PACIFICORP ENERGY
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Threatened and Endangered Species

Annual Bull Trout (*Salvelinus confluentus)* Monitoring Report

2009

North Fork Lewis River Hydroelectric Projects

Merwin	*FERC No. 935*
Yale	*FERC No. 2071*
Swift No. 1	*FERC No. 2111*
Swift No. 2	*FERC No. 2213*

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TABLE OF CONTENTS

1.0 INTRODUCTION

PacifiCorp and the Public Utility District No. 1 of Cowlitz County, Washington (Cowlitz PUD) (collectively the Utilities) are involved in various bull trout (*Salvelinus confluentus*) and salmonid monitoring programs on the North Fork Lewis River in southwest Washington. These monitoring programs and this report are designed to meet requirements pursuant to Article 402 in the Utilities existing Federal Energy Regulatory Commission (FERC) operating licenses for the Merwin, Yale, Swift No. 1 and Swift No. 2 hydroelectric projects and to meet requirements pursuant to sections 9.6 and 14.2.6 of the Lewis River Settlement Agreement (SA). This report and monitoring programs also serve to meet requirements contained in the 2006 Biological Opinion issued to PacifiCorp and Cowlitz PUD by the U.S. Fish and Wildlife Service (FWS). All activities are developed in consultation with the USFWS. This report provides results from programs that are either ongoing or have been completed in 2009. For methods and general descriptions of all programs please refer to the Annual Bull Trout Monitoring Plan for the North Fork Lewis River 2009 that was submitted to the USFWS, members of Lewis River Aquatic Coordination Committee (ACC) and FERC within the ACC/TCC Annual Report in April 2009.

2.0 STUDY AREA

Bull trout monitoring activities are performed on the North Fork Lewis River and its tributaries upstream of Merwin dam commencing at river mile (RM) 19.5 and ending at Lower Falls, a complete anadromous fish barrier at RM 72.5. The North Fork Lewis River above Merwin dam is influenced by three reservoirs created from hydroelectric facilities; 4,000 acre Lake Merwin, 3,800 acre Yale Lake, and the largest and furthest upstream 4,600 acre Swift Reservoir. From Lower Falls downstream, the North Fork Lewis is free-flowing for about 12 miles until the river reaches the head of Swift Reservoir at RM 60. A map of the study area for all programs is shown in Figure 2.0-1.

Bull trout are found in all three reservoirs and the Swift No. 2 Power Canal with the bulk of the population residing in Swift Reservoir. Only three known bull trout spawning streams are found in the study area; Rush and Pine Creeks, tributaries to the North Fork Lewis River upstream of Swift Reservoir, and Cougar Creek a tributary to Yale Lake. Genetic analysis performed in 2004 identified two distinct sub-populations residing within the basin, Rush Creek bull trout and Pine Creek bull trout. Genetically, bull trout residing in Yale and Merwin reservoirs are a mixture of the two sub-populations found in Swift Reservoir (Nerass and Spruell 2004). The Utilities are currently working with the USFWS to establish a new Lewis River bull trout genetic baseline which will clarify the differences between the three Lewis River subpopulations. Results of this evaluation will be included in the 2010 annual monitoring report.

3.0 METHODS AND RESULTS

During 2009 the Utilities participated in, funded or initiated seven monitoring programs. Of those programs, all are ongoing and will continue in 2010. One proposed 2009 program, Swift reservoir rainbow trout stomach analysis, was not completed due to instrument malfunction. Equipment used to lavage rainbow trout encountered problems and was not able to be repaired with sufficient time to complete sampling during the proposed time-frame.

Bull Trout Programs completed in 2009 and ongoing for 2010 include:

1. Swift reservoir adult migration population estimate (ongoing)
2. Yale tailrace collection and transport (ongoing)
3. Swift bypass collection (ongoing)
4. Cougar Creek spawning estimate (ongoing)
5. Bull trout redd surveys of Pine Creek tributary P8 (ongoing)
6. Swift Creek surveys (ongoing)
7. Bull trout collection and transport of the Swift No. 2 power canal (ongoing)

3.1 FERC PROJECT LICENSE ARTICLE 402(B) AND LEWIS RIVER SETTLEMENT AGREEMENT SECTION 9.6 - ESTIMATE OF STAGING BULL TROUT THAT MIGRATED UP THE NORTH FORK LEWIS RIVER FROM THE HEAD OF SWIFT RESERVOIR

MARKING:

Tangle net collection activities at the upper end of Swift reservoir began on May 13, 2009 and continued through July 7, 2009 (Appendix A). In total, nine netting days were completed during the period. A total of 107 bull trout were captured in the Eagle Cliffs area of Swift reservoir. Of these, 73 were tagged with a pink colored Floy® tag and 7 were tagged with an orange/white bi-color Floy® tag. The use of two different Floy® tag color sets is a continuation of what was first implemented in 2008. The two color sets were used in an attempt to assess the migration patterns of differing size classes of bull trout. The hypothesis is that smaller fish may not migrate at the same rate as larger size bull trout. That is, smaller bull trout (350mm to 450mm) may represent immature fish that are present in the Eagle Cliffs area due to the presence of other bull trout, abundant forage and cool water. To test this hypothesis, bull trout less than 450mm were given a different colored tag (orange/white bi-color) than individuals larger than 450mm (pink). Thus, these two different colored tag groups would allow distinction of size classes and migration patterns of bull trout if encountered during snorkeling recapture surveys outside the staging area.

Nine of the captured bull trout were too small (less than 14 inches) to safely tag with a Floy® tag, seventeen were current year recaptures, and there was one mortality (Appendix A). In addition to the seventeen current year recaptures, thirty-five captured bull trout had Floy® or PIT (Passive Integrated Transponder) tags from previous years bringing the total capture rate of previously handled fish to forty-nine percent (52 fish of a total of 107 fish). All newly captured fish received a Floy® and PIT tag (dorsal sinus tag location) to uniquely identify each bull trout for future reference and newly captured fish were weighed and measured to fork length. The weighing of fish is a continuation of what was first implemented in 2008 and, along with fork lengths, will be used to assess the condition factor (K-factor) of bull trout residing in Swift reservoir. This biological information will be recorded with each fish captured and individual metrics will be compared with each recapture to evaluate trends in reservoir productivity and how this pertains to bull trout behavior.

SNORKEL SURVEYS:

To satisfy the recapture portion of the mark/recapture estimate, snorkel surveys were conducted four times on Rush Creek and four times on Pine Creek between August 12, 2009 and September 30, 2009 as well as one time of the mainstem North Fork Lewis River on September 24, 2009 (Figure 3.1-1). Snorkel surveys on Rush Creek include a portion of the North Fork Lewis River known as the "Rush Creek hole". This area is thought to be used as a staging area for bull trout ascending Rush Creek and is about 200 feet long, 40 feet wide, and 10 feet deep. It is located at the confluence of Rush Creek and the North Fork Lewis River. Bull trout counts in Rush Creek occur within two index areas, one from the mouth (including the Rush Creek hole) upstream to the Forest Service Road (FR) 90 Bridge and the other for about 3200 feet upstream from the FR 90 bridge (about RM 0.85). On Pine Creek, surveys are divided into three index areas where counts are typically conducted between RM 2.0 and 4.5 (Figure 3.1-2). Surveys on Pine Creek are limited due to inaccessibility. On the mainstem North Fork Lewis River, the September 24, 2009 survey was from the Crab Creek Bridge down to Eagle Cliff, a distance of approximately twelve miles. The twelve miles of river was broken into three sections with teams of snorkelers performing the survey within each specified section. Most of the bull trout during the mainstem North Fork Lewis snorkel were observed at the confluences of Rush Creek, Muddy River, and Pine Creek.

During each snorkel survey all encountered bull trout are enumerated. Care is also taken to try and determine the presence of any pink and orange/white Floy® tagged fish. Four of the nine snorkeling events observed fish from the orange/white tagged group (comprising of bull trout between 350-450mm (Table 3.1-1) and most of the surveys observed un-tagged fish smaller than 450mm fork length. The main goal of the two different tagged size groups was to verify if the smaller fish were indeed present in the re-sight area during the re-sight surveys.

For 2009, 445 adult bull trout (95% Confidence Limit (CL) 554-367, J. Byrne, WDFW unpublished data) were estimated to be migrating upstream from the Eagle Cliff area of Swift reservoir to the North Fork Lewis River, Pine or Rush Creeks (Figure 3.1-1 and Table 3.1-2). A key assumption within the Peterson mark/recapture estimate is that each tagged individual has an equal probability of being "recaptured" during the resight snorkel surveys. Being iteroparous, bull trout have the ability to migrate and spawn one year and not the next. Currently, it is unknown what the error rate associated with tagged non-migrating bull trout is in Swift reservoir. It is assumed that this rate fluctuates from one year to the next and is most likely closely related to reservoir productivity. Care should be taken during evaluation, as this variable non-migration rate may bias migration abundance estimates. A ten percent in-season Floy® tag loss is assumed within the estimate.

