Lyons Ferry Complex Hatchery Evaluation: Summer Steelhead Annual Report 2004 Run Year

by

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Introduction

This annual report is one in a continuing series describing Washington Department of Fish and Wildlife's (WDFW) progress toward meeting trout (resident and anadromous) mitigation goals established in the Lower Snake River Compensation Plan (LSRCP). The reporting period covers between 1 July 2004 and 30 June 2005. Smolt trapping information for the 2004/2005 emigration season will be presented in a future report, as population estimates were not completed at the time of report printing. Coded wire tag recoveries/expansions from the summer steelhead (*Oncorhynchus mykiss*) sport fishery in the Columbia and Snake river basins will also be presented in future reports. In addition, we had anticipated a genetics summary of samples collected from natural origin Tucannon and Touchet rivers steelhead, compared to Lyons Ferry stock steelhead, but a delay in the analysis made the summary report unavailable to be included here. We anticipate that this summary should be available for the next annual report.

The LSRCP program in Washington State began in 1981 with construction of Lyons Ferry Hatchery (LFH). Refurbishing of the Tucannon Fish Hatchery (TFH) followed in 1984 to 1985. In addition to the hatchery construction and modifications, three remote acclimation ponds (AP) were built along the Tucannon (Curl Lake AP), Touchet (Dayton AP), and Grande Ronde (Cottonwood AP) rivers to acclimate juvenile summer steelhead before release. All of these facilities make up WDFW's Lyons Ferry Complex (LFC) (Figure 1).

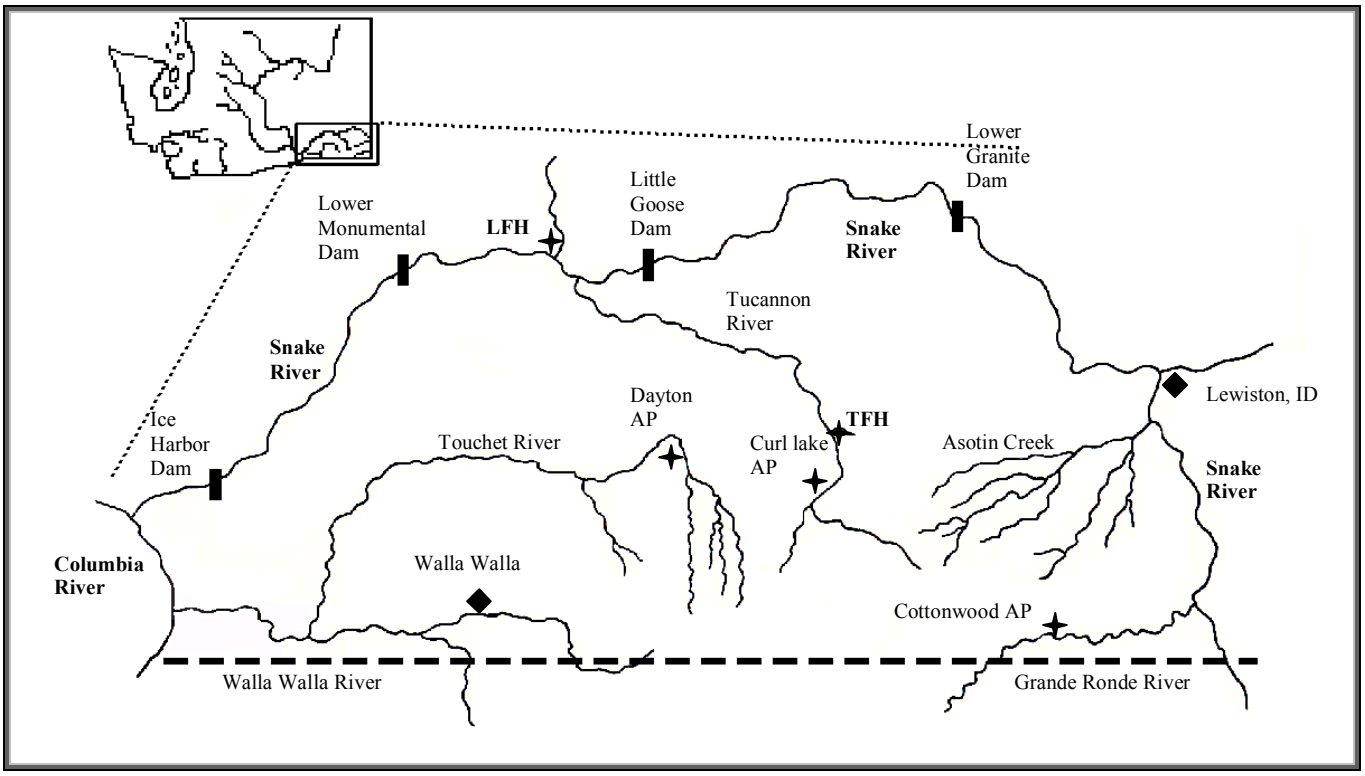

Figure 1. Map of major rivers and streams in Southeast Washington, and Lyons Ferry Complex facilities.

Production Goals of Steelhead and Rainbow Trout Stocks

The LFC currently uses four stocks of steelhead to produce smolts for release into the Snake (60,000 smolts of LFH stock), Tucannon (100,000 smolts of LFH stock, 50,000 smolts of Tucannon Endemic stock), Grande Ronde (160,000 smolts of Wallowa Stock), Walla Walla (100,000 smolts of LFH stock), and Touchet rivers (85,000 smolts of LFH stock, 50,000 smolts of Touchet Endemic stock) to enhance recreational opportunities for steelhead anglers. All steelhead smolts for the program are planned for a release size of 4.5 fish/lb. Current releases of summer steelhead smolts are lower than originally specified by the LSRCP program. Releases have been reduced through the years in partial response to Endangered Species Act (ESA) concerns and documented smolt-to-adult (SAR) survival rates far exceeding the original SAR goal of 0.5%.

The LSRCP mitigation trout program has focused on providing recreational fishing opportunities in southeast Washington. Currently, the LFC goal is to produce 237,500 trout (79,900 lbs) for release into southeast Washington. The LFC also produces another 150,000 (3,000 lbs) fry (Spokane stock), and 50,000 (3,333 lbs) fingerlings (Kamloops stock) for Idaho Fish and Game's (IDFG) LSRCP program. Endangered Species Act (ESA) listings of Chinook (*O. tshawytscha*),

steelhead, and bull trout (*Salvelinus confluentus*) caused the stocking of rainbow trout from LFC into Washington State area waters to be shifted almost exclusively to small lakes and ponds to reduce the potential negative effects on listed species. During the report period, stocking of LSRCP produced rainbow trout within Washington (Table 1 – catchable size only), and transfers to the State of Idaho (both Spokane and Kamloops stocks) went as planned. WDFW also produces larger sized (1.5-2.5 lbs/fish) rainbow trout at TFH for stocking into areas lakes (Table 1).

In-Hatchery Survival

Survival rates of steelhead at LFC remain highly variable among stocks and among years. Fish health problems (e.g., cold water disease), presence of pathogens such as Infectious Hematopoetic Necrosis virus (IHNV), and spawning conditions at LFC and at remote spawning sites have all affected in-hatchery survival (Table 2). Despite extra measures taken by both hatchery and science staffs to obtain accurate estimated numbers of eggs or newly hatched steelhead fry, there continues to be errors discovered when 100% of the fish are counted during the marking phase. Within hatchery survival estimates are therefore not very reliable (we often have fry-smolt survival in excess of 100%). This imprecision, while not absolutely critical to program evaluations or determining program success, warrants further examination.

Table 1. Summary of rainbow trout plants (catchable size) from Lyons Ferry Complex, 2005 (Represents both LSRCP and State funded programs).

County	Location	Number of Plants	LSRCP lbs of fish planted	LSRCP # of fish planted	State lbs of fish planted	State # of fish planted
Adams	Sprague Lake	2	1,762	4,500	0	0
	Total	***2***	***1,762***	***4,500***	***0***	***0***
Asotin	Golf course Pond	11	7,125	20,504	743	450
	Headgate Pond	1	589	2,003	0	0
	Silcott Pond	1	800	2,000	0	0
	West Evans Pond	11	6,449	18,056	748	450
	Total	***24***	***14,963***	***42,563***	***1,491***	***900***
Columbia	Beaver Lake	2	317	1,002	0	0
	Big Four Lake	2	1,111	3,000	390	300
	Blue Lake	12	6,743	19,568	640	350
	Curl Lake	5	3,414	10,036	512	201
	Dam Pond	1	370	1,000	0	0
	Dayton Jv. Pond	9	1,000	3,090	252.5	125
	Deer Lake	3	978	3,647	0	0
	Donnie Lake	1	100	420	0	0
	Orchard Pond	1	556	1,500	0	0
	Rainbow Lake	13	6,721	18,096	779	400
	Spring Lake	8	3,984	11,054	451	300
	Watson Lake	11	5,770	16,523	744	388
	Total	***67***	***30,950***	***88,788***	***3,768.5***	***1,364***
Franklin	Dalton Lake	7	7,844	24,022	540	300
	Marmes Pond	2	805	2,000	0	0
	Total	***9***	***8,649***	***26,022***	***540***	***300***
Garfield	Baker's Pond	2	1,273	3,001	0	0
	Casey Pond	1	148	503	0	0
	Total	***3***	***1,421***	***3,504***	***0***	***0***
Walla Walla	Bennington Lake	7	7,115	19,158	294	200
	Fishhook Pk. Pond	3	1,585	5,139	270	150
	Lions Park Pond	5	744	1,858	200	100
	Quarry Pond	8	8,338	25,969	600	300
	Total	***22***	***17,665***	***51,972***	***1,364***	***750***
Whitman	Garfield Pond	2	715	2,002	63	25
	Gilcrest Pond	2	358	1,503	50	25
	Pampa Pond	4	1,811	6,039	360	200
	Riparia Pond	1	556	1,500	0	0
	Union Flat Creek	1	500	1,500	0	0
	Total	***10***	***3,940***	***12,544***	***473***	***250***
Total Rainbows		**137**	**79,350**	**229,893**	**7,636.5**	**4,264**

Table 2. Number spawned, average fecundity, and survival by life state of LFH stock steelhead spawned at LFH, 2004 and 2005 brood years.

	Spawned		Average eggs/							Fry-smolt
BY	Female	male	female	Eggs taken	Eggs retained [a]	Percent retained	Fry	Egg-fry survival	Smolts	survival
Wallowa Stock										
2004	68	105	4,683	318,430	290,391	91.2	286,536	98.7	150,442 [b]	100.0
2005	60	70	4,711	282,675	274,586	97.1	273,608			
Lyons Ferry Stock										
2004	133	259	3,832	494,380	414,258	83.8	408,462	98.6	355,362	87.0
2005	133	263	4,428	571,185	452,011	79.1	439,803			
Tucannon Stock										
2004	16	15	4,723	75,560	59,911	79.3	58,882	98.3	61,238	100.0
2005	14	25	5,509	77131	71,933	93.3	70,254	97.7		
Touchet Stock										
2004	15	10	4,408	66,125	56,066	84.8	55,358	98.7	55,706 [c]	100.0
2005	18	17	4,147	79,540	50,629	63.6	49,870	98.5		

[a] The number of eggs retained includes all losses from green egg to eye up (mortality and eggs destroyed due to IHNV).

[b] The fry to smolt survival percentage has been adjusted to include fry 146,481 that were transported to an area lake because we were over-production for the 2004 Brood Year.

[c] Five (2005 BY) Touchet steelhead tested positive for IHNV. Four of the fish were reared to the fed fry stage (20,441) and released into the Touchet River. The remaining fish was held to the eyed-egg stage (5,459) and planted into an artificial redd in the Touchet River near the confluence of the North and South Forks.

Marking

All production steelhead from the LFH and Wallowa stocks were marked for harvest management with an adipose (AD) fin clip prior to release. Study groups within the LFH and Wallowa stocks of fish were marked with a combination of coded wire tag (CWT) and left ventral (LV) fin clip for specific contribution studies and/or to document straying (Table 3). The Tucannon and Touchet rivers endemic steelhead stocks are not currently managed for harvest: therefore adipose fins were not clipped prior to release. In January 2005, the endemic stocks were tagged with a CWT and given a green Visual Implant Elastomer (VIE) tag behind the eye for external identification (Table 3). Evaluation staff conducted quality control tag/mark checks on all release groups. In addition, about 10,000 passive integrated transponder (PIT) tags were inserted in each of the endemic groups prior to release in 2005. Since the endemic stock releases are not marked for sport harvest, we will rely on adult PIT tag detections at the mainstem dams and PIT tag arrays in the Tucannon and Walla Walla rivers to determine smolt-to-adult survival rates for these groups. We are assuming PIT tag loss and differential mortality is negligible on these groups as they are tagged at a relatively large size (~90g, 200mm). An assessment of downstream migration success from these PIT tag groups will be presented in future reports, as well as an evaluation of the programs success and recommendations about the program.

Table 3. Summer steelhead smolt releases from Lyons Ferry Complex, 2005.

Location (Stock)	Rkm	Date	Total release	Marked release [a]	CWT [b] code	Marks/ Brand/ VIE	Lbs	Size #/lb	CWT %Loss	VIE %Loss
Grande Ronde @ Cottonwood AP (Wallowa)	45.9	3/25-3/31	150,442	37,761	26 / 77	ADLV	23,507	6.4	5.2439	NA
Snake River @ LFH (LFH)	92.8	4/4-4/7	63,036	20,011	23 / 64	ADLV	13,874	4.5	3.8317	NA
Tucannon River ~200m ↓ Pataha Creek (LFH)	18.5	4/4-4/7	102,029	19,265	23 / 65	ADLV	21,989	4.6	2.1935	NA
Touchet River @ Dayton AP (LFH)	86.4	4/1-4/10	86,270	19,071	23 / 67	ADLV	18,355	4.7	1.2232	NA
Walla Walla River (LFH)	56.0	4/4-4/7	104,027	20,021	23 / 66	ADLV	22,956	4.5	1.2443	NA
Tucannon River @ Curl Lake Intake (Tucannon)	64.0	3/29-3-31	61,238	61,238	11 / 86	CWT ONLY RG VIE	12,817	4.8	2.3522	NA
Touchet River @ NF Touchet Bridge (Touchet)	91.5	3/29-3/31	55,706	55,706	11 / 85	CWT ONLY LG VIE	10,185	5.5	2.3780	NA

[a] The number shown as marked released has not been adjusted for tag/mark loss. Endemic stock releases are not externally marked, therefore the unmarked release is equal to the total release number.

[b] All CWT codes begin with "63".

