

Assessment of Salmonids and their Habitat Conditions in the Walla Walla River Basin within Washington

**Annual Report
2003 - 2004**



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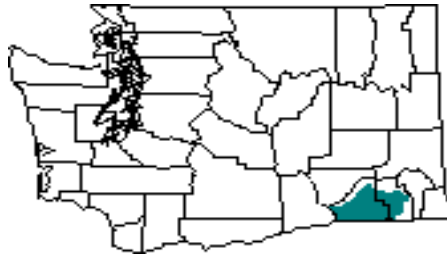
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Assessment of Salmonids and Their Habitat Conditions in the Walla Walla River Basin within Washington:

2003 Annual Report

(from March 1, 2003 to March 1, 2004)



By

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Washington
Department of
**FISH and
WILDLIFE**

For

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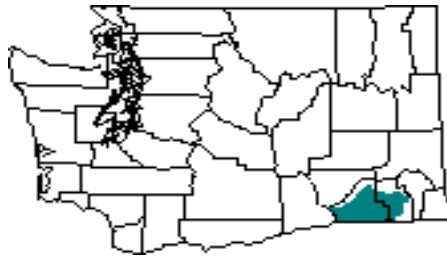
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Acknowledgments

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Table of Contents

List of Tables	iii
List of Figures	v
Executive Summary	1
Introduction	3
Background	3
Study Purpose and Objectives	6
Methods	8
Study Area	8
Stream Reaches	8
Individual Site Selection	8
Habitat Assessment	9
Stream Flows	9
Stream Temperatures	9
Limiting Factor Identification	12
Fish Stock Assessment	12
Distribution and Abundance	12
Electrofishing	12
Quantitative Electrofishing	12
Qualitative Electrofishing	15
Snorkeling	16
Spawning Surveys	16
Genetic Sampling	16
Results and Discussion	17
Habitat Assessment	17
Stream Flows	17
Walla Walla Settlement Agreement	21
Stream Temperatures	30
Walla Walla Settlement Agreement	30
Limiting Factors Identification	35
Fish Stock Assessment	36
Distribution and Abundance	36
Electrofishing	36
Quantitative Electrofishing	36
Qualitative Electrofishing	39
Walla Walla Settlement Agreement	40

Snorkeling	41
Non-Salmonid Species Abundance and Distribution	43
Spawning Surveys	43
Steelhead	43
Bull Trout	45
Genetic Sampling and Analyses	52
Recommendations	53
Literature Cited	55
Appendices	58
Appendix A. Study Sites, 2003	58
Appendix B. Discharge Data, 2003	65
Appendix C. Stream Temperature Graphs (EF), 2003	79
Appendix D. Qualitative Electrofishing, 2003	104
Appendix E. Relative Abundance of Non-Salmonids, 2003	116
Appendix F. Manual Flow Summary for the Walla Walla River, 1998-2003	119

List of Tables

Table 1.	Categories of relative abundance (per site) for non-salmonids.	16
Table 2.	Mean streamflow in cfs (standard deviation, number of samples) measured manually in the Walla Walla River, 1998-2003.	22
Table 3.	Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.	24
Table 4.	Average and mean maximum temperatures (EF and standard deviation) from temperature monitors at Pepper Rd., Mojonier Rd., Swegle Rd., and Detour Rd. in the Walla Walla River, 1998-2003 (listed from upstream to downstream).	31
Table 5.	Densities of salmonids from electrofishing sites in the Walla Walla Basin, summer 2003. Sites are listed in order from upstream to downstream.	37
Table 6.	Comparison of summer rainbow/steelhead densities (fish/100 m ²) in the Walla Walla River between the Stateline and Lowden from 1998 through 2003.	40
Table 7.	Relative abundance of fish from qualitative snorkel sites in the Walla Walla River, 2003.	42
Table 8.	Steelhead spawning survey summary for the Walla Walla basin in Washington State, 2003.	44
Table 9.	Bull trout spawning survey summary for the Wolf Fork of the Touchet River, 2003.	45
Table 10.	Bull trout spawning survey summary, redd count (number of times surveyed), for the Wolf Fork of the Touchet River, 1990-2003.	46
Table 11.	Bull trout spawning survey summary for the South Fork Touchet and one of its tributaries	47
Table 12.	Bull trout spawning survey summary, redd count (number of times surveyed), for the Burnt Fork, 2000-2003.	48

Table 13. Bull trout spawning survey summary for the North Fork Touchet and one of its tributaries, 2003. 48

Table 14. Bull trout spawning survey summary, redd count (number of times surveyed), for the North Fork Touchet River, 1994-2003. 49

Table 15. Bull trout spawning survey summary, redd count (number of times surveyed), for Mill Creek, 1990-2003. 50

Table 16. Bull trout spawning survey summary, redd count (number of times surveyed), for tributaries to Mill Creek, 1994-2003. 51

List of Figures

Figure 1.	Walla Walla watershed (modified from map courtesy of USACE, Walla Walla District).	4
Figure 2.	Relative locations of WDFW flow monitoring sites in the Walla Walla basin, 2003	10
Figure 3.	Relative locations of WDFW temperature logger sites in the Walla Walla River, 2003	11
Figure 4.	Relative locations of WDFW quantitative electrofishing sites in the Walla Walla basin, 2003.	13
Figure 5.	Relative locations of WDFW qualitative electrofishing sites in the Walla Walla basin, 2003.	14
Figure 6.	Walla Walla River stream discharge (CFS) and daily maximum water temperatures (EF) every four hours below Mojonner Rd. (WW-7), 2003. (Measured Q = manual stream discharge measurements)	18
Figure 7.	Walla Walla River stream discharge (CFS) and daily maximum water temperatures (EF) every four hours above Detour Rd. (WW-10), 2003. (Measured Q = manual stream discharge measurements)	18
Figure 8.	Yellowhawk Creek stream discharge (CFS) and daily maximum water temperatures (EF) every four hours below Yellowhawk diversion (YC-1), 2003. (Measured Q = manual stream discharge measurements)	19
Figure 9.	Yellowhawk Creek stream discharge (CFS) and daily maximum water temperatures (EF) every four hours above mouth (YC-7), 2003. (Measured Q = manual stream discharge measurements)	19
Figure 10.	East Little Walla Walla River stream discharge (CFS) and daily maximum water temperatures (EF) every four hours 0.2 miles above mouth (ELW-5), 2003. (Measured Q = manual stream discharge measurements)	20
Figure 11.	Mill Creek stream discharge (CFS) and daily maximum water temperatures (EF) every four hours below Wallula Rd. (MC-30), 2003. (Measured Q = manual stream discharge measurements)	20

Figure 12. Bull trout redd counts for the Wolf Fork, 1990-2003. 46

Figure 13. Bull trout redd counts for the Burnt Fork, 2000-2003. 47

Figure 14. Bull trout redd counts for the North Fork Touchet, 1994-2003. 49

Figure 15. Bull trout redd counts for Mill Creek and its tributaries, 1990-2003. 51

Executive Summary

This study began in 1998 to assess salmonid distribution, relative abundance, genetics, and the condition of salmonid habitats in the Walla Walla River basin within Washington.

Stream flows in the Walla Walla Basin continue to show a general trend that begins with a sharp decline in discharge in late June, followed by low summer flows and then an increase in discharge in fall and winter. Manual stream flows at Pepper Rd bridge have shown substantial increases in recent years. The increase is apparently associated with a 2000 settlement agreement between the U.S. Fish and Wildlife Service (USFWS) and the Irrigation Districts to leave minimum flows in the river.

Stream temperatures in 2003 in the Walla Walla River were higher than those in 2002. Upper montane tributaries maintained maximum summer temperatures below 65EF, while sites in the middle and lower Touchet and Walla Walla rivers frequently had daily maximum temperatures well above 68EF (high enough to inhibit migration in adult and juvenile salmonids, and to sharply reduce survival of their embryos and fry). These high temperatures are possibly the most critical physiological barrier to salmonids in the Walla Walla basin, but other factors (available water, turbidity or sediment deposition, cover, lack of pools, etc.) also play a part in salmonid survival, migration, and breeding success. The increased flows in the Walla Walla, due to the USFWS/Irrigation Districts settlement agreement, have not shown consistent improvements to stream temperatures.

Rainbow/steelhead (*Oncorhynchus mykiss*) trout represent the most common salmonid in the basin. Densities of Rainbow/steelhead in the Walla Walla River from the Washington/Oregon stateline to Mojonier Rd. increased from 2002, and are still considerably higher than before the USFWS settlement agreement. Other salmonids including; bull trout (*Salvelinus confluentus*), chinook salmon (*Oncorhynchus tshawytscha*), mountain whitefish (*Prosopium williamsoni*), and brown trout (*Salmo trutta*) had low densities, and limited distribution throughout the basin. Few spring chinook were documented in the Walla Walla basin in 2003. We failed to document bull trout in the Walla Walla River during snorkel surveys in June.

Due to high water conditions steelhead spawning surveys were limited in 2003. Surveyors found 9 redds on Mill Creek, 4 redds on Whiskey Creek, and 28 redds on the Coppei Creek system (7 on the South Fork Coppei, 14 on the North Fork Coppei, and 7 on the mainstem Coppei Creek). Bull trout spawning surveys in the upper Touchet River tributaries found a total of 126 redds and 149 live fish (101 redds and 79 fish in the Wolf Fork, 0 redds and 3 fish in the Burnt Fork, 0 redds and 0 fish in the South Fork Touchet, 25 redds and 67 fish in the North Fork Touchet, and 0 redds and 0 fish in Lewis Ck.). Bull trout redd surveys were summarized since 1990 for the Touchet River and Mill Creek. The Wolf Fork redds have increased the past few years but the NF has declined. No bull trout redds were found on the Burnt Fork for the first time since we began surveys in 2000.

Recommendations for assessment activities in 2004 included:

- 1) continue to monitor the Walla Walla River (focusing from the stateline to McDonald Rd., the Mill Ck system, and the Little Walla Walla System).
- 2) continue to reevaluate Whiskey Ck. for abundance and distribution of salmonids, and Lewis Ck. for bull trout density and distribution.
- 3) select or develop a habitat survey protocol and begin to conduct habitat inventory and assessment surveys. Implementation of habitat surveys is a very high priority as the lack of these data are significant data gaps for planning and habitat restoration actions.
- 4) begin to evaluate temperature and flow data to assess if the habitat conditions exist for spring chinook in the Touchet River.

Introduction

Concerns about the decline of native salmon and trout populations have increased among natural resource managers and the public in recent years. As a result, a multitude of initiatives have been implemented at the local, state, and federal government levels. These initiatives include management plans and actions intended to protect and restore salmonid fishes and their habitats.

In 1998 bull trout (*Salvelinus confluentus*) were listed under the Endangered Species Act (ESA) as “Threatened” for the Walla Walla River and its tributaries. Steelhead (*Oncorhynchus mykiss*) were listed as “Threatened” in 1999 for the mid-Columbia River and its tributaries. These ESA listings emphasize the need for information about these threatened salmonid populations 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 submitted a proposal in December 1997 to the Bonneville Power Administration (BPA) to assess salmonid distribution, relative abundance, genetics, and the condition of salmonid habitats in the Walla Walla River basin.

The primary purposes of this project are to collect baseline biological and habitat data, to identify major data gaps, and to draw conclusions whenever possible. The study reported herein details the findings of the 2003 field season (March to December, 2003). All WDFW reports for this project are available on the BPA website at:

www.efw.bpa.gov/cgi-bin/ws.exe/websql.dir/FW/PUBLICATIONS/QueryPublications.pl
and type in Mendel for the author’s last name.

Background

The Walla Walla River and its major tributaries including the Touchet River, comprise a watershed of 1,758 square miles (ACOE 1997) and 2,454 major stream miles (Knutson et al. 1992). The majority of the watershed (73%) lies within the State of Washington, with the remainder in Oregon (Figure 1). The Walla Walla River originates from a fine network of deeply incised streams on the western slopes of the Blue Mountains. The Touchet River originates from similar streams on the northwestern slopes of the Blue Mountains, and also from seasonal streams draining Palouse hillsides to the north. The Touchet River drains into the Walla Walla River just west of the town of Touchet, WA. The Walla Walla River drains into the Columbia River near Wallula Gap, about 21 miles above McNary Dam and 6 miles above the Oregon border.

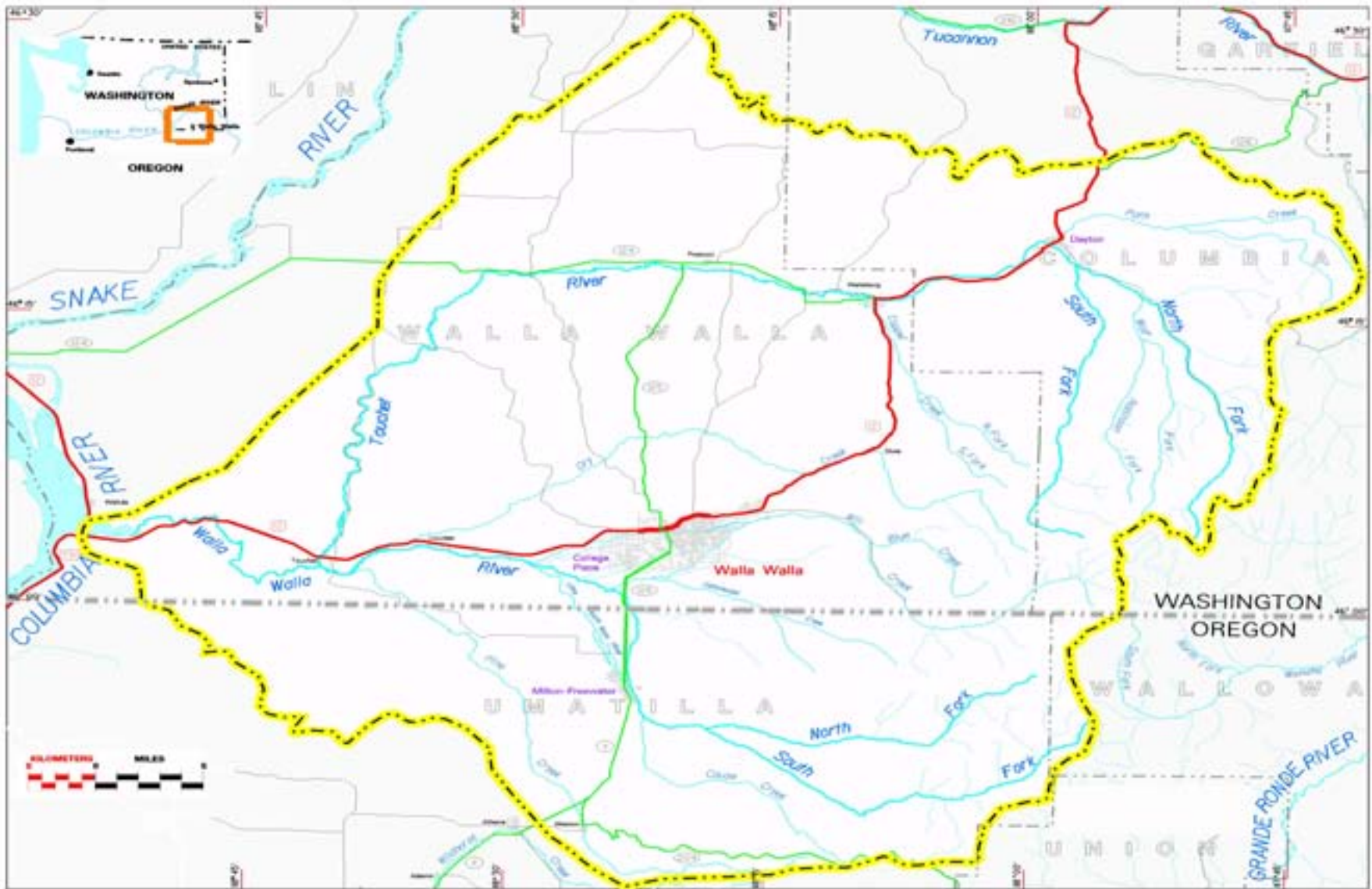


Figure 1. Walla Walla watershed (modified from map courtesy of USACE, Walla Walla District).

Historic and contemporary land-use practices have had a profound impact on the salmonid species abundance and distribution in the watershed. Fish habitat in area streams has been severely degraded by urban and agricultural development, grazing, tilling, logging, recreational activities and flood control. Agricultural diversions have severely impacted stream flows in the Walla Walla River since the 1880's (Nielson 1950). Nearly all (99%) of the surface water diversions within Washington are for the purpose of irrigation (Pacific Groundwater Group 1995). The reduced stream flows created by irrigation withdrawals adversely impact salmonid survival within the basin. Additionally, many unscreened or partially screened diversions and fish passage barriers exist within the basin, although most diversions have been screened recently (Dave Karl, WDFW, personal communication).

Out-of-basin manmade impacts to local fish populations have also been substantial. Salmon migrating to or from the ocean must pass through four dams and reservoirs in the Columbia River before reaching their destination. Juvenile and adult salmonid mortalities occur as they pass through each reservoir or dam. Other impacts include over-harvest, habitat destruction in the lower Columbia River and estuaries, predation, and industrial pollution. In addition, natural environmental fluctuations (droughts, floods, and ocean productivity) have significantly affected local fish populations.

Historically the basin probably produced substantial runs of both spring chinook (*Oncorhynchus tshawytscha*) and summer steelhead. The last substantial run of wild chinook took place in 1925; thereafter chinook populations continued a precipitous decline, and the species is considered extirpated in the basin (Nielson 1950, ACOE 1997). Anecdotal accounts and reports of historic fisheries in adjacent basins, indicate that chum (*Oncorhynchus keta*) and coho (*Oncorhynchus kisutch*) could have occurred in substantial numbers in the Walla Walla Basin (Pirtle 1957), but little written documentation exists. Endemic steelhead (*Oncorhynchus mykiss*) persist throughout much of the study area, populations in the Washington portion of the Walla Walla basin were considered depressed in 1992 and unknown in 2002, and populations in the Touchet basin were considered depressed in both 1992 and 2002 (WDF and WDW 1993, WDFW 2002). Historically as many as 300,000, and presently as many as 185,000, non-endemic hatchery steelhead (Lyons Ferry stock) and 50,000 endemic steelhead have been released annually in the middle Touchet and lower Walla Walla rivers under the Lower Snake River Compensation Program (LSRCP) to provide harvest mitigation for the four lower Snake River dams (Bumgarner et al. 2003).

Not all native salmonids in the basin are anadromous. Mountain whitefish (*Prosopium williamsoni*), bull trout and rainbow/redband trout exist within the basin. However, only rainbow/redband trout retain a wide distribution. In the past, bull trout are thought to have been widely distributed in the basin. Currently, bull trout distribution is generally limited to montane upper tributaries of the Touchet River, Walla Walla River, and Mill Creek (Mongillo 1993). However, bull trout are known to migrate into the middle or lower reaches of these rivers during winter months. Many factors have led to the decline of bull trout in southeast Washington. Damaged riparian vegetation, increased sedimentation, and decreased water flows have resulted

in elevated water temperatures beyond the tolerance of this cold water species (Mongillo 1993). Introduced rainbow trout and brown trout (*Salmo trutta*) may have increased competition or predation for bull trout.

Several non-native fish species have been introduced to support recreational fishing, or have strayed into the basin. The Washington Department of Game (now WDFW) began stocking brown trout in the Touchet River in July, 1965. Stocking of brown trout was discontinued in 1999 due to concerns about competition, hybridization, and predation with native bull trout, and steelhead, or rainbow/redband trout. Common Carp (*Cyprinus carpio*) were introduced as early as 1884 (Walla Walla Daily Journal 1884). Channel catfish (*Ictalurus punctatus*), smallmouth bass (*Micropterus dolomieu*), and bluegill (*Lepomis macrochirus*) are some of the warm water fish that now occur in the lower basin. Additionally, since 1999, three-spine stickleback (*Gasterosteus aculeatus*) have been found in the Walla Walla River by WDFW personnel involved with this project.

Study Purpose and Objectives

The purpose of this study is to assess steelhead and bull trout distribution, densities, habitat, and genetic composition in the Walla Walla watershed. In addition we wanted to document fish passage, rearing, and spawning conditions for steelhead and to examine environmental factors for potential reintroduction of chinook salmon.

Specific objectives and tasks were outlined in WDFW's proposal and statement of work to the Bonneville Power Administration (BPA Project #199802000). Some tasks had to be scaled back or postponed. Multi-year study objectives include:

1. Assess baseline habitat conditions for salmonids in the Washington portion of the Walla Walla watershed;
2. Determine salmonid distribution and relative abundance in the Washington portion of the Walla Walla watershed; and
3. Identify genetic stocks of steelhead and bull trout in the Walla Walla watershed.

Specific objectives and tasks were outlined in the statement of work. Tasks included:

- Establish constant recording temperature and flow data loggers in the Walla Walla River basin, to identify available water, as well as temperature limitations for salmonid passage, spawning and rearing;
- Conduct biweekly manual stream flow and temperature measurements to calibrate the instream monitor data outputs, and to provide data for reaches that did not have instream discharge monitors in place;

- Monitor water quality by sampling dissolved oxygen, pH, turbidity, and conductivity (This task has been deferred);
- Conduct electrofishing to determine salmonid distribution, and abundance;
- Conduct snorkel surveys during the spring and summer to supplement electrofishing data and for seasonal density comparisons;
- Conduct general habitat surveys in portions of the stream with potential for salmonid use to quantify habitat conditions and identify limiting factors (This task has been deferred);
- Conduct steelhead and bull trout spawning surveys to determine spawning timing and distribution, and to establish an index of relative abundance; and
- Collect tissue samples from bull trout and steelhead for genetic analyses.

Methods

Study Area

The study area encompasses the greater Walla Walla River basin in Washington State (Figure 1). The Walla Walla River, the Touchet River, and Mill Creek are the major rivers within the basin.

Stream Reaches

Representative stream reaches were identified based on general physical characteristics and readily identifiable landmarks. General physical characteristics included: slope, width, depth, and temperature; as well as, predominant adjacent land use. Landmarks included towns, roads, and bridges.

Individual Site Selection

Most of the study streams are in private ownership, therefore it was necessary to obtain permission from landowners to access potential sites. Owners of property bordering the study streams were identified from county assessment records and contacted in person or by telephone. For convenience, public land was utilized whenever possible. Study sites were distributed to comprehensively cover the study area (Appendix A), and sites are listed and identified in order from upstream to downstream.

River miles were determined by measuring 1:24,000 USGS topographic maps with a digital map wheel. River miles were determined by measuring the distance between the confluence of each stream and the study site. These locations should be considered approximate due to the limited precision of this method.

Electrofishing sites were selected randomly from access areas. Selection of top and bottom net locations were also randomized. Site lengths sometimes had to be modified to avoid unsuitable stream features, such as deep pools, rapids, multiple channels, and/or safety concerns.

Snorkeling sites were designed to extend and compliment the area surveyed by electrofishing. Sites were located using the same randomization process used for establishing electrofishing sites.

Habitat Assessment

Stream Flows

Stream discharge was measured using two methods. Manual flow measurements were taken 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) with Quattro Pro[®] spreadsheets. The calculated manual discharge measurements (cfs) were put into table format by site for the report (Appendix B). The second method involved the use of continuous flow data loggers (Unidata America, Model KB/DSP 128K). The monitors collect stream discharge (water stage (based on pressure)) data every 15 seconds and stores the data every hour as averages. The monitors were placed at two sites on the Walla Walla River, two sites on Yellowhawk Creek, one site on East Little Walla Walla, and one site on lower Mill Creek (Appendix A, Figure 2). WDFW contracted with the Washington Department of Ecology (WDOE) to maintain the monitors and collect the data. Manual flow measurements were taken approximately every two weeks by WDFW near each of the flow monitors to correlate the discharge and stage readings recorded by the monitors. An index site was a location where discharge measurements were taken approximately every two weeks, compared to periodic flow sites where flow measurements were taken occasionally (Appendix A, Figure 2).

Stream Temperatures

We used three methods to collect water temperatures. Water temperature (EF) 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[®]), which were set to continuously measure temperatures in EF at 30 minute intervals. The monitors were placed at sites throughout the Walla Walla River basin (Appendix A, Figure 3). WDFW maintained the temperature monitors and downloaded the data using an Optic Stowaway Shuttle[®]. Temperature data was downloaded from the shuttle into BoxCar[®] Pro 4.0 software. BoxCar[®] Pro 4.0 was used to calculate daily minimum, maximum, and mean temperatures, which were exported to Quattro Pro[®] spreadsheets. Data in Quattro Pro[®] was used to make graphs showing minimum, maximum, and mean temperatures (Appendix C). The third method involved the use of continuous flow and temperature data loggers (Unidata America, Model KB/DSP 128K), which took hourly temperature measurements. The monitors were used to collect temperature as a substitute for the stowaway temperature loggers at their respective sites (Appendix A, Figure 3). The accuracy of field thermometers and data loggers was evaluated using a laboratory calibrated thermometer (Kessler Instrument).

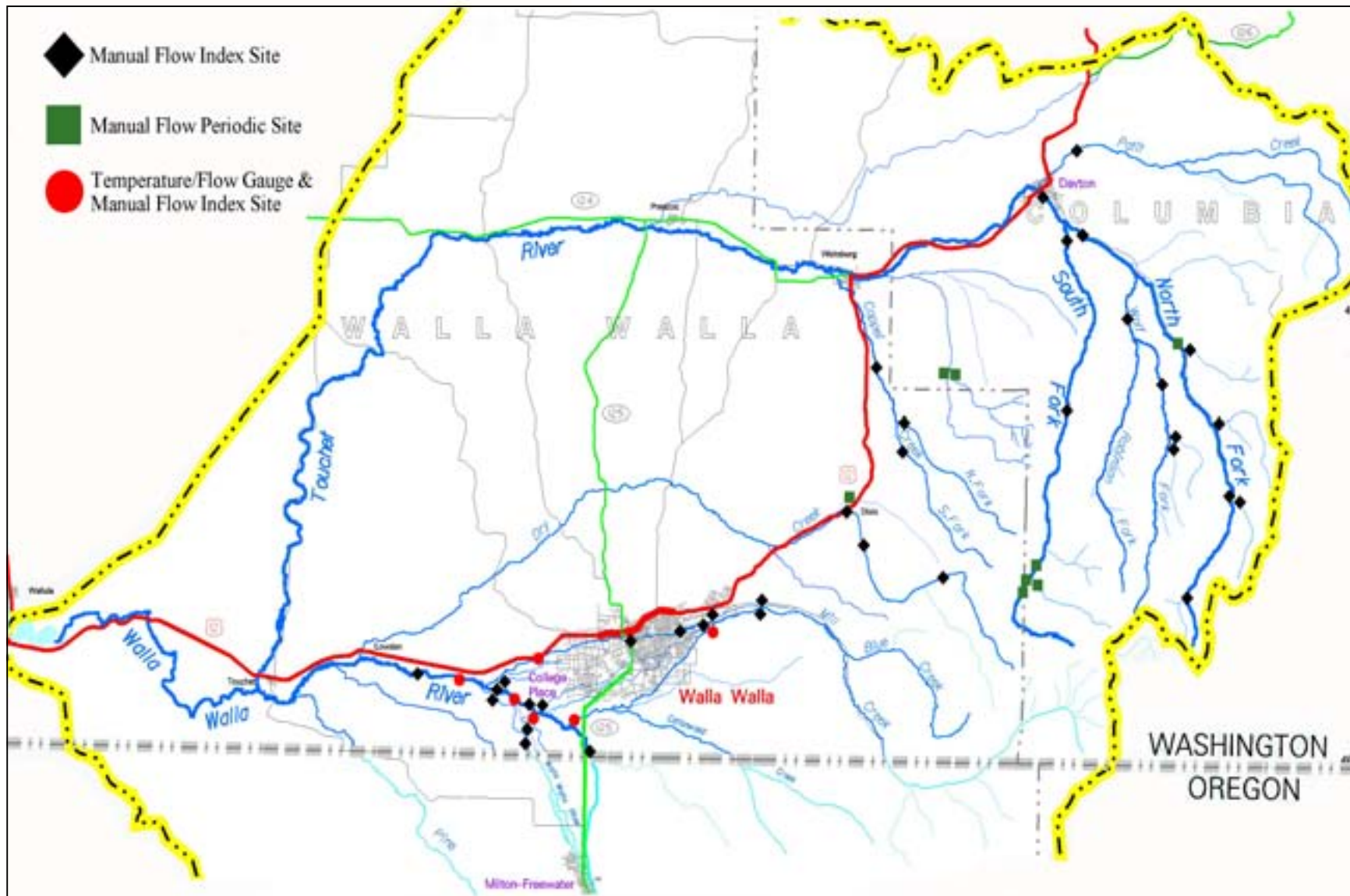


Figure 2. Relative locations of WDFW flow monitoring sites in the Walla Walla basin, 2003.

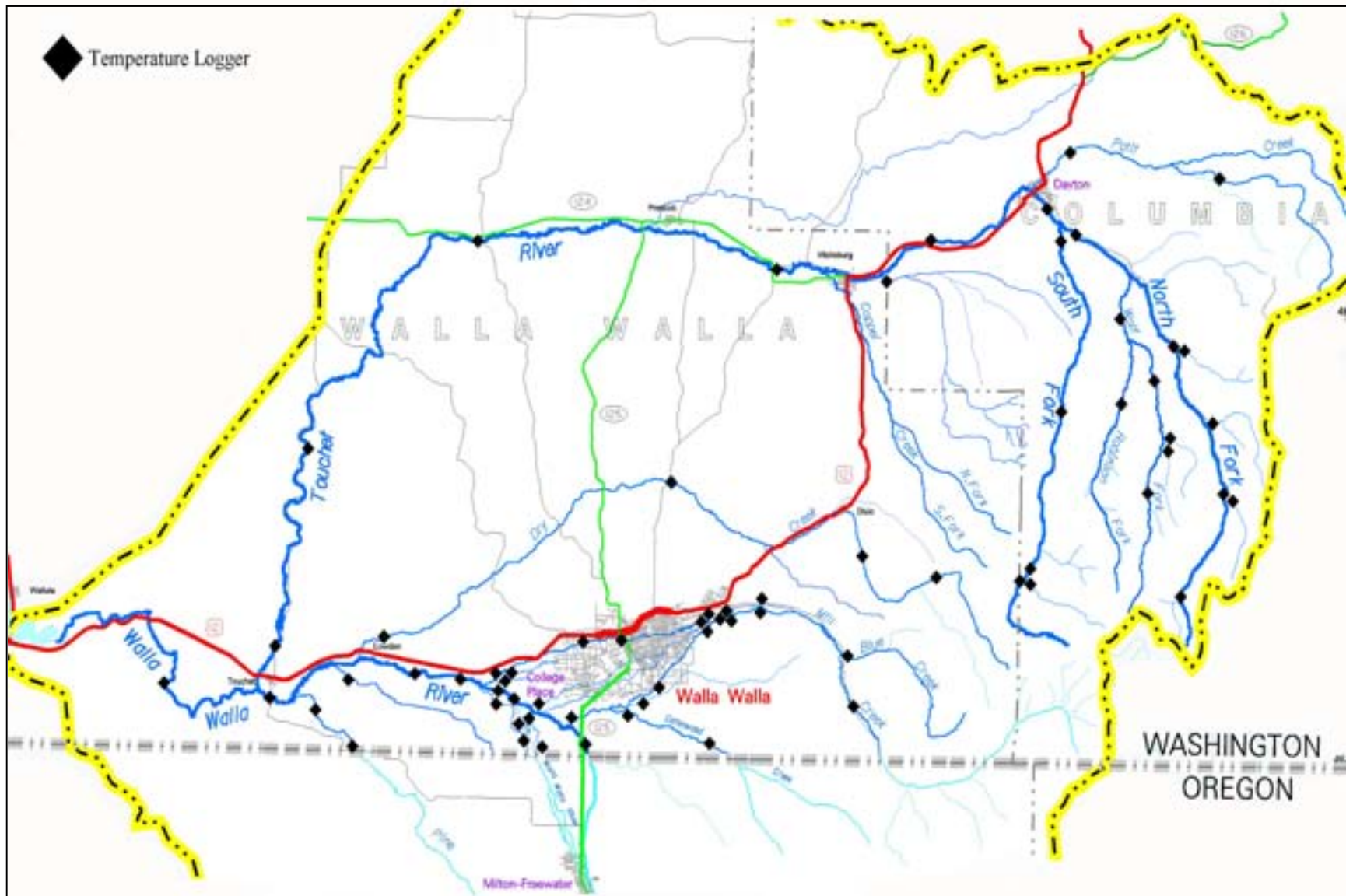


Figure 3. Relative locations of WDFW temperature logger sites in the Walla Walla basin, 2003.

Limiting Factor Identification

One of the study goals was to identify and document physical barriers to salmonid passage, spawning and rearing. Field personnel noted the presence of potential barriers and provided the information to local biologists to coordinate habitat rehabilitation efforts. The activity of two major irrigation diversion structures, Hofer Dam on the Touchet River, and Burlingame Diversion on the Walla Walla River, were also noted throughout the season.

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

Fish Stock Assessment

Distribution and Abundance

Electrofishing

A Smith-Root Model 11A or 12B electrofishing backpack unit was used to collect fish so we could calculate densities at various study sites in the Walla Walla basin (Figures 4 and 5). We used pulse DC (direct current) between 200 and 600 volts. Two different types of electrofishing surveys (quantitative and qualitative) were used during our sampling.

Quantitative Electrofishing

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

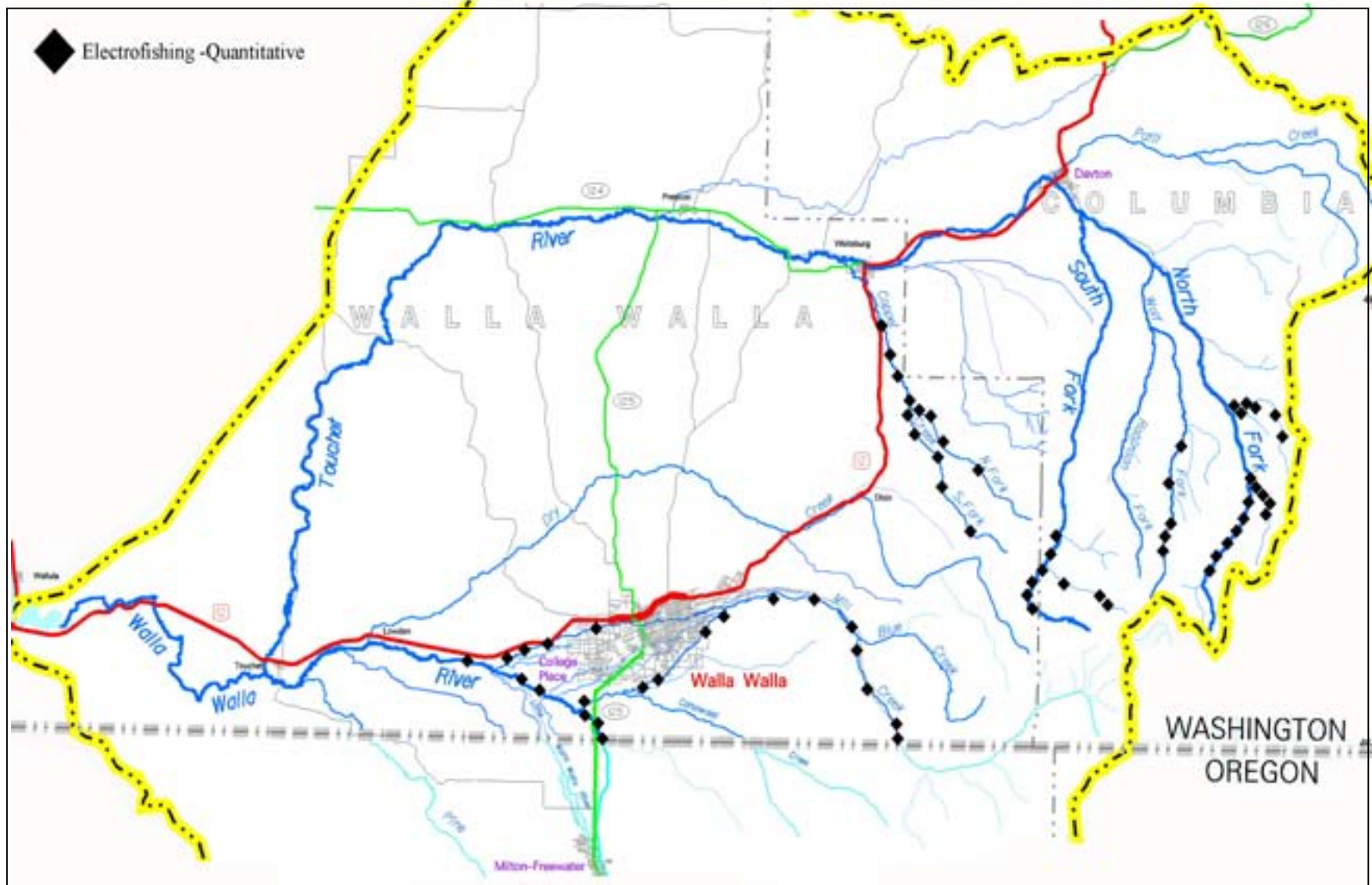


Figure 4. Relative locations of WDFW quantitative electrofishing sites in the Walla Walla basin (excluding SRL sites), 2003.

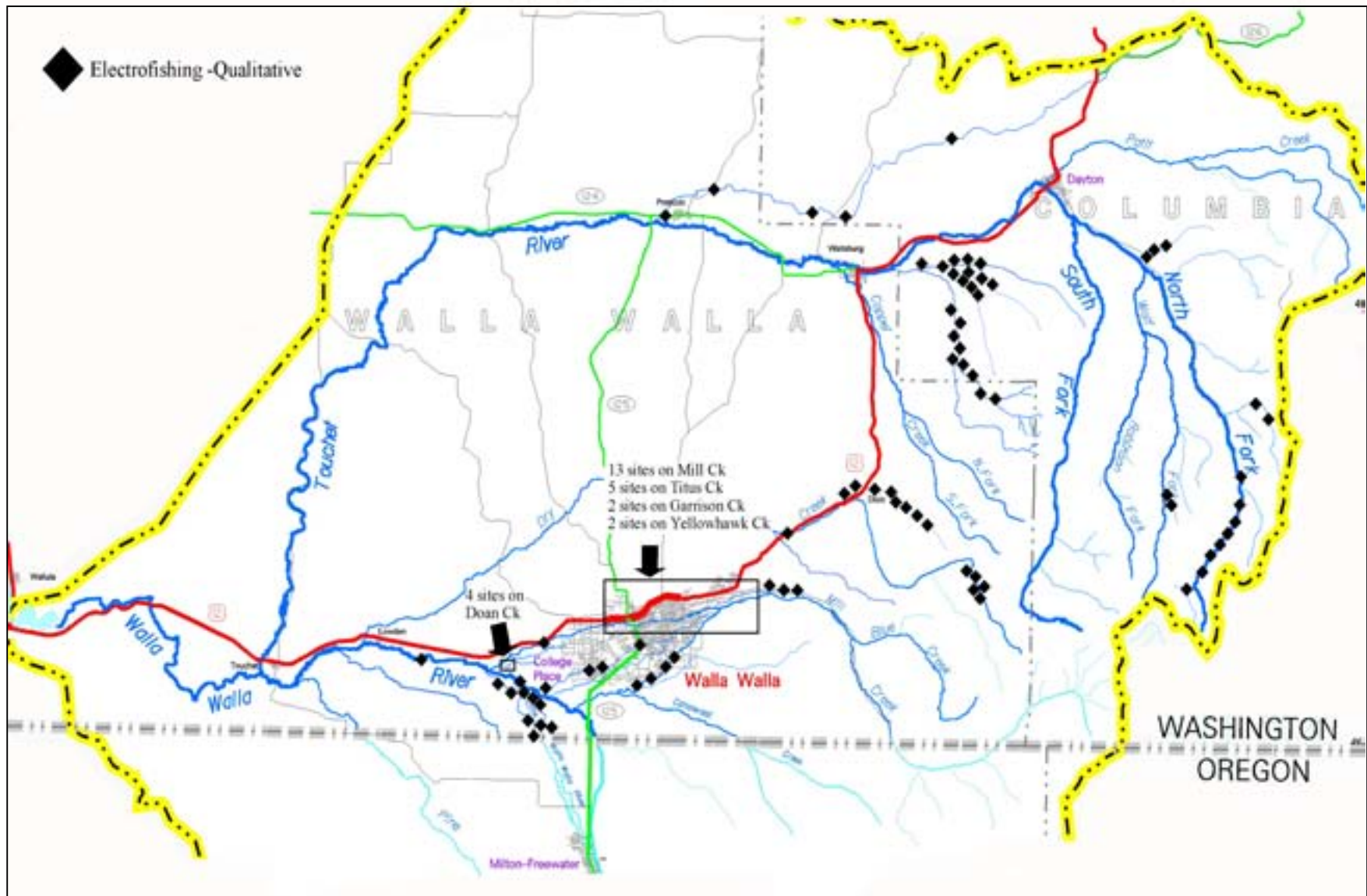


Figure 5. Relative locations of WDFW qualitative electrofishing sites in the Walla Walla basin, 2003.

Fork lengths collected during quantitative electrofishing were used to create length frequency histograms. The histograms were used to determine age classes (Mendel et al. 1999). These age class delineations were checked against ages determined from reading fish scales that were collected from several of the stream reaches in the past. Age class groupings were specific for each stream or stream reach.

A removal-depletion software program developed by the U.S. Forest Service (Van Deventer and Platts 1983) was used to calculate population densities (#/100m²) for each salmonid species, by age class. The average weight (g) of each age class can be multiplied by its density to calculate biomass (g/100m²) per age class.

The area sampled was determined by multiplying site length by the average of four or more site width measurements. A brief description of the riparian vegetation, bank stability, substrate, pool/riffle ratio, and the presence of large woody debris (LWD) was recorded for each site.

Qualitative Electrofishing

We also conducted qualitative electrofishing surveys at several sites in the Walla Walla basin (Appendix D, Figure 5). These surveys enabled us to cover larger areas relatively quickly as they did not entail the use of block nets or repeat sampling passes. We electrofished at these sites by moving upstream and capturing fish to determine species presence, size of fish (age class) and their relative abundance. The length and average width of area sampled were recorded as well as a brief description of the riparian vegetation, bank stability, substrate, pool/riffle ratio, and the presence of large woody debris (LWD). This method supplemented our more intensive quantitative electrofishing surveys to provide a more complete view of fish distribution and abundance.

Fish identification for both quantitative and qualitative 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 based on general observations made during electrofishing (Table 1). Relative abundance for non-salmonid species were treated semi-quantitatively. For each species at each site, a relative abundance was determined. The relative abundance was assigned a corresponding ranking value (Table 1). Ranked values were averaged to determine a relative abundance for each species per designated reach. Relative abundance data were tabulated to provide qualitative comparisons between reaches and species (Appendix E).

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

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

Snorkeling

Snorkeling sites in 2003 were generally between 80 and 150 meters in length and were sampled qualitatively. Surveys were focused on locating bull trout in the Washington portion of the Walla Walla River. Snorkelers moved upstream, identifying species and estimating relative abundance (Table 1). Relative abundance were assigned to salmonids by species and age class, while non-salmonids were only classified by species.

Spawning Surveys

Spawning surveys were conducted in the same manner for both steelhead and bull trout. Surveyors generally walked downstream and visually identified spawning fish and/or redds (nests). Redds were usually readily identified, 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 score of its observability and its location. Counts were tallied for each designated stream reach.

Genetic Sampling

Sampling of salmonid tissues was undertaken by WDFW personnel for later genetic analyses. Fin clips or opercle punches were obtained from adult steelhead, juvenile rainbow/steelhead trout, and bull trout. Tissue samples were placed in tubes of 95% 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 bull trout and wild steelhead in the Walla Walla River basin.

Results and Discussion

Habitat Assessment

Stream Flows

The number and distribution of stream flow (discharge) and water temperature measurements by WDFW changed slightly in 2003. The number of sites were similar to 2002 while the distribution changed to capture some of our usual sites that were monitored by Washington Department of Ecology (WDOE) in 2002 for a Total Maximum Daily Load (TMDL) study in the Walla Walla Basin. In 2002 we had 66 temperature monitor sites and 57 flow sites in the Walla Walla basin (Mendel et al. 2003), while in 2003 we had 68 temperature monitor sites and 50 flow sites (Appendix A).