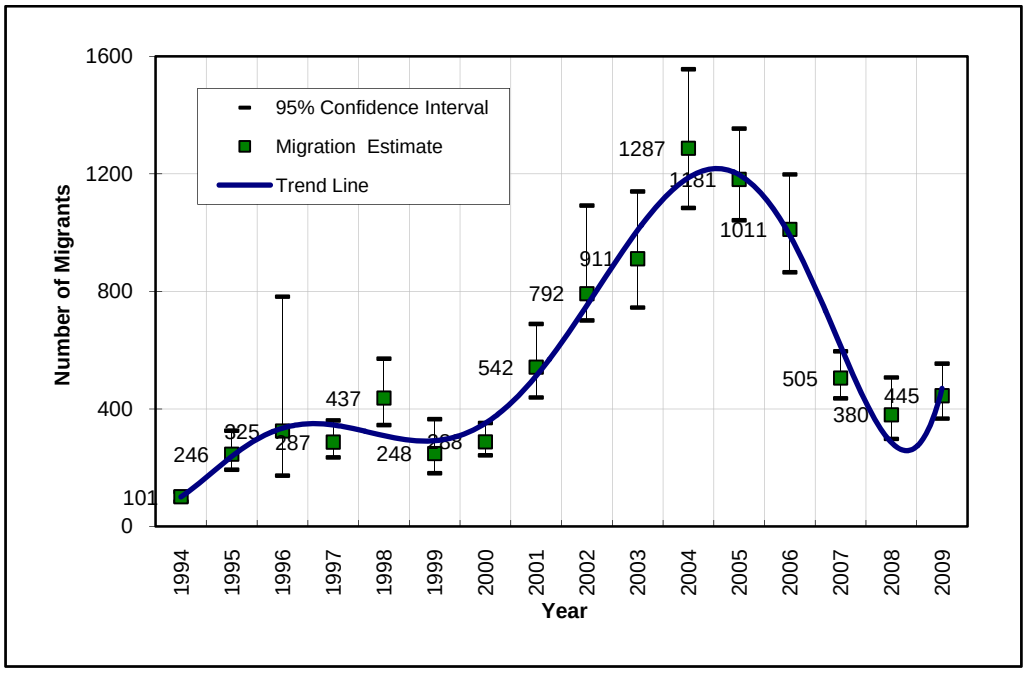


Figure 3.1-1. Estimate of bull trout that ascended from Swift Reservoir to migrate up the North Fork Lewis River or its tributaries for the years 1994 through 2009. (Source: WDFW)

Table 3.1-1. 2009 bull trout snorkel survey results (recapture)

Survey Date	Number of Bull Trout Observed						Total
	Rush Creek		Pine Creek		Lewis River Mainstem		
	Tagged	*Untagged*	*Tagged*	*Untagged*	*Tagged*	*Untagged*	
12-Aug	16	58					74
19-Aug			1	8			9
26-Aug	16	82					98
2-Sep			5	21			26
9-Sep	14	60					74
16-Sep			2	18			20
23-Sep	0	12					12
24-Sep					7	58	65
30-Sep			3	12			15
TOTAL	46	212	11	59	7	58	393

Source: Jim Byrne WDFW

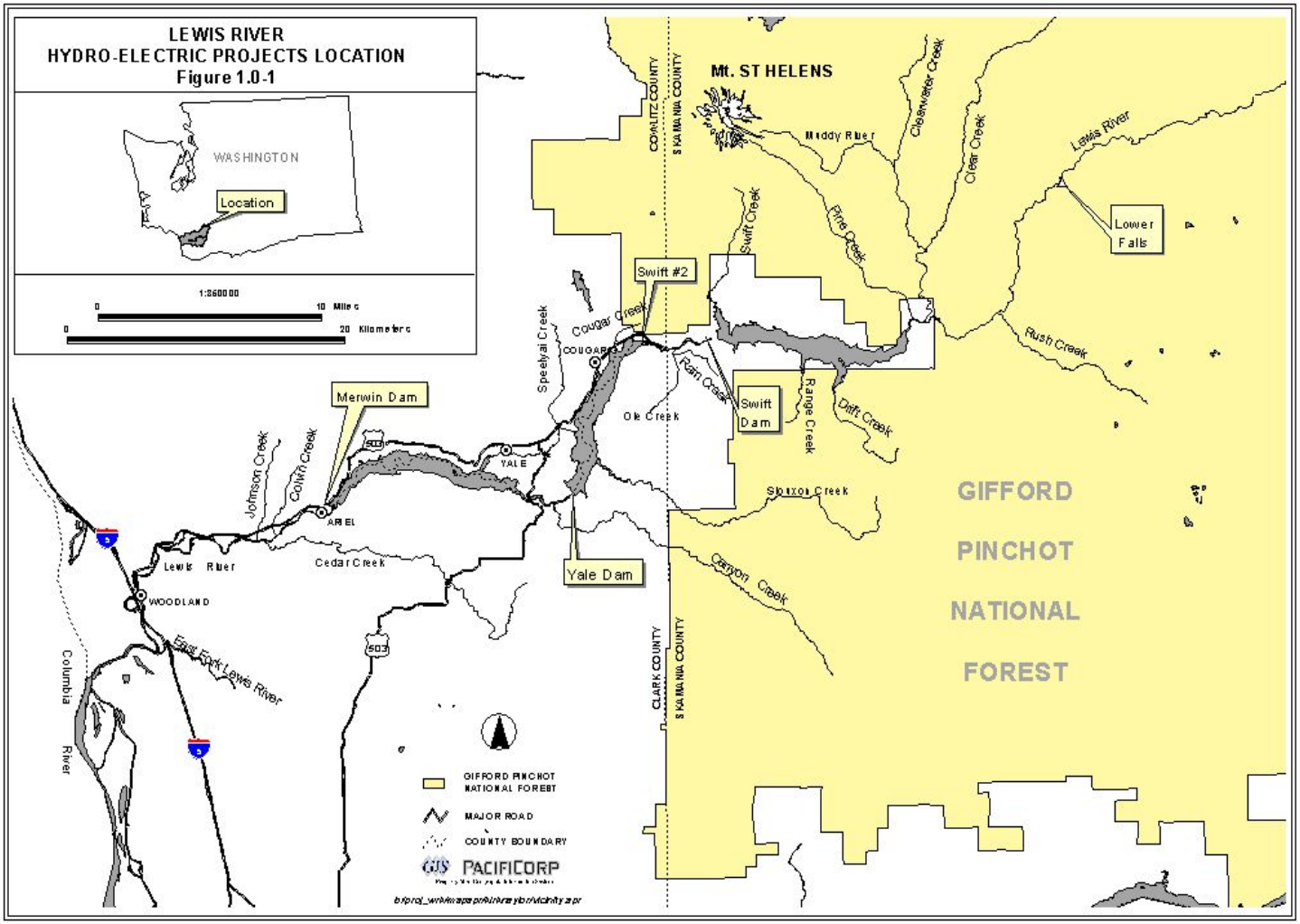
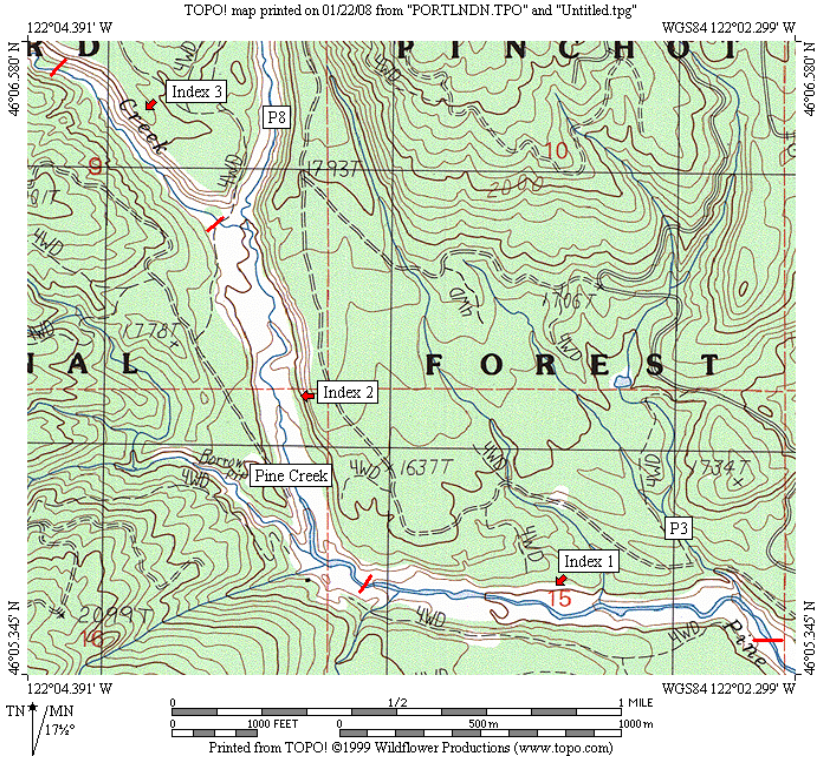


Figure 2.0-1. Map of North Fork Lewis River study area.



