry streambed and subsurface flows. It is unknown if this is typical during late summer and early fall or if it is caused by the drought in 2005.



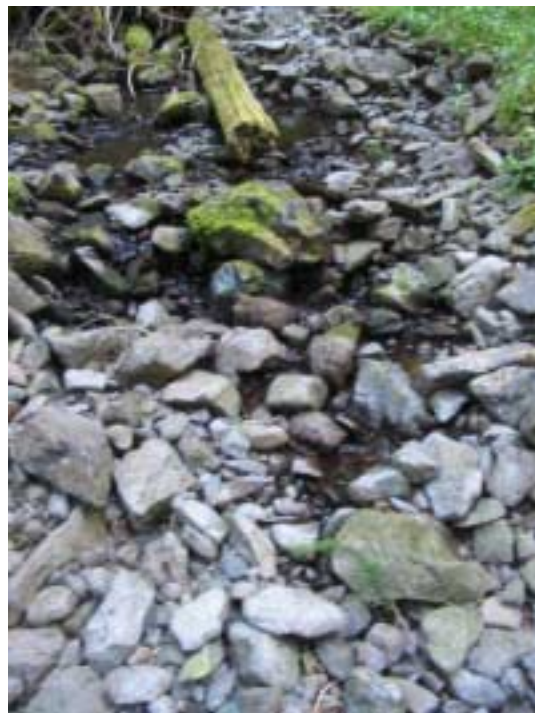
**Photo 19.** North Fork Asotin Creek on the lower half of the electrofishing survey area.



**Photo 20.** North Fork Asotin Creek just above the mouth of Cougar Canyon.



**Photo 21.** North Fork Asotin Creek above Cougar Canyon during a bull trout spawning survey on September 8<sup>th</sup>, 2005. Note dry areas of the channel.



**Photo 22.** North Fork Asotin Creek above Cougar Canyon during a bull trout spawning survey on September 8<sup>th</sup>, 2005. Note nearly dry channel.

### **Cougar Canyon**

Electrofishing surveys took place on Cougar Canyon on August 24<sup>th</sup>, 2005 to document species composition, distribution, and relative abundance (Table 2). Five sites were sampled from 0.1

miles below the forks to 0.2 miles above the mouth. Multiple age and size classes of rainbow/steelhead (21-181mm) and 29 bull trout (43-187mm) were found. Tissue samples were collected (Table 5). Water temperatures at the five sites ranged from 41-47 °F from 1000 to 1450 hrs. Tailed frogs were observed (Appendix C).

Cougar Canyon is a small tributary of North Fork Asotin Creek located approximately 2.5 miles southeast of Clearwater Lookout. Good riparian vegetation exists, consisting of scattered pines with an alder and brush understory. At times the riparian zone is quite narrow due to clearcut areas from past logging operations. Other habitat features include good bank stability, moderate to high sedimentation, small to medium cobble with scattered boulders, and an abundance of woody debris. The limited water was unexpected. There are several areas where the stream went subsurface creating a passage barrier to migrating fish. It is currently unknown if this is typical or is due to the 2005 drought.



**Photo 23.** Cougar Canyon ~1.0 miles below forks.



**Photo 24.** Cougar Canyon ~1.0 miles below forks.



**Photo 25.** Cougar Canyon ~1.2 miles below forks.

### **George Creek**

Three steelhead spawning surveys were conducted on lower George Creek from mid-March to late April (Table 3). The first survey on March 18<sup>th</sup>, revealed extremely low stream flows and multiple dry areas, creating fish passage barriers. The second survey was conducted on April 6<sup>th</sup> and stream flows had increased to allow passage for migrating adult steelhead. During this survey, 13 live adults and 23 redds were observed in 5.8 miles. The final survey took place on April 21<sup>st</sup>. Another 10 steelhead (five live and five dead) and seven new redds were observed during this survey. Streamflow on this date was 14.7 cfs. All eleven genetic samples collected during spawning surveys were from unmarked steelhead.

We conducted eleven electrofishing surveys on George Creek from June 21<sup>st</sup> to August 17<sup>th</sup>, 2005 (Table 2). Three of these surveys were in the upper basin from 1.2 miles above the U.S. Forest Service property line down to Trent Ridge Road on June 29<sup>th</sup>. We captured rainbow/steelhead from 61-174 mm. Six surveys took place on June 21<sup>st</sup> in the lower portion of George Creek (river mile 7.2 to river mile 0.7) to collect genetic samples, distribution, species composition, and relative abundance information. A total of 118 age 0+ rainbow/steelhead (28-60mm) and 239 age 1+ rainbow/steelhead (85-170mm) were found (Table 2). Tissue samples were collected from many of the trout (Table 5). No bull trout were found. Water temperatures in upper George Creek ranged from 46-50 °F between 1030 and 1340 hrs, and temperatures in lower George Creek 65-73 between 1045 and 1515 hrs. Sculpins and speckled dace were observed in lower George Creek, but the only non-salmonids observed in upper George Creek were tailed frogs and crayfish (Appendix C).

Two fish salvage efforts were conducted on lower George Creek from Meyer Ridge Road bridge downstream 0.7 miles to assist the Asotin County Conservation District with the removal of fish from a stream reach that was being dewatered during a channel reconstruction project to improve habitat conditions for fish. The first survey took place on July 19<sup>th</sup> by several agencies including; Asotin County Conservation District, United State Forest Service (USFS), Lyons

Ferry Hatchery Complex, WDFW Snake River Lab and Fish Management Personnel. A total of three electrofishers, several dip nets, and a fish transport tanker were used on this first survey. Due to the large number of fish in the salvaged area, they could not be individually counted. It is estimated that 2,000 to 3,000 salmonids were collected and transported to Asotin Creek just above the Cloverland Road bridge. The second salvage encompassed the same 0.7 miles and took place on August 17<sup>th</sup> by Asotin County Conservation District, USFS, and WDFW Fish Management personnel. One electrofisher and several dip nets and buckets were used to collect fish. Fish were not individually counted due to fair numbers of fish and time constraints. It is estimated that approximately 200+ salmonids were collected and transported to Asotin Creek just above the Cloverland Road bridge during this survey.

George Creek is a large tributary to Asotin Creek in Asotin County that WDFW previously surveyed in 2000 and 2003 (Mendel et al 2001 and 2004). The surveyed portion of upper George Creek (Trent Ridge Road upstream) is quite different from that of lower George Creek. The upper basin consists of a narrow canyon containing a conifer overstory and brush understory riparian zone, moderate to low gradient, and small to medium cobble substrate. As noted by previous reports (Mendel et. al. 2004 a), the culvert at Trent Ridge is still a potential barrier due to being undersized and slightly perched. The lower portion of George Creek (from the upstream portion of WDFW property to Meyer Ridge Rd. bridge) contains a much different habitat. Conifers are sparse and cottonwoods and willows are more prevalent. Moderate to high sedimentation exists. Good spawning habitat is also present (gravel and small cobble), as noted in spawning surveys (Table 3). The largest limiting factor for summer rearing is the limited water from early summer to late fall. For about 0.8 miles below the Meyer Ridge Road bridge the stream changes drastically. Riparian vegetation is much more limited and the stream channel is much more unstable. This area includes a deposition zone at the confluence of George and Pintler creeks. Asotin County Conservation District (with the help of others), conducted a stream reconstruction project in this area. The stream has been moved away from the road, meanders were installed, and small trees have been planted to try and stabilize this area and improve habitat conditions for fish.



**Photo 26.** Upper end of the steelhead spawning survey area on lower George Creek, on March 18<sup>th</sup>, 2005.



**Photo 27.** Steelhead (circled) swimming up through a shallow riffle on lower George Creek, on March 18<sup>th</sup>, 2005.



**Photo 28.** Upper George Creek 0.1 miles below the Forest Service line.

### **Hefflefinger Gulch**

Four electrofishing surveys (Table 2) were also conducted on upper Hefflefinger Gulch on June 29<sup>th</sup> from 1.6 miles above the mouth to Bennett Ridge Road (1.9 miles). No fish were found. Water temperatures were 49-50 °F from 1115 to 1240 hrs.

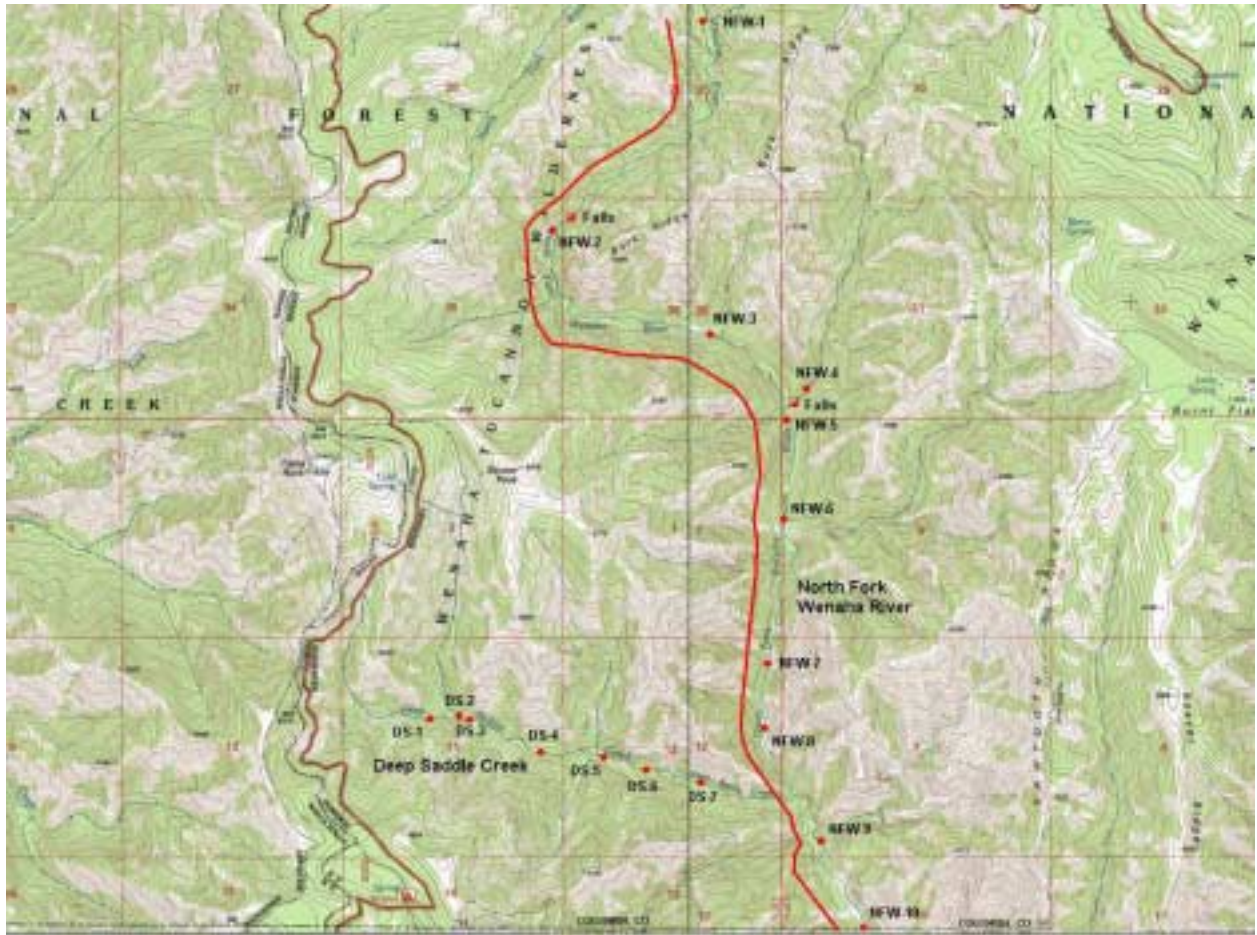
Hefflefinger Gulch is a small tributary to George Creek approximately 2.6 miles below Trent Ridge Road. The habitat in the lower 0.9 miles consists of a thick riparian zone containing a coniferous overstory and a dense alder and brush understory. Small to medium cobble with scattered areas of gravel, high sedimentation, and fair bank stability were other noted habitat features. At the lowest survey site (river mile 1.6) a head cut exists creating a four to five foot falls that is a barrier. The habitat conditions at the uppermost survey site were different from those below. The canyon is much wider creating a meadow-like stream. Scattered pines, heavy sedimentation, and gravel and mud substrate comprise the habitat.

## **2. Wenaha River Tributaries in Washington State**

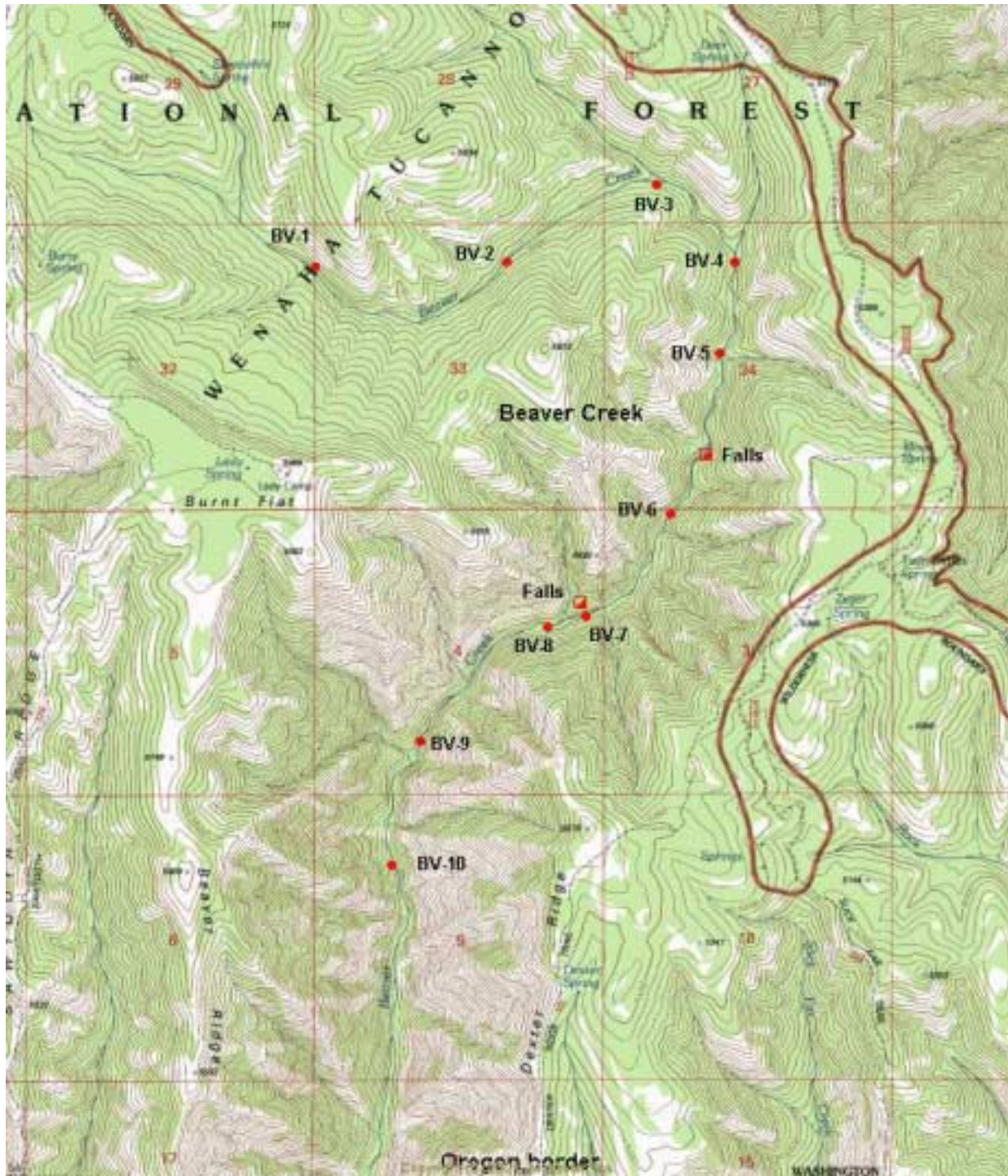
### **Electrofishing Surveys**

Electrofishing surveys were conducted in early August of 2005 in the North Fork Wenaha River drainage and Beaver Creek to assess distribution, relative abundance, species composition, and to collect genetic samples for future analysis. Surveys were conducted on four streams encompassing 12.2 river miles (Figures 2, 9, 10, and Table 6).





**Figure 9.** Electrofishing sites on Deep Saddle Creek (DS1-DS7) and North Fork Wenaha River (NFW1-NFW10) upstream of Oregon/Washington border, 2005. Bull trout spawning surveys were conducted on reaches of stream paralleling the solid (red) line. Note location of two falls on an upper unnamed tributary and the upper mainstem North Fork Wenaha River.



**Figure 10.** Electrofishing sites on Beaver Creek (BV1-BV10), upstream of the Oregon/Washington border, 2005. Note location of upper and lower falls.

**Table 6.** Relative abundance and distribution from electrofishing surveys conducted in Wenaha River Tributaries in Washington State, 2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
NF Wenaha River	NFW-1 River mile 5.8	8/3	37.0	4.0	148.0	5.0	One adult BT (248mm), TF-rare	0.0	0.7
	NFW-2 River mile 4.5	8/3	41.0	4.6	188.6	7.5	27 age 0+ BT's (32-52mm), ten age 1+ BT's (92-165mm), four age 1+ RBT's (152-192mm), TF-uncommon	2.1	19.6
	NFW-3 River mile 3.3	8/3	37.0	5.5	203.5	8.2	22 age 0+ BT's (44-52mm), 20 age 1+ BT's (87-177mm), one adult BT (223mm), four age 1+ RBT's (147-178mm)	2.0	21.1
	NFW-4 0.15 miles up unnamed tributary	8/2	30.0	2.4	72.0	3.5	18 age 1+ RBT's (74-187mm), TF-rare	25.0	0.0
	NFW-5 ~ 0.1 miles below unnamed tributary	8/2	30.0	4.3	129.0	6.9	Six age 0+ BT's (39-59mm), eleven age 1+ BT's (98-122mm), four age 1+ RBT's (155-177mm), TF-uncommon	3.1	13.2
	NFW-6 ~ 0.5 miles below unnamed tributary	8/2	38.0	5.7	216.6	6.6	20 age 0+ BT's (42-62mm), eight age 1+ BT's (95-154mm), one adult BT (207mm), five age 1+ RBT's (147-182mm)	2.3	13.4
	NFW-7 ~ 0.7 miles above Deep Saddle Creek	8/3	30.0	6.0	180.0	N/A	14 age 0+ BT's (40-58mm), nine age 1+ BT's (88-176mm), seven age 1+ RBT's (142-190mm), two legal-sized RBT's (228mm), SCP, TF-rare	4.4	12.8
	NFW-8 ~ 0.4 miles above Deep Saddle Creek	8/3	50.0	5.3	265.0	N/A	12 age 0+ BT's (44-58mm), seven age 1+ BT's (95-120mm), 18 age 1+ RBT's (100-186mm), Three legal-sized RBT's (208-235mm), SCP, TF-uncommon	7.9	7.2

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish lengths. Bull trout  $\geq 200$ mm in fork length are considered adults.