Stream flows in the Walla Walla River basin follow a fundamental pattern initiated by a rapid decline in discharge in late June, followed by low summer flows and increased discharge in the fall and winter. In 2003, increased discharge in the fall wasn't seen due to lack of precipitation throughout the basin. Since an increase wasn't noted we continued some monitoring into the middle of December, when discharge increased (Appendix B). The reduced flows in late June generally represent the end of the spring runoff, activation of water diversions for agricultural irrigation, and the usual lack of summer precipitation in the basin. The recharge in the fall is usually generated because of fall precipitation and after most water diversions are discontinued or reduced. However, sites in proximity to major irrigation facilities exhibited more erratic stream flow patterns (Appendix B). Irrigation withdrawals included pumps, "push-up" dams for gravity diversions and irrigation district dams and canals.

Stream flows at two continuous flow monitor sites on the Walla Walla River appear very different in the spring, but similar in the fall (Figure 6 and 7). The monitor at Mojonner Rd. was erratic all season fluctuating between 5 and 80 cfs (Figure 6), while the monitor at Detour Rd. was stable in the spring (between 45 and 55 cfs) and much more erratic in the fall (between 20 and 100 cfs, Figure 7). The two monitors in Yellowhawk Creek were both very erratic, but both are affected by the diversion from Mill Creek (Figure 8 and 9). East Little Walla Walla was relatively constant, between 5 and 15 cfs, throughout the time the monitor was in place (Figure 10). Lower Mill Creek had a very constant flow but it was also very low, generally between 5 and 15 cfs (Figure 11).

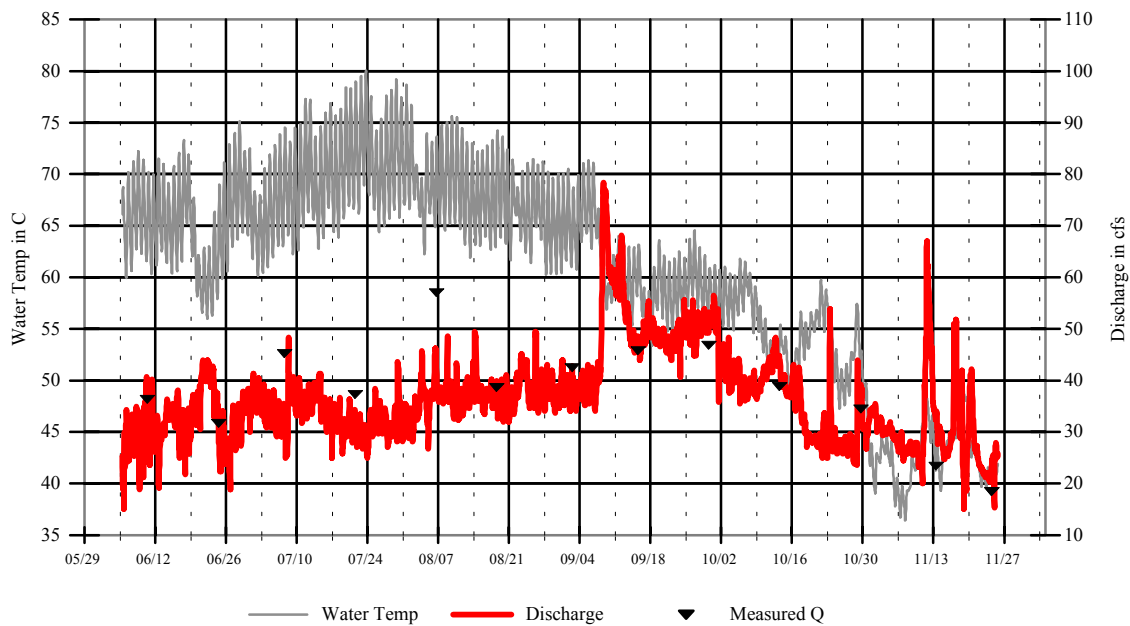


Figure 6. Walla Walla River stream discharge (CFS) and hourly temperatures (EF) below Mojonner Rd. (WW-7), 2003. (Measured Q = manual stream discharge measurements)

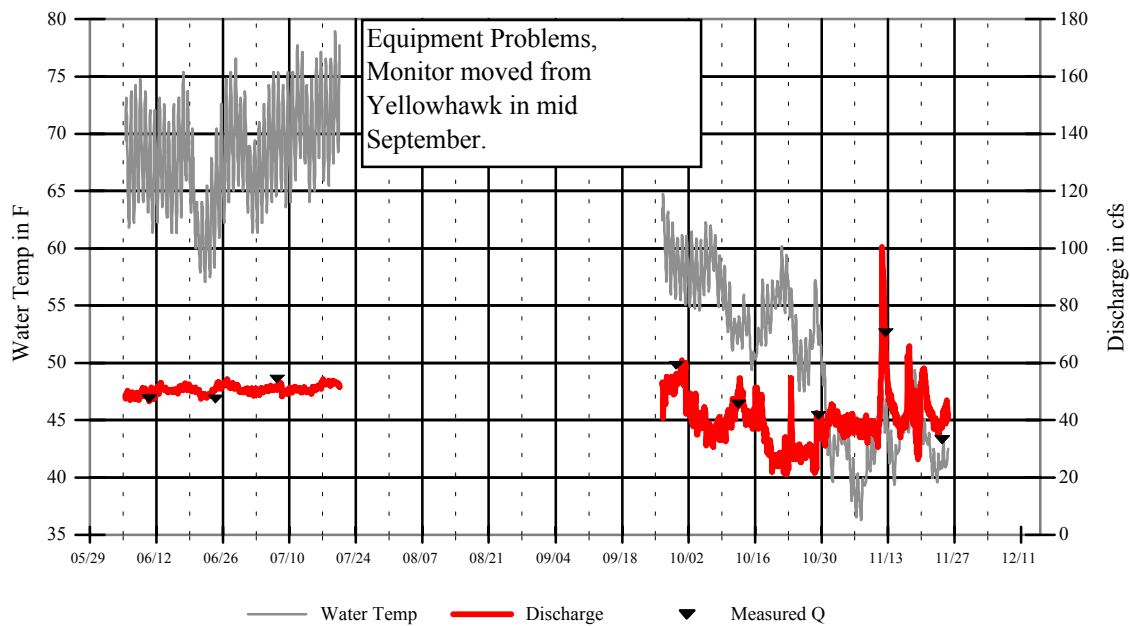


Figure 7. Walla Walla River stream discharge (CFS) and hourly temperatures (EF) above Detour Rd. (WW-10), 2003. (Measured Q = manual stream discharge measurements)

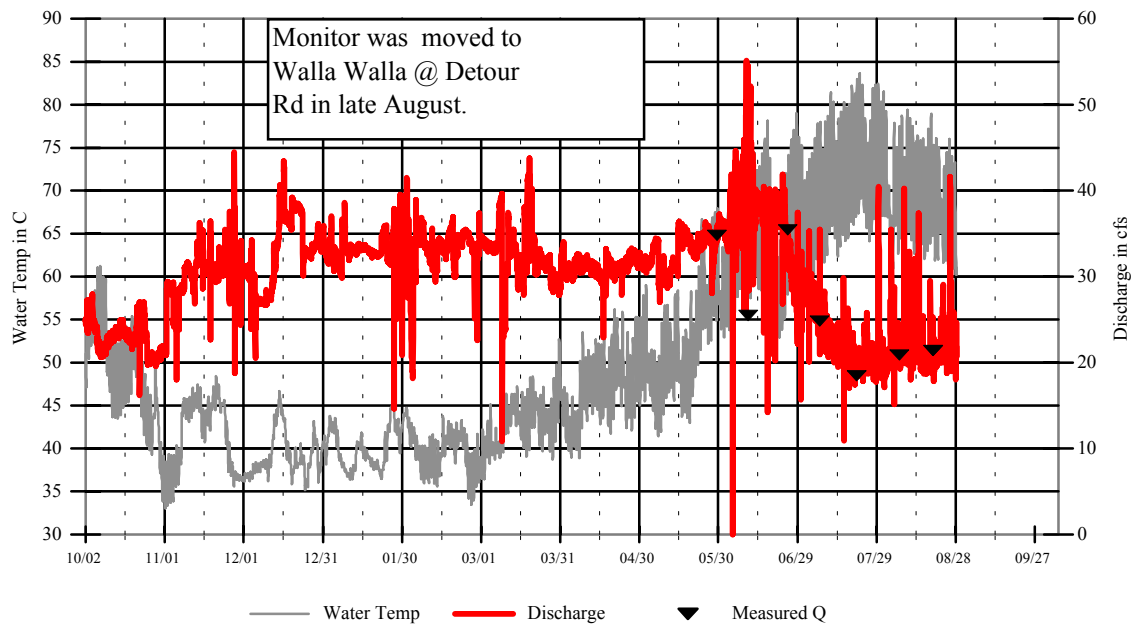


Figure 8. Yellowhawk Creek stream discharge (CFS) and hourly temperatures (EF) below Yellowhawk diversion (YC-1), 2003. (Measured Q = manual stream discharge measurements)

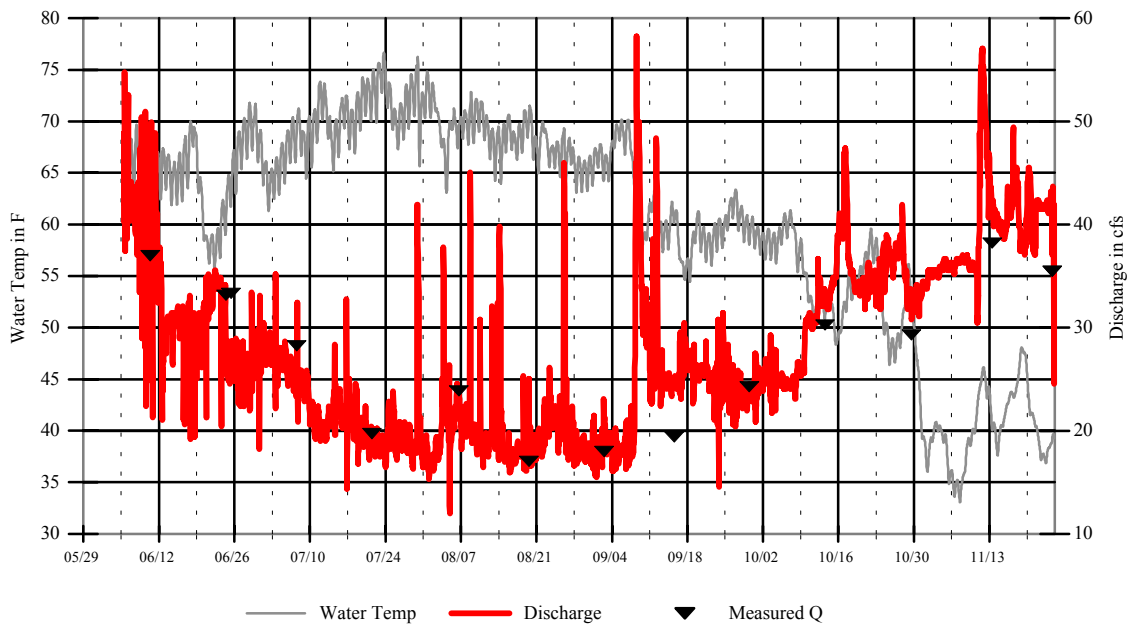


Figure 9. Yellowhawk Creek stream discharge (CFS) and hourly temperatures (EF) above mouth (YC-7), 2003. (Measured Q = manual stream discharge measurements)

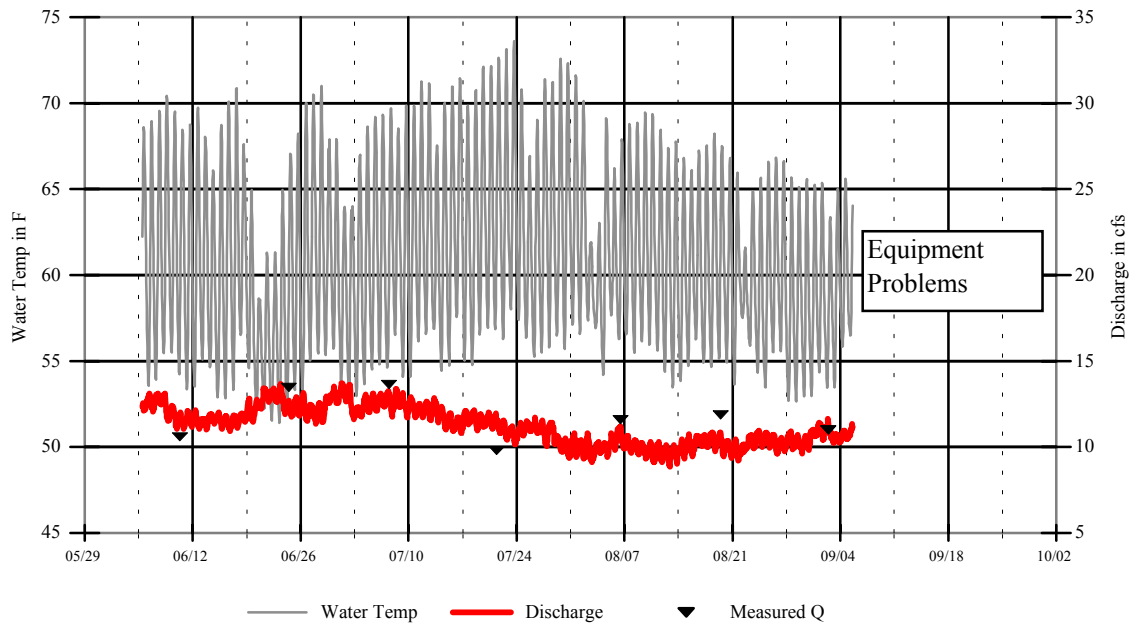


Figure 10. East Little Walla Walla stream discharge (CFS) and hourly temperatures (EF) 0.2 miles above mouth (ELW-5), 2003. (Measured Q = manual stream discharge measurements)

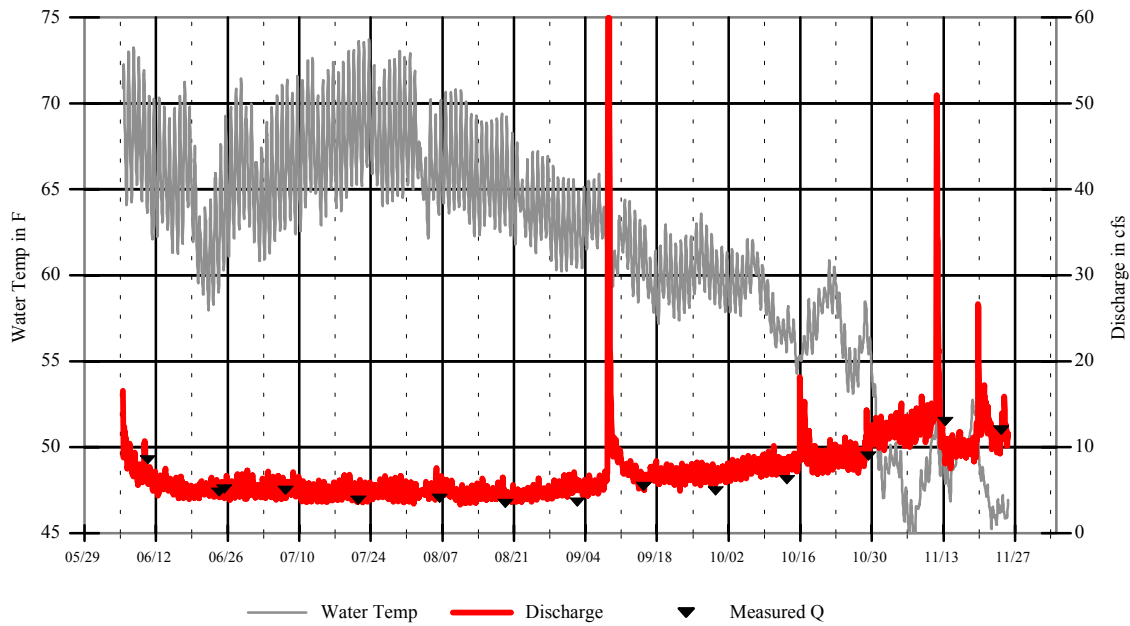


Figure 11. Mill Creek stream discharge (CFS) and hourly temperatures (EF) below Wallula Rd. (MC-29), 2003. (Measured Q = manual stream discharge measurements)

Walla Walla Settlement Agreement

In 2000, under a settlement agreement with the U.S. Fish and Wildlife Service (USFWS), irrigation districts in Oregon maintained a minimum instream flow of 13 cfs at Nursery Bridge in Milton Freewater, OR. Nursery Bridge is approximately four miles upstream of the Washington/Oregon state line. The minimum instream flow at Nursery Bridge was increased to 18 cfs in 2001, and then increased again to 25 in 2002. In 2003, the minimum flow increased to 27 cfs through June 30th and then went back to 25 cfs for the remainder of the year. The additional water, in 2000, made an immediate impact in Oregon by considerably reducing the historic dewatered area from Nursery Bridge downstream to below Tumalum Bridge, near the stateline. With the additional water available in 2001 the Walla Walla River saw continuous overland flow from Nursery Bridge to the Washington/Oregon stateline for the first time in decades. Manual stream flow measurements taken at Pepper Rd. bridge (just below the Washington/Oregon State line) showed little or no increase in stream flows until July-September 2001 when flows increased 300 - 400% over summer flows documented the previous three years. In 2002, manual flows at Pepper Rd. bridge again showed increases of 110-185% from July through September (Table 2). In 2003, the summer flows were similar to those in 2002 (both years were at a minimum 25 cfs during summer months) throughout the Walla Walla (Appendix F, Table 2). Also, under the auspices of the settlement agreement, Gardena Farms Irrigation District, in Washington, maintained at least a 10 cfs streamflow past Burlingame Dam (just above Mojonner Rd.) during the spring, early summer, and fall irrigation season of 2000. In 2001 this 10 cfs was increased to 14 cfs, and then increased again to 18 cfs in 2002. In 2003, the minimum flow increased to 19 cfs through June 30th and then went back to 18 cfs for the remainder of the year. Flows have shown a general increase from 1999 to 2001 at continuous flow monitoring sites near Mojonner and Detour roads (Table 3), especially in July and August, but this was not consistent in 2002. In 2003, small increases were seen over 2002, but may not be significant (Table 3). Manual flow measurements show consistent increases in August and September (Table 2).

Table 2. Mean streamflow in cfs (standard deviation, number of samples) measured manually in the Walla Walla River, 1998-2003.

	Stateline	Pepper Rd.	Above Hwy. 125	Mojonnier Rd.	Swegel Rd.	Detour Rd.	McDonald Rd. ^c
1998^a							
July		3.16 ^b		32.77 (3.285, 2)	23.53 (14.303, 3)		4.51 (0.415, 2)
August		3.26 (0.165, 2)		25.46 (0.315, 2)	24.44 (2.780, 2)		3.98 (3.980, 2)
September		3.06 (0.265, 2)		31.66 (3.355, 2)	31.42 (5.865, 2)		13.64 (3.670, 2)
October		3.04 (0.180)		7.78 (5.945, 2)	14.38 (6.055, 2)		
1999							
June		44.2 (34.300, 2)		128.53 (122.602, 3)	126.73 (118.189, 3)	180.40 (163.515, 3)	
July		3.7 (1.400, 2)		20.60 (5.100, 2)	20.60 (3.100, 2)	23.00 (3.800,2)	6.73 ^b
August		3.1 ^b		23.80 (1.200, 2)	24.25 (0.650, 2)	31.6 (1.000,2)	10.25 (1.150, 2)
September		2.7 (0.000, 2)		23.90 (2.200, 2)	28.95 (2.350, 2)	32.20 (3.200,2)	13.30 (1.200, 2)
October		2.65 (0.050, 2)		18.30 (9.659, 3)	20.4 ^b	31.8 ^b	15.8 ^b
2000							
June		42.4 (36.900, 2)		57.55 (47.050,2)	42.9 ^b	97.20 (74.500, 2)	36.6 ^b
July		3.8 (0.200, 2)		29.30 (12.900,2)	22.2 ^b	32.05 (6.450, 2)	5.9 ^b
August		4.1 ^b		31.05 (1.150,2)	32.90 (3.800,2)	33.70 (4.400, 2)	14.40 (3.400, 2)
September				48.35 (0.650,2)	55.55 (0.750,2)	57.45 (2.450, 2)	37.65 (3.350, 2)
October		52.35 (28.650, 2)		54.95 (38.450,2)	60.40 (36.700,2)	84.95 (43.250, 2)	69.75 (42.450, 2)
^a No data collected in June in 1998							
^b Only one sample during the month, so no mean or standard deviation were calculated.							
^c Mean CFS (SD, N) was only collected at McKay Rd. (0.6 miles above the mouth of Pine Ck.) in 1998 and was; July–3.8 (N/A), August–0.00 (N/A), September–8.82 (6.395, 2), and October–4.20 (3.435, 2).							

Table 2. (Cont.) Mean streamflow in cfs (standard deviation, number of samples) measured manually in the Walla Walla River, 1998-2003.

	Stateline	Pepper Rd.	Above Hwy. 125	Mojonnier Rd.	Swegel Rd.	Detour Rd.	McDonald Rd.
2001							
June		18.9 (6.253, 3)	22.93 (6.650, 2)	31.96 (0.735, 2)	27.30 (0.655, 2)	40.53 (6.425, 2)	23.12 (4.495, 2)
July	10.92 (2.637, 3)	12.22 (2.303, 5)	11.88 (2.590, 5)	39.79 (8.501, 6)	40.96 (5.553, 3)	49.63 (7.910, 3)	19.67 (2.165, 2)
August	13.90 (0.015, 2)	13.65 (1.140, 2)	13.13 (0.210, 2)	48.84 (2.420, 2)	41.55 (0.970, 2)	42.33 (1.220, 2)	19.97 (3.740, 2)
September	12.86 (0.070, 2)	12.00 (0.870, 2)	12.22 (0.930, 2)	41.28 (4.200, 2)	44.38 (1.425, 2)	44.27 (0.020, 2)	19.50 (1.765, 2)
October	41.46 (20.205, 5)	53.13 (21.872, 4)	42.01 (20.404, 5)	41.96 (18.481, 5)	42.06 (9.682, 3)	52.85 (15.140, 5)	39.93 (11.585, 3)
2002							
June		36.7 ^b	35.4 ^b	30.1 ^b	34.3 ^b	99.6 (48.800, 2)	20.4 ^b
July	19.5 (0.700, 2)	18.8 (2.250, 2)	18.2 (3.050, 2)	42.8 (1.100, 2)	43.8 (2.650, 2)	43.9 (2.050, 2)	18.4 (1.100, 2)
August	14.2 (1.650, 2)	15.1 (2.650, 2)	14.4 (1.900, 2)	40.3 (2.200, 2)	38.9 (6.500, 2)	39.2 (6.750, 2)	14.4 (4.500, 2)
September	19.9 (6.700, 2)	21.8 (5.700, 2)	20.6 (6.400, 2)	51.3 (10.550, 2)	42.9 (7.750, 2)	43.3 (7.350, 2)	23.6 (7.350, 2)
October	17.1 (1.190, 3)	16.2 (1.815, 3)	17.3 (1.584, 3)	32.8 (17.833, 3)	34.3 (14.604, 3)	41.5 (10.870, 3)	24.0 (6.594, 3)
2003							
June	15.25 (3.450, 2)			30.67 (6.250, 3)	42.30 (6.100, 2)	46.27 (2.050, 3)	22.20 (1.100, 2)
July	10.5 (1.500, 2)			41.30 (4.000, 2)	41.65 (0.650, 2)	46.30 (8.100, 2)	10.90 (1.100, 2)
August	15.65 (1.050, 2)			47.90 (9.200, 2)	47.35 (6.950, 2)	47.65 (5.950, 2)	18.60 (6.100, 2)
September	17.50 (1.900, 3)			45.07 (1.650, 3)	49.90 (8.050, 2)	56.43 (8.650, 3)	31.23 (7.950, 3)
October	23.50 (4.150, 2)			36.70 (2.200, 2)	36.90 (3.900, 2)	43.70 (2.000, 2)	30.70 (3.800, 2)
^a No data collected in June in 1998							
^b Only one sample during the month, so no mean or standard deviation were calculated.							

Table 3. Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.												
	1998		1999		2000		2001		2002		2003	
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation
Walla Walla River												
<u>Stateline</u>												
June (20 th -30 th)							N/A	N/A	29.15	19.302		
July							11.95 ^a	2.152 ^a	12.71	1.369		
August							11.40	1.354	13.39	1.478		
September							14.48	5.415	16.80	2.028		
October							31.37	16.736	17.68	1.868		
Nov. (1st-14th)							11.37	6.413	21.86 ^b	3.817 ^b		
<u>Pepper Rd.</u>												
June (20 th -30 th)					35.42	28.261	15.22 ^d	3.853 ^d				
July					5.75 ^c	1.227 ^c	10.71 ^d	3.404 ^d				
August					N/A	N/A	12.05 ^d	2.946 ^d				
September					N/A	N/A	15.55 ^d	6.198 ^d				
October					N/A	N/A	30.85 ^d	10.331 ^d				
Nov. (1st-14th)					N/A	N/A	27.13 ^d	7.235 ^d				
^a Monitor in the Walla Walla River (Stateline) in 2001 was put in place on July 17 th . ^b Monitor in the Walla Walla River (Stateline) in 2002 was removed on November 13 th . ^c Monitor in the Walla Walla River (Pepper Rd.) in 2000 quit working on July 27 th , so no data was available after that point. ^d Monitor in the Walla Walla River (Pepper Rd.) in 2001 was actually 0.7 miles below Pepper Rd. brg.												

Table 3. (Cont.) Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.												
	1998		1999		2000		2001		2002		2003	
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation
Walla Walla River (Cont.)												
<u>Mojonnier Rd.</u>												
June (20 th -30 th)	N/A	N/A	14.55	6.979	46.33	33.203	26.45	7.094	28.58 ^{f,g}	7.408 ^{f,g}	33.90	5.150
July	N/A	N/A	16.52	5.156	20.63	4.270	36.91	9.335	32.52 ^g	5.582 ^g	33.37	2.559
August	N/A	N/A	18.97	4.608	26.40	1.925	40.88	5.206	34.62 ^g	3.725 ^g	37.35	2.415
September	N/A	N/A	24.14	3.131	51.73	9.259	43.50	8.350	45.91 ^g	5.324 ^g	48.95	7.722
October	N/A	N/A	20.06	13.970	24.71 ^e	14.075 ^e	29.37	13.222	29.59 ^g	11.364 ^g	35.94	6.162
Nov. (1st-14th)	N/A	N/A	11.23	5.038	58.44	42.236	18.93	4.513	28.43 ^g	9.012 ^g	31.64	7.039
<u>Swegle Rd.</u>												
June (20 th -30 th)	N/A	N/A	19.92	8.530								
July	25.73 ^h	3.968 ^h	20.90	5.121								
August	21.24	3.318	22.40	5.036								
September	37.54	10.234	24.48	2.684								
October	13.49	7.902	21.99	12.220								
Nov. (1st-14th)	18.79	11.444	14.34	5.090								
^e At least one measurement for the month was removed as an outlier. ^f Monitor in the Walla Walla River (Mojonnier Rd.) in 2002 was put in place on June 26 th . ^g Data collected by the Department of Ecology as part of TMDL monitoring. ^h Monitor in the Walla Walla River (Swegle Rd.) in 1998 was put in place on until July 9 th .												

Table 3. (Cont.) Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.												
	1998		1999		2000		2001		2002		2003	
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation
Walla Walla River (Cont.)												
<u>Detour Rd.</u>												
June (20 th -30 th)			35.49	13.353	69.05	41.052	45.70	10.362	51.75	22.947	50.80	1.437
July			24.73	3.447	30.77	3.028	41.72	4.159	31.00	6.433	51.17 ⁱ	1.045 ⁱ
August			26.18	5.855	31.12	1.575	38.12	3.601	26.09	6.729	N/A ⁱ	N/A ⁱ
September			29.15	2.762	53.57 ^e	9.922 ^e	43.16	8.530	44.37	8.041	52.29 ⁱ	2.814 ⁱ
October			32.29	11.496	52.48 ^e	21.484 ^e	43.33	12.052	27.35	13.092	36.79	7.162
Nov. (1st-14th)			26.93	6.417	96.89	57.287	46.82	9.649	55.62	8.792	43.21	9.788
Touchet River												
<u>Simms Rd.</u>												
June (20 th -30 th)			86.63	11.482	101.25	18.396	80.65	10.636				
July			50.20	7.812	45.86	16.762	28.22	11.905				
August			41.15	3.861	19.27	3.906	9.54	6.246				
September			39.75	2.358	43.92	9.700	14.56	12.565				
October			48.73	8.624	69.08	20.896	53.05	11.915				
Nov. (1st-14th)			55.58	2.544	75.36	9.877	67.17	12.911				
^e At least one measurement for the month was removed as an outlier. ⁱ Monitor in the Walla Walla River (Detour Rd.) malfunctioned from July 21 st through September 25 th , so no data was collected during this period.												

Table 3. (Cont.) Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.												
	1998		1999		2000		2001		2002		2003	
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation
Touchet River (Cont.)												
<u>Cummins Brg.</u>												
June (20 th -30 th)	N/A ^j	N/A ^j	108.68 ^l	22.531 ^l	89.42	23.612	67.09	41.993				
July	9.21 ^{j,k}	5.504 ^{j,k}	30.27 ^l	14.450 ^l	23.61	15.674	10.51	7.525				
August	7.48 ^j	6.107 ^j	12.97 ^l	5.017 ^l	3.85	1.219	5.24	4.287				
September	12.15 ^j	9.280 ^j	13.75 ^l	2.165 ^l	24.12	9.815	3.62 ^m	3.746 ^m				
October	35.71 ^j	5.827 ^j	30.06 ^l	16.732 ^l	99.26	145.013	N/A	N/A				
Nov. (1st-14th)	75.44 ^j	11.912 ^j	47.70 ^l	3.988 ^l	104.51	36.490	N/A	N/A				
<u>Above Hofer Dam</u>												
June (20 th -30 th)							N/A	N/A	104.50	27.347		
July							N/A	N/A	51.75 ⁿ	16.333 ⁿ		
August							N/A	N/A	26.35 ⁿ	2.376 ⁿ		
September							N/A	N/A	27.93	2.611		
October							N/A	N/A	39.66	3.257		
Nov. (1st-14th)							N/A	N/A	61.30 ⁿ	10.344 ⁿ		
^j Monitor in the Touchet River (Cummins Brg.) was at the Touchet River Gun Club __miles above Cummins Brg. ^k Monitor in the Touchet River (Cummins Brg.) in 1998 was put in place on July 9 th . ^l Monitor in the Touchet River (Cummins Brg.) was 0.3 miles above Markham Rd. ^m Monitor in the Touchet River (Cummins Brg.) in 2001 quit working on September 25 th . ⁿ Monitor above Hofer dam in 2002 quit working from July 21 st to August 23 rd , and then was pulled on November 13 th .												

Table 3. (Cont.) Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.												
	1998		1999		2000		2001		2002		2003	
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation
Yellowhawk Creek												
<u>Below Diversion</u>												
June (20 th -30 th)							N/A	N/A	30.14	3.100	36.23	7.735
July							21.11 ^o	1.540 ^o	16.47	3.620	23.06	3.016
August							19.95	7.037	12.95	1.700	21.76 ^p	1.745 ^p
September							16.53	2.628	16.07	2.647	N/A	N/A
October							27.91	5.995	19.09	2.086	N/A	N/A
Nov. (1st-14th)							36.72	2.210	26.45	3.639	N/A	N/A
<u>Just above mouth</u>												
June (20 th -30 th)					44.20	3.274	26.53	0.893	31.47 ^g	3.423 ^g	28.83	3.152
July					28.05	5.754	23.87	1.905	14.02 ^g	6.324 ^g	22.01	3.076
August					17.66	1.962	18.58	4.687	12.93 ^g	3.722 ^g	19.84	2.421
September					28.56 ^e	4.589 ^e	13.75	1.606	14.95 ^g	2.889 ^g	24.65	4.850
October					50.51	9.115	19.97	3.484	9.88 ^g	4.397 ^g	32.12	5.046
Nov. (1st-14th)					56.07	9.347	21.80	3.213	22.14 ^g	6.042 ^g	38.47	4.070
^e At least one measurement for the month was removed as an outlier. ^g Data collected by the Department of Ecology as part of TMDL monitoring. ^o Monitor in Yellowhawk Creek (below diversion) in 2001 was put in place on July 17 th . ^p Monitor in Yellowhawk Creek (below diversion) in 2003 was removed on August 28 th .												

Table 3. (Cont.) Mean monthly streamflow (cfs) and standard deviation from continuous flow monitors in the Walla Walla basin, 1998-2003.													
	1998		1999		2000		2001		2002		2003		
	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	Mean Flow	Standard Deviation	
East Little Walla Walla River													
<u>0.2 miles above mouth</u>													
June (20 th -30 th)									10.67	0.934	12.52	0.378	
July									9.40	2.093	11.68	0.824	
August									9.34	0.903	10.10	0.296	
September									11.33 ^q	1.495 ^q	10.79 ^r	0.197 ^r	
October									N/A	N/A	N/A	N/A	
Nov. (1st-14th)									N/A	N/A	N/A	N/A	
Mill Creek													
<u>Wallula Rd.</u>													
June (20 th -30 th)								N/A	N/A	12.61	6.871	5.05	0.192
July								5.28 ^s	0.387 ^s	5.05	1.535	4.68	0.281
August								3.09	1.017	3.99	0.328	6.65	0.343
September								4.13	0.910	5.07	0.373	10.29	19.491
October								9.13	3.107	11.17	10.342	8.70	1.264
Nov. (1st-14th)								13.92	3.527	43.38 ^t	27.774 ^t	12.95	3.164
^q Monitor in East Little Walla Walla (0.2 miles above mouth) in 2002 quit working on September 10 th . ^r Monitor in East Little Walla Walla (0.2 miles above mouth) in 2003 was quit working on September 5 th . ^s Monitor in Mill Creek (Wallula Rd.) in 2001 was put in place on July 17 th . ^t Monitor in Mill Creek (Wallula Rd.) in 2002 was removed on November 13 th .													

Stream Temperatures

Water temperatures in 2003 were similar to water temperatures in 2002 throughout the Walla Walla basin (Appendix C). Sites where maximum water temperatures were less than or equal to 65EF during summer months were generally located in upper tributaries associated with the Blue Mountains; North Fork Touchet (NFT-2, 9), Spangler Creek (SC-5), Lewis Creek (LC-8), Wolf Fork (WF-5, 7), Whitney Creek (WH-1), Coates Creek (C-1), Burnt Fork (BF-4), South Fork Touchet (SFT-2), and Mill Creek in the cold return (MC-14). Maximum daily temperatures at some instream monitoring sites routinely exceeded temperatures that can be lethal for salmonids (75-84EF, Bjornn and Reiser 1991). This generally occurred during mid-summer, when the photo-period is long and evening cooling is brief. Sites with maximum water temperatures greater than 75EF included; the lower North Fork Touchet (NFT-11), South Fork Touchet (SFT-5), Touchet River (TR-3, 4, 5, 6, 7), Walla Walla River within Washington (WW-2, 7, 9, 10, 11, 12, 13), Yellowhawk Creek (YC-1, 7), Cottonwood Creek (CWC-1, 2), Garrison Creek (GC-6), Blue Creek (BLC-1), Mill Creek below Bennington Lake diversion dam (MC-13, 15, 18, 26, 27, 31), West Little Walla Walla (WLW-1, 3), Walsh Creek (WAC-1), Dry Creek (DRC-5), Mud Creek (MD-1), and Pine Creek (PC-1). Sites in the mid and lower Touchet and Walla Walla Rivers frequently had daily temperatures that were high enough (above 68EF) to inhibit migration of adults and young, and to sharply reduce survival of embryos and fry (Bjornn and Reiser 1991, Figures 6 and 7, Appendix C). However, at night, temperatures would usually decrease to within reasonable physiological limits for steelhead/rainbow trout (<65-70EF).

Walla Walla Settlement Agreement

Increases in streamflow did not consistently improve water temperatures during summer months from 1998 through 2002 (Table 4). We documented little or no change in temperatures at Pepper Br. even though stream flows increased several fold since 2001, compared to previous years. We documented some decreases in mean and maximum temperatures in August and September at Mojonner Rd. from 1998-2002, but temperatures were higher in 2003 than in 2002 at this site. Average and maximum temperatures at Swegle Rd. and Detour Rd. have shown no consistent changes (Table 4).

Table 4. Average and mean maximum temperatures (EF and standard deviation) from temperature monitors at Pepper Rd., Mojonnier Rd., Swegle Rd., and Detour Rd. in the Walla Walla River, 1998-2003 (listed from upstream to downstream).

	1998		1999		2000		2001		2002		2003	
	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)
Pepper Rd.												
April							46.38 (2.957)	50.26 (3.929)				
May					54.40 (3.425)	57.56 (4.264)	53.72 (4.877)	59.32 (6.177)			54.51 (3.624)	58.88 (4.134)
June			59.19 (3.861)	65.04 (5.361)	58.71 (4.539)	64.22 (5.636)	60.62 (2.773)	66.15 (4.209)			63.53 (2.358)	69.27 (2.885)
July			66.68 (2.592)	73.92 (3.276)	67.14 (1.960)	73.16 (2.191)	66.25 (2.047)	71.99 (3.466)	69.67 (1.228)	74.76 (0.795)	68.72 (2.018)	74.51 (2.569)
August			68.03 (2.280)	73.40 (3.042)	66.68 (2.273)	71.88 (2.576)	66.76 (1.659)	72.07 (2.213)	65.35 (1.206)	70.41 (1.878)	67.21 (1.397)	71.75 (1.933)
September			60.68 (1.999)	64.84 (2.564)	60.36 (2.604)	63.74 (2.923)	61.37 (2.329)	65.12 (2.754)	59.74 (2.747)	63.32 (3.225)	60.76 (2.610)	64.07 (2.974)
October			53.21 (2.560)	55.64 (2.810)	51.20 (2.496)	53.64 (2.755)	51.53 (2.592)	53.79 (3.193)	50.81 (3.832)	53.31 (4.178)	54.31 (3.061)	56.40 (3.407)

^a Temps were not collected at Pepper Rd. or Detour Rd. due to lack of time and resources available in the first year of the project. The 1998 data was collected on continuous temp and flow monitors that took reading every 15 seconds and stores the every four hours as averages.

Table 4. (Cont.) Average and mean maximum temperatures (EF and standard deviation) from temperature monitors at Pepper Rd., Mojonner Rd., Swegle Rd., and Detour Rd. in the Walla Walla River, 1998-2003 (listed from upstream to downstream).

	1998		1999		2000		2001		2002		2003	
	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)
Mojonner Rd.												
April							47.34 (3.079)	50.71 (3.875)				
May					55.91 (3.019)	59.34 (3.631)	54.63 (4.440)	59.03 (4.955)			56.11 (3.968)	60.04 (4.216)
June			62.81 (2.304)	68.64 (2.666)	59.46 (4.156)	64.22 (4.759)	60.03 (3.184)	63.71 (4.382)	62.16 (2.812)	66.28 (2.915)	64.37 (2.769)	69.13 (3.208)
July	71.97 (2.056)	78.23 (2.669)	66.82 (3.177)	74.78 (3.445)	66.76 (2.500)	72.35 (3.086)	66.70 (2.591)	71.83 (3.660)	68.21 (2.769)	73.25 (3.059)	69.36 (2.394)	74.90 (2.948)
August	69.72 (0.646)	75.17 (2.589)	68.28 (2.947)	74.77 (3.313)	65.52 (2.951)	70.97 (3.132)	67.16 (2.259)	71.66 (2.170)	65.40 (1.526)	70.57 (1.991)	67.34 (1.577)	71.88 (1.936)
September	64.63 (6.673)	71.21 (3.004)	59.28 (2.698)	64.61 (2.951)	58.19 (3.330)	61.21 (3.647)	60.72 (2.411)	64.56 (2.956)	59.41 (2.934)	62.80 (3.416)	60.48 (3.040)	63.58 (3.505)
October	49.61 (2.681)	51.48 (2.987)	51.52 (2.730)	54.48 (2.983)	51.87 (2.249)	53.76 (2.422)	51.98 (2.021)	53.73 (2.580)	50.31 (4.211)	52.72 (4.392)	54.04 (3.550)	55.99 (3.808)

^a Temps were not collected at Pepper Rd. or Detour Rd. due to lack of time and resources available in the first year of the project. The 1998 data was collected on continuous temp and flow monitors that took reading every 15 seconds and stores the every four hours as averages.

Table 4. (Cont.) Average and mean maximum temperatures (EF and standard deviation) from temperature monitors at Pepper Rd., Mojonner Rd., Swegle Rd., and Detour Rd. in the Walla Walla River, 1998-2003 (listed from upstream to downstream).

	1998		1999		2000		2001		2002		2003	
	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)
Swegle Rd.												
April			50.32 (1.757)	53.91 (2.753)			47.80 (3.364)	51.40 (4.204)				
May			52.54 (2.683)	55.99 (2.880)	57.74 (3.885)	61.060 (4.218)	54.57 (4.022)	58.79 (4.114)			57.23 (4.232)	60.88 (4.297)
June	69.22 (2.199)	75.46 (4.256)	62.38 (4.929)	67.95 (5.792)	61.31 (5.058)	66.12 (5.831)	61.80 (4.547)	66.33 (5.501)	66.00 (3.409)	70.75 (3.719)	66.08 (2.757)	71.21 (3.163)
July	73.41 (2.032)	79.61 (2.289)	68.83 (2.865)	75.13 (3.132)	69.18 (2.227)	74.45 (2.252)	68.22 (2.796)	72.73 (3.543)	69.79 (2.709)	74.53 (2.650)	70.99 (2.453)	75.91 (2.822)
August	71.09 (2.990)	76.23 (3.351)	69.70 (3.282)	74.68 (3.675)	67.59 (3.077)	71.44 (3.434)	68.23 (2.352)	72.68 (2.699)	66.33 (1.533)	70.05 (1.705)	68.74 (1.704)	72.67 (2.012)
September	64.23 (3.978)	68.20 (4.469)	59.90 (2.739)	64.00 (3.170)	59.36 (3.578)	62.23 (3.818)	60.51 (2.408)	64.36 (2.814)	60.16 (3.019)	62.40 (3.166)	61.36 (3.222)	64.41 (3.522)
October	52.97 (3.580)	55.98 (3.789)	51.41 (2.868)	54.19 (2.793)	51.83 (2.758)	53.94 (2.900)	50.62 (2.503)	53.64 (2.823)	51.95 (3.018)	53.16 (3.196)	54.71 (3.620)	56.80 (3.843)

^a Temps were not collected at Pepper Rd. or Detour Rd. due to lack of time and resources available in the first year of the project. The 1998 data was collected on continuous temp and flow monitors that took reading every 15 seconds and stores the every four hours as averages.

Table 4. (Cont.) Average and mean maximum temperatures (EF and standard deviation) from temperature monitors at Pepper Rd., Mojonner Rd., Swegle Rd., and Detour Rd. in the Walla Walla River, 1998-2003 (listed from upstream to down stream).

	1998		1999		2000		2001		2002		2003	
	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp (SD)	Mean Max Temp (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)	Average Temp. (SD)	Mean Max. Temp. (SD)
Detour Rd.												
April							48.18 (3.503)	51.62 (4.283)				
May					59.03 (3.414)	62.56 (3.619)	57.19 (5.919)	62.53 (7.637)			59.53 (4.659)	62.99 (4.857)
June			66.12 (2.327)	71.53 (2.920)	62.38 (4.910)	66.97 (5.875)	63.70 (3.295)	68.79 (4.409)	66.44 (3.379)	71.44 (4.067)	66.85 (2.696)	72.40 (3.071)
July			69.22 (2.783)	75.73 (2.803)	69.76 (2.148)	75.60 (2.270)	68.84 (2.925)	73.89 (3.836)	70.77 (2.720)	76.16 (2.703)	71.50 (2.465)	76.65 (2.802)
August			70.18 (3.047)	75.36 (3.424)	68.13 (3.142)	72.57 (3.442)	68.61 (2.335)	73.12 (2.760)	67.36 (1.727)	71.96 (2.039)	69.22 (1.721)	73.25 (2.039)
September			60.27 (2.632)	64.18 (3.036)	59.89 (3.595)	62.79 (3.801)	61.81 (2.600)	64.86 (2.865)	60.57 (3.292)	63.67 (3.656)	61.84 (3.187)	64.94 (3.515)
October			51.71 (2.814)	54.32 (2.743)	52.91 (2.448)	54.79 (2.612)	52.45 (2.296)	54.48 (2.851)	50.98 (4.229)	53.49 (4.416)	55.31 (3.259)	57.38 (3.646)

^a Temps were not collected at Pepper Rd. or Detour Rd. due to lack of time and resources available in the first year of the project. The 1998 data was collected on continuous temp and flow monitors that took reading every 15 seconds and stores the every four hours as averages.