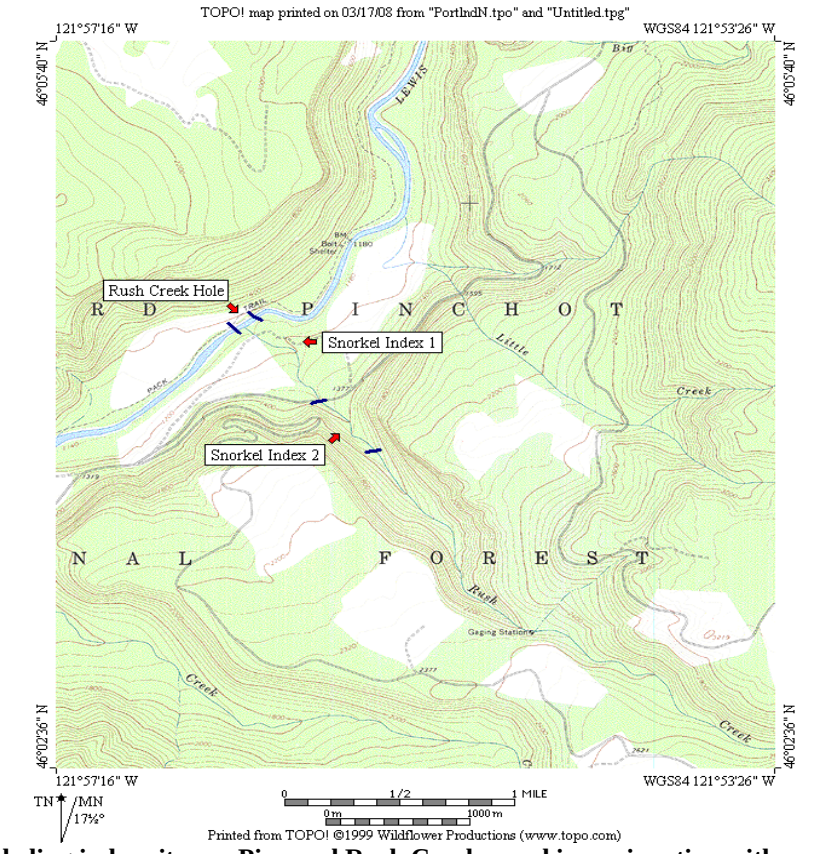


Figure 3.1-2. Snorkeling index sites on Pine and Rush Creeks used in conjunction with mark/recapture activities.

Table 3.1-2. Tabular data of Swift reservoir bull trout mark-recapture migration estimates for 1994 - 2009. (Source: Jim Byrne, WDFW non-published data)

Year	Lower Bound (95% CL)	Upper Bound (95% CL)	Migration Estimate
1994	85	118	101
1995	193	326	246
1996	173	782	325
1997	235	361	287
1998	345	571	437
1999	181	365	248
2000	242	352	288
2001	439	689	542
2002	701	1092	792
2003	745	1140	911
2004	1084	1556	1287
2005	1042	1354	1181
2006	865	1198	1011
2007	436	596	505
2008	298	507	380
2009	367	554	445

3.2 FERC PROJECT LICENSE ARTICLE 402(A) AND LEWIS RIVER SETTLEMENT AGREEMENT SECTIONS 4.9.1 & 4.9.2 - YALE TAILRACE COLLECTION AND TRANSPORTATION

Per the FERC licenses' Article 402(a) and the Lewis River SA section 4.9.1, PacifiCorp, in cooperation with the WDFW, annually captures and transports bull trout from the Yale powerhouse tailrace (upper Merwin reservoir) to the mouth of Cougar Creek, a Yale reservoir tributary. A total of 134 bull trout have been captured from the Yale tailrace since the program began in 1995.

To capture bull trout from the Yale tailwaters, monofilament or multi-filament mesh tangle nets are used (typically 2.5'' stretch). Netting occurs on a weekly basis beginning in June and ending mid-August. Netting usually occurs between the hours of 0900 and 1200. During this time, the powerhouse generators are taken off-line to facilitate deployment and handling of the nets. Nets are tied to the powerhouse wall and then stretched across the tailrace area using powerboats. The nets are then allowed to sink to the bottom. Depending on conditions or capture rate, the nets are held by hand on one end or allowed to fish unattended. The maximum time nets are allowed to fish is 10 minutes or less.

Upon capture of a bull trout, fish are immediately freed of the net (usually by cutting the net material) and placed in a live well. Captured fish are measured to their caudal fork, inserted with a uniquely colored Floy® tag for that year and inserted with a uniquely coded PIT tag in the dorsal sinus, as well as weighed to the nearest gram. As in Swift reservoir, all captured bull trout were weighed with a hand-held scale. The scale was attached to a net, allowed to tare to zero, and then the captured fish was placed in the net and weighed. Along with fork length

information, the weights of captured bull trout will be used to assess the condition factor (K-factor) of fish residing in Lake Merwin.

Once biological information is gathered and tags are inserted, the bull trout is placed in a six-inch diameter rubber tube that is partially filled with water. A rope is tied to the tube, which allows hatchery crews on the powerhouse deck to hoist the bull trout out of the tailrace area and into hatchery fish transport trucks. The entire process, from capture to hatchery truck, takes only a few minutes and no direct mortality has ever been observed.

Use of Alternative Capture Methods

Pursuant to the FERC licenses' Article 401(b) and the Lewis River SA section 4.9.2; PacifiCorp continues to seek more effective and less intrusive methods to collect bull trout from the Yale tailrace. Past alternative methods investigated include; beach seines, purse seines, drifting of tangle nets when the powerhouse is online, and hook & line techniques.

In 2009 tangle nets and hook and line were the only methods used and, to date, tangle nets remain the most effective. Currently PacifiCorp is investigating the feasibility of a floating upstream collector to trap and transport bull trout from the Yale tailrace.

Yale Netting Results

At the Yale powerhouse tailrace, eight capture attempts were completed from June 4, 2009 through August 6, 2009. A total of five bull trout were captured in the tailrace, transported, and then released into Cougar Creek. Of special interest during 2009 Yale tailrace collection activities was the recap of a bull trout initially encountered within the tailrace and transported upstream to Cougar Creek in 2008 (Floy® tag #2 Table 3.2-1). This was the third occurrence of a bull trout recapture from previous year's capture and relocation efforts. Of the three recorded bull trout recaptures, all fish were >450mm. Other species captured, in order of frequency, included kokanee (*Oncorhynchus nerka*), largescale suckers (*Catostomus macrocheilus*), northern pikeminnow (*Ptychocheilus oregonensis*), mountain whitefish (*Prosopium williamsonii)*, coho (*O. kisutch)*, coastal cutthroat (*O. clarkii*), rainbow trout (*O. mykiss*), and spring Chinook (*O. tshawytscha*) all of which were returned to the tailrace. No bull trout mortalities were observed as a result of netting and transportation activities. Biological information and release information of the captured bull trout is shown in Table 3.2-1.

Of the one hundred thirty-four bull trout captured from the Yale tailrace, one hundred four have been transported to the mouth of Cougar Creek since 1995 (Table 3.2-3). While the intent is to release all fish into Yale reservoir, some bull trout have been released back into Merwin reservoir due to a sonic tracking study, part of mark/recapture studies, or because bull trout were caught during testing of collection methods when no transportation vehicles were available. The contribution of transported bull trout to Cougar Creek's spawning escapement is summarized in Table 3.2-2. Of the five fish released in Yale reservoir in 2009, one bull trout (with yellow Floy® tag) was observed during annual spawning surveys on Cougar Creek in September thru November (see section 3.5).