**Table 6. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in Wenaha River Tributaries in Washington State, 2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>NF Wenaha River (cont.)</b>	NFW-9 ~ 0.3 miles below Deep Saddle Creek	8/3	50.0	4.9	245.0	N/A	Five age 0+ BT's (44-60mm), eight age 1+ BT's (97-188mm), 12 age 1+ RBT's (89-192mm), two Legal RBT's (212-242mm), one age 0+ WCH (62mm), SCP-common	5.7	5.3
	NFW-10 WA/OR state line	8/3	70.0	6.4	448.0	N/A	Two age 0+ BT's (49-60mm), nine age 1+ BT's (112-160mm), one adult BT (232mm), three age 0+ RBT's (40-43mm), ten age 1+ RBT's (96-172mm), three legal RBT's (208-238mm), 17 age 0+ WCH (53-82mm), SCP-common	3.6	2.7
<b>Deep Saddle Creek</b>	DS-1 ~ 50 meters above left bank tributary	8/2	50.0	2.3	115.0	N/A	No fish found	0.0	0.0
	DS-2 ~ 50 meters up left bank tributary	8/2	50.0	4.4	220.0	N/A	One age 1+ RBT (90mm), TF-rare	0.5	0.0
	DS-3 Just below left bank tributary	8/2	70.0	4.1	287.0	N/A	Three age 1+ RBT's (79-194mm)	1.0	0.0
	DS-4 ~ 0.4 miles below left bank tributary	8/2	50.0	4.0	200.0	N/A	15 age 1+ RBT's (75-180mm), TF-common	7.5	0.0
	DS-5 River mile 0.9	8/2	52.0	2.5	130.0	N/A	22 age 1+ RBT's (70-186mm), one legal RBT (210mm), TF-uncommon	17.7	0.0
	DS-6 River mile 0.7	8/2	46.0	3.4	156.4	N/A	Two age 0+ RBT's (64-69mm), 13 age 1+ RBT's (80-180mm), TF-common	9.6	0.0
	DS-7 River mile 0.5	8/2	50.0	2.5	125.0	N/A	20 age 1+ RBT's (72-187mm), three legal RBT's (200-218mm), TF-uncommon	18.4	0.0
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout $\geq 200$ mm in fork length are considered adults.									

**Table 6. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in Wenaha River Tributaries in Washington State, 2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
Beaver Creek	BV-1	7/28	30.0	2.1	60.3	N/A	No fish found	0.0	0.0
			Below unnamed tributary on right bank						
	BV-2	7/28	30.0	2.3	60.9	N/A	No fish found	0.0	0.0
			0.6 miles upstream of Elwell Spring tributary						
	BV-3	7/28	30.0	3.1	90.3	N/A	No fish found	0.0	0.0
			Just above Elwell Spring tributary						
	BV-4	7/28	30.0	2.4	72.0	3.5	Three age 1+ RBT's (167-175mm), TF-common	4.2	0.0
			Just below Deer Spring tributary						
	BV-5	7/28	86.0	4.0	344.0	N/A	Four age 1+ RBT's (157-187mm), TF-common	1.2	0.0
			0.5 miles below Deer Spring tributary						
BV-6	7/28	40.0	3.9	156.0	N/A	13 age 1+ RBT's (73-187mm), TF-uncommon	8.3	0.0	
		1.0 miles below Deer Spring tributary							
BV-7	7/28	8.0	9.6	76.8	N/A	Seven age 1+ RBT's (123-191mm)	9.1	0.0	
		Base of lower falls at river mile 2.4							
BV-8	7/28	45.0	3.3	148.5	N/A	Ten age 1+ RBT's (72-190mm), TF-rare	6.7	0.0	
		1.5 miles below Deer Spring tributary							
BV-9	7/28	45.0	3.3	148.5	N/A	Eleven age 1+ RBT's (72-190mm), TF-rare	7.4	0.0	
		1.6 miles above WA/OR border							
BV-10	7/28	45.0	4.3	193.5	N/A	Seven age 1+ RBT's (140-192mm)	3.6	0.0	
		~ 1.0 miles above WA/OR border							

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trout  $\geq 200$ mm in fork length are considered adults.

## Bull Trout Spawning Surveys

Bull trout spawning surveys were conducted in the North Fork Wenaha River and the Butte Creek system in 2005 (Figure 9, Tables 7, 8). The surveys covered a total of 15.6 miles of presumed spawning habitat. The North Fork Wenaha was surveyed twice during September and October. A total of 153 redds (26.4 redds per mile) and 89 live bull trout were observed on the North Fork Wenaha during the two surveys between NFW1 and NFW10. Bull trout and redds were observed at NFW10 and NFW1 where the survey was terminated, so we suspect that bull trout distribution extends further in both directions.

It appears only resident bull trout were above the falls on the North Fork Wenaha. The average bull trout redd mound below the falls was 73.15 x 67.1cm (2.4 by 2.2 ft, range of 1x 1 to 4 x 4) for the 57 redds measured. Estimated size of 78 observed fish in this portion of the stream ranged from about 200 mm (8 in) to 864 mm (34 in), with an average of just under 508 mm (20 in). Above the falls the average redd mound was 33.5 x 33.5 cm (1.1 by 1.1 ft, range of 8 x 8 inch to 2 x 2 ft) for 9 redds measured. Average fish size was estimated to be about 216 mm (8.5 in) for the 14 fish observed (range of 8-11 in).

**Table 7.** Bull trout spawning survey summary for the North Fork Wenaha River in Washington State, 2005. See Figure 10.

Reach/ Date	Survey	Stream Section <sup>a</sup>	Surveyed Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
9/19	1	(A) River mile 5.8 to river mile 4.6	1.2	17	14.2	13	0
9/19	1	(B) River mile 4.6 to river mile 2.7	1.9	50	26.3	41	0
9/19	1	(C) River mile 2.7 to river mile 0.4	2.3	41	17.8	32	0
9/6	1	(D) River mile 0.4 to river mile 0.0 <sup>b</sup>	0.4	2	5.0	3	0
10/10	2	(A) River mile 5.8 to river mile 4.6	1.2	3	2.5	1	0
10/10	2	(B) River mile 4.6 to river mile 2.7	1.9	16	8.4	2	0
10/10	2	(C) River mile 2.7 to river mile 0.4	2.3	14	6.1	0	0
10/10	2	(D) River mile 0.4 to river mile 0.0 <sup>c</sup>	0.4	10	25.0	0	0
<b>Total</b>			<b>5.8</b>	<b>153</b>	<b>26.4</b>	<b>92</b>	<b>0</b>

<sup>a</sup> A: 0.4 miles below forks downstream to falls, B: Falls downstream to 1.0 mile above Deep Saddle Ck., C: 1.0 mile above Deep Saddle Ck. downstream to 0.4 miles above state line, D: 0.4 miles above state line to state line  
<sup>b</sup> Survey conducted by ODFW  
<sup>c</sup> Twelve redds were observed but only ten were counted since the two ODFW flags could not be found

The Butte Creek system was surveyed only once over a period of two days due to the remoteness (32 miles round-trip, on foot) as well as time and funding constraints. A total of 31 redds were observed (Table 8, Figure 11). The majority of spawning activity took place on the West Fork of Butte Creek (23 redds and 17 live bull trout). Bull trout and redds were observed directly below a set of falls, and extended downstream to just above the mouth of West Butte Creek. The remaining eight bull trout redds were observed in mainstem Butte Creek from just above Box Canyon downstream to one-quarter mile above the state line (with the exception of Box Canyon, where no redds or fish were seen). No redds or fish were observed on Preacher Creek or East Fork Butte Creek and time constraints precluded surveys on Rainbow Creek.

Average redd mound size was not much different between West Butte Creek and mainstem Butte Creek. The average redd mound was 85.3 x 64.0 cm (2.8 by 2.1 ft) in West Butte Creek (ranged from 2 x 1 ft to 5.5 x 3.5 ft) for the 12 redds measured. Estimated fish size was 229 to 660 mm (9 to 26 in) for the 17 bull trout observed, with an average of just under 432 mm (17 in). Only four redds were measured in mainstem Butte Creek but they averaged 76.2 x 70.1 cm (2.5 by 2.3 ft, range of 2 x 2 to 4 x 3 ft). No fish were observed in this stream reach.

**Table 8.** Bull trout spawning survey summary for Butte Creek and its tributaries in Washington State, 2005. See Figure 11.

Reach/ Date	Survey	Stream Section <sup>a</sup>	Surveyed Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
<b>West Fork Butte Creek</b>							
9/13	1	(A) River mile 3.1 to river mile 2.1	1.0	16	16.0	13	0
9/13	1	(B) River mile 2.1 to river mile 0.0	2.1	7	3.3	4	0
<b>Total</b>			<b>3.1</b>	<b>23</b>	<b>7.4</b>	<b>17</b>	<b>0</b>
<b>Preacher Creek</b>							
9/13	1	(C) River mile 0.8 to river mile 0.0	0.8	0	0.0	0	0
<b>Total</b>			<b>0.8</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>
<b>East Fork Butte Creek</b>							
9/13	1	(D) River mile 0.5 to river mile 0.0	0.5	0	0.0	0	0
<b>Total</b>			<b>0.5</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>
<b>Butte Creek</b>							
9/14	1	(E) River mile 5.4 to river mile 0.0	5.4	8	1.5	0	0
<b>Total</b>			<b>5.4</b>	<b>8</b>	<b>1.5</b>	<b>0</b>	<b>0</b>

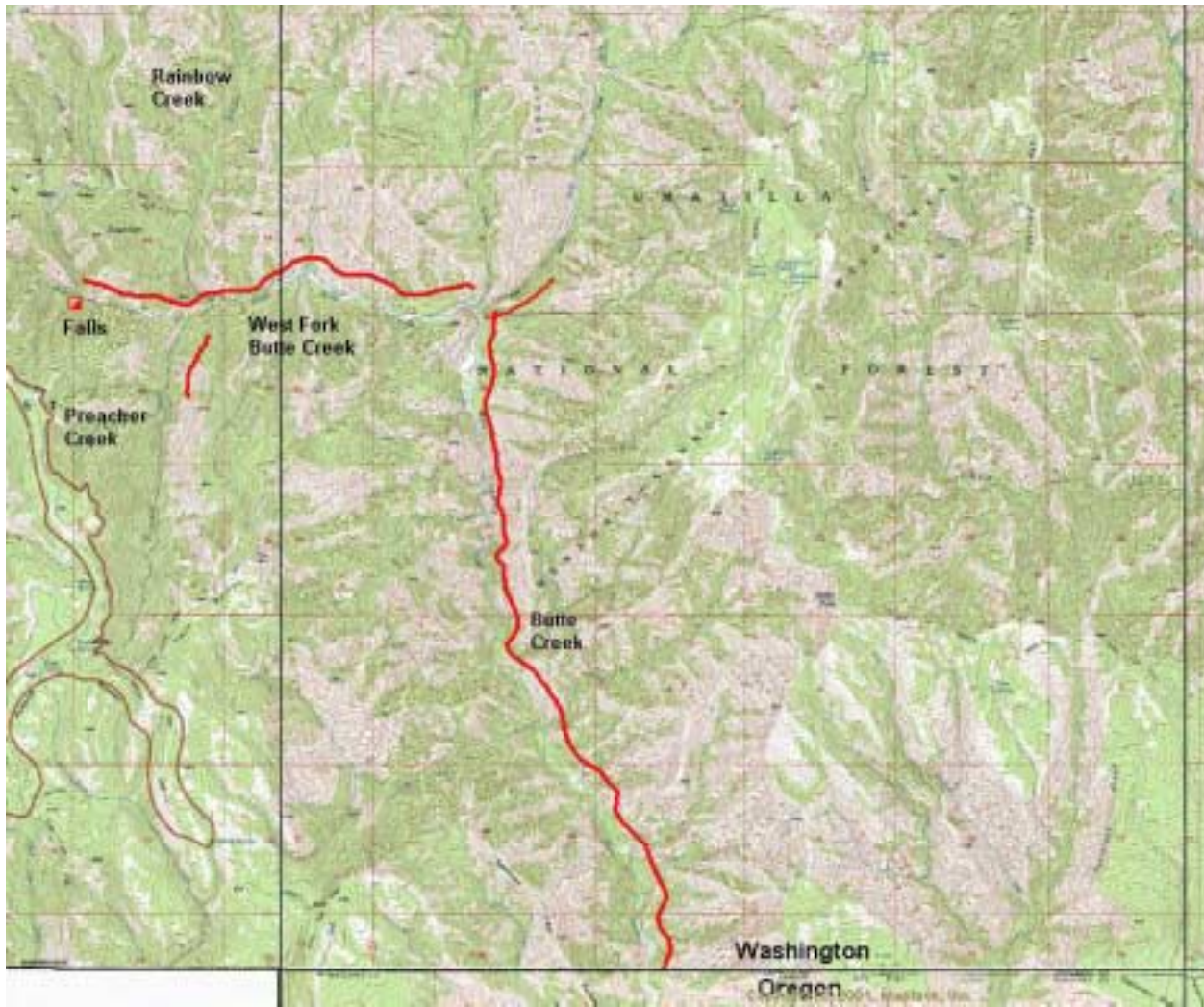
<sup>a</sup> A: Falls downstream to mouth of Rainbow Creek, B: Mouth of Rainbow Creek downstream to mouth of West Fork, C: River mile 0.8 to mouth of Preacher Ck, D: River mile 0.5 of East Fork to mouth, E: Forks to state line

## Spring Chinook Spawning Surveys

A total of seven spring chinook redds and one dead spring chinook were also observed during the bull trout spawning survey in Butte Creek. The uppermost chinook redd was observed approximately 1.5 miles above the Oregon border and the lowest was observed 0.5 miles above the border. A chinook carcass was found one mile above the state line. Average size of the redd mound was 143.3 x 149.3 cm (4.7 by 4.9 ft) for the five redds measured.

## Tissue Sampling

Fin clips were collected from a total of 209 salmonids in this study area in 2005 (Table 9). One of these samples was taken from an adult spring chinook carcass found in lower Butte Creek during bull trout spawning surveys. The remaining 208 samples (75 bull trout, 126 rainbow/steelhead, 7 chinook) were collected from juveniles during electrofishing surveys.



**Figure 11.** Spawning survey reaches on Butte Creek and tributaries, 2005.

**Table 9.** Tissue samples collected in Wenaha River tributaries in Washington State, 2005.

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
NF Wenaha R.	75	53	40	45	13	40	7	7
Deep Saddle Ck.	0	0	0	42	17	20	0	0
Beaver Ck.	0	0	0	39	7	39	0	0
<b>Totals</b>	<b>75</b>	<b>53</b>	<b>40</b>	<b>126</b>	<b>37</b>	<b>99</b>	<b>7</b>	<b>7</b>



## Stream Profiles of Upper Wenaha River Tributaries

### North Fork Wenaha River

Ten electrofishing sites were sampled in the North Fork Wenaha and one unnamed tributary during the first week of August (Table 6). A total of 222 bull trout, 95 rainbow/steelhead, and 18 chinook juveniles were sampled during these surveys. One of the bull trout sampled was collected 1.2 miles above an impassable falls, and eighteen of the rainbow/steelhead were sampled in an unnamed tributary near the base of Buck Ridge, above an impassable falls. Tissue samples were collected from many of the trout (Table 9). The bull trout captured above the falls was noticeably different looking than the bull trout captured downstream (Photos 33-34). Water temperatures during these surveys ranged from 49-58 °F from 1040-1825 hrs. Sculpins and tailed frogs were observed in the North Fork Wenaha (Appendix C- Table 2).

Bull trout spawning surveys were conducted on the North Fork Wenaha River in the fall due to the large number of age 0+ bull trout found during electrofishing surveys (Table 7). The first survey took place on September 6<sup>th</sup> by Oregon Department of Fish and Wildlife (ODFW) from 0.4 miles above the state line (at Indian Trail) to the mouth. ODFW surveyors observed two redds and three live bull trout within the Washington portion of their survey. WDFW Fish Management personnel conducted the first survey on September 19<sup>th</sup> and covered 5.4 miles of presumed spawning habitat. In the lower portion of the survey (0.4 miles above the state line to the impassable falls at river mile 4.6), surveyors observed 91 redds and 73 live bull trout. Above the falls (which is ~4 m or 12 feet high and appears impassable) surveyors counted 17 redds and 13 live bull trout. The second survey occurred on October 10<sup>th</sup> and encompassed 5.8 miles. Surveyors observed twelve redds from the state line upstream 0.4 miles. However, since no flags were observed from the previous walk conducted by ODFW, only ten of these redds were counted as new redds. From 0.4 miles above the state line to the falls, surveyors observed forty new redds and two live bull trout. Above the falls surveyors observed three new redds and one live bull trout. No spring Chinook adults or redds were observed within the Washington portion.

In 1988 the Washington Department of Fisheries surveyed approximately 1.5 miles of this stream from the state line upstream for spawning spring Chinook (Seidel et al. 1988). One redd was sighted. In 1989 the same area was surveyed and no redds were observed. WDFW staff recall observing spring Chinook spawning between Indian Trail and Deep Saddle Creek in the mid 1990s during recreational trips. This appears to be the upper end of current spring Chinook distribution (about 0.5 miles into Washington).

The North Fork Wenaha River is a large tributary of the Wenaha River in the Wenaha-Tucannon Wilderness Area approximately two miles southwest of Ski Bluewood. Stream and habitat characteristics are slightly different in the surveyed area above the falls than the area below the falls. Above the falls, the stream is in a deep narrow canyon containing an abundant amount of woody debris, moderate sedimentation, and gravel with small to medium cobble. The main riparian zone is located on the hillsides above the stream and contains conifers with scattered alders and brush. The falls has a jump pool below of approximately 1.6 m (five feet) deep. The stream becomes much higher in gradient with areas of bedrock, medium to large cobble, and low sedimentation for the first half mile below the falls. At this point the stream takes on a slightly

different look downstream to Deep Saddle Creek. The canyon becomes wider creating more room for the stream to meander and therefore it has lower gradient. Alder and scattered conifers comprise the riparian zone that is next to the stream rather than on the hillside. Small and medium cobble are the dominant substrate. Below Deep Saddle Creek, the stream contains approximately one third to one half more water than the area above Deep Saddle Creek. The increase in flows is due to both Deep Saddle Creek and multiple springs entering the stream. The stream here is very low gradient containing small to medium cobble with scattered boulders and low sedimentation. The riparian vegetation is comprised of scattered conifers with an alder and brush understory.



**Photo 29.** North Fork Wenaha below falls in Photo 31.



**Photo 30.** Bedrock chute on North Fork Wenaha ~0.3 miles above falls seen in Photo 31.



**Photo 31.** Falls on upper North Fork Wenaha.



**Photo 32.** North Fork Wenaha ~0.7 miles above the mouth of Deep Saddle Creek.



**Photo 33.** Bull trout found above falls on North Fork Wenaha, notice the difference between this fish and the one in Photo 34.



**Photo 34.** Bull trout found near state line on North Fork Wenaha, notice the difference between this fish and the one in Photo 33.



**Photo 35.** North Fork Wenaha River ~1.0 miles above the end of Buck Ridge.

### **Unnamed Tributary of North Fork Wenaha**

One electrofishing site (NFW-4) was sampled on an unnamed tributary that runs along the east side of Buck Ridge, approximately 2.5 miles upstream of the WA/OR border (Table 6). The site is located approximately 0.15 miles above the mouth of the tributary just above an impassable waterfall. Surveyors sampled multiple age and size classes of rainbow/steelhead (76-187mm) during the survey. Surveyors also conducted one cursory survey of the pool below the 2.4 to 3 m (eight to nine ft) high waterfall and found bull trout and rainbow/steelhead. However, as this was just a cursory survey below the falls, no data were recorded.

The stream was approximately 2.5 meters in width and contained very little water. There was good riparian vegetation, abundant small pools, good spawning gravel along with small to medium size cobble, and abundant woody debris. The waterfall exists approximately 300 m above the mouth and is a possible passage barrier.