Juvenile Releases

Evaluation staff collected pre-release samples for all LFC release locations (Table 4). Release numbers and size goals for the Wallowa stock fell short due to the unexpected outbreak of Bacterial Gill Disease at Cottonwood Pond. The disease, in combination with low water supply during the spring of 2005 causing poor water conditions in the pond, prevented us from feeding the normal amount of food prior to release. All other release groups (LFH stock) were at, or above, program numbers. This was mainly due to the bird netting placed over Lake One that held the LFH stock fish, which greatly reduced predation compared to previous years.

For the second year in a row, hatchery staff size graded both endemic stocks. This was an effort to prevent a bi-modal size distribution in the release groups. This effort was successful for the Tucannon stock, but the small sized fish in the Touchet endemic stock never caught up and in the end they had to be released at a smaller than desired size. Additional measures to eliminate these size differences, that have been a continual problem in the endemic stock programs from the beginning, continue to be investigated.

Table 4. Mean fork lengths, weights, condition factor (K), co-efficient of variation (CV), fish per pound (FPP), and the percent of each release visually documented as precociously mature males from LFC steelhead prior to release, 2005.

Location (Stock)	Date	N	Avg LN (mm)	Avg WT (g)	K	CV	FPP	Percent precocious
Cottonwood (Wallowa)	3/25	336	185.6	70.7	1.03	12.2	6.4	0.00%
Tucannon (LFH)	4/04	262	212.0	99.8	1.03	8.0	4.6	0.38%
Tucannon (Endemic-Large)	3/28	200	201.7	95.6	1.12	11.9	4.7	0.00%
Tucannon (Endemic-Small)	3/28	200	200.3	96.5	1.14	14.5	4.7	0.00%
Touchet (LFH)	3/25	278	207.6	97.7	1.07	7.8	4.6	0.00%
	4/07	250	207.1	95.4	1.05	9.4	4.8	0.00%
Touchet (Endemic-Large)	3/28	209	197.4	94.6	1.14	15.6	4.8	0.00%
Touchet (Endemic-Small)	3/28	207	172.1	65.4	1.15	16.9	6.9	1.44%
Walla Walla (LFH)	4/04	340	209.6	97.4	1.04	7.8	4.7	0.00%
Lyons Ferry (LFH)	4/04	331	212.8	102.6	1.04	8.6	4.4	0.00%
Lake #1 [a] (LFH)	4/04	280	222.8	106.9	0.96	5.8	4.2	0.00%
	4/05	220	223.3	106.9	0.85	6.8	4.2	0.00%
	4/06	250	219.2	103.6	0.97	7.0	4.4	0.00%

[a] Fish removed from Lake#1 were released in the Tucannon and Walla Walla rivers, and on-station at Lyons Ferry.

Smolt Migration

We calculated relative smolt passage (migration success) during down river migration in the Snake River (Cottonwood, Tucannon and Lyons Ferry releases) and the Columbia River (Touchet Endemic stock releases) from PIT tags, freeze brands, and VIE tags sampled at the juvenile bypass facilities located at dams (Fish Passage Center unpublished data). A Passage Index, and median and 95% passage time (days) for each freeze brand and/or VIE group released from the 2004 release year were estimated (Table 5). The passage indices estimated in 2004 were similar to previous years (Bumgarner et al. 2003, Bumgarner et al. 2004).

During the spring of 2004, we PIT tagged groups of natural and endemic stock steelhead at the Tucannon River smolt trap to monitor downstream migration success to each of the dams located

on the Snake and Columbia rivers. Cumulative unique PIT tag detections were summarized, which provided a detection history for both the natural and endemic origin groups (Table 6). Besides unique detections, we also used the SURPH model (Smith et al. 1994) to estimate survival of both natural and endemic origin groups of fish from point of release or from our smolt trap to Lower Monumental Dam (Tucannon River releases) or to McNary Dam (Touchet River releases; Table 6). SURPH model estimates were higher as expected and likely represent a truer estimate of survival compared to unique detections. We believe the estimated low survival of our endemic releases from the point of release is a combination of residualism, mortality or predation following release, and harvest in the river by trout fisherman after June 1 each year.

Table 5. Estimated passage of freeze branded or VIE tagged LFC summer steelhead at the first downstream collector dam from site of release, 2004 release year (FPC 2004, unpublished data)

Brand	Release site	Passage index	Number released [a]	Percent of release	Size (#/lb)	Passage days 50%	Passage days 95%
LA-S-1	Cottonwood AP	14,293	37,292	38.3	4.8	14	33
RA-IJ-1	Tucannon River	2,290	19,027	12.0	4.4	17	30
LA-IJ-1	Lyons Ferry Hatchery	10,063	19,311	52.1	4.4	12	21
Right Red VIE	Tucannon River	10,601	39,633	26.8	4.8	46	54
Left Red VIE	Touchet River	3,039	55,829	5.4	5.3	30	55

[a] Adjusted for freeze brand or VIE tag loss following tagging

Table 6. Unique detections of PIT tags from natural or endemic stock steelhead tagged and released in the Tucannon and Touchet rivers, 2004.

Group	Number Tagged	Detection facility [a] LMO	MCN	JDA	BONN	Total	%	SURPH [b] Estimate
Tucannon River @ Curl Lake Intake (Endemic Hatchery Origin)	9,969	1,882	180	124	39	2,241 [c]	22.5	36% (+/-1%)
Tucannon R. @ smolt trap (Endemic Hatchery Origin)	757	278	37	24	3	347 [d]	45.8	80% (+/-15%)
Tucannon R.@ smolt trap (Natural Origin)	1,985	773	111	58	19	970 [e]	48.9	83% (+/-6%)
Touchet River (Endemic Origin) @ Baileysburg on N.F. Touchet	9,920	- - -	181	158	33	381 [f]	3.8	9% (+/-1%)

[a] Detection Facilities: LGR - Lower Granite Dam, LGO - Little Goose Dam, LMO – Lower Monumental Dam, MCN - McNary Dam, JDA – John Day Dam, BONN - Bonneville Dam.

[b] SURPH estimate is to first mainstem dam fish would encounter. For Tucannon River releases it is Lower Monumental Dam, for Touchet River releases it is McNary Dam. Parenthesis show the 95% confidence intervals.

[c] Includes 16 fish captured from the Travel Array Experiment (TWX) below Bonneville Dam.

[d] Includes five fish captured from the Travel Array Experiment (TWX) below Bonneville Dam.

[e] Includes nine fish captured from the Travel Array Experiment (TWX) below Bonneville Dam.

[f] Includes nine fish captured from the Travel Array Experiment (TWX) below Bonneville Dam.

Tucannon River Natural Smolt Production

We operated a 1.5m rotary screw trap at rkm 3.0 on the Tucannon River between fall of 2003 and spring 2004 to estimate the number of migrating natural steelhead smolts. Methods to estimate smolt production have been previously described (Bumgarner et. al. 2003, Bumgarner et. al. 2002). During the 2003/2004 trapping season we captured 2,770 natural origin steelhead smolts at the trap, for an estimated 15,512 total smolt out-migration (Table 7). About 94% of the migrant smolts were captured between 15 March and 15 June. Age composition based on the scale readings and expanded smolt estimate was 22.8% Age 1, 68.5% Age 2, and 8.5% Age 3, and 0.2% Age 4. During the main out-migration period (March-early June) mean length, weight, and K-factor for natural fish captured was 183.3 mm, 62.8g and 0.99, respectively. The mean size of smolts captured was similar to previous years (Table 8.) Peak of migration for natural steelhead was May 21, with an estimated 807 smolts migrating past the trap on that day.

Table 7. Estimated production of natural-origin steelhead smolts from the Tucannon River by migration (1996-2004) and brood year (1995-2003).

Migration year	Brood Year									Totals
	1995	1996	1997	1998	1999	2000	2001	2002	2003	
1995/1996 [a]	5,583									14,667
1996/1997 [a]	8,967	6,069								15,944
1997/1998	834	11,584	16,684							29,096
1998/1999		1,133	14,095	9,000						24,229
1999/2000		37	3,279	25,069	14,897					43,282
2000/2001			8	945	13,747	11,912				26,612
2001/2002				17	498	10,824	8,050			19,389
2002/2003						915	9,085	9,920		19,920
2003/2004						31	1,318	10,626	3,537	15,512
Totals	15,384	18,823	34,066	35,031	29,142	23,682	18,453	20,546	- - -	

[a] Scales were not collected during the 1995/1996 or 1996/1997 migration years. Age composition for those years are based on mean age composition from the 1998/1999 to 2000/2001 migration years. Age 4 fish were not included in the calculation based on their low frequency.

Table 8. Mean fork length and percent of sample by age of summer steelhead smolt captured at the Tucannon River smolt trap (March-June of each year).

	Mean length by age				Overall Mean	Sample Size	Percent age in scale sample			
	Age 1	Age 2	Age 3	Age 4			Age 1	Age 2	Age 3	Age 4
1998	184.1	187.0	190.5	- - -	185.3	729	61.0	36.2	2.7	0.0
1999	173.1	186.5	189.2	- - -	182.6	1052	30.0	64.8	5.1	0.0
2000	182.3	189.3	196.5	199.5	187.6	1016	32.9	58.6	8.4	0.2
2001	177.6	186.4	197.3	193.0	183.3	790	39.1	57.2	3.5	0.1
2002	166.7	176.2	202.6	251.0	172.8	824	45.3	51.7	2.8	0.1
2003	163.1	176.9	186.0	- - -	171.9	991	40.6	53.0	6.5	0.0
2004	167.7	185.9	191.0	216.7	183.3	906	18.0	72.0	9.7	0.3
Average	**173.5**	**184.0**	**193.3**	**215.1**	**181.0**		**38.1**	**56.2**	**5.5**	**0.1**

Broodstock Collections / Adult Returns

As part of our annual broodstock collection and research activities, WDFW hatchery and evaluation staffs operate a series of adult steelhead traps in SE Washington rivers. Lyons Ferry hatchery staff operates the LFH and Cottonwood Creek adult traps. The TFH staff operates the upper Tucannon adult trap, and evaluation staff operates an adult trap on the lower Tucannon River and the Touchet River trap in Dayton. Traps in the Touchet and Tucannon rivers are being used for endemic broodstock development and evaluation (initially planned for five years). Returns from endemic stocks have been low and difficult to obtain to date. Hence, WDFW and the co-managers agreed to extend the evaluation a few more years before a decision is reached on the fate/direction of these two endemic stock programs. Information presented below summarizes collection and hatchery spawning activities for the project period.

Lyons Ferry Hatchery Trap

Adult steelhead were trapped from 1 September through 18 November 2004. A total of 1,697 adult steelhead (997 female (58.7%) and 700 male (41.3%)) were trapped. Fish to be retained for broodstock were sorted on 17 and 19 November. All fish not needed for broodstock or retained to recover CWTs were returned to the Snake River to contribute to the sport fishery (1,168). Of all the fish trapped, five were wild origin (unmarked). We recovered 374 fish with CWTs (Table 9). Age composition based on CWT recoveries was 78.6% one-ocean, and 21.4% two-ocean. Mortality during trapping, holding, and spawning was 154 fish (8.0% of all fish trapped). Pre-spawning mortality rate was low in 2004 as compared to previous years (1999 – 28.8%, 2000 – 10.3%, 2001 – 25.3, 2002 – 10.3%, 2003 – 10.1%, 2004 - 7.0%). During January and February of 2005, 133 females were spawned with 263 males (two males were generally combined into one bag and used on a single female), producing 452,011 eyed eggs (Table 2) for the LFH stock program. Eggs from 12 females were destroyed due to presence of IHNV in ovarian fluid or mortality at eye-up was greater than 90% (49,030 eggs total). Fecundities of one-ocean and two-ocean females were 4,060 and 4,839 eggs, respectively.

Table 9. Summary of tagged adult summer steelhead trapped at LFH for the 2004 run year / 2005 brood year.

Brood year	Freeze Brand	CWT code	Stock	Release site		Number of tags
2001	LA-IT-1	63 / 11 / 78	Wallowa	Grande Ronde @Cottonwood AP		0
	RA-IV-3	63 / 12 / 70	Lyons Ferry	Snake River – On Station		39
	LA-IV-1	63 / 12 / 78	Lyons Ferry	Tucannon River		4
	NONE	63 / 12 / 79	Lyons Ferry	Touchet River @ Dayton AP		22
	NONE	63 / 12 / 69	Lyons Ferry	Walla Walla River		14
	VIE RR	63 / 09 / 70	Tucannon	Tucannon River @ Curl Lake Intake		1
					Total	80
2002	LA-IC-1	63 / 15 / 23	Wallowa	Grande Ronde @Cottonwood AP		0
	LA-2-2	63 / 15 / 16	Lyons Ferry	Snake River – On Station		145
	RA-2-2	63 / 15 / 79	Lyons Ferry	Tucannon River		30
	NONE	63 / 15 / 80	Lyons Ferry	Touchet River @ Dayton AP		47
	NONE	63 / 15 / 81	Lyons Ferry	Walla Walla River		70
	VIE RG	63 / 14 / 82	Tucannon	Tucannon River @ Curl Lake Intake		2
					Total	294
			Lost tags, Unreadable tags, No Wire			7
					Grand Total	381
					Grand Total	381

Cottonwood Creek Trap

Due to the low water conditions in early spring 2005, the adult trap could not be operated at the same time as the acclimation pond. Two-thirds of the annual broodstock were therefore collected from Wallowa Hatchery in cooperation with Oregon Department of Fish and Wildlife. After smolt releases were completed on 31 March, we operated the adult trap to collect information on tag returns, and collection of final broodstock. At the Cottonwood Creek Trap, 1,009 adult steelhead (494 female, 515 male) were trapped in 2005. In addition, a total of three wild (unmarked fish) were captured. Age composition based on CWT recoveries and fork lengths of sampled fish was 69.8% one-ocean and 30.2% two-ocean. For the season, sixty females were spawned with 70 males (40 females and 40 males were taken from Wallowa Hatchery), producing 282,675 fertilized eggs. No females tested positive for IHNV in 2005. Average fecundity of one and two-ocean age females was 3,664 and 5,358 eggs/female, respectively. During 2005, fish that did not contain CWT's or were not spawned were passed above the trap to spawn naturally. All carcasses from spawning and fish that were killed outright to retrieve the CWT's were distributed in upper Cottonwood Creek for nutrient enhancement, or donated to Walla Walla Community College for science lab dissections. We recovered 76 fish that had, or should have had CWTs (Table 10); all recovered CWTs were originally released on-site at Cottonwood AP.

Table 10. Summary of tagged adult summer steelhead trapped at Cottonwood Trap for the 2004 run year / 2005 BY.