TABLE 3.2-1: Biological and tag information of captured bull trout netted in the Yale Tailrace – 2009

Date	Tag #	Tag Color	PIT #	Fork Length (mm)	Weight (grams)	Comments
6/4/2009	No bull trout captured, H2O 12°C					
6/11/2009	1	Yellow	3D91C2CEBCC91	630	3340	Healthy fish, H2O 13°C
6/11/2009	too small	n/a	3D91C2CE9E603	345	460	Healthy fish
6/25/2009	No bull trout captured, H2O 13°C					
7/2/2009	2	Yellow	3D91C2CE9E176	521	1460	Recap from 2008 Yellow/Green #004, 71mm and 213 gram growth
7/2/2009	3	Yellow	3D600053FE71B	549	2360	Healthy fish, H2O 12.5°C, caught SPCH 468mm
7/9/2009	No bull trout captured, H2O 13°C, caught SPCH 544mm					
7/16/2009	No bull trout captured. H2O 12.5°C					
7/23/2009	4	Yellow	3D600053FE6DA	622	3120	Healthy fish. H2O 13°C
8/6/2009	No bull trout captured. H2O 11°C (sump) 21°C (surface)					

TABLE 3.2-2. Contribution of Merwin bull trout transported to Cougar Creek: 1995-2009

YEAR	Bull trout escapement into Cougar Creek^	Number of bull trout released	Number of bull trout observed with Yale tailrace tags during surveys*								Proportion Estimate of Merwin bull trout transported to Yale that ascend Cougar Creek**
			Chart.	Orange	White	Yellow	Blue	Pink	Yellow/Green bi-color	Green	
1995	7	9				2					22%
1996	11	13				1					8%
1997	14	10				2		1			10%
1998	7	6				2				2	33%
1999	9	0									n/a
2000	9	7						1			14%
2001	9	0									n/a
2002	15	5				1					20%
2003	21	8					1				13%
2004	18	3			1						33%
2005	31	5		1	1						20%
2006	26	5								1	20%
2007	38	13	1								7%
2008	60	15	1						1	1	6%
2009	50	5				1					2%

NOTES:

* Orange = 2005; White= 2004; Blue = 2003, Yellow = 1995, 1996, 1998, 2002, 2009; Pink =1997, 2000; Green = 1997,2006; Chartreuse = 2007; Yellow/Green bi-color = 2008

** Estimate is based only on year of release and only on tags observed. As a result, the estimate is considered the lowest percent contribution possible.

^ 1995-2006 bull trout escapement estimates represent peak counts plus any mortalities or tagged fish observed that are not represented in the peak count. 2007-present bull trout escapement estimates represent redd counts with expansion factors of 2 fish per redd observed.

TABLE 3.2-3. Number of bull trout collected from Yale tailrace (Merwin reservoir) and transferred to the mouth of Cougar Creek (Yale tributary): 1995 – 2009.

YEAR	No. captured at the Yale tailrace	No. transferred to mouth of Cougar Creek	No. released back into Merwin reservoir.	MORTALITIES
1995	15	9	6	0
1996	15	13	2	0
1997	10	10	0	0
1998	6	6	0	0
1999	6	0	6	0
2000	7	7	0	0
2001	0	0	0	0
2002	6	5	1	0
2003	19	8	1	10^
2004	8	3	5*	0
2005	5	5	0	0
2006	5	5	0	0
2007	13	13	0	0
2008	15	15	0	0
2009	5	5	0	0
TOTAL	**134**	**104**	**21**	**10**

* Represents fish tagged with sonic tags and released in Speelyai Bay rather than transported to Cougar Creek (exception: one fish was a recapture from 2003; Sonic tag 444 which was released into the Yale tailrace upon capture). ^ Please refer to 2003 annual report for description of mortalities.

3.3 FERC PROJECT LICENSE ARTICLE 402(A) AND LEWIS RIVER SETTLEMENT AGREEMENT SECTIONS 4.9.1 & 4.9.2 - BULL TROUT CAPTURE AND MARKING ACTIVITIES IN THE SWIFT BYPASS REACH

The Swift Bypass Reach is the former Lewis River channel between the Swift No. 1 and Swift No. 2 hydroelectric projects. Since 2002 a minimum flow of 47 cubic-feet-per-second (cfs) has flowed in the Bypass Reach through what is termed the "power canal drain". The drain flows from the Swift Power Canal into a 0.21 mile long reach (Lower Release or "Constructed" Channel) that is relatively unaffected by Swift No. 1 spill events. This channel then joins the main channel Bypass Reach and, along with Ole Creek, provides most of the flow into the lower Bypass Reach.

In 1999, The Utilities began netting the Swift No. 2 powerhouse tailrace as part of requirements contained in amendments to Article 51 of the former Merwin license. The tailrace was not netted from 2001 to 2005 because of the Swift No. 2 canal failure in 2001 and subsequent reconstruction. Capture efforts were then restarted in 2006 pursuant to sections 4.9.1 and 4.9.2 of the Lewis River Settlement Agreement and in 2008 pursuant to Article 402(a) of the new FERC licenses for Swift No. 1 and No. 2. Due to the extremely low capture rates at Swift No. 2 tailrace (two fish in 1999 and none since then) the Utilities proposed in 2007, during the annual bull trout monitoring coordination meeting, that the USFWS recommend discontinuing netting the Swift No. 2 tailrace and moving the collection site to areas within the Swift Bypass Reach (Figure 3.3-1). As noticed in past Swift Bypass Reach snorkel surveys, this area was found to hold many adult bull trout between the months of June thru October. The USFWS and those in attendance at the 2007 coordination meeting approved this recommendation (see Utilities 2007 Annual Bull Trout Monitoring Plan for meeting notes).

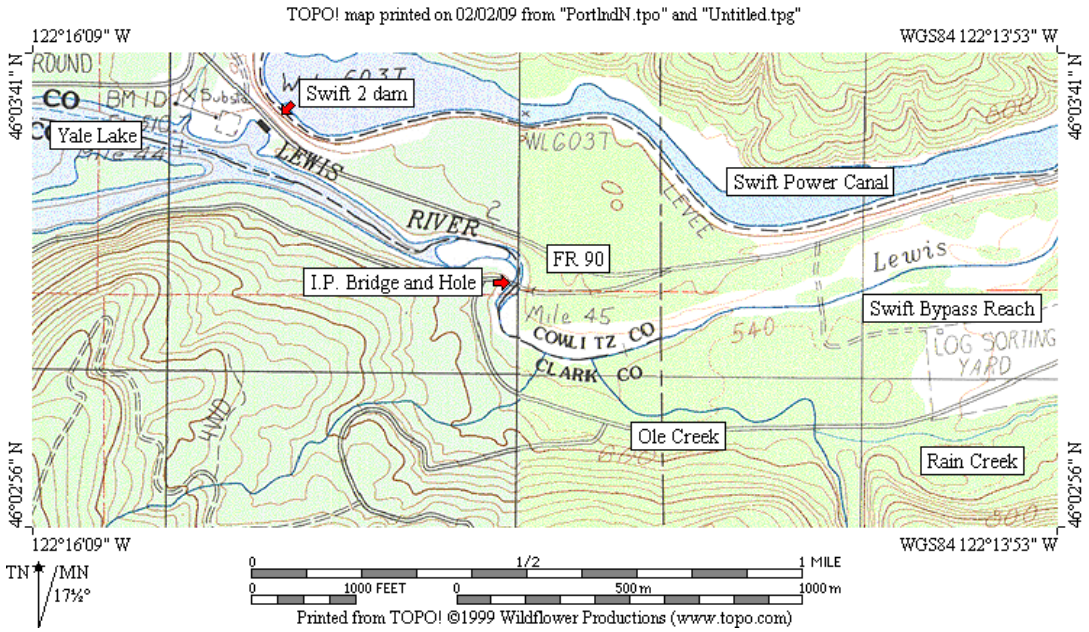


Figure 3.3-1. Map showing bull trout sampling areas within Swift Bypass Reach

Past collection activities typically focused on capturing bull trout from the area of the bypass reach below the International Paper Bridge termed the I.P. hole (Figure 3.3-1). New in 2009 was the use of an additional collection site located at the confluence of the bypass reach with Yale Lake. A snorkel survey on June 30, 2009, observed a congregation of large bull trout in this area and subsequent return visits continued to document individuals. Based on these observations, this area was routinely sampled, along with the I.P. hole, during the 2009 sampling period.

The Swift Bypass Reach was sampled eight times from June 8 to August 11, 2009. During this sampling time-frame, twenty-nine bull trout were captured. Of these, twenty-five were newly captured and four were present year recaptures (Table 3.3-1). After capture, bull trout were tagged with a uniquely colored Floy® tag for that year and with a uniquely coded PIT tag in the dorsal sinus, sampled for genetic material, weighed, and measured to their caudal fork. Once all biological information was gathered, bull trout were transferred to a live box for holding within the stream. The holding of captured fish for the duration of the sampling event, allowed researchers to thoroughly sample an area without fear of recapturing a fish from that day's activities and causing further stress to the fish. Only bull trout of similar sizes were held in live carts. At the end of the sampling event, all bull trout were returned to the area of capture. As in other monitoring program areas, weights of captured bull trout were recorded to assess the K-factor of bull trout residing in Yale reservoir. Other species captured in order of frequency included largescale suckers, mountain whitefish, coastal cutthroat, rainbow trout, and spring Chinook.