**Photo 36.** Unnamed tributary on North Fork Wenaha east of Buck Ridge.

### **Deep Saddle Creek**

Seven electrofishing sites were sampled in Deep Saddle Creek on August 6<sup>th</sup> from the headwaters to the mouth (Table 6). Three sites were upstream of an impassable bedrock chute located ~100 meters below the forks. Three age 1+ rainbow/steelhead (79-90mm) were found above the bedrock chute and one age 1+ rainbow/steelhead (194mm) was found in the pool directly below the chute. The remaining four sites were sampled between the bedrock chute at river mile 1.6 and the mouth. A total of 72 age 1+ rainbow/steelhead (64-187mm) and three legal-sized ( $\geq 200$ mm or 8in) rainbow/steelhead (200-218mm) were sampled in this section. Tissues were collected from many of the trout (Table 9). Water temperatures at the sampled sites ranged from 50-56 °F between 1120 and 1720 hrs. Tailed frogs were observed (Appendix C).

Deep Saddle Creek is a spring fed tributary to the North Fork Wenaha River located approximately 0.7 miles above the state line in the Wenaha Tucannon Wilderness area. Habitat features remain fairly consistent throughout the stream. These features include a scattered pine overstory and dense alder and brush understory, medium to large cobble with scattered boulders, and an abundance of woody debris. The stream has a fairly steep gradient throughout creating a majority of riffles and scattered plunge pools.



**Photo 37.** Upper Deep Saddle Creek in right bank tributary just above forks.



**Photo 38.** Deep Saddle Creek looking up into left bank tributary.



**Photo 39.** Deep Saddle Creek at river mile 0.7.



**Photo 40.** Rainbow trout found during electrofishing survey on Deep Saddle Creek.



**Photo 41.** Looking up unnamed left bank tributary of Deep Saddle Creek ~1.0 miles above mouth.

### **Beaver Creek**

Ten electrofishing sites were sampled on Beaver Creek from the headwaters to one mile above the state line on July 28<sup>th</sup> (Table 6). Three sites were sampled above the Deer Spring tributary, but no fish of any species were encountered. Two sites were sampled between Deer Spring and the upper falls with a total of seven age 1+ rainbow/steelhead (157-187mm) sampled. One site was between the upper falls and the lower falls with thirteen age 1+ rainbow/steelhead sampled. From the base of the lower falls to approximately one mile above the state line, four sites were electrofished and a total of 35 age 1+ rainbow/steelhead (72-192mm) and one legal-sized (233mm) rainbow/steelhead were sampled. No other salmonids were observed during these surveys even though past surveys by Oregon Department of Fish and Wildlife and the USFS indicate that bull trout and chinook juveniles were present in the lower portion of Beaver Creek near, or below the state line. Tissues were collected from many of the trout (Table 9). Water temperatures were 42-44 °F between 0915 and 1115 hrs upstream of Deer Spring, and 52-61 °F between 1115 and 1445 hrs downstream of Deer Spring. Tailed frogs were observed here (Appendix C-Table 2).

Beaver Creek is a tributary to the Wenaha River located in the Wenaha Tucannon Wilderness area approximately three miles southeast of Ski Bluewood. The upper basin habitat conditions are very different from those in the lower portion of the surveyed area. From the headwaters (river mile 5.8) to the uppermost falls (river mile 2.9), the stream is very low gradient, contains

gravel and small cobble with scattered boulders, a good riparian zone consisting of scattered pines and alders, high sedimentation, and a large amount of woody debris. The falls is approximately 2 to 2.1 m (six to seven feet) tall with a 1 to 1.3 m (three to four foot) jump pool (Figure 10). From the uppermost falls to the next falls (approximately 0.75 miles) the stream is high gradient, contains medium to large cobble with scattered areas of bedrock, a good riparian zone consisting of scattered pines, firs, and alders, and moderate to low sedimentation. The lower falls is approximately 2.2 to 2.6 m (seven to eight feet) tall with a 1.3 to 1.6 m (four to five foot) jump pool (Figure 10). From the lower falls downstream to one mile above the state line, the stream has a moderate to high gradient, a good riparian vegetation buffer, and contains an adequate amount of woody debris. Very little gravel exists for spawning, although several small rainbow/steelhead (~72mm) were sampled.



**Photo 42.** Beaver Creek between upper and lower falls seen in photos 43 and 45.



**Photo 43.** Lower falls on Beaver Creek about 2 miles above the Oregon border.



**Photo 44.** Beaver Creek ~1.2 miles above the Washington/Oregon state line.



**Photo 45.** Upper falls on Beaver Creek over 2.5 miles above the Oregon border.



**Photo 46.** Beaver Creek ~1.5 miles below Deer Spring tributary.



**Photo 47.** Upper Beaver Creek just below forks.



**Photo 48.** Upper Beaver Creek showing small headcut between forks and uppermost electrofishing site.



**Photo 49.** Beaver Creek just above Elwell Spring tributary.





**Photo 50.** Small falls on upper Beaver Creek below Deer Spring tributary.



**Photo 51.** Beaver Creek ~0.5 miles below Deer Spring tributary.

### **West Fork Butte Creek**

Electrofishing surveys were not conducted on West Fork Butte Creek in 2005. Plans were in place to conduct surveys, with access assistance from a USFS horse packer, however a large wildfire known as the School Fire caused the USFS to close the Umatilla National Forest to protect public safety. WDFW Fish management personnel is hoping to conduct surveys in the summer of 2006, if time and funding allows.

A bull trout spawning survey was conducted along the West Fork Butte Creek from an impassable set of several falls located at river mile 3.1 (Figure 11) downstream to the mouth on September 13<sup>th</sup> (Table 8). The lower falls is approximately 1.6-2 m (5-6 ft) high with a good plunge pool. The next falls upstream is 2.6-3.2 m (8-10 ft) high with a small pool below it. Additional falls could be seen upstream from this point. Water temperature was 44 °F at 1030 hrs. A second survey was not conducted due to time and funding constraints.

West Fork Butte Creek is a large tributary of Butte Creek located in the Wenaha Tucannon Wilderness area. The stream contains a good riparian area comprised of conifers and alders, small to medium cobble with scattered boulders, low to moderate sedimentation, and good quantities of woody debris.

The Washington Department of Fisheries conducted systematic habitat surveys (with a randomized start) every 30 m in both the West Fork Butte Creek and Butte Creek in 1988-89 (WDFW files). These data were never summarized and reported. They surveyed West Butte Creek from Rainbow Creek downstream to the confluence with Dickenson Creek. They found 73% riffles, 2.5% pools, and 24.3% runs in this reach. Mean wetted width was 6.3 meters. Measured gradients were 2.1-3.5%. They identified five areas with good spawning conditions for spring Chinook in this reach. Habitat survey methods used here are described in Seidel et al. 1988 for the Tucannon River.



**Photo 52.** Upper West Fork Butte Creek falls.



**Photo 53.** West Fork Butte Creek looking downstream just below the mouth of Preacher Creek.



**Photo 54.** Mouth of Preacher Creek as it enters West Fork Butte Creek.



**Photo 55.** Bull trout spawning survey on West Fork Butte Creek, surveyor is writing up one redd flag and two others can be seen (circled).

### **Preacher Creek**

As with other streams in the Butte Creek system, electrofishing surveys were not conducted on Preacher Creek in 2005 due to the School Fire. Surveys may be conducted in the future if time and funding allows.

WDFW surveyors conducted a short bull trout spawning survey from the mouth upstream 0.8 miles on Preacher Creek on September 13<sup>th</sup> (Table 8). No bull trout or redds were observed during this survey. From this assessment it appears that this stream has little value for bull trout, but this assessment is based on limited water during this drought year.

Preacher Creek is a small tributary to West Fork Butte Creek located in the Wenaha Tucannon Wilderness area. Limited water was the most notable habitat feature. Other habitat features include moderate to high sedimentation, small to medium cobble with scattered areas of gravel, excellent woody debris, and a good riparian zone consisting of conifers and scattered alders.

### **East Fork Butte Creek**

Electrofishing surveys were not conducted on East Fork Butte Creek in 2005 due to the large wildfire in the Blue Mountains. Surveys may be conducted in the future as time and funding allows.

A short bull trout survey (0.5 miles) took place on September 13<sup>th</sup> from the mouth upstream (Table 8). No redds or fish were observed during this survey. A water temperature of 46 °F was recorded at 1115 hrs.

East Fork Butte Creek is a tributary to Butte Creek located in the Wenaha Tucannon Wilderness area. Habitat features noted during the survey include, a steep gradient with riffles and plunge pools, moderate sedimentation, medium to large cobble with scattered areas of gravel, and fair riparian vegetation consisting of scattered conifers with an alder understory. A tributary (Dickinson Creek) enters near the mouth of East Butte Creek, but it had very limited water.

### **Butte Creek**

Electrofishing surveys were not conducted in 2005 on Butte Creek due to the closure of the Umatilla National Forest because of the School Fire. Electrofishing surveys are planned in the future.

A bull trout survey took place on Butte Creek from the forks downstream to the state line (5.4 miles) on September 14<sup>th</sup> (Table 8). Surveyors observed eight bull trout redds, seven spring chinook redds, and one dead spring chinook during this survey. All spring chinook redds were located below Box Canyon (approximately 1.5 miles above the state line downstream), while bull trout redds were found both above and below Box Canyon.

During the late 1980s and early 1990s this stream was surveyed by Washington Department of Fisheries (WDF) personnel for spring Chinook spawning (Table 10) as well as an evaluation of habitat conditions. Spring Chinook are known to spawn in the lower portion of the North Fork of Butte Creek. ODFW conducts spawning surveys annually in the lower North Fork. Spring Chinook and their redds were observed as high as the confluence of the West and East forks. Even though some spawning surveys were conducted upstream of the forks, spring Chinook were not documented in this reach. However, the observations of Chinook as far upstream as the forks is much higher than Chinook were found in our 2005 surveys (below Box Canyon only). The limited distribution in 2005 may be a result of the drought conditions in 2005.

<b>Table 10.</b> Spring Chinook spawning survey summary for Butte Creek and its tributaries in Washington State, by WDF, 1987-1993 (from WDF annual reports for LSRCF).							
Reach/ Date	Survey	Stream Section <sup>a</sup>	Surveyed Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
9/22/87	1	State line upstream to mile 2	2.0	8	4.0	0	0
8/29/88	1	State line upstream to above forks	6.8	4	0.6	0	0
9/19/88	2	State line upstream to above forks	6.8	6	0.9	0	0
8/31/89	1	State line upstream to mile 2.5	2.5	1	0.4	0	0
9/13,14/92	1	State line upstream to Forks	4.0	14	3.5	2	1 <sup>a</sup>
9/12,13/93	1	State line upstream to Forks	4.0	5	1.2	0	0

<sup>a</sup> The dead Chinook found in 1992 had a CWT from Lookingglass hatchery.

WDF conducted habitat surveys in Butte Creek and West Fork Butte Creek in 1988 and 1989. These data were never summarized and reported (see WDFW files, and Seidel et al. 1988 for description of methods). From the forks downstream on the mainstem Butte Creek to Box Canyon they found 46.3% riffles, 48.2% runs and 5.5% pools. Average wetted stream width was 7.9 m. Within Box Canyon the measurements were 66.7% riffles, 24.2 runs, and 9.1% pools. Average wetted stream width increased to 8.5 m. Just below Box Canyon the habitat was 59.8% riffles, 35.4% runs, and 4.9% pools. Average width was 8.4 m. Further downstream below box canyon to the state line the surveys documented riffles at 57.5%, pools 32.5% and runs were 10.0%. Mean wetted stream width was 9.1 m. Measured gradients ranged from 0.3 – 2.9% in this lower reach.

Butte Creek is a relatively large tributary to the Wenaha River located in the northern portion of the Wenaha Tucannon Wilderness area. Habitat features noted from the forks to the head of Box Canyon include; medium to large cobble with scattered areas of gravel, fair to good amounts of woody debris, moderate sedimentation, a fairly low gradient, and good riparian vegetation. As Butte Creek cuts it's way through a narrow canyon, known as Box Canyon, habitat features differ slightly. The riparian vegetation moves from along the stream to the surrounding hillsides, the gradient becomes steeper, the substrate becomes large cobble with boulders creating a lot of riffle and plunge pools, woody debris becomes rare, and sedimentation is quite low. From the lower end of Box Canyon to the state line the stream changes again. A riparian buffer is along the stream rather than on the hillside, the gradient levels off, small and medium cobble dominate the substrate type, woody debris is common, and sedimentation is moderate.