Limiting Factors Identification

Extensive and intensive surveys of habitat conditions to identify limiting factors were deferred because of lack of adequate staff time. However, a number of barriers or impediments to salmonid passage and rearing have been identified by this project since 1998 (Mendel et. al. 1999, 2000, 2001, 2002, 2003). A portion of those barriers were physical (e.g. structures or dewatered streambeds) that physically blocked salmonid movement see Mendel et al. (2003), others were physiological barriers (e.g. temperature, sediment, lack of pools, etc.). Physiological barriers and impediments to salmonid passage and rearing were extensive in terms of stream miles affected. The primary physiological factor affecting fish in the Walla Walla River basin was water temperature. Temperature possibly represents the most critical physiological barrier to salmonids, particularly for passage or rearing. Seasonal temperature related barriers for salmonids generally occur in lower areas of the Touchet River, Mill Creek, and the Walla Walla Rivers and their tributaries. Stream reaches with mean water temperatures exceeding 75°F during the summer are associated with low densities of salmonids (Mendel et. al., 1999). Most of the salmonids in these marginal thermal areas are age 0+ rainbow/steelhead trout. We have documented temperatures of 70°F or higher in many lower mainstem reaches and in some tributaries during summer as might be expected, but also in mid to late May and June and again in early September when they may affect migration of salmonids. These temperatures likely adversely affect migrating juvenile salmonids and adult steelhead in spring, and adult steelhead returning in September. Turbidity, sedimentation, lack of pools and cover, and other habitat factors, may also present challenges to migrating, breeding and rearing salmonids.

Fish Stock Assessment

Distribution and Abundance

Densities of three salmonid species were calculated from quantitative electrofishing sites in the Walla Walla Basin (Table 5). Adult rainbow trout densities represent wild or unknown origin trout unless noted. Identified salmonid species included: rainbow/steelhead trout, bull trout, and chinook salmon. Other data collected by the WDFW Snake River Lab, that used to be included in our report will appear in their annual report (eg. see Bumgarner et al. 2003).

Rainbow/steelhead trout represent the most common salmonid found in the Walla Walla Basin. Age 0+ rainbow/steelhead densities are typically higher than for older age classes for most sites. Age 1+ rainbow/steelhead trout predominated in the following sites; North Fork Touchet River (NFT-6, 7, 8), all sites on Spangler Creek (SC-1, 2, 3, 4), Lewis Creek (LC-3, 5), Wolf Fork (WF-1, 2, 3, 4), Green Fork (GF-3, 4), all sites on the Burnt Fork (BF-1, 2, 3), both sites on the South Fork Touchet River (SFT-2, 3), Walla Walla River (WW-1, 3), Yellowhawk Creek (YC-1, 7), and one site on Mill Creek (MC-4). Large or “legal sized” (\$8 in.) rainbow trout were found in very low densities throughout the basin. The numbers of age 0+ steelhead found in the mainstem Walla Walla River suggests that spawning is commonly occurring within the Washington portion of the river.

Other salmonid species had a limited distribution (Table 5, Appendix D). Bull trout distribution was greatest in the North Fork and the Wolf Fork of the Touchet River. Low densities of bull trout were found in Spangler Creek, Lewis Creek, and Mill Creek. Juvenile chinook salmon were found in low densities at a following sites in the Walla Walla River (WW-3), Yellowhawk Creek (YC-7), and Mill Creek (MC-1, 2, 4, 5, 7, 9, 27). The presence of chinook salmon in Walla Walla system is primarily associated with the outplanting of adult spring chinook in late summer of 2002. These fish were released by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and allowed to spawn freely in the upper portion of Mill Creek, and the Walla Walla River (CTUIR 2003).

Electrofishing

Quantitative Electrofishing

Quantitative electrofishing was conducted on several streams in the Walla Walla Basin from the middle of July through the end of September and produced densities of rainbow/steelhead trout ranging from 0 to 145.6 fish per 100 m² (Table 5). Sub-yearling (age 0+) trout were the most abundant age class at sites in the mainstem and lower reaches. Yearling (Age 1+) rainbow/steelhead were most abundant in tributaries and upper mainstem, with densities between 0.7 and 63.3 fish per 100 m² (Table 5). Adult (\$8 in.) rainbow/steelhead were found in lower densities ranging from 0 to 3.2 fish per 100 m². Densities of bull trout ranged from 0 to 33.6

with sub-yearling and yearling age classes each dominating about half of the sites. Densities of sub-yearling chinook ranged from 0 to 5.4 fish per 100 m² with most of these sites occurring in upper Mill Creek.

Table 5. Densities of salmonids from electrofishing sites in the Walla Walla Basin, summer 2003. Sites are listed in order from upstream to downstream.

Stream Reach	Date	Site Length (m)	Mean Width (m)	Area (m ²)	Densities (#/100 m ²)							
					Rainbow/steelhead				Other Species ^a	Age/Size		
					Age/Size	Age/Size	Age/Size	0+		1+	\$8 in	Total
Site Name	(mm/dd)	(m)	(m)	(m²)	0+	1+	\$8 in	Total	Other Species^a	0+	1+	\$8 in
NF Touchet												
NFT-3	7/28	30.0	4.96	148.8	0.0	0.0	0.0	0.0	BT	16.1	14.1	0.7
NFT-4	7/29	30.0	3.46	103.8	0.0	0.0	0.0	0.0	BT	2.9	9.6	1.9
NFT-5	7/28	37.0	3.54	131.0	0.0	0.0	0.0	0.0	BT	14.5	19.1	0.0
NFT-6	7/29	30.0	3.48	104.4	0.0	1.9	0.0	1.9	BT	2.9	15.3	1.0
NFT-7	7/28	30.0	4.76	142.8	0.0	9.1	0.7	9.8	BT	0.0	0.7	0.0
NFT-8	7/29	35.0	4.12	144.2	1.4	9.7	0.0	11.1	BT	0.7	0.7	0.0
NFT-9	7/29	34.0	4.66	158.4	36.6	18.9	0.0	55.5				
Spangler Creek												
SC-1	9/3	30.0	3.18	95.4	0.0	8.4	0.0	8.4				
SC-2	9/3	25.0	2.54	63.5	1.6	14.2	0.0	15.8	BT	0.0	1.6	0.0
SC-3	9/3	30.0	3.42	102.6	8.8	15.6	1.0	25.4	BT	1.0	2.9	0.0
SC-4	9/3	25.0	3.04	76.0	5.3	15.8	0.0	21.1	BT	0.0	1.3	0.0
Lewis Creek												
LC-1	8/13	25.0	3.04	76.0	21.1	17.1	0.0	38.2	BT	1.3	0.0	0.0
LC-3	8/13	30.0	3.62	108.6	10.1	23.9	0.0	34.0	BT	5.5	0.9	0.0
LC-5	8/13	30.0	2.68	80.4	1.2	26.1	0.0	27.3				
LC-6	8/14	30.0	2.62	78.6	57.3	28.0	1.3	86.6	BT	3.8	0.0	0.0
LC-7	8/14	30.0	3.44	103.2	27.1	27.1	0.0	54.2	BT	1.0	1.0	0.0
LC-8	8/14	30.0	3.46	103.8	39.5	32.8	0.0	72.3				
Wolf Fork												
WF-1	7/30	30.0	3.22	96.6	0.0	12.4	0.0	12.4	BT	12.4	6.2	0.0
WF-2	7/30	30.0	3.28	98.4	1.0	22.4	0.0	23.4	BT	5.1	5.1	0.0
WF-3	7/30	30.0	3.82	114.6	0.0	13.1	0.9	14.0	BT	5.2	7.9	0.0
WF-4	7/31	30.0	4.80	144.0	0.0	8.3	0.0	8.3	BT	20.8	9.0	1.4
WF-6	7/31	30.0	6.20	186.0	16.1	14.0	1.1	31.2	BT	12.9	2.2	0.0
Green Fork												
GF-1	9/22	30.0	1.86	55.8	32.3	28.7	0.0	61.0				
GF-2	9/22	30.0	2.68	80.4	19.9	16.2	0.0	36.1				
GF-3	9/22	30.0	4.32	129.6	24.7	63.3	1.5	89.5				
GF-4	9/22	30.0	3.26	97.8	23.5	26.6	0.0	50.1				
Burnt Fork												
BF-1	8/5	30.0	3.52	105.6	1.0	13.3	0.0	14.3				
BF-2	8/5	30.0	3.10	93.0	0.0	25.8	1.1	26.9				
BF-3	8/5	30.0	3.72	111.6	0.9	26.0	0.0	26.9				

^a BT=bull trout, WCH=wild chinook.

^b Calculated using the sum of the passes, due to poor reduction between successive passes.

^c Actual area, but reported widths are rounded.

Table 5. (Continued) Densities of salmonids from electrofishing sites in the Walla Walla Basin, summer 2003. Sites are listed in order from upstream to downstream.

Stream Reach	Date	Site Length	Mean Width	Area	Densities (#/100 m ²)							
					Rainbow/steelhead				Other Species ^a	Age/Size		
					Age/Size					0+	1+	\$8 in
Site Name	(mm/dd)	(m)	(m)	(m ²)	0+	1+	\$8 in	Total		0+	1+	\$8 in
SF Touchet												
SFT-2	8/6	30.0	4.72	141.6	6.4	25.4 ^b	0.7	32.5				
SFT-3	8/6	30.0	4.72	141.6	36.7	59.3	1.4	97.4				
SF Coppei												
SFC-1	7/16	30.0	3.90	117.0	62.4	41.9	0.0	104.3				
SFC-2	7/16	30.0	3.62	108.6	45.1	4.6	0.0	49.7				
SFC-3	7/16	30.0	4.24	127.2	54.3	3.9	0.0	58.2				
SFC-4	7/14	30.0	2.54	76.2	110.2	35.4	0.0	145.6				
SFC-5	7/16	30.0	3.16	94.8	101.3	30.6	0.0	131.9				
NF Coppei												
NFC-1	7/14	30.0	2.18	65.4	39.8	12.2	0.0	52.0				
NFC-2	7/15	30.0	3.14	94.2	77.5	4.3	0.0	81.8				
NFC-3	7/15	30.0	3.12	93.6	140.0	31.0	0.0	171.0				
NFC-4	7/14	30.0	3.62	108.6	82.9	37.8	0.0	120.7				
Coppei Creek												
MC-1	7/17	30.0	3.70	111.0	111.7	9.9	0.0	121.6				
MC-2	7/17	30.0	2.18	65.4	113.2	21.4	0.0	134.6				
MC-3	7/14	34.0	4.52	153.7	22.1	16.3	0.0	38.4				
MC-4	7/17	30.0	3.86	115.8	13.0	6.0	0.0	19.0				
Walla Walla River												
WW-1	7/24	30.0	9.82	294.6	1.0	4.8	0.0	5.8				
WW-3	7/24	30.0	8.20	246.0	4.9	6.9	0.0	11.8	WCH	1.2	0.0	0.0
WW-4	8/4	30.0	11.54	346.2	2.6	2.0	0.0	4.6				
WW-5	8/4	30.0	6.44	193.2	7.3	1.6	0.0	8.9				
WW-8	8/11	38.0	10.86	412.7	2.9	0.7	0.0	3.6				
WW-10	8/18	44.0	11.96	526.2	1.5	0.6	0.0	2.1				
Yellowhawk Creek												
YC-1	8/28	44.0	6.52	286.9	0.0	0.7	0.4	1.1				
YC-2	8/28	30.0	3.68	110.4	5.4	0.9	0.0	6.3				
YC-5	6/17	40.0	4.88	195.2	4.6	3.1 ^b	0.0	7.7				
YC-6.	9/16	30.0	4.36	130.8	0.8	0.0	0.0	0.8				
YC-7	6/17	38.0	8.14	309.3	0.3	1.0	0.7 ^b	2.0	WCH	0.0	0.3	0.0
YC-7	8/28	50.0	5.64	282.0	1.1	1.1	0.0	2.2				
Mill Creek												
MC-1	8/12	30.0	12.58	377.4	21.7	5.3	0.0	27.0	WCH	0.3	0.0	0.0
									BT	0.0	0.3	0.0
MC-2	8/19	30.0	10.88	326.4	20.8	3.7	0.0	24.5	WCH	1.8	0.0	0.0
MC-4	8/19	30.0	6.76	202.8	13.3	19.7 ^b	1.5	34.5	WCH	5.4	0.0	0.0
									BT	0.0	0.5	1.0
MC-5	8/25	30.0	7.34	220.2	15.9	11.4 ^b	1.4	28.7	WCH	1.8	0.0	0.0

^a BT=bull trout, WCH=wild chinook.

^b Calculated using the sum of the passes, due to poor reduction between successive passes.

^c Actual area, but reported widths are rounded.

Table 5. (Continued) Densities of salmonids from electrofishing sites in the Walla Walla Basin, summer 2003. Sites are listed in order from upstream to downstream.

Stream Reach	Date	Site Length (m)	Mean Width (m)	Area (m ²)	Densities (#/100 m ²)							
					Rainbow/steelhead				Other Species ^a	Age/Size		
					Age/Size					0+	1+	\$8 in
Site Name	(mm/dd)	(m)	(m)	(m ²)	0+	1+	\$8 in	Total	Species ^a	0+	1+	\$8 in
Mill Creek (Continued)												
MC-6	8/25	30.0	7.38	221.4	11.3 ^b	1.8	1.4	14.5				
MC-7	8/25	30.0	8.36	250.8	27.1 ^b	16.0 ^b	3.2 ^b	46.3	WCH	0.8	0.0	0.0
MC-9	8/12	40.0	6.52	260.8	18.0	11.9	0.4	30.3	WCH	0.8	0.0	0.0
MC-27	6/12	28.0	7.66	214.5	42.9	0.0	0.0	42.9	WCH	0.0	0.5	0.0
MC-27	7/22	30.0	6.80	204.0	18.1	0.5	0.0	18.6				
MC-29	6/12	30.0	6.76	202.8	58.2 ^b	0.0	0.0	58.2				
MC-29	7/23	30.0	6.04	181.2	35.9	0.0	0.0	35.9				
MC-30	6/11	30.0	6.00	180.0	26.7	2.8	0.0	29.5				
MC-30	7/23	30.0	3.80	114.0	6.1	0.0	0.0	6.1				
MC-31	6/11	30.0	4.78	143.3 ^c	6.3	1.4	2.1 ^b	9.8				
MC-31	7/22	30.0	4.78	143.4 ^c	14.6	2.8	0.0	17.4				

^a BT=bull trout, WCH=wild chinook.

^b Calculated using the sum of the passes, due to poor reduction between successive passes.

^c Actual area, but reported widths are rounded.

Qualitative Electrofishing

Qualitative electrofishing surveys were conducted on 22 streams within the Walla Walla Basin in 2003. Surveys were started in early April and ran through early October. The surveys in April and May were done to check stream that go completely or partially dry during summer months when most of the electrofishing surveys are conducted. These early spring electrofishing sites were conducted in Hatley Gulch (HG-1, 2, 3), Hogeys Hollow (H-4, 5), Whiskey Creek (WC-2, 3, 4, 5), Alyward Trib., a tributary to Whiskey Creek, (A-1, 2, 3, 4). Only three of these 13 sites had no fish present, and of the 10 with fish present eight contained salmonids (Appendix D). The Qualitative surveys done during the summer months were used to supplement the more intensive quantitative electrofishing surveys, to look at areas where quantitative surveys may not be feasible (like in the weir sections of Mill Creek where the stream is too wide for our nets), and to assess streams where fish presence or use has little or no documentation. We also did a set of qualitative surveys on the North Fork Touchet to look for juvenile bull trout (NFT-1, 3, 4, 5, 6, 7, 8, 9).

Walla Walla Settlement Agreement

Increased flows and/or decreased temperatures may have resulted in increased rainbow/steelhead densities between the Washington/Oregon Stateline and Mojonner Rd. (Burlingame), the average density in 2003 was the highest seen to date. Densities below Mojonner Rd. have not shown consistent increases since the settlement agreement was implemented (Table 6).

Table 6. Comparison of summer rainbow/steelhead densities (fish/100 m ²) in the Walla Walla River between the Stateline and Lowden from 1998 through 2003.					
Year/ Reach	Mean Density	Standard Deviation	# of sites	Densities per Site (fish/100 m²)	Other Salmonids Present
1998					
Stateline to just below Burlingame	0.3333	0.3215	3	0.7,0.1,0.2	none
down to McDonald Rd.	0.4	N/A	1	0.4	none
1999					
Stateline to just below Burlingame	3.6714	5.1068	7	1.8,1.4,2.8,0.5,15, 1.0,0.3	chinook & whitefish
down to McDonald Rd.	3.4500	2.3193	6	6.5,1.6,5.5,1.7,4.4,1. 0	none
down to Lowden Gardena Rd.	0	N/A	1	0 ^b	none
2000					
Stateline to just below Burlingame	4.0000	7.2596	4	2.4,4.5,14.5,17.1	whitefish
down to McDonald Rd.	1.5	2.213	2	3.0,0,+1 qual ^a	none
down to Lowden Gardena Rd.	0	N/A	1	0 ^b	none
2001					
Stateline to just below Burlingame	7.633	6.4488	9	15.9,15.7,5.2,2.5,6.8, 15.5,6.1,0.9,0.1	chinook & whitefish
down to McDonald Rd.	0.4667	0.6429	3	1.2,0,0.2,+3 qual ^a	none
down to Lowden Gardena Rd.	0.0	0.0	2	0,0	none
^a Plus qualitative sites with rainbow/steelhead. ^b High densities (31.4 to 101 fish/100 m ²) existed in June and the first couple days of July for mainly Age 0+ rainbow/steelhead.					

Table 6. Comparison of summer rainbow/steelhead densities (fish/100 m²) in the Walla Walla River between the Stateline and Lowden from 1998 through 2003.

Year/ Reach	Mean Density	Standard Deviation	# of sites	Densities per Site (fish/100 m ²)	Other Salmonids Present
2002					
Stateline to just below Burlingame	6.000	5.0413	4	8.0, 13.3, 2.1, 0.6	chinook & whitefish
2003					
Stateline to just below Burlingame	7.775	2.8039	4	5.8, 11.8, 4.6, 8.9	chinook
down to McDonald Rd.	2.850	0.7500	2	3.6, 2.1	none
^a Plus qualitative sites with rainbow/steelhead. ^b High densities (31.4 to 101 fish/100 m ²) existed in June and the first couple days of July for mainly Age 0+ rainbow/steelhead.					

Snorkeling

Snorkeling surveys were only conducted in the Walla Walla River in 2003. Ten qualitative sites were done throughout the month of June, with the purpose of locating bull trout. These sites ranged from the stateline down to McDonald Rd., and while no bull trout were observed during any of the surveys, relative abundance of all fish was noted (Table 7). Rainbow/steelhead trout sub-yearling (age 0+) and yearling (age 1+) were observed at all ten sites, adults (≥8 in.) were seen at seven sites, and sub-yearling (age 0+) chinook were seen in the five upper sites (Table 7).

Table 7. Relative abundance of fish from qualitative snorkel sites in the Walla Walla River, 2003.

Stream	Site #	Date	Site Length	Avg. Width	Relative Abundance ^a	Comments
Walla Walla River	WW-1 Stateline	6/24	100	10.3	0+ RBT-common, 1+ RBT-uncommon, adult RBT-rare, 0+ WCH-common. SD, SCP, RSS-common	Looking for bull trout none found
	WW-2 Pepper Rd bridge	6/24	110	7.4	0+ RBT-common, 1+ RBT-rare, adult RBT-rare, 0+ WCH-uncommon. SD, RSS-abundant, SCP-common, BLS-uncommon, NPM-rare	Looking for bull trout none found
	WW-3 0.7 miles below Pepper Rd	6/25	85	12.5	0+ RBT-uncommon, 1+ RBT-uncommon, 0+ WCH-uncommon. SD, SCP, RSS-common, BLS-rare	Looking for bull trout none found
	WW-4 ~15 feet above Yellowhawk Ck mouth	6/24	87	9.1	0+ RBT-common, 1+ RBT-rare, 0+ WCH-rare. RSS, SD-abundant, SCP, BLS, NPM-common	Looking for bull trout none found
	WW-5 0.5 miles above Burlingame Diversion	6/25	147	12.1	0+ RBT-common, 1+ RBT-rare, adult RBT-rare, 0+ WCH-uncommon. RSS, SD-abundant, SCP, BLS, NPM-common	Looking for bull trout none found
	WW-6 Directly below Burlingame Diversion	6/6	96	11.9	0+ RBT-rare, 1+ RBT-uncommon, adult RBT-rare. SD, RSS, SCP-common, NPM, BLS-uncommon	Looking for bull trout none found
	WW-7 ~45 meters below Mojonier Rd	6/6	116	11.7	0+ RBT-uncommon, 1+ RBT-uncommon. SD, SCP-abundant, RSS-common, BLS, NPM-uncommon	Looking for bull trout none found
	WW-9 Swegle Rd bridge	6/25	100	13.0	0+ RBT-abundant, 1+ RBT-rare, adult RBT-rare, 0+ WCH-uncommon. SD, RSS-abundant, SCP, BLS, NPM-common	Looking for bull trout none found
	WW-10 0.4 miles above Detour Rd brg	6/24	130	13.5	0+ RBT-common, 1+ RBT-rare, adult RBT-rare, 0+ WCH-uncommon. SD, RSS-abundant, SCP, BLS, NPM-common	Looking for bull trout none found
	WW-11 ~50 meters above McDonald Rd brg	6/25	79	7.8	0+ RBT-rare, 1+ RBT-rare, adult RBT-rare. SD, RSS-abundant, BLS, NPM-common, SMB-uncommon, SCP-rare	Looking for bull trout none found

^a RBT=rainbow trout, WCH=chinook, SD=speckled dace, SCP=sculpin, RSS=redside shiner, BLS=bridgelip sucker, NPM=northern pikeminnow, SMB=smallmouth bass.

Non-Salmonid Species Abundance and Distribution

Speckled dace (*Rhinichthys osculus*) and sculpin (*Cottus spp.*) were the most common non-salmonids found at most of our sampling sites (Appendix E). Speckled dace generally did not exist at upper sites where water temperatures were relatively cool. Longnose dace (*Rhinichthys cataractae*) was observed during electrofishing in Mill Creek, Yellowhawk Creek, and Titus Creek. Sculpin are found throughout the basin except in the lower sections of the mainstem Walla Walla and Touchet rivers and in cold headwater sites. Northern pikeminnow (*Ptychocheilus oregonensis*) and chiselmouth (*Acrocheilus alutaceus*) are found in low densities in lower sections of tributaries and mainstem rivers. Tailed frogs/tadpoles (*Ascaphus truei*) were found only in upper sites in cold, clean water. During our efforts we have generally found bull trout where tailed frogs were present, but we have also found tailed frogs in headwater areas where bull trout are not present.

Spawning Surveys

Steelhead

Steelhead spawning surveys were conducted on Mill Creek, and two tributaries to the Touchet River Whiskey Creek drainage (included Whiskey Creek and one of its tributaries) and Coppei Creek drainage (included Coppei Creek, South Fork Coppei, and North Fork Coppei) in 2003 between late March and early May (Table 8). Steelhead surveys overall in the Walla Walla Basin were very incomplete (low number and distribution of surveys). Survey crews were delayed due to high, turbid stream flows that make accurate observations of fish and redds nearly impossible.

Fish Management personnel completed two surveys on upper Mill Creek from the stateline down to Bennington Lake diversion (8.1 miles) and nine redds and one dead fish were observed. Whiskey Creek was surveyed for 7.2 miles and four redds, three live fish, and one dead fish were observed. The lower 4.8 miles of the South Fork Coppei were surveyed two times and seven redds and two live fish were observed. The lower 3.1 miles of the North Fork Coppei were surveyed twice and 14 redds and 10 live fish were observed. Coppei Creek was surveyed once from the confluence of the North and South Fork Coppei down to just above the town of Waitsburg (5.3 miles) and seven redds and 1 live fish were observed (Table 8).

Table 8. Steelhead spawning survey summary for the Walla Walla basin in Washington State, 2003.

Reach/ Date	Survey	Stream section ^a	Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
Mill Creek							
4/16	1	(A) River mile 19.9 to river mile 19.1	0.8	0	0	0	0
4/15	1	(B) River mile 19.1 to river mile 17.0	2.1	5	2.4	0	0
4/16	1	(C) River mile 16.8 to river mile 14.7	2.1	1	0.5	0	0
4/16	1	(D) River mile 14.7 to river mile 12.8	1.9	0	0	0	0
4/16	1	(E) River mile 12.8 to river mile 11.6	1.2	0	0	0	0
Total			8.1	9	1.1	0	1
Whiskey Ck							
3/31	1	(F) River Mile 0.0 to river mile 2.4	2.4	0	0	0	0
3/31	1	(G) River Mile 5.7 to river mile 3.5	2.2	0	0	3	0
3/31	1	(H) River Mile 3.5 to river mile 1.4	2.1	0	0	0	0
4/4	1	(I) River Mile 0.5 to river mile 0.0	0.5	0	0	0	0
4/22	2	(G) River Mile 5.7 to river mile 3.5	2.2	1	0.5	0	1
4/22	2	(H) River Mile 3.5 to river mile 1.4	2.1	3	1.4	0	0
Total			7.2	4	0.6	3	1
SF Coppei							
4/7	1	(J) River mile 4.8 to river mile 2.3	2.5	0	0	0	0
4/7	1	(K) River mile 2.3 to river mile 0.0	2.3	2	0.9	2	0
4/21	2	(J) River mile 4.8 to river mile 2.3	2.5	3	1.2	0	0
4/21	2	(K) River mile 2.3 to river mile 0.0	2.3	2	0.9	0	0
Total			4.8	7	1.5	2	0
NF Coppei							
4/7	1	(L) River mile 3.7 to river mile 1.9	1.8	1	0.6	2	0
4/7	1	(M) River mile 1.3 to river mile 0.0	1.3	11	8.5	8	0
4/23	2	(L) River mile 3.7 to river mile 1.9	1.8	2	1.1	0	0
4/23	2	(M) River mile 1.3 to river mile 0.0	1.3	0	0.0	0	0
Total			3.1	14	4.5	10	0
Coppei Ck							
4/16	1	(N) River mile 7.5 to river mile 6.0	1.5	3	2.0	0	0
4/16	1	(O) River mile 6.0 to river mile 5.0	1.0	0	0.0	0	0
4/16	1	(P) River mile 5.0 to river mile 2.2	2.8	4	1.4	1	0
Total			5.3	7	1.3	1	0
^a A: RM 19.9 to Wickersham bridge, B: Wickersham bridge to RM 17.0, C: Blue Ck to Seven Mile Rd., D: Seven Mile Rd. to Five Mile Rd., E: Five Mile Rd. to Bennington Lake Diversion, F: Left fork from mouth to forks (Alyward Trib.), G: Forks to 2 nd bridge on Whiskey Ck. Rd., H: 2 nd bridge on Whiskey Ck. Rd. to mouth of Hogeye Hollow, I: RM 0.5 to mouth of Whiskey Ck, J: 0.4 miles below Barnes Ck to RM 2.3, K: RM 2.3 to mouth, L: RM 3.7 to RM 1.9, M: RM 1.3 to mouth, N: Forks to RM 6.0, O: RM 6.0 to McCowan Rd., P: McCowan Rd. to Meinburg Rd.							

Bull Trout

Bull trout spawning surveys were conducted in the upper tributaries of the Touchet River in 2003. The surveyed areas included the Wolf Fork, North Fork Touchet, Lewis Creek, South Fork Touchet, and the Burnt Fork. Surveys were conducted at least three times in each of these streams with some sections of the Wolf Fork being surveyed five times.

Bull trout spawning surveys were conducted in the upper Wolf Fork again in 2003 (Table 9). Water temperatures in the Wolf Fork during bull trout spawning season were generally in the low to mid 40's (EF). A total of 101 redds and 79 live fish were observed between river mile 7.2 and river mile 14.1 (Table 9). This was the highest recorded number of redds seen in the Wolf Fork since 1990 (Figure 12, Table 10). The population of bull trout in the Wolf Fork appears to be increasing. Since 1998 the number of redds has more than doubled, with similar distribution and number of walks taking place (Table 10).

Table 9. Bull trout spawning survey summary for the Wolf Fork of the Touchet River, 2003.							
Reach/ date	Survey	Stream section ^a	Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
Wolf Fork							
9/4	1	(A) River mile 14.1 to river mile 12.0	2.1	4	1.9	6	0
9/4	1	(B) River mile 12.0 to river mile 10.7	1.3	3	2.3	9	0
9/4	1	(C) River mile 10.7 to river mile 9.8	0.9	13	14.4	16	0
9/5	1	(D) River mile 9.8 to river mile 8.7	1.1	0	0	5	0
9/5	1	(E) River mile 8.7 to river mile 7.2	1.5	0	0	0	0
9/17	2	(A) River mile 14.1 to river mile 12.0	2.1	10	4.8	4	0
9/17	2	(B) River mile 12.0 to river mile 10.7	1.3	7	5.4	5	0
9/17	2	(C) River mile 10.7 to river mile 9.8	0.9	24	26.7	18	0
9/17	2	(D) River mile 9.8 to river mile 8.7	1.1	9	8.2	5	0
9/17	2	(E) River mile 8.7 to river mile 7.2	1.5	2	1.3	1	0
10/2	3	(A) River mile 14.1 to river mile 12.0	2.1	8	3.8	0	0
10/2	3	(B) River mile 12.0 to river mile 10.7	1.3	2	1.5	4	0
10/2	3	(C) River mile 10.7 to river mile 9.8	0.9	2	2.2	2	0
10/2	3	(D) River mile 9.8 to river mile 8.7	1.1	3	2.7	0	0
10/2	3	(E) River mile 8.7 to river mile 7.2	1.5	3	2.0	0	0
10/15	4	(A) River mile 14.1 to river mile 12.0	2.1	0	0.0	1	0
10/15	4	(B) River mile 12.0 to river mile 10.7	1.3	9	6.9	0	0
10/15	4	(C) River mile 10.7 to river mile 9.8	0.9	2	2.2	0	0
10/15	4	(D) River mile 9.8 to river mile 8.7	1.1	0	0.0	1	0
10/15	4	(E) River mile 8.7 to river mile 7.2	1.5	0	0.0	0	0
10/27	5	(B) River mile 12.0 to river mile 10.7	1.3	0	0.0	0	0
10/27	5	(C) River mile 10.7 to river mile 9.8	0.9	0	0.0	2	0
Total			6.9	101	14.6	79	0

^a A: RM 14.1 to Forest Service Line, B: Forest Service Line to mouth of Tate Ck., C: Mouth of Tate Ck. to RM 9.8 D: RM 9.8 to old cabin, E: Old cabin to RM 7.2.

Total Bull Trout Redds/Year

Wolf Fork Touchet

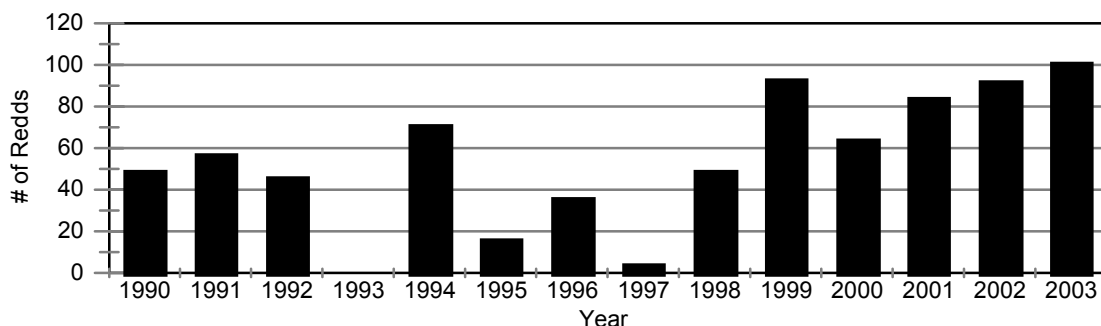


Figure 12. Bull trout redd counts for the Wolf Fork, 1990-2003.

Table 10. Bull trout spawning survey summary, redd count (number of times surveyed), for the Wolf Fork of the Touchet River, 1990-2003.

Year	Reach Surveyed ^a							Total Redds
	A	B	C	D	E	F	G	
	RM 14.1-13.5	RM 13.5-12.0	RM 12.0-10.7	RM 10.7-9.8	RM 9.8-8.7	RM 8.7-7.5	RM 7.5-6.8	
1990			18 (8)	31 (8)				49
1991			20 (5)	37 (5)				57
1992			46 (3)					46
1993 ^b								0
1994			71 (?)					71
1995			16 (?)					16
1996			36 (?)					36
1997 ^c					4 (1)			4
1998		11 (3)	7 (3)	18 (3)	12 (3)	0 (3)		48
1999		32 (4)	14 (5)	34 (5)	11 (5)	2 (4)		93
2000		3 (3)	17 (4)	33 (4)	7 (4)	4 (3)		64
2001		15 (4)	19 (4)	36 (4)	11 (4)	2 (3)	1 (2)	84
2002		25 (4)	15 (4)	39 (4)	8 (4)	5 (4)		92
2003	3 (4)	19 (4)	21 (5)	41 (5)	12 (4)	5 (4)		101

^a A: RM 14.1 to RM 13.5 (2nd meadow), B: RM 13.5 (2nd meadow) to Forest Service line, C: Forest Service Line to Mouth of Tate Ck., D: Mouth of Tate Ck to RM 9.8 (stream ford), E: RM 9.8 (stream ford) to Old cabin, F: Old cabin to Mouth of Whitney Ck., G: Mouth of Whitney Ck. to First bridge below yellow gate.

^b No survey done.

^c One survey done late in October and too far downstream.

The upper South Fork Touchet and one of its tributaries (the Burnt Fork) were surveyed for the fourth consecutive year in 2003, but no redds and only three live bull trout (all in the Burnt Fork) were observed (Table 11). This is the first year since surveys began in 2000 that no redds were seen (Figure13, Table 12). Continued monitoring of this population in the next couple years is essential to see if it will rebound or disappear.

Table 11. Bull trout spawning survey summary for the South Fork Touchet and one of its tributaries, 2003.

Reach/ date	Survey	Stream section ^a	Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
South Fork Touchet							
9/10	1	(A) River mile 15.4 to river mile 14.2	1.2	0	0	0	0
10/1	2	(A) River mile 15.4 to river mile 14.2	1.2	0	0	0	0
10/16	3	(A) River mile 15.4 to river mile 14.2	1.2	0	0	0	0
Total			1.2	0	0	0	0
Burnt Fork							
9/10	1	(B) River mile 3.5 to river mile 1.4	2.1	0	0	3	0
9/10	1	(C) River mile 1.4 to river mile 0.0	1.4	0	0	0	0
10/1	2	(B) River mile 3.5 to river mile 1.4	2.1	0	0	0	0
10/1	2	(C) River mile 1.4 to river mile 0.0	1.4	0	0	0	0
10/16	3	(B) River mile 3.5 to river mile 1.4	2.1	0	0	0	0
10/16	3	(C) River mile 1.4 to river mile 0.0	1.4	0	0	0	0
Total			3.5	0	0	3	0

^a A: Confluence of Burnt Fk. and Green Fk. to mouth of Griffen Fk, B: Just above forks to RM 1.4, C: RM 1.4 to mouth of Burnt Fk.

Total Bull Trout Redds/Year

Burnt Fk

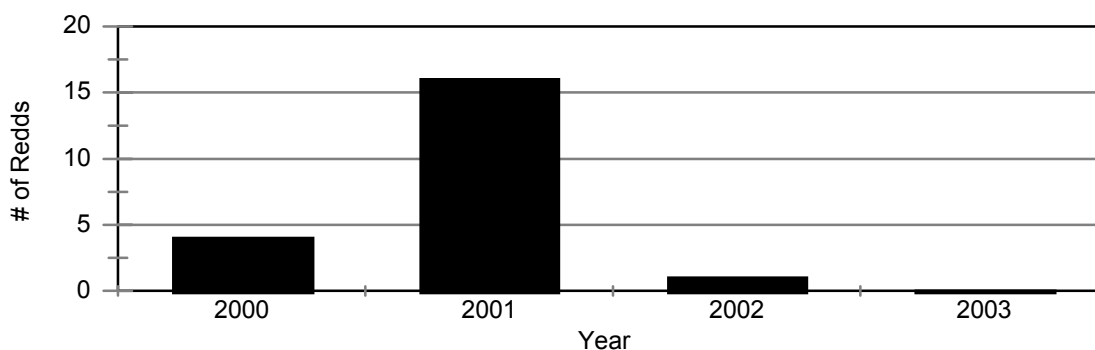


Figure13. Bull trout redd counts for the Burnt Fork, 2000-2003.

Table 12. Bull trout spawning survey summary, redd count (number of times surveyed), for the Burnt Fork, 2000-2003.

Year	Reach Surveyed ^a			Total Redds
	A	B	C	
	RM 3.5-3.3	RM 3.3-1.4	RM 1.4-0.0	
2000	0 (1) ^b	4 (3)	0 (1)	4
2001	13 (4)		3 (4)	16
2002	2 (3)		0 (3)	2
2003	0 (3)		0 (3)	0

^a A: River Mile 3.5 to Forks (RM 3.3), B: Forks (RM 3.3) to Forest Service Line, C: Forest Service Line to Mouth of Burnt Fork.
^b Survey this year actually went up to RM 3.6.

Bull trout spawning surveys were conducted in the North Fork Touchet and Lewis creek again in 2003. Lewis Creek was surveyed three times, but no redds or fish were observed, and the North Fork was surveyed four times with 25 redds and 67 live bull trout being observed (Table 13). This was the second year in a row that the total number of redds was below 30 (which hasn't happened since the mid 1990's), but the number of fish seen was fairly high (Figure 14, Tables 13 and 14).

Table 13. Bull trout spawning survey summary for the North Fork Touchet and one of its tributaries, 2003.

Reach/ date	Survey	Stream section ^a	Miles	Redds	Redds per mile	Fish Observed	
						Live	Dead
North Fork Touchet							
9/5	1	(A) River mile 19.1 to river mile 16.6	2.5	19	7.6	37	0
9/5	1	(B) River mile 16.6 to river mile 12.4	4.2	2	0.5	22	0
9/16	2	(A) River mile 19.1 to river mile 16.6	2.5	3	1.2	2	0
9/16	2	(B) River mile 16.6 to river mile 12.4	4.2	0	0.0	2	0
9/30	3	(A) River mile 19.1 to river mile 16.6	2.5	0	0.0	0	0
9/30	3	(B) River mile 16.6 to river mile 12.4	4.2	0	0.0	0	0
10/14	4	(A) River mile 19.1 to river mile 16.6	2.5	1	0.4	4	0
10/14	4	(B) River mile 16.6 to river mile 12.4	4.2	0	0.0	0	0
Total			6.7	25	3.7	67	0
Lewis							
9/2	1	(C) River mile 2.6 to river mile 1.1	1.5	0	0	0	0
9/12	1	(D) River mile 1.1 to river mile 0.1	1.0	0	0	0	0
9/26	2	(C) River mile 2.6 to river mile 1.1	1.5	0	0	0	0
9/26	2	(D) River mile 1.1 to river mile 0.1	1.0	0	0	0	0
10/23	3	(C) River mile 2.6 to river mile 1.1	1.5	0	0	0	0
10/23	3	(D) River mile 1.1 to river mile 0.1	1.0	0	0	0	0
Total			2.5	0	0	0	0

^a A: Bluewood culvert to 2.5 miles below Bluewood culvert, B: 2.5 miles below Bluewood culvert to RM 12.4, C: 1.5 miles above Forest Service Line to Forest Service Line, D: Forest Service Line to North Fork Touchet Rd.

Total Bull Trout Redds/Year NF Touchet

Bluewood Ck to Spangler Ck - 4.5 mi

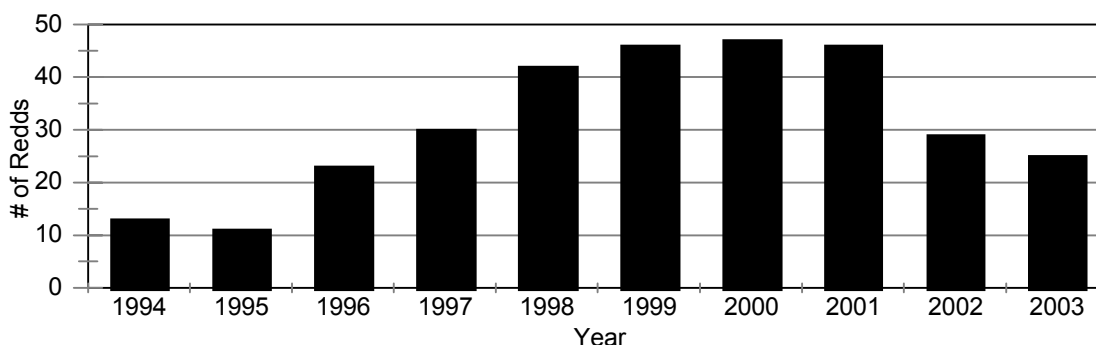


Figure 14. Bull trout redd counts for the North Fork Touchet, 1994-2003.

Table 14. Bull trout spawning survey summary, redd count (number of times surveyed), for the North Fork Touchet River, 1994-2003.			
Year	Reach Surveyed^a		Total Redds
	A	B	
	River Mile 19.1-16.6	River Mile 16.6-14.0	
1994	10 (2)	3 (2)	13
1995	11 (2)	0 (1)	11
1996	21 (2)	2 (2)	23
1997	24 (2)	6 (1)	30
1998	24 (3)	18 (2)	42
1999	25 (2)	21 (2)	46
2000	47 (2)	0 (1)	47
2001	41(4)	5 (4)	46
2002	28 (4)	1 (4)	29
2003	23 (4)	2 (4)	25

^a A: Bluewood culvert to 2.5 miles below Bluewood culvert, B: 2.5 miles below Bluewood culvert to Stream ford below mouth of Spangler Ck.

Spawning surveys have been conducted by the Oregon Department of Fish and Wildlife (ODFW) and the United States Forest Service (USFS) on Mill Creek since 1994 (Table 15), and on some of Mill Creek's upper tributaries since 1994 (Table 16). Surveys in Mill Ck in 1990-1992 were conducted by masters students Martin and Underwood in cooperation with WDFW. The tables and graphs in this report were derived from data provided by ODFW (Paul Sancovich personal communication), the USFS (Dave Crabtree personal communication), Martin et al. (1992), and Underwood et al. (1995). Since 1994 the number and distribution of walks on Mill Ck and its tributaries has been fairly constant (Tables 15 and 16). This allows for a good annual

comparison of total redds for the Mill Ck system, with a peak of just over 220 redds in 2001 (Figure 15).

Table 15. Bull trout spawning survey summary, redd count (number of times surveyed), for Mill Creek, 1990-2003.