During annual bull trout redd surveys performed on Cougar Creek in the fall; surveyors took care to notice any Floy® tagged fish. The contribution of Swift Bypass Reach tagged bull trout to the Cougar Creek spawning escapement is assessed in Table 3.3-2.

Table 3.3-1: Capture information of bull trout netted in the I.P. pool – 2009

Date	Tag #	Tag Color	PIT#	Fork Length (mm)	Weight (grams)	Genetic Vial	Comments
6/8/2009	1	red	n/a	559	2820	LRbypass018	Hook&Line. H2O 13.5° C, snorkeled big rock to pool observed 2 BT
6/22/2009	No bull trout captured						Snorkeled big rock to pool, two snorkelers observed 2 BT
6/30/2009	2	red	3D91C2CE9E4BD	416	840	LRbypass075	Hook&Line.
6/30/2009	too small	red	3D91C2CE9EFF8	331	380	LRbypass062	Hook&Line.
6/30/2009	3	red	3D91C2CEA2504	720	4200	LRbypass067	Hook&Line. Mouth of bypass reach
7/8/2009	4	red	3D600053FF517	702	4120	LRbypass049	Tangle net at mouth of bypass reach. H2O 12°C
7/8/2009	5	red	3D600053FC0F8	605	2360	LRbypass082	Tangle net at mouth of bypass reach.
7/8/2009	7	red	3D600053FF496	530	1620	LRbypass068	Tangle net at mouth of bypass reach.
7/8/2009	8	red	982000088061890	453	1400	LRbypass054	Tangle net at mouth of bypass reach.
7/8/2009	9	red	982000088058955	546	2560	LRbypass076	Tangle net at mouth of bypass reach.

Date	Tag #	Tag Color	PIT#	Fork Length (mm)	Weight (grams)	Genetic Vial	Comments
7/8/2009	10	red	3D600053FF57B	597	2000	LRbypass079	Tangle net at mouth of bypass reach.
7/8/2009	11	red	982000088072372	490	1180	LRbypass092	Tangle net at mouth of bypass reach. Observed 3 BT in IP Hole, a blue/orange and a red Floy tagged fish and a no-tag.
7/15/2009	12	red	3D600053FADE0	544	1780	LRbypass074	Tangle net at mouth of bypass reach.
7/15/2009	13	red	3D600053FCADI	594	2540	LRbypass036	Tangle net at mouth of bypass reach.
7/15/2009	14	red	3D600053FF2C6	735	3460	LRbypass037	Tangle net at mouth of bypass reach. 1 blue/orange and 1 red tagged BT also observed but not captured at mouth. 2 blue/orange, 1 green/yellow and 4 non-tagged observed but not captured while snorkeling bypass under IP bridge.
7/23/2009	15	red	3D600053FF56D	539	1800	LRbypass093	Tangle net at mouth of bypass reach. Possible hybrid? Halos on dorsal and faint vermiculations on back.
7/23/2009	16	red	3D600053FF5A6	624	2520	LRbypass097	Tangle net at mouth of bypass reach.
7/23/2009	17	red	3D600053FDC82	371	520	LRbypass040	Tangle net in IP hole
7/23/2009	18	red	3D600053FF0C6	547	1840	LRbypass085	Tangle net in IP hole
7/23/2009	19	red	3D600053FF4D9	640	3540	LRbypass069	Tangle net in IP hole
7/23/2009	20	red	3D600053FF51B	643	3140	LRbypass081	Tangle net in IP hole. Also observed but did not capture 1 no-tag BT at mouth and 1 green/yellow, 1 blue/orange and 4 non-tagged BT in the IP hole snorkeling.
7/29/2009	Recap 19	red					Tangle net in IP hole
7/29/2009	Recap 16	red					Tangle net in IP hole
7/29/2009	Recap 17	red					Mortality. Tangle net in IP hole
7/29/2009	21	red	3D600053FD854	519	1780	LRbypass016	Recap of 2008 Blue/Orange Floy #002, growth of 74mm and 873 grams. Tangle net in IP hole
7/29/2009	22	red	3D600053FB20B	480	1260	LRbypass011	Tangle net in IP hole
7/29/2009	23	red	3D600053FCA8E	471	n/a	LRbypass005	Tangle net in IP hole
8/11/2009	Recap 22	red					Tangle net in IP hole
8/11/2009	24	red	3D600053FE7AC	800	4900	LRbypass027	Tangle net in IP hole
8/11/2009	25	red	3D600053FC482	436	640	LRbypass019	Tangle net in IP hole. Also observed but did not capture 1 red tag and 3 no-tags at mouth via snorkel.

Table 3.3-2: Contribution of Swift Bypass Reach tagged fish to Cougar Creek spawning escapement.

Year	Bull trout escapement into Cougar Creek^	Number of bull trout released	Number of bull trout observed with Swift Bypass Reach tags during surveys*			Proportion Estimate of Swift Bypass Reach tagged bull trout that ascend Cougar Creek**
			Pink	Blue/Orange bi-color	Red	
2007	38	14	4			28%
2008	60	6	1	1		16%
2009	50	24	1	1	4	16%
* Pink = 2007; Blue/Orange bi-color = 2008; Red = 2009						
** Estimate is based only on year of release and only on peak count of tags observed. As a result, the estimate is considered the lowest percent contribution possible.						
^Bull trout escapement estimates represent redd count expansion numbers of 2 fish per redd observed						

3.4 FERC PROJECT LICENSE ARTICLE 402(B) AND LEWIS RIVER SETTLEMENT AGREEMENT SECTION 9.6 - COUGAR CREEK SPAWNING ESTIMATE

Since 1979, PacifiCorp biologists, along with various state and federal agencies, have conducted annual surveys to estimate spawning escapement of kokanee in Cougar Creek. Along with the kokanee, surveyors also count the number of bull trout observed within the creek. In 2009, the Utilities conducted nine Cougar Creek bull trout redd surveys. PacifiCorp personnel also conducted two snorkel surveys of the creek. The 2009 bull trout count is based on information obtained from redd and snorkel surveys.

Based on the presence and detection of multiple bull trout redds in Cougar Creek since 2006, redd count spawning population estimate methodology has become the main source for the annual Cougar Creek bull trout spawner abundance estimate. Bull trout redd surveys were conducted in Cougar Creek weekly from September 8, 2009 to November 2, 2009. Surveys commence at the mouth of the creek and end at the creek's spring source, a distance of approximately 1.3 miles. Though redd count methodology has effectively replaced live peak counts as the metric used to estimate spawner abundance, peak counts are still performed during redd surveys in order to continue this established trend for comparison and calibration for the new method.

Due to the wide range use of redd counts as a bull trout spawner abundance metric, multiple studies have questioned the accuracy of redd counts as a population estimator especially when indices or multiple observers are used when surveying large streams and drainages (Dunham et al. 2001, Muhlfeld et al. 2006). Indices are questioned based on the reliance that fish must come back to the same area at the same time every year to spawn. The use of multiple and different observers is considered to cause inaccuracies based on the variability between observers associated with redd surveys. The methodology employed within Cougar Creek differs from most large-scale redd surveys in that the stream is small enough to have the entire length surveyed and currently is the only known bull trout spawning stream in Yale Lake, thus

increasing the reliability of this technique. Cougar Creek also lends itself nicely to these types of surveys in that the water is extremely clear and remains stable in flow for most part of the year. Redd life, the amount of time a redd remains visible, is exceptionally high. Most, if not all observed redds since 2006 remain visible during the entire time-frame of the surveys.

At least one biologist, and many times two, surveyed the entire 1.3 miles of Cougar Creek. This precludes the spatial questions encountered when breaking a large system into sampling indices. Weekly surveys are completed over an extended period of time to address potential error associated with spawn timing. Surveys are completed until no fish and no new redds are observed. To alleviate inter-observer variability, surveys are performed by the same experienced samplers every week. Dunham et al. (2001) specifies that investigators should not rely on indices and should use the same surveyors as effective ways of improving the reliability of redd counts.

The real challenge of using redds to quantify a spawning population size lies in determining the relationship between redd counts and actual numbers of fish (Budy et al. 2003). Much research has been conducted that attempts to correlate the number of spawning adult bull trout per redd. Baxter and Westover (2000) used a weir on a fluvial and adfluvial population of bull trout on the Wigwam River in Canada and estimated their ratio to be 1.2 fish to 1 redd, Sankovich et al. (2003) using a weir, estimated a ratio of 2.1 to 1 for a fluvial and resident bull trout population on the Walla Walla River. Ratliff et al. (1996) using a weir and subsequent redd counts on an adfluvial bull trout population, found the ratio on the Metolius River to be 2.3 fish to 1 redd, while Taylor and Reasoner (2000) using a weir with a fish counter on an adfluvial population of bull trout in the McKenzie River had estimates of 3.5 and 4.3 fish for each redd. It seems that the number of bull trout per redd is most likely basin or watershed specific and highly variable.