**Photo 56.** Butte Creek in Box Canyon.

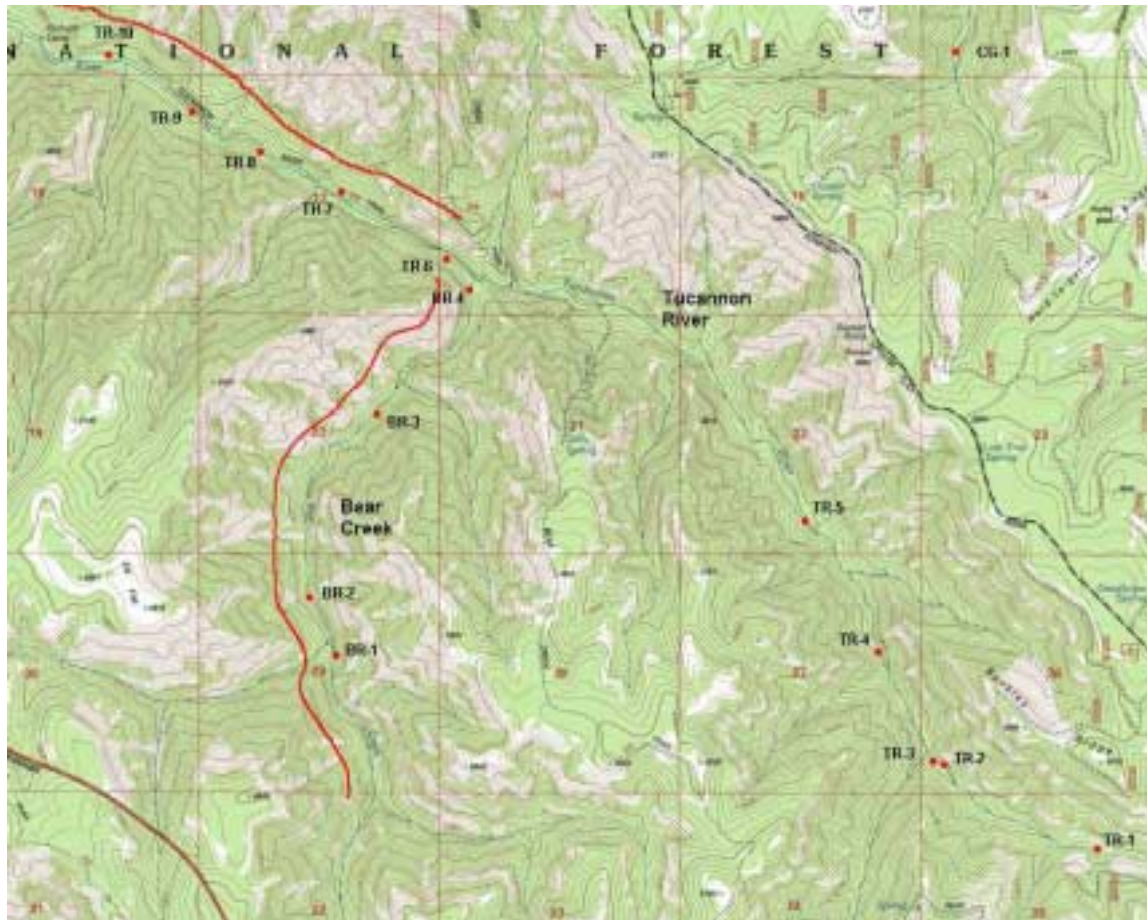


**Photo 57.** Butte Creek below Box Canyon.

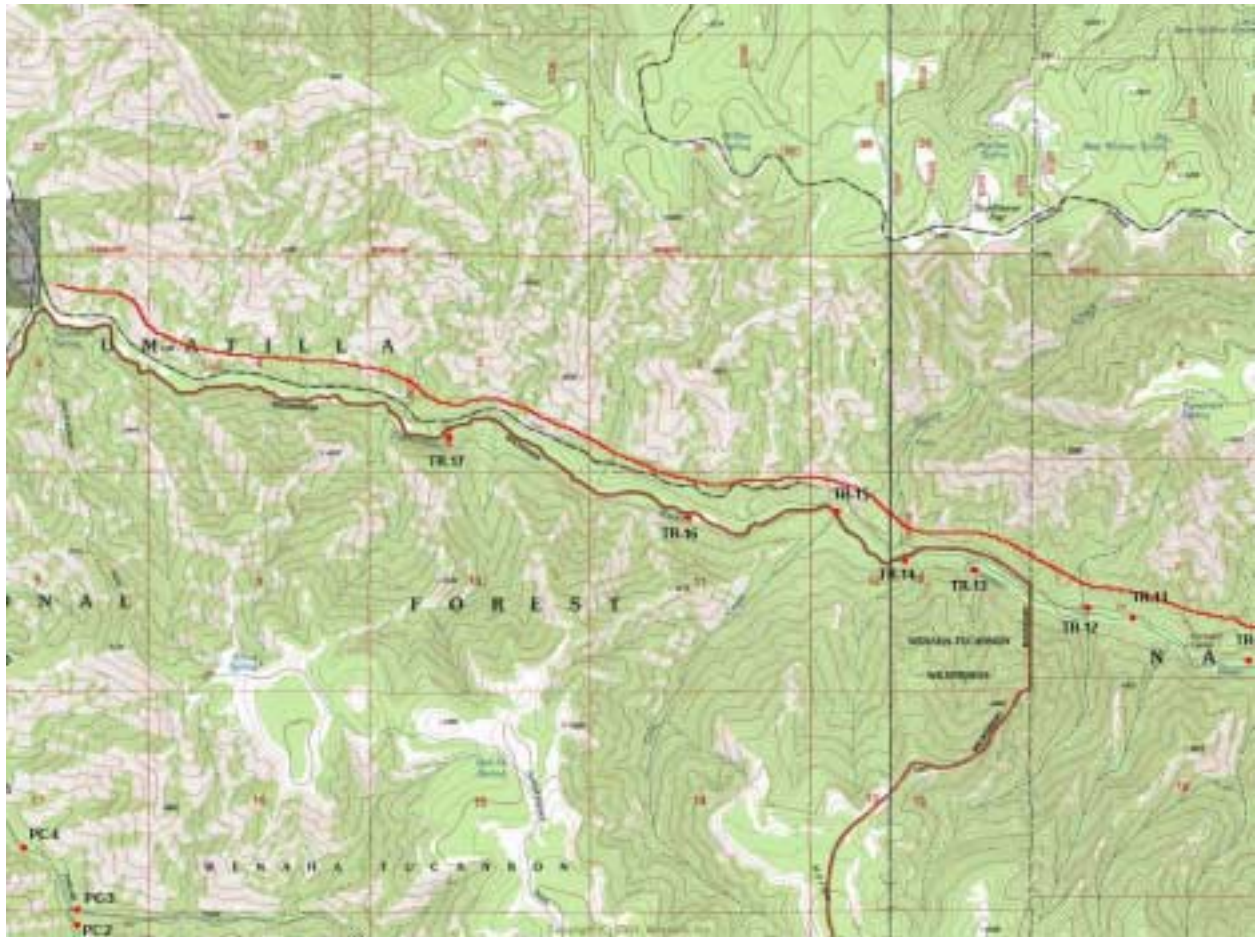
### **3. Tucannon River Drainage**

#### **Electrofishing Surveys**

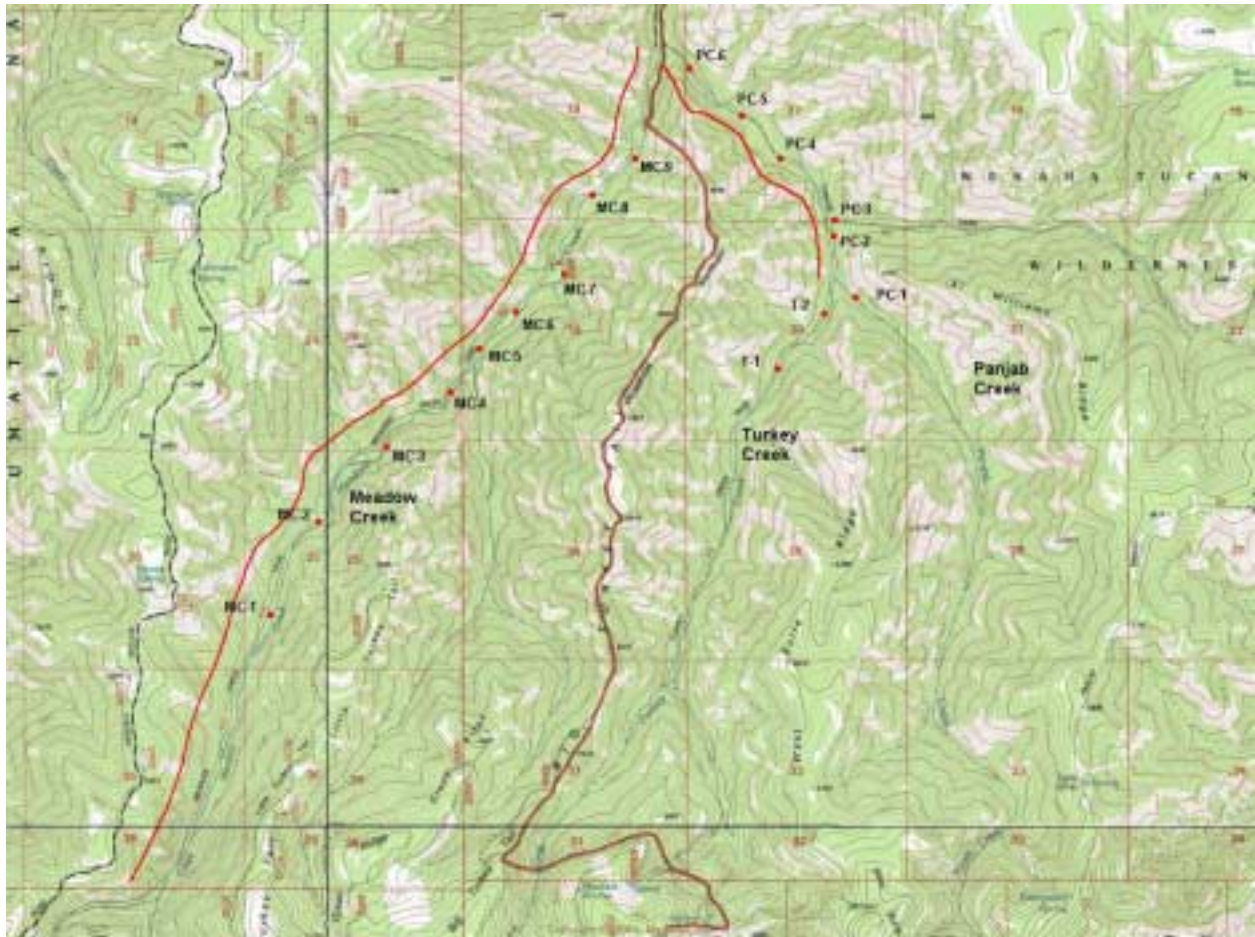
Electrofishing surveys were conducted in the summer of 2005 in the Tucannon River Drainage to assess distribution, relative abundance, species composition, obtain tissue samples for genetic studies and to implant bull trout with PIT tags to aid in an ongoing bull trout movement study. Surveys were also conducted in 2004 on Cummings Creek to assess fish distribution, abundance and genetic makeup. Surveys occurred on a total of eight stream reaches encompassing 25.6 river miles (Figures 2, 12-17, and Table 11). Electrofishing sampling in Bear Creek and the Tucannon River between Bear Creek and Sheep was not very effective because of equipment problems during the first survey.



**Figure 12.** Electrofishing sites on the upper Tucannon River (TR1-TR10) and Bear Creek (BR1-BR4), 2005. Bull trout spawning survey conducted on portions of streams bordered by solid (red) line.



**Figure 13.** Electrofishing sites on the Tucannon River (TR11-TR17), from Bear Creek (see Figure 12 for Bear Creek) and the mouth of Panjab Creek, 2005. Bull trout spawning surveys were conducted on portions of streams bordered by the solid (red) line.

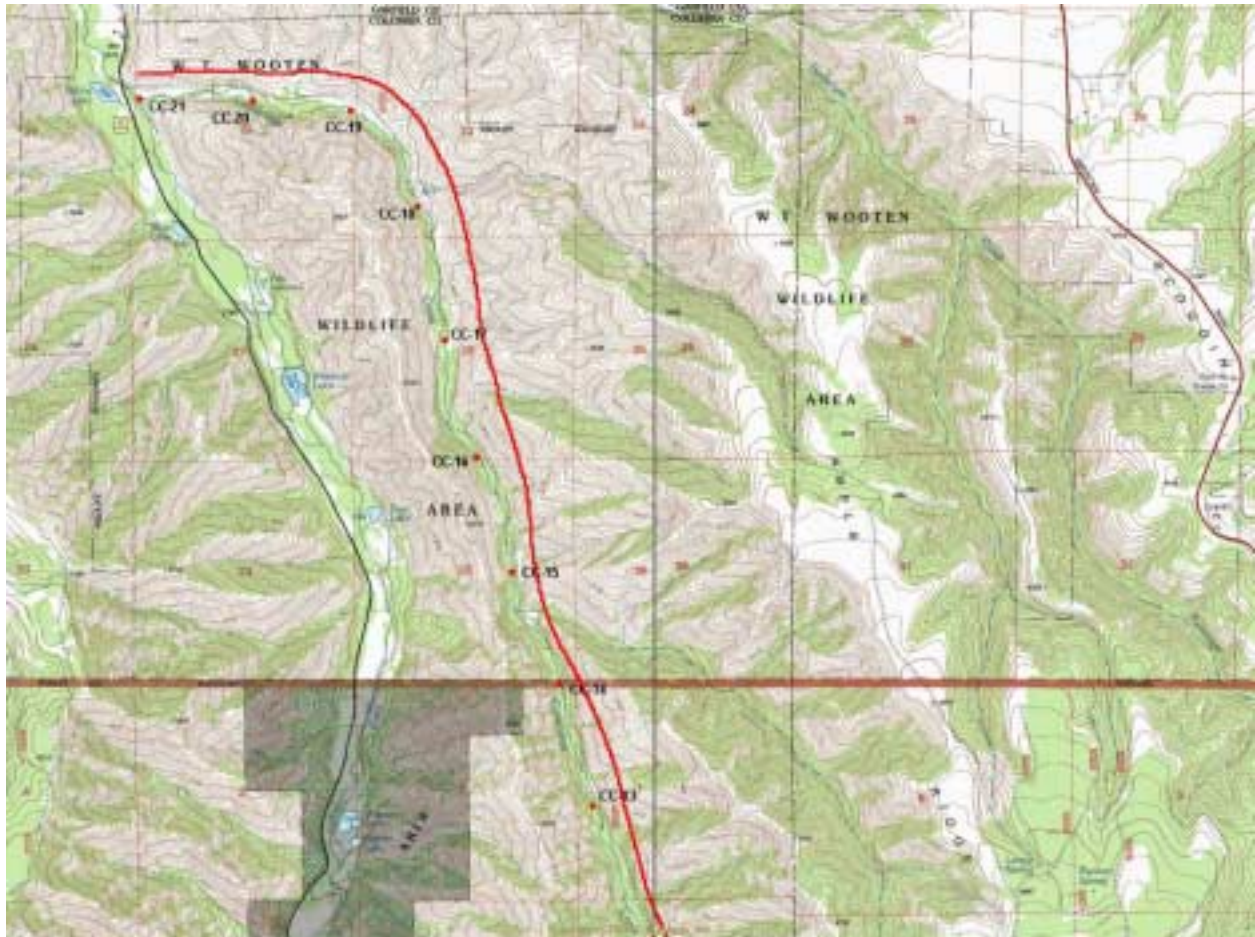


**Figure 14.** Electrofishing sites on Panjab Creek (PC1-PC6), Meadow Creek (MC1-MC9), and Turkey Creek (T1-T2) within the Tucannon subbasin, 2005. Bull trout spawning survey conducted on portions of Creek bordered by the solid (red) line.





**Figure 15.** Electrofishing sites on upper Cummings Creek (CC1-CC12), 2004. Note section of dry streambed. Bull trout spawning survey marked by the solid (red) line paralleling the stream, 2003. The solid line (red) near the bottom of the map shows the dry stream reach.



**Figure 16.** Electrofishing sites on lower Cummings Creek (CC13-CC21), 2004. Bull trout spawning survey conducted on portions of Creek bordered by the solid (red) line, 2003.



**Figure 17.** Electrofishing site (KC1) on upper Kellogg Creek, 2005.

**Table 11.** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
Tucannon River	TR-1	7/18	30.0	3.5	105.0	4.5	No fish found	0.0	0.0
			~ 3.8 miles above Bear Creek mouth						
	TR-2	7/18	30.0	3.3	99.0	4.5	No fish found	0.0	0.0
			~ 3.0 miles above Bear Creek mouth						
	TR-3	7/18	30.0	2.8	84.0	3.6	Four age 0+ BT's (33-36mm), five age 1+ BT's (76-190mm)	0.0	10.7
			~ 2.9 miles above Bear Creek mouth						
	TR-4	7/18	30.0	4.2	126.0	5.0	Five age 0+ BT's (25-38mm), 18 age 1+ BT's (72-137mm), one adult BT (202mm), TF-uncommon	0.0	19.0
			~ 2.5 miles above Bear Creek mouth						
	TR-5	7/18	30.0	5.8	174.0	7.5	Eleven age 0+ BT's (32-41mm), 23 age 1+ BT's (68-185mm), TF-rare	0.0	19.5
			~ 1.8 miles above Bear Creek mouth						
TR-6	7/19	47.0	5.1	239.7	N/A	Eight age 1+ BT's (83-134mm), one age 1+ RBT (183mm), one legal-sized RBT (216mm)	0.8	3.3	
		~ 3.5 miles above Sheep Creek mouth							
TR-7	7/26	33.0	6.0	198.0	6.4	Twelve age 0+ BT's (31-51mm), nine age 1+ BT's (74-141mm), RBT-common	N/A	10.6	
		~ 2.8 miles above Sheep Creek mouth							
TR-8	7/26	53.0	5.6	296.8	N/A	Four age 0+ BT's (36-44mm), six age 1+ BT's (69-104mm), SCP, TF-common	0.0	3.4	
		~ 2.5 miles above Sheep Creek mouth							
TR-9	7/19	52.0	4.4	228.8	N/A	One adult BT (340mm), one age 1+ RBT (183mm)	0.4	0.4	
		~ 2.1 miles above Sheep Creek mouth							
TR-10	7/26	62.0	6.3	390.6	7.8	Eight age 0+ BT's (37-47mm), eight age 1+ BT's (79-149mm), RBT-uncommon, SCP-abundant, TF-common	N/A	4.1	
		~ 1.7 miles above Sheep Creek mouth							

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class is based on fish length. BT's  $\geq 200$ mm in fork length are considered adults.

**Table 11. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Tucannon River (cont.)</b>	TR-11	7/26	42.0	4.4	184.8	6.7	Two age 1+ BT's (117-127mm), SCP, TF-common	0.0	1.1
			~ 1.1 miles above Sheep Creek mouth						
	TR-12	7/26	50.0	7.5	375.0	N/A	Three age 0+ BT's (38-49mm), six age 1+ BT's (92-145mm), SCP-abundant, TF-common	0.0	2.4
			~ 0.9 miles above Sheep Creek mouth						
	TR-13	7/26	70.0	6.7	469.0	9.6	Six age 0+ BT's (43-48mm), 18 age 1+ BT's (83-161mm), RBT, SCP-common, TF-uncommon	N/A	5.1
			~ 0.3 miles above Sheep Creek mouth						
	TR-14	7/19	41.0	5.0	205.0	N/A	Two age 1+ BT's (90-132mm) one age 1+ RBT (82mm)	0.5	1.0
		Just upstream of Sheep Creek mouth							
TR-15	7/19	30.0	7.5	225.0	9.6	Two age 0+ BT's (49-50mm), one age 1+ BT (98mm), five age 1+ RBT's (129-182mm), SCP, TF-common	2.2	1.3	
		~ 40 meters downstream of Cold Creek							
TR-16	7/19	30.0	8.7	261.0	10.0	One age 0+ BT (41mm), two age 1+ BT's (88-94mm) eight age 1+ RBT's (72-155mm), Five age 0+ WCH (54-65mm), SCP-common, TF-uncommon	3.1	1.1	
		~ 0.7 miles downstream of Cold Creek							
TR-17	7/19	30.0	6.4	192.0	7.6	One age 1+ RBT (125mm), four age 0+ WCH (58-65mm), SCP, TF-common	0.5	0.0	
		~ 300 meters above Ladybug Flat Campground							
<b>Bear Creek</b>	BC-1	7/18	44.0	3.1	136.4	N/A	Nine age 1+ BT's (112-163mm)	0.0	6.6
			~ 0.1 miles above left bank tributary						
	BC-2	7/18	31.0	3.6	111.6	N/A	Eight age 1+ BT's (99-190mm)	0.0	7.2
		~ 0.2 miles below left bank tributary							

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class is based on fish length. BT's  $\geq 200$ mm in fork length are considered adults.

<b>Table 11. (Cont.)</b> Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.									
Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Bear Creek (cont.)</b>	BC-3	7/18	46.0	3.6	165.6	N/A	Ten age 1+ BT's (75-163mm), one age 1+ RBT (174mm)	0.6	6.0
	BC-4	7/19	15.0	4.9	73.5	N/A	One age 1+ BT (110mm), one age 1+ RBT (159mm)	1.4	1.4
<b>Turkey<sup>c</sup> Creek</b>	TC-1	7/19	106.5	3.3	351.5	3.9	18 age 1+ BT's (72-156mm), 13 age 1+ RBT's (60-194mm) <sup>b</sup> , TF-common	3.7	5.1
	TC-2	7/19	44.0	3.1	136.4	3.8	Five age 1+ BT's (128-166mm), three age 1+ RBT's (65-164mm), one legal RBT (211mm) <sup>b</sup> , TF-common	2.9	3.7
<b>Panjab<sup>c</sup> Creek</b>	PC-1	7/19	82.5	2.6	214.5	3.2	Five age 1+ BT's (69-122mm), seven age 1+ RBT's (104-153mm), TF-common	3.3	2.3
	PC-2	7/19	57.0	4.3	245.1	4.9	Eight age 1+ BT's (99-124mm), eight age 1+ RBT's (62-159mm), TF-common	3.3	3.3
	PC-3	7/19	N/A	N/A	N/A	N/A	One age 1+ BT (112mm), five age 1+ RBT's (61-129mm)	N/A	N/A
	PC-4	7/19	99.3	4.2	417.1	8.1	Six age 1+ BT's (76-139mm), 21 age 1+ RBT's (51-195mm) <sup>b</sup> , one legal RBT (223mm) <sup>b</sup> SCP, TF-common	5.3	1.4
	PC-5	7/26	187.0	5.7	1065.9	6.1	One age 1+ BT (147mm), RBT, TF-common	N/A	0.1

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class is based on fish length. BT's  $\geq 200$  mm in fork length are considered adults.  
<sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag as follows: TC-1 two fish 192 and 194mm, TC-2 one fish 211mm, PC-4 two fish 195 and 223mm  
<sup>c</sup> Some RBT's may be 0+ but data was inconclusive on length/frequency histogram, actual age breaks will be determined when scales are checked.

**Table 11. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Panjab Creek (cont.)</b>	PC-6	7/26	108.0	3.4	367.2	4.2	Two age 1+ BT's (138mm), RBT <sup>b</sup> , SCP, TF-common	N/A	0.5
<b>Meadow Creek</b>	MC-1	7/18	102.4	2.9	297.0	4.6	One age 0+ BT (37mm), eleven age 1+ BT's (116-188mm), 15 age 1+ RBT's (63-182mm), TF-common	5.1	4.0
	MC-2	7/18	95.6	3.8	363.3	5.5	Two adult BT's (201-220mm), 20 age 1+ RBT's (57-198mm), TF-common	5.5	0.6
	MC-3	7/18	63.6	3.0	190.8	4.5	Nine age 0+ BT's (33-49mm), 16 age 1+ BT's (86-178mm), 17 age 1+ RBT's (98-198mm), TF-common	8.9	13.1
	MC-4	7/18	56.0	3.7	207.2	5.0	One age 1+ BT (180mm), 13 age 1+ RBT's (67-157mm), TF-common	6.3	0.5
	MC-5	7/18	104.0	4.9	509.6	7.9	Two age 1+ BT's (135-176mm), five age 1+ RBT's (110-167mm), TF-common	1.0	0.4
	MC-6	7/26	98.0	4.6	450.8	6.1	One age 0+ BT (47mm), six age 1+ BT's (135-150mm), one legal RBT (215mm) <sup>b</sup> , TF-common	N/A	1.6
	MC-7	7/26	118.0	4.3	507.4	5.8	Four age 1+ BT's (130-171mm), one adult BT (202mm), RBT, TF-common	N/A	1.0
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101. Size/age class based on fish length. BT's ≥200mm in fork length are considered adults. <sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag <sup>c</sup> Some RBT's may be 0+ but data was inconclusive on length/frequency histogram, actual age breaks will be determined when scales are checked.									

**Table 11. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Meadow Creek (cont.)</b>	MC-8	7/26	66.0	4.1	270.6	5.5	One age 1+ BT (180mm), RBT-common, SCP, TF-uncommon	N/A	0.4
	MC-9	7/26	72.0	4.1	295.2	5.4	RBT, SCP, TF-common	N/A	0.0
<b>Cummings Creek (2004 FM Data)</b>	CC-1	8/18	40.0	1.0	40.0	N/A	35 age 1+ RBT's (69-172mm)	87.5	0.0
	CC-2	8/18	40.0	0.8	32.0	N/A	Eight age 1+ RBT's (67-153mm)	25.0	0.0
	CC-3	8/18	40.0	1.6	64.0	N/A	36 age 1+ RBT's (59-172mm), TF-rare	56.3	0.0
	CC-4	8/18	N/A	N/A	N/A	N/A	No fish found—stream was dry	0.0	0.0
	CC-5	8/18	40.0	1.7	68.0	N/A	One age 1+ BT (105mm), 38 age 1+ RBT's (56-171mm)	55.9	1.5
	CC-6	8/16	60.0	2.6	156.0	N/A	Two age 1+ BT's (61-152mm), 21 age 1+ RBT's (93-180mm), TF-rare	13.5	1.3
	CC-7	8/16	40.0	2.7	108.0	N/A	One age 1+ BT (141mm), 22 age 1+ RBT's (71-185mm), TF-rare	20.4	0.9
	CC-8	8/16	45.0	3.2	144.0	N/A	One age 1+ BT (111mm), 26 age 1+ RBT's (61-175mm), SCP-uncommon	18.1	0.7
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. BT's $\geq 200$ mm in fork length are considered adults. <sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag <sup>c</sup> Some RBT's may be 0+ but data was inconclusive on length/frequency histogram, actual age breaks will be determined when scales are checked.									