Brood year	Freeze Brand	CWT code	Stock	Release site	CWT	Number of tags
2001	LA-IT-1	63 / 11 / 78	Wallowa	Cottonwood AP	Recovered	17
2002	LA-IC-1	63 / 15 / 23	Wallowa	Cottonwood AP	Recovered	54
					Lost	2
					No Tag	3
				Grand Total for Year		76

Tucannon FH Trap

A permanent adult steelhead and salmon trap was installed in 1998 at the TFH water intake diversion dam. Natural and Tucannon River endemic stock origin steelhead are enumerated, sampled, and passed upstream to spawn, while LFH stock fish are returned to below the trap. In 2005 hatchery staff trapped 42 natural, 13 Tucannon River endemic stock, and one LFH stock hatchery-origin steelhead.

Lower Tucannon Adult Trap

Evaluation staff deployed and operated a temporary trap at rkm 17.7 in the lower Tucannon River during the fall/winter of 2004/2005, with the primary focus to collect natural-origin fish for a new hatchery broodstock (Bumgarner et. al. 2002). A secondary objective of the trap is to enumerate and collect biological samples from natural-origin steelhead in the Tucannon River. The trap was operated between 13 September and 28 March. Nearly continuous operation was accomplished due to a new floating weir design (dramatically reduced debris loads), and low stream flows much of the trapping season. This year we also included a downstream trap with the hopes of collecting bull trout for a radio telemetry project conducted by the US Fish and Wildlife Service and WDFW. In all, 372 natural fish (176 males and 196 females), 101 Tucannon River endemic stock, and 309 LFH hatchery fish were trapped or collected as kelts (24 natural-origin, five Tucannon Endemic, 26 LFH) in the downstream trap or on top of the weir panels. Fifty-nine percent of the kelts were captured in the downstream trap. We collected and hauled 36 natural fish (17 females and 19 males) to LFH for broodstock. Natural origin fish not collected for broodstock were passed upstream after length and sex were determined, and scales samples were collected.

During 2004/2005, pre-spawning loss (0 fish) was lower than in previous years because of more aggressive fungus control treatments. During February and March 2005, 14 adult females were spawned with 25 males at LFH. All 19 males that had been collected were spawned, and an additional six males were live spawned at the trap and released. Three females were not spawned and were returned to the river for natural spawning. Total eggtake was estimated at 77,131 (Table

2). Natural fish trapped at the lower Tucannon Trap consisted of 41.2% one-ocean and 58.8% two-ocean age fish (Table 11). In addition to the summer steelhead captured in the lower trap, we captured or found on the floating weir panels one spring Chinook, eight fall Chinook, three Coho salmon (*O. kisutch*), six bull trout, one whitefish (*Prosopium williamsoni*), and seven suckers (*Catostomus columbianus or C. macrocheilus*).

Table 11. Summary of fresh and salt-water age composition of natural origin adult steelhead from the Tucannon River, 2000-2004 brood years.

Year	Age [a] 1.1		Age 1.2		Age 2.1		Age 2.2		Age 3.1		Age 3.2		Repeat spawners
	N	%	N	%	N	%	N	%	N	%	N	%	
2000	18	25.0	6	8.3	36	50.0	7	9.7	5	6.9	0	0.0	NONE
2001	0	0	13	27.1	13	27.1	19	39.6	0	0.0	3	6.3	NONE
2002	5	8.8	10	17.5	29	50.9	10	17.5	3	5.3	0	0.0	NONE
2003	0	0	4	3.9	29	28.2	56	54.4	5	4.9	6	5.8	YES [b]
2004	0	0	0	0.0	42	68.9	13	21.3	5	4.9	0	0.0	YES [c]
2005	15	4.8	32	10.3	99	31.9	141	45.5	14	4.5	7	2.3	YES [d]
Combined	38	5.8	65	10.0	248	38.1	346	37.8	32	4.9	16	2.5	- - -

[a] Age reporting protocol is F.S, where F=freshwater years and S=saltwater years of age.

[b] Three fish sampled in 2003 were repeat spawners, one fish was 1.1S, two were 2.1S for 3.6% of the run.

[c] One fish sampled in 2004 was a repeat spawner (2.1S1).

[d] Two fish sampled in 2005 were repeat spawners, one fish was 1.1S, the other was 2.1S for 0.6% of the run.

Touchet River Adult Trap

Evaluation staff operated the adult trap in the Touchet River from 14 February to 10 June in 2005. We trapped 86 (71.1%) natural, 24 (19.8%) LFH hatchery origin, and 11 (9.1%) Touchet River endemic hatchery origin steelhead. Sex ratio of natural and hatchery steelhead was slightly skewed toward females (55.8%). We collected 36 natural origin fish (20 females and 16 males) for broodstock. Pre-spawning mortality was low in 2005 with one fish dying (2.8%). For the season, 18 females were spawned with 15 males yielding 79,540 eggs. However, five of the females spawned tested positive for IHNV. The WDFW consulted with NOAA Fisheries and the Umatilla Tribe to determine the best fate for these fish. After consultation, it was decided that to reduce the risk of contamination to the Touchet Endemic stock and other steelhead at LFH, the progeny from these fish would be planted into the Touchet River as fry (19,214) or eyed eggs (5,131). After the plants, the program was left with an estimated 53,640 eyed eggs. Natural fish trapped in 2005 consisted of 61.9% one-ocean and 38.1% two-ocean age (Table 12).

In addition to trapping summer steelhead, we also captured five spring Chinook (four wild, one hatchery), 49 bull trout, 171 bridgelip suckers (*C. columbianus*), one northern pike minnow (*Pytchocheilus oregonensis*), six brown trout (*Salmo trutta*), and eight whitefish in the Touchet adult trap. Data collected from bull trout, brown trout and whitefish trapped at the Touchet adult trap in 2004 and 2005 are presented in Appendix B.

We operated a Logie 2100C Resistivity Fish Counter at the Touchet River trap. Our main objective in 2005 was to video validate the counter for accuracy. This was accomplished by linking a digital video recorder to the counter so video footage would be archived each time the counter detected a change in resistance over the counter. Technical difficulties during the season were minimal, though video was lost a few times. For the season when the video recorder was operating, we had 697 hits on the counter, and acquired 684 (98.1%) video clips. Each of the video clips was examined and compared against the counter output. Based on either the size of the fish (estimated from the video), or size and timing (Figure 2) in comparison to what was being captured in the adult trap, we determined the species of fish.

Table 12. Summary of fresh and salt-water age composition of natural origin adults from the Touchet River, 1994-1995 and 1999-2005 brood years.

BY	Age 1.1		Age 1.2		Age 2.1		Age 2.2		Age 3.1		Age 3.2		Age 4.1		Age 4.2		Repeat spawners
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
1994	0	0.0	0	0.0	6	28.6	8	38.1	3	14.3	3	14.3	0	0.0	0	0.0	Yes [a]
1995	0	0.0	0	0.0	0	0.0	5	85.7	0	0.0	0	0.0	0	0.0	1	14.3	None
1999	0	0.0	1	3.2	18	58.1	9	29.0	2	6.5	0	0.0	0	0.0	0	0.0	Yes [b]
2000	1	3.2	1	3.2	17	54.8	8	25.8	3	9.7	1	3.2	0	0.0	0	0.0	None
2001	1	0.6	14	8.0	84	48.3	40	23.0	15	8.6	9	5.2	1	0.6	0	0.0	Yes [c]
2002	6	4.8	3	2.4	84	67.7	20	16.1	6	4.8	3	2.4	0	0.0	0	0.0	Yes [d]
2003	0	0.0	8	6.7	20	16.7	73	60.8	2	1.7	10	8.3	0	0.0	0	0.0	Yes [e]
2004	0	0.0	1	0.8	47	39.2	18	15.0	18	15.0	2	1.7	1	0.8	0	0.0	Yes [f]
2005	0	0.0	0	0.0	37	44.0	21	25.0	15	17.9	8	9.5	0	0.0	0	0.0	Yes [g]
Totals	8	1.2	28	4.1	313	45.6	203	29.5	64	9.3	36	5.2	2	0.3	1	0.1	

[a] One fish sampled in 1994 was a repeat spawner, 2.1S for 4.8% of the run.

[b] One fish sampled in 1999 was a repeat spawner, 2.1S for 3.2% of the run.

[c] Ten fish sampled in 2001 were repeat spawners, eight fish were 2.1S, and two were 2.1S1 for a total of 5.7% of the run.

[d] Two fish sampled in 2002 were repeat spawners, one fish was 2.1S, and one was 2.1S for a total of 1.6% of the run.

[e] Six fish sampled in 2003 were repeat spawners, one fish was 1.1S, four were 2.1S, and one was 3.1S for a total of 5.8% of the run.

[f] Ten fish sampled in 2004 were repeat spawners, four were 2.1S, one was 3.1S, five were 2.1S1, and one was 2.1SS for a total of 8.1%.

[g] Three fish sampled in 2005 were repeat spawners, one was 2.1S, one was 2.2S, and one was 2.1S1S for a total of 3.6% of the total run.

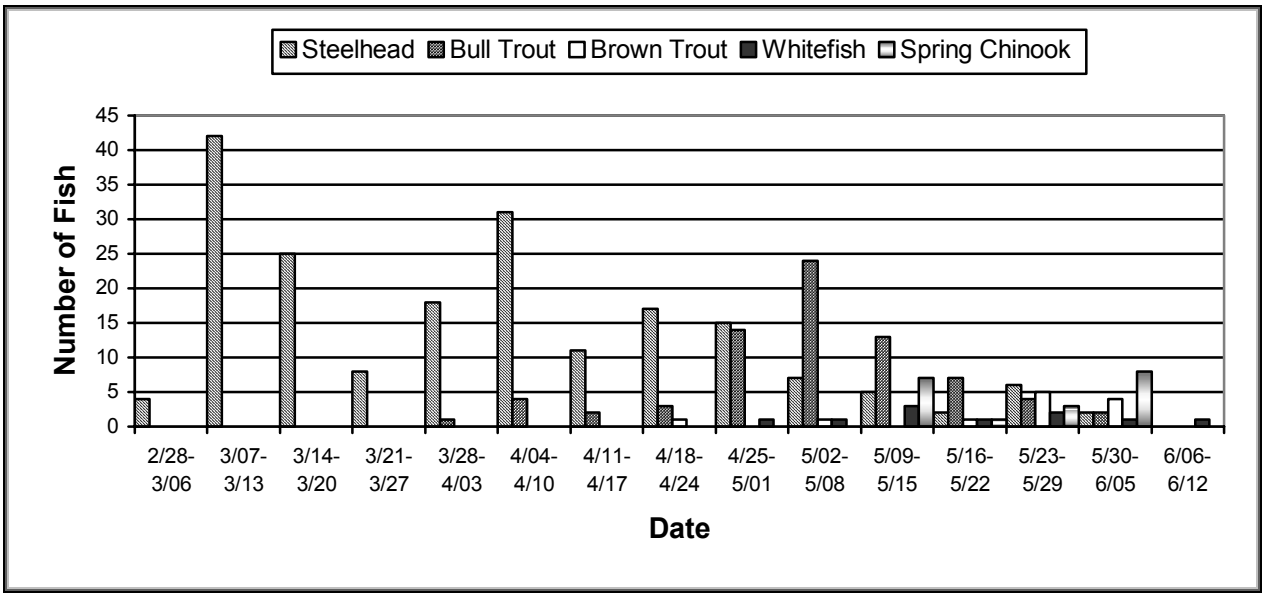

Figure 2. Run timing of salmonid species to the Dayton Adult Trap during the spring of 2005. Includes both fish captured and those observed passing upstream on the Resistivity Counter ramp.

Following data verification and examination of video clips, we determined that 61 summer steelhead (7 hatchery, 29 natural, and 25 unknown origin), 19 spring Chinook, 6 brown trout, 9 bull trout, two whitefish, and six bridgelip suckers passed upstream over the counter ramp in 2005. We observed three summer steelhead, one bull trout and one brown trout passing downstream over the counter ramp. An additional 13 unidentifiable fish crossed the counter in either an upstream (8) or downstream (5) direction during the season. Unidentifiable fish resulted because of loss of video, the picture was too dark (nighttime crossing), or the water was too muddy.

Creel Surveys

WDFW personnel surveyed steelhead sport anglers within the LSRCP area of Washington (see Schuck et. al. 1990 for methods) to recover CWTs from tagged steelhead. We then estimate the number of LFC steelhead in the Washington sport catch in SE Washington using WDFW sport harvest estimates from Washington catch record cards. Also, data from each week's surveys are summarized during the season and provided to the local news media to assist anglers. During the 2004/2005 steelhead season we surveyed 10,993 anglers that caught 4,043 fish within the LSRCP area of Washington (Table 13). A total of 1,512 natural origin fish (37.4% of the total catch documented from creel surveys) were caught and released during the 2004/2005 season. All CWTs collected during the fishery were extracted and sent to Olympia for eventual inclusion in the PSMFC/CWT database (RMIS) maintained in Portland, OR.

In addition, we cooperate with ODFW in conducting a joint survey of anglers on the lower Grande Ronde River of Washington and Oregon. Angler effort, catch rates, and harvest were estimated by

ODFW staff as described in Carmichael et al. (1988). The total number of fish sampled during the fishery and estimated harvest by the joint surveys from the Grande Ronde fishery in the Washington portion were supplied by ODFW for the 2003 run year (Table 14). The 2004 run year data will be presented in future annual reports.

Spawning Ground Surveys

During spring 2005, evaluation staff surveyed spawning grounds in select reaches (Appendix B) of the Tucannon and Touchet rivers and Asotin Creek for steelhead redds. From these surveys we estimated the total number of redds in each (Tables 15, 16 and 17). Adult spawning distribution in both the Tucannon River and Asotin Creek appears to have been altered in 2005. The possible reasons for the shift in spawning distribution was likely caused by two factors: 1) low stream flow conditions during the early spring may have delayed upstream migration causing fish to spawn in the lower reaches of these river, and 2) fish were delayed by refusing to enter the adult traps operated on both of those streams. For example, in the Tucannon River below the adult steelhead trap we estimate 13.2 redds/km compared to 4.4 redds/km above the adult trap. Similarly, in the Asotin Creek mainstem, we estimate 38.3 redds/km compared to 14.7 redds/km above the adult trap. Spawning distribution in the Touchet River did not appear to be affected as much by low water conditions, but these fish typically spawn later in the season compared to the Tucannon River and Asotin Creek. Further, we were unable to survey the Touchet River below the adult trap due to increased stream flows in mid-April. These increased stream flows in mid-April likely enhanced distribution in the Touchet River compared to the other steams.