Year	Reach Surveyed ^a									Total Redds
	A	B	C	D	E	F	G	H	I	
1990		48(3)	15(3)	1(3)						64
1991	10(4)	14(4)	17(4)	11(5)						52
1992	6(4)	9(4)	51(4)							66
1993 ^b										
1994	15(1)	28(2)	91(5)	26(1)		2(2)	0(1)	1(1)	0(1)	163
1995	28(2)	16(2)	68(3)	13(2)	1(2)	3(1)	0(1)	0(1)	0(1)	129
1996	3(2)	8(2)	48(2)	14(2)	4(2)	0(1)	0(1)	1(1)	0(1)	78
1997	16(4)	15(4)	36(4)	14(4)		5(4)	0(4)	0(4)		86
1998	17(4)	14(4)	45(4)	15(4)		3(4)	1(4)	0(4)		95
1999	14(4)	13(4)	58(5)	38(4)		4(4)	0(4)	0(4)	3(1)	130
2000	15(4)	10(4)	70(4)	13(4)		2(4)	0(4)	0(1)	1(4)	111
2001 ^c	18(3)	27(4)	83(4)	32(4)		0(2)	3(3)	0(2)	2(1)	165
2002 ^c	15(3)	24(3)	80(3)	40(3)		2(2)	0(2)	0(2)		161
2003	9(3)	12(3)	53(3)	18(3)		6(3)	0(2)	0(2)	4(2)	102

^a A: Forks to Bull Ck., B: Bull Ck. to Deadman Ck., C: Deadman Ck. to N. Fork Mill Ck., D: N. Fork Mill Ck. to ½ way to Paradise Ck., E: ½ way to Paradise Ck. to Paradise Ck., F: Paradise Ck. to Broken Ck., G: Broken Ck. to Low Ck., H: Low Ck. to intake dam, I: Intake dam to forest boundary.
^b No survey done.
^c ODFW data only.

Table 16. Bull trout spawning survey summary, redd count (number of times surveyed), for tributaries to Mill Creek, 1994-2003.

Year	Reach Surveyed ^a								Total Redds
	A	B	C	D	E	F	G	H	
	Bull Ck.	Green Fork	Burnt Fork	Deadman Ck.	N. Fork Mill Ck.	Paradise Ck.	Broken Ck.	Low Ck.	
	RM ^b 0.0-0.5 ¹ or 0.6 ² or 1.0 ³	RM 0.0-0.7	RM ^b 0.0-0.3 ¹ or 0.7 ²	RM ^b 0.0-0.3 ¹ or 0.4 ² or 1.2 ³	RM ^b 0.0-0.5 ¹ or 0.9 ²	RM ^b 0.0-1.4 ¹ or 1.5 ² or 2.0 ³	RM 0.0-1.5	RM ^b 0.0-0.5 ¹ or 1.0 ² or 1.3 ³ or 2.0 ⁴	
1994	0(1) ³	4(1)	2(1) ²	0(1) ³	9(1) ¹	10(1) ³	0(1)	3(1) ²	28
1995	9(1) ³	1(1)	3(1) ²	2(1) ³	12(1) ¹	9(1) ³	0(1)	0(1) ¹	36
1996	10(2) ¹	0(1)	12(3) ^{2 c}	3(1) ¹	5(1) ¹	8(1) ²	0(1)	18(2) ⁴	56
1997	2(4) ¹		4(3) ^{1 c}	1(4) ¹	3(4) ¹	2(4) ²	0(4)	20(4) ⁴	32
1998	2(4) ¹		2(4) ^{1 c}	4(4) ¹	6(4) ¹	1(1) ²	0(4)	27(3) ⁴	42
1999	1(4) ¹		4(4) ^{1 c}	0(4) ¹	6(4) ¹	6(2) ²		41(3) ⁴	58
2000	1(4) ¹		14(4) ^{1 c}	7(4) ¹	17(4) ¹	5(4) ²		39(4) ⁴	83
2001 ^c	1(3) ²		3(3) ^{1 c}	0(2) ²	17(4) ²	3(4) ¹		33(4) ³	57
2002 ^c	1(3) ²		2(3) ^{1 c}	0(2) ²	12(3) ²	5(3) ¹		32(3) ³	52
2003	5(3)	0(1)	1(3)	0(?)	8(?)	1(2)		28(3)	43

^a A: Mouth of Bull Ck. Upstream, B: Mouth of Green Fork upstream, C: Mouth of Burnt Fork upstream, D: Mouth of Deadman Ck. Upstream, E: Mouth of N. Fork Mill Ck. Upstream, F: Mouth of Paradise Ck. Upstream, G: Mouth of Broken Ck. Upstream, H: Mouth of Low Ck. Upstream.

^bRiver Miles (RM) varied from year to year in some of the tributaries and are foot noted with numbers 1, 2, 3, or 4.

^c ODFW data only.

Total Bull Trout Redds/Year Mill Creek

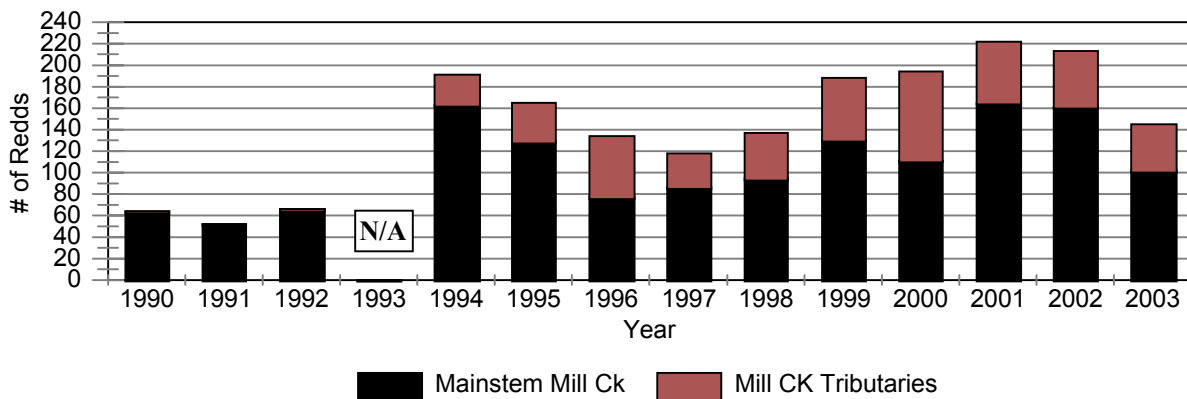


Figure 15. Bull trout redd counts for Mill Creek and its tributaries, 1990-2003.

Genetic Sampling and Analyses

Fish Management personnel collected 248 fin clips in the Walla Walla basin in 2003. Of the 248 samples, 150 were from juvenile and adult (\$8") rainbow/steelhead trout (RBT), 91 were from juvenile and adult (\$8") bull trout (BT), and the other seven were from adult steelhead (SH).

The 146 juvenile and 4 adult RBT's were sampled during electrofishing surveys. The samples were collected as follows; 36 juveniles from the Walla Walla River, 33 juveniles and four adults from Mill Creek, 19 juveniles from the SF Coppei, 17 juveniles from the NF Coppei, 17 juveniles from the mainstem Coppei Creek, nine juveniles from the Green Fork, five juveniles from Dustin Hollow, five juveniles from Garrison Creek, and five juveniles from Titus Creek.

All of the juvenile and adult BT's were also sampled during electrofishing surveys. Twelve were adults (\$8") and 79 were juveniles. The samples were collected as follows; 40 juveniles and six adults from the Wolf Fork, 27 juveniles and six adults from the NF Touchet, seven juveniles from Lewis Creek, and 5 juveniles from Spangler Creek.

The seven steelhead were sampled at a temporary trap on Yellowhawk Creek.

Recommendations

Recommendations for Assessment Activities in 2004

- a) One of the highest priorities for 2004 is to select or develop a habitat survey protocol and begin conducting habitat inventory and assessment surveys. Detailed habitat assessment inventory data are lacking in nearly all portions of the Walla Walla Basin within Washington. This lack of information limits watershed and subbasin planning and restoration actions. Begin habitat inventory in one or more stream reaches in 2004, and evaluate its utility.
- b) Continue to monitor the mainstem Walla Walla River from the Stateline downstream to McDonald Bridge to document changes in stream temperatures, water flows, and salmonid densities and distribution with the addition of water under the settlement agreement.
- c) Continue and emphasize monitoring of the Mill Creek flood channel, and other parts of Mill Creek, Titus Creek, and Yellowhawk creeks, to document seasonal changes in temperatures, flows, and fish distribution and abundance. Increase steelhead redd surveys and electrofishing surveys. Information is needed to guide management and restoration actions in the Mill Creek system (includes Titus, and Yellowhawk creeks). Increase monitoring in Titus Creek for flows, temperatures, and electrofishing surveys.
- d) Continue to reevaluate the seasonal distribution and abundance of salmonids in Whiskey Creek now that passage has been restored in lower Whiskey Creek. Conduct steelhead spawning surveys and spring electrofishing, as well as summer surveys, to document seasonal use, distribution and relative abundance, as well as the presence or absence of available water. Evaluate three potential barriers.
- e) Continue to emphasize monitoring of the Little Walla Walla system to document flows, temperatures, and salmonid use seasonally. This information is necessary to guide decisions and actions for managing this modified system.
- f) Continue to evaluate bull trout use (densities and distribution) of Lewis Creek. Collect genetic samples from each of the Touchet River tributaries for a genetic comparison of these populations.
- g) Continue to examine water temperatures and flows in May and June for possible effects on salmonid passage in the lower Walla Walla, lower Mill Creek, and the middle and lower Touchet River.
- h) Increase genetic samples from adult steelhead in Mill and Yellowhawk creeks for comparison with the upper Walla Walla and the Touchet watershed.

- i) Look for and document any new barriers (physical or physiological) to fish migrations in the Washington portion of the subbasin. Including a closer look at three possible barriers on Whiskey Creek.
- j) Resample for salmonid abundance and distribution below Dayton or Prescott in the Touchet River, and in the Walla Walla River from Detour to the mouth of the Touchet River. Document all species encountered.
- k) Collect genetic samples from juvenile steelhead below the Stateline, and in Coppei Creek and compare with hatchery steelhead samples or samples from other areas in the Walla Walla Basin to try and determine whether primarily wild or hatchery steelhead are spawning in these areas.
- l) Resample Coppei Creek for steelhead spawning and juvenile fish use as this has not been done for several years.
- m) Increase fish sampling in middle and lower Dry Creek and its major tributaries (e.g. both Mud creeks).
- n) Increase scale sampling (esp. on 65-115mm fish) and summarize results of all scales collected over the years.
- p) Continue to collect information regarding stream flows, temperatures and fish use in the South Fork of the Touchet River, as much of these data were not collected in the first couple of years of this study.
- q) Begin to evaluate temperature and flow data for spring chinook habitat conditions in the Touchet River. This information will be used to evaluate possible spring chinook reintroduction in the Touchet River in the near future, and compile this information in the next annual report.
- r) Expand sampling of Lewis and Spangler creeks to document bull trout distribution and relative abundance. Also sample upper Robinson Fork, Greenfly Creek, Whitney Creek, and Tate Creek all tributaries of the Wolf Fork.

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Appendix A. Study Sites, 2003

Appendix A. Table 1. Touchet River and tributary study sites, 2003.					
Stream	Site	RM^a	Location	Sample Type^b	Comments
NF Touchet River	NFT-1	19.1	T7N,R40E,Sec 18, NW¼,NE¼	EL	~10 meters above Bluewood culvert
	NFT-2	19.1	T7N,R40E,Sec 18, NW¼,NE¼	T ^d ,F ^c	~15 meters below Bluewood culvert
	NFT-3	18.6	T7N,R40E,Sec 7, NE¼,SE¼	EQ,EL	Sno-Park
	NFT-4	18.1	T7N,R40E,Sec 8, SW¼,NW¼	EQ,EL	~0.5 miles below Sno-Park
	NFT-5	17.6	T7N,R40E,Sec 5, SE¼,SW¼	EQ,EL	~1.6 miles below Sno-Park
	NFT-6	17.1	T7N,R40E,Sec 5, NW¼,SE¼	EQ,EL	~2.1 miles below Sno-Park
	NFT-7	16.2	T8N,R40E,Sec 33,SE¼,SW¼	EQ,EL	~2.4 miles below Sno-Park
	NFT-8	15.2	T8N,R40E,Sec 28, SE¼,SE¼	EQ,EL	~1.0 miles above Spangler Ck mouth
	NFT-9	14.0	T8N,R40E,Sec 21,SE¼,SE¼	EQ,EL,T ^d ,F ^{c,d}	~0.2 miles below Spangler Ck mouth
	NFT-10	7.6	T9N,R40E,Sec 30,SW¼,NE¼	T ^d ,F ^d	~40ft below Jim Ck mouth
	NFT-11	1.4	T9N,R39E,Sec 4,NW¼,NE¼	T ^d ,F ^{c,d}	Above Baileysburg
Spangler Ck	SC-1	1.5	T8N,R40E,Sec 34,NW¼,NE¼	EQ	0.3mi past end of road
	SC-2	1.2	T8N,R40E,Sec 27, SW¼,SE¼	EQ	End of Road
	SC-3	0.8	T8N,R40E,Sec 27, SE¼,NW¼	EQ	0.8 miles above mouth
	SC-4	0.4	T8N,R40E,Sec 27,NW¼,NW¼	EQ	0.4 miles above mouth
	SC-5	0.2	T8N,R40E,Sec 27,NW¼,NW¼	T ^d ,F ^{c,d}	~0.2 miles above Spangler Ck mouth
Lewis Ck	LC-1	2.4	T8N,R40E,Sec 10, NE¼,NE¼	EQ	1.3 miles above Forest Service Line
	LC-2	2.2	T8N,R40E,Sec 10, NE¼,NE¼	EL	1.1 miles above Forest Service Line
	LC-3	1.9	T8N,R40E,Sec 3, SW¼,SE¼	EQ	0.8 miles above Forest Service Line
	LC-4	1.5	T8N,R40E,Sec 3, NE¼,SW¼	EL	0.4 miles above Forest Service Line
	LC-5	1.1	T8N,R40E,Sec 3, SW¼,SW¼	EQ	Forest Service Line
	LC-6	0.9	T8N,R40E,Sec 4,SE¼,SE¼	EQ ^d	0.2 miles below Forest Service Line
	LC-7	0.5	T8N,R40E,Sec 9,NW¼,NE¼	EQ ^d	0.4 miles above NF Touchet Rd brg
	LC-8	0.1	T8N,R40E,Sec 9,NW¼,NW¼	EQ,T ^d ,F ^{c,d}	~15ft above NF Touchet Rd
Jim Ck	JC-1	0.1	T9N,R40E,Sec 30, SW¼,NE¼	T,F ^c	~10ft below NF Touchet Rd
Wolf Fk	WF-1	11.9	T8N,R39E,Sec 36, SE¼,SW¼	EQ	Forest Service Line
	WF-2	11.3	T8N,R39E,Sec 36, SW¼,NE¼	EQ	0.6 miles below Forest Service Line
	WF-3	10.7	T8N,R39E,Sec 25, NW¼,SE¼	EQ	Tate Creek mouth
	WF-4	9.9	T8N,R39E,Sec 25, SW¼,SE¼	EQ	0.5 miles below Green Fly Canyon
	WF-5	9.8	T8N,R39E,Sec 25,SW¼,SE¼	T ^d	0.6 miles below Green Fly Canyon
	WF-6	8.6	T8N,R39E,Sec 13, SE¼,SE¼	EQ	2.1 miles below Tate Ck
	WF-7	4.5	T9N,R39E,Sec 36,NW¼,NW¼	T ^d ,F ^{c,d}	~15ft below 3 rd brg on Wolf Fk Rd
	WF-8	1.8	T9N,R39E,Sec 23,NW¼,NW¼	T ^d ,F ^{c,d}	Directly below Holmberg Rd brg
Green Fly	G-1	0.2	T8N,R39E,Sec 25, NE¼,SE¼	EL	0.2 miles above mouth
	G-2	0.0	T8N,R39E,Sec 25, SW¼,NE¼	EL	Mouth upstream
Whitney Ck	WH-1	0.3	T8N,R40E,Sec 7,NE¼,SW¼	T ^d	0.2 miles up Whitney Ck Rd
	WH-2	0.0	T8N,R40E, Sec 7, SW¼,SW¼	F ^c	~40 meters above mouth
Coates Ck	C-1	0.0	T8N,R40E, Sec 7, NW¼,SW¼	T,F ^c	Directly below Wolf Fk Rd
Robinson	RF-1	1.5	T9N,R39E, Sec 35, SW¼,NE¼	T	5ft above 3 rd brg on Robinson Fk Rd
Hatley	HG-1	1.5	T9N,R39E, Sec 1, SE¼,NW¼	EL	1.0 miles above 1 st brg
	HG-2	1.0	T9N,R39E, Sec 1, NW¼,SW¼	EL	0.5 miles above 1 st brg
	HG-3	0.5	T9N,R39E, Sec 2, SW¼,SE¼	EL	First brg

^a River Mile
^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow
^c Index discharge site
^d Same as previous year

Appendix A. Table 1. (Continued) Touchet River and tributary study sites, 2003.					
Stream	Site	RM^a	Location	Sample Type^b	Comments
Green Fk	GF-1	2.1	T7N,R38E,Sec 13,SW¼,SE¼	EQ	RM 1.3
	GF-2	1.3	T7N,R38E,Sec 13,NE¼,NE¼	EQ	3 rd site (1.2mi above lowest brg)
	GF-3	0.6	T7N,R38E,Sec 12,NE¼,SE¼	EQ	0.5mi above lowest bridge
	GF-4	0.1	T7N,R39E,Sec 7,NE¼,NW¼	EQ,T,F	Lowest bridge
	GF-5	0.0	T7N,R39E,Sec 7,NE¼,NW¼	F ^d	~25 feet above mouth
Burnt Fk	BF-1	3.3	T7N,R39E,Sec 16,NE¼,SE¼	EQ	RM 3.3
	BF-2	3.0	T7N,R39E,Sec 16,SW¼,NE¼	EQ	RM 3.0
	BF-3	1.6	T7N,R39E,Sec 17,NE¼,NW¼	EQ	Canyon Crossing
	BF-4	0.0	T7N,R39E,Sec 7,NE¼,NW¼	T,F ^d	~25 feet above mouth
SF Touchet River	SFT-1	15.3	T7N,R39E,Sec 6,SE¼,SW¼	F	~10 meters below Burnt Fk mouth
	SFT-2	15.2	T9N,R39E,Sec 6,SE¼,SW¼	EQ,T ^d	0.2 miles below Burnt Fk
	SFT-3	14.2	T7N,R39E,Sec 31,SE¼,SE¼	EQ	Directly above Griffen Fk mouth
	SFT-4	8.4	T8N,R39E,Sec 5,NW¼,SE¼	T ^d ,F ^{c,d}	~50 ft above Camp Nancy Lee brg
	SFT-5	0.5	T9N,R39E,Sec 5,NW¼,NE¼	T ^d ,F ^{c,d}	Gephart Rd
Touchet River	TR-1	53.8	T10N,R39E,Sec 30,SE¼,SE¼	T ^d	~20 ft below SRL Trap
	TR-2	53.5	T10N,R39E,Sec 30,NW¼,SE¼	F ^{c,d}	0.3 miles below SRL Trap
	TR-3	48.4	T9N,R38E,Sec4,SW¼,NW¼	T ^d	Behind Lewis and Clark State Park
	TR-4	40.5	T9N,R37E,Sec 8,SW¼,NW¼	T	~40 meters above Bolles brg
	TR-5	26.1	T9N,R35E,Sec 6,NW¼,SW¼	T	~10 meters below Lamar brg
	TR-6	11.5	T8N,R33E,Sec 23,NE¼,SW¼	T ^d	Below Simms Rd brg
	TR-7	2.0	T7N,R33E,Sec 27,NE¼,SW¼	T	Cummins Rd brg
SF Patit Ck	SFP-1	2.1	T10N,R40E,Sec 21,NW¼,SW¼	T ^d	10ft above 2 nd brg on SF Patit Rd
Patit Ck	P-1	2.4	T10N,R39E,Sec 17,SE¼,SE¼	T,F ^c	First brg on Patit Ck Rd
Dustin Hollow	DH-1	1.7	T9N,R38E,Sec 22,NE¼,NE¼	EL	1.7 miles above mouth
	DH-2	1.2	T9N,R38E,Sec 15,SE¼,SW¼	EL	1.2 miles above mouth
	DH-3	0.9	T9N,R38E,Sec 15,SW¼,SW¼	EL	~70 meters above Bundy Hollow
	DH-4	0.0	T9N,R38E,Sec16,NW¼,NE¼	EL	~100 meters above mouth
Bundy Hollow	BH-1	0.6	T9N,R38E,Sec 21,SE¼,NE¼	EL	0.6 miles above mouth
	BH-2	0.3	T9N,R38E,Sec 21,NE¼,NE¼	EL	0.3 miles above mouth
	BH-3	0.0	T9N,R38E,Sec 16,SE¼,SE¼	EL	~10 feet above mouth
Hogeye Hollow	H-1	3.0	T9N,R38E,Sec 15,SE¼,NE¼	EL	2.3 miles above Whiskey Ck Rd
	H-2	2.5	T9N,R38E,Sec 15,NE¼,NW¼	EL	1.8 miles above Whiskey Ck Rd
	H-3	1.6	T9N,R38E,Sec 16,NW¼,NE¼	EL	0.9 miles above Whiskey Ck Rd
	H-4	0.7	T9N,R38E,Sec 8,SW¼,SE¼	EL	Whiskey Ck Rd
	H-5	0.0	T9N,R38E,Sec 8,SW¼,SW¼	EL	Just above mouth
Whiskey Ck	WC-1	5.7	T9N,R38E,Sec 33,SE¼,NW¼	EL ^d ,F	Mouth of Alyward Trib
	WC-2	5.4	T9N,R38E,Sec 33,NE¼,NW¼	EL	4 th bridge on Whiskey Ck Rd
	WC-3	4.9	T9N,R38E,Sec 29,SE¼,SE¼	EL	3 rd bridge on Whiskey Ck Rd
	WC-4	4.1	T9N,R38E,Sec 29,NE¼,NE¼	EL	0.8 miles below 3 rd bridge
	WC-5	3.5	T9N,R38E,Sec 20,SE¼,NE¼	EL ^d	5 meters below 2 nd bridge
	WC-6	0.0	T9N,R37E,Sec 12,NE¼,SE¼	T ^d	~20 feet above mouth
^a River Mile ^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow ^c Index discharge site ^d Same as previous year					

Appendix A. Table 1. (Continued) Touchet River and tributary study sites, 2003					
Stream	Site	RM^a	Location	Sample Type^b	Comments
Alyward	A-1	2.5	T8N,R38E,Sec 11,NE¼,NE¼	EL	Top site
Trib to	A-2	1.9	T8N,R38E,Sec 3,SE¼,NE¼	EL	2 nd site
Whiskey Ck	A-3	0.9	T9N,R38E,Sec 34,SW¼,SW¼	EL	Powerlines
	A-4	0.0	T9N,R38E,Sec 33,SE¼,NW¼	EL,F	~10 feet above mouth
SF Coppei	SFC-1	4.8	T8N,R38E,Sec 33,NE¼,NW¼	EQ	Barns Ck
	SFC-2	3.5	T8N,R38E,Sec 29,NW¼,NE¼	EQ	1.3 miles below Barns Ck
	SFC-3	2.3	T8N,R38E,Sec 20,NE¼,NW¼	EQ	2.5 miles below Barns Ck
	SFC-4	0.9	T8N,R38E,Sec 18,NE¼,NW¼	EQ,F ^{c,d}	~10ft above 2 nd brg on SF Coppei Rd
	SFC-5	0.1	T8N,R38E,Sec 7,SW¼,NW¼	EQ	~15 meters above mouth
NF Coppei	NFC-1	3.9	T8N,R38E,Sec 22,SW¼,NW¼	EQ	RM 3.9
	NFC-2	2.0	T8N,R38E,Sec 17,NW¼,SE¼	EQ	RM 2.0
	NFC-3	0.9	T8N,R38E,Sec 8,NW¼,SW¼	EQ	Grain Elevator
	NFC-4	0.1	T8N,R38E,Sec 7,SE¼,NW¼	EQ,F ^{c,d}	Forks bridge
Coppei Ck	CO-1	7.5	T8N,R38E,Sec 7,NW¼,NW¼	EQ	~50 meters below SF Coppei mouth
	CO-2	6.1	T9N,R37E,Sec 36,SW¼,SE¼	EQ	1.0 mile above McCowan Rd
	CO-3	5.1	T9N,R37E,Sec 36,NE¼,NW¼	EQ,F ^{c,d}	~40 feet above McCowan Rd brg
	CO-4	3.9	T9N,R37E,Sec 23,SE¼,SE¼	EQ	1.2 miles below McCowan Rd
Whetstone	WN-1	15.1	T10N,R38E,Sec 17,NE¼,NE¼	EL	Thorn Hollow Rd brg
	WN-2	9.1	T10N,R37E,Sec 34,SE¼,NW¼	EL	McKay Alto Rd brg
	WN-3	8.2	T10N,R37E,Sec 33,SW¼,NE¼	EL	Bridge below Weller Canyon Rd
	WN-4	3.0	T10N,R36E,Sec 27,NE¼,SE¼	EL	Smith Springs Rd brg
	WN-5	0.6	T10N,R36E,Sec 32,SE¼,SE¼	EL	Hwy 124 bridge
^a River Mile ^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow ^c Index discharge site ^d Same as previous year					

Appendix A. Table 2. Walla Walla River and tributary study sites, 2003

Stream	Site	RM ^a	Location	Sample Type ^b	Comments
Walla Walla River	WW-1	40.0	T6N,R35E,Sec 13,SW¼,NE¼	EQ ^d ,F ^{c,d} ,S	Stateline
	WW-2	39.6	T6N,R35E,Sec 13,NE¼,NW¼	T ^d ,S	~30 meters above Pepper Rd brg
	WW-3	38.9	T6N,R35E,Sec 11,NE¼,SW¼	EQ ^d ,S	0.7 miles below Pepper Rd
	WW-4	38.1	T6N,R35E,Sec 38,SE¼,NE¼	EQ ^d ,S	~15 ft above Yellowhawk Ck mouth
	WW-5	37.1	T6N,R35E,Sec 3,SW¼,SE¼	EQ,F ^{c,d} ,S	0.5 miles above Burlingame Diversion
	WW-6	36.6	T6N,R35E,Sec 39,SW¼,NE¼	S	Directly below Burlingame Diversion
	WW-7	36.5	T6N,R35E,Sec 39,NE¼,NW¼	EL ^d ,T ^d ,F ^{c,d} ,S,G	~45 meters below Mojonner Rd
	WW-8	35.1	T6N,R35E,Sec 5,NE¼,NE¼	EQ	Below Last Chance Rd
	WW-9	34.0	T7N,R35E,Sec 38,SE¼,SW¼	T ^d ,F ^{c,d} ,S	Swegle Rd bridge
	WW-10	33.3	T7N,R35E,Sec 31, east edge	EQ,T ^d ,F ^{c,d} ,S,G ^d	0.4 miles above Detour Rd brg
	WW-11	29.4	T7N,R34E,Sec 34, NW¼,NW¼	EL ^d ,T ^d ,F ^{c,d} ,S	~50 meters above McDonald Rd brg
	WW-12	22.8	T7N,R33E,Sec 3, SE¼,NW¼	T ^d	~15 feet below Touchet Gardena brg
	WW-13	15.6	T7N,R32E,Sec 35,SE¼,SE¼	T	Byerley bridge
Yellowhawk Creek	YC-1	8.0	T7N,R36E,Sec 23, NE¼,NW¼	EQ ^d ,EL,T ^d ,F ^{c,d} ,G	~25 meters below Diversion
	YC-2	6.8	T7N,R36E,Sec 27,NW¼,NE¼	EQ,EL ^d	Carl St.
	YC-3	5.4	T7N,R36E,Sec 33,NW¼,NE¼	EL	~50 meters above Fern Ave.
	YC-4	5.2	T7N,R36E,Sec 33, SW¼,NW¼	EL	0.2 miles below Fern Ave
	YC-5	4.1	T7N,R36E,Sec 37,SW¼,NE¼	EQ ^d ,EL	3 rd and Yellowhawk St
	YC-6	3.5	T6N,R36E,Sec 37,NW¼,SE¼	EQ,EL	Plaza Way
	YC-7	0.1	T6N,R35E,Sec 38,NE¼,NE¼	EQ ^d ,T ^d ,F ^{c,d} ,G	~30 meters above the mouth
Caldwell Ck	CD-1	0.2	T7N,R36E,Sec 37,SE¼,NW¼	T ^d	Directly below 3 rd Ave culvert
Russell Ck	RC-1	0.2	T6N,R36E,Sec 37,SW¼,SW¼	T ^d	Under Plaza Way Rd brg
Cottonwood	CWC-1	4.4	T6N,R36E,Sec 10,NE¼,SE¼	T ^d	~10 feet below Hood Rd brg
	CWC-2	0.9	T6N,R36E,Sec 6,NE¼,SE¼	T ^d	~10 feet below Braden Rd brg
East Little Walla Walla	ELW-1	0.4	T6N,R35E,Sec 14,NW¼	T ^d	0.4 miles up Big Spring Branch
	ELW-2	0.3	T6N,R35E,Sec 11,SW¼	EL ^d	0.3 miles up Big Spring Branch
	ELW-3	1.3	T6N, R35E,Sec 11,SW¼	EL	Just above Big Spring Branch mouth
	ELW-4	0.4	T6N,R35E,Sec38,SW¼,NW¼	EL ^d	0.4 miles above mouth
	ELW-5	0.2	T6N,R35E,Sec 38,NE¼,NW¼	EL,T ^d ,F ^{c,d} ,G	0.2 miles above mouth
Garrison Ck	GC-1	9.1	T7N,R36E,Sec 23,NE¼,NW¼	EL,F ^{c,d}	~10 meters below Diversion
	GC-2	7.3	T7N,R36E,Sec 21,SE¼,SE¼	EL	Pioneer School
	GC-3	5.4	T7N,R36E,Sec 29,NW¼,SW¼	EL	Jefferson Park
	GC-4	4.2	T7N,R36E,Sec 31,NW¼,NW¼	EL	Fort Walla Walla
	GC-5	3.5	T7N,R35E,Sec 36,NE¼,SW¼	EL	Lions Park
	GC-6	0.3	T6N,R35E,Sec 3,SW¼,NW¼	EL,T ^d ,F ^{c,d}	Mission Rd
Mill Creek	MC-1	21.7	T6N,R38E,Sec 18, SW¼,NW¼	EQ ^d	Stateline
	MC-2	20.4	T6N,R37E,Sec 12,NW¼,NE¼	EQ ^d	1.3 miles below the stateline
	MC-3	19.1	T6N,R37E,Sec 2,NW¼,NE¼	T ^d	~40 meters above Wickersham bridge
	MC-4	19.1	T6N,R37E,Sec 2,NW¼,NE¼	EQ ^d	~15 meters below Wickersham bridge
	MC-5	17.0	T7N,R37E,Sec 26,SW¼,NW¼	EQ ^d	0.2 miles above Blue Ck mouth
	MC-6	16.4	T7N,R37E,Sec 22,SE¼,SE¼	EQ ^d	0.4 miles below Blue Ck mouth
	MC-7	14.7	T7N,R37E,Sec 16,SE¼,SW¼	EQ ^d	~30 meters below Seven Mile brg

^a River Mile
^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow; S-Snorkel; G-Flow Gauge
^c Index discharge site
^d Same as previous year

Appendix A. Table 2. (Continued) Walla Walla River and tributary study sites, 2003

Stream	Site	RM ^a	Location	Sample Type ^b	Comments	
Mill Creek (Cont.)	MC-8	12.8	T7N,R37E,Sec 18,NW¼,SE¼	T ^d ,F ^{c,d}	Under Five Mile brg	
	MC-9	12.8	T7N,R37E,Sec 18,NW¼,SE¼	EQ ^d	~30 meters below Five Mile brg	
	MC-10	11.5	T7N,R37E,Sec 13,Lower½,Donation	EL	Base of Bennington Lake Dam	
	MC-11	11.4	T7N,R36E,Sec 13,Lower½,Donation	EL	4 weirs below Bennington Dam	
	MC-12	11.4	T7N,R36E,Sec 13,Lower½,Donation	EL	Footbridge at Rooks Park	
	MC-13	11.3	T7N,R36E,Sec 13,Lower½,Donation	T ^d	~45 meters above cold return	
	MC-14	11.3	T7N,R36E,Sec 13,Lower½,Donation	T ^d	In the cold return	
	MC-15	11.3	T7N,R36E,Sec 13,Lower½,Donation	T ^d	~45 meters below the cold return	
	MC-16	10.5	T7N,R36E,Sec 23,NW¼,NE¼	EL ^d	~60 meters above the Yellowhawk Div.	
	MC-17	10.4	T7N,R36E,Sec 23,NE¼,NW¼	EL ^d	~30 meters below the Yellowhawk Div.	
	MC-18	10.0	T7N,R36E,Sec 23,NW¼,NW¼	T ^d ,EL ^d	First weir above Tausick Way brg	
	MC-19	9.0	T7N,R36E,Sec 21,NE¼,SE¼	EL ^d	Wilbur Ave.	
	MC-20	8.4	T7N,R36E,Sec 21,NW¼,SE¼	F ^{c,d} ,EL ^d	~15 meters above Roosevelt St	
	MC-21	7.9	T7N,R36E,Sec 21,NW¼,SW¼	EL ^d	Clinton St. bridge	
	MC-22	7.6	T7N,R36E,Sec 20,NE¼,SE¼	EL ^d	Otis St. bridge	
	MC-23	7.3	T7N,R36E,Sec 20,NW¼,SE¼	EL ^d	Spokane St to Palouse St	
	MC-24	7.2	T7N,R36E,Sec 20,NE¼,SW¼	EL ^d	Colville St to Spokane St	
	MC-25	6.7	T7N,R36E,Sec 19,SE¼,SE¼	F ^d ,EL ^d	9 th Ave bridge	
	MC-26	6.6	T7N,R36E,Sec 19,SE¼,SE¼	T ^d	~60 meters below 9 th Ave	
	MC-27	4.7	T7N,R35E,Sec 23,SE¼,SE¼	T ^d ,EQ ^d	~10 feet below Gose St	
	MC-28	2.8	T7N,R35E,Sec 27,NW¼,SW¼	EL	~200 meters above Wallula Rd brg	
	MC-29	2.7	T7N,R35E,Sec 28,NE¼,SE¼	EQ ^d ,F ^{c,d} ,G	~10 meters above Wallula Rd brg	
	MC-30	1.5	T7N,R35E,Sec 32,NE¼,NE¼	EQ ^d	0.2 miles below Last Chance Rd	
	MC-31	0.4	T7N,R35E,Sec 38,SE¼,NW¼	T ^d ,EQ ^d	~20 meters below Swegle Rd brg	
	Blue Ck	BLC-1	0.2	T7N,R37E,Sec 26,SE¼,NW¼	T ^d	Under Mill Ck Rd bridge
	Titus Ck	TC-1	4.3	T7N,R36E,Sec 16,NW¼,SW¼	EL	1.7 miles above Five Mile Rd
		TC-2	3.6	T7N,R36E,Sec 17,SW¼,NE¼	EL	1.0 miles above Five Mile Rd
		TC-3	2.6	T7N,R36E,Sec 18,SW¼,NE¼	EL,T ^d ,F ^{c,d}	Five Mile Rd
		TC-4	1.9	T7N,R36E,Sec 13,SE¼,NE¼	EL	0.7 miles below Five Mile Rd
		TC-5	1.6	T7N,R36E,Sec 13,SW¼,NE¼	EL	0.3 miles below Five Mile Rd
		TC-6	1.3	T7N,R36E,Sec 13,NW¼,SE¼	EL	Rooks Park
TC-7		0.2	T7N,R36E,Sec 23,NE¼,NW¼	EL ^d ,F ^c	Behind WWCC Nursing Building	
TC-8		0.1	T7N,R36E,Sec 23,NE¼,NW¼	EL ^d ,T	~10 feet above WWCC footbridge	
Cold Ck	CC-1	0.6	T7N,R35E,Sec 32, east edge	T ^d	~30 meters below Last Chance Rd	
Doan Ck	DNC-1	0.9	T7N,R35E,Sec 38, east edge	EL,T ^d ,F ^{c,d}	~0.4 miles below Last Chance Rd	
	DNC-2	0.8	T7N,R35E,Sec 38, east edge	EL	~0.5 miles below Last Chance Rd	
	DNC-3	0.6	T7N,R35E,Sec 38, east edge	EL	Pond outlet at Whitman Mission	
	DNC-4	0.6	T7N,R35E,Sec 38, east edge	EL	Whitman Mission pond to road	
West Little	WLW-1	4.5	T6N,R35E,Sec 9,NE¼,SW¼	T ^d ,F ^{c,d} ,EL ^d	0.5 miles up Valley Chapel Rd	
Walla Walla	WLW-2	3.4	T6N,R35E,Sec 5,SE¼,SE¼	EL ^d	Frog Hollow Rd downstream	
	WLW-3	0.8	T6N,R35E,Sec 37, north edge	T ^d ,F ^c ,EL	~5 feet above Swegle Rd	
	WLW-4	0.8	T6N,R35E,Sec 37, north edge	EL	~5 feet below Swegle Rd	
	WLW-5	0.5	T6N,R35E,Sec 38,SE¼,SW¼	EL ^d	WDFW property	

^a River Mile
^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow; S-Snorkel; G-Flow Gauge
^c Index discharge site
^d Same as previous year

Appendix A. Table 2. (Continued) Walla Walla River and tributary study sites, 2003					
Stream	Site	RM^a	Location	Sample Type^b	Comments
Walsh Ck	WAC-1	1.2	T6N,R35E,Sec 9,NE¼	T ^d ,F ^{c,d}	~20 feet above Valley Chapel Rd culvert
NF Dry Ck	NFD-1	2.9	T7N,R38E,Sec 15,NE¼,NW¼	EL	Top site
	NFD-2	2.9	T7N,R38E,Sec 15,NE¼,NW¼	EL	50m below top
	NFD-3	2.9	T7N,R38E,Sec 15,NE¼,NW¼	EL	5m below 2nd
	NFD-4	2.6	T7N,R38E,Sec 10,SE¼,SW¼	EL	RM 2.6
	NFD-5	2.5	T7N,R38E,Sec 10,NE¼,SW¼	EL	RM 2.5
	NFD-6	0.2	T7N,R38E,Sec 8,NW¼,SE¼	T ^d ,F ^{c,d}	0.25 miles up Scott Rd
Dry Ck	DRC-1	27.3	T8N,R37E,Sec 35,NW¼,NE¼	T ^d ,F ^{c,d}	0.5 miles up Biscuit Ridge Rd
	DRC-2	26.8	T8N,R37E,Sec 26,NW¼,SW¼	F ^c	Hwy 12 bridge in Dixie
	DRC-3	23.8	T7N,R37E,Sec 5,NW¼,NE¼	EL	Hwy 12 bridge west of Dixie
	DRC-4	17.4	T8N,R36E,Sec 21,SW¼,SE¼	T ^d	~40 meters above Lower Waitsburg Rd
	DRC-5	2.8	T7N,R34E,Sec 22,SW¼,SW¼	T ^d	~20 meters below Talbott Rd brg
Mud Ck (Dry Ck Tributary)	MDC-1	3.3	T8N,R38E,Sec 31,NE¼,SE¼	EL	2.6 miles above Hwy 12
	MDC-2	2.6	T8N,R38E,Sec 31,SW¼,NW¼	EL	1.9 miles above Hwy 12
	MDC-3	2.0	T8N,R37E,Sec 36,NW¼,NE¼	EL	1.3 miles above Hwy 12
	MDC-4	1.4	T8N,R37E,Sec 25,NE¼,SW¼	EL	Directly above old railroad culvert
	MDC-5	1.4	T8N,R37E,Sec 25,NE¼,SW¼	EL	Directly below old railroad culvert
	MDC-6	0.9	T8N,R37E,Sec 26,SE¼,NE¼	EL	First crossing on Mud Ck Rd
	MDC-7	0.3	T8N,R37E,Sec 26,NE¼,SW¼	EL,F	Across from Dixie School
	MDC-8	0.1	T8N,R37E,Sec 26,NE¼,SW¼	EL	0.1 miles above mouth
Mud Ck	MD-1	0.5	T7N,R43E,Sec 31,NW¼,SW¼	T ^d	Barney Rd bridge (Walla Walla Trib.)
Pine Ck	PC-1	4.8	T6N,R34E,Sec 17,SE¼,NW¼	T ^d	~10 feet below Stateline Rd brg
	PC-2	1.3	T6N,R33E,Sec 1,SW¼,NW¼	T ^d	Directly under Sand Pit Rd brg

^a River Mile
^b EQ-Quantitative Electrofishing (density estimates); EL-Qualitative Electrofishing; T-Temperature; F-Flow; S-Snorkel; G-Flow Gauge
^c Index discharge site
^d Same as previous year