**Table 11. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Cummings<sup>c</sup> Creek (2004 FM Data cont.)</b>	CC-9	8/16	45.0	2.5	112.5	N/A	Three age 1+ BT's (59-105mm), 28 age 1+ RBT's (65-193mm), SCP, TF-rare	24.9	2.7
	CC-10	8/16	30.0	1.2	36.0	N/A	One age 0+ RBT (29mm), eight age 1+ RBT's (61-129mm), TF-rare	25.0	0.0
	CC-11	8/16	40.0	2.2	88.0	N/A	One age 0+ RBT (36mm) 24 age 1+ RBT's (78-185mm), SCP, TF-uncommon	28.4	0.0
	CC-12	8/16	30.0	3.8	114.0	N/A	Four age 1+ RBT's (80-124mm), SCP-common	3.5	0.0
<b>Cummings Creek (2004 SRL Data)</b>	CC-13	8/16	100.0	2.9	290.0	N/A	Two age 1+ BT's (144-146mm), 20 age 0+ RBT's, 69 age 1+ RBT's, SCP-common	30.7	0.7
	CC-14	8/16	100.0	3.5	350.0	N/A	23 age 0+ RBT's, 75 age 1+ RBT's, SCP-abundant, SD-common	28.0	0.0
	CC-15	8/16	100.0	3.3	330.0	N/A	77 age 0+ RBT's, 85 age 1+ RBT's, SCP-abundant	49.1	0.0
	CC-16	8/16	100.0	4.2	420.0	N/A	44 age 0+ RBT's, 60 age 1+ RBT's, SCP-abundant	24.8	0.0

<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish  
Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. BT's  $\geq 200$ mm in fork length are considered adults.  
<sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag  
<sup>c</sup> Some RBT's may be 0+ but data was inconclusive on length/frequency histogram, actual age breaks will be determined when scales are checked.

**Table 11. (Cont.)** Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.

Stream	Site #	Date	Site Length (m)	Average width (m)	Area (m <sup>2</sup> )	Ave. Bankfull width (m)	Relative Abundance by size/age class <sup>a</sup>	Number of Rainbows/100m <sup>2</sup>	Number of Bull Trout/100m <sup>2</sup>
<b>Cummings Creek (2004 SRL Data cont.)</b>	CC-17	8/16	100.0	3.1	310.0	N/A	60 age 0+ RBT's, 76 age 1+ RBT's, SCP-abundant	43.9	0.0
	2.4 miles above gate on Cummings Creek (SRL site name CC3-02)								
	CC-18	8/16	100.0	3.2	320.0	N/A	One age 1+ BT (178mm), 41 age 0+ RBT's, 78 age 1+ RBT's, SCP-common	37.2	0.3
	1.8 miles above gate on Cummings Creek (SRL site name CC2a-04)								
	CC-19	8/16	100.0	2.9	290.0	N/A	One age 1+ BT (134mm), 79 age 0+ RBT's, 75 age 1+ RBT's, SCP-abundant	53.1	0.3
1.2 miles above gate on Cummings Creek (SRL site name CC2-02)									
CC-20	8/16	100.0	2.9	290.0	N/A	61 age 0+ RBT's, 57 age 1+ RBT's, SCP-abundant	40.7	0.0	
0.6 miles above gate on Cummings Creek (SRL site name CC1a-04)									
CC-21	8/25	100.0	3.1	310.0	N/A	One adult BT (200mm), 11 age 0+ RBT's, 28 age 1+ RBT's, 17 age 1+ WCH, SCP, SD-abundant	12.6	0.3	
~ 50 meters above mouth of Cummings Creek (SRL site name CC1-01)									
<b>Cummings Creek (2005 SRL Data)</b>	SRCC-1	8/29	50	3.1	154.2	N/A	One age 1+ RBT (86mm)	0.6	0.0
	~ river mile 3.6 (SRL site name CC-4-00)								
SRCC-2	8/29	50	2.8	140.0	N/A	47 age 0+ RBT's (32-62mm), 27 age 1+ RBT's (73-174mm)	52.9	0.0	
~ river mile 2.4 (SRL site name CC-3-00)									
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare=≤3, Uncommon=4-10, Common=11-100, and Abundant=≥101. Size/age class based on fish length. Bull trt ≥200mm in fork length are considered adults. <sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag									

<b>Table 11. (Cont.)</b> Relative abundance and distribution from electrofishing surveys conducted in the Tucannon River basin, 2004-2005.									
<b>Cummings Creek (2005 SRL Data cont.)</b>	SRCC-3	8/29	49	3.2	156.8	N/A	37 age 0+ RBT's (32-57mm), 36 age 1+ RBT's (71-196mm), one age 1+ BT (154mm)	46.6	0.6
	SRCC-4	8/29	50	3.0	148.3	N/A	24 age 0+ RBT's (32-75mm), six age 1+ RBT's (91-152mm), five age 0+ WCH (60-80mm)	20.2	0.0
<b>Kellogg Creek</b>	KC-1	7/27	62.0	N/A	N/A	N/A	No fish found—CF-present	0.0	0.0
<sup>a</sup> BT=bull trout, RBT=rainbow trout, WCH=wild chinook, SCP=sculpin, SD=speckled dace, TF=tailed frogs, CF=crayfish Rare= $\leq 3$ , Uncommon=4-10, Common=11-100, and Abundant= $\geq 101$ . Size/age class based on fish length. Bull trt $\geq 200$ mm in fork length are considered adults. <sup>b</sup> Endemic hatchery stocked fish identified by an elastomer tag									

## **Bull Trout Spawning Surveys**

Bull trout spawning surveys were conducted by WDFW in portions of the Tucannon River basin in 2005 (Table 12). Index areas were selected for spawning surveys in four Tucannon Basin streams or reaches in 2005 to save time and money, and to allow WDFW to conduct surveys in other streams in southeast Washington where little or no data exists. Spawning surveys were conducted at least twice and covered 17.0 miles of known spawning habitat. A total of 147 redds (8.6 redds per mile) and 54 live bull trout were observed in the basin during the surveys.

The range of redd mound sizes suggests that most areas surveyed have both resident and migratory bull trout spawning. The average redd mound in Bear Creek was 54.9 x 64.0 cm (1.8 by 2.1 ft), but the range was 30.5 x 30.5 to 121.9 x 91.4 mm (1 x 1 to 4 x 3 ft) for the 28 redds measured. Observed bull trout (16 fish) were estimated to range from 203-533 mm (8-21 in). From Bear Creek to Sheep Creek the average redd mound was 579 by 792 (1.9 by 2.6 ft), but it ranged from 30.5 x 30.5 cm to 152.4 x 182.9 cm (1 x 1 to 5 x 6 ft) for the 42 redds measured. Observed bull trout were estimated to be from 178-508 mm (7-20 in) long and the mean was about 380 mm (~ 15 in). Redds in Meadow Creek were smaller with a range of only 30.5 by 30.5 cm to 61.0 by 61.0 cm (1 by 1 to 2 by 2 ft) for the 12 redds measured. The average was 39.6 by 45.7 cm (1.3 by 1.5 ft). Observed bull trout (7 fish) in Meadow Creek were 152-250 mm (6-10 in) long and averaged just over 152 mm (6 in).

More extensive bull trout surveys were conducted by WDFW on portions of the Tucannon River basin in 2004 (Table 13). Surveys were walked at least twice on seven stream reaches and encompassed 27.4 miles of known and presumed spawning habitat. A total of 237 redds (8.6 redds per mile) and 124 live bull trout were observed in the basin during these surveys. A summary of bull trout surveys for all years, including surveys by the USFS, WDFW, Martin et al. (1992) and Underwood et al. (1995), shows that sampling effort is variable from year to year, but index areas can be compared in some years (Table 14, 15).

A spawning survey was also conducted by WDFW in Cummings Creek on October 21<sup>st</sup>, 2003. The surveyed reach was from river mile 6.5 (upstream of the forks) to the mouth. No redds or bull trout were observed (see WDFW files).

<b>Table 12.</b> Bull trout spawning survey summary for the Tucannon River, 2005.							
<b>Reach/ Date</b>	<b>Survey</b>	<b>Stream Section<sup>a</sup></b>	<b>Surveyed Miles</b>	<b>Redds</b>	<b>Redds per mile</b>	<b>Fish Observed</b>	
<b>Tucannon River</b>							
9/13	1	(A) River mile 54.2 to river mile 50.7	3.5	17	4.9	Live	Dead
8/21 <sup>b</sup>	1	(B) River mile 50.7 to river mile 46.1	4.6	1	0.2	20	0
9/28	2	(A) River mile 54.2 to river mile 50.7	3.5	37	10.6	N/A	N/A
9/1 <sup>b</sup>	2	(B) River mile 50.7 to river mile 46.1	4.6	4	0.9	5	0
10/13	3	(A) River mile 54.2 to river mile 50.7	3.5	9	2.6	N/A	N/A
9/7 <sup>b</sup>	3	(B) River mile 50.7 to river mile 46.1	4.6	6	1.3	3	0
9/23 <sup>b</sup>	4	(B) River mile 50.7 to river mile 46.1	4.6	12	2.6	5	0
<b>Total</b>			<b>8.1</b>	<b>86</b>	<b>10.6</b>	<b>28</b>	<b>0</b>
<b>Bear Creek</b>							
9/13	1	(C) River mile 2.6 to river mile 1.4	1.2	1	0.8	0	0
9/13	1	(D) River mile 1.4 to river mile 0.0	1.4	31	22.0	13	1
9/28	2	(C) River mile 2.6 to river mile 1.4	1.2	0	0.0	1	0
9/28	2	(D) River mile 1.4 to river mile 0.0	1.4	13	9.3	0	1
10/13	3	(D) River mile 1.4 to river mile 0.0 <sup>c</sup>	1.4	3	2.1	0	0
<b>Total</b>			<b>2.6</b>	<b>48</b>	<b>18.5</b>	<b>14</b>	<b>2</b>
<b>Meadow Creek</b>							
9/18	1	(E) River mile 4.9 to river mile 1.1	3.8	0	0.0	2	0
9/27	1	(F) River mile 1.1 to river mile 0.0	1.1	4	3.6	1	0
9/27	2	(E) River mile 4.9 to river mile 1.1	3.8	7	1.8	4	0
10/12	2	(F) River mile 1.1 to river mile 0.0	1.1	1	0.9	0	0
10/12	3	(E) River mile 4.9 to river mile 1.1	3.8	1	0.3	0	0
<b>Total</b>			<b>4.9</b>	<b>13</b>	<b>2.7</b>	<b>7</b>	<b>0</b>
<b>Panjab Creek</b>							
9/27	1	(G) River mile 3.5 to river mile 2.1	1.4	0	0.0	0	0
10/12	2	(G) River mile 3.5 to river mile 2.1	1.4	0	0.0	0	0
<b>Total</b>			<b>1.4</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> A: Mouth of Bear Ck. to mouth of Sheep Ck., B: Mouth of Sheep Ck. to Panjab Bridge, C: Bear Ck forks to beaver dam at river mile 1.4, D: Beaver dam at river mile 1.4 to mouth of Bear Ck, E: Forks to Meadow Ck. campground, F: Meadow Ck. campground to mouth of Meadow Ck., F: Mouth of Turkey Ck to Panjab campground

<sup>b</sup> Bull trout redds observed and noted during spring chinook surveys conducted by Snake River Lab personnel

<sup>c</sup> Beaver dam at river mile 1.4 appears to be impassable

<b>Table 13. Bull trout spawning survey summary for the Tucannon River, 2004.</b>							
<b>Reach/ Date</b>	<b>Survey</b>	<b>Stream Section<sup>a</sup></b>	<b>Surveyed Miles</b>	<b>Redds</b>	<b>Redds per mile</b>	<b>Fish Observed</b>	
						<b>Live</b>	<b>Dead</b>
<b>Tucannon River</b>							
9/7	1	(A) River mile 58.0 to river mile 54.2	3.8	4	8.9	22	0
9/7	1	(B) River mile 54.2 to river mile 50.7	3.5	9	2.6	10	0
9/1 <sup>b</sup>	1	(C) River mile 50.7 to river mile 46.1	4.6	2	0.4	N/A	N/A
9/21	2	(A) River mile 58.0 to river mile 54.2	3.8	10	2.6	1	0
9/21	2	(B) River mile 54.2 to river mile 50.7	3.5	34	9.7	16	0
9/8 <sup>b</sup>	2	(C) River mile 50.7 to river mile 46.1	4.6	1	0.2	N/A	N/A
10/5	3	(A) River mile 58.0 to river mile 54.2	3.8	4	1.1	1	0
10/5	3	(B) River mile 54.2 to river mile 50.7	3.5	11	3.1	3	0
9/15 <sup>b</sup>	3	(C) River mile 50.7 to river mile 46.1	4.6	11	2.4	N/A	N/A
10/19	4	(B) River mile 54.2 to river mile 50.7	3.5	1	0.3	1	0
9/30	4	(C) River mile 50.7 to river mile 46.1	4.6	15	3.3	1	0
10/19	5	(C) River mile 50.7 to river mile 46.1	4.6	5	1.1	0	0
<b>Total</b>			<b>11.9</b>	<b>137</b>	<b>11.5</b>	<b>55</b>	<b>0</b>
<b>Bear Creek</b>							
9/7	1	(D) River mile 0.4 to river mile 0.0	0.4	5	12.5	9	1
9/7	1	(E) River mile 2.6 to river mile 0.0	2.6	22	8.5	29	0
9/21	2	(E) River mile 2.6 to river mile 0.0	2.6	16	6.2	6	0
10/5	3	(E) River mile 2.6 to river mile 0.0	2.6	8	3.1	1	0
<b>Total</b>			<b>2.6</b>	<b>51</b>	<b>17.0</b>	<b>45</b>	<b>1</b>
<b>Meadow Creek</b>							
9/8	1	(F) River mile 4.9 to river mile 1.1	3.8	12	3.2	12	0
9/30	1	(G) River mile 1.1 to river mile 0.0	1.1	1	0.9	1	0
9/23	2	(F) River mile 4.9 to river mile 1.1	3.8	0	0.0	6	0
10/19	2	(G) River mile 1.1 to river mile 0.0	1.1	0	0.0	0	0
10/7	3	(G) River mile 1.1 to river mile 0.0	1.1	7	1.8	0	0
10/21	4	(G) River mile 1.1 to river mile 0.0	1.1	0	0.0	0	0
<b>Total</b>			<b>4.9</b>	<b>20</b>	<b>4.1</b>	<b>19</b>	<b>0</b>
<b>Panjab Creek</b>							
9/8	1	(H) River mile 4.5 to river mile 2.1	2.4	6	2.5	0	0
9/30	1	(I) River mile 2.1 to river mile 0.0	2.1	0	0.0	0	0
9/23	2	(H) River mile 4.5 to river mile 2.1	2.4	13	5.4	2	0
10/19	2	(I) River mile 2.1 to river mile 0.0	2.1	0	0.0	0	0
10/7	3	(H) River mile 4.5 to river mile 2.1	2.4	0	0.0	2	0
10/21	4	(H) River mile 4.5 to river mile 2.1	2.4	0	0.0	0	0
<b>Total</b>			<b>4.5</b>	<b>19</b>	<b>4.2</b>	<b>4</b>	<b>0</b>
<b>Turkey Creek</b>							
9/8	1	(J) River mile 2.1 to river mile 0.0	2.1	0	0.0	1	0
9/23	2	(J) River mile 2.1 to river mile 0.0	2.1	3	1.4	0	0
10/7	3	(J) River mile 2.1 to river mile 0.0	2.1	2	1.0	0	0
10/21	4	(J) River mile 2.1 to river mile 0.0	2.1	1	0.5	0	0
<b>Total</b>			<b>2.1</b>	<b>6</b>	<b>2.4</b>	<b>1</b>	<b>0</b>
<b>Cold Creek</b>							
10/1	1	(K) River mile 0.8 to river mile 0.0	0.8	0	0.0	0	0
10/27	2	(K) River mile 0.8 to river mile 0.0	0.8	0	0.0	0	0
<b>Total</b>			<b>0.8</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0</b>
<b>Sheep Creek</b>							
10/1	1	(L) River mile 0.6 to river mile 0.0	0.6	4	6.7	0	0
10/27	2	(L) River mile 0.6 to river mile 0.0	0.6	0	0.0	0	0
<b>Total</b>			<b>0.6</b>	<b>4</b>	<b>6.7</b>	<b>0</b>	<b>0</b>

<sup>a</sup> A: Headwaters to mouth of Bear Ck., B: Mouth of Bear Ck. to mouth of Sheep Ck., C: Mouth of Sheep Ck. to Panjab bridge, D: River mile 0.4 to mouth on right bank fork, E: Forks to mouth of Bear Ck., F: Forks to Meadow Ck. campground, G: Meadow Ck. campground to mouth, H: River mile 4.5 to Panjab campground, I: Panjab campground to mouth,, J: Forks to mouth, K: River mile 0.8 to mouth, L: Falls to mouth

<sup>b</sup> Bull trout redds observed and noted during spring chinook surveys conducted by Snake River Lab personnel

**Table 14.** Bull trout spawning survey summary with redd counts (number of times surveyed) for the Tucannon River and 3 tributaries, 1990-2005.

Year	Reach Surveyed <sup>a</sup>																Total Redds
	Tucannon			Bear Creek			Right Bank Fork to Bear Ck.	Tucannon				Sheep Creek	Cold Creek	Tucannon			
	A	B	C	D	E	F	G	F	G	H	I	J	K	L	M	N	
	RM	RM	RM	RM	RM	RM 1.9- 2.6	RM0.4- 0.0	RM	RM	RM	RM	RM	RM	RM	RM	RM	
1990 <sup>b</sup>								21(1)	0(1)	32(6)	9(6)			1(6)			63
1991 <sup>b</sup>			11(4)					21(4)	5(5)	10(5)	11(5)						58
1992 <sup>b</sup>			9(4)					41(4)		12(4)	4(4)						66
1993 <sup>c</sup>																	0
1994 <sup>d</sup>				10(3)				99(3) <sup>f</sup>						22(3)			131
1995 <sup>d</sup>				5(1)				63(1) <sup>f</sup>						37(1)			105
1996 <sup>d</sup>		31(1)	21(3)	25(3)				78(2)						15(2)			170
1997 <sup>d</sup>		11(1)	2(1)	23(1)				25(1)						13(3)			74
1998 <sup>d</sup>				4(1)				78(2) <sup>f</sup>						10(2)	16(2)	0(1)	108
1999 <sup>d</sup>		36(1)	6(3)	26(1)				57(3)				2(1)	2(1)	24(1)	12(1)		165
2000 <sup>e</sup>	26(1)			49(2)				52(2)						11(1)	3(1)	3(1)	144
2001 <sup>d</sup>								68(2)									68
2002 <sup>e</sup>	11(1)		3(1)	32(2)				20(1)						10(1)	3(1)		79
2003 <sup>e</sup>	59(3)			49(3)				37(5)						26(2)			171
2004 <sup>e</sup>	36(3)			51(3)			5(1)	55(4)				4(2)	0(2)	34(5)			185
2005 <sup>e</sup>				47(3) <sup>g</sup>		1(2)		63(3)						23(4) <sup>h</sup>			134

<sup>a</sup> A: Headwaters 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 forks, F: Bear Ck. to 3/4 mi. below Bear Ck, G: 3/4 mi. below Bear Ck. to Tinman Camp, H: Tinman Camp to Rucherts Camp, I: Rucherts Camp to Sheep Ck, J: Mouth to falls, K: Mouth to first large spring, L: Sheep Ck. to Ladybug Flat Campground, M: Ladybug Flat Campground to Panjab Br., N: Panjab Br. to Cowcamp Br.