Table 13. Steelhead angler interview results for fall/winter/spring of the 2004 run year from Washington State licensed anglers.

River Basin River section description [a]	River section number	Anglers Surveyed	Total hours fished	Natural fish released	Hatchery fish kept	Hatchery fish released	Catch rate (hr/fish)
Columbia River Basin							
McNary Dam to Pasco	533	1,225	3,626.3	68	93	4	21.9
Walla Walla Subbasin							
Walla Walla River	659	726	1,899.7	89	189	62	5.6
Touchet River	657	211	530.8	62	55	33	3.5
Snake River Basin							
Mouth to IHR	640	31	111	3	6	0	12.3
IHR to LMD	642	3,614	11,758.3	191	364	13	20.7
LMD to LGD	644	2,144	10,363.5	228	430	12	23.4
LGD to LGR	646	1,175	4,228.8	80	120	4	20.7
LGR to Hwy 12 Br.	648	297	1492	45	64	6	12.9
Hwy 12 Br. upstream	650	1,245	7,100.6	537	692	43	9.7
Tucannon River	653	325	1,120.0	209	163	178	2.0
Totals		10,993	42,231.0	1,512	2,176	355	10.4

[a] Abbreviations as follows: IHR=Ice Harbor Dam, LMD=Lower Monumental Dam, LGD=Little Goose Dam, LGR=Lower Granite Dam, Hwy=Interstate Highway. Creel information from sections 648 and 650 include data collected by IDFG.

Table 14. Estimated angler effort, catch rates, and harvest for steelhead anglers on a portion of the Grande Ronde River in Washington, run year 2003 (Mike Flesher, ODFW).

	2003				2004				Total
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
Effort Hours	464.8	3,597.9	2,454.2	1,847.2	1,587.6	7,607.5	5,600.6	916.4	24,076.2
Catch Rate [a]	0.0367	0.0774	0.1979	0.0638	0.1621	0.2171	0.2539	0.1369	0.1809
Total Catch [b]	17	279	486	118	257	1,652	1,422	125	4,356
Fish Kept	1	112	248	98	127	796	753	54	2,189
Hatchery Released	9	77	53	0	25	490	601	62	1,317
Natural Released	7	89	185	20	106	366	69	9	851

[a] Catch rate here is defined as the estimated fish captured divided by the hours fished.

[b] Estimated fish captured have been rounded to whole numbers, so total of fish kept and released may not always add up to total catch.

Table 15. Results of summer steelhead index redd surveys in the Tucannon River, 2005.

Stream Section surveyed	Est. Rkm	Dates Surveyed	Redds counted	Total redds	Expanded # of redds	% of total index reach surveyed	Total est. redds for reach
Tucannon River Basin (Index)	**88.3**		**440**	**440**	**47**	**91.2**	**505**
Reach 0 – Mouth to Highway 12 Bridge	***22.1***	***See below dates for this reach***	***268***	***268***	***0***	***93.7***	***286***
Index 1 – Starbuck Rock Wall to Mouth	*5.7*	2/25, 3/7, 3/21, 4/12	7,18,34,15	74			
Index 2 – Smith Hollow Bridge to Jackson's Fence	*4.7*	3/7, 3/21, 4/12	12, 5, 16	33			
Index 3 – Adult Steelhead Trap to Smith Hollow Bridge	*4.8*	2/25, 3/7, 3/21, 4/12	6,15,55,16	92			
Index 4 – Highway 12 Bridge to Adult Steelhead Trap	*5.5*	2/24, 3/23, 4/14, 5/4	3, 42, 17, 7	69			
Reach 1 - Highway 12 Bridge to Marengo	***19.2***	***See below dates for this reach***	***78***	***78***	***35***	***65.1***	***113***
Index 0 – Enrich Bridge to HWY 12 Bridge	6.4	2/24, 3/23, 4/14, 5/4	6, 25, 26, 2	59			
Index 1 – 2 miles above Enrich to Enrich	3.4	3/23, 4/14, 5/3	2, 8, 3	13			
Index 2 – Marengo to Silt Basin	2.7	2/25, 4/8, 4/14, 4/22, 5/3, 5/27	2, 1, 2, 3, 1, 0	9			
Reach 2 – Marengo to Cumming Creek Bridge (Hartsock Stratum)	***16.9***	***See below dates for this reach***	***64***	***64***	***12***	***100.0***	***76***
Index 1 – Bridge 12 to Marengo	7.5	2/25, 4/8, 4/14, 4/22, 5/3, 5/27	9, 5, 3, 6, 6, 4	33			
Index 2 – Cummings Creek Br to Bridge 14	4.7	4/12, 4/22, 5/3, 5/23	3, 6, 3, 0	12			
Final Walk – Bridge 14 to Bridge 12	4.7		19	19			
Reach 3 – Wooten Wildlife Area to Wilderness Boundary (HMA Stratum)	***19.5***	***See below dates for this reach***	***25***	***25***	***0***	***100.0***	***25***
Hatchery Intake to Cummings Creek Bridge	3.3	4/12, 4/22, 5/3, 5/23	1, 5, 11, 0	17			
Final Walk – Panjab Bridge to Hatchery Intake	16.5	5/24	8	8			
Reach 4 – Cummings Creek (Old Mine to Mouth)	***10.6***	***5/18***	***5***	***5***	***0***	***100.0***	***5***

Table 16. Results of summer steelhead index redd surveys in the Touchet River, 2005.

Stream Section surveyed	Est. Rkm	Dates Surveyed	Redds counted	Total redds	Expanded # of redds	% of total index reach surveyed	Total est. redds for reach
Touchet River Basin (Index)	**69.0**		**192**	**192**	**112**	**62.6**	**304**
North Fork Touchet Reach – MP 13 to Mouth	*19.2*	***See below dates for this reach***	*77*	*77*	*35*	*70.8*	*112*
Index 1 – Vernon Marll's Bridge to South Fork Mouth	3.3	4/7, 4/20, 4/27, 5/10	3, 13, 6, 2	24			
Index 2 - LE of Frames to Wolf Fork Bridge	4.0	4/7, 4/20, 4/27, 5/10	11, 18, 4, 7	40			
Final Walk 1 - Bridge at MP 13 to Dedloff's House	6.3	5/11	13	13			
South Fork Touchet Reach – Griffen Fork to Mouth	*24.5*	***See below dates for this reach***	*34*	*34*	*44*	*47.8*	*78*
Index 1 – 1.6 rd miles above Bridge 2	2.4	4/7, 4/13, 4/21, 4/28, 5/5, 5/19	1, 5, 3, 4, 1, 0	14			
Index 2 - Camp Nancy Lee down 1.8 miles	2.9	4/7, 4/13, 4/21, 4/28, 5/5, 5/19	0, 4, 4, 1, 0, 0	9			
Final Walk 1 - Cabins to Camp Nancy Lee	6.4	5/24	11	11			
Wolf Fork Touchet Reach – Newby Cabin to Mouth	*16.5*	***See below dates for this reach***	*59*	*59*	*29*	*70.3*	*88*
Index 1 – 1.5 miles above Bridge above Nelsons, back down to Bridge at Nelsons	2.4	4/6, 4/20, 4/27, 5/9	0, 6, 6, 2	14			
Index 2 – 0.3 miles below Nelson's to Holmberg Fence	4.4	4/6, 4/20, 4/27, 5/9	0, 10, 8, 5	23			
Final Walk 1 – Newby Cabin to first bridge below Coates Creek Mouth	3.7	5/10	22	22			
Robinson Fork Touchet Reach – 5.0 miles to Mouth	*8.8*	***See below dates for this reach***	*22*	*22*	*4*	*84.1*	*26*
Index 1 – Upstream 4.5 road miles from first bridge, down to fence line below the bridge 0.2 miles.	7.4	5/4, 5/11	16, 6	22			

Table 17. Results of summer steelhead index redd surveys in Asotin Creek, 2005.

Stream Section surveyed	Est. Rkm	Dates surveyed	Redds counted	Total redds	Expanded # of redds	% of total index reach surveyed	Total est. redds for reach
Asotin Creek Basin (Index)	**58.2**		**433**	**433**	**55**	**97.7**	**488**
Mainstem Asotin Creek Reach – NF/SF Confluence to George Creek Mouth	***20.5***	***See below dates for this reach***	***310***	***310***	***48***	***96.6***	***358***
Index 1 - NF/SF confluence ↓ 2.4 road miles	4.0	3/24, 4/6, 4/18, 5/2	23,28, 7, 8	66			
Index 2 - 2 miles above Headgate Park to Headgate Park	8.0	3/24, 4/6, 4/18, 5/2	51,48,13,10	122			
Index 3 – First Bridged on left above Hendrickson's, down to George Creek Bridge	3.8	3/24, 4/6, 4/15, 4/21, 5/2	55, 11, 15, 8, 7	98			
Final Walk 1 - Between index 1 and index 2	4.0	5/2	24	24			
North Fork Asotin Creek Reach – Middle Fork to Mouth	***16.0***	***See below dates for this reach***	***67***	***67***	***3***	***100.0***	***70***
Index 1 - End of old rd down to Lick Creek	6.8	4/11, 4/18, 5/5	23, 8, 6	37			
Index 2 - Lick Creek to confluence	1.7	3/24, 4/6, 4/18, 5/2	1, 10, 1, 6	18			
Final Walk 1 - Second FS Fence to top of index	4.3	5/5	6	6			
Final Walk 2 – 200m above Middle Fork, to Second Forest Service Fence Line.	3.2	5/5	6	6			
South Fork Asotin Creek Reach – Old Chimney to Mouth	***11.4***	***See below dates for this reach***	***19***	***19***	***0***	***100.0***	***19***
Index 1 - 2 rd miles above mouth, down to mouth	3.3	4/11, 4/21, 4/28, 5/5	10, 8, 0, 1	19			
Final Walk 1 - Old chimney top of index site	8.1	5/06	0	0			
Charley Creek Reach – Old Corral to Mouth	***10.3***	***See below dates for this reach***	***37***	***37***	***4***	***94.2***	***41***
Index 1 – 4.0 miles above Koch Gate down 3.0 miles	4.9	4/11, 4/21, 4/28, 5/6	17,10, 2, 2	31			
Final Walk 1 - Old Corral to top of index	3.2	5/06	1	1			
Final Walk 2 – Bottom of index down to Koch Gate	1.6	5/06	5	5			

Contributions to LSRCP Mitigation Goals

In summary, the LFC summer steelhead program (LFH and Wallowa stock only) continues to meet and/or exceed its original mitigation goals by supplying large returns for harvest within the Lower Snake River area. Based on CWT recoveries from adult traps and creel surveys alone, we estimated that a minimum of 4,485 (3,155 goal) LFH stock and 2,200 (1,500 goal) Wallowa stock fish returned in the 2004 run year. That represents 142% and 147% of the Washington mitigation goal for each of these stocks, respectively. Fish escaping to the spawning grounds have not been accounted for in these calculations. Over the last ten years, LFH stock releases have averaged 195% of the mitigation goal, while the Wallowa stock releases have averaged 192%. Program reductions of ~40% for both the LFH and Wallowa stocks since 1995 should bring these two programs more in line with mitigation goals.

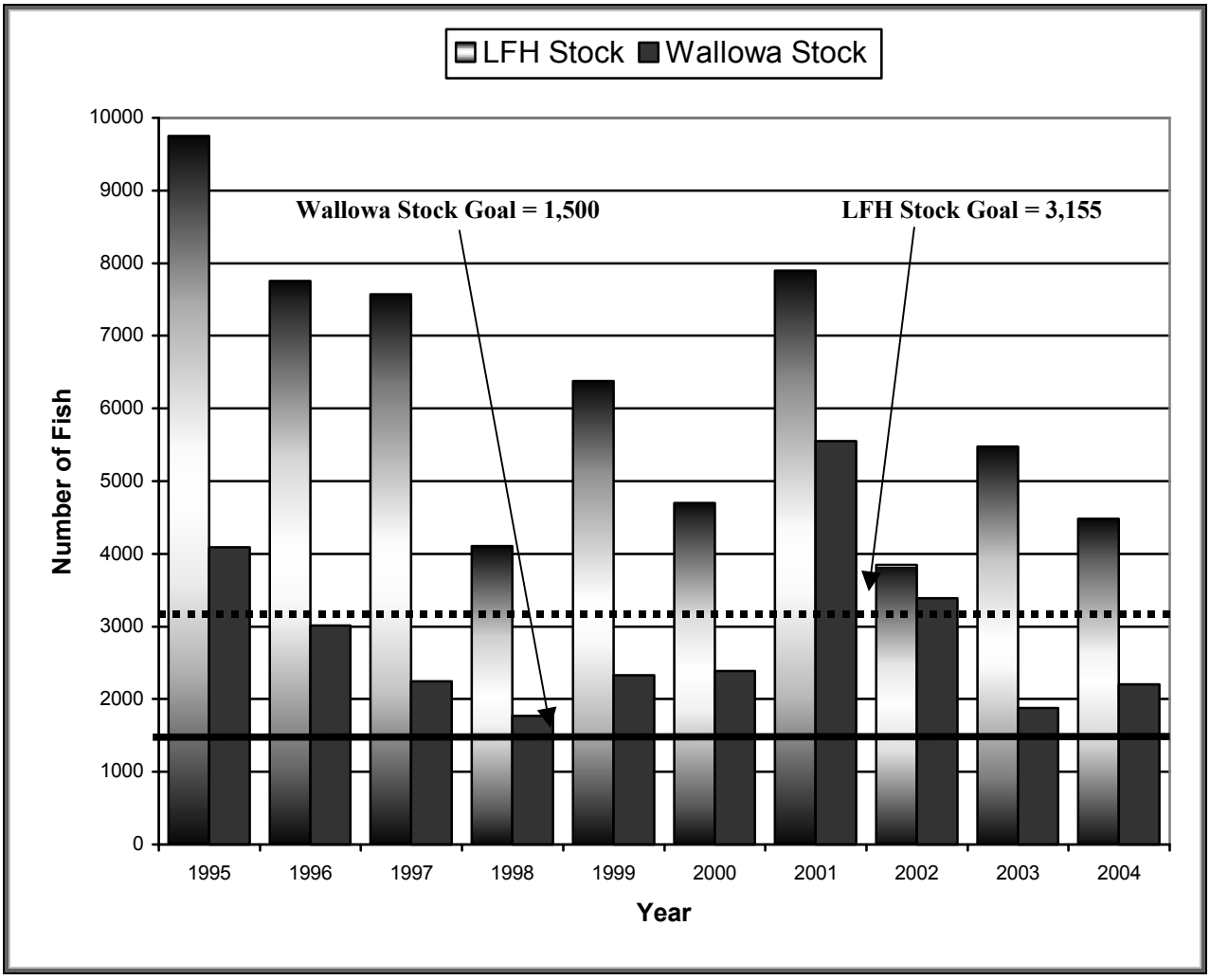

Figure 3. Annual contributions of LFH or Wallowa stock summer steelhead to the LSRCP mitigation area (includes the Walla Walla Basin)

Natural Juvenile Production in Area Rivers

As in previous years, WDFW electrofished using either a multiple pass removal method (Zippin 1958) or a single pass method at index sites to estimate Age 0 and Age 1+ juvenile steelhead densities and derive population estimates for specific river reaches (Tables 18 and 19). Another objective of our surveys was to document the number of hatchery residual steelhead (Table 20) from the endemic steelhead broodstock program. The potential for residual hatchery steelhead to negatively affect natural salmonid populations through competition, displacement, or predation was identified as a concern by NOAA Fisheries after Chinook salmon were listed as threatened under the ESA. In the early 1990's, WDFW began a series of experiments to examine methods to reduce residualism. Results from the Tucannon, Touchet, and Grande Ronde rivers have been provided in the past (Viola and Schuck 1995; Schuck et. al. 1998; Martin et. al. 2000).