Appendix B. Discharge Data, 2003

Appendix B. Table 1. Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
NF Touchet River	NFT-2	2.4	5/21	6.0	40.0	10:11	~15 meters below Bluewood Trib
		2.3	6/9	3.2	43.0	10:20	
		2.2	6/23	2.0	41.0	10:15	
		2.2	7/7	1.6	44.0	09:45	
		2.1	7/21	1.0	51.0	11:00	
		2.1	8/5	1.3	44.0	09:05	
		1.9	8/18	1.2	44.0	10:45	
		1.8	9/2	0.9	44.0	10:20	
		1.8	9/15	0.8	42.0	10:40	
		1.7	9/29	0.6	43.0	10:10	
		2.0	10/14	0.8	37.0	12:40	
		2.0	10/28	0.6	41.0	13:28	
		1.8	11/12	0.6	38.0	10:40	
Spangler Creek	SC-5	3.2	5/21	9.5	43.0	10:45	0.2 miles up Spangler Creek
		2.6	6/9	5.7	48.0	10:50	
		2.7	6/23	4.1	45.0	10:40	
		2.3	7/7	3.5	50.0	11:25	
		2.2	7/21	2.4	66.0	12:50	
		2.2	8/5	2.6	54.0	09:35	
		2.2	8/18	2.0	54.0	11:05	
		2.2	9/2	1.9	52.0	10:45	
		2.2	9/15	1.8	48.0	11:05	
		1.9	9/29	1.4	49.0	10:30	
		2.1	10/14	1.5	43.0	13:00	
		1.9	10/28	1.5	44.0	14:08	
		2.4	11/12	2.2	38.0	11:10	
NF Touchet River	NFT-9	5.3	5/21	29.6	43.0	11:05	0.2 miles below mouth of Spangler Ck
		4.9	6/9	15.4	50.0	11:05	
		4.8	6/23	11.1	47.0	11:00	
		4.7	7/7	8.8	51.0	10:50	
		4.9	7/21	7.4	68.0	13:20	
		4.9	8/5	6.0	55.0	09:50	
		4.9	8/18	5.4	55.0	11:20	
		4.8	9/2	4.2	53.0	11:05	
		4.7	9/15	5.3	50.0	11:20	
		3.3	9/29	4.2	49.0	10:40	
		4.8	10/14	4.0	43.0	13:15	
		4.6	10/28	3.8	44.0	13:55	
		4.5	11/12	5.8	38.0	11:40	
4.4	12/11	7.8	36.0	10:20			
Lewis Creek	LC-8	3.1	5/21	10.6	46.0	11:25	~15 feet above NF Touchet Rd
		3.0	6/9	7.0	52.0	11:25	
		3.0	6/23	5.7	50.0	11:40	
		2.9	7/7	4.8	55.0	11:15	
		3.1	7/21	4.4	67.0	13:50	
		3.0	8/5	5.4	54.0	10:10	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Lewis Creek (Cont).	LC-8	3.0	8/18	4.9	54.0	11:50	~15 feet above NF Touchet Rd
		3.1	9/2	4.7	52.0	11:20	
		3.1	9/15	5.1	50.0	11:35	
		2.9	9/29	4.1	50.0	10:52	
		3.1	10/14	4.7	46.0	13:30	
		3.2	10/30	4.6	40.0	09:25	
		3.1	11/12	5.0	42.0	12:05	
		2.9	11/26	4.2	41.0	10:30	
		3.3	12/11	5.2	40.0	10:40	
Jim Creek	JC-1	2.9	5/21	2.9	50.0	11:45	~10 feet below NF Touchet Rd
		2.7	6/9	1.7	61.0	11:40	
		2.6	6/23	1.6	54.0	11:20	
		2.9	7/7	1.3	61.0	11:40	
		2.7	7/21	1.0	77.0	14:10	
		2.3	8/5	1.3	61.0	10:30	
		2.4	8/18	1.1	62.0	12:30	
		2.3	9/2	1.0	58.0	11:35	
		2.4	9/15	1.3	54.0	11:55	
		2.3	9/29	1.1	52.0	12:05	
		2.7	10/14	1.4	48.0	13:45	
		2.5	10/30	0.8	40.0	09:45	
		2.7	11/12	1.3	41.0	12:25	
		2.6	11/26	1.2	39.0	10:50	
2.8	12/11	1.3	39.0	10:55			
NF Touchet River	NFT-10	8.6	5/21	63.2	48.0	12:00	~40 feet below Jim Ck mouth
Whitney Creek	WH-2	2.6	5/21	6.7	47.0	12:45	~40 meters above mouth
		2.4	6/9	4.5	56.0	12:22	
		2.2	6/23	3.9	52.0	12:23	
		2.2	7/7	3.5	55.0	12:20	
		2.4	7/21	3.1	68.0	14:50	
		2.3	8/5	3.4	55.0	11:05	
		2.4	8/18	3.2	56.0	12:55	
		2.4	9/2	2.4	54.0	12:10	
		2.4	9/15	2.9	51.0	12:25	
		2.1	9/29	2.6	51.0	11:30	
		2.0	10/14	2.7	47.0	14:10	
		1.9	10/30	2.8	41.0	10:15	
		2.0	11/12	2.9	43.0	13:15	
		2.0	11/26	2.3	40.0	11:20	
4.8	12/11	3.3	41.0	11:25			
Coates Creek	C-1	3.7	5/21	4.4	48.0	13:03	Directly below Wolf Fork Rd
		3.5	6/9	2.5	55.0	12:37	
		3.0	6/23	1.8	49.0	12:45	
		3.2	7/7	1.7	56.0	12:45	
		3.2	7/21	1.8	69.0	15:00	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Coates Creek (Cont).	C-1	3.1	8/5	2.0	56.0	11:15	Directly below Wolf Fork Rd
		2.9	8/18	1.7	56.0	13:10	
		3.2	9/2	1.2	55.0	12:20	
		3.2	9/15	1.8	51.0	12:40	
		3.1	9/29	1.9	51.0	11:40	
		2.7	10/14	1.6	46.0	14:20	
		3.0	10/30	1.7	40.0	10:30	
		3.2	11/12	2.4	41.0	13:25	
		3.0	11/26	1.4	39.0	11:30	
		3.3	12/11	2.9	40.0	11:40	
Wolf Fork	WF-7	7.3	5/21	43.7	50.0	13:24	~15 feet below 3 rd bridge on Wolf Fk Rd
		7.1	6/9	31.4	58.0	12:58	
		7.5	6/23	27.3	52.0	13:10	
		7.6	7/7	26.9	59.0	13:10	
		7.9	7/21	22.5	73.0	15:25	
		7.7	8/5	25.1	56.0	11:40	
		7.6	8/18	25.8	60.0	13:30	
		7.8	9/2	23.5	56.0	12:40	
		7.7	9/15	25.0	54.0	12:55	
		6.6	9/29	22.1	53.0	11:54	
		7.8	10/14	24.0	45.0	14:40	
		6.9	10/30	25.1	41.0	10:50	
		6.7	11/12	21.7	43.0	13:45	
		5.6	11/26	22.6	40.0	11:50	
6.6	12/11	27.8	40.0	12:00			
Wolf Fork	WF-8	9.6	5/21	49.8	53.0	13:45	Directly below Holmberg Rd bridge
		9.3	6/9	37.1	62.0	13:17	
		8.7	6/23	26.7	57.0	13:40	
		9.0	7/7	22.8	63.0	13:45	
		9.0	7/21	20.2	75.0	15:45	
		8.8	8/5	19.5	60.0	11:55	
		8.9	8/18	18.2	63.0	13:55	
		8.8	9/2	18.1	60.0	12:55	
		8.6	9/15	18.6	57.0	13:15	
		4.6	9/29	18.9	55.0	12:10	
		8.8	10/14	18.2	46.0	14:55	
		9.0	10/30	17.7	46.0	11:05	
		9.0	11/12	20.1	43.0	14:25	
8.8	11/26	19.1	41.0	12:05			
NF Touchet River	NFT-11	17.4	5/21	132.8	55.0	14:15	Above Baileysburg
		9.3	6/9	66.4	67.0	13:45	
		8.4	6/23	57.9	62.0	14:10	
		11.8	7/7	45.4	68.0	14:15	
		8.5	7/21	38.6	81.0	16:10	
		8.5	8/5	41.0	64.0	12:45	
		8.3	8/18	34.3	70.0	14:20	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
NF Touchet River (Cont.)	NFT-11	8.2	9/2	37.6	65.0	13:20	Above Baileysburg
		7.7	9/15	40.7	61.0	13:40	
		7.9	9/29	37.6	60.0	12:30	
		8.8	10/14	44.7	51.0	15:15	
		9.1	10/30	48.2	45.0	11:35	
		9.5	11/12	57.8	45.0	14:50	
		12.7	12/11	70.6	41.0	12:25	
Green Fork	GF-4	3.5	8/6	0.8	66.0	16:35	Lowest Bridge
Green Fork	GF-5	1.9	9/10	0.3	56.0	13:28	~25 meters above mouth
		2.0	9/22	0.1	50.0	11:02	
		1.8	10/1	0.0	52.0	13:08	actual flow was less than 0.1 cfs
		2.3	10/16	0.8	48.0	14:25	
Burnt Fork	BF-4	4.2	8/6	2.3	62.0	16:50	~25 feet above mouth
		5.7	9/10	2.4	53.0	13:33	
		5.6	9/22	1.7	47.0	10:55	
		4.1	10/1	1.7	51.0	13:00	
		5.6	10/16	3.3	44.0	14:15	
SF Touchet River	SFT-1	5.4	8/6	2.3	62.0	17:05	~10 meters below Burnt Fk mouth
		3.8	9/10	1.9	54.0	13:40	
		3.4	9/22	1.4	48.0	10:50	
		3.7	10/1	1.4	52.0	12:55	
		4.3	10/16	2.1	47.0	14:40	
SF Touchet River	SFT-4	16.2	5/21	28.6	53.0	14:45	~50 feet above Camp Nancy Lee brg
		8.4	6/9	13.9	68.0	14:17	
		7.9	6/23	8.4	61.0	14:40	
		7.3	7/7	4.1	70.0	14:50	
		7.0	7/21	2.5	79.0	16:40	
		6.7	8/5	2.2	67.0	13:15	
		6.7	8/18	1.4	72.0	14:55	
		6.7	9/2	0.9	70.0	13:50	
		6.8	9/15	2.1	65.0	14:10	
		3.1	9/29	3.7	63.0	13:00	
		6.8	10/14	3.2	52.0	15:40	
		3.1	10/30	5.2	50.0	12:05	
		3.7	11/12	7.2	44.0	15:15	
		7.0	11/26	5.1	41.0	12:40	
5.8	12/11	17.4	41.0	12:50			
SF Touchet River	SFT-5	8.5	5/21	26.0	57.0	15:13	Gephart Rd
		8.6	6/9	13.1	72.0	14:44	
		8.8	6/23	6.7	67.0	15:05	
		6.5	7/7	3.2	73.0	15:25	
		8.4	7/21	1.0	80.0	17:10	
		5.2	8/5	1.9	69.0	13:40	
		2.2	8/18	0.2	73.0	15:15	
		4.0	9/2	0.1	68.0	14:10	
		5.7	9/15	2.0	66.0	14:35	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.								
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments	
SF Touchet River (Cont.)	SFT-5	5.6	9/29	1.6	67.0	13:20	Gephart Rd	
		6.3	10/14	2.9	53.0	16:05		
		5.6	10/30	3.8	48.0	12:30		
		6.3	11/12	8.0	46.0	15:45		
		6.7	11/26	6.2	42.0	13:05		
		8.4	12/11	18.0	41.0	13:15		
Touchet River	TR-2	20.5	5/21	140.8	55.0	15:35	0.3 miles below SRL trap	
		19.8	6/9	80.2	70.0	15:22		
		19.3	6/23	62.4	65.0	15:45		
		19.3	7/7	46.7	72.0	16:25		
		19.7	7/21	36.8	82.0	17:45		
		18.8	8/5	41.3	68.0	14:20		
		18.4	8/18	37.5	72.0	15:55		
		18.0	9/2	36.9	68.0	14:45		
		19.1	9/15	43.6	62.0	15:10		
		17.8	9/29	40.5	62.0	13:50		
		19.3	10/14	48.4	51.0	16:35		
		17.5	10/30	52.9	46.0	13:10		
		18.6	11/12	67.6	45.0	16:25		
		17.5	11/26	56.4	43.0	13:30		
		17.5	12/11	92.0	41.0	13:45		
Patit Creek	P-1	3.1	5/30	3.6	63.0	12:10	First bridge on Patit Ck Rd	
		3.2	6/9	1.5	69.0	13:04		
		2.2	6/23	0.6	60.0	15:30		
		2.7	7/7	0.3	65.0	16:05		
		3.0	7/21	0.2	78.0	17:30		
		1.9	8/5	0.2	62.0	14:00		
		2.1	8/18	0.2	62.0	15:35		
		1.6	9/2	0.1	58.0	14:25		
		2.9	9/15	0.1	57.0	14:50		
		N/A	9/29	N/A	N/A	N/A		no measurable flow
		4.2	10/14	0.1	49.0	16:15		
N/A	10/30	N/A	N/A	N/A	no measurable flow from 10-30 to 12-11			
Whiskey Creek	W-1	4.5	4/9	18.7	46.0	13:40	Mouth of Alyward Tributary	
Alyward Trib	A-4	2.8	4/9	12.0	46.0	13:35	~10ft above mouth	
SF Coppei Creek	SFC-4	2.1	6/10	1.6	63.0	15:00	~10 feet above 2 nd brg on SF Coppei Rd	
		2.1	6/25	1.7	64.0	13:40		
		2.3	7/7	0.9	68.0	17:00		
		2.3	7/21	1.0	66.0	08:45		
		2.3	8/5	1.0	68.0	14:55		
		2.3	8/18	1.3	63.0	09:15		
		2.4	9/2	1.4	60.0	08:45		
		2.2	9/15	1.5	56.0	09:35		
		1.9	9/29	1.4	55.0	08:50		
		2.3	10/14	1.6	48.0	11:20		

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
SF Coppei Creek (Cont.)	SFC-4	2.3	10/28	1.6	51.0	11:40	~10 feet above 2 nd brg on SF Coppei Rd
		2.6	11/12	1.8	42.0	09:00	
		2.3	11/26	2.0	39.0	09:45	
		2.5	12/11	4.1	38.0	08:50	
NF Coppei Creek	NFC-4	3.0	6/10	1.3	63.0	15:19	~10 meters above Forks bridge
		3.1	6/25	1.4	63.0	13:50	
		2.8	7/7	0.6	68.0	17:15	
		3.1	7/21	0.9	65.0	09:00	
		3.1	8/5	0.7	67.0	15:10	
		3.0	8/18	1.2	62.0	09:25	
		2.9	9/2	1.3	60.0	09:00	
		3.0	9/15	1.4	56.0	09:25	
		1.7	9/29	1.2	55.0	09:00	
		3.1	10/14	1.2	47.0	11:30	
		3.3	10/28	1.2	54.0	11:55	
		3.1	11/12	2.1	43.0	09:20	
		3.3	11/26	1.6	39.0	09:59	
3.3	12/11	2.8	39.0	09:05			
Coppei Creek	MC-3	2.9	6/10	2.5	65.0	15:32	~40 feet above McCowan Rd brg
		2.6	6/25	2.3	69.0	14:00	
		2.9	7/7	1.3	75.0	17:30	
		3.2	7/21	1.4	68.0	09:30	
		2.7	8/5	1.4	71.0	15:25	
		2.8	8/18	1.2	64.0	09:40	
		3.1	9/2	1.2	61.0	09:20	
		3.2	9/15	1.8	57.0	09:00	
		1.8	9/29	2.0	56.0	09:10	
		3.9	10/14	1.9	49.0	11:45	
		3.9	10/28	2.6	55.0	12:10	
		3.3	11/12	3.4	43.0	09:40	
4.3	11/26	3.6	39.0	10:20			
3.8	12/11	6.7	38.0	09:25			
Walla Walla River	WW-1	20.4	5/29	129.2	62.0	12:20	Stateline
		15.6	6/10	18.7	63.0	11:34	
		14.7	6/24	11.8	66.0	12:50	
		15.3	7/7	12.0	72.0	14:12	
		14.6	7/21	9.0	73.0	12:55	
		13.9	8/6	16.7	71.0	14:55	
		14.1	8/19	14.6	71.0	14:00	
		11.2	9/2	16.2	64.0	12:14	
		11.0	9/15	12.4	64.0	12:20	
		11.5	9/29	23.9	58.0	12:40	
		11.1	10/13	19.0	54.0	12:45	
		11.1	10/29	27.3	50.0	12:05	
11.4	11/13	26.1	44.0	11:40			

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Walla Walla River (Cont.)	WW-1	11.5	11/24	19.1	43.0	11:50	Stateline
		11.8	12/8	85.7	44.0	12:28	
Yellowhawk Creek	YC-1	5.0	5/29	34.8	66.0	13:40	~25 meters below Diversion
		5.1	6/10	25.5	65.0	12:48	
		4.7	6/25	35.5	66.0	11:13	
		4.8	7/7	24.9	75.0	15:52	
		5.1	7/21	18.5	81.0	14:40	
		4.7	8/6	20.9	77.0	16:05	
		4.8	8/19	21.4	75.0	15:05	
		4.7	9/2	12.3	68.0	13:35	
		5.7	9/15	15.9	64.0	13:35	
		5.0	9/29	22.1	62.0	13:50	
		4.8	10/13	25.7	56.0	13:50	
		4.7	10/29	23.5	54.0	13:25	
		4.9	11/13	30.5	43.0	13:10	
		4.8	11/24	33.4	43.0	13:10	
5.2	12/8	30.7	44.0	14:21			
Yellowhawk Creek	YC-7	4.8	5/29	43.3	62.0	12:00	~30 meters above mouth
		4.2	6/4	36.7	63.0	12:40	
		4.1	6/10	37.0	62.0	11:22	
		7.6	6/24	33.2	62.0	11:15	
		7.6	6/25	33.4	62.0	09:40	
		7.4	7/7	28.2	70.0	13:30	
		7.5	7/21	19.7	74.0	12:35	
		7.6	8/6	23.9	69.0	14:30	
		7.5	8/19	17.1	70.0	13:30	
		7.6	9/2	18.0	63.0	11:50	
		8.4	9/15	19.4	60.0	12:05	
		8.4	9/29	24.3	57.0	12:20	
		7.8	10/13	30.3	52.0	12:30	
		7.6	10/29	29.3	51.0	11:45	
7.6	11/13	38.2	42.0	11:05			
7.7	11/24	35.5	42.0	11:35			
7.7	12/8	42.2	44.0	12:08			
Walla Walla River	WW-5	16.6	5/29	182.9	61.0	11:42	0.5 miles above Burlingame diversion
		16.3	6/10	55.5	66.0	11:13	
		16.0	6/24	41.0	67.0	14:10	
		15.7	7/7	55.4	71.0	13:15	
		16.7	7/21	43.0	73.0	12:20	
		16.4	8/6	53.7	70.0	14:15	
		16.6	8/19	44.1	70.0	13:10	
		17.6	9/2	44.3	62.0	11:39	
		19.5	9/15	52.3	61.0	11:50	
		16.4	9/29	50.0	57.0	12:05	
		16.5	10/13	64.6	54.0	12:20	
16.8	10/29	66.6	52.0	11:30			

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Walla Walla River (Cont.)	WW-5	17.0	11/13	69.4	42.0	10:45	0.5 miles above Burlingame diversion
		16.8	11/24	66.3	42.0	11:20	
East Little Walla Walla	ELW-5	3.8	5/29	12.6	60.0	10:50	0.2 miles above mouth
		4.1	6/4	14.1	61.0	12:10	
		3.9	6/10	10.6	60.0	10:36	
		3.7	6/24	13.5	59.0	11:42	
		3.1	7/7	13.6	65.0	12:20	
		3.8	7/21	9.8	65.0	11:40	
		3.5	8/6	11.6	62.0	12:35	
		3.4	8/19	11.9	61.0	11:45	
		3.4	9/2	11.0	56.0	10:40	
		5.0	9/15	17.3	56.0	11:00	
		4.2	9/29	17.7	53.0	11:25	
		4.1	10/13	16.6	53.0	11:45	
		4.1	10/29	13.4	49.0	10:45	
		3.9	11/13	11.5	43.0	09:40	
3.4	11/24	11.3	45.0	10:40			
3.8	12/8	11.8	46.0	11:21			
Walla Walla River	WW-7	23.9	5/29	100.2	61.0	11:10	~45 meters below Mojonner Rd
		15.7	6/4	23.9	63.0	11:50	
		16.4	6/10	36.4	63.0	10:49	
		14.5	6/24	31.7	62.0	12:00	
		12.5	7/7	45.3	69.0	12:40	
		15.4	7/21	37.3	72.0	12:00	
		13.6	8/6	57.1	71.0	13:50	
		13.8	8/19	38.7	69.0	12:45	
		14.0	9/2	42.5	62.0	11:00	
		16.4	9/15	45.8	59.0	11:25	
		14.2	9/29	46.9	57.0	11:45	
		13.8	10/13	38.9	54.0	12:00	
		8.7	10/29	34.5	52.0	11:05	
		8.2	11/13	23.5	43.0	10:05	
8.0	11/24	18.5	43.0	11:10			
9.9	12/8	61.1	44.0	11:49			
Garrison Creek	GC-1	3.2	5/29	4.4	66.0	13:30	~10 meters below diversion
		3.3	6/10	1.3	65.0	12:31	
		3.3	6/25	2.5	67.0	11:24	
		3.0	7/7	3.7	78.0	15:40	
		2.8	7/21	2.9	81.0	14:20	
		2.7	8/6	2.7	77.0	15:55	
		2.9	8/19	3.2	75.0	14:55	
		3.1	9/2	2.5	68.0	13:25	
		3.5	9/15	2.6	64.0	13:30	
		3.2	9/29	2.8	62.0	13:45	
		3.2	10/13	4.3	56.0	13:50	
3.2	10/29	3.1	54.0	13:15			

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Garrison Creek (Cont.)	GC-1	3.2	11/13	4.0	44.0	13:00	~10 meters below diversion
		3.3	11/24	4.4	43.0	13:10	
		3.3	12/8	3.9	44.0	14:11	
Garrison Creek	GC-6	1.9	5/29	4.5	67.0	11:25	Mission Rd
		1.8	6/10	2.5	64.0	10:57	
		1.7	6/24	0.8	64.0	12:15	
		1.5	7/7	0.8	73.0	13:00	
		1.7	8/6	0.6	68.0	13:20	
		1.7	8/19	1.3	68.0	12:30	
		1.1	9/2	1.1	64.0	11:10	
		2.5	9/15	2.1	62.0	11:40	
		2.2	9/29	1.5	59.0	11:55	
		2.5	10/13	2.5	58.0	12:05	
		2.1	10/29	0.6	56.0	11:15	
		3.3	11/13	1.2	48.0	10:25	
		2.8	11/24	3.4	46.0	10:55	
2.2	12/8	2.4	48.0	11:35			
Walla Walla River	WW-9	19.1	5/29	123.9	62.0	10:00	Swegle Rd
		17.9	6/10	48.4	63.0	10:06	
		17.4	6/24	36.2	62.0	10:25	
		17.8	7/7	41.0	68.0	11:00	
		18.2	7/21	42.3	72.0	10:40	
		17.6	8/6	54.3	69.0	11:35	
		17.6	8/19	40.4	68.0	10:50	
		18.0	9/2	38.7	62.0	10:10	
		20.5	9/15	54.8	59.0	10:25	
		17.6	9/29	56.2	56.0	10:45	
		17.4	10/13	40.8	64.0	11:10	
		17.2	10/29	33.0	52.0	09:55	
		19.0	11/12	49.8	44.0	11:27	
		16.9	11/24	23.9	42.0	10:00	
21.1	12/8	79.5	44.0	10:32			
Mill Creek	MC-8	13.4	5/29	82.6	66.0	14:10	Five Mile Rd
		12.0	6/10	46.1	64.0	13:53	
		11.1	6/25	48.0	64.0	12:25	
		10.8	7/7	39.3	70.0	16:50	
		10.9	7/21	29.6	75.0	15:20	
		10.6	8/6	27.3	71.0	17:05	
		10.9	8/19	24.6	69.0	15:40	
		11.0	9/2	27.5	65.0	14:11	
		12.6	9/15	29.1	60.0	14:10	
		11.0	9/29	31.1	59.0	14:30	
		11.0	10/13	36.3	56.0	14:25	
		11.1	10/29	33.9	50.0	14:00	
		11.6	11/13	39.4	44.0	14:25	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.								
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments	
Mill Creek (Cont.)	MC-8	11.7	11/24	43.2	44.0	13:45	Five Mile Rd	
		13.8	12/8	108.1	44.0	14:58		
Titus Creek	TC-3	1.2	5/29	2.4	65.0	14:20	Five Mile Rd	
		1.0	6/10	1.1	62.0	13:32		
		1.5	6/25	1.9	61.0	12:15		
		0.9	7/7	0.6	72.0	16:46		
		1.1	7/21	6.3	74.0	15:30		
		1.5	8/6	5.4	70.0	17:15		
		1.2	8/19	5.5	68.0	15:50		
		1.2	9/2	5.9	62.0	13:59		
		1.0	9/15	5.0	58.0	14:05		
		1.0	9/29	4.7	57.0	14:20		
		N/A	10/13	N/A	N/A	14:15		Stream was dry
		N/A	10/29	N/A	N/A	13:50		Stream was dry
		1.2	11/13	0.3	43.0	14:05		
N/A	11/24	N/A	N/A	13:40	Stream was dry			
1.1	12/8	3.5	44.0	14:50				
Titus Creek	TC-7	2.4	5/29	2.1	65.0	13:55	Walla Walla Community College	
		2.0	6/10	1.0	61.0	13:15		
		2.0	6/25	0.9	60.0	11:40		
		2.1	7/7	0.9	71.0	16:30		
		2.2	7/21	1.4	69.0	14:45		
		3.3	8/6	1.3	65.0	16:35		
		2.2	8/19	1.5	64.0	15:25		
		2.2	9/2	1.6	61.0	13:47		
		2.8	9/15	1.8	60.0	13:50		
		2.3	9/29	1.2	59.0	14:10		
		2.2	10/13	0.9	58.0	14:10		
		2.0	10/29	0.2	57.0	13:40		
		2.1	11/13	0.2	54.0	13:40		
1.8	11/24	0.4	44.0	13:30				
2.3	12/8	0.7	49.0	14:34				
Mill Creek	MC-20	2.9	5/29	36.8	75.0	13:06	~15 meters above Roosevelt St	
		2.7	6/10	6.3	79.0	12:19		
		N/A	6/25	N/A	N/A	N/A		No measurable flow--Dry 6-25 to 10-29
		N/A	11/13	N/A	43.0	12:35		No measurable flow
		N/A	11/24	N/A	N/A	13:00		No measurable flow
13.0	12/8	59.0	45.0	13:49				
Mill Creek	MC-25	3.4	5/29	52.1	72.0	12:45	9 th Ave	
		2.7	6/10	7.1	65.0	11:53		
		2.7	6/24	3.8	72.0	14:40		
		2.3	6/25	1.9	65.0	10:03		
		2.8	7/7	4.3	74.0	15:08		
		2.8	7/21	2.6	78.0	13:30		
		2.8	8/6	4.5	74.0	15:20		
		2.6	8/19	3.7	73.0	14:25		

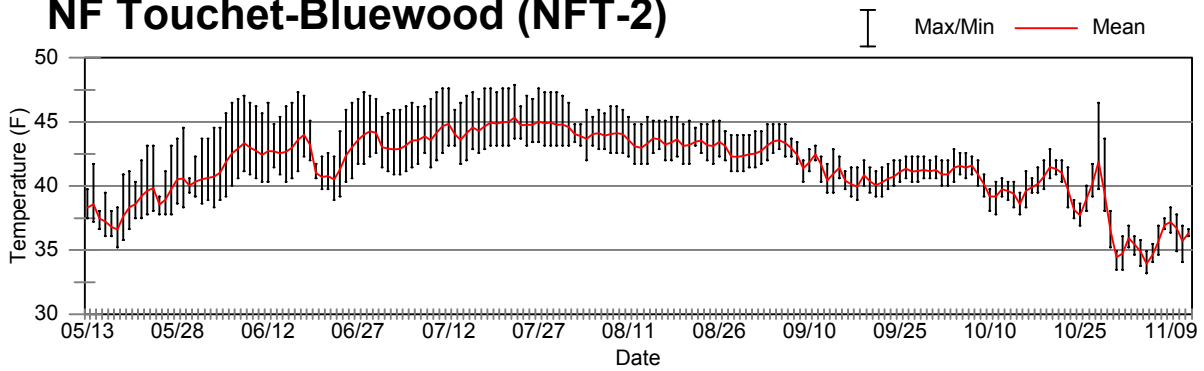
Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Mill Creek (Cont.)	MC-25	2.5	9/2	2.7	64.0	12:53	9 th Ave
		2.3	9/15	3.8	60.0	13:00	
		2.6	9/29	2.7	60.0	13:05	
		2.8	10/13	3.1	58.0	13:25	
		2.7	10/29	4.4	56.0	12:45	
		2.7	11/13	4.0	50.0	12:20	
		2.7	11/24	5.7	47.0	12:40	
		4.0	12/8	62.4	46.0	13:17	
Mill Creek	MC-29	8.7	5/29	50.3	66.0	08:55	~10 meters above Wallula Rd bridge
		7.5	6/4	17.1	72.0	13:00	
		7.2	6/10	8.5	63.0	09:15	
		6.9	6/24	4.8	60.0	09:00	
		6.7	6/25	5.1	63.0	09:10	
		6.5	7/7	5.0	64.0	09:30	
		6.6	7/21	3.8	73.0	13:45	
		6.9	8/6	4.1	65.0	10:15	
		7.0	8/19	3.5	64.0	09:10	
		7.0	9/2	3.6	60.0	09:00	
		7.3	9/15	5.4	58.0	09:15	
		6.9	9/29	4.9	58.0	09:40	
		7.2	10/13	6.2	56.0	10:20	
		6.9	10/29	9.0	56.0	08:55	
		7.8	11/13	13.0	49.0	09:10	
7.9	11/24	12.0	48.0	09:00			
8.8	12/8	74.4	44.0	09:26			
Doan Creek	DNC-1	1.2	5/29	1.9	63.0	10:08	~0.4 miles below Last Chance Rd
		1.3	6/10	1.6	61.0	09:59	
		1.2	6/24	0.7	58.0	10:05	
		1.3	7/7	0.9	66.0	10:40	
		1.2	7/21	0.6	66.0	11:00	
		0.9	8/6	0.4	65.0	11:15	
		0.9	8/19	0.3	61.0	10:30	
		1.4	9/2	0.8	57.0	09:55	
		1.0	9/15	0.8	55.0	10:15	
		1.0	9/29	0.6	54.0	10:30	
		1.1	10/13	0.7	53.0	10:55	
		1.1	10/28	0.9	54.0	10:10	
		1.3	11/12	0.8	44.0	11:06	
1.0	11/24	0.9	46.0	09:50			
West Little Walla Walla	WLW-1	1.7	5/29	1.9	64.0	10:35	0.5 miles up Valley Chapel Rd
		1.3	6/10	0.3	62.0	10:27	
		1.5	6/24	2.0	61.0	10:52	
		1.7	7/7	0.8	65.0	12:00	
		1.4	7/21	0.5	72.0	11:25	
		1.1	8/6	1.3	67.0	12:05	
		1.4	8/19	0.2	72.0	11:30	

Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
West Little Walla Walla (Cont.)	WLW-1	0.0	9/2	N/A	N/A	N/A	0.5 miles up Valley Chapel Rd
		1.3	9/15	0.9	59.0	10:50	
		1.6	9/29	1.2	56.0	11:05	
		1.8	10/13	2.6	54.0	11:25	
		1.7	10/29	2.6	52.0	10:20	
		1.6	11/12	1.6	48.0	12:03	
		1.7	11/24	1.6	46.0	10:25	
		1.8	12/8	2.0	48.0	11:00	
Walsh Creek	WAC-1	1.9	5/29	3.1	65.0	10:26	~ 20 feet above Valley Chapel Rd culvert
		0.8	6/10	0.4	64.0	10:20	
		0.9	6/24	1.0	64.0	10:42	
		1.4	7/7	1.9	72.0	11:40	
		0.7	7/21	0.4	76.0	11:20	
		0.8	8/6	0.8	70.0	12:00	
		0.6	8/19	0.3	69.0	11:15	
		0.8	9/2	0.3	62.0	10:15	
		0.7	9/15	0.3	59.0	10:45	
		0.8	9/29	0.5	57.0	10:55	
		1.1	10/13	0.5	54.0	11:20	
		0.7	10/29	0.3	50.0	10:10	
		0.6	11/12	0.1	46.0	11:52	
		0.8	11/24	0.5	43.0	10:20	
		0.9	12/8	0.7	46.0	10:51	
West Little Walla Walla	WLW-3	1.2	6/10	0.5	62.0	10:13	~5 feet above Swegle Rd
		N/A	6/24	N/A	N/A	N/A	Dry or not measurable from 6/24 to 11/12
		1.4	11/24	1.3	40.0	10:10	
		2.0	12/8	3.0	44.0	10:40	
Walla Walla River	WW-10	14.2	5/29	161.6	64.0	09:40	0.4 miles above Detour Rd bridge
		11.5	6/4	43.6	62.0	11:05	
		11.3	6/10	47.7	64.0	09:44	
		11.5	6/24	47.5	63.0	09:50	
		11.3	7/7	54.4	66.0	10:15	
		11.4	7/21	38.2	73.0	10:30	
		12.0	8/6	53.6	69.0	11:00	
		11.7	8/19	41.7	67.0	10:10	
		11.5	9/2	46.3	62.0	09:43	
		14.1	9/15	63.6	59.0	09:50	
		11.8	9/29	59.4	57.0	10:15	
		11.5	10/13	45.7	54.0	10:45	
		11.7	10/29	41.7	52.0	09:35	
		12.0	11/12	70.6	45.0	10:48	
		11.6	11/24	33.3	44.0	09:35	
		14.9	12/8	150.7	44.0	10:15	
Walla Walla River	WW-11	17.3	5/29	146.9	65.0	09:20	~50 meters above McDonald Rd bridge
		8.5	6/10	21.1	64.0	09:33	
		9.4	6/24	23.3	65.0	09:27	

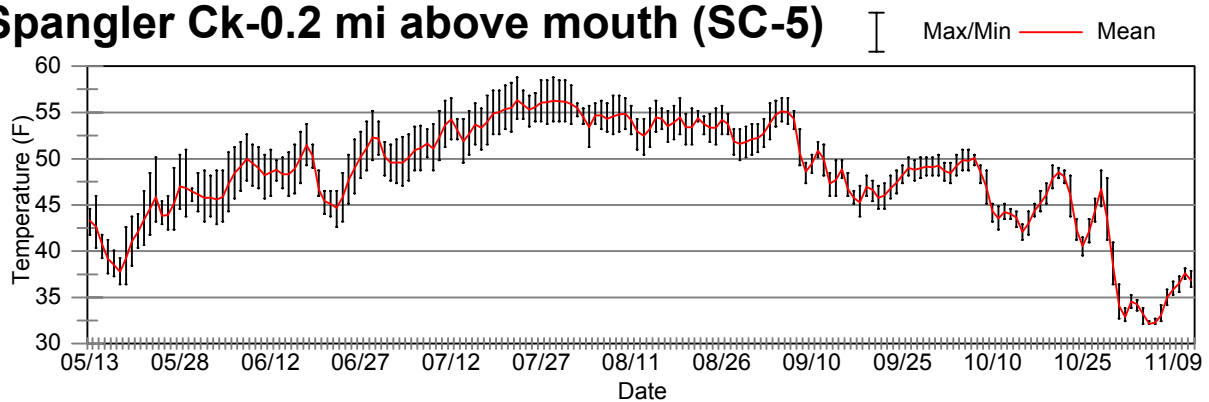
Appendix B. Table 1. (Continued) Manual discharge (cfs) measurements 2003.							
Stream	Site	Width	Date	CFS	Temp (F)	Time	Comments
Walla Walla River (Cont.)	WW-11	6.8	7/7	9.8	68.0	10:00	~50 meters above McDonald Rd bridge
		8.0	7/21	12.0	78.0	10:10	
		9.5	8/6	24.7	72.0	10:35	
		8.9	8/19	12.5	70.0	09:35	
		9.3	9/2	16.7	67.0	09:30	
		11.2	9/15	32.6	62.0	09:35	
		10.3	9/29	44.4	58.0	09:55	
		12.9	10/13	34.5	55.0	10:35	
		11.9	10/29	26.9	52.0	09:15	
		13.0	11/12	55.5	44.0	10:21	
		11.1	11/24	21.3	44.0	09:15	
		14.3	12/8	137.5	44.0	09:48	
NF Dry Creek	NFD-6	2.7	5/29	2.0	64.0	14:45	0.25 miles up Scott Rd
		2.4	6/10	1.2	61.0	14:20	
		2.4	6/25	1.1	59.0	13:00	
		2.3	7/7	0.8	68.0	17:53	
		2.5	7/21	0.7	67.0	16:05	
		2.5	8/6	0.7	62.0	17:40	
		2.7	8/19	0.7	61.0	16:15	
		2.4	9/2	0.5	59.0	14:41	
		3.0	9/15	0.6	53.0	14:45	
		2.5	9/29	0.6	54.0	15:15	
		2.7	10/13	0.6	51.0	15:00	
		2.5	10/28	0.6	51.0	11:15	
		3.7	11/13	0.9	44.0	15:05	
2.7	11/24	0.9	44.0	14:20			
Dry Creek	DRC-1	4.2	5/29	5.1	70.0	15:00	0.5 miles up Biscuit Ridge Rd
		3.9	6/10	2.6	65.0	14:40	
		3.9	6/25	2.1	66.0	13:20	
		3.5	7/7	N/A	73.0	17:22	
Dry Creek	DRC-2	2.8	8/6	1.6	63.0	08:50	Hwy 12 bridge in Dixie
		2.8	8/19	0.9	70.0	16:40	
		3.3	9/2	1.2	66.0	14:58	
		3.8	9/15	1.2	59.0	14:30	
		3.0	9/29	1.2	59.0	15:00	
		3.2	10/13	2.0	53.0	14:45	
		3.3	10/28	1.6	53.0	11:00	
		3.4	11/13	2.1	41.0	14:50	
		3.5	11/24	2.9	41.0	14:35	
		4.0	12/8	8.8	43.0	15:15	
Mud Ck	MDC-7	1.4	10/10	0.3	50.0	09:52	Across from Dixie School

Appendix C. Stream Temperature Graphs (EF), 2003

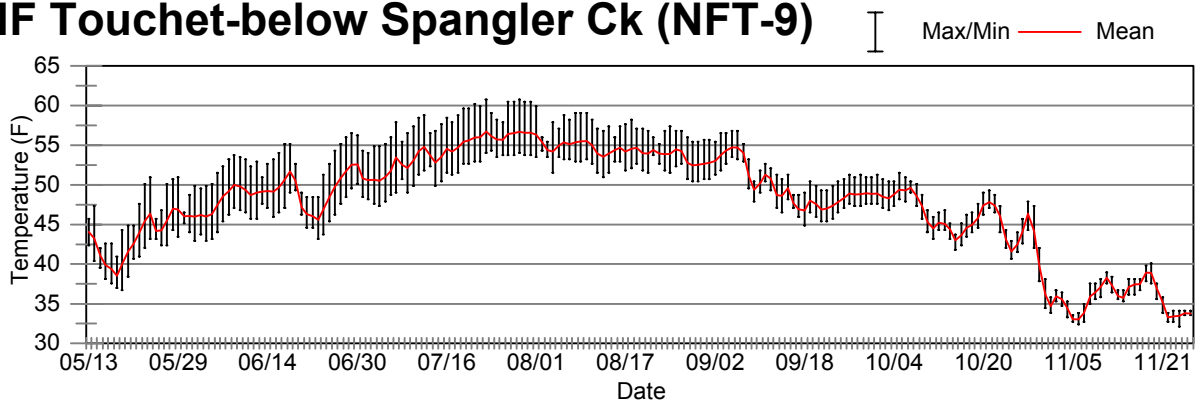
NF Touchet-Bluewood (NFT-2)



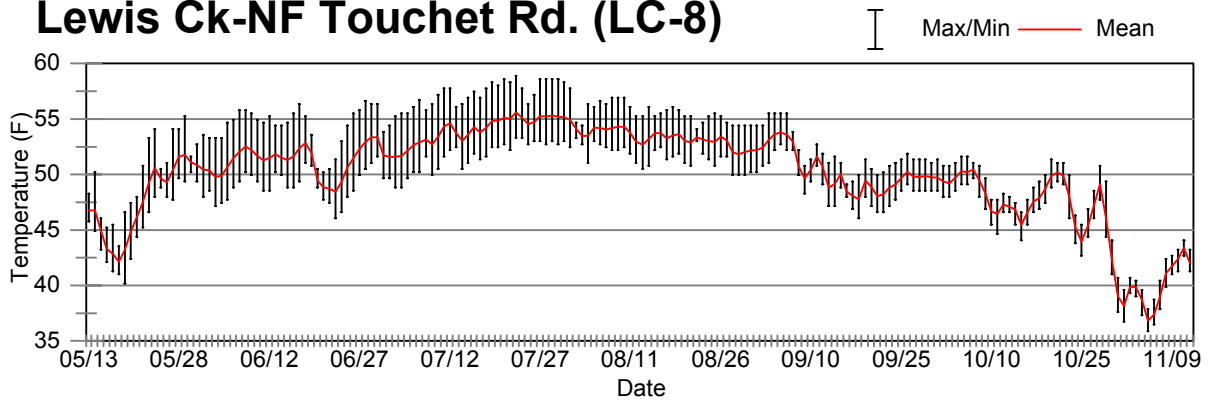
Spangler Ck-0.2 mi above mouth (SC-5)



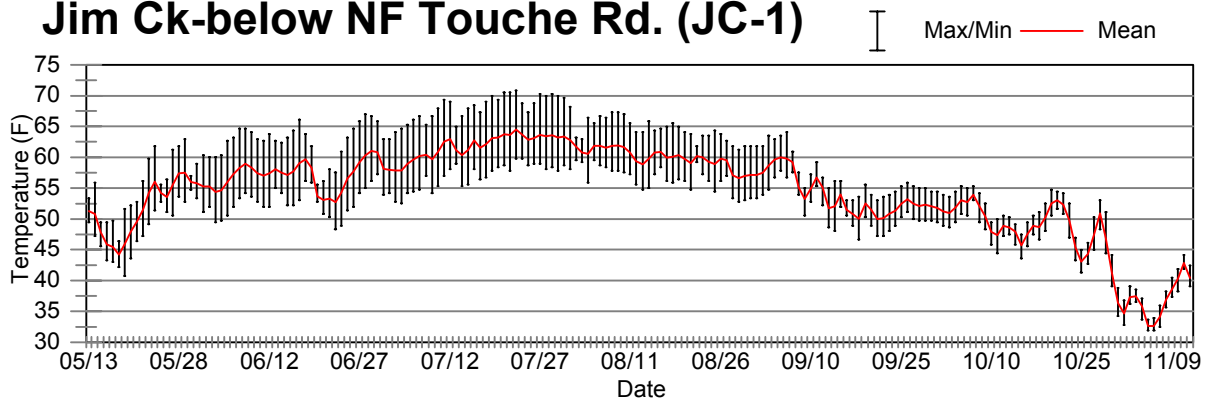
NF Touchet-below Spangler Ck (NFT-9)



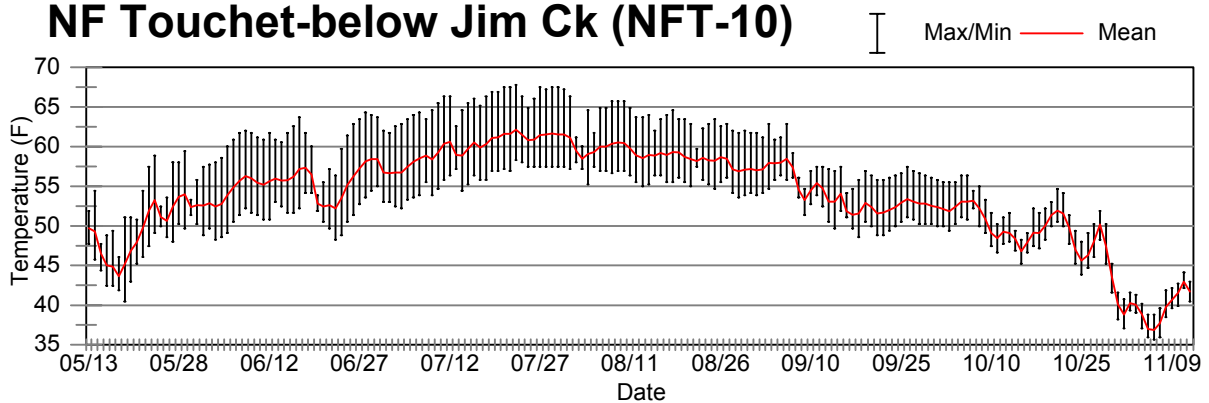
Lewis Ck-NF Touchet Rd. (LC-8)



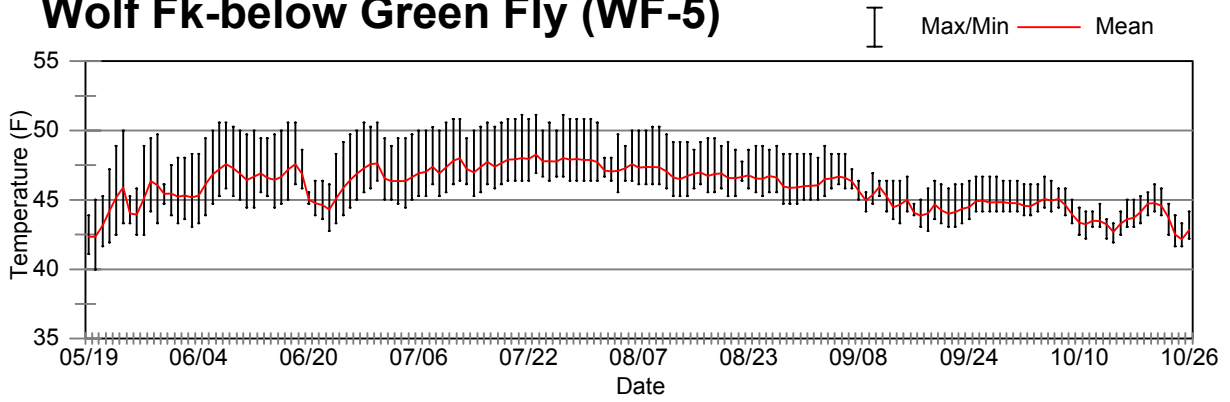
Jim Ck-below NF Touche Rd. (JC-1)



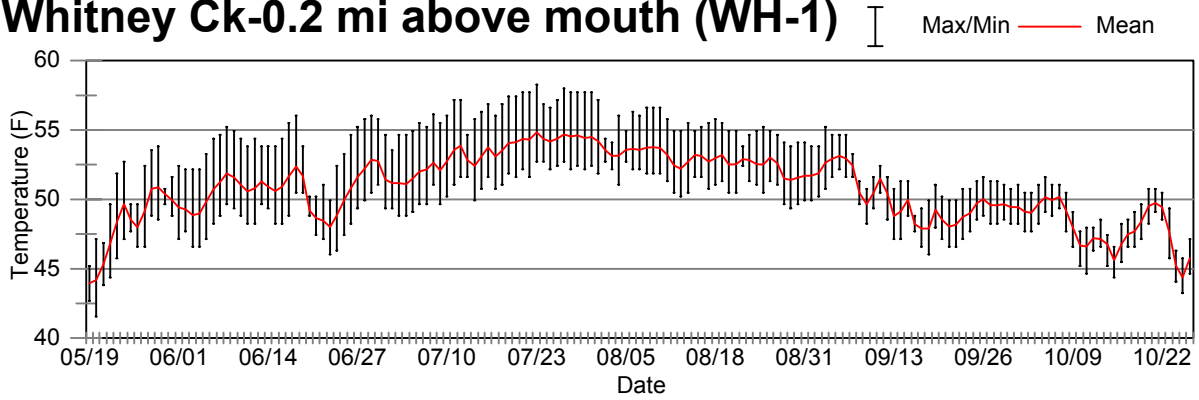
NF Touchet-below Jim Ck (NFT-10)