<sup>b</sup> Surveys conducted by Martin and Underwood.

<sup>c</sup> No surveys.

<sup>d</sup> Surveys conducted by US Forest Service Personnel.

<sup>e</sup> Surveys conducted by WDFW Fish Management Personnel.

<sup>f</sup> Includes redds from section C.

<sup>g</sup> Survey actually stopped at river mile 1.4 the third walk due to large impassable beaver dam.

<sup>h</sup> 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 15.** Bull trout spawning survey summary with redd counts (number of times surveyed) for the Panjab and Meadow creek Basins, 1995-2005.

Year	Reach Surveyed <sup>a</sup>													Total Redds
	Panjab Creek					Meadow Creek					Turkey Creek	Turkey Tail		
	A	B	C	D	E	F	G	H	I	J	K	L	M	
	RM 4.5-3.8	RM 3.8-3.5	RM 3.5-3.2	RM 3.2-2.1	RM 2.1-0.0	RM 4.9-4.0	RM 4.0-2.2	RM 2.2-1.2	RM 1.2-1.0	RM 1.0-0.0	RM 2.1-0.0	RM 3.4-2.8	RM 2.8-0.0	
1995 <sup>b</sup>					7(1)					2(1)				9
1996 <sup>b</sup>					9(1)					5(1)				14
1997 <sup>b</sup>				2(2)	2(1)			0(2)						4
1998 <sup>b</sup>					0(1)					0(1)				0
1999 <sup>c</sup>		9(1)		6(1)	1(1)	25(1)			0(1)		8(1)	8(1)		57
2000 <sup>c</sup>								7(1)						7
2001 <sup>d</sup>														0
2002 <sup>c</sup>			3(2)		0(2)			8(2)	0(2)					11
2003 <sup>c</sup>			6(3)		5(3)	3(3)			0(3)		3(1)	0(1)		17
2004 <sup>c</sup>	19(4)				0(2)	19(4)			1(2)		6(4)			45
2005 <sup>c</sup>			0(2)			8(3)			5(2)					13

<sup>a</sup> A: river mile (RM) 4.5 to RM 3.8, B: RM 3.8 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.

<sup>b</sup> Surveys conducted by US Forest Service Personnel.

<sup>c</sup> Surveys conducted by WDFW Fish Management Personnel.

<sup>d</sup> No survey done.

## Tissue Sampling

Fin clips were collected from a total of 264 salmonids in this study area in 2005 (Table 16). All 264 samples (167 bull trout and 97 rainbow/steelhead) were collected from juveniles during electrofishing surveys. The following numbers of bull trout fin clips were collected from these streams; 77 from the Tucannon River, 28 from Bear Creek, 23 from Meadow Creek, 12 from Turkey Creek, 18 from Panjab Creek, and 9 from Cummings Creek (2004). The following numbers of rainbow/steelhead samples were collected from these streams; 17 from the Tucannon River, 2 from Bear Creek, 36 from Meadow Creek, 12 from Turkey Creek, and 30 from Panjab Creek. PIT tags were also implanted in 218 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.



**Table 16.** Tissue samples collected in the Tucannon River basin, 2005.

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 ↑ Bear Ck.	27	16	16	0	0	0
Bear Creek	28	10	0	2	0	0
Tucannon from Bear to Sheep Ck.	47	42	0	4	1	0
Tucannon from Sheep Ck. to Ladybug Flat Campground	3	3	3	13	4	13
Meadow Creek	23	6	23	36	12	17
Turkey Creek	12	5	10	12	6	11
Panjab Creek	18	11	11	30	15	10
Cummings Creek (2004)	9	6	0	0	0	0
<b>Totals</b>	<b>167</b>	<b>99</b>	<b>63</b>	<b>97</b>	<b>38</b>	<b>51</b>

## Stream Profiles of the Tucannon River Basin

### Tucannon River

The Tucannon River is a tributary to the Snake River approximately 7.9 miles downstream of Little Goose Dam. The first 33 miles of the river flows through primarily agricultural land with a cottonwood and alder riparian overstory and a brush understory. The riparian zone transitions to include pines and firs throughout the Wooten Wildlife Area and conifers predominate further upstream.

A joint electrofishing sampling effort by WDFW and the USFWS (Table 11) was conducted throughout the upper reaches of the Tucannon River and a few of its major tributaries including Bear Creek, Panjab Creek, Turkey Creek, and Meadow Creek to monitor distribution, abundance, collect genetic and scale samples, and to implant PIT tags into bull trout (USFWS primary goal). Rainbow/steelhead were also sampled for distribution, abundance, and genetic and age information. Cummings Creek data from 2004 is also included here as part of the evaluation of fish abundance, distribution, and genetic samples. In addition, WDFW sampled six sites on the Little Tucannon River in 2002, from river mile 1.2 to river mile 3.6, in an effort to locate bull trout. No bull trout were found in the Little Tucannon River but age 0+ and age 1+ rainbow/steelhead were captured in the lower five sites. No salmonids were found in the upper site, but tailed frogs were found in very low density (see WDFW files). This sampling effort combined with earlier electrofishing efforts in other years in the Little Tucannon River have failed to locate any bull trout in this tributary.

### Upper Tucannon River (Buckley Ridge to Bear Creek)

Five electrofishing surveys were conducted on the upper Tucannon River on July 18<sup>th</sup>, 2005 (Table 11). The upper two sites yielded zero fish and three tailed frogs. Between sites TR1-2 there is a possible fish passage barrier, which had been identified by WDFW in the past as a

bedrock falls measuring approximately 2 m (six feet) in height. The three sites sampled below the bedrock falls yielded 20 age 0+ bull trout (25-41mm), 46 age 1+ bull trout (68-190mm), and 1 adult bull trout (202mm). WDFW and USFWS staff collected 27 genetic samples and 16 scale samples, as well as implanted 47 bull trout with PIT tags in this reach (Table 16). The only other species observed was tailed frogs, and no rainbow/steelhead were seen. Water temperatures measured during sampling ranged from 44 -55 °F between 0900 and 1345 hrs.

The upper Tucannon River is defined as Buckley Ridge (river mile 58) downstream to Bear Creek (river mile 54.2). WDFW has conducted bull trout spawning surveys in this reach for several years (Tables 13, 14). Bull trout and redds have only been observed in the lower portion of this reach. The upper half of this section consisted of a pine and fir riparian overstory with a dense brush and fern understory, while the lower half has a dense alder, fern, and brush understory. Other habitat features throughout this section include moderate sedimentation, good bank stability, small to medium sized cobble, and abundant large woody debris.

### **Bear Creek**

Electrofishing surveys were conducted by WDFW and USFWS staff on Bear Creek on July 18<sup>th</sup> and 19<sup>th</sup>, 2005 (Table 11). Four sites sampled between river mile 0.0 to river mile 1.9 produced 28 bull trout, all of which were in the age 1+ class (75-190mm). The USFWS electrofisher was not operating properly and capture efficiency was thought to be poor. All of the bull trout collected were sampled for genetics and implanted with a PIT tag (Table 16). Two rainbow/steelhead were collected and both were sampled for tissues for genetic analysis. Water temperatures ranged between 52 – 53 °F , between 0615 and 1400 hrs.

WDFW conducted bull trout spawning surveys on Bear Creek to monitor spawning abundance and distribution on September 13<sup>th</sup> and 28<sup>th</sup>, and October 13<sup>th</sup>. (Table 12) Two surveys were broken up into two sections, river mile 0.0 to river mile 1.4 and river mile 1.4 to river mile 2.6, due to a large beaver dam that was constructed after summer sampling at river mile 1.4. This dam was believed to be impassable to bull trout. The third and final survey was from the mouth to the beaver dam because only one redd was found in the upper section on the previous two walks. A total of 47 redds were observed in the lower 1.4 miles of stream. Bear Creek contains a large number of spawning bull trout in most years (Tables 13, 14).

The mouth of Bear Creek is located at river mile 54.2 on the Tucannon River. This stream meanders through a narrow canyon and contains a dense pine and fir riparian overstory with a dense alder and brush understory. Other habitat attributes include low to moderate sedimentation, small to large cobble with some boulders, good bank stability, and abundant large woody debris.



**Photo 58.** Falls on left bank tributary of lower Bear Creek forks ~5 meters high.



**Photo 59.** Falls on left bank tributary of lower Bear Creek Forks ~ 5 meters high (same falls as Photo 58).



**Photo 60.** Large beaver dam on Bear Creek at approximately river mile 1.4.



**Photo 61.** Pond created by large beaver dam on Bear Creek at approximately river mile 1.4.

### **Tucannon River (Bear Creek to Sheep Creek)**

Electrofishing surveys were conducted by WDFW and USFWS staff on the Tucannon River between Bear Creek and Sheep Creek on July 19<sup>th</sup>, and again by WDFW on July 26<sup>th</sup>, 2005 (Table 11). Nine electrofishing sites were sampled within this section, three on the 19<sup>th</sup>, and six on the 26<sup>th</sup>. The USFWS electrofisher was not operating properly on the 19<sup>th</sup> and reduced sampling efficiency. The six additional sites were sampled because of the inadequate number of genetic samples collected on the 19<sup>th</sup>. A total of 97 bull trout were collected. There were 47

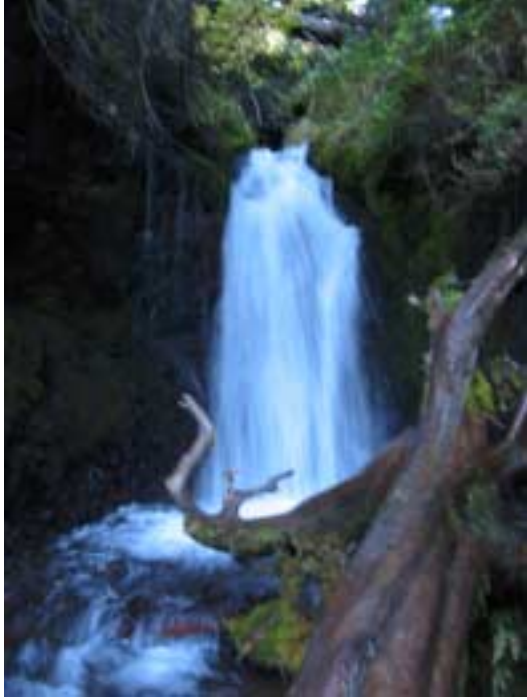
genetic samples collected and 58 PIT tags implanted (Table 16). Four rainbow/steelhead were collected on July 19<sup>th</sup>, all of which were tissue sampled for DNA analysis. On July 26<sup>th</sup> there were no rainbow/steelhead sampled but abundance levels were estimated at each site ranging from absent (0) to common (>10 and <100). Water temperatures ranged from 43–54 °F between 1000 and 1630 hrs.

WDFW conducted bull trout spawning surveys in this section to monitor spawning abundance and distribution. Three surveys were conducted on a bi-weekly basis on September 13<sup>th</sup>, and 28<sup>th</sup>, and again on October 13<sup>th</sup> (Table 12). This reach usually has large numbers of bull trout redds (Tables 13, 14).

This reach of the Tucannon River was from the confluence of Bear Creek and the Tucannon River (river mile 54.2) downstream to the mouth of Sheep Creek (river mile 50.7). It consisted primarily of a coniferous riparian overstory with an alder and brush understory. Other habitat features included moderate sedimentation, small to large cobble with some boulders, fair to moderate bank stability, and abundant large woody debris.

### **Sheep Creek**

Bull trout spawning surveys were conducted on Sheep Creek on October 1<sup>st</sup> and 27<sup>th</sup>, 2004 from the mouth upstream to an impassable falls (Photo 62 and 63) at river mile 0.6. Sheep Creek is a small tributary to the Tucannon River that drains from the north and is located approximately 4.6 miles above Panjab Bridge. Sheep Creek is low gradient with gravel and small cobble in the lower 50 meters, above this it is high gradient with large cobble. The stream has good riparian fair bank stability, and fair LWD. Four redds were found during the first survey on Sheep Creek and none on the second survey (Table 13).



**Photo 62.** Falls on Sheep Creek 0.6 miles above mouth.



**Photo 63.** Falls on Sheep Creek 0.6 miles above mouth.

### **Tucannon River (Sheep Creek to Ladybug Flat Campground)**

Electrofishing surveys were conducted by WDFW and USFWS staff between Sheep Creek and Ladybug Flat Campground on the Tucannon River on July 19<sup>th</sup>, 2005 (Table 11). Three sites were sampled within this section and only six bull trout were collected; three age 0+ bull trout (41-50mm), and three age 1+ bull trout (88-98mm). Bull trout were sampled for genetics, scales, and implanted with a PIT tag (Table 16). There were 13 rainbow/steelhead collected and 12 of those were sampled for genetics and scales. Other species collected were a few juvenile wild Chinook from the lower sites, sculpins (Appendix C-Table 3), and tailed frogs. Water temperatures ranged from 50-55 °F between 1200 and 1600 hrs.

This reach of the Tucannon River is located between river mile 50.7 and river mile 48.1. The riparian overstory consisted of scattered pines, firs, and cottonwoods with an alder and brush understory. Other habitat features include moderate sedimentation, good bank stability, small to large cobble with some boulders, and moderate to abundant large woody debris.

### **Cold Creek**

A bull trout spawning survey was conducted on Cold Creek on October 1<sup>st</sup> and 27<sup>th</sup>, 2004. Cold Creek is a small tributary to the Tucannon River that drains from the south and is located approximately 0.4 miles below Sheep Creek. Cold Creek is low gradient towards the lower end and then becomes higher gradient as you move upstream. The high gradient area is a series of

steps with sections of moderate gradient riffles and runs. The riparian overstory consists of pines and firs with a brush and fern understory. It also contains moderate bank stability, abundant large woody debris, moderate sedimentation, and good shade cover. No redds were found but spawning could occur in this stream. The limiting factor for Cold Creek was limited water observed during our survey.



**Photo 64.** Lower Cold Creek ~0.1 miles above mouth.



**Photo 65.** Middle section of Cold Creek.



**Photo 66.** Middle to upper section of Cold Creek.



**Photo 67.** Upper Cold Creek near the top of the Survey, ~0.8 miles above mouth.

## **Turkey Creek**

Electrofishing sites were sampled by WDFW on Turkey Creek on July 19<sup>th</sup>, 2005 (Table 11). Two sites between river mile 0.2 to river mile 0.5 produced 23 bull trout and 17 rainbow/steelhead. These fish consisted of 23 age 1+ (72-166mm) bull trout, and 16 age 1+ (60-194mm) and one legal (211mm) rainbow/steelhead. We collected 12 genetic and 10 scale samples from bull trout, as well as implanting PIT tags into 21 bull trout (Table 16). Another 12 genetic and 11 scale samples were collected from rainbow/steelhead. Water temperatures ranged from 44-45 °F between 1000 and 1130 hrs.

Turkey Creek has had some documented bull trout spawning in previous years (Tables 13, 15) but it was not surveyed in 2005.

Turkey Creek is a small tributary located approximately at river mile 3.5 on Panjab Creek. Turkey Creek Trail parallels Turkey Creek its entire length, which starts at the end of Forest Service Road 4608 to the confluence of Panjab Creek. It flows out of a narrow canyon with moderate to heavy sedimentation and abundant large woody debris. The riparian overstory consists of pines and firs while the understory consists of alders, ferns, and brush. Other habitat features include small to medium cobble, moderate bank stability, and high sedimentation.

## **Panjab Creek**

Six electrofishing sites were sampled by WDFW on Panjab Creek on July 19<sup>th</sup> and 26<sup>th</sup>, 2005 between approximately river mile 2.1 to river mile 3.6 (Table 11). A total of 23 bull trout and 43 rainbow/steelhead were collected. All of the bull trout collected were in the age 1+ size class (69-147mm), and 41 of the rainbow/steelhead were in the age 1+ class (53-195mm), with 2 legal-sized (208-223mm). There were 18 genetic and 11 scale samples collected as well as 20 PIT tags implanted into bull trout (Table 16). Another 29 genetic and 10 scale samples were taken from rainbow/steelhead. Other species observed consisted of tailed frogs that were common throughout the surveyed sites, as well as sculpins that were present in sites PC-4, 5, and 6 (Appendix C). Sculpins did not exist at sites upstream of site PC-4 (about 0.8 miles upstream of Meadow Creek). Water temperatures at sampling sites ranged from 47-51°F between 1400 and 1550 hrs.

WDFW conducted bull trout spawning surveys on Panjab Creek to monitor spawning abundance and distribution, as well as to ensure man-made dams did not block fish passage as they did in 2004 (Faler et al. 2005). Surveys were conducted on September 27<sup>th</sup> and October 12<sup>th</sup> (Table 12). The spawning surveys were walked from the confluence of Meadow Creek (river mile 2.1) to confluence of Turkey Creek (river mile 3.5). Within this section there were no bull trout redds observed. We also walked from the mouth of Panjab Creek to Meadow Creek in September to ensure no barrier dams blocked passage. We saw no redds during this walk and we notched 13 man-made barriers on the lower half of this stream to allow fish passage. These dams were found from Meadow Creek Campground downstream to the mouth of Panjab Creek. All dams were in or near campgrounds. This reach has had documented bull trout spawning in past years (Tables 13, 15).

Panjab Creek is a tributary located at approximately river mile 46.2 on the Tucannon River. The riparian overstory consists of pines, firs, and cottonwoods with an alder and brush understory. Other habitat features include low to moderate sedimentation, small to medium cobble, good bank stability, and abundant large woody debris.

### **Meadow Creek**

Electrofishing surveys were conducted on Meadow Creek on July 18<sup>th</sup> and 26<sup>th</sup>, 2005 (Table 11). There were nine sites sampled, five sites completed on July 18<sup>th</sup> and four sites on July 26<sup>th</sup>. The additional four sites were sampled because insufficient tissue samples were collected from bull trout for genetic analysis on July 18<sup>th</sup>. A total of 55 bull trout and 71 rainbow/steelhead were collected. Twenty-one genetic and 23 scale samples were collected as well as 43 PIT tags implanted into bull trout (Table 16). Another 36 genetic and 17 scale samples were collected from rainbow/steelhead. Bull trout ranged in size from 33-220mm. Rainbow/steelhead were 57-215mm). The total number of rainbow/steelhead collected was from the first five sites, including one hatchery legal-sized fish with an elastomer tag from site six. The fish abundance from the last four sites was classified as common because the objective was to only collect bull trout genetic samples. Water temperatures ranged from 43-56 between 1000 and 1500 hrs.

WDFW conducted bull trout spawning surveys on Meadow Creek in 2005 to monitor spawning abundance and distribution (Table 12). There were three surveys conducted on September 18<sup>th</sup>, and 27<sup>th</sup>, and October 12<sup>th</sup>. This stream was divided into two sections, the forks (river mile 4.9) to Meadow Creek Campground (river mile 1.1) and Meadow Creek Campground to the mouth (river mile 0.0). This stream has had a highly variable number of bull trout redds in past years (Tables 12, 13, 15) possibly because of the frequent occurrence of man-made dams on this stream or downstream that block passage in late summer and fall.