During 2004, we estimated residual hatchery steelhead (LFH stock and Endemic stocks) present in the Tucannon and Touchet rivers in July and August through the use of electrofishing surveys (Table 20). Estimated residualism is therefore a minimum as natural mortality and harvest from trout fisherman would have occurred between the time of release (April) and before electrofishing surveys were complete. In addition, we believe our residual estimates may be biased. Bias in our electrofishing occurs because we consistently underestimate larger sized fish within a site, as they are not as easily captured. Bias can also occur if fish are able to enter or escape the site while the surveys are taking place. A minimum estimate of residualism for the Tucannon River in 2004 was 3.7% of the endemic stock release (42,967) and 2.4% of the LFH stock release (83,726). Estimated residualism for the Touchet River in 2003 was 6.9% of the endemic stock release (58,733) and 0.4% of the LFH stock release (86,347).

The mean length of endemic stock residuals captured in July and August (3-4 months following release) in the Touchet and Tucannon rivers was 207.7 mm (SD=32.9), and 204.7 (SD=27.4), respectively. The Touchet stock residuals were larger than their mean size at release (Touchet = 200.0 mm), but the Tucannon stock residuals were similar to their release size (Tucannon = 203.9 mm). It appears that generally only larger fish residualized in the Touchet stock, while the Tucannon stock had a range of sizes. Summer steelhead Age 0 and Age 1+ mean densities by river reach, densities per site, site descriptions, and other sensitive species captured during electrofishing surveys are provided in Appendix C.

Table 18. Summary of mean fish density (Fish/100 m^2) and population estimates of Age 0 summer steelhead in index areas of Asotin Creek, and Touchet and Tucannon rivers for specific tributaries/reaches in 2004.

Basin	Reach	Sites	Mean Density	Population Estimate	95% C.I.
Asotin Creek	Mainstem	10	41.40	72,913	+/- 21,050
	North Fork	10	25.38	24,917	+/- 6,744
	South Fork	3	12.51	6,102	+/- 11,809
	Charley Cr.	9	48.00	16,598	+/- 4,017
				120,530	
Touchet River	North Fork	4	33.53	51,419	+/- 28,068
	Wolf Fork	4	35.01	42,709	+/- 17,595
	South Fork	4	33.81	62,551	+/- 30,783
	Robinson Fork	5	16.38	6,317	+/- 7,664
				162,996	
Tucannon River	Marengo	3	2.30	2,699	+/- 1,227
	Hartsock	3	6.89	11,618	+/- 4,988
	HMA	11	6.36	14,601	+/- 6,158
	Wilderness	3	2.79	2,335	+/- 1,794
	Cummings Cr.	9	17.66	4,568	+/- 1,443
				35,821	

Table 19. Summary of mean fish density (Fish/100 m^2) and population estimates of Age 1+ summer steelhead in index areas of Asotin Creek, and Touchet and Tucannon rivers for specific tributaries/reaches in 2004.

Basin	Reach/Strata	Sites	Mean Density	Population Estimate	95% C.I.
Asotin Creek	Mainstem	10	20.14	35,153	+/- 9,646
	North Fork	10	24.73	23,241	+/- 9,406
	South Fork	3	37.13	18,107	+/- 5,273
	Charley Cr.	9	27.21	9,411	+/- 3,429
				85,912	
Touchet River	North Fork	4	21.20	32,521	+/- 17,353
	Wolf Fork	4	16.11	19,660	+/- 8,933
	South Fork	4	13.94	25,795	+/- 9,775
	Robinson Fork	5	15.93	6,142	+/- 16,502
				84,118	
Tucannon River	Marengo	3	5.14	6,035	+/- 3,602
	Hartsock	3	9.20	15,507	+/- 9,666
	HMA	11	7.89	18,108	+/- 4,102
	Wilderness	3	13.53	11,312	+/- 3,430
	Cummings Cr.	9	25.12	6,497	+/- 1,081
				50,962	

Table 20. Summary of mean fish density (Fish/100 m^2) and population estimates of hatchery endemic stock summer steelhead residuals in index areas of theTouchet and Tucannon rivers for specific tributaries/reaches in 2004.

Basin	Reach/Strata	Sites	Mean Density	Population Estimate	95% C.I.
Touchet					
	North Fork	4	1.50	2,299	+/- 1,731
	Wolf Fork	4	0.48	586	+/- 640
	South Fork	4	0.61	1,119	+/- 1690
	Robinson Fork	5	0.05	20	+/- 213
				4,024	
Tucannon	Marengo	3	0.03	41	+/- 81
	Hartsock	3	0.04	42	+/- 83
	HMA	11	0.54	1,249	+/- 868
	Wilderness	3	0.30	251	+/- 496
				1,583	

Steelhead Predation

When spring/summer Chinook were listed under the ESA in the early 1990's, there was concern that hatchery summer steelhead smolts/residuals were preying on newly emerged salmonid fry. Studies conducted by WDFW (Martin et al. 1993) in the Tucannon River found little evidence that smolt/residual steelhead were preying on the natural spring Chinook. They found only three spring Chinook salmon in the stomachs of residual steelhead (expanded to 456 total fish for the study) and the spring Chinook eaten were of yearling size (94-105 mm), not subyearling size as expected. Subyearling spring Chinook may have been eaten, but because of their smaller size they might have been digested quicker and thus were not identified. Subyearling fall Chinook emerge from mid-April to early May in the Tucannon River (Gallinat 2004). Lyons Ferry stock steelhead smolts are released into the Tucannon River during the second or third week of April each year, in an area slightly above the fall Chinook production area. Subyearling fall Chinook salmon captured at the smolt trap range in size from 30-100 mm depending on the time of capture during their out-migration. Subyearling fall Chinook salmon generally don't grow to 100 mm in size until June. By then most steelhead smolts have emigrated from the river. In late spring 2003, samplers at WDFW's Tucannon River smolt trap (Rkm 3) noticed large fish preying on the juvenile spring and/or fall Chinook being released from the smolt trap. First indications were that these predatory fish were either northern pike minnow, or smallmouth bass (*Micropterus dolomieui*). However, angling for these predatory fish confirmed that some were in fact large hatchery steelhead smolts and/or residuals.

We conducted a pilot study to determine the extent of predation by steelhead (natural and hatchery origin) smolts, bass, northern pike minnow, or other predatory species on spring and/or fall Chinook salmon in the lower 5 km of the Tucannon River (Starbuck to the slack water near the mouth). We surveyed the lower Tucannon River by angling on three separate dates (April 22, May

14, and June 7). All spinners/lures used were barbless for easy release and to minimize injury to fish. All predatory species (steelhead, smallmouth bass, northern pike minnow, grass pickerel) captured were retained in five gallon buckets, anesthetized, and their stomachs emptied by lavage (plastic squeeze bottle with modified tip). All captured fish were measured (fork length) and marked (caudal fin punched) in case they were recaptured. Stomach contents from each fish were grossly analyzed in the field, with any whole fish preserved in a sodium bicarbonate solution and frozen for later examination/identification.

Data collected was summarized by date, predator species (origin), category of stomach contents (empty, insects, or fish), and species of prey consumed (Table 21). The limited sample size prohibits a more extensive analysis.

Table 21. Summary of stomach sample contents from Tucannon River pilot predation study in the spring of 2004.

		Stomach Contents			
Date (species)	Total Fish	Empty	Insects	Fall Chinook	Percent w/fish
4/22/04					
Hatchery steelhead	104	12	92	0	0.0
Natural steelhead	11	0	11	1	8.3
Smallmouth bass	4	2	1	1	25.0
5/14/04					
Hatchery steelhead	29	3	26	0	0.0
Natural steelhead	3	0	3	0	0.0
Smallmouth bass	17	8	9	0	0.0
Northern pike minnow	8	6	2	0	0.0
6/07/05					
Hatchery steelhead	3	0	3	0	0.0
Natural steelhead	4	1	3	0	0.0
Smallmouth bass	5	3	2	0	0.0
Northern pike minnow	6	4	2	0	0.0
Combined					
Hatchery steelhead	136	15	121	0	0.0
Natural steelhead	18	1	17	1	5.6
Smallmouth bass	26	13	12	1	3.9
Northern pike minnow	14	10	4	0	0.0

Based on this very limited sample, it's difficult to say whether or not this is a serious problem. With a larger sample size and more frequent sampling we may have been able to document more predation by hatchery steelhead. However, of the four fall Chinook identified in the stomach samples, two were found in natural origin summer steelhead, and two in smallmouth bass. Natural origin summer steelhead may have a higher tendency to prey on small fish, as that has been part of their life history strategy in the stream. Hatchery origin summer steelhead, on the other hand, may not become predatory immediately following release, as they have been accustomed to eating only

fish food pellets at the hatchery. Further, they might not be as aggressive in seeking food in the water column, as they are more accustomed to food arriving on the surface. The majority of the hatchery summer steelhead stomachs contained insects, potentially indicating that they were eating insects that were drifting down, or that fell into the stream, their customary place for seeking food. Predation of fall Chinook by natural-origin summer steelhead and smallmouth bass may be a factor limiting the recovery of fall chinook salmon in the lower Tucannon River. However, estimating the impact of predation would require substantial funding and staff resources that are currently unavailable. Further, we don't believe that this is a high priority issue for the LSRCP program to investigate.

Conclusions and Recommendations

In an effort to maintain successful mitigation in an ESA environment, we offer the following conclusions/recommendations from our monitoring and evaluation work, and suggest additional critical questions that should be pursued in the future:

1) The NOAA Fisheries ruled that LSRCP hatchery steelhead jeopardized listed steelhead populations within the Snake and Columbia river basins (NMFS 1999), and called for the development of new endemic broodstocks for the hatchery steelhead program. Initial efforts in the Tucannon and Touchet rivers appear to be somewhat successful, but more data are needed before a final conclusion is reached about whether we should expand the use of these local broodstocks. Current adult traps we use for capturing broodstock are not adequate for adult return evaluation. In addition, since none of the fish released are marked for harvest, we have no other way of accounting for these fish upon return. To address this problem, we began PIT tagging a large (~20%) number of the annual endemic release to estimate SAR's for program evaluation. This will require less reliance on the traps (which typically are not 100% efficient and can be disabled by high spring flows).

The numbers of fish used to develop these endemic broodstocks are very low, raising genetic concerns (potential lack of genetic diversity within the broodstock, domestication, and escapement of large numbers of these hatchery fish onto the spawning grounds) for the future. At present, none of the adult fish that return will be used as broodstock in the hatchery because of their low founding population size. If the program should expand, it will require collecting more unmarked (natural) fish from each river, potentially causing further damage to these listed populations. We need to investigate other broodstock methods (captive broodstock or live partial spawning of adult males and females) that would increase the effective population size of these stocks in the hatchery.

Adult traps have been utilized to collect the standard hatchery steelhead stocks, develop new endemic stocks, or to assess stock/population potential in other areas. In addition, they provide an opportunity to collect tagged (ADLV+CWT) hatchery steelhead from the LRSCP program that allows us to determine program contribution, and assess stray rates from other programs throughout the region.

> Recommendation: Continue with development/evaluation of endemic broodstocks in the Tucannon and Touchet rivers on a trial basis. Continue PIT tagging large representative groups of endemic stock smolts for program evaluation (SAR). Evaluate the effect of partially spawning females on completing their spawning in the wild (Wallowa Stock in Cottonwood Creek). Determine if a similar strategy would be appropriate to increase effective population

size of endemic stock programs for the future. Continue to have discussions regarding a possible captive broodstock program for the endemic stocks to increase effective population sizes. At all trapping locations, sacrifice tagged (ADLV+CWT) adult steelhead to determine release points and assess straying.

2) Tissue samples for genetic stock comparison between Tucannon and Touchet river natural origin steelhead, and LFH stock steelhead continue to be analyzed. Previous results indicate that each of these groups remain genetically distinct from each other despite years of LFH stock hatchery releases in each basin (Bumgarner et al. 2003, Bumgarner et al. 2004). However, the Tucannon and LFH stocks are more similar and indicate some introgression between the two stocks may have occurred. The Touchet River stock appears to have been less effected.

Recommendation: Long-term monitoring of the genetic characteristics of the new endemic broodstock should occur because of the small founding populations used for the hatchery broodstock.

3) Accurate, precise juvenile population abundance estimates are crucial for describing survival trends of populations over time, and to measure response to management actions such as hatchery supplementation and habitat manipulation/restoration. Recent studies (Hillman et al. 1992; Peterson et al. 2004) have identified bias, and resulting error, associated with traditional sampling methodologies, some of which have been used on this project. Correctly, those studies have called for researchers to carefully evaluate bias and error associated with their study data by conducting separate population estimates using methods with demonstrated accuracy and precision. Further, it has been strongly suggested (Peterson et al. 2004) that researchers test the assumptions of population estimators being used. While the evidence for estimator bias and error seem consistent in the literature, our methods differ from those, and thus must be tested to estimate the level of bias, and confirm compliance of the methods with underlying assumptions. Moreover, we possess significant long-term data sets for juvenile populations in southeast Washington streams. If bias in our methods is consistent over the term of the data, it could be adjusted as appropriate once bias was measured. These corrections could be important in understanding ecological and population response relationships that might be masked by error resulting from methodology bias.