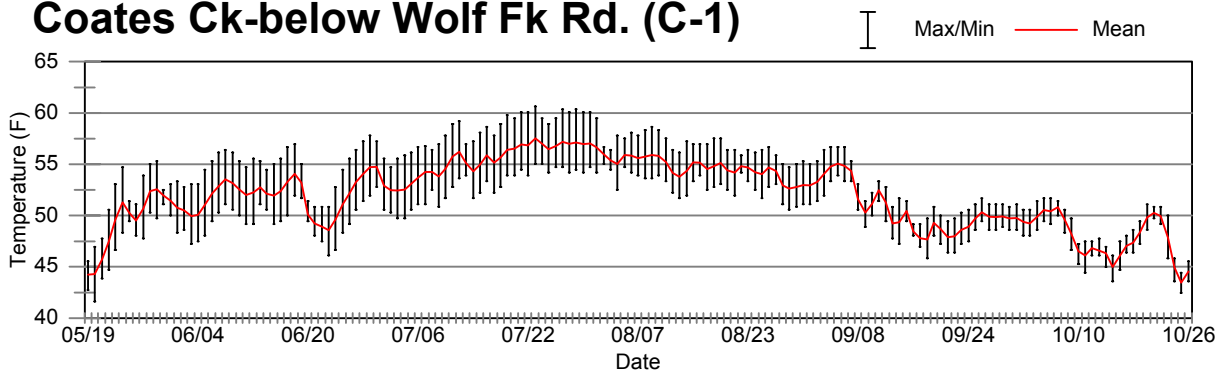
Wolf Fk-below Green Fly (WF-5)



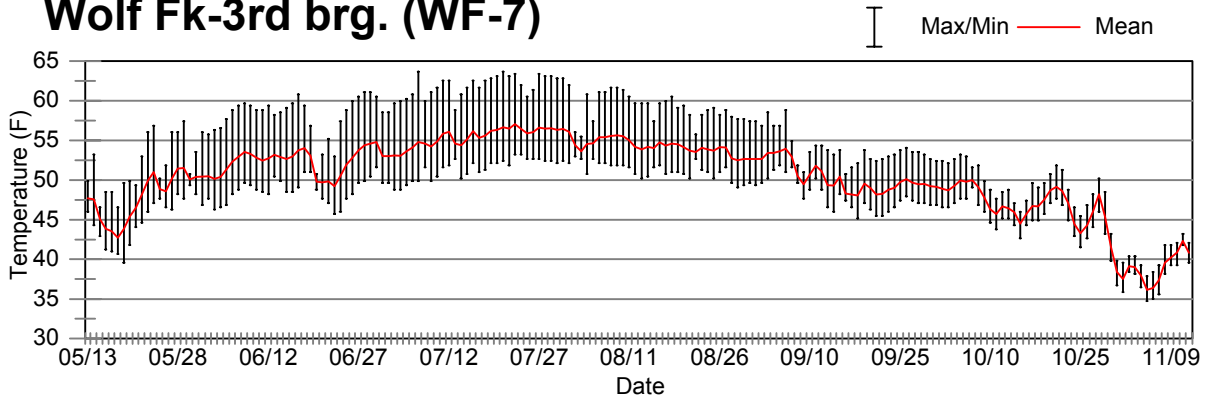
Whitney Ck-0.2 mi above mouth (WH-1)



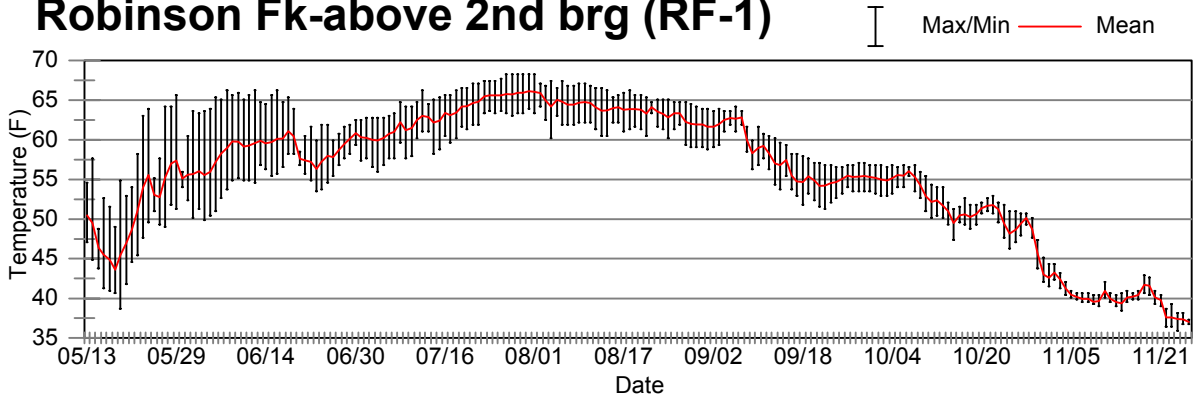
Coates Ck-below Wolf Fk Rd. (C-1)



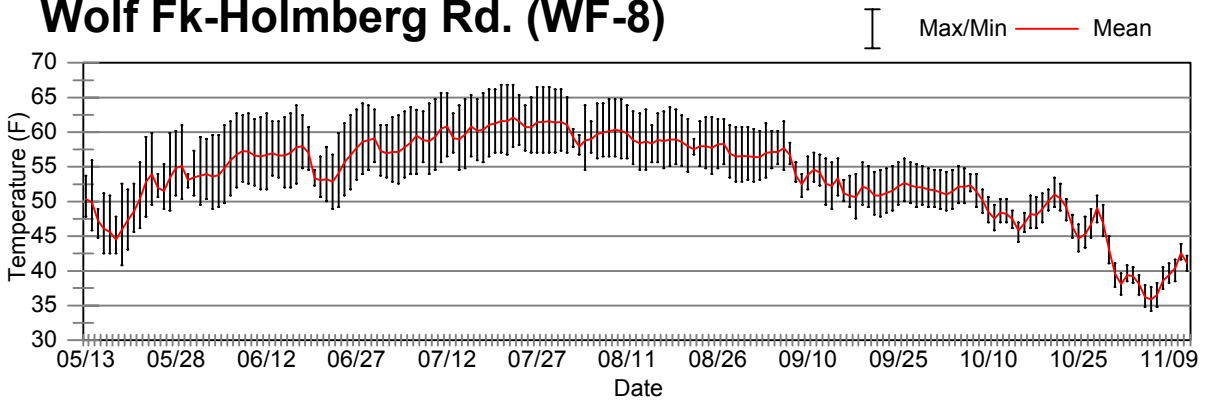
Wolf Fk-3rd brg. (WF-7)



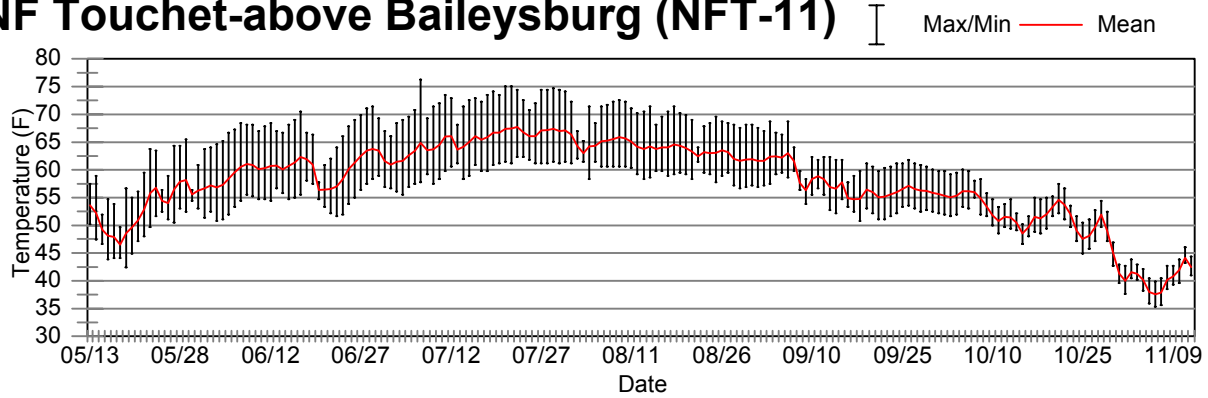
Robinson Fk-above 2nd brg (RF-1)



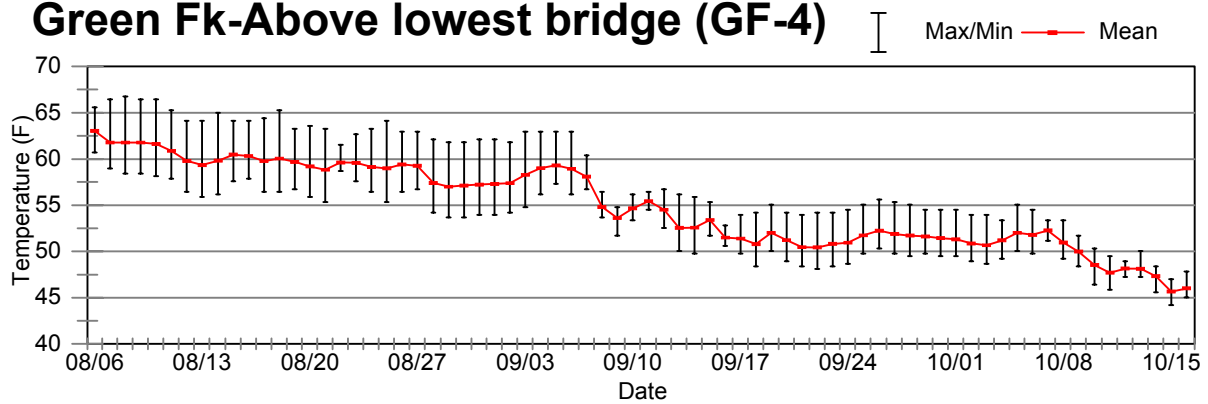
Wolf Fk-Holmberg Rd. (WF-8)



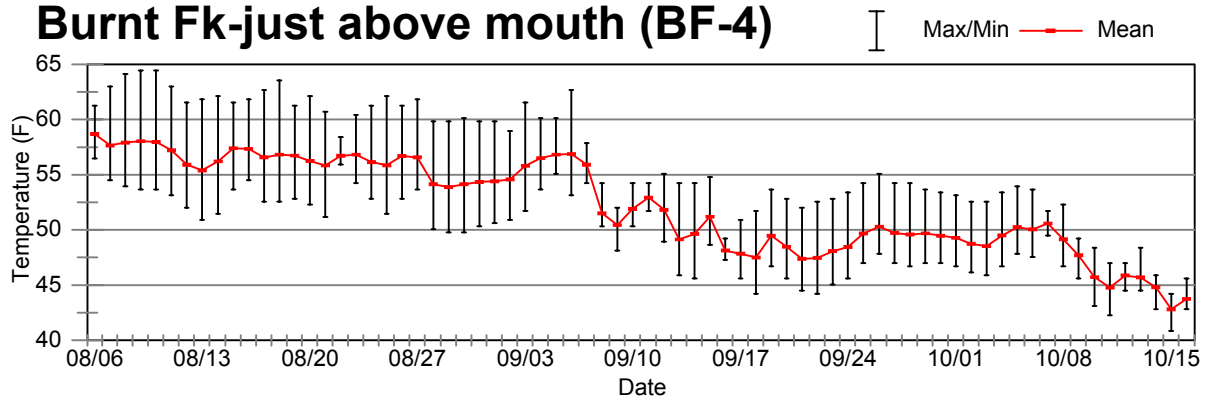
NF Touchet-above Baileysburg (NFT-11)



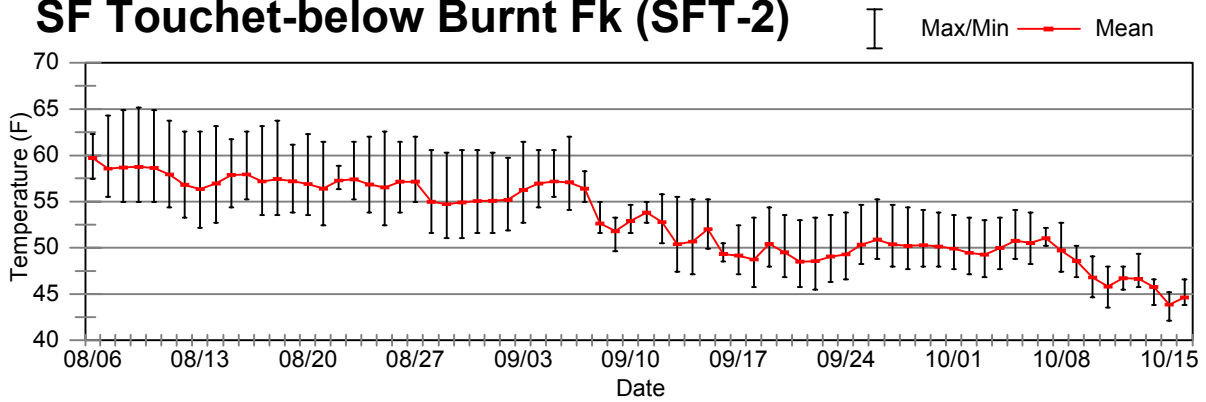
Green Fk-Above lowest bridge (GF-4)



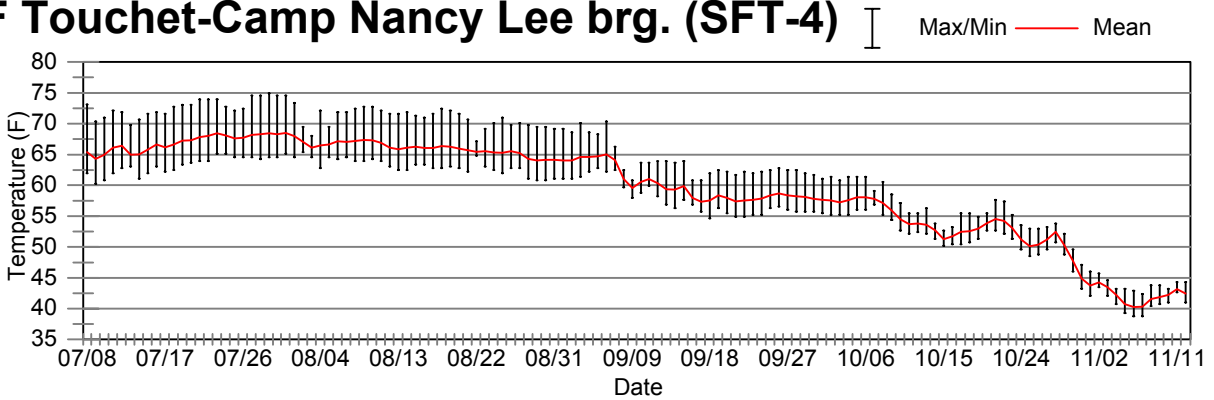
Burnt Fk-just above mouth (BF-4)



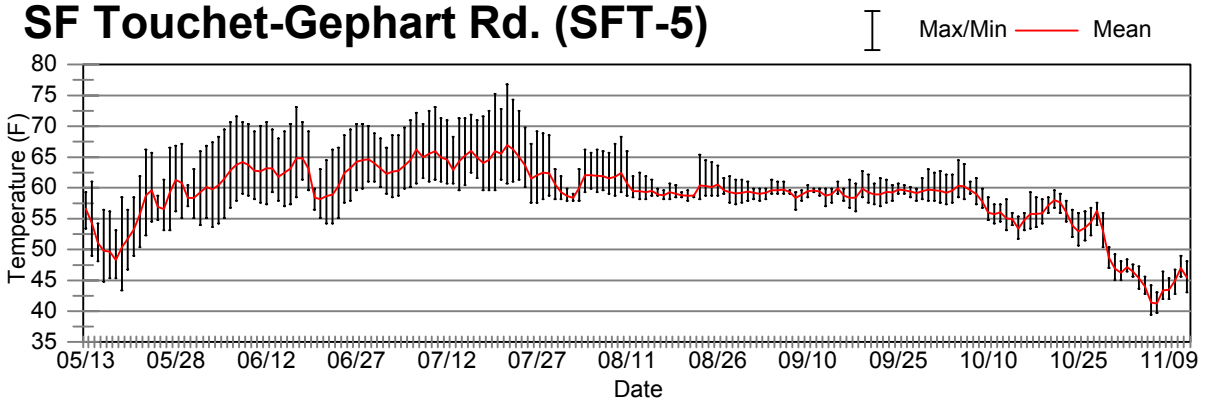
SF Touchet-below Burnt Fk (SFT-2)

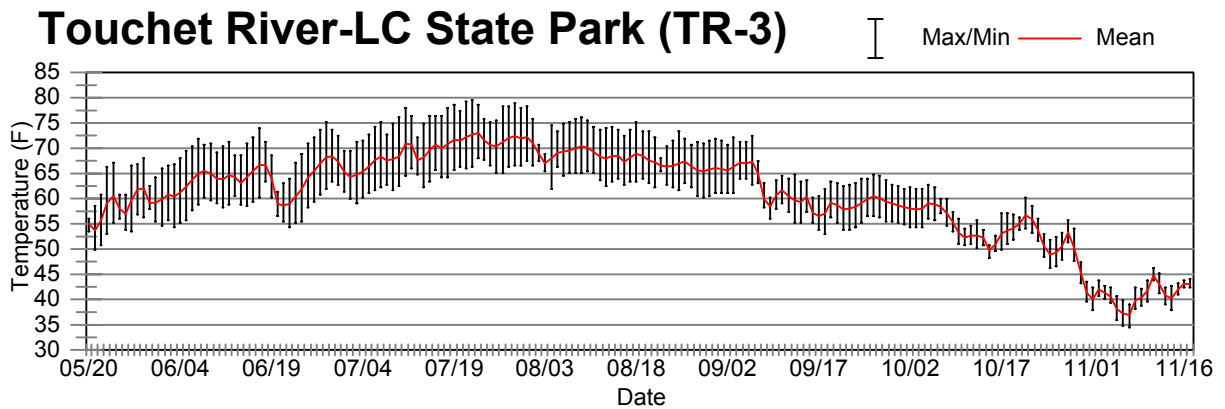
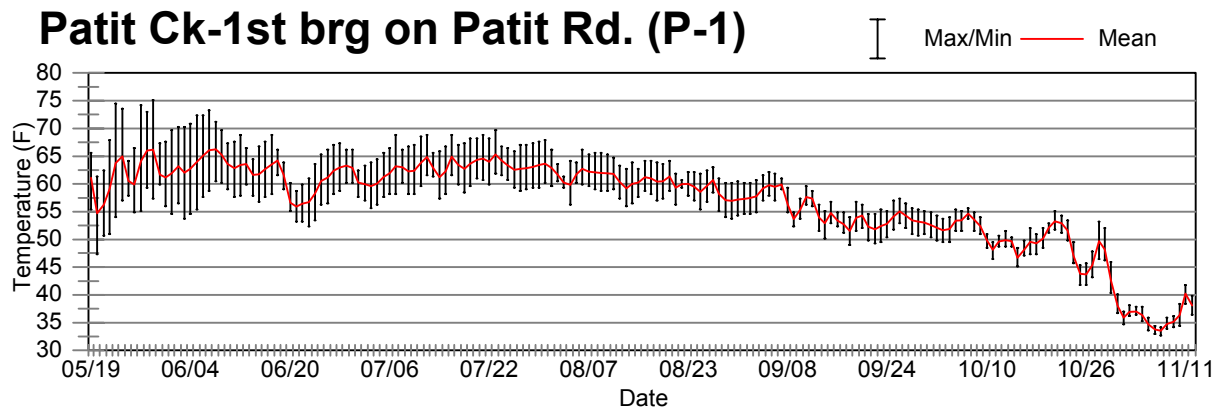
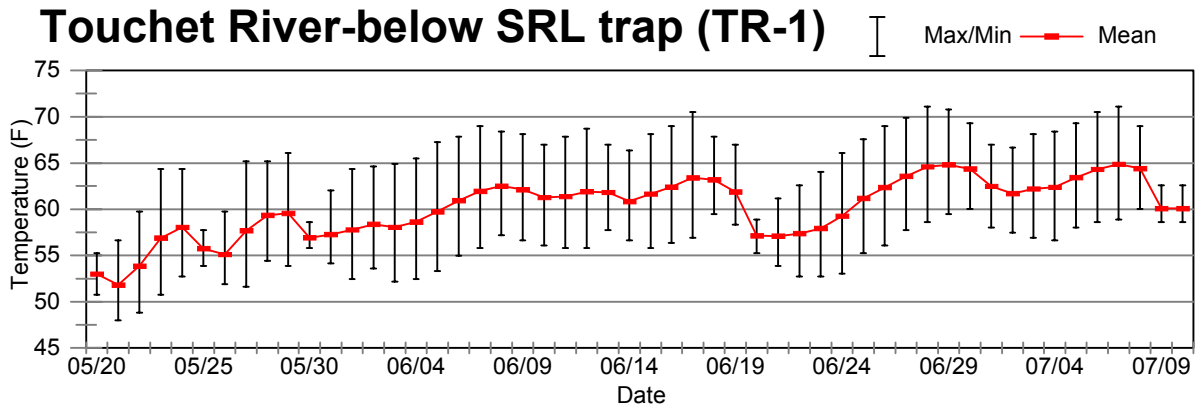


SF Touchet-Camp Nancy Lee brg. (SFT-4)

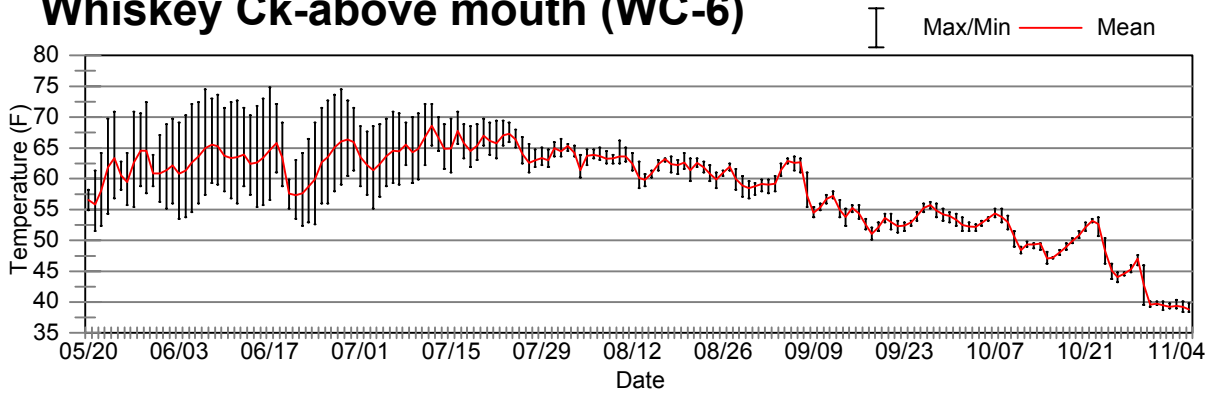


SF Touchet-Gephart Rd. (SFT-5)

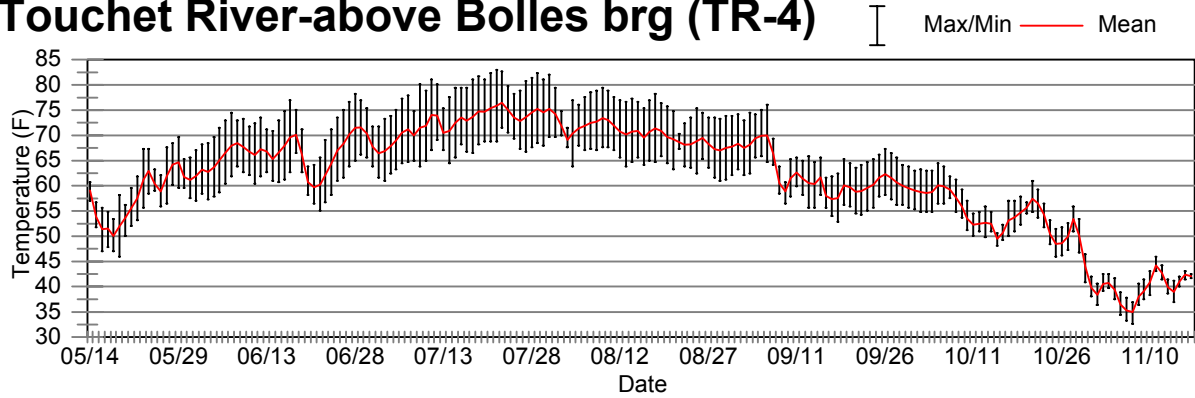




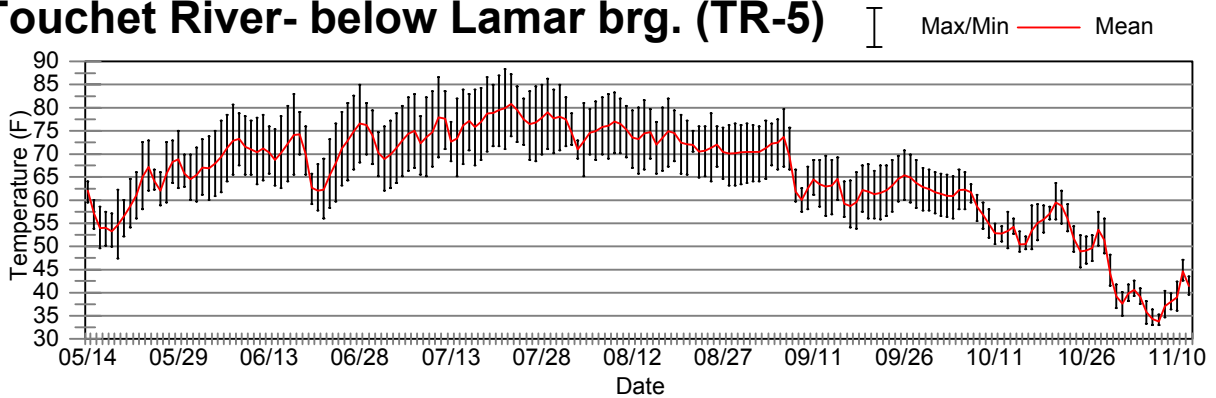
Whiskey Ck-above mouth (WC-6)



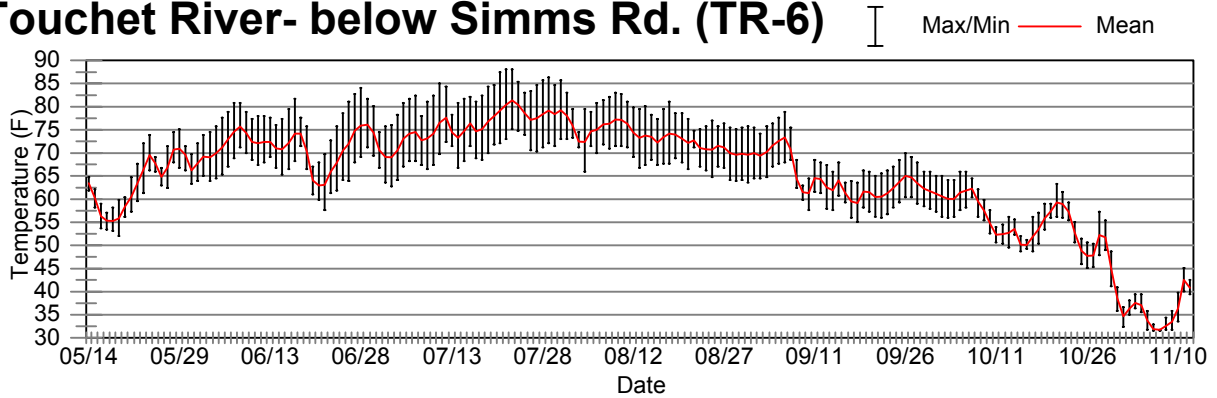
Touchet River-above Bolles brg (TR-4)



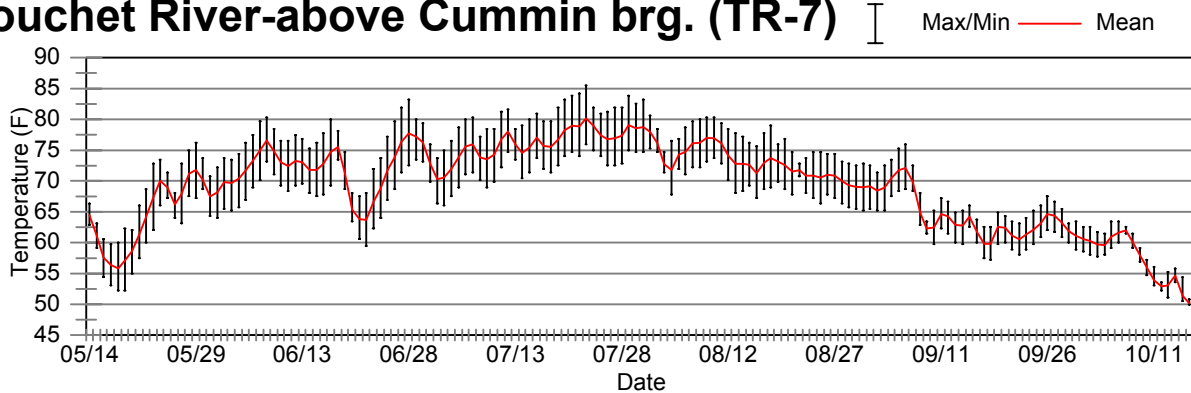
Touchet River- below Lamar brg. (TR-5)



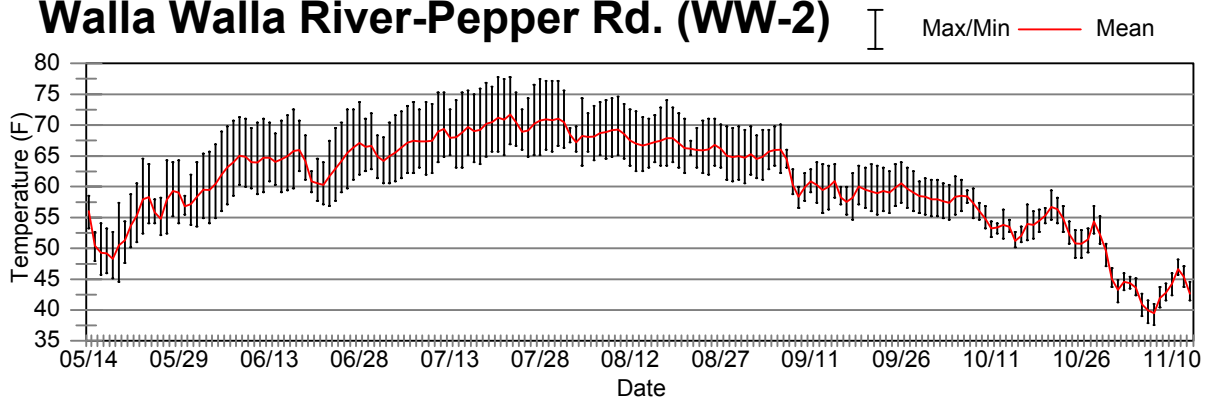
Touchet River- below Simms Rd. (TR-6)



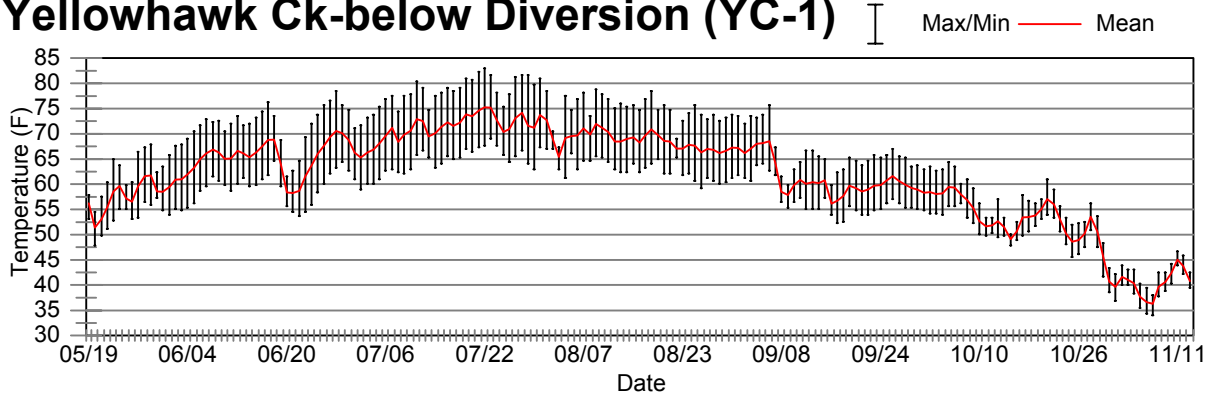
Touchet River-above Cummin brg. (TR-7)



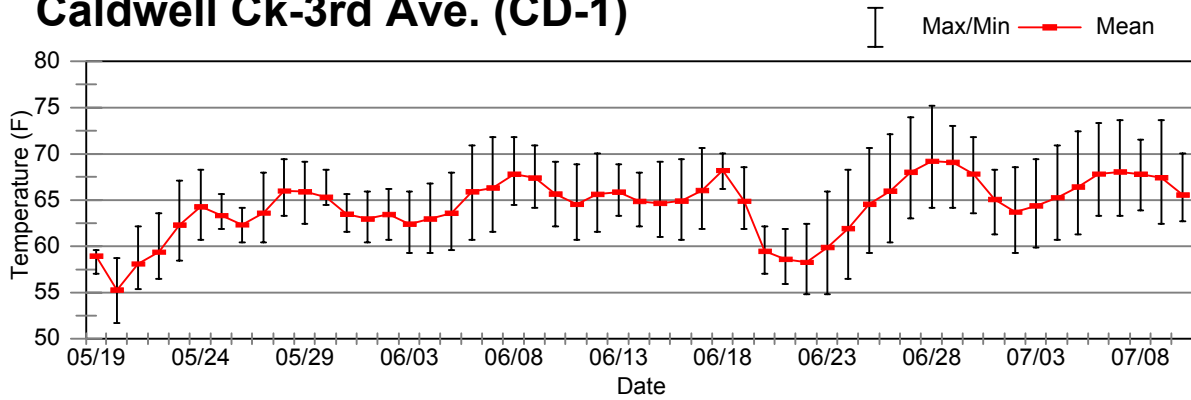
Walla Walla River-Pepper Rd. (WW-2)



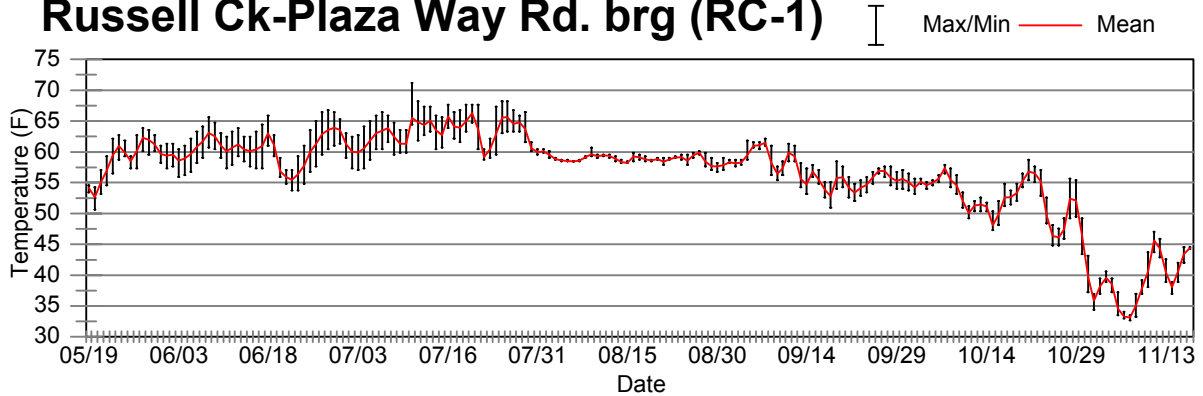
Yellowhawk Ck-below Diversion (YC-1)



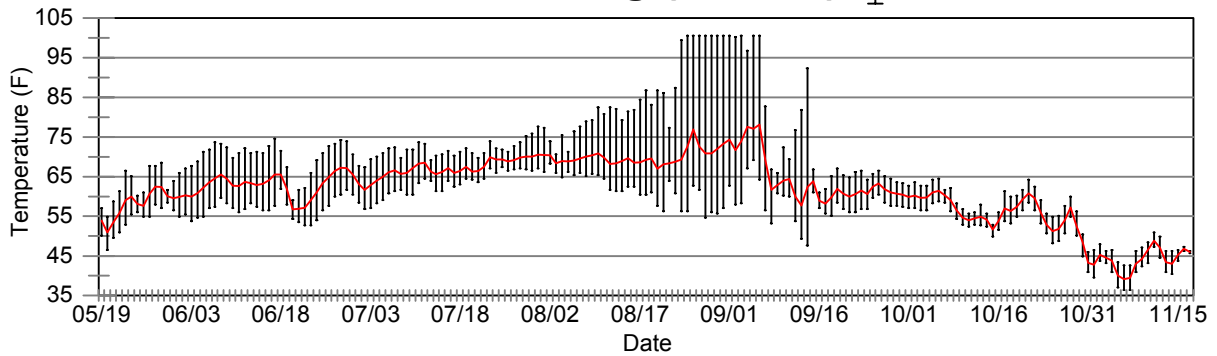
Caldwell Ck-3rd Ave. (CD-1)



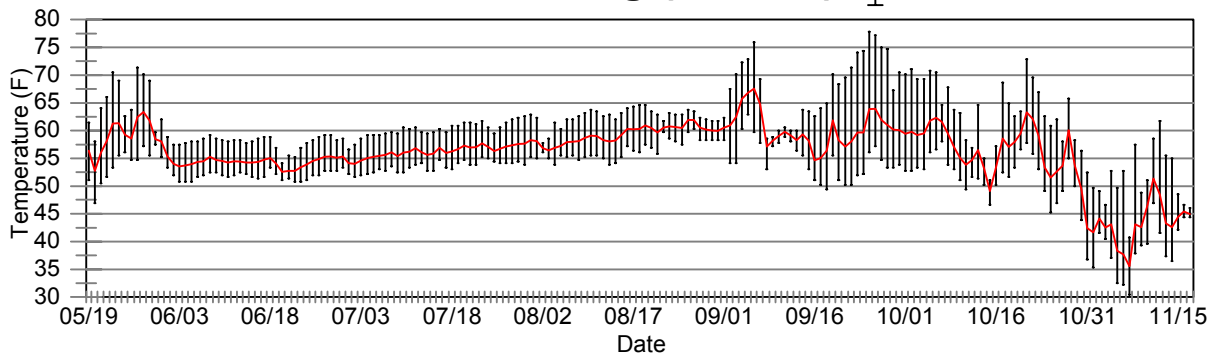
Russell Ck-Plaza Way Rd. brg (RC-1)



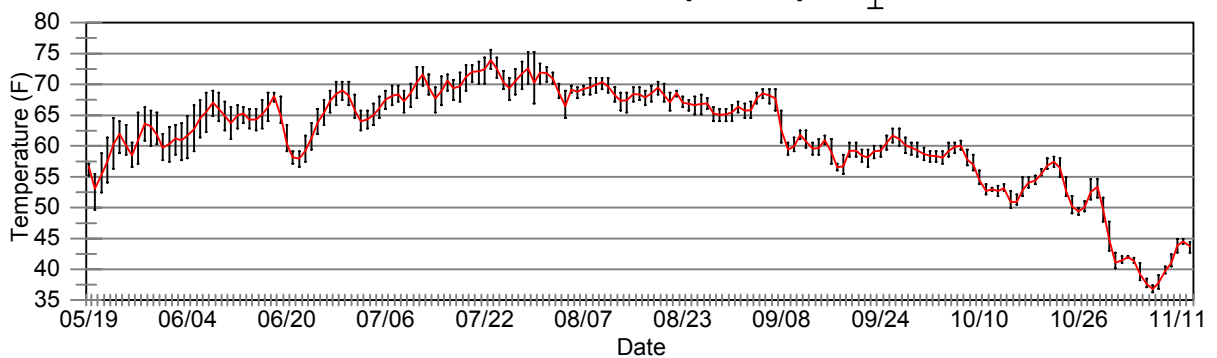
Cottonwood Ck-Hood Rd. brg (CWC-1)



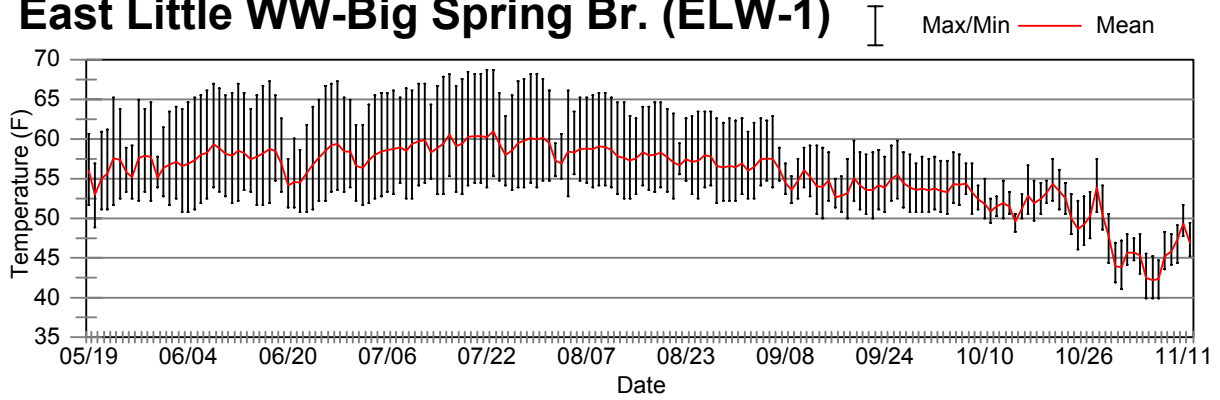
Cottonwood Ck-Braden Rd. brg (CWC-2)



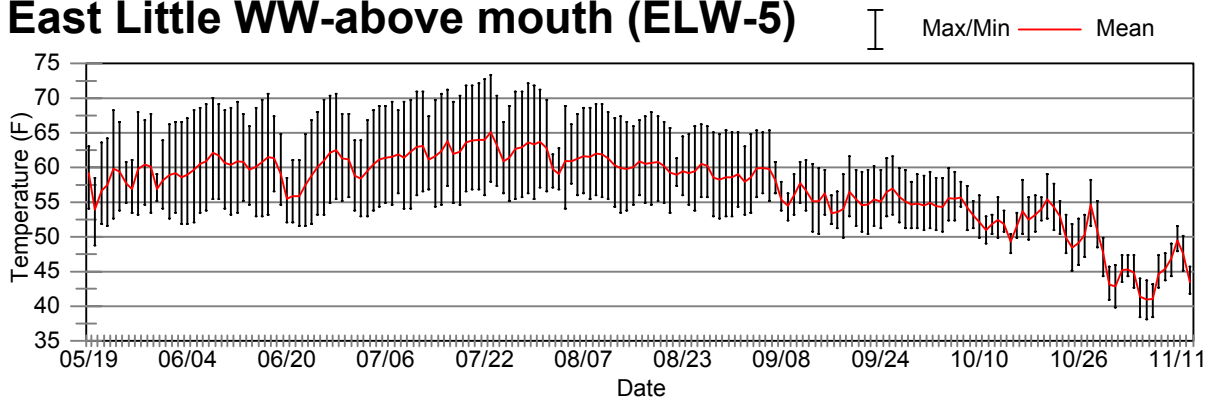
Yellowhawk Ck-above mouth (YC-7)