Meadow Creek is a tributary to Panjab Creek located along a forest service road. The riparian overstory consists of scattered pines, firs, and cottonwoods with a dense alder and brush understory. Overall it is a moderate gradient stream with moderate sedimentation, small to large cobble with some boulders, moderate bank stability, and abundant large woody debris. With respect to many other streams in the area, 2005 was an extremely low water year for Meadow Creek. Combined with the low water and a number of man-made barriers in lower Meadow Creek and Panjab Creek again this year, upstream passage of migrating bull trout could have been impeded as it was in 2004 (Faler et al. 2005).

### **Cummings Creek**

WDFW Fish Management personnel conducted electrofishing surveys on the upper reaches of Cummings Creek on August 16<sup>th</sup> and 18<sup>th</sup>, 2004, primarily to capture and sample bull trout (Table 11). Twelve sites were sampled from river mile 5.7 to river mile 8.8. A total of eight bull trout were collected and all were tissue sampled for genetic analysis (Table 16). Bull trout were 59-152mm in length. Rainbow/steelhead collected consisting of 253 fish from 25-193mm. At the fourth site the water was subsurface and the stream channel was dry. The upper end of this section was at river mile 8.3 and the downstream channel was dry for approximately 300 -



400 meters. Other species observed were tailed frogs and sculpins (Appendix C-Table 3). Water temperatures ranged from 51 to 57 °F from 1100 to 1745 hrs.

WDFW Snake River Lab personnel conducted electrofishing surveys at nine sites on August 16<sup>th</sup> and 25<sup>th</sup>, 2004 between river mile 0.0 to river mile 4.8 (Table 11). There were four age 1+ (134-178mm) and one adult (200mm) bull trout collected and a total of 1,020 rainbow/steelhead. A genetic sample was collected only from the 200 mm bull trout. The age and size classification for rainbow/steelhead was 416 age 0+, 603 age 1+, and one legal-sized. Lengths were not included in the age breakdowns due to not having all the individual fish measurements for each site. Other species observed were 17 wild Chinook near the mouth, sculpins, and speckled dace.

In 2005, Snake River Lab. personnel sampled four sites with multiple pass electrofishing (Table 11) and another three sites after the School fire for presence/absence information for fish. They electrofished on August 30<sup>th</sup>, 2005 in Cummings Creek shortly after the School Fire had burned through that area. During the later survey they found a few rainbow/steelhead near the end of the road (about 6 miles above the mouth). They sampled downstream in a 2-2.5 mile area and found no fish. It appears that the fire killed all fish in the 2-2.5 mile area starting about 3.1 miles above the mouth

Cummings Creek is a tributary to the Tucannon River at approximately river mile 35. The lower half of the river has primarily a cottonwood riparian overstory with some scattered pines and an alder and brush understory. The upper half has a dense pine and fir riparian overstory with few scattered cottonwoods and a dense alder and brush understory. Other habitat attributes include moderate sedimentation, good bank stability, small to large cobble with some boulders, and abundant large woody debris.



**Photo 68.** Photo of bull trout seen in stream above the end of the road on August 16<sup>th</sup>, 2004.



**Photo 69.** CC-4, start of dry section at river mile 8.3 looking downstream, on August 16<sup>th</sup>, 2004.



**Photo 70.** CC-7, at river mile 7.1 looking downstream, taken on August 16<sup>th</sup>, 2004.



**Photo 71.** Right bank tributary at river mile 6.7 looking downstream toward mouth, taken on August 16<sup>th</sup>, 2004.



**Photo 72.** CC-3, at river mile 8.5 looking upstream, taken on August 18<sup>th</sup>, 2004.



**Photo 73.** Lightly burned mosaic area ~1.0 miles above mouth, taken on October 6<sup>th</sup>, 2005.



**Photo 74.** Cummings Creek after fire, ~2.0-3.0 miles above mouth, taken on October 6<sup>th</sup>, 2005.



**Photo 75.** Cummings Creek after fire, on USFS property, taken on October 6<sup>th</sup>, 2005.

### **Kellogg Creek**

One site was electrofished on upper Kellogg Creek on July 27<sup>th</sup> to document the presence or absence of fish for a Columbia County Transportation Department bridge replacement project. No fish were found during the survey (Table 11).

Kellogg Creek is a tributary of the Tucannon River that enters on the south edge of the town of Starbuck. In the surveyed area, the habitat features include no riparian vegetation, poor bank stability, moderate to high sedimentation, and very little water. Future surveys are needed downstream as little or no sampling has occurred to document fish use in Kellogg Creek.

# Conclusions and Recommendations

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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 basin within Washington State. 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 primarily from our sampling in 2005, but some data from our earlier sampling efforts have been included.

We view this report as an interim 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 for each of the next 2-4 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 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.

For 2006, we have the following recommendations for additional field sampling:

- 1) Continue collecting bull trout genetic samples in Tucannon River reaches 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. We may assist the USFWS and USACE with PIT tagging bull trout during these sampling efforts.
- 2) Continue conducting bull trout spawning surveys in the North Fork Asotin and upper Tucannon to continue to monitor these bull trout populations annually.
- 3) Continue, and expand, our electrofishing sampling and bull trout spawning surveys in the Wenaha Basin and the lower Grande Ronde Basin tributaries in Washington to try and eventually complete sampling in all drainages. High priorities areas for 2006 would include Butte Creek, North Fork Wenaha, especially the upper portion of the drainage, and possibly Crooked Creek and its tributaries.
- 4) Continue to monitor steelhead distribution and relative abundance in parts of George Creek and Couse Creek in Asotin County. Previous sampling in Couse Creek was very limited and inadequate.
- 5) Conduct several steelhead spawning surveys in Alpowa Creek and lower Joseph Creek. We currently have inadequate data regarding spawning distribution, spawn timing and relative abundance in these streams. These surveys are a high priority as these stream reaches are the only designated steelhead major spawning areas (MSA's) in southeast Washington for which we don't have this baseline spawning information.

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## Appendices A-C

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Appendix A. Table 1. Study site locations for Lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek drainage, 2005.							
Stream	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
Grouse Ck.	GC-1	2.6	T6N,R43E,Sect. 9,NE¼,NE¼	EL	46.01464	117.42103	1.3 miles above the WA/OR state line
	GC-2	1.9	T6N,R43E,Sect. 9,NE¼,SE¼	EL	46.00598	117.41825	0.6 miles above the WA/OR state line
	GC-3	1.6	T6N,R43E,Sect. 10,SW¼,SW¼	EL	46.00320	117.41633	0.4 miles above the WA/OR state line
	GC-4	1.3	T6N,R43E,Sect. 15,NW¼,NW¼	EL	45.99959	117.41237	Just above the WA/OR state line
Bear Ck.	BC-1	0.7	T6N,R44E,Sect. 16,NE¼,SW¼	EL	45.99534	117.32371	0.7 miles up West Fork
	BC-2	0.3	T6N,R44E,Sect. 17,NE¼,NE¼	EL	46.00050	117.31929	0.3 miles up West Fork
	BC-3	0.6	T6N,R44E,Sect. 16,NE¼,NE¼	EL	45.99829	117.31335	0.6 miles up East Fork
	BC-4	0.5	T6N,R44E,Sect. 16,NW¼,NW¼	EL	46.00000	117.31377	0.5 miles up East Fork
	BC-5	1.3	T6N,R44E,Sect. 8,SE¼,NE¼	EL	46.00945	117.31637	0.4 miles below forks
	BC-6	1.2	T6N,R44E,Sect. 8,SE¼,NE¼	EL	46.01151	117.31545	0.5 miles below forks
	BC-7	0.6	T6N,R44E,Sect. 4,NW¼, SW¼	EL	46.01960	117.31489	0.6 miles above mouth
	BC-8	0.6	T6N,R44E,Sect. 4,NW¼, SW¼	EL	46.01960	117.31489	~30 meters below site # BC-7
Buford Ck.	BU-1	3.0	T6N,R44E,Sect. 15,NW¼,NE¼	EL,F	45.99884	117.28065	Below culvert @ state line
	BU-2	2.3	T6N,R44E,Sect. 10,NE¼,SE¼	EL	46.00795	117.27768	0.7 miles below culvert @ state line
	BU-3	1.9	T6N,R44E,Sect. 10,SE¼,NE¼	EL	46.01136	117.27313	1.0 mile below culvert @ state line
	BU-4	1.6	T6N,R44E,Sect. 11,NW¼,NW¼	EL	46.01423	117.26832	1.4 miles below culvert @ state line
Shumaker Ck.	SC-1	3.8	T7N,R45E,Sect. 14,NE¼,NE¼	EL	46.08847	117.12806	Upper site
	SC-2	0.1	T7N,R45E,Sect. 36,SW¼,NW¼	EL	46.04220	117.12279	At stream ford
Myers Ck.	M-1	1.2	T7N,R46E,Sect. 31,NW¼,NW¼	EL	46.06147 <sup>d</sup>	117.09215 <sup>d</sup>	At forks
	M-2	0.0	T7N,R46E,Sect. 19,SW¼,SW¼	EL	46.04475 <sup>d</sup>	117.09712 <sup>d</sup>	Above mouth
Tenmile Ck.	TC-1	14.5	T8N,R46E,Sect. 31,SE¼,NE¼	EL	46.12698	117.08572	1.0 mile below instream pond
	TC-2	14.3	T8N,R46E,Sect. 31,NE¼,NE¼	EL	46.12996	117.08448	1.3 miles below instream pond
	TC-3	6.9	T9N,R46E,Sect. 34,NW¼,NW¼	EL	46.21770	117.03455	5.8 miles above Weissenfels Ridge Rd. bridge
	TC-4	6.5	T9N,R46E,Sect. 27,SE¼,SW¼	EL	46.22247	117.03114	5.4 miles above Weissenfels Ridge Rd. bridge
	TC-5	5.8	T9N,R46E,Sect. 27,SW¼,NE¼	EL	46.23134	117.02733	4.7 miles above Weissenfels Ridge Rd. bridge
	TC-6	4.6	T9N,R46E,Sect. 22,SE¼,NE¼	EL	46.24595	117.01790	3.4 miles above Weissenfels Ridge Rd. bridge
	TC-7	1.5	T9N,R46E,Sect. 2,SW¼,SE¼	EL	46.28196	117.00448	0.33 miles above Weissenfels Ridge Rd. bridge
	TC-8	1.1	T9N,R46E,Sect. 2,NW¼,SE¼	EL	46.28557	117.00125	Weissenfels Ridge Rd. bridge
NF Asotin Ck.	NFA-1	16.9	T8N,R42E,Sect. 4,NE¼,SE¼	EL	46.20023	117.54270	Just below confluence of Double Springs
	NFA-2	16.4	T8N,R42E,Sect. 3,SW¼,NW¼	EL	46.20096	117.53737	~1.5 miles upstream from Cougar Canyon

<sup>a</sup> River Mile  
<sup>b</sup> EL-Qualitative Electrofishing, F-Flow, T-Temp  
<sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°  
<sup>d</sup> GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum



Appendix A. Table 1. Study site locations for Lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek drainage, 2005							
Stream Name	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
NF Asotin Ck. (cont.)	NFA-3	15.9	T8N,R42E,Sect. 3,SW¼,NE¼	EL	46.20309 <sup>d</sup>	117.52760 <sup>d</sup>	~1.0 miles upstream from Cougar Ck.
	NFA-4	15.4	T8N,R42E,Sect. 2,NW¼,NW¼	EL	46.20596	117.51824	~0.5 miles upstream from Cougar Ck.
	NFA-5	14.9	T8N,R42E,Sect. 2,NW¼,NE¼	EL	46.20455	117.50910	50 meter below Cougar Ck. Confluence
Cougar Canyon	CG-1	1.7	T8N,R42E,Sect. 11,SW¼,SW¼	EL	46.18152	117.51857	0.1 miles below forks
	CG-2	1.3	T8N,R42E,Sect. 11,NW¼,SW¼	EL	46.18699	117.51743	0.5 miles below forks
	CG-3	0.8	T8N,R42E,Sect. 11,NE¼,NW¼	EL	46.19313	117.51400	1.0 mile below forks
	CG-4	0.6	T8N,R42E,Sect. 2, SE¼,SW¼	EL	46.19657	117.51260	1.2 miles below forks
	CG-5	0.2	T8N,R42E,Sect. 2,SW¼,NE¼	EL	46.20227 <sup>d</sup>	117.51052 <sup>d</sup>	1.6 miles below forks
SF Asotin Ck.	SFA-1	10.9	T8N,R43E,Sect. 14,SE¼,NE¼	EL	46.17326	117.38166	2.0 miles above Redhill Gulch
	SFA-2	10.4	T8N,R43E,Sect. 13,SE¼,NW¼	EL	46.17391	117.37316	1.6 miles above Redhill Gulch
	SFA-3	9.6	T8N,R43E,Sect. 13,SE¼,NE¼	EL	46.17410	117.35716	0.8 miles above Redhill Gulch
	SFA-4	0.0	T8N,R44E,Sect. 18,NW¼,NW¼	EL	46.17288 <sup>d</sup>	117.35407 <sup>d</sup>	~50 meters up right bank tributary
	SFA-5	9.1	T8N,R44E,Sect. 18,SE¼,NW¼	EL	46.17208	117.34754	0.3 miles above Redhill Gulch
Redhill Gulch	RHG-1	0.0	T8N,R44E,Sect. 18,SW¼,NE¼	EL	46.17287	117.34135	~50 meters up Redhill Gulch
George Ck.	GG-1	20.9	T8N,R44E,Sect. 29,SE¼,SE¼	EL	46.13522	117.31513	1.2 miles above Forest Service Line
	GG-2	19.5	T8N,R44E,Sect. 21,SW¼,SE¼	EL	46.15088	117.30228	0.1 miles below Forest Service line
	GG-3	18.7	T8N,R44E,Sect. 22,NW¼,NW¼	EL, T	46.15982	117.29193	Trent Ridge culvert
	GG-4	7.2	T9N,R45E,Sect. 21,NE¼,NW¼	EL	46.25037	117.17691	Upper end of WDFW property boundary
	GG-5	5.7	T9N,R45E,Sect. 9,NW¼,SE¼	EL	46.26996	117.17211	200 meters above Stringtown Gulch
	GG-6	4.5	T9N,R45E,Sect. 3,SW¼,SE¼	EL	46.27944	117.15412	Rockpile Gulch
	GG-7	3.9	T9N,R45E,Sect. 2,NW¼,SW¼	EL	46.28380	117.14409	2.4 miles above Meyer Ridge Rd. bridge
	GG-8	3.6	T9N,R45E,Sect. 2,NW¼,SW¼	T	46.28624 <sup>d</sup>	117.13915 <sup>d</sup>	2.1 miles above Meyer Ridge Rd. bridge
	GG-9	1.8	T10N,R45E,Sect. 36,NW¼,SW¼	EL	46.30302	117.11724	0.3 miles above Meyer Ridge Rd. bridge
	GG-10	1.5	T10N,R45E,Sect. 36,NE¼,NW¼	F	46.30716 <sup>d</sup>	117.11390 <sup>d</sup>	Meyer Ridge Rd. bridge
	GG-11	1.2	T10N,R45E,Sect. 25,SE¼,SW¼	EL	46.31037	117.11325	0.3 miles below Meyer Ridge Rd. bridge
	GG-12	0.7-1.5	T10N,R45E,Sect. 25,SE¼,NE¼	Salvage	46.31639 <sup>d</sup>	117.10994 <sup>d</sup>	River mile 0.7 to Meyer Ridge Rd. bridge
Hefflefinger Gulch	HF-1	3.5	T8N,R45E,Sect. 31,SW¼,NW¼	EL	46.12930	117.22890	Bennett Ridge Rd.
	HF-2	2.5	T8N,R45E,Sect. 30,SE¼,NW¼	EL	46.14137	117.22234	1.0 mile below Bennett Ridge Rd.
	HF-3	2.1	T8N,R45E,Sect. 30,NW¼,NW¼	EL	46.14622	117.22416	River mile 2.1
	HF-4	1.6	T8N,R44E,Sect. 24,SE¼,SE¼	EL	46.15058	117.23166	River mile 1.6

<sup>a</sup> River Mile  
<sup>b</sup> EL-Qualitative Electrofishing, F-Flow, T-Temp  
<sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°  
<sup>d</sup> GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum

Appendix A. Table 2. Study site locations for the Wenaha River Basin in Washington State, 2005.							
Stream	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
NF Wenaha River	NFW-1	5.8	T7N,R39E,Sect. 25,NW¼,NE¼	EL	46.06005	117.87457	River mile 5.8
	NFW-2	4.5	T7N,R39E,Sect. 35,NE¼,NE¼	EL	46.04633	117.88893	River mile 4.5
	NFW-3	3.3	T7N,R39E,Sect. 36,NW¼,SW¼	EL	46.03942	117.87391	River mile 3.3
	NFW-4	0.1	T7N,R40E,Sect. 31,SW¼,SW¼	EL	46.03584	117.86490	0.15 miles up unnamed tributary
	NFW-5	2.8	T7N,R40E,Sect. 31,SW¼,SW¼	EL	46.03375	117.86673	~0.1 miles below unnamed tributary
	NFW-6	2.3	T6N,R39E,Sect. 1,SE¼,NE¼	EL	46.02710	117.86520	~0.5 miles below unnamed tributary
	NFW-7	1.5	T6N,R39E,Sect. 12,NE¼,NE¼	EL	46.01763	117.86853	~0.7 miles above Deep Saddle Creek
	NFW-8	1.2	T6N,R39E,Sect. 12,SE¼,NE¼	EL	46.01340	117.86877	~0.4 miles above Deep Saddle Creek
	NFW-9	0.5	T6N,R40E,Sect. 7,SW¼,SW¼	EL	46.00593	117.86351	~0.3 miles below Deep Saddle Creek
	NFW-10	0.0	T6N,R40E,Sect. 18,SE¼,NW¼	EL	46.00021	117.85947	WA/OR border
Deep Saddle Creek	DS-1	1.7	T6N,R39E,Sect. 11,SE¼,NW¼	EL	46.01398 <sup>d</sup>	117.90037 <sup>d</sup>	~50 meters upstream of left bank tributary
	DS-2	0.0	T6N,R39E,Sect. 11,SW¼,NE¼	EL	46.01419 <sup>d</sup>	117.89766 <sup>d</sup>	~50 meters up left bank tributary
	DS-3	1.6	T6N,R39E,Sect. 11,SW¼,NE¼	EL	46.01391 <sup>d</sup>	117.89672 <sup>d</sup>	Just below left bank tributary
	DS-4	1.2	T6N,R39E,Sect. 11,SE¼,NE¼	EL	46.01183	117.88997	~0.4 miles below left bank tributary
	DS-5	0.9	T6N,R39E,Sect. 12,NW¼,SW¼	EL	46.01119	117.88410	River mile 0.9
	DS-6	0.7	T6N,R39E,Sect. 12,NE¼,SW¼	EL	46.01053	117.87991	River mile 0.7
	DS-7	0.5	T6N,R39E,Sect. 12,NW¼,SE¼	EL	46.00981	117.87482	River mile 0.5
Beaver Creek	BV-1	5.8	T7N,R40E,Sect. 32,NE¼,NE¼	EL	46.04602 <sup>d</sup>	117.82124 <sup>d</sup>	Below unnamed tributary on right bank
	BV-2	4.9	T7N,R40E,Sect. 33,NW¼,NE¼	EL	46.04647 <sup>d</sup>	117.80713 <sup>d</sup>	~0.6 miles above Elwell Spring tributary
	BV-3	4.3	T7N,R40E,Sect. 27,SE¼,SE¼	EL	46.05043 <sup>d</sup>	117.79623 <sup>d</sup>	Just above Elwell Spring tributary
	BV-4	3.9	T7N,R40E,Sect. 34,NE¼,NW¼	EL	46.04648	117.79059	Just below Deer Spring tributary
	BV-5	3.5	T7N,R40E,Sect. 34,SE¼,NW¼	EL	46.04188 <sup>d</sup>	117.79174 <sup>d</sup>	~0.5 miles below Deer Spring tributary
	BV-6	2.9	T6N,R40E,Sect. 3,NW¼,NW¼	EL	46.03372 <sup>d</sup>	117.79524 <sup>d</sup>	~1.0 miles below Deer Spring tributary
	BV-7	2.4	T6N,R40E,Sect. 4,SE¼,NE¼	EL	46.02876 <sup>d</sup>	117.80051 <sup>d</sup>	~2.4 miles above WA/OR border
	BV-8	2.3	T6N,R40E,Sect. 4,SE¼,NE¼	EL	46.02793	117.80417	~2.3 miles above WA/OR border
	BV-9	1.6	T6N,R40E,Sect. 4,SE¼,SW¼	EL	46.02218 <sup>d</sup>	117.81338 <sup>d</sup>	~1.6 miles above WA/OR border
	BV-10	1.2	T6N,R40E,Sect. 9,NE¼,SE¼	EL	46.01593	117.81540	~1.2 miles above WA/OR border