Recommendation: For each survey method that we use to estimate populations, critically look at the assumptions that need to be followed to obtain an unbiased estimate. If assumptions appear to be violated, examine/implement additional surveys that can be used for comparison or correction of past surveys results.

Recommendation: Discuss the possibility of changing current sampling designs to the EMAP sampling approach to evaluate status and trends of summer steelhead throughout these basins.

Coordinate these surveys and methodologies with WDFW Fish Management staff for consistent use throughout SE Washington.

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Appendix A

Bull Trout, Whitefish, and Brown Trout Capture Data from the Touchet River Adult Trap, 2004-2005

Appendix A: Table 1. Bull trout captured at the Dayton Adult Trap on the Touchet River, 2004. Data shown represents first time captures that were then PIT tagged.

Year	Date	Ln (cm)	Wt (g)	Age [a]	PIT Tag Code	Year	Date	Ln (cm)	Wt (g)	Age [a]	PIT Tag Code
2004	3/11	32.0	373.2	5	3D9.1BF1BD1D36	2004	5/7	36.0	525.7	4	3D9.1BF1BD2F3F
2004	3/18	43.0	881.5	6	3D9.1BF1C5F03E	2004	5/7	37.0	569.3	4	3D9.1BF1C4E80C
2004	3/23	37.0	569.3		3D9.1BF1C6AA2C	2004	5/11	38.5	639.1		3D9.1BF1B75769
2004	3/31	31.5	356.5	3	3D9.1BF1C4E90A	2004	5/12	35.0	484.3	3	3D9.1BF1BD2C2D
2004	4/6	38.0	615.2	R	3D9.1BF1C71ED4	2004	5/12	23.5	152.0	3	3D9.1BF1C48A6C
2004	4/7	29.5	294.5	R	3D9.1BF1BD0968	2004	5/12	37.0	569.3	4	3D9.1BF1C5EDD0
2004	4/7	38.0	615.2	5	3D9.1BF1C71EC9	2004	5/18	31.0	340.2	4	3D9.1BF1B5FBCC
2004	4/7	37.0	569.3	4	3D9.1BF1C735F0	2004	5/18	33.5	426.4	3	3D9.1BF1BB6124
2004	4/8	32.0	373.2	4	3D9.1BF1C5FAD0	2004	5/18	35.5	440.0	3	3D9.1BF1C6AC91
2004	4/14	34.5	464.5	4	3D9.1BF1BD2B4D	2004	5/18	42.0	823.2	4	3D9.1BF1C6BAE3
2004	4/14	38.5	639.1	4	3D9.1BF1C4E8B0	2004	5/20	33.0	408.1	4	3D9.1BF1B5F392
2004	4/14	33.5	426.4	3	3D9.1BF1C4EC0C	2004	5/20	35.5	504.7	R	3D9.1BF1B7992D
2004	4/14	33.0	408.1	3	3D9.1BF1C5F387	2004	5/21	33.5	390.0	4	3D9.1BF1B62218
2004	4/14	35.0	484.3	4	3D9.1BF1C63E04	2004	5/21	39.0	663.5	4	3D9.1BF1B69CFA
2004	4/14	43.0	881.5	4	3D9.1BF1C6BA86	2004	5/21	34.0	410.0	4	3D9.1BF1B72FD5
2004	4/15	32.0	373.2	4	3D9.1BF1C4E67B	2004	5/25	33.0	395.0	4	3D9.1BF1B60E6F
2004	4/23	28.0	253.0	3	3D9.1BF1B6433F	2004	5/28	32.0	360.0	4	3D9.1BF1BB08D0
2004	4/23	43.0	860.0	4	3D9.1BF1B71028	2004	6/3	30.5	320.0	3	3D9.1BF1B775BA
2004	4/27	38.5	639.1	5	3D9.1BF1B17569	2004	6/3	33.0	325.0	4	3D9.1BF1B85CFF
2004	4/28	30.0	309.3	4	3D9.1BF1B65408	2004	6/8	35.5	520.0	4	3D9.1BF1B749A4
2004	4/28	39.5	650.0	5	3D9.1BF1B72447	2004	6/8	35.5	480.0	4	3D9.1BF1B837F3
2004	4/30	35.5	510.0	4	3D9.1BF1C62990	2004	6/8	34.5	520.0	4	3D9.1BF1CD7C5D
2004	5/5	43.0	881.5	4	3D9.1BF1A0542E	2004	6/9	33.0	475.0	R	3D9.1BF1B93260
2004	5/5	35.0	484.3	4	3D9.1BF1B70048	2004	6/10	38.0	600.0	3	3D9.1BF1B92713
2004	5/5	36.0	590.0	5	3D9.1BF1B83C5C	2004	6/23	33.0	420.0	3	3D9.1BF1B6EBF8
2004	5/5	33.0	408.1			2004	6/24	25.0	245.0	2	3D9.1BF1B8579F
2004	5/6	42.0	823.2	4	3D9.1BF1B647E1	2004	6/25	19.0	100.0	2	3D9.1BF1BAEC57
2004	5/7	34.5	464.5	4	3D9.1BF1BD1D7B	2004	7/1	34.0	460.0	3	3D9.1BF1B5CBAD

[a] Age determined from scale samples. Missing ages are due to unreadable scale samples.

Appendix A: Table 2. Recaptures of PIT tagged bull trout captured at the Dayton Adult Trap on the Touchet River, 2004 and 2005. Data presented shows date, length, weight, and age (based on scale samples) at time of recapture.

Recovery Year	Date	Ln (cm)	Wt (g)	Age [a]	PIT Tag Code	Year Tagged	Recovery Year	Date	Ln (cm)	Wt (g)	Age [a]	PIT Tag Code	Year Tagged
2004	4/9	46.0	1072.6	6	3D9.1BF11EB12C	2003	2005	4/26	42.0	890.0	4	3D9.1BF1C5F387	2004
2004	4/20	43.0	881.5	5	3D9.1BF110542E	2003	2005	4/27	43.0	1080.0	4	3D9.1BF1BD2C2D	2004
2004	5/5	44.0	900.0	5	3D9.1BF11ACA45	2003	2005	5/3	50.0	1400.0	5	3D9.1BF1C71ED4	2004
2004	5/5	43.5	911.6	5	3D9.1BF11E9A03	2003	2005	5/4	52.0	1920.0	5	3D9.1BF11E9C3F	2003
2004	5/5	41.5	795.0	5	3D9.1BF1239508	2003	2005	5/6	44.0	1000.0	5	3D9.1BF1B837F3	2004
2004	5/7	42.0	823.2	4	3D9.1BF1239AAD	2003	2005	5/10	54.0	1900.0	6	3D9.1BF123A317	2002
2004	5/7	43.0	881.5	4	3D9.1BF123A30D	2003	2005	5/17	43.5	1100.0	5	3D9.1BF1CD7C5D	2004
2004	5/18	49.0	1289.0	5	3D9.1BF123A317	2002							
2004	5/25	41.0	890.0	4	3D9.1BF11EC309	2003							

[a] Age determined from scale samples. Missing ages are due to unreadable scale samples.

Appendix A: Table 3. Bull trout captured at the Dayton Adult Trap on the Touchet River, 2005. Data shown represents first time captures that were then PIT tagged.

Year	Date	Ln (cm)	Wt (g)	Age	PIT Tag Code	Year	Date	Ln (cm)	Wt (g)	Age	PIT Tag Code
2005	4/1	37.0	630.0	4	3D9.1BF1E8D468	2005	5/3	37.5	520.0	4	3D9.1BF1A2F561
2005	4/5	27.0	300.0	4	3D9.1BF1D86D87	2005	5/3	38.0	525.0	U	3D9.1BF1CF1DC2
2005	4/5	28.0	300.0	4	3D9.1BF1F8585E	2005	5/3	32.5	400.0	3	3D9.1BF1E8E16F
2005	4/6	29.0	300.0	4		2005	5/3	44.0	900.0	4	3D9.1BF1F8E509
2005	4/7	34.0	540.0	4	3D9.1BF1D86E3C	2005	5/4	34.5	440.0	3	3D9.1BF1A00E08
2005	4/15	32.0	530.0	4	3D9.1BF1A086DF	2005	5/4	33.0	320.0	4	3D9.1BF1A25650
2005	4/15	28.5	330.0	4	3D9.1BF1A517AA	2005	5/4	38.0	615.2	R	3D9.1BF1CF27A7
2005	4/19	35.0	560.0	4	3D9.1BF1A7F645	2005	5/4	30.0	260.0	3	3D9.1BF1F85699
2005	4/22	32.0	520.0	4	3D9.1BF1CD657C	2005	5/4	41.0	810.0	R	3D9.1BF200542FB
2005	4/22	40.0	880.0	4	3D9.1BF1E7A0A8	2005	5/5	36.0	525.0	R	3D9.1BF1E79BFD
2005	4/26	31.0	340.0	5	3D9.1BF19379F4	2005	5/5	37.0	550.0	4	3D9.1BF205685B
2005	4/26	37.0	580.0	4	3D9.1BF1E8F128	2005	5/6	39.0	800.0	R	3D9.1BF1A0048F
2005	4/26	32.0	400.0		3D9.1BF204ACDF	2005	5/6	32.0	250.0	4	3D9.1BF1A2EED7
2005	4/27	34.5	420.0	4	3D9.1BF1CF71E4	2005	5/6	30.0	400.0	4	3D9.1BF1AF88FB
2005	4/27	34.0	420.0	3	3D9.1BF1E8CC93	2005	5/10	33.0	425.0	4	3D9.1BF1CD71E4
2005	4/27	40.5	740.0	4	3D9.1BF1EFD1CF	2005	5/10	45.0	####	R	3D9.1BF1D8B7FC
2005	4/27	39.0	700.0	5	3D9.1BF205492D	2005	5/13	34.5	440.0	4	3D9.1BF1A767B9
2005	4/28	35.5	460.0	4	3D9.1BF1F869BF	2005	5/17	38.0	660.0	4	3D9.1BF203E703
2005	4/28	35.0	450.0	4	3D9.1BF1F9D46C	2005	5/24	38.5	925.0	R	3D9.1BF1A31774
2005	5/3	42.0	980.0	5	3D9.1BF1936C4A	2005	5/27	33.5	560.0	4	3D9.1BF1F926DD
2005	5/3	31.5	360.0	R	3D9.1BF1A28C09	2005	6/2	30.0	340.0	4	3D9.1BF1A7997B

[a] Age determined from scale samples. Missing ages are due to unreadable scale samples.

Appendix A: Table 4. Whitefish captured at the Dayton Adult Trap on the Touchet River, 2004-2005.

Year	Date	LN (cm)	WT (g)	Age	Year	Date	LN (cm)	WT (g)	Age
2004	3/31	30.0		5	2005	4/29	34.0		
2004	4/7	24.0		3	2005	5/5	32.0	400.0	4
2004	5/14	28.5		3	2005	5/12	30.5	325.0	3
2004	5/20	25.0		2	2005	5/12	33.0	530.0	4
2004	5/26	28.0		3	2005	5/12	31.0	400.0	3
2004	5/26	28.0		2	2005	5/20	29.5	350.0	4
2004	6/29	26.0	375.0	2	2005	6/2	25.5		2
					2005	6/8	22.5		1

Appendix A: Table 5. Brown trout captured at the Dayton Adult Trap on the Touchet River, 2004-2005.

Year	Date	LN (cm)	WT (g)	Age	Year	Date	LN (cm)	WT (g)	Age
2004	3/19	39.0			2005	4/20	51.5		5
2004	4/14	30.0			2005	5/4	62.5		6
2004	4/27	22.0			2005	5/17	50.0		
2004	4/27	38.0			2005	6/2	48.0		
2004	5/14	27.0			2005	6/2	43.0		3
2004	6/3	41.0			2005	6/3	50.0		5
2004	6/23	42.0							
2004	6/24	40.0							
2004	6/24	54.5							
2004	6/24	50.0							
2004	6/24	39.5							
2004	6/25	41.5							
2004	6/25	39.0							
2004	6/26	57.0							
2004	6/26	42.0							
2004	6/26	35.0		3					
2004	6/29	33.0							

Appendix B

Summer Steelhead Index Areas for Spawning Ground Surveys in 2005

Appendix B: Table 1. Start and stop coordinates (latitude and longitude) for stream reaches, index sections, and final walks for summer steelhead spawning ground surveys in the Tucannon and Touchet rivers, and Asotin Creek, 2005. (Note: Reference coordinates were determined from Maptech® Terrain Navigator Pro Software). Locations provided are in a downstream to upstream direction.