At this time, given that the exact number of bull trout that ascended Cougar Creek to spawn is unknown, there is no reliable way to get an approximate number of fish per redd. A weir was attempted in Cougar Creek in 1996 but subsequently failed. Starting in 2007 and continuing through 2009, an underwater video camera has been installed to visually count adult bull trout as they migrate upstream and downstream. Data from the underwater video camera is still being processed at this time, so it remains to be seen if this will be an effective way at capturing true fish numbers in Cougar Creek. Therefore, until we are able to get true numbers of adult bull trout spawners that enter Cougar Creek either through the use of a weir, fish counter, or underwater video technology, PacifiCorp has elected to temporarily adopt two fish per redd as the index until numbers can be verified.

Prior to each survey, a stream gage reading was taken at the bridge. New redds were flagged and identified by GPS coordinates (Figure 3.4-3) with the date, location of redd in relation to the flag, and GPS coordinates written on the flagging. Subsequent surveys inspected each redd to see if they were still visible. If a redd was still visible that information was written on the flagging with the date, until the redd was no longer visible, at which time this was noted on the flagging. Biologists also counted any bull trout observed within the vicinity of each redd. Throughout the spawning season, new redds were flagged and identified as described above until no bull trout adults and no new redds were observed in Cougar Creek.

Twenty-five individual bull trout redds were observed in Cougar Creek in 2009. Using the two fish per redd expansion, fifty spawning bull trout were believed to have ascended Cougar Creek in 2009 (Figure 3.4-1). The first recorded redd was observed on September 8, 2009, and the last new redd was observed on October 27, 2009. The bulk of redd construction occurred during the two week span between October 12th and October 27th when sixteen new bull trout redds were counted. A peak count of six new redds occurred twice, during the October 12th and October 27th surveys.

All bull trout redds were observed in the upper half of the creek upstream of a log jam that on most years is impassable to kokanee. Kokanee are also actively spawning within Cougar Creek during the same time period. This is not to say that bull trout did not spawn in the lower reaches of Cougar Creek, the lower portion of the creek was surveyed intensively but due to the amount of spawning kokanee it is nearly impossible to say whether a redd of appropriate size is a bull trout redd or many kokanee redds superimposed upon one another.

A recent concern first recorded in 2008, is the observation of bull trout redds found to be superimposed over one another. During surveys performed in 2009, four bull trout redds were observed superimposed over previously excavated bull trout redds. All observed bull trout redd superimposition was recorded during the October 27th redd survey. Two of the four superimposed redds were in an area that experienced redd superimposition in 2008. Of the four superimposition occurrences, only one appeared to be completely superimposed, while the other three were partially over-lapping with other redds.

Flagging from redd surveys performed in 2008 was left in place over the course of the year and along with GPS coordinates, care was taken to document redd habitat areas used consecutively from the previous year. It was found that seventeen of the twenty-five redds (68%) were constructed very near and often in nearly the exact spots as the previous year. These findings prompted surveyors in 2008 to collect data documenting the habitat parameters for redd construction by bull trout in Cougar Creek. During the course of redd surveys, biologists documented the water depth over the redd egg pocket, water velocity over the redd egg pocket (feet per second), length and width of redd pocket and pit, location of redd in relation to the stream, location of the redd in relation to any large wood, and the size of gravel present in the redd. This information will continue to be collected to standardize bull trout redd habitat attributes in Cougar and other creeks, this data can then be used in the future to evaluate superimposition of bull trout redds when reintroduced anadromous salmon and steelhead are also spawning in the streams.

Along with redd counts a peak visual count of bull trout was also performed in the same manner that began in 1979 (Figure 3.4-2). This count is not considered a spawning population estimate as it relies on a peak count of bull trout observed on a single sampling event. Rather, the annual peak counts are used to monitor Cougar Creek bull trout trends from year to year. In 2009 the peak count was a combined foot and snorkel survey and was thirty-four adult bull trout. Since 2006 snorkel surveys have been included within the peak visual count. The peak comes from a snorkel count of thirty-three adult fish observed, plus the addition of a pink tagged fish (Swift Bypass Reach 2007 tagging activities) not observed on the snorkel survey but observed on a subsequent redd survey. During the peak snorkel count, six of the thirty-three fish observed had a Floy® tag, one yellow tag (2009 Merwin transport), one blue/orange bi-color tag (Swift Bypass

Reach 2008 tagging activities), and four red tags (Swift Bypass Reach 2009 tagging activities). Yale Lake bull trout use of the Swift Bypass Reach and Cougar Creek will continue to be monitored in future surveys. The estimate of thirty-four bull trout is considered to be the minimum number of bull trout that ascended Cougar Creek in 2008.

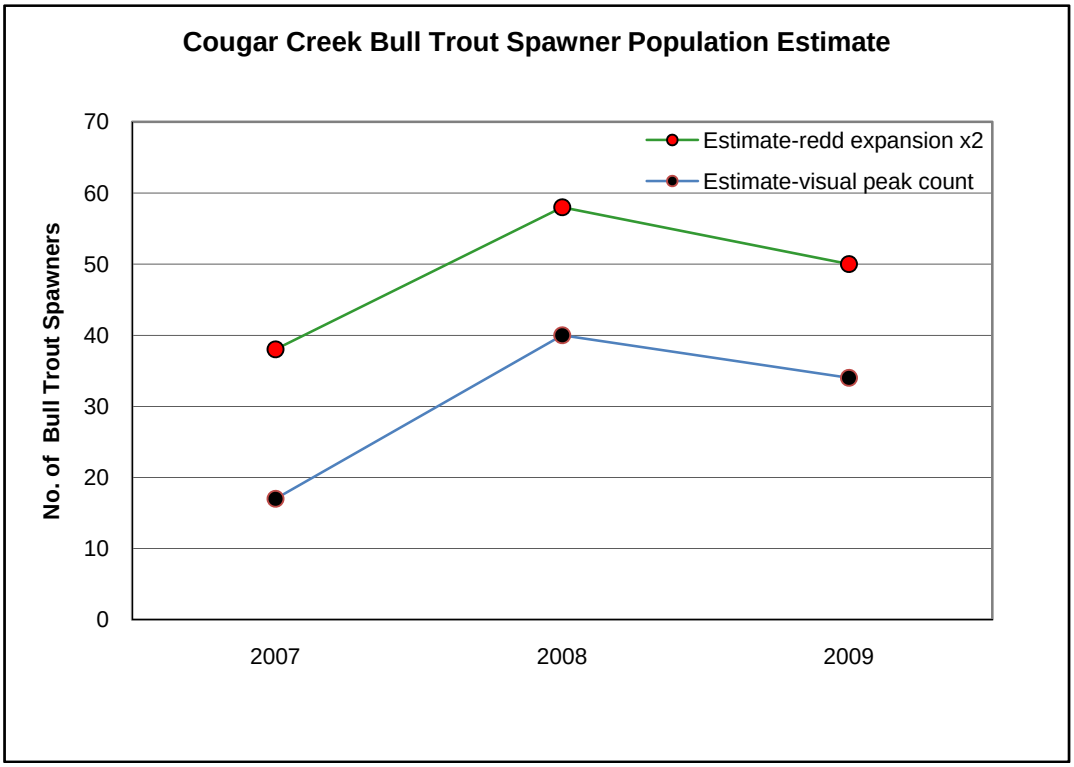


Figure 3.4-1. Annual Cougar Creek bull trout spawning escapement based on redd surveys, 2007-2009.