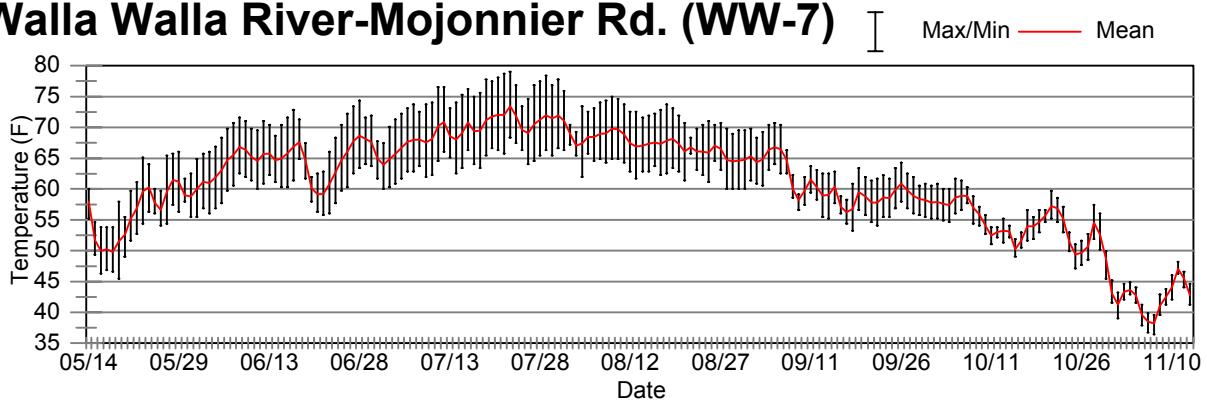
East Little WW-Big Spring Br. (ELW-1)



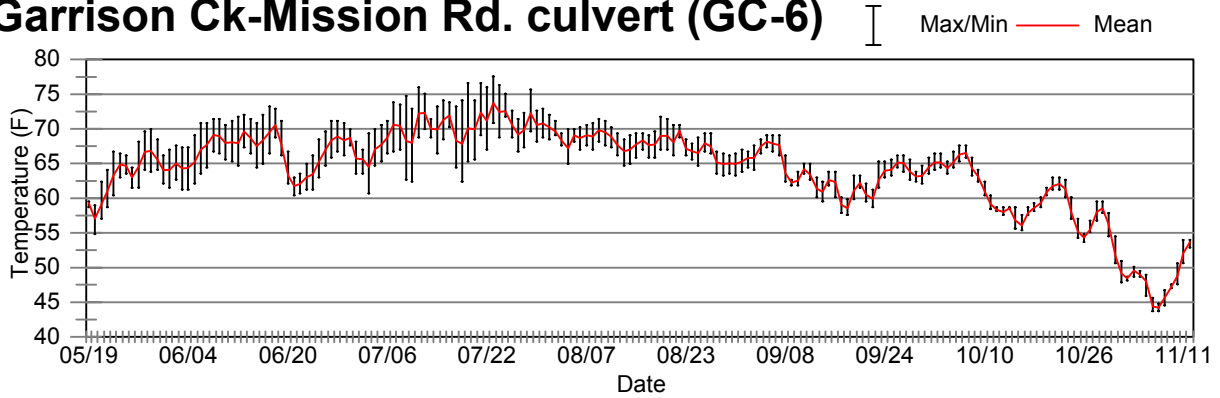
East Little WW-above mouth (ELW-5)



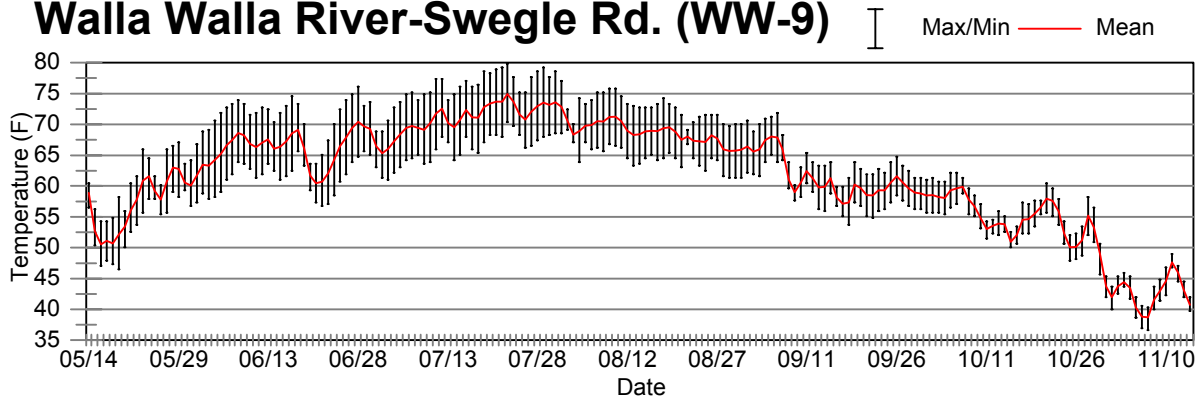
Walla Walla River-Mojonnier Rd. (WW-7)



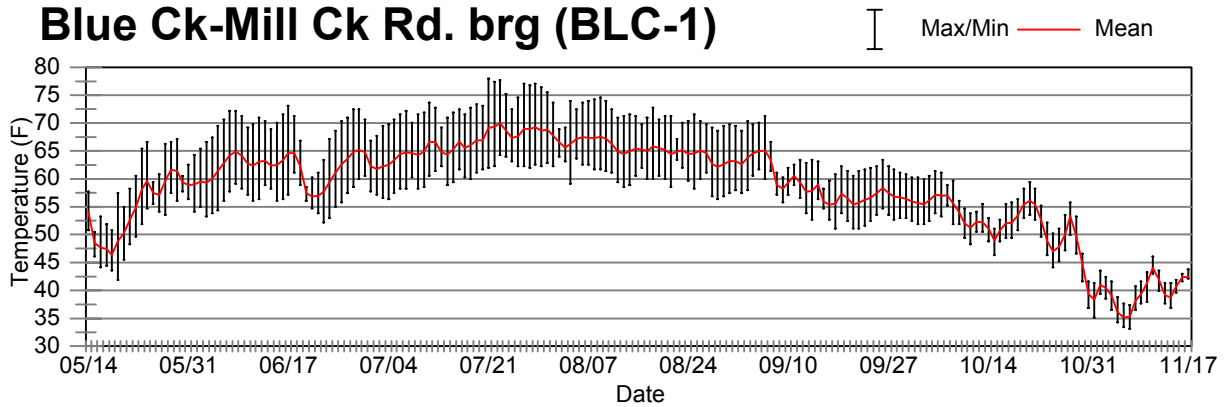
Garrison Ck-Mission Rd. culvert (GC-6)



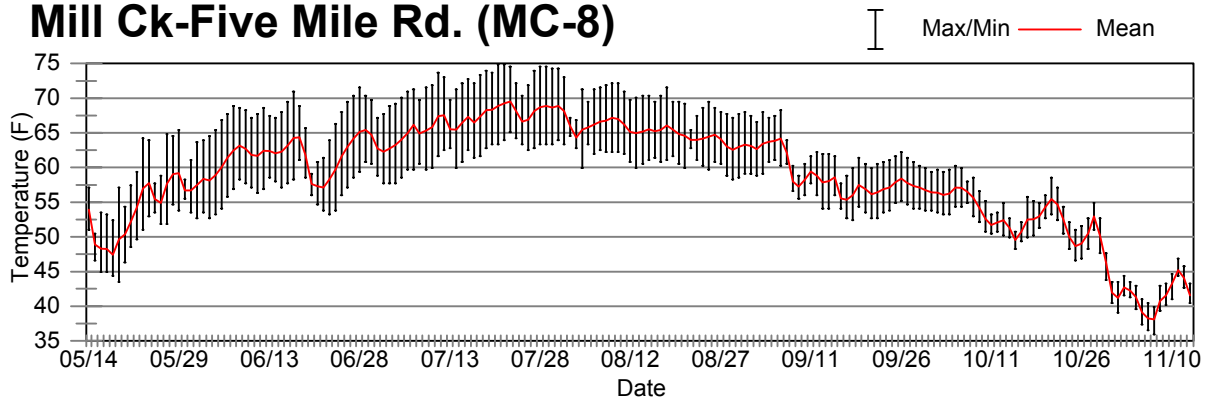
Walla Walla River-Swegle Rd. (WW-9)



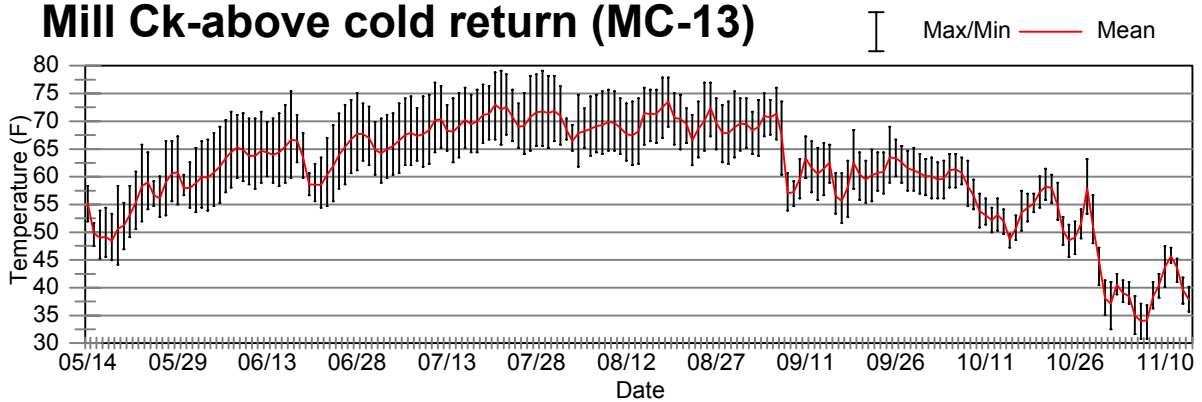
Blue Ck-Mill Ck Rd. brg (BLC-1)



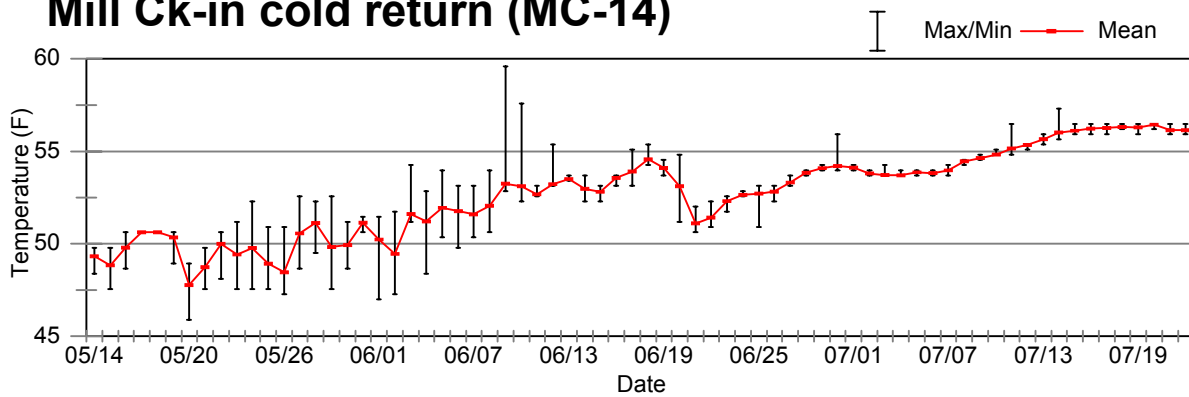
Mill Ck-Five Mile Rd. (MC-8)



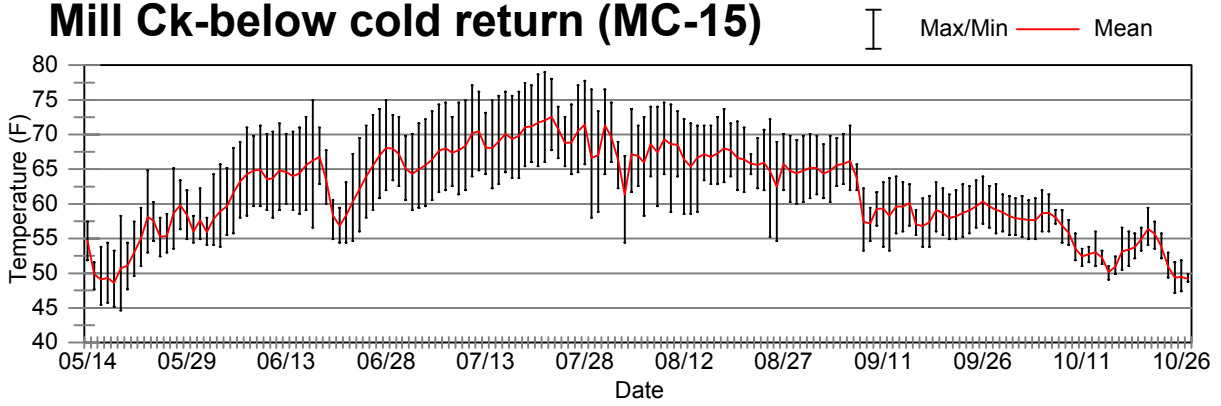
Mill Ck-above cold return (MC-13)



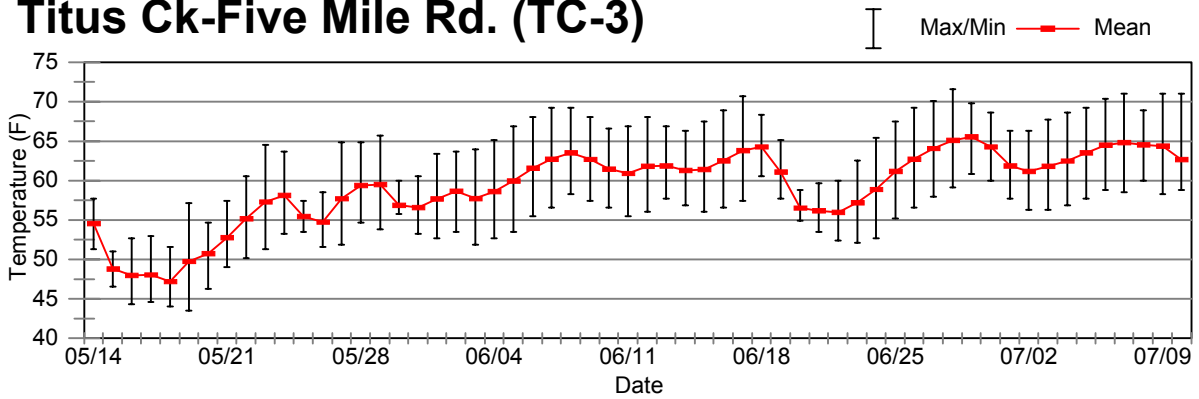
Mill Ck-in cold return (MC-14)



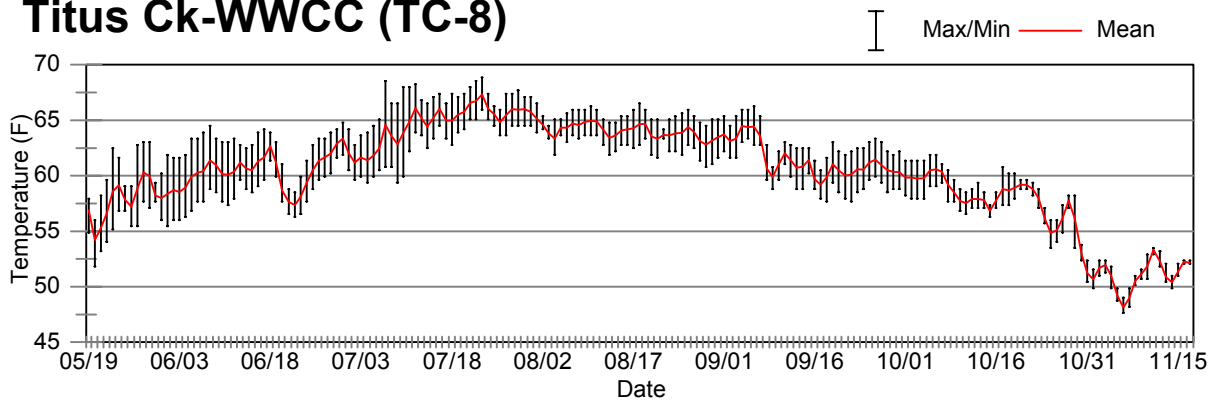
Mill Ck-below cold return (MC-15)



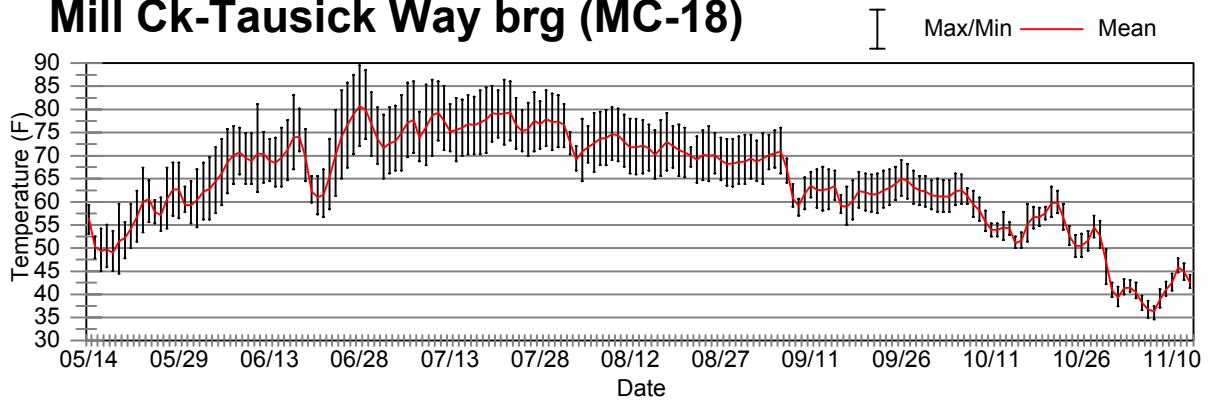
Titus Ck-Five Mile Rd. (TC-3)



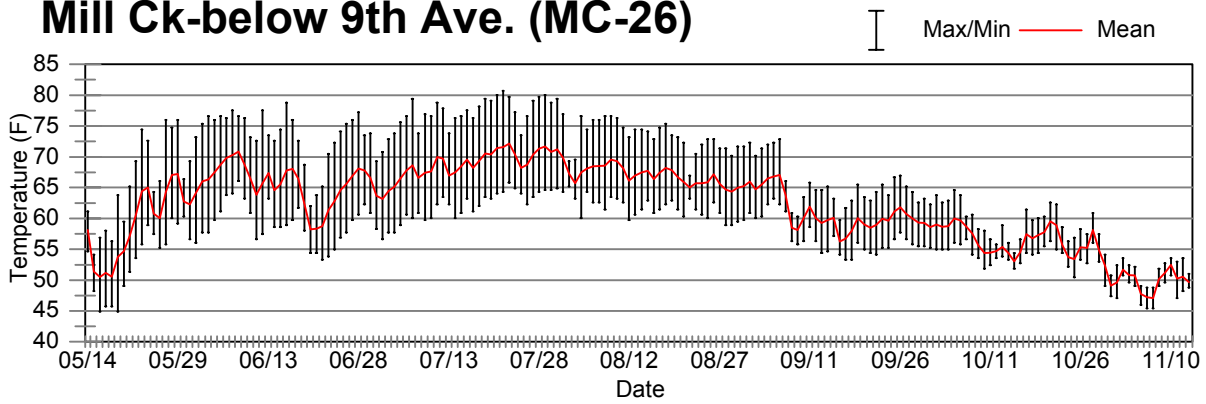
Titus Ck-WWCC (TC-8)



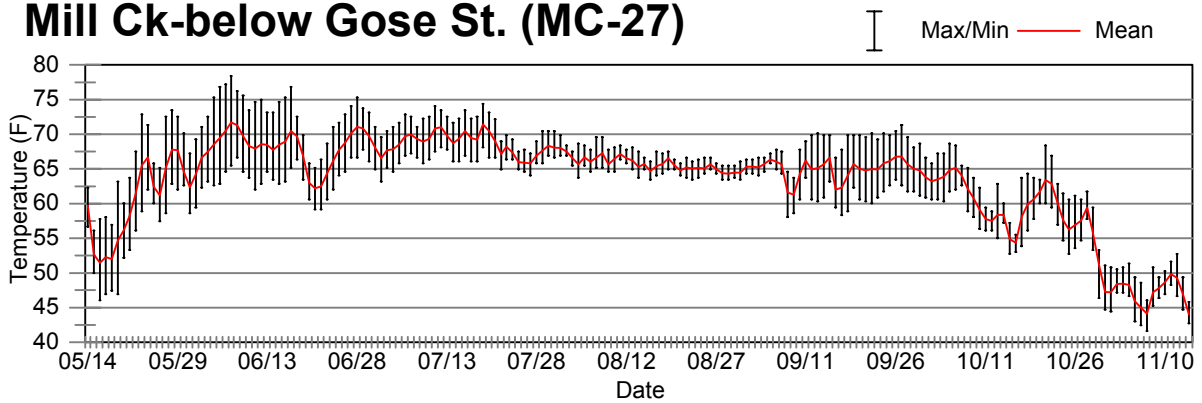
Mill Ck-Tausick Way brg (MC-18)



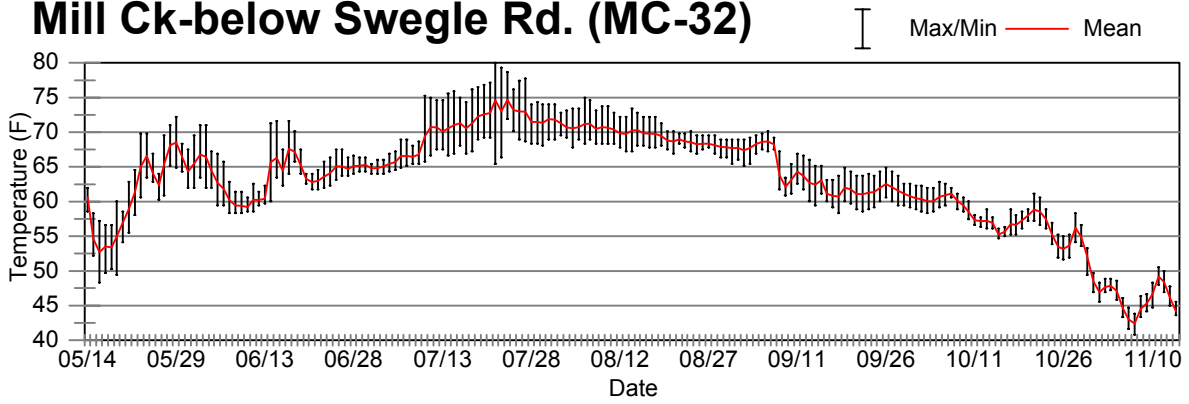
Mill Ck-below 9th Ave. (MC-26)



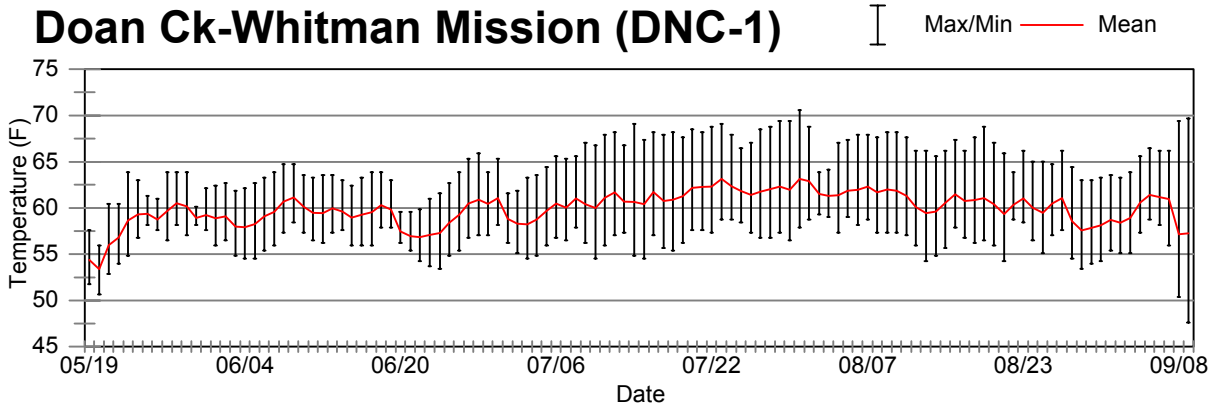
Mill Ck-below Gose St. (MC-27)



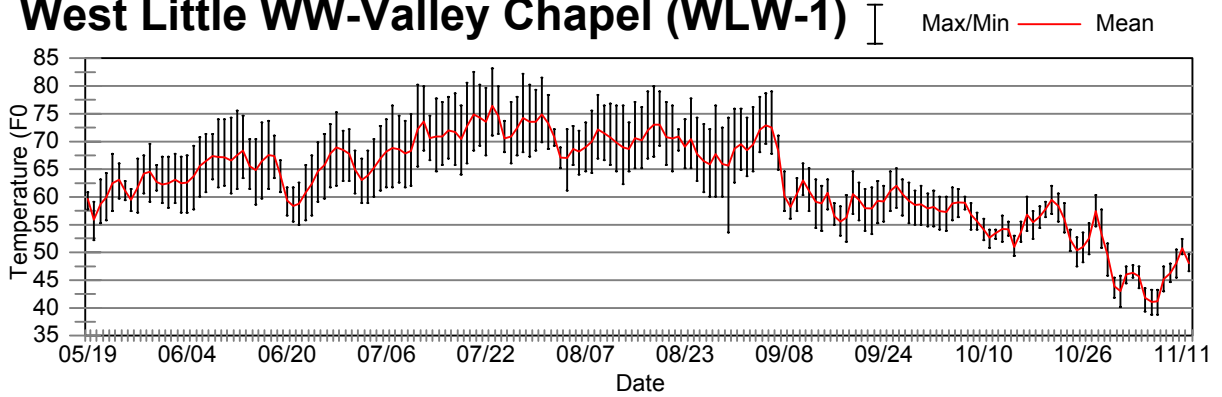
Mill Ck-below Swegle Rd. (MC-32)



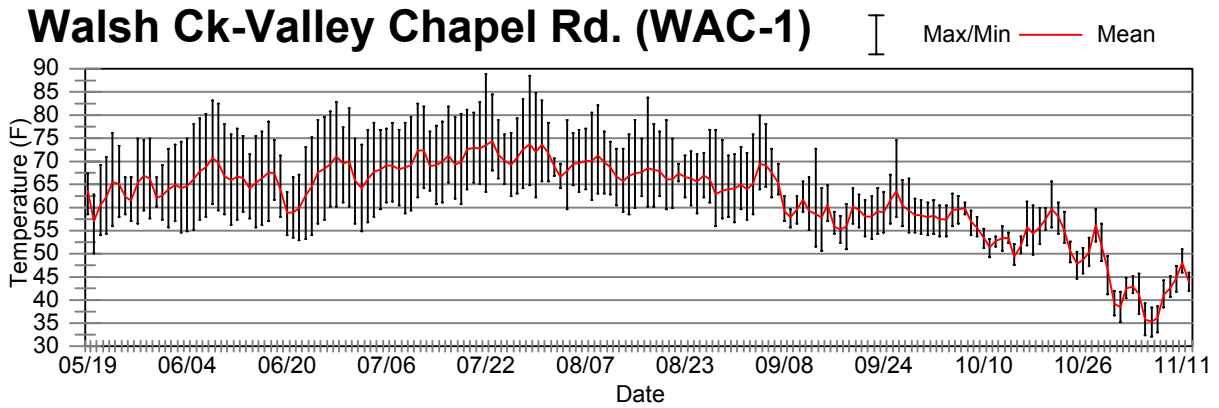
Doan Ck-Whitman Mission (DNC-1)



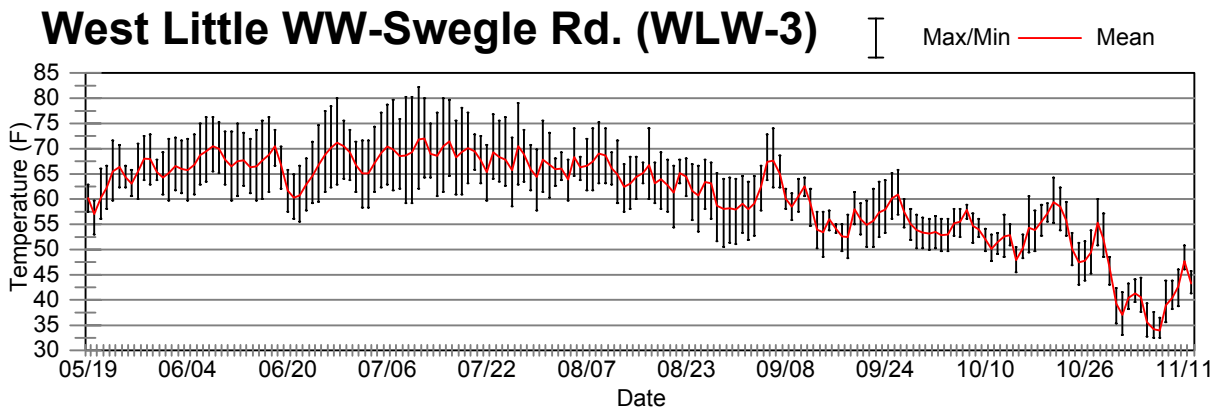
West Little WW-Valley Chapel (WLW-1)



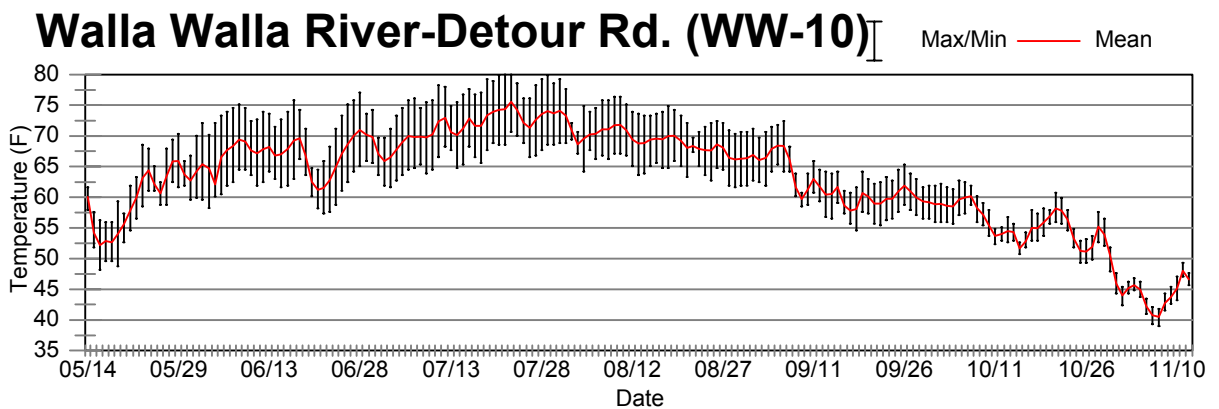
Walsh Ck-Valley Chapel Rd. (WAC-1)



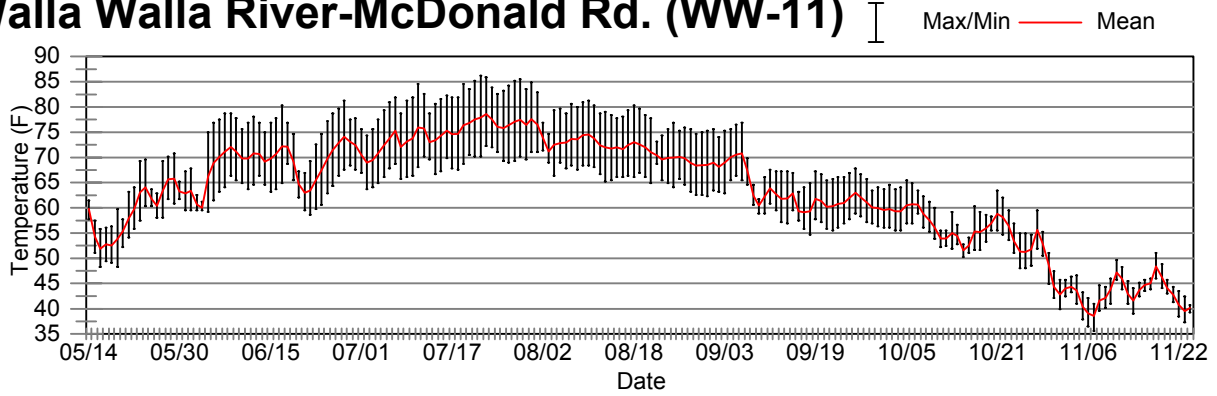
West Little WW-Swegle Rd. (WLW-3)



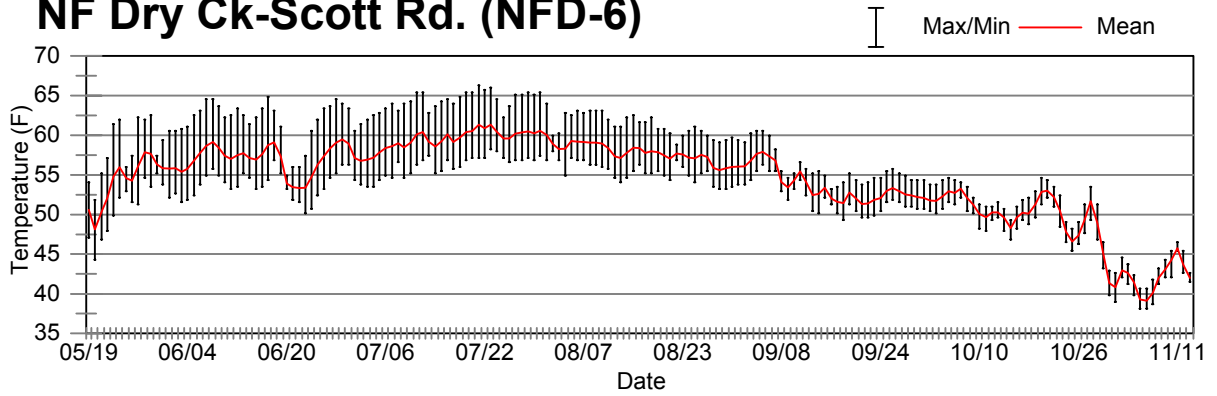
Walla Walla River-Detour Rd. (WW-10)



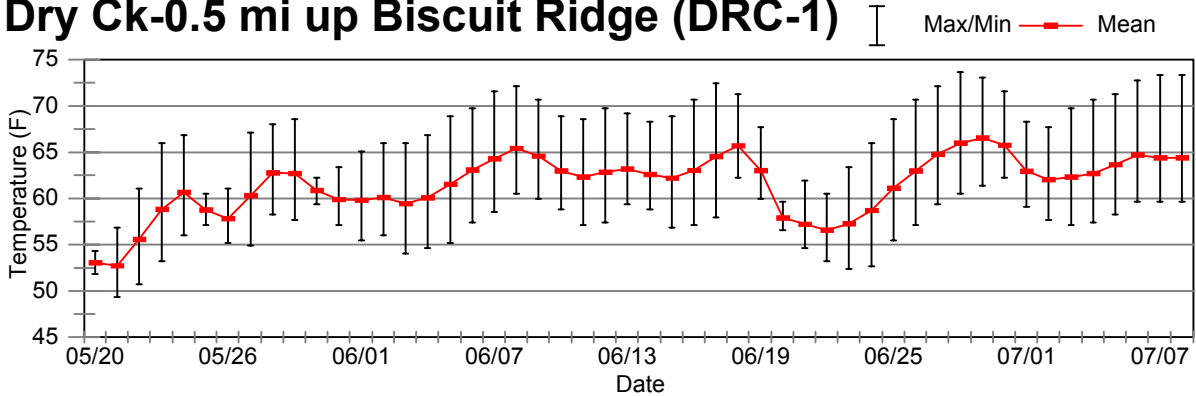
Walla Walla River-McDonald Rd. (WW-11)



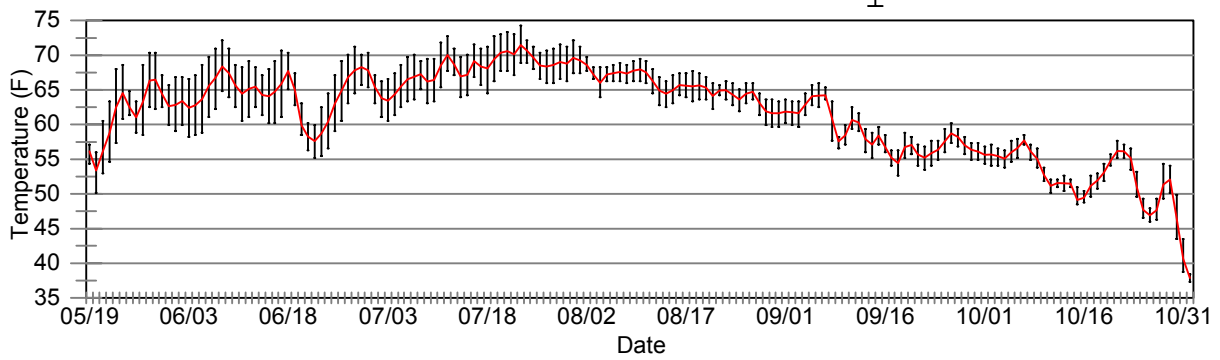
NF Dry Ck-Scott Rd. (NFD-6)



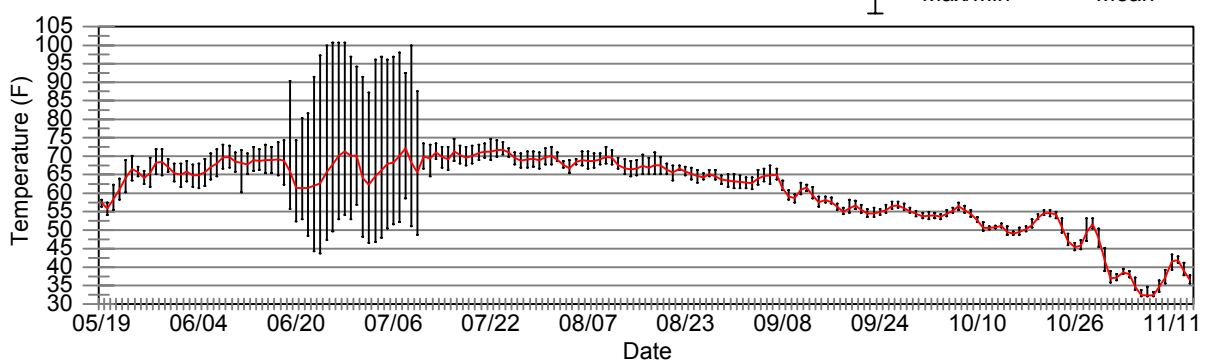
Dry Ck-0.5 mi up Biscuit Ridge (DRC-1)



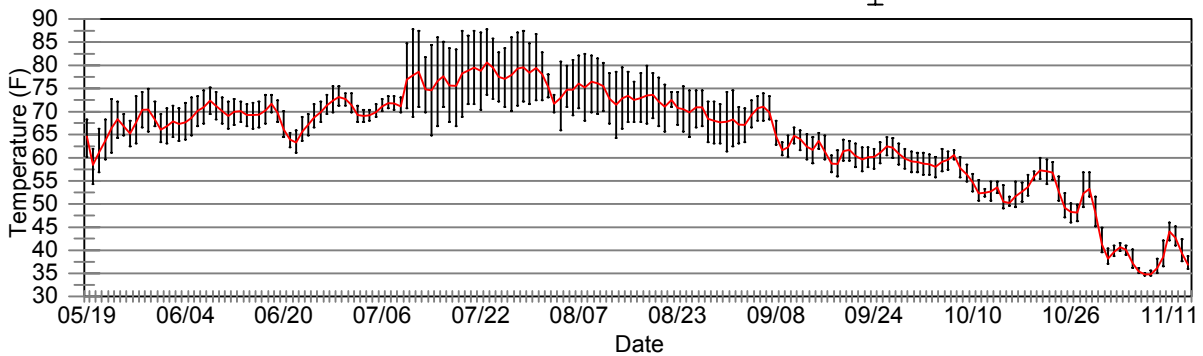
Dry Ck-Lower Waitsburg Rd. (DRC-4)



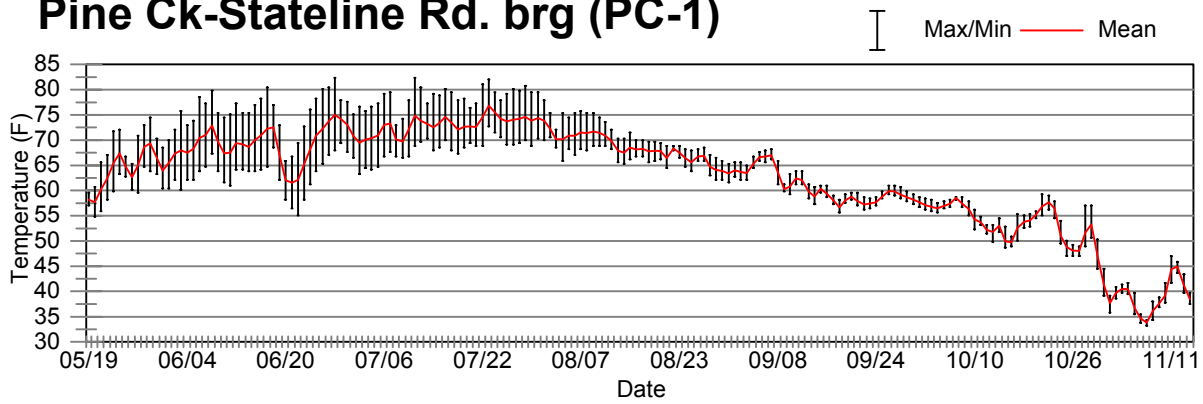
Dry Ck-Talbott Rd. brg (DRC-5)



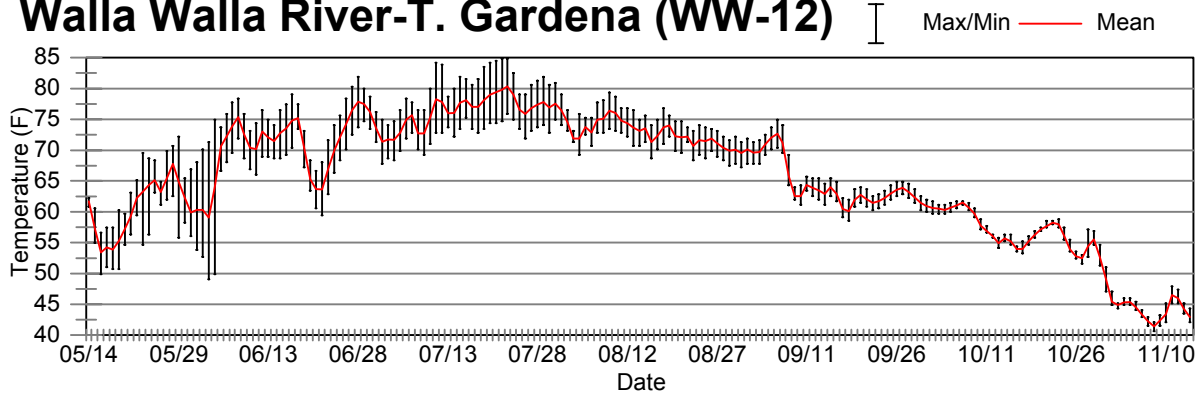
Mud Ck-Barney Rd. brg (MDC-1)



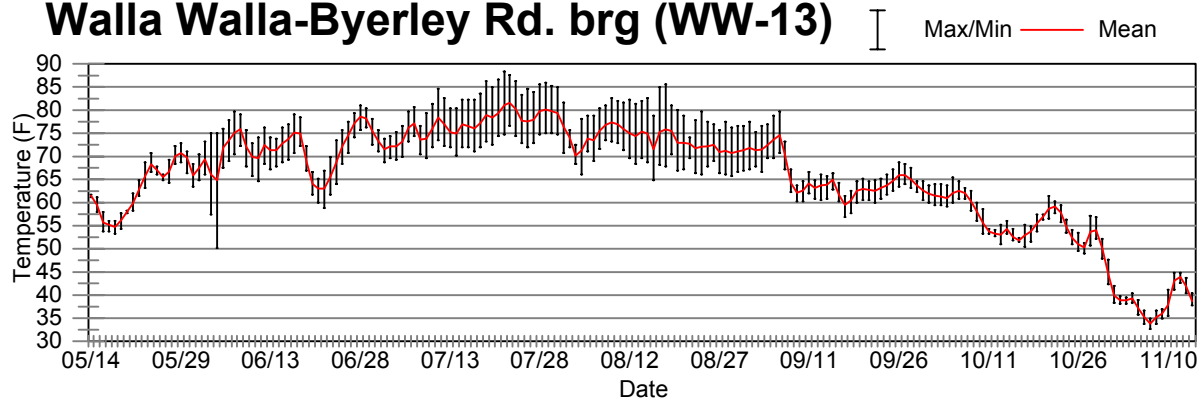
Pine Ck-Stateline Rd. brg (PC-1)



Walla Walla River-T. Gardena (WW-12)



Walla Walla-Byerley Rd. brg (WW-13)



List of lost or stolen temperature loggers, and loggers with only partially collected data or data that has inconsistencies, 2003.