Stream – Surveyed Section	Upstream coordinates (Start)	Downstream coordinates (Stop)
Tucannon River		
Reach 0	*46 29' 20.29" N, 117 57' 37.79" W*	*46 32' 52.18" N, 118 10' 31.82" W*
Index 1	46 29' 20.29" N, 117 57' 37.79" W	46 30' 22.18" N, 118 00' 37.87" W
Index 2	46 30' 22.18" N, 118 00' 37.87" W	46 30' 17.47" N, 118 03' 50.71" W
Index 3	46 30' 17.47" N, 118 03' 50.71" W	46 30' 47.21" N, 118 07' 03.28" W
Index 4	46 31' 12.43" N, 118 07' 47.80" W	46 32' 52.18" N, 118 10' 31.82" W
Reach 1	*46 18' 35.87" N, 117 39' 22.73" W*	*46 29' 20.29" N, 117 57' 37.79" W*
Index 1	46 27' 41.64" N, 117 51' 31.33" W	46 27' 56.64" N, 117 53' 50.34" W
Index 2	46 23' 49.00" N, 117 43' 00.89" W	46 26' 42.47" N, 117 46' 44.27" W
Index 3	46 18' 36.18" N, 117 39' 22.90" W	46 22' 07.00" N, 117 41' 25.91" W
Reach 2	*46 11' 18.29" N, 117 37' 25.95" W*	*46 18' 35.87" N, 117 39' 22.73" W*
Index 1	46 12' 24.04" N, 117 42' 21.77" W	46 18' 35.87" N, 117 39' 22.73" W
Reach 3		
Final Walk 1	*46 15' 49.62" N, 117 36' 55.61" W*	*46 19' 57.76" N, 117 40' 25.73" W*
Touchet River		
North Fork Touchet Reach	*46 11' 21.53" N, 117 49' 19.79" W*	*46 18' 05.41" N, 117 57' 30.80" W*
Index 1	46 17' 16.61" N, 117 55' 13.14" W	46 18' 05.41" N, 117 57' 30.80" W
Index 2	46 14' 28.74" N, 117 51' 58.07" W	46 16' 16.33" N, 117 53' 20.71" W
Final Walk 1	46 11' 21.53" N, 117 49' 19.79" W	46 13' 56.00" N, 117 51' 07.10" W
South Fork Touchet Reach	*46 07' 15.30" N, 117 58' 22.92" W*	*46 18' 05.41" N, 117 57' 30.80" W*
Index 1	46 14' 39.84" N, 117 55' 54.94" W	46 15' 48.66" N, 117 56' 19.34" W
Index 2	46 11' 58.60" N, 117 57' 17.18" W	46 13' 20.02" N, 117 56' 48.71" W
Final Walk 1	46 09' 09.19" N, 117 58' 24.01" W	46 11' 58.60" N, 117 57' 17.18" W
Wolf Fork Touchet Reach	*46 08' 56.71" N, 117 52' 29.14" W*	*46 16' 27.10" N, 117 53' 42.41" W*
Index 1	46 13' 41.11" N, 117 52' 25.01" W	46 15' 20.67" N, 117 53' 09.43" W
Index 2	46 12' 10.85" N, 117 52' 03.80" W	46 13' 18.79" N, 117 52' 25.72" W
Final Walk 1	46 08' 56.71" N, 117 52' 29.14" W	46 11' 20.01" N, 117 51' 54.54" W
Robinson Fork Touchet Reach	*46 10' 14.62" N, 117 55' 10.44" W*	*46 14' 16.42" N, 117 53' 41.60" W*
Index 1	46 10' 14.62" N, 117 55' 10.44" W	46 13' 58.45" N, 117 53' 32.33" W
Asotin Creek		
Main Asotin Creek Reach	*46 16' 21.42" N, 117 17' 27.79" W*	*46 19' 34.44" N, 117 06' 18.82" W*
Index 1	46 16' 21.42" N, 117 17' 27.79" W	46 17' 57.12" N, 117 15' 15.54" W
Index 2	46 19' 02.37" N, 117 14' 12.30" W	46 19' 45.51" N, 117 09' 13.14" W
Index 3	46 19' 30.89" N, 117 08' 51.82" W	46 19' 32.63" N, 117 06' 27.63" W
Final Walk 1	46 17' 57.12" N, 117 15' 15.54" W	46 19' 02.37" N, 117 14' 12.30" W
NF Asotin Creek Reach	*46 11' 48.87" N, 117 26' 03.08" W*	*46 16' 21.42" N, 117 17' 27.79" W*
Index 1	46 15' 44.23" N, 117 17' 45.12" W	46 16' 21.42" N, 117 17' 27.79" W
Index 2	46 14' 11.53" N, 117 21' 26.31" W	46 15' 44.23" N, 117 17' 45.12" W
Final Walk 1	46 13' 01.76" N, 117 23' 45.40" W	46 14' 11.53" N, 117 21' 26.31" W
Final Walk 2	46 11' 48.87" N, 117 26' 03.08" W	46 13' 01.76" N, 117 23' 45.40" W
SF Asotin Creek Reach	*46 11' 32.61" N, 117 19' 14.57" W*	*46 16' 21.42" N, 117 17' 27.79" W*
Index 1	46 14' 27.46" N, 117 17' 01.43" W	46 16' 21.42" N, 117 17' 27.79" W
Final Walk 1	46 11' 32.61" N, 117 19' 14.57" W	46 14' 27.46" N, 117 17' 01.43" W
Charley Creek Reach	*46 16' 58.50" N, 117 23' 49.12" W*	*46 17' 18.92" N, 117 16' 38.71" W*
Index 1	46 16' 57.73" N, 117 21' 18.00" W	46 17' 20.14" N, 117 18' 01.38" W
Final Walk 1	46 16' 58.50" N, 117 23' 49.12" W	46 16' 57.73" N, 117 21' 18.00" W
Final Walk 2	46 17' 20.14" N, 117 18' 01.38" W	46 17' 17.80" N, 117 17' 05.28" W

Appendix C

Estimates of Juvenile Summer Steelhead Densities in SE Washington Rivers that are part of the LSRCP Program

Appendix C: Table 1. Summary of natural origin juvenile summer steelhead / rainbow trout mean densities (fish/100 m^2) by age class for SE Washington rivers that are a part of the LSRCP Program.

Age 0 Steelhead / Rainbow Trout									
Stream Name	Asotin Creek				Touchet River			Tucannon River	Cummings Creek
Year	Main	North Fork	South Fork	Charley Creek	North Fork	South Fork	Wolf Fork	Main	Main
1983	- - -	23.7	44.3	- - -	- - -	- - -	- - -	- - -	- - -
1984	- - -	6.6	39.0	- - -	- - -	- - -	- - -	16.0	- - -
1985	- - -	- - -	- - -	73.0	- - -	- - -	- - -	- - -	- - -
1986	- - -	29.7	- - -	- - -	- - -	- - -	- - -	18.4	- - -
1987	- - -	- - -	- - -	- - -	- - -	- - -	- - -	20.6	- - -
1988	- - -	45.8	- - -	- - -	- - -	- - -	- - -	- - -	- - -
1989	- - -	22.8	6.0	- - -	- - -	- - -	- - -	18.1	- - -
1990	- - -	- - -	- - -	- - -	- - -	- - -	- - -	19.1	- - -
1991	- - -	22.1	1.8	- - -	- - -	- - -	- - -	13.0	- - -
1992	- - -	56.9	50.0	- - -	35.5	42.8	41.1	17.4	- - -
1993	49.1	36.8	78.7	- - -	26.0	8.7	21.8	14.6	43.2
1994	36.8	20.4	0.8	19.0	20.8	16.2	20.2	- - -	42.9
1995	47.7	23.4	34.5	- - -	42.5	31.1	25.0	11.0	32.4
1996	62.8	13.0	2.0	64.4	4.9	1.9	2.3	15.8	47.8
1997	33.4	24.0	32.5	- - -	28.5	11.6	21.1	16.5	- - -
1998	52.2	44.6	32.9	18.3	15.4	16.7	23.6	17.2	12.5
1999	20.9	11.0	27.4	12.7	24.5	9.4	15.6	5.2	31.3
2000	26.6	41.9	21.8	43.0	15.6	10.9	15.3	19.3	40.3
2001	35.6	33.9	68.8	38.5	23.6	13.8	13.6	17.8	14.8
2002	37.1	40.4	84.7	65.8	48.0	52.1	43.4	27.2	54.9
2003	51.9	36.9	83.6	57.7	54.2	32.8	42.9	21.7	48.9
2004	41.4	23.6	15.0	48.0	33.5	33.8	35.0	5.3	17.7
Age 1+ Steelhead / Rainbow Trout									
1983	- - -	8.7	25.3	- - -	- - -	- - -	- - -	- - -	- - -
1984	- - -	7.5	30.6	- - -	- - -	- - -	- - -	2.5	- - -
1985	- - -	- - -	- - -	37.6	- - -	- - -	- - -	- - -	- - -
1986	- - -	37.6	- - -	- - -	- - -	- - -	- - -	13.7	- - -
1987	- - -	- - -	- - -	- - -	- - -	- - -	- - -	8.5	- - -
1988	- - -	8.1	- - -	- - -	- - -	- - -	- - -	- - -	- - -
1989	- - -	18.1	34.0	- - -	- - -	- - -	- - -	10.6	- - -
1990	- - -	- - -	- - -	- - -	- - -	- - -	- - -	9.8	- - -
1991	- - -	14.2	13.9	- - -	- - -	- - -	- - -	6.5	- - -
1992	- - -	22.2	10.4	- - -	19.0	15.5	8.7	4.8	- - -
1993	22.1	28.1	42.5	- - -	19.3	15.0	10.5	7.0	26.3
1994	39.6	34.9	16.4	20.0	18.9	5.8	11.5	- - -	20.4
1995	13.1	11.2	21.7		8.9	9.5	6.4	4.0	29.6
1996	12.2	17.4	11.2	15.3	3.6	10.2	5.3	3.2	16.6
1997	6.9	6.7	4.6		2.3	2.8	7.4	4.6	- - -
1998	10.2	25.5	22.8	49.0	4.9	16.2	13.4	6.4	12.7
1999	14.4	13.9	17.3	22.9	3.4	8.4	13.0	4.2	16.1
2000	9.7	16.6	22.3	17.9	11.2	13.3	8.9	4.9	17.3
2001	19.7	30.4	29.8	23.6	13.7	13.6	11.6	6.9	8.6
2002	12.0	19.7	24.7	19.4	12.1	10.7	6.6	4.3	27.4
2003	15.5	18.7	36.2	38.3	16.7	17.2	16.2	7.20	28.3
2004	20.1	23.6	21.1	27.2	21.1	13.9	16.1	8.5	25.1

Appendix C: Table 2. Densities of natural origin juvenile steelhead/rainbow trout (fish/100 m2) from single (S) or multiple pass (MP) electrofishing sites in the Tucannon River basin, 2004.

Stream Site Name	Est. rkm	Site length (m)	Mean width (m)	Area (m^2)	Fish/100m^2 Age 0	Fish/100m^2 Age 1+	Fish/100m^2 Legal (>200mm)
Tucannon River							
TUC2-00 (MP)	28.0	75	12.70	952.50	1.47	7.35	0.00
TUC4-00 (S)	34.1	75	13.04	978.21	2.15	5.93	0.00
TUC5-00 (S)	36.7	75	10.56	792.00	3.28	2.15	0.00
TUC6-00 (MP)	41.8	75	11.30	847.50	4.96	6.96	0.00
TUC8-00 (S)	49.1	75	11.07	830.36	5.90	14.93	0.00
TUC9a-00 (S)	55.6	75	10.04	753.21	9.82	5.71	0.00
TUC10-00 (S)	57.1	75	12.35	926.25	7.99	6.91	0.00
TUC10a-04 (S)	59.1	75	12.10	907.50	4.30	6961	0.00
TUC10b-04 (S)	60.1	75	12.38	929.06	14.32	3.34	0.11
TUC11-00 (MP)	61.2	66.5	13.27	882.55	13.71	6.12	0.00
TUC11a-04 (S)	62.8	75	17.89	1,341.56	8.27	4.10	0.00
TUC12-00 (MP)	64.4	75	11.09	831.43	1.80	9.50	0.00
TUC12a-04 (S)	67.2	75	11.05	828.75	2.05	7.00	0.36
TUC13-00 (S)	68.4	75	10.93	819.64	3.66	9.27	0.00
TUC13a-04 (MP)	70.0	75	10.83	812.50	5.17	10.95	0.00
TUC14-00 (S)	72.9	75	9.61	721.07	0.97	9.15	0.00
TUC14a-04 (S)	73.4	75	11.37	852.86	7.74	13.02	0.35
TUC15-00 (MP)	75.8	75	7.51	563.57	2.84	9.76	0.00
TUC15a-04 (S)	77.7	85	7.84	666.40	4.65	13.96	0.00
TUC16-00 (S)	78.5	75	10.50	787.50	0.89	16.76	0.13
Cummings Creek							
CC-1-01 (S)	0.0	100	3.12	312.00	4.81	11.22	0.00
CC-1a-04 (S)	0.9	100	2.94	293.64	27.58	24.18	0.00
CC-2-01 (MP)	1.8	100	2.91	291.11	28.17	28.17	0.34
CC-2a-04 (S)	2.8	100	3.18	319.33	16.96	30.79	0.00
CC-3-01 (S)	3.8	100	3.11	311.00	25.72	30.55	0.00
CC-3a-04 (S)	4.8	100	4.15	415.00	13.98	18.07	0.00
CC-4-01 (MP)	5.8	100	3.33	333.00	23.42	25.83	0.00
CC-4a-04 (S)	6.8	100	3.49	349.00	8.88	26.93	0.00
CC-5-02 (S)	7.7	100	2.87	287.00	9.41	29.97	0.00

Appendix C: Table 3. Densities of natural origin juvenile steelhead/rainbow trout (fish/100 m2) from single (S) or multiple pass (MP) electrofishing sites in Asotin Creek, 2004.

Stream Site Name	Est. rkm	Site length (m)	Mean width (m)	Area (m^2)	Fish/100m^2 Age 0	Fish/100m^2 Age 1+	Fish/100m^2 Legal (>200mm)
Asotin Creek							
MA-1-01 (S)	4.4	50	8.88	444.00	41.89	12.61	0.00
MA-1a-04 (MP)	6.1	50	8.23	411.42	50.07	27.47	0.24
MA-2-01 (S)	7.8	50	7.53	376.25	37.74	15.95	0.00
MA-2a-04 (S)	7.8	50	10.69	534.38	19.09	22.46	0.00
MA-3-01 (MP)	11.5	50	8.53	426.67	33.28	13.12	0.00
MA-3a-04 (S)	13.0	50	9.24	563.33	68.20	26.55	0.00
MA-3b-04 (S)	14.1	50	7.60	380.00	42.89	20.00	0.00
MA-4-01 (MP)	15.2	50	8.57	428.33	59.07	22.88	0.00
MA-4a-04 (S)	17.2	50	7.06	352.86	25.51	13.60	0.00
MA-5-00 (S)	19.0	50	8.06	402.86	36.24	26.56	0.00
North Fork							
NFA-0-04 (S)	0.8	50	7.83	391.67	23.49	16.34	0.00
NFA-1-00 (S)	1.6	50	8.37	418.57	17.68	12.42	0.00
NFA-1a-04 (MP)	2.7	50	7.00	350.00	25.81	13.14	0.00
NFA-2-04 (S)	5.3	50	7.46	373.00	34.32	18.77	0.00
NFA-3-00 (S)	7.0	50	6.28	314.17	35.97	44.56	0.00
NFA-3a-04 (MP)	8.3	50	6.47	323.33	23.20	42.37	0.62
NFA-4-00 (S)	9.6	50	6.88	344.17	36.32	25.28	0.00
NFA-4a-04 (S)	10.7	50	6.91	345.71	20.54	24.30	0.00
NFA-5-00 (S)	11.8	50	8.36	418.00	11.24	25.36	0.00
South Fork							
SFA-1-00 (MP)	0.6	50	4.66	232.86	73.86	19.75	0.00
SFA-2-00 (S)	3.0	50	4.88	244.17	1.23	45.05	0.00
SFA-3-00 (MP)	5.4	50	3.90	195.00	0.00	40.51	1.03
Charley Creek							
CC-1-02 (MP)	1.0	50	3.33	166.67	49.20	21.60	0.00
CC-1a-04 (S)	2.4	50	3.97	198.33	39.33	13.61	0.00
CC-2-02 (S)	3.7	50	3.23	161.67	34.02	12.99	0.00
CC-2a-04 (S)	5.0	50	3.86	192.50	54.55	15.58	0.00
CC-3-02 (MP)	6.4	50	3.34	167.14	76.58	10.09	0.00
CC-3a-04 (S)	7.6	50	2.87	143.33	55.82	30.00	0.00
CC-4-02 (S)	9.1	50	3.05	152.50	35.41	24.92	0.00
CC-4a-04 (MP)	10.4	50	3.29	164.29	67.56	25.56	0.00
CC-5-02 (S)	11.8	50	3.27	163.33	19.59	60.61	0.00

Appendix C: Table 4. Densities of natural origin juvenile steelhead/rainbow trout (fish/100 m2) from single (S) or multiple pass (MP) electrofishing sites in the Touchet River basin, 2004.