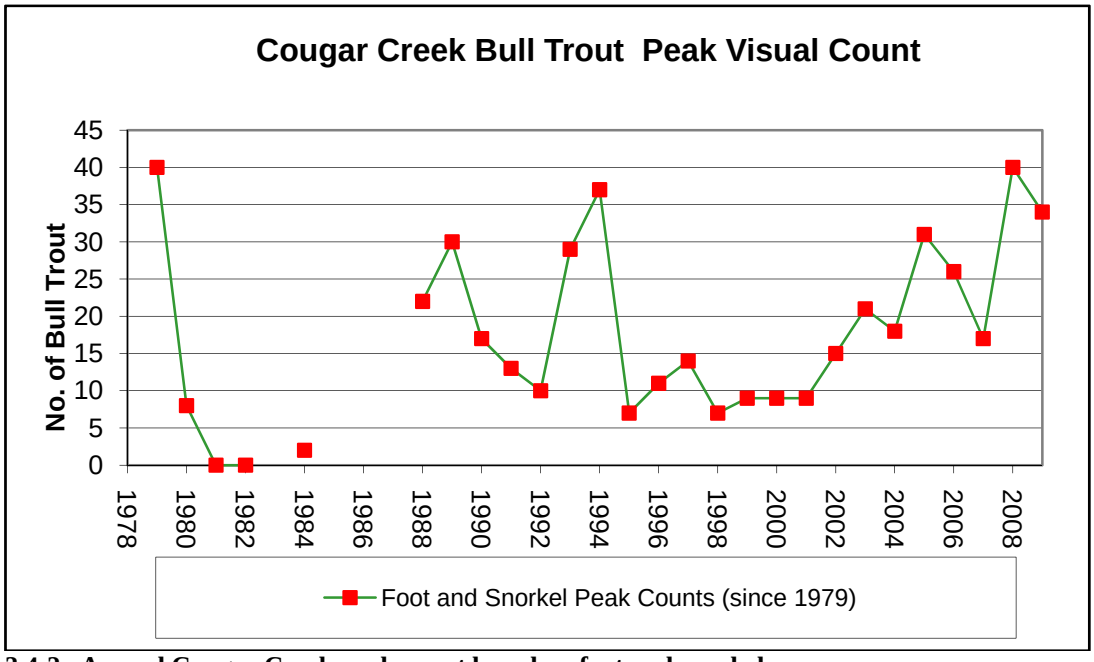


Figure 3.4-2. Annual Cougar Creek peak count based on foot and snorkel surveys.

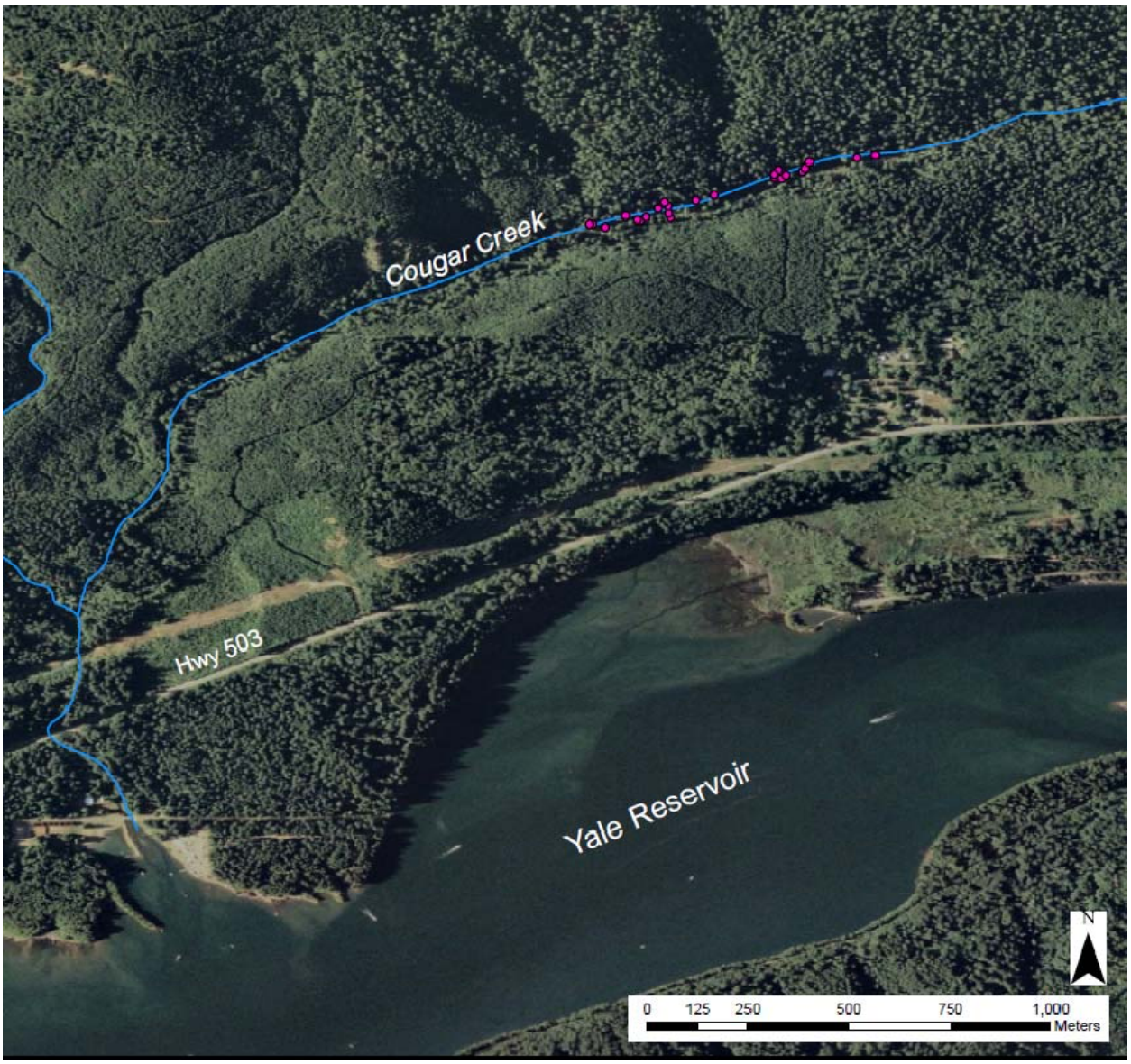


Figure 3.4-3. GPS locations of bull trout redds in Cougar Creek in 2009. Each pink dot represents an individual bull trout redd (n=24).

3.5 BULL TROUT REDD SURVEYS OF PINE CREEK AND PINE CREEK TRIBUTARY P8

Based in part on observations of both adult and juvenile bull trout and bull trout redds within Pine Creek tributary P8 since 2005, and the fact that very few bull trout redds had ever been observed within the confines of Pine Creek mainstem, P8 was surveyed for bull trout redds in 2009. The general thought between parties involved in the planning of bull trout monitoring within the Lewis River basin, was that P8 contained the bulk of bull trout spawning.

P8 (Figure 3.5-1) is the eighth and largest tributary to Pine Creek when counting tributaries from Pine Creek mouth upstream. Based on surveys performed in 1999 and 2000 to document the extent of anadromous fish habitat within the North Fork Lewis River basin, P8 contained

approximately four miles of accessible anadromous fish habitat and had relatively low gradient for the first mile. P8 is a relatively small stream, with average wetted width of 11 feet, but it contains abundant annual flow and cold water (PacifiCorp and Cowlitz PUD 2004).

Redd surveys were performed on Pine Creek tributary P8 by personnel from WDFW five times (September 18th – October 20th) during the 2009 bull trout spawning season. The first recorded redd was observed on September 18th and the last observed redd was recorded on October 8th. The peak count of five new redds occurred during a survey on September 25th. In all, fourteen bull trout redds were observed from the mouth of P8 to 1.3 miles upstream. No bull trout and no new bull trout redds were observed during the final survey on October 20th. Based on estimated expansion factors of two adult bull trout per redd, twenty-eight bull trout were believed to have spawned within P8.

During a snorkel survey on September 30th of the three Pine Creek resight indices used during the Swift reservoir bull trout migration mark/recapture estimate, twelve bull trout redds were observed. In 2008, one bull trout redd was observed for the first time within the confines of Pine Creek mainstem. Due to the volatile nature of the mainstem of Pine Creek, no extensive bull trout redd surveys have ever been performed. The mainstem stream bed is composed of loose volcanic pumice and ash from the 1980 Mt. St. Helens lahar; couple this with high gradient and flow and it allows for much bed load movement making it extremely difficult to observe redds. The September 30, 2009, snorkel survey was the first observance of multiple bull trout redds within the Pine Creek mainstem. These mainstem redd sightings coincide with peak redd construction observed within P8 in 2009 (week of September 21st-25th). Typically, mark/recapture migration estimate snorkel activities end September 15, 2009.