Robinson Fork @ Above Second Bridge (RF-1)

- < Low variance in temperatures after the middle of June, assume it is spring fed or ground recharge

Green Fork @ Above Lowest Bridge (GF-4)

- < Logger was deployed late due to landowner access issues and the first time we went to drop logger the vehicle broke down before we got there

Burnt Fork @ Just Above Mouth (BF-4)

- < Logger was deployed late due to landowner access issues and the first time we went to drop logger the vehicle broke down before we got there

South Fork Touchet @ Below Burnt Fork (SFT-2)

- < Logger was deployed late due to landowner access issues and the first time we went to drop logger the vehicle broke down before we got there

South Fork Touchet @ Camp Nancy Lee Brg. (SFT-4)

- < Deployed logger # 98-23 on 5/13
- < Logger was replaced on 7/8 with logger # 261122, because original logger quit working and wouldn't download, so no data was collected from 5/13 to 7/8

South Fork Touchet @ Gephart Rd. (SFT-5)

- < Low variance after late July, assume it is spring fed or ground recharge water

Touchet River @ SRL Trap (TR-1)

- < Deployed logger on 5/20
- < Logger collected data from 5/20 to 7/9
- < Logger was to be pulled on 11/17, but was not found so no data available after 7/9

South Fork Patit @ 2nd Bridge (SFP-1)

- < Deployed logger on 5/19
- < Logger was found dry on 7/9, and was pulled
- < Logger would not download, so no data is presented

Whiskey Creek @ Above Mouth (WC-6)

- < Low variance after the middle of July, assume it is spring fed or ground recharge water

Caldwell Creek @ 3rd Ave. (CD-1)

- < Deployed logger on 5/19
- < Logger collected data from 5/19 to 7/10
- < Logger was to be pulled on 11/17, but was not found so no data available after 7/9

Russell Creek @ Plaza Way (RC-1)

- < Low variance after late July, assume it is spring fed or ground recharge water

Cottonwood Creek @ Hood Rd. (CWC-1)

- < We assume that the stream went dry from late August to early September when maximum temperatures were recorded around 100EF, but the logger wasn't seen during this time

Cottonwood Creek @ Braden Rd. (CWC-2)

- < Low variation from late May to early September, assume it is spring fed or ground recharge water
- < Logger may have gone dry in the middle of September, because it was dry when we pulled it and mid September is when variance began to increase

Mill Creek @ Wickersham Bridge

- < Deployed logger on 5/14
- < Went to download logger on 7/21, but logger was missing
- < Checked for logger again in mid November, but could not locate

Mill Creek @ Cold return at Rooks Park (MC-14)

- < Deployed logger on 5/14
- < Logger collected data from 5/14 to 7/21
- < Logger was to be pulled on 11/14, but was not found, so no data is available after 7/21

Cold Creek @ Last Chance Rd. (CC-1)

- < Deployed logger on 05/19
- < Couldn't find on 07/21
- < No data collected

Titus Creek @ Five Mile Rd. (TC-3)

- < Deployed logger on 5/14
- < Logger collected data from 5/14 to 7/10
- < Logger was to be pulled on 11/17, but stream was dry at this time and logger couldn't be found so no data is available after 7/10

Mill Creek @ Below Sweгле Rd. (MC-32)

- < Deployed logger on 5/14
- < Logger was found dry on 6/4 and moved to new area, so data between 5/14 and 6/4 is suspect
- < Logger stayed wet from 6/4 until it was pulled on 11/14.

Doan Ck @ Whitman Mission (DNC-1)

- < Deployed logger on 5/19
- < Logger collected data all season, but was found dry on bank when we went to pull it for the season. Data was cut off at approximately 9/10 to try and correct for when it was removed from the stream.

Walla Walla River @ Detour Rd. (WW-10)

- < Deployed logger on 5/14
- < Logger was found dry on 6/4 and moved to new area, so data between 5/14 and 6/4 is suspect
- < Logger stayed wet from 6/4 until it was pulled on 11/12

Walla Walla River @ McDonald Rd (WW-11)

- < Deployed logger on 5/14
- < Logger was found dry on 6/4 and moved to new area, so data between 5/14 and 6/4 is suspect
- < Logger stayed wet from 6/4 until it was pulled on 11/24.

Dry Creek @ 0.5 miles up Biscuit Ridge Rd (DRC-1)

- < Deployed logger on 5/20
- < Logger was pulled on 7/7
- < Logger was to be left out until fall, but a change in landowner, caused access to be denied.

Dry Creek @ Talbott Rd. Brg. (DRC-5)

- < Deployed logger on 5/19
- < Logger was found dry and move to a new spot on 7/10, and appears to have been dry since approximately 6/20
- < Logger stayed wet from 7/10 until it was pulled on 11/14

Pine Creek @ Sand Pit Rd

- < Deployed logger on 5/19
- < Went to download logger on 7/10, but logger was missing
- < Checked for logger again on 7/21, but could not locate

Appendix D. Qualitative Electrofishing, 2003

Appendix D. Table 1. Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
NF Touchet River	NFT-1	7/28	30	1.8	One 1+ RBT (88mm) and one adult BT (278mm) found.	Heavy intensity survey Looking for juvenile BT
	NFT-1	8/20	30	1.5	One 0+ BT (40mm), two 1+ BT's (85mm), and one adult BT (290mm) found.	Heavy intensity survey Looking for juvenile BT
	NFT-3	8/20	30		Three 0+ BT's (41-49mm) and 12 1+ BT's (85-140mm) found. TF-rare	Heavy intensity survey Looking for juvenile BT
	NFT-4	8/20	30		Five 0+ BT's (46-62mm) and Five 1+ BT's (90-165mm) found. TF-rare	Heavy intensity survey Looking for juvenile BT
	NFT-5	8/20	30		One 1+ RBT (145mm), Five 0+ BT's (47-54mm), and 12 1+ BT's (97-170mm) found. TF-rare	Heavy intensity survey Looking for juvenile BT
	NFT-6	8/20	30		Four 1+ RBT's (155-182mm), One 0+ BT (56mm), and seven 1+ BT's (71-165mm) found. SCP-rare	Heavy intensity survey Looking for juvenile BT
	NFT-7	8/20	30		Seven 1+ RBT's (77-190mm), Three 1+ BT's (115-149mm), and One adult BT (285mm) found.	Heavy intensity survey Looking for juvenile BT
	NFT-8	8/20	30		Six 0+ RBT's (26-39mm), 16 1+ RBT's (79-165mm), and One 0+ BT (52mm) found. SCP-uncommon, TF-rare	Heavy intensity survey Looking for juvenile BT
	NFT-9	8/20	30		24 0+ RBT's (30-58mm), 20 1+ RBT's (75-185mm), and One 1+ BT (170mm) found. SCP-common	Heavy intensity survey Looking for juvenile BT
Lewis Creek	LC-2	8/13	25		23 1+ RBT's (62-140mm) found. TF-uncommon	Heavy intensity survey
	LC-4	8/13	40		Two 0+ RBT's (45-68mm), Eight 1+ RBT's (47-172mm), and One 1+ BT (115mm) found. SCP-common, TF-uncommon	Heavy intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Green Fly	G-1	10/02	150 0.2 miles above the mouth	1.3	14 0+ RBT's (32-48mm), 21 1+ RBT's (70-180mm), Two 0+ BT's (55-57mm) and Two 1+ BT's (160-190) found. TF-uncommon	Moderate intensity survey looking for BT
	G-2	10/02	200 Mouth upstream	1.8	19 0+ RBT's (35-50mm), 30 1+ RBT's (67-143mm), Two 0+ BT's (68-69mm), and Two 1+ BT's (112-156mm) found. TF-uncommon	High intensity survey looking for BT
Hatley Gulch	HG-1	4/25	100 1.0 miles above 1 st bridge	2.1	20 1+ RBT's (74-132mm) found.	Moderate intensity survey
	HG-2	4/25	100 0.5 miles above 1 st bridge	1.3	Three 1+ RBT's (90-165mm) found.	Moderate intensity survey
	HG-3	4/25	100 1 st bridge on Hatley Gulch Rd	1.3	No fish found.	Moderate intensity survey
Dustin Hollow	DH-1	7/8	20 1.7 miles above mouth	0.8	37 0+ RBT's (48-85mm) found.	Moderate intensity survey
	DH-2	7/8	30 1.2 miles above mouth	0.8	No fish found.	Moderate intensity survey
	DH-3	7/8	30 ~70 meters above Bundy Hollow	0.8	Three 0+ RBT's (60-68mm), Three 1+ RBT's (119-170mm) found.	Moderate intensity survey
	DH-4	6/5	63 100 meters above mouth	2.5	Five 0+ RBT's (30-44mm) found. SCP-common, CF-present	Moderate intensity survey
Bundy Hollow	BH-1	7/8	N/A 0.6 miles above mouth	N/A	N/A	Stream was dry
	BH-2	7/8	N/A 0.3 miles above mouth	N/A	N/A	Stream was dry
	BH-3	7/8	N/A ~10 feet above mouth	N/A	N/A	Stream was dry
Hogeye	H-1	7/8	20 2.3 miles above Whiskey Ck Rd	0.8	One 0+ RBT (48mm) found. SCP-rare	Moderate intensity survey
	H-2	7/8	N/A 1.8 miles above Whiskey Ck Rd	N/A	N/A	Stream was dry

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Hogeye (Cont.)	H-3	7/8	N/A	N/A	N/A	Stream was dry
	0.9 miles above Whiskey Ck Rd					
	H-4	5/27	28	1.9	Six 1+ RBT's (98-130mm) found. SCP-common, SD-rare	Moderate intensity survey
	H-5	5/27	68	2.1	Eight 1+ RBT's (90-133mm) found. SCP-common, SD-rare	Moderate intensity survey
Just above mouth						
Whiskey Creek	WC-1	6/25	30	3.4	Five 0+ RBT's (49-68mm), Seven 1+ RBT's (121-180mm) found. SD-abundant, BLS-common	Moderate intensity survey
	mouth of Alyward Trib					
	WC-2	4/9	25	7.8	Eight 1+ RBT's (81-152mm) found. SD-uncommon	Moderate intensity survey
	4 th brg on Whiskey Ck Rd					
	WC-3	4/9	37	7.3	Seven 1+ RBT's (88-161mm) found. SCP-rare	Moderate intensity survey
	3 rd brg on Whiskey Ck Rd					
	WC-4	4/9	26	5.1	11 1+ RBT's (75-171mm) found. SCP-rare	Moderate intensity survey
0.8 mi below 3 rd brg on Whiskey Ck Rd						
WC-5	4/9	92	7.0	Nine 1+ RBT's (81-152mm) found. SD-uncommon, SCP-rare	Moderate intensity survey	
~5 meters below 2 nd brg on Whiskey Ck Rd						
WC-5	6/25	N/A	N/A	N/A	Stream was dry	
~5 meters below 2 nd brg on Whiskey Ck Rd						
Alyward Trib	A-1	4/10	40	2.0	No salmonids found SD-rare	Moderate intensity survey
	Top site					
	A-2	4/10	30	2.5	No fish found.	Moderate intensity survey
	2 nd Site					
	A-3	4/10	50	3.0	No fish found.	Moderate intensity survey
Powerlines						
A-4	4/10	60	3.0	No salmonids found. SD-abundant	Moderate intensity survey	
~10 feet above mouth						
A-4	6/25	30	1.0	No salmonids found. SD-common, BLS-rare	Moderate intensity survey	
~10 feet above mouth						
Whetstone Ck	WN-1	6/5	40	0.7	No fish found.	Moderate intensity survey Very little water
Thorn Hollow Rd						

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Whetstone Ck (Cont.)	WN-2	6/5	N/A	N/A	N/A	Stream was dry
	WN-3	6/5	40	2.1	No fish found.	Moderate intensity survey
	WN-4	6/5	27	1.1	No salmonids found. SD-rare, CF-present	Moderate intensity survey
	WN-5	6/5	32	2.0	No salmonids found. SD-uncommon, CF-present	Moderate intensity survey
	WW-7	8/11	30	10.2	Three 0+ RBT's (61-93mm), One 1+ RBT (154mm) found. SD-abundant, SCP, RSS-common, NPM-rare	Heavy intensity survey, lost bottom net during first pass.
Walla Walla River	WW-11	8/18	30	9.3	Five 0+ RBT's (60-88mm) RSS, SD, BLS-abundant, NPM-common, SMB, CMO-rare	Heavy intensity survey, lost bottom net during first pass
Yellowhawk Creek	YC-1	6/18	100		15 1+ RBT's (117-190mm), SCP, SD, RSS, BLS-common CF-present	High intensity survey
	YC-2	6/19	30	6.3	One 0+ RBT (55mm), Three 1+ RBT's (110-145mm) found. SCP-common, SD, LND-uncommon, RSS-rare, CF-present	High intensity survey
	YC-3	6/18	90	3.0	11 0+ RBT's (33-55mm), Six 1+ RBT's (112-150mm), One adult RBT (265mm), One 1+ WCH (91mm) found. SCP, SD-common, RSS-uncommon	High intensity survey
	YC-3	9/16	100		15 0+ RBT's (55-77mm), Six 1+ RBT's (110-165mm) found. SCP, SD-common, LPY, RSS, BLS-rare, CF-present	High intensity survey
	YC-4	9/16	50		12 0+ RBT's (59-90mm), 15 1+ RBT's (110-185mm), One adult RBT (239mm) found. SCP-common, SD-rare	High intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Yellowhawk Creek (Cont.)	YC-5	9/16	70		14 0+ RBT's (57-80mm), Five 1+ RBT's (125-167mm) found. SCP, SD-common, RSS, LPY-rare	High intensity survey
	YC-6	6/19	30	4.8	11 0+ RBT's (32-52mm) found. SCP, RSS-common, SD-uncommon, NPM, LPY-rare	High intensity survey
East Little Walla Walla	ELW-2	4/29	87.5	5.6	Four 1+ RBT's (97-160mm) found. SCP, SD-abundant, RSS, BLS-uncommon	High intensity survey
	ELW-2	6/26	100	2.0	Three 1+ RBT's (145-195mm) found. SCP, SD-common, RSS-uncommon, NPM-rare, CF-present	High intensity survey
	ELW-2	8/27	100		One 0+ RBT (95mm), One 1+ RBT (178mm), One 0+ WCH (81mm), One 0+ MTW (125mm) found. SCP-common, SD-uncommon, CF-present	High intensity survey
	ELW-3	4/29	38	2.3	No salmonids found. SD-common, SCP-uncommon	Moderate intensity survey
	ELW-4	4/29	43	4.9	No salmonids found. SCP, SD, RSS-common, BLS-uncommon, NPM, CMO-rare	Moderate intensity survey
	ELW-4	6/26	75	2.0	Three 1+ RBT's (135-155mm) found. SCP, SD, BLS-common, RSS, CMO-uncommon	High intensity survey
	ELW-4	8/27	80		One 0+ RBT (98mm), Three 1+ RBT's (105-165mm) found. SCP, RSS, BLS, CMO-common, SD-uncommon, NPM-rare	High intensity survey
	ELW-5	4/29	96	5.4	Three 1+ RBT's (81-190mm) found. SD, RSS, BLS-abundant NPM, SCP-common, CMO-uncommon, LPY-rare	High intensity survey
	ELW-5	6/26	25		Two 0+ RBT's (55-73mm), Two 1+ RBT's (135-145mm), Two 0+ WCH (90-100mm) found.	Moderate intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
East Little Walla Walla (Cont.)	ELW-5 0.2 miles above mouth	8/27	40		No salmonids found. SCP, SD, RSS, BLS-abundant, CMO-common, NPM-rare	Moderate intensity survey
Garrison Creek	GC-1 ~10 meters below diversion	6/16	30	3.7	No salmonids found. RSS-abundant, SCP, BLS-common, LPY-rare	High intensity survey
	GC-2 Pioneer School	6/27	35	2.3	No salmonids found. SCP-common, RSS-rare	Moderate intensity survey
	GC-3 Jefferson Park	6/27	40	2.7	No salmonids found. SCP-abundant, RSS-rare	Moderate intensity survey
	GC-4 Fort Walla Walla	6/27	35	3.0	No salmonids found. SCP-abundant, RSS-rare	Moderate intensity survey
	GC-5 Lions Park	6/27	60	4.0	One 0+ RBT (59mm), three 1+ RBT (127-146mm), and one adult RBT (205mm) found. SCP-abundant, NPM, RSS, BLS-common, LPY, BLS-rare	Moderate intensity survey
	GC-6 Mission Rd.	6/18	30	0.75	No salmonids found. RSS-rare	Moderate intensity survey
Mill Creek	MC-10 Base of Bennington Dam	9/19	100		51 0+ RBT (65-114mm), 17 1+ RBT (115-196mm), seven adult RBT (223-400mm), and one 1+WCH (120mm) found. SCP, SD, RSS, BLS-abundant	High intensity survey
	MC-11 4 weirs below Bennington Dam	6/11			10 1+ RBT (124-189mm), and six adult RBT (209-270mm) found. SD, RSS, BLS-common, SCP-uncommon	Moderate intensity survey
	MC-12 Footbridge at Rooks Park	7/23	60	40	Three 0+ RBT (61-81mm) found. SCP, SD-abundant, RSS, BLS-common, CF-present	Moderate intensity survey
	MC-16 ~60 meters above Yellowhawk diversion	6/21	63	24.5	Six 1+ RBT (110-196mm), and two adult RBT (260-280mm) found. SCP, RSS, SD, BLS-common	Moderate intensity survey
	MC-16 ~60 meters above Yellowhawk diversion	7/23	60	40	One 1+ RBT (122mm), and one adult RBT (230mm) found. SCP, SD, RSS-abundant, BLS-common, CF-present	Moderate intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Mill Creek (Cont.)	MC-16	9/19			Three 1+ RBT (175-190mm), and one adult RBT (233mm) found. SD, RSS, BLS-common, SCP-uncommon, LPY-rare	Moderate intensity survey
			~60 meters above Yellowhawk diversion			
	MC-17	6/11	53	24.5	One 1+ RBT (164mm), and three adult RBT (217-234mm) found. SD, RSS, BLS-common, SCP-uncommon	Moderate intensity survey
			~30 meters below Yellowhawk diversion			
	MC-17	7/23	60	40	No salmonids found. BLS-abundant, SCP, SD, RSS-common	Moderate intensity survey
			~30 meters below Yellowhawk diversion			
	MC-17	9/19	75	32	No salmonids found. SD, RSS, BLS-common, CF-present	Moderate intensity survey
			~30 meters below Yellowhawk diversion			
	MC-18	6/16	40	22.5	One 1+ RBT (157mm) found. SCP, SD, RSS, BLS-common, LND-rare, CF-present	Moderate intensity survey
			Above Tausick Way bridge			
	MC-18	7/23	60	22.0	No salmonids found. SD-abundant, SCP, RSS-common	Moderate intensity survey
			Above Tausick Way bridge			
	MC-18	9/19			No salmonids found. BLS-abundant, SD, RSS-common	Moderate intensity survey
		Above Tausick Way bridge				
MC-19	6/16	50	3.4	One adult RBT (205mm) found. RSS, BLS, SD-common	Moderate intensity survey	
		Wilbur Avenue				
MC-20	6/12	62	2.6	No salmonids found. RSS-common	Moderate intensity survey	
		~15 meters above Roosevelt Street				
MC-21	6/18	100	2.6	Nine 0+ RBT (33-50mm) found. SD, RSS-common, SCP-rare	Moderate intensity survey	
		Clinton Street bridge				
MC-21	7/22	60	2.6	Five 0+ RBT (65-79mm) found. SD, RSS-common, SCP-rare	Moderate intensity survey	
		Clinton Street bridge				
MC-22	6/18	100	3	Seven 0+ RBT (45-50mm) found. RSS, SD-common	Moderate intensity survey	
		Otis Street bridge				
MC-22	7/22	75	2.6	One 0+ RBT (78mm) found.	Moderate intensity survey	
		Otis Street bridge				
MC-23	6/12	110	2.6	Three 1+ RBT (160-198mm) and nine adult RBT (208-298) found. SD, RSS-common, SCP-rare	Moderate intensity survey	
		Spokane St to Palouse St				

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS=threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Mill Creek (Cont.)	MC-24	7/22	130	2.6	Eleven 0+ RBT (57-106mm) and two adult RBT (219 and 259mm) found. SD, RSS-common	Moderate intensity survey
	MC-25	6/12	72	2.6	No salmonids found. SD-rare	Moderate intensity survey
	MC-25	7/22	75	2.6	No salmonids found. SD, RSS-common	Moderate intensity survey
	MC-28	10/13	7	3.1	No salmonids found. SCP, SD-common, CF-present	Moderate intensity survey
Titus Creek	TC-1	6/27	35	3.0	Nine 0+ RBT (35-58mm) found. LPY, SCP, SD, RSS-common	Moderate intensity survey
	TC-2	9/19	60		Two 0+ RBT (86-96mm), eight 1+ RBT (118-183mm), and one adult RBT (228mm) found. SD-common, LND-uncommon, LPY, RSS, BLS-rare	Moderate intensity survey, unknown fish found
	TC-3	6/27	25	0.5	No salmonids found. SD-common RSS-uncommon, SCP-rare	Moderate intensity survey
	TC-3	9/18	35		No salmonids found. SD-common, LND, RSS-uncommon, BLS-rare	Moderate intensity survey
	TC-4	9/18	30		No salmonids found. SD-common, RSS-uncommon, LND, BLS-rare	Moderate intensity survey
	TC-5	9/18	50		No salmonids found. SD, LND-common	Moderate intensity survey
	TC-6	6/27	30	1.0	No salmonids found. SD, RSS-common	Moderate intensity survey
	TC-7	6/16	30	2.5	No salmonids found. SD-abundant, SCP, RSS-common, BLS-rare, CF-present	Moderate intensity survey
	TC-7	9/18	30		No salmonids found. SD, RSS-common, SCP-uncommon, LPY, BLS-rare, CF-present	Moderate intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS=threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Titus Creek (Cont.)	TC-8	6/16	40	3.0	No salmonids found. SCP-common, SD, RSS-uncommon, LPY, BLS-rare, CF-present	Moderate intensity survey
	TC-8	9/18	20		No salmonids found. SD-common, SCP, RSS-uncommon, LPY, BLS-rare	Moderate intensity survey
Doan Creek	DNC-1	4/30	90	1.3	One 1+ RBT (145mm) found. SCP, SD-common, CF-present	High intensity survey
	DNC-1	8/27	30		No salmonids found. SCP-common, SD-uncommon	Moderate intensity survey
	DNC-2	8/27	40	0.9	No salmonids found. SCP-common, SD-uncommon	Moderate intensity survey
	DNC-3	8/27	100		No salmonids found. SD-common, SCP-uncommon	Moderate intensity survey
	DNC-4	5/01	137	1.3	Four 1+ RBT (107-175mm), CC-rare (350-420mm)	High intensity survey
West Little Walla Walla	WLW-1	4/29	70	1.3	No salmonids found. RSS, BLS-abundant, SCP, SD-common	Moderate intensity survey
	WLW-1	6/26	50	1.5	No salmonids found. SD, RSS-common, SCP-uncommon, NPM, BLS-rare	Moderate intensity survey
	WLW-1	8/27	N/A	N/A	N/A	Stream was dry
	WLW-2	6/26	35	1.0	No salmonids found. SD-common	Moderate intensity survey
	WLW-2	8/27	N/A	N/A	N/A	Stream was dry
	WLW-3	8/27	N/A	N/A	N/A	Stream was dry
	WLW-4	6/26	50	0.8	No salmonids found. SD, TSS-abundant	Moderate intensity survey
	WLW-5	8/27	N/A	N/A	N/A	Stream was dry

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
NF Dry Creek	NFD-1 RM 2.9	8/07	29.9	1.8	Seven 1+ RBT (78-112mm) found. SCP-uncommon	High intensity survey
	NFD-2 RM 2.9	8/07	29.25	1.9	Nine 0+ RBT (50-66mm) and 13 1+ RBT (70-105mm) found. SCP-common	High intensity survey
	NFD-3 RM 2.9	8/07	3.9	1.9	15 1+ RBT (71-130mm) found. SCP-rare	High intensity survey
	NFD-4 RM 2.6	8/07	35	2.8	Eight 0+ RBT (55-59mm) and 11 1+ RBT (82-144mm) found. SCP-rare	High intensity survey
	NFD-5 RM 2.5	8/07	35	2.8	Four 0+ RBT (50-55mm) and one 1+ RBT (122mm) found.	Moderate intensity survey
Dry Creek	DRC-3 Highway 12 bridge west of Dixie	7/14	52.5	3.3	55 0+ RBT (40-82mm), 21 1+ RBT (118-183mm), and three adult RBT (234-256mm) found. LPY, SCP, SD, BLS-abundant	High intensity survey, salvage effort for bridge construction
Mud Creek	MDC-1 2.6 miles above Hwy 12	10/10	35	0.8	No salmonids found. SCP-common	Moderate intensity survey
	MDC-2 1.9 miles above Hwy 12	9/30	25	1.2	No salmonids found. SCP-common	Moderate intensity survey
	MDC-3 1.3 miles above Hwy 12	5/27	45	1.1	No salmonids found. SCP-common	Moderate intensity survey
	MDC-4 Directly above old railroad culvert	5/27	26	1.1	No salmonids found. SCP-common	Moderate intensity survey
	MDC-4 Directly above old railroad culvert	9/30	20	0.5	No salmonids found. SCP-rare	Moderate intensity survey
	MDC-5 Directly below old railroad culvert	9/30	20	2.5	Five 1+ RBT (144-164mm) and one adult RBT (200mm) found. SCP-common, crayfish-present	Moderate intensity survey
	MDC-6 First crossing on Mud Ck Rd	5/27	38	1.2	No salmonids found. SCP-common	Moderate intensity survey
	MDC-6 First crossing on Mud Ck Rd	9/30	20	2.0	Two 0+ RBT (80 and 96mm), and one 1+ RBT (171mm) found. SCP-common	Moderate intensity survey
^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.						

Appendix D. Table 1. (Continued) Relative abundance of fish from qualitative electrofishing sites in the Walla Walla River basin, 2003.

Stream	Site #	Date	Site Length	Average Width	Relative Abundance ^a	Comments
Mud Creek (Cont.)	MDC-7	9/30	120	1.0	One 1+ RBT (106mm) and one adult RBT (210mm) found. SD-abundant, SCP-common, CF-present	Moderate intensity survey
	MDC-8	9/30	45	1.0	No salmonids found. SD-abundant, SCP-uncommon	Moderate intensity survey

^a RBT=rainbow trout, BT=bull trout, WCH=chinook, MTW=mountain whitefish, TF=tailed frogs, SCP=sculpin, CF=crayfish, SD=speckled dace, BLS=bridgelip suckers, RSS=redside shiner, NPM=northern pikeminnow, SMB=smallmouth bass, CMO=chiselmouth, LND=longnose dace, LPY=lamprey, CC=common carp, TSS-threespine stickleback.

Appendix E. Relative Abundance of Non-Salmonids, 2003

Appendix E. Table 1. Species	Relative Abundance of Non-salmonids in the Walla Walla River Basin 2003.											
	Walla Walla River	Yellowhawk Creek	East Little Walla Walla	Garrison Creek	Mill Ck 8 Bennington Div.	Mill Ck 9 Bennington Div.	Titus Creek	Doan Creek	West Little Walla Walla	NF Dry Creek	Dry Creek	Mud Creek
Petromyzontide Lamprey larvae	1	1	1	1	1	1	1	0	0	0	4	0
Cyprinidae Speckled dace <i>Rhinichthys osculus</i>	4	3	3	0	2	3	3	2	3	0	4	1
Longnose dace <i>Rhinichthys cataractae</i>	0	1	0	0	2	1	1	0	0	0	0	0
Chiselmouth <i>Acrocheilus alutaceus</i>	1	0	1	0	0	1	0	0	0	0	0	0
Redside shiner <i>Richardsonius balteatus</i>	4	2	2	2	1	3	2	0	2	0	3	0
Northern pikeminnow <i>Ptychocheilus oregonensis</i>	1	1	1	1	0	1	0	0	1	0	0	0
Carp <i>Cyprinus carpio</i>	0	0	0	0	0	0	0	1	0	0	0	0
Catostomidae Suckers ^a <i>Catostomus sp.</i>	2	1	2	1	1	2	1	0	1	0	4	0
Centrarchidae Smallmouth bass <i>Micropterus dolomieu</i>	1	0	0	0	0	0	0	0	0	0	0	0
Largemouth bass <i>Micropterus salmoides</i>	0	0	0	1	0	0	0	0	0	0	0	0
Cottidae Sculpin <i>Cottus sp.</i>	2	3	3	3	3	2	1	2	1	2	4	3
Gasterosteidae Threespine stickleback <i>Gasterosteus aculeatus</i>	0	0	1	0	0	1	0	0	1	0	0	0
Crayfish <i>Pacifastacus Spp.</i>	P	P	P	0	P	P	P	P	0	P	0	P

P = present,

^a Noted by genus only, not identified by species.

Species	NF Touchet 8 Lewis Ck	Spangler Creek	Lewis Ck	Wolf Fork	Green Fly	Hatley Gulch	Green Fork	Burnt Fork	South Fork Touchet	Dustin Hollow	Bundy Hollow	Hogeye Hollow	Whiskey Creek	Alyward Trib.	SF Copei	NF Copei	Copei Creek	Whetstone Creek
Petromyzontide Lamprey	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	1	0
Cyprinidae Speckled dace <i>Rhinichthys osculus</i>	0	0	0	0	0	0	0	0	2	0	0	1	2	2	3	2	3	1
Longnose dace <i>Rhinichthys cataractae</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Redside shiner <i>Richardsonius balteatus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Northern pikeminnow <i>Ptychocheilus oregonesis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Catostomidae Suckers ^a <i>Catostomus sp.</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0
Cottidae Sculpin ^a <i>Cottus sp.</i>	1	1	2	1	0	0	3	3	3	1	0	2	1	0	3	3	3	0
Tailed Frogs <i>Ascaphus truei</i>	1	3	3	3	2	0	0	2	0	0	0	0	0	0	0	0	0	0
Crayfish <i>Pacifastacus sp.</i>	0	0	0	0	0	0	P	P	P	P	0	0	0	0	P	P	P	P

P = present,

^a Noted by genus only, not identified by species.

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

**Appendix F. Manual Flow Summary for the Walla
Walla River, 1998-2003**

Appendix F. Table 1. Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	1998		1999		2000		2001		2002		2003	
	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS
Stateline^a												
July							17	14.59	8	20.2	7	12.0
							24	8.5	22	18.8	21	9.0
							31	9.68				
Avg. Monthly CFS (SD)								10.92 (2.637)		19.50 (0.700)		10.50 (1.500)
August							7	13.91	5	15.8	6	16.7
							20	13.88	20	12.5	19	14.6
Avg. Monthly CFS (SD)								13.90 (0.015)		14.15 (1.650)		15.65 (1.050)
September							4	12.79	4	13.2	2	16.2
							17	12.93	17	26.6	15	12.4
											29	23.9
Avg. Monthly CFS (SD)								12.86 (0.070)		19.90 (6.700)		17.50 (4.784)
October							2	23.35	1	18.6	13	19.0
							8	18.91	15	15.7	29	27.3
							16	36.88	31	16.9		
							23	55.16				
							31	73.02				
Avg. Monthly CFS (SD)								41.46 (20.205)		17.07 (1.190)		23.15 (4.150)
Pepper Rd.												
June			14	78.5	20	79.3	12	27.13	24	36.7		
			30	9.9	29	5.5	21	11.98				
							26	17.60				
Avg. Monthly CFS (SD)				44.2 (34.300)		42.4 (36.900)		18.9 (6.253)		N/A ^b		
July	27	3.16	13	5.1	11	3.6	5	13.65	8	21.0		
			28	2.3	20	4.0	11	14.45	22	16.5		
							17	14.16				
							24	9.19				
							31	9.66				
Avg. Monthly CFS (SD)		N/A ^b		3.7 (1.400)		3.8 (0.200)		12.22 (2.303)		18.75 (2.250)		
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hwy. 125, Mojonier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	1998		1999		2000		2001		2002		2003	
	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS
Pepper Rd. (Cont.)												
August	03	3.42	10	3.1	7	4.1	7	12.51	5	17.7		
	17	3.09					20	14.79	20	12.4		
Avg. Monthly CFS (SD)		3.26 (0.165)		N/A ^b		N/A ^b		13.65 (1.140)		15.05 (2.650)		
September	01	2.79	15	2.7			4	11.13	4	16.1		
	16	3.32	28	2.7			17	12.87	17	27.5		
Avg. Monthly CFS (SD)		3.06 (0.265)		2.7 (0.000)				12.00 (0.870)		21.80 (5.700)		
October	16	2.86	5	2.6	4	81.0	2	26.00	1	17.4		
	28	3.22	13	2.7	19	23.7	16	39.08	15	13.6		
							23	65.61	31	17.5		
							31	81.84				
Avg. Monthly CFS (SD)		3.04 (0.180)		2.65 (0.050)		52.35 (28.650)		53.13 (21.872)		16.17 (1.815)		
0.4 mi above hwy. 125												
June							12	29.58	24	35.4		
							26	16.28				
Avg. Monthly CFS (SD)								22.93 (6.650)		N/A ^b		
July							5	13.74	8	21.2		
							11	14.62	22	15.1		
							17	13.35				
							24	7.86				
							31	9.82				
Avg. Monthly CFS (SD)								11.88 (2.590)		18.15 (3.050)		
August							7	13.34	5	16.3		
							20	12.92	20	12.5		
Avg. Monthly CFS (SD)								13.13 (0.210)		14.40 (1.900)		
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	1998		1999		2000		2001		2002		2003	
	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS
0.4 mi above hwy. 125 (Cont.)												
September							4	11.29	4	14.2		
							17	13.15	17	27.0		
Avg. Monthly CFS (SD)								12.22 (0.930)		20.60 (6.400)		
October							2	22.06	1	19.5		
							8	19.42	15	16.0		
							16	37.47	31	16.3		
							23	60.90				
							31	70.22				
Avg. Monthly CFS (SD)								42.01 (20.404)		17.27 (1.584)		
0.5 mi above Buringame Div.												
June			26	83.0			12	78.6	24	81.0	10	55.5
							28	68.2			24	41.0
Avg. Monthly CFS (SD)				N/A ^b				73.40 (5.200)		N/A ^b		48.25 (7.250)
July			11	45.1			10	41.9	8	61.6	7	55.4
							24	36.0	22	41.0	21	43.0
							31	43.9				
Avg. Monthly CFS (SD)				N/A ^b				40.60 (3.354)		51.30 (10.300)		49.20 (6.200)
August			7	27.6	6	48.6	5	36.3	6	53.7		
			8	33.1	20	54.6	20	36.6	19	44.1		
Avg. Monthly CFS (SD)				30.35 (2.750)		51.60 (3.000)		36.45 (0.150)		48.90 (4.800)		
September			5	48.7	4	46.8	4	39.5	2	44.3		
			18	48.1	17	41.6	17	52.2	15	52.3		
									29	50.0		
Avg. Monthly CFS (SD)				48.40 (0.300)		44.20 (2.600)		45.85 (6.350)		48.87 (3.363)		
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	1998		1999		2000		2001		2002		2003	
	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS
0.5 mi above Buringame Div. (Cont.)												
October					19	81.9	2	62.4	1	50.8	13	64.6
							16	90.2	15	49.1	29	66.6
							31	136.6	31	40.2		
Avg. Monthly CFS (SD)						N/A ^b		96.40 (30.608)		46.70 (4.648)		65.60 (1.000)
Mojonnier Rd.												
June			1	296.0	20	104.6	12	32.69	24	30.1	4	23.9
			9	83.7	29	10.5	26	31.22			10	36.4
			30	5.9							24	31.7
Avg. Monthly CFS (SD)				128.53 (122.602)		57.55 (47.050)		31.96 (0.735)		N/A ^b		30.67 (5.155)
July	9	29.48	13	15.5	11	16.4	5	24.26	8	41.7	7	45.3
	20	36.05	28	25.7	20	42.2	10	43.28	22	43.9	21	37.3
							11	49.88				
							17	45.24				
							24	33.42				
							31	42.65				
Avg. Monthly CFS (SD)		32.77 (3.285)		20.60 (5.100)		29.30 (12.900)		39.79 (8.501)		42.80 (1.100)		41.30 (4.000)
August	3	25.77	10	22.6	7	29.9	7	46.42	5	42.5	6	57.1
	17	25.14	23	25.0	21	32.2	20	51.26	20	38.1	19	38.7
Avg. Monthly CFS (SD)		25.46 (0.315)		23.80 (1.200)		31.05 (1.150)		48.84 (2.420)		40.30 (2.200)		47.90 (9.200)
September	1	28.30	15	21.7	5	49.0	4	45.48	4	40.7	2	42.5
	16	35.01	28	26.1	18	47.7	17	37.08	17	61.8	15	45.8
											29	46.9
Avg. Monthly CFS (SD)		31.66 (3.355)		23.90 (2.200)		48.35 (0.650)		41.28 (4.200)		51.30 (10.550)		45.07 (1.870)
October	16	1.83	5	31.4	4	93.4	2	40.86	1	57.9	13	38.9
	28	13.72	13	15.1	19	16.5	8	25.97	15	22.7	29	34.5
			18	8.4			16	18.58	31	17.9		
							23	55.64				
							31	68.74				
Avg. Monthly CFS (SD)		7.78 (5.945)		18.30 (9.659)		54.95 (38.450)		41.96 (18.481)		32.83 (17.833)		36.70 (2.200)
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	<u>1998</u>		<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002</u>		<u>2003</u>	
	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>
Swegel Rd.												
June			1	287.6	26	42.9	11	27.95	24	34.3	10	48.4
			9	85.6			27	26.64			24	36.2
			30	7.0								
Avg. Monthly CFS (SD)				126.73 (118.189)		N/A ^b		27.30 (0.655)		N/A ^b		42.30 (6.100)
July	2	3.43	13	17.5	11	22.2	10	43.74	8	41.1	7	41.0
	9	31.65	28	23.7			24	33.21	22	46.4	21	42.3
	20	35.52					31	45.93				
Avg. Monthly CFS (SD)		23.53 (14.303)		20.60 (3.100)		N/A ^b		40.96 (5.553)		43.75 (2.650)		41.65 (0.650)
August	3	27.22	10	23.6	7	29.1	6	40.58	5	45.4	6	54.3
	17	21.66	23	24.9	21	36.7	20	42.52	20	32.4	19	40.4
Avg. Monthly CFS (SD)		24.44 (2.780)		24.25 (0.650)		32.90 (3.800)		41.55 (0.970)		38.90 (6.500)		47.35 (6.950)
September	1	25.55	15	26.6	5	54.8	4	42.95	4	35.1	2	38.7
	16	37.28	28	31.3	18	56.3	17	45.80	17	50.6	15	54.8
											29	56.2
Avg. Monthly CFS (SD)		31.42 (5.865)		28.95 (2.350)		55.55 (0.750)		44.38 (1.425)		42.85 (7.750)		49.90 (7.940)
October	16	8.32	13	20.4	4	97.1	1	49.81	1	54.8	13	40.8
	26	20.43			19	23.7	16	28.41	15	26.5	29	33.0
							31	47.96	31	21.7		
Avg. Monthly CFS (SD)		14.38 (6.055)		N/A ^b		60.40 (36.700)		42.06 (9.682)		34.33 (14.604)		36.90 (3.900)
Detour Rd.												
June			1	403.4	20	171.7	11	34.10	18	148.4	4	43.6
			9	121.9	29	22.7	27	46.95	24	50.8	10	47.7
			30	15.9							24	47.5
Avg. Monthly CFS (SD)				180.40 (163.515)		97.20 (74.500)		40.53 (6.425)		99.60 (48.800)		46.27 (1.887)
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	<u>1998</u>		<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002</u>		<u>2003</u>	
	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>	<u>Day</u>	<u>CFS</u>
Detour Rd. (Cont.)												
July			13	19.2	10	25.6	10	57.32	8	45.9	7	54.4
			28	26.8	20	38.5	24	38.75	22	41.8	21	38.2
							31	52.82				
Avg. Monthly CFS (SD)				23.00 (3.800)		32.05 (6.450)		49.63 (7.910)		43.85 (2.050)		46.30 (8.100)
August			10	30.6	7	29.3	6	43.55	5	45.9	6	53.6
			24	32.6	21	38.1	20	41.11	20	32.4	19	41.7
Avg. Monthly CFS (SD)				31.6 (1.000)		33.70 (4.400)		42.33 (1.220)		39.15 (6.750)		47.65 (5.950)
September			15	29.0	5	55.0	4	44.29	4	35.9	2	46.3
			28	35.4	18	59.9	17	44.25	17	50.6	15	63.6
											29	59.4
Avg. Monthly CFS (SD)				32.20 (3.200)		57.45 (2.450)		44.27 (0.020)		43.25 (7.350)		56.43 (7.368)
October			13	31.8	4	128.2	1	54.34	1	56.3	13	45.7
					19	41.7	8	35.71	15	30.5	29	41.7
							16	35.43	31	37.7		
							23	69.66				
							31	69.10				
Avg. Monthly CFS (SD)				N/A ^b		84.95 (43.250)		52.85 (15.140)		41.50 (10.870)		43.70 (2.000)
McDonald Rd.												
June					26	36.6	11	18.62	24	20.4	10	21.1
							27	27.61			24	23.3
Avg. Monthly CFS (SD)						N/A ^b		23.12 (4.495)		N/A ^b		22.20 (1.100)
July	9	4.09	13	6.73	10	5.9	10	17.50	8	19.5	7	9.8
	20	4.92					23	21.83	22	17.3	21	12.0
Avg. Monthly CFS (SD)		4.51 (0.415)		N/A ^b		N/A ^b		19.67 (2.165)		18.40 (1.100)		10.90 (1.100)
^a No data was collected in June at these sites. ^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.												

Appendix F. Table 1. (Cont.) Manual flow summary (average monthly CFS and standard deviation) from June through September, 1998-2003, on the Walla Walla River at Stateline, Pepper Rd., 0.4 mi above hyw. 125, Mojonnier Rd., Swegel Rd., Detour Rd., McDonald Rd., and Mckay Rd.

	1998		1999		2000		2001		2002		2003	
	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS	Day	CFS
McDonald Rd. (Cont.)												
August	3	0.00	10	9.1	7	11.0	6	23.71	5	18.9	6	24.7
	17	7.96	23	11.4	21	17.8	20	16.23	20	9.9	19	12.5
Avg. Monthly CFS (SD)		3.98 (3.98)		10.25 (1.150)		14.40 (3.400)		19.97 (3.740)		14.40 (4.500)		18.60 (6.100)
September	1	9.97	15	12.1	5	34.3	4	17.73	4	16.2	2	16.7
	17	17.31	28	14.5	18	41.0	17	21.26	17	30.9	15	32.6
											29	44.4
Avg. Monthly CFS (SD)		13.64 (3.670)		13.30 (1.200)		37.65 (3.350)		19.50 (1.765)		23.55 (7.350)		31.23 (11.350)
October			13	15.8	4	112.2	1	38.2	1	33.3	13	34.5
					19	27.3	16	26.68	15	20.3	29	26.9
							31	54.9	31	18.5		
Avg. Monthly CFS (SD)				N/A ^b		69.75 (42.450)		39.93 (11.585)		24.03 (6.594)		30.70 (3.800)
McKay Rd.^a												
July	27	3.80										
Avg. Monthly CFS (SD)		N/A ^b										
August	17	0.00										
Avg. Monthly CFS (SD)		N/A ^b										
September	1	2.42										
	28	15.21										
Avg. Monthly CFS (SD)		8.82 (6.395)										
October	16	0.76										
	28	7.63										
Avg. Monthly CFS (SD)		4.20 (3.435)										

^a No data was collected in June at these sites.

^b N/A- only one measurement was taken during the month so no average or standard deviation was calculated.