Stream Site Name	Est. Rkm	Site length (m)	Mean width (m)	Area (m^2)	Fish/100m^2 Age 0	Fish/100m^2 Age 1+	Fish/100m^2 Legal (>200mm)
North Fork							
NFT-1-01 (S)	0.1	80	10.70	856.00	25.58	6.31	0.00
NFT-3-01 (MP)	6.8	80	6.67	535.00	61.12	33.27	0.56
NFT-5-01 (S)	12.4	80	9.16	733.00	22.24	21.42	0.00
NFT-7-01 (S)	17.7	80	5.91	473.00	25.16	23.26	0.00
South Fork							
SFT-1-02 (S)	0.1	80	4.45	355.64	50.33	13.22	0.00
SFT-3-02 (MP)	7.0	80	7.84	327.56	19.29	11.15	0.00
SFT-5-02 (S)	13.4	80	8.55	684.00	19.59	9.80	0.00
SFT-7-02 (S)	19.8	80	6.19	495.11	46.05	21.61	0.00
Wolf Fork							
WFT-1-01 (S)	0.2	80	8.13	650.67	28.28	7.38	0.00
WFT-3-01 (MP)	4.3	80	9.56	764.80	33.60	15.82	0.00
WFT-5-01 (S)	8.6	80	5.80	464.00	22.41	25.22	0.22
WFT-7-01 (S)	12.6	80	6.09	486.00	55.76	15.84	0.00
Robinson Fork							
RFT-1-01 (S)	0.8	80	4.55	364.00	17.58	20.88	0.00
RFT-2-01 (MP)	2.4	80	3.67	293.33	20.11	19.09	0.00
RFT-3-01 (S)	3.8	80	4.83	386.67	9.31	24.83	0.00
RFT-4-01 (MP)	5.6	80	4.81	385.00	18.18	12.99	0.00
RFT-5-01 (S)	7.2	80	4.04	323.00	16.72	1.86	0.00

Appendix C: Table 5. Estimated number of other sensitive species present from electrofishing sites in the Tucannon River basin, 2004. Sites were surveyed using single (S) or multiple pass (MP) surveys.

Stream Site Name	Bull Trout Age 0	Bull Trout Age 1+	Bull Trout legal (>200mm)	Whitefish (Legal)	Spring Chinook	Hatchery Steelhead	Endemic Hatchery Steelhead
Tucannon River							
TUC2-00 (MP)	0	0	0	0	1	49	1
TUC4-00 (S)	0	0	0	0	6	0	0
TUC5-00 (S)	0	0	0	0	10	0	0
TUC6-00 (MP)	0	0	0	2 [a]	17	0	0
TUC8-00 (S)	0	0	0	2	197	0	1
TUC9a-00 (S)	0	0	0	1	34	0	0
TUC10-00 (S)	0	0	1	0	74	0	0
TUC10a-04 (S)	0	0	1	0	69	0	0
TUC10b-04 (S)	0	0	0	0	61	0	0
TUC11-00 (MP)	0	1	0	0	104	1	5
TUC11a-04 (S)	0	1	3	2	61	0	3
TUC12-00 (MP)	0	0	1	0	73	0	16
TUC12a-04 (S)	0	0	1	1	48	0	0
TUC13-00 (S)	0	1	0	0	54	0	11
TUC13a-04 (MP)	0	0	0	1	41	0	7
TUC14-00 (S)	0	0	5	0	22	0	6
TUC14a-04 (S)	0	0	8	0	31	0	2
TUC15-00 (MP)	0	4	1	0	2	0	0
TUC15a-04 (S)	21	5	3	0	3	0	6
TUC16-00 (S)	3	8	1	0	0	0	0
Cummings Creek							
CC-1-01 (S)	0	1	0	0	20	0	0
CC-1a-04 (S)	0	0	0	0	0	0	0
CC-2-01 (MP)	0	1	0	0	0	0	0
CC-2a-04 (S)	0	1	0	0	0	0	0
CC-3-01 (S)	0	0	0	0	0	0	0
CC-3a-04 (S)	0	0	0	0	0	0	0
CC-4-01 (MP)	0	0	0	0	0	0	0
CC-4a-04 (S)	0	0	0	0	0	0	0
CC-5-02 (S)	0	2	0	0	0	0	0

[a] Whitefish have been observed as Age 0 or legal based on size.

Appendix C: Table 6. Estimated number of other sensitive species present from electrofishing sites in Asotin Creek, 2004. Sites were surveyed using single (S) or multiple pass (MP) surveys.

Stream Site Name	Bull Trout Age 0	Bull Trout Age 1+	Bull Trout legal (>200mm)	Whitefish (Legal)	Spring Chinook	Hatchery Steelhead	Endemic Hatchery Steelhead
Asotin Creek							
MA-1-01 (S)	0	0	0	0	1	NA	NA
MA-1a-04 (MP)	0	0	0	0	1	NA	NA
MA-2-01 (S)	0	0	0	0	0	NA	NA
MA-2a-04 (S)	0	0	0	0	0	NA	NA
MA-3-01 (MP)	0	0	0	0	0	NA	NA
MA-3a-04 (S)	0	0	0	0	1	NA	NA
MA-3b-04 (S)	0	0	0	0	0	NA	NA
MA-4-01 (MP)	0	0	0	0	0	NA	NA
MA-4a-04 (S)	0	0	0	0	0	NA	NA
MA-5-00 (S)	0	0	0	0	0	NA	NA
North Fork							
NFA-0-04 (S)	0	0	0	0	0	NA	NA
NFA-1-00 (S)	0	0	0	0	0	NA	NA
NFA-1a-04 (MP)	0	0	0	0	0	NA	NA
NFA-2-04 (S)	0	0	0	0	0	NA	NA
NFA-3-00 (S)	0	0	0	0	0	NA	NA
NFA-3a-04 (MP)	0	0	0	0	0	NA	NA
NFA-4-00 (S)	0	0	0	0	0	NA	NA
NFA-4a-04 (S)	0	0	0	0	0	NA	NA
NFA-5-00 (S)	0	0	0	0	0	NA	NA
South Fork							
SFA-1-00 (MP)	0	0	0	0	0	NA	NA
SFA-2-00 (S)	0	0	0	0	0	NA	NA
SFA-3-00 (MP)	0	0	0	0	0	NA	NA
Charley Creek							
CC-1-02 (MP)	0	0	0	0	0	NA	NA
CC-1a-04 (S)	0	0	0	0	0	NA	NA
CC-2-02 (S)	0	0	0	0	0	NA	NA
CC-2a-04 (S)	0	0	0	0	0	NA	NA
CC-3-02 (MP)	0	0	0	0	0	NA	NA
CC-3a-04 (S)	0	0	0	0	0	NA	NA
CC-4-02 (S)	0	0	0	0	0	NA	NA
CC-4a-04 (MP)	0	0	0	0	0	NA	NA
CC-5-02 (S)	0	0	0	0	0	NA	NA

Appendix C: Table 7. Estimated number of other sensitive species present from electrofishing sites in the Touchet River basin, 2004. Sites were surveyed using single (S) or multiple pass (MP) surveys.

Stream Site Name	Bull Trout Age 0	Bull Trout Age 1+	Bull Trout legal (>200mm)	Whitefish [a]	Brown Trout [b]	Spring Chinook	Hatchery Steelhead	Endemic Hatchery Steelhead
North Fork								
NFT-1-01 (S)	0	0	0	0	7-0	0	1	20
NFT-3-01 (MP)	0	0	0	0	2-0	0	0	14
NFT-5-01 (S)	0	1	1	0	1-0, 2-1+	0	3	3
NFT-7-01 (S)	0	1	1	0	0	0	0	3
South Fork								
SFT-1-02 (S)	0	0	0	0	0	0	0	7
SFT-3-02 (MP)	0	0	0	0	0	0	2	1
SFT-5-02 (S)	0	0	0	0	0	0	0	2
SFT-7-02 (S)	0	0	0	0	0	0	0	0
Wolf Fork								
WFT-1-01 (S)	0	1	0	0	1-0	0	0	8
WFT-3-01 (MP)	0	1	0	0	1-0	0	0	2
WFT-5-01 (S)	0	0	0	0	0	0	0	2
WFT-7-01 (S)	0	0	5	0	0	0	0	0
Robinson Fork								
RFT-1-01 (S)	0	0	0	0	0	0	0	0
RFT-2-01 (MP)	0	0	0	0	0	0	0	0
RFT-3-01 (S)	0	0	0	0	0	0	0	1
RFT-4-01 (MP)	0	0	0	0	0	0	0	0
RFT-5-01 (S)	0	0	0	0	0	0	0	0

[a] Whitefish have been observed as Age 0 or legal based on size.

[b] Brown Trout have been observed to have at least three age classes in the Touchet River. We have designated age based on length at time of capture.

Appendix C: Table 8. 2004 Electofishing site locations for the Tucannon River, Cummings Creek, and Asotin Creek.

Stream / Site name	Approximate site location/description
Tucannon River	
TUC2-00	100 m above Enrich Bridge (Road Mile 17.1)
TUC4-00	100 m below King Grade Bridge (Road Mile 20.9)
TUC5-00	Hovrud's Silt Basin, (RM 23.2)
TUC6-00	Across from MP 12, above Marengo Bridge (Road Mile 25.7)
TUC8-00	100 m above Bridge 13 (Road Mile 30.6)
TUC9a-00	Lower end of Camp Ground #1, below HMA fence line
TUC10-00	Across from Campground 2, Rock Cliff below site (Road Mile 35.3)
TUC10a-00	Below Tucannon Hatchery Intake
TUC10b-00	Day Use Parking Area, above old Campground #6 where river splits
TUC11-00	Across from Campground 5, USFS Info Board (Road Mile 37.8)
TUC11a-00	Half way between Beaver/Watson Lake and Big 4 Lake
TUC12-00	Across from Big 4 Lake, top is at the overflow from lake (Road Mile 40.0)
TUC12a-00	Day Use Area across from Forest Service Guard Station
TUC13-00	Across from Camp Wooten, old HMA 15 (Road Mile 42.3)
TUC13a-00	Across from second cattleguard crossing
TUC14-00	100' above Cow Camp Bridge (Road Mile 44.5)
TUC14a-00	Forest Service Log Weir, across from cabins
TUC15-00	Upper End of Wild Campground 2 (Road Mile 46.7) FS Blocked road to CG.
TUC15a-00	Lower End of Lady Bug Flat Campground
TUC16-00	Above Winchester Creek (Road Mile 48.2)
Cummings Creek	
CC1-01	~50 m above mouth of Cummings Creek
CC1a-04	0.6 miles above the Gate along the Cummings Creek Trail Road
CC2-02	1.2 miles above the Gate along the Cummings Creek Trail Road
CC2a-04	1.8 miles above the Gate along the Cummings Creek Trail Road
CC3-02	2.4 miles above the Gate along the Cummings Creek Trail Road
CC3a-04	3.0 miles above the Gate along the Cummings Creek Trail Road
CC4-02	3.6 miles above the Gate along the Cummings Creek Trail Road
CC4a-04	4.2 miles above the Gate along the Cummings Creek Trail Road
CC5-02	4.8 miles above the Gate along the Cummings Creek Trail Road
Asotin Creek	
AC1-01	~200m above bridge at George Creek mouth, behind Joe Curl's house
AC2-01	½ way between George Creek and Headgate Park
AC3-01	~100m upstream of Headgate Park Dam
AC4-01	~2.5 miles below confluence bridge, public fishing access area
AC5-01	Upper end of 1998 meander reconstruction (Frank Koch's property)
North Fork Asotin	
NF1-00	~20m above mouth of Lick Creek
NF2-00	1.4 miles above Lick Creek Crossing
NF3-00	3.0 miles below upper USFS fence line (where Pinkham Trail enters)
NF4-00	1.4 miles below upper USFS fence line
NF5-00	6.4 miles above Lick Creek Crossing, upper USFS fence line at Pinkham Trail
South Fork Asotin	
SF1-00	~300m above South Fork mouth, where Campbell Grade Rd comes off of hillside
SF2-00	2 miles above mouth of South Fork
SF3-00	~50 m downstream from Schlee Bridge
SF4-00	1.7 miles above Schlee Bridge
SF5-00	3.4 miles above Schlee Bridge
Charley Creek (Asotin)	
CC1-02	Frank Koch's water diversion ditch, ¼ mile up from main Gate at Koch's house
CC2-02	1.7 miles above main Gate at Koch's house
CC3-02	2.9 miles above main Gate at Koch's house
CC4-02	4.4 miles above main Gate at Koch's house
CC5-02	5.9 miles above main Gate at Koch's house

Appendix C: Table 9. 2004 Electofishing site locations for the Touchet River.

Site name	Approximate site location/description
North Fork	
NFT1-01	~50m above the mouth of the South Touchet (Road Mile 0.1)
NFT3-01	~50m above Wolf Fork Bridge (Road Mile 4.2)
NFT5-01	Behind Jerry Dedloff's House (Road Mile 7.6)
NFT7-01	~20m above last bridge on North Touchet Rd. at MP 13 (Road Mile 11.0)
South Fork	
SFT1-01	~20m up from mouth (Road Mile 0.0)
SFT3-02	2 miles above Pettyjohn Bridge (Road Mile 4.4)
SFT5-02	~100m above Camp Nancy Lee Bridge (Road Mile 8.4)
SFT7-02	4 miles above Camp Nancy Lee Bridge (Road Mile 12.4)
Wolf Fork	
WF1-01	~100m above mouth of the Wolf Fork, behind Fairchild's house
WF3-01	2.4 miles above Wolf Fork Bridge
WF5-01	Donnelly's Bridge (Road Mile 5.2)
WF7-01	Mouth of Coates Creek (Road Mile 7.8)
Robinson	
RF1-01	½ Mile upstream from bridge at mouth
RF2-01	1.5 miles upstream from bridge at mouth
RF3-01	2.4 miles upstream from bridge at mouth
RF4-01	3.5 miles upstream from bridge at mouth
RF5-01	4.5 miles upstream from bridge at mouth