<sup>a</sup> River Mile – river miles were measured from the WA/OR border for the NF Wenaha and Beaver Creek.  
<sup>b</sup> EL-Qualitative Electrofishing  
<sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°  
<sup>d</sup> GPS was made using Mapttech's Terrain Navigator (version 5.03) program in WSG 84 datum

Appendix A. Table 3. Study site locations for the Tucannon River basin, 2005.							
Stream	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
Tucannon River	TR-1	60.0	T8N,R42E,Sect. 35,SW¼,NE¼	EL	46.13325	117.50640	~3.9 miles upstream from mouth of Bear Ck.
	TR-2	59.3	T8N,R42E,Sect. 26,SW¼,SW¼	EL	46.13829	117.51958	~3.2 miles upstream from mouth of Bear Ck.
	TR-3	59.2	T8N,R42E,Sect. 26,SW¼,SW¼	EL	46.13850	117.52063	~3.1 miles upstream from mouth of Bear Ck.
	TR-4	58.7	T8N,R42E,Sect. 27,SE¼,NE¼	EL	46.14516	117.52534	~2.6 miles upstream from mouth of Bear Ck.
	TR-5	58.0	T8N,R42E,Sect. 22,SW¼,SE¼	EL	46.15305	117.53172	~1.9 miles upstream from mouth of Bear Ck.
	TR-6	56.0	T8N,R42E,Sect. 16,SW¼,SW¼	EL	46.16903	117.56268	~3.4 miles upstream from mouth of Sheep Ck.
	TR-7	55.5	T8N,R42E,Sect. 17,SW¼,NE¼	EL	46.17308	117.57192	~2.9 miles upstream from mouth of Sheep Ck.
	TR-8	55.1	T8N,R42E,Sect. 17,SE¼,NW¼	EL	46.17547	117.57896	~2.5 miles upstream from mouth of Sheep Ck.
	TR-9	54.7	T8N,R42E,Sect. 18,NE¼,NE¼	EL	46.17792	117.58490	~2.2 miles upstream from mouth of Sheep Ck.
	TR-10	54.3	T8N,R42E,Sect. 7,SW¼,SE¼	EL	46.18132	117.59204	~1.7 miles upstream from mouth of Sheep Ck.
	TR-11	53.7	T8N,R42E,Sect. 7,NE¼,SW¼	EL	46.18415	117.60300	~1.1 miles upstream from mouth of Sheep Ck.
	TR-12	53.5	T8N,R42E,Sect. 7,NW¼,SW¼	EL	46.18488	117.60731	~0.9 miles upstream from mouth of Sheep Ck.
	TR-13	52.9	T8N,R41E,Sect. 12,SE¼,NE¼	EL	46.18735	117.61798	~0.3 miles upstream from mouth of Sheep Ck.
	TR-14	52.5	T8N,R41E,Sect. 12,SE¼,NW¼	EL	46.18792	117.62463	Just upstream from mouth of Sheep Ck.
	TR-15	52.1	T8N,R41E,Sect. 12,NW¼,NW¼	EL	46.19116	117.63103	~40 meters downstream of Cold Ck.
	TR-16	51.4	T8N,R41E,Sect. 11,NE¼,NW¼	EL	46.19077	117.64510	~0.7 miles below Cold Ck.
	TR-17	50.1	T8N,R41E,Sect. 3,SE¼,SW¼	EL	46.19605	117.66775	~300 meters upstream of Ladybug CG
Bear Ck.	BC-1	2.0	T8N,R42E,Sect. 29,SW¼,NE¼	EL	46.14487	117.57185	~0.1 miles above left bank tributary
	BC-2	1.7	T8N,R42E,Sect. 29,NE¼,NW¼	EL	46.14848	117.57462	~0.2 miles below left bank tributary
	BC-3	0.8	T8N,R42E,Sect. 20,SW¼,NE¼	EL	46.15959	117.56879	~0.8 miles upstream from mouth
	BC-4	0.0	T8N,R42E,Sect. 16,SW¼,SW¼	EL	46.16709	117.56018	~50 meters upstream from mouth
Turkey Ck.	TC-1	0.5	T8N,R41E,Sect. 20,NE¼,SW¼	EL	46.15507	117.70824	~0.5 miles above Panjab confluence
	TC-2	0.2	T8N,R41E,Sect. 20,SW¼,NE¼	EL	46.15863	117.70384	~0.2 miles above Panjab confluence
Panjab Ck.	PC-1	3.7	T8N,R41E,Sect. 20,SE¼,NE¼	EL	46.15973	117.70082	~1.5 miles upstream from Panjab trailhead
	PC-2	3.4	T8N,R41E,Sect. 20,NW¼,NE¼	EL	46.16381	117.70291	~1.2 miles upstream from Panjab trailhead
	PC-3	3.3	T8N,R41E,Sect. 20,NW¼,NE¼	EL	46.16485	117.70285	~30 meters above mouth of unnamed tributary
	PC-4	3.0	T8N,R41E,Sect. 17,NE¼,SW¼	EL	46.16891	117.70791	~0.8 miles upstream from Panjab trailhead
	PC-5	2.7	T8N,R41E,Sect. 17,NW¼,SW¼	EL	46.17175 <sup>d</sup>	117.71158 <sup>d</sup>	~0.5 miles upstream from Panjab trailhead
	PC-6	2.3	T8N,R41E,Sect. 17,SW¼,NW¼	EL	46.17487	117.71659	~0.2 miles upstream from Panjab trailhead

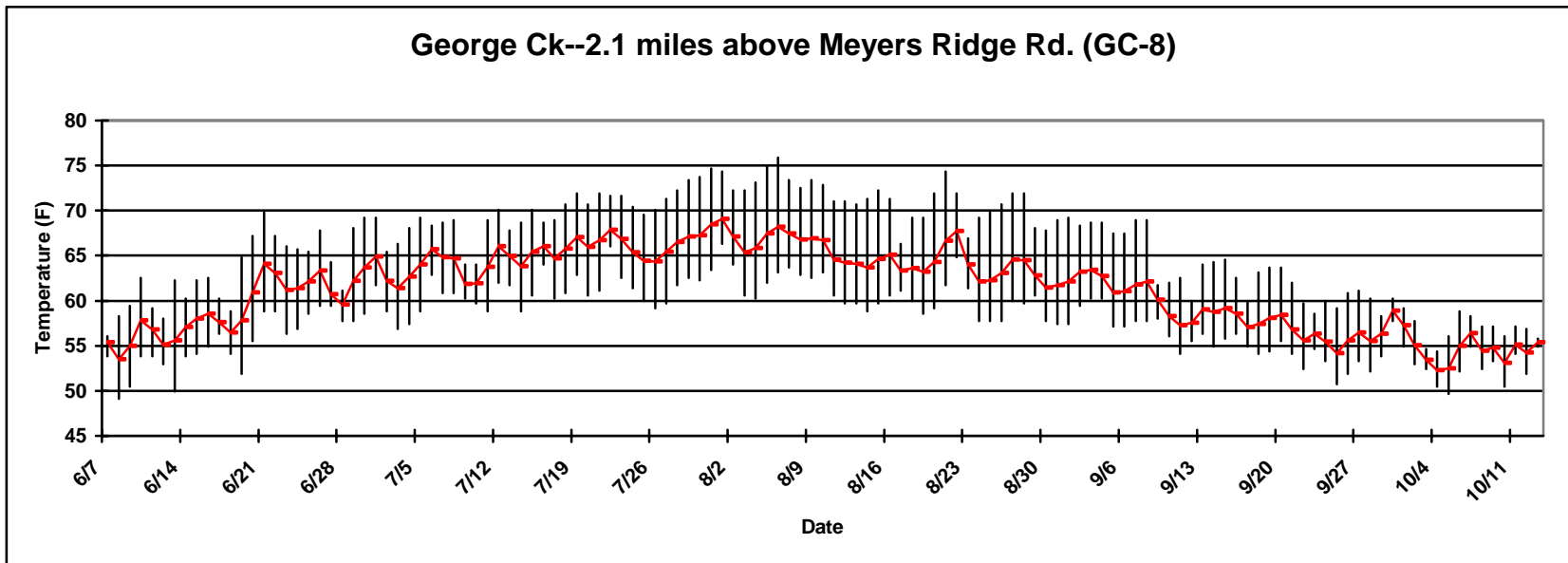
<sup>a</sup> River Mile  
<sup>b</sup> EL-Qualitative Electrofishing  
<sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°  
<sup>d</sup> GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum

Stream Name	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. Sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
Meadow Ck.	MC-1	3.5	T8N,R40E,Sect. 25,SW¼,SW¼	EL	46.13874	117.75628	~2.2 miles above Meadow Ck. campground
	MC-2	3.0	T8N,R40E,Sect. 25,SE¼,NW¼	EL	46.14484	117.75174	~1.7 miles above Meadow Ck. campground
	MC-3	2.5	T8N,R40E,Sect. 24,SW¼,SE¼	EL	46.14982	117.74529	~1.2 miles above Meadow Ck. campground
	MC-4	2.0	T8N,R40E,Sect. 24,NE¼,SE¼	EL	46.15341	117.73924	~0.8 miles above Meadow Ck. campground
	MC-5	1.8	T8N,R41E,Sect. 19,NW¼,SW¼	EL	46.15639	117.73656	~0.5 miles above Meadow Ck. campground
	MC-6	1.5	T8N,R41E,Sect. 19,SW¼,NW¼	EL	46.15879	117.73302	~0.3 miles above Meadow Ck. campground
	MC-7	1.2	T8N,R41E,Sect. 19,NE¼,NW¼	EL	46.16128	117.72852	Meadow Ck. campground
	MC-8	0.8	T8N,R41E,Sect. 18,SW¼,SE¼	EL	46.16650 <sup>d</sup>	117.72576 <sup>d</sup>	~0.4 miles below Meadow Ck. campground
	MC-9	0.5	T8N,R41E,Sect. 18,NE¼,SE¼	EL	46.16894 <sup>d</sup>	117.72171 <sup>d</sup>	~0.7 miles below Meadow Ck. campground
Cummings Ck. (data collected in 2004)	CC-1	8.8	T9N,R42E,Sect. 30,NW¼, NW¼	EL	46.23528	117.60947	2.2 miles above end of road
	CC-2	8.6	T9N,R41E,Sect. 25,NE¼,NE¼	EL	46.23723	117.61351	Up left bank tributary ~100 meters
	CC-3	8.5	T9N,R41E,Sect. 24,SE¼,SE¼	EL	46.23854	117.61388	1.9 miles above end of road
	CC-4	8.3	T9N,R41E,Sect. 24,SE¼,SE¼	EL	46.24036	117.61688	1.7 miles above end of road
	CC-5	8.1	T9N,R41E,Sect. 24,NW¼,SE¼	EL	46.24324	117.61916	1.5 miles above end of road
	CC-6	7.3	T9N,R41E,Sect. 13,SE¼,SE¼	EL	46.25408	117.61643	0.7 miles above end of road
	CC-7	7.1	T9N,R41E,Sect. 13,NE¼,SE¼	EL	46.25638	117.61648	0.5 miles above end of road
	CC-8	7.1	T9N,R41E,Sect. 13,NE¼,SE¼	EL	46.25655	117.61638	0.5 miles above end of road
	CC-9	7.0	T9N,R41E,Sect. 13,NE¼,SE¼	EL	46.25825	117.61580	0.4 miles above end of road
	CC-10	6.7	T9N,R41E,Sect. 13,SE¼,NE¼	EL	46.26186 <sup>d</sup>	117.61397 <sup>d</sup>	Up right bank tributary ~100 meters
	CC-11	6.6	T9N,R41E,Sect. 13,NE¼,NE¼	EL	46.26332	117.61638	End of road
	CC-12	5.7	T9N,R41E,Sect. 12,SE¼,NW¼	EL	46.27457	117.62486	0.9 miles below end of road

<sup>a</sup> River Mile  
<sup>b</sup> EL-Qualitative Electrofishing  
<sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D°  
<sup>d</sup> 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 basin, 2005.							
Stream Name	Site #	RM <sup>a</sup>	Location (within sect. is listed as smallest qtr. Sect. of qtr. sect.)	Sample Type <sup>b</sup>	GPS Coordinates <sup>c</sup>		Comments
					North	West	
Cummings Ck. (2004 data collected by SRL)	CC-13	4.8	T9N,R41E,Sect. 1,NW¼,SW¼	EQ	46.28602 <sup>d</sup>	117.63179 <sup>d</sup>	4.8 miles above the Gate along the Cummings
	CC-14	4.2	T9N,R41E,Sect. 2,NE¼,NE¼	EQ	46.29405 <sup>d</sup>	117.63500 <sup>d</sup>	4.2 miles above the Gate along the Cummings
	CC-15	3.6	T10N,R41E,Sect. 35,NW¼,SE¼	EQ	46.30143 <sup>d</sup>	117.63945 <sup>d</sup>	3.6 miles above the Gate along the Cummings
	CC-16	3.0	T10N,R41E,Sect. 26,SW¼,SE¼	EQ	46.30906 <sup>d</sup>	117.64284 <sup>d</sup>	3.0 miles above the Gate along the Cummings
	CC-17	2.4	T10N,R41E,Sect. 26,SE¼,NW¼	EQ	46.31672 <sup>d</sup>	117.64583 <sup>d</sup>	2.4 miles above the Gate along the Cummings
	CC-18	1.7	T10N,R41E,Sect. 23,NW¼,SW¼	EQ	46.32559 <sup>d</sup>	117.64840 <sup>d</sup>	1.8 miles above the Gate along the Cummings
	CC-19	1.1	T10N,R41E,Sect. 22,SE¼,NE¼	EQ	46.33191 <sup>d</sup>	117.65473 <sup>d</sup>	1.2 miles above the Gate along the Cummings
	CC-20	0.6	T10N,R41E,Sect. 22,SW¼,NE¼	EQ	46.33248 <sup>d</sup>	117.66406 <sup>d</sup>	0.6 miles above the Gate along the Cummings
	CC-21	0.0	T10N,R41E,Sect. 22,SW¼,NW¼	EQ	46.33261 <sup>d</sup>	117.67475 <sup>d</sup>	~50 m above mouth of Cummings Creek
Cumming Ck. (2005 data collected by SRL)	SRCC-1	3.6	T10N,R41E,Sect. 35,NW¼,SE¼	EQ	46.30143 <sup>d</sup>	117.63945 <sup>d</sup>	3.6 miles above the Gate along the Cummings
	SRCC-2	2.4	T10N,R41E,Sect. 26,SE¼,NW¼	EQ	46.31672 <sup>d</sup>	117.64583 <sup>d</sup>	2.4 miles above the Gate along the Cummings
	SRCC-3	1.1	T10N,R41E,Sect. 22,SE¼,NE¼	EQ	46.33191 <sup>d</sup>	117.65473 <sup>d</sup>	1.2 miles above the Gate along the Cummings
	SRCC-4	0.0	T10N,R41E,Sect.22,SW¼,NW¼	EQ	46.33261 <sup>d</sup>	117.67475 <sup>d</sup>	~50 m above mouth of Cummings Creek
Kellogg Ck.	KC-1	7.6	T11N,R39E,Sect. 16,SE¼,SW¼	EL	46.42868 <sup>d</sup>	118.06755 <sup>d</sup>	Mead Rd. bridge
<sup>a</sup> River Mile <sup>b</sup> EL-Qualitative Electrofishing, EQ-Quantitative Electrofishing, F-Flow, T-Temp <sup>c</sup> GPS were taken with Garmin II plus, in WSG 84 datum and in D.D <sup>o</sup> <sup>d</sup> GPS was made using Maptech's Terrain Navigator (version 5.03) program in WSG 84 datum							

**Appendix B. Figure 1.** Temperature monitor on lower George Creek, 2005.



**Appendix C. Table 1.** Relative Abundance of non-salmonids from electrofishing sites on lower Grande Ronde tributaries, Tenmile Creek, and Asotin Creek drainage, 2005.

	Grouse Ck	Bear Ck	Buford Ck	Shumaker Ck	Myers Ck	Tenmile Ck ↑ Mill Ck	Tenmile Ck ↓ Mill Ck	NF Asotin Ck	Cougar Ck	SF Asotin Ck	Redhill Gulch	George Ck ↑ Trent Grade	George Ck ↓ Trent Grade	Heffelfinger Gulch
<b>Cyprinidae</b> Speckled dace <i>Rhinichthys osculus</i>	0	0	0	0	0	3	3	0	0	0	0	0	3	0
<b>Catostomidae</b> Bridgelip suckers <i>Catostomus columbianus</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0
<b>Cottidae</b> Sculpin <sup>a</sup> <i>Cottus spp.</i>	0	0	0	0	0	0	1	0	0	1	0	0	2	0
Tailed Frogs <i>Ascalphus truei</i>	0	0	0	0	0	0	0	1	1	1	0	1	0	0
Crayfish <sup>a</sup> <i>Pacifastacus spp.</i>	1	0	1	0	0	1	1	0	0	0	0	1	0	0
<sup>a</sup> Noted by genus only, not identified by species.														

**Appendix C. Table 2.** Relative Abundance of non-salmonids from electrofishing sites on Wenaha River basin tributaries, 2005.

	NF Wenaha ↑ Thunder Camp (RM 2.3)	NF Wenaha ↓ Thunder Camp (RM 2.3)	Deep Saddle Ck	Beaver Ck
<b>Cottidae</b> Sculpin <sup>a</sup> <i>Cottus spp.</i>	0	2	0	0
Tailed Frogs <i>Ascalphus truei</i>	1	1	2	1

<sup>a</sup> Noted by genus only, not identified by species.

**Appendix C. Table 3.** Relative Abundance of non-salmonids from electrofishing sites from Tucannon River basin, 2005.

	Tucannon R. ↑ Bear Ck	Tucannon R. from Bear to Sheep Ck	Tucannon R. ↓ Sheep Ck	Bear Ck	Turkey Ck	Panjab Ck	Meadow Ck ↑ Campground	Meadow Ck ↓ Campground	Cummings Ck	Kellog Ck
<b>Cottidae</b> Sculpin <sup>a</sup> <i>Cottus spp.</i>	0	2	3	0	0	1	0	2	1	0
Tailed Frogs <i>Ascalphus truei</i>	1	2	3	0	3	3	3	3	1	0

<sup>a</sup> Noted by genus only, not identified by species.