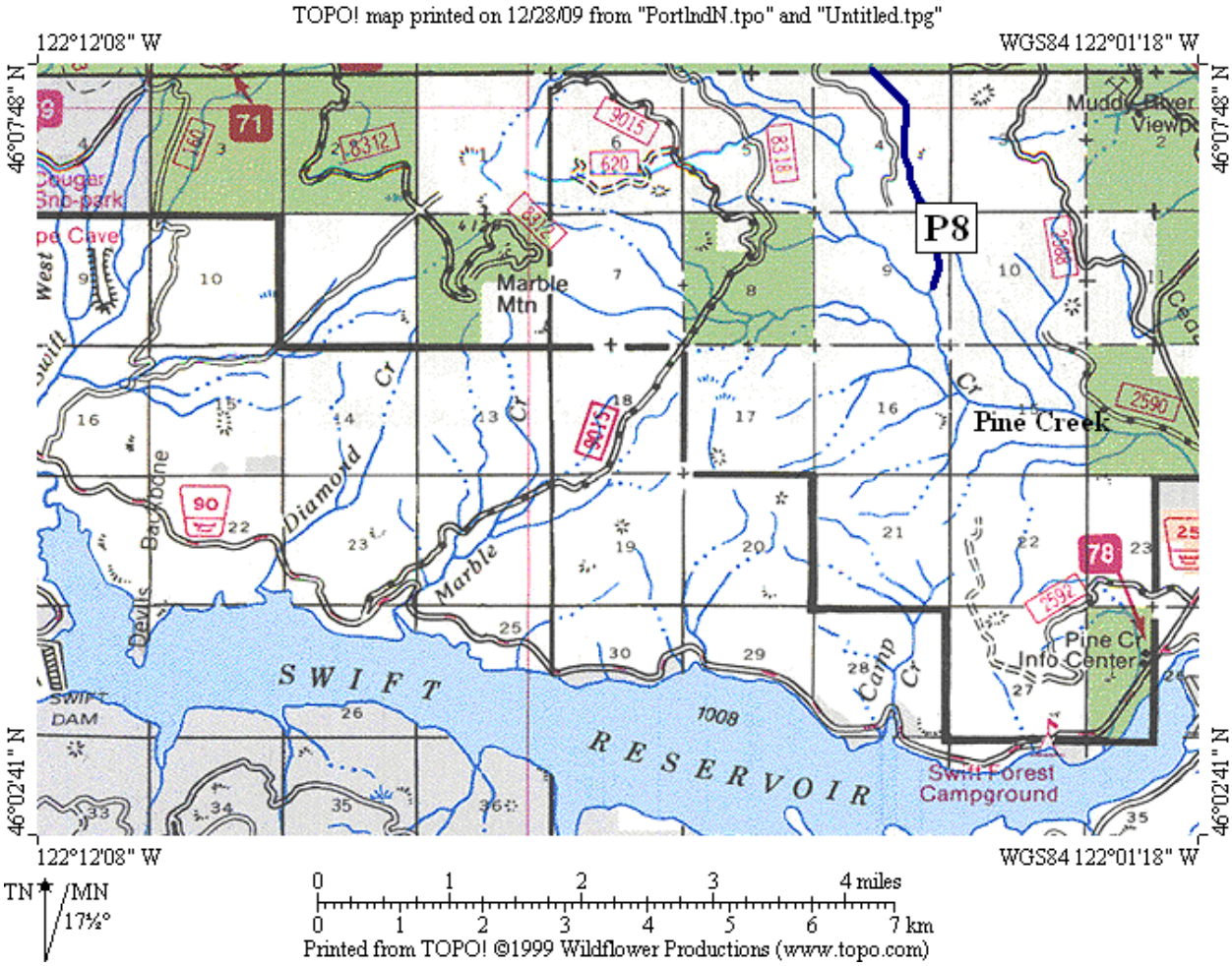


Figure 3.5-1. Map of Pine Creek tributary P8.

3.6 SWIFT CREEK BULL TROUT PRESENCE/ABSENCE SURVEYS

In August of 2006, during the annual *Salvelinus confluentus* Curiosity Society workshop held that year on the Lewis River, Swift Creek was snorkeled by conference attendees from the stream mouth to the anadromous fish barrier. Four adult-sized bull trout were observed for the first time within the confines of the stream. Based on these initial findings, presence/absence surveys have been performed within Swift Creek annually.

On July 7th, 2009 Swift Creek cove was sampled via hook and line. No bull trout were captured but two adult-sized individuals were observed. Swift Creek cove was again sampled via hook and line and snorkeled on July 17th, 2009, one bull trout was captured and three other adult-sized individuals were visually observed but not handled. The captured bull trout was measured, weighed, and inserted with a PIT tag in the dorsal sinus (Table 3.6-1) before being returned to the stream.

As part of a separate study documenting the aquatic baseline of the North Fork Lewis River basin upstream of Merwin Dam performed through the Aquatic Coordination Committee (ACC), two 100 meter index sites were electrofished three times over the course of five months. The

sites were the first available two hundred meters of habitat within the creek. Based on prior surveys, it becomes unsafe to electrofish any further than this within Swift Creek. Swift Creek was single-pass electrofished once in June, August, and October 2009. During the August survey, one juvenile bull trout was captured. Because of the low elevation of the reservoir, the amount of available stream habitat was much greater than what was observed during the initial survey in June. Thus, the established index site that was just up from the stream mouth during the survey in June was now 800 feet upstream from the mouth in August. The bull trout was encountered near the upstream end of the first one hundred meter index site, approximately 350 meters upstream from the reservoir.

This was the first known occurrence of a bull trout juvenile within the confines of Swift Creek. After being measured, weighed, inserted with a PIT tag in the dorsal sinus, and sampled for genetic material (Table 3.6-1), the bull trout was returned to the stream.

Table 3.6-1. Tag and biological information of captured Swift Creek bull trout, 2009.

Date	Survey Type	FL(mm)	Genetic vial	Weight (grams)	PIT Tag	Comments
7/7/2009	Hook&Line	-	-	-	-	No BT captured, visually observed 2 individuals in cove
7/17/2009	Hook&Line	615	n/a	3720	3D600053FF5E6	Snorkeling, observed but did not capture 3 other individuals in cove
8/27/2009	Efish	182	LR_07	n/a	3D600053FF562	Captured via Efish during baseline sampling

3.7 BULL TROUT COLLECTION AND TRANSPORT OF THE SWIFT POWER CANAL

Per the direction of the FWS, conveyed during the annual Lewis River bull trout monitoring plan coordination meeting on March 20, 2009, the Swift Power Canal (Figure 3.7-1) was netted for bull trout four times between the months of May and July. The goal of the netting surveys was to transport any captured bull trout upstream to Swift Reservoir.

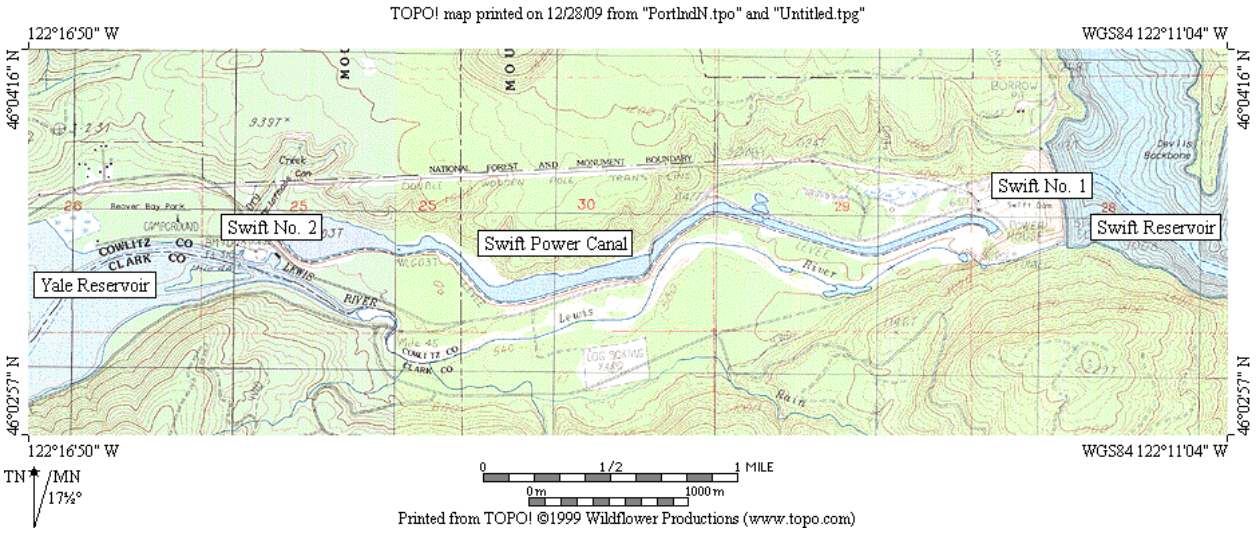


Figure 3.7-1. Area map showing the Swift Power Canal and surrounding vicinity.

Based on past surveys and from the aftermath of the Swift No. 2 dam blowout in 2001 where numerous bull trout mortalities were found stranded when the water receded, bull trout are known to inhabit the canal. The only entry for bull trout into the canal is from turbine passage at Swift No. 1 dam at the upstream end. It is unknown exactly how many fish become entrained and what the survival rate of turbine passage is at Swift No. 1. It is assumed, that the larger the fish, the greater the turbine passage mortality rate; from the high head at Swift Dam (greater than 400ft. at full pool) and from the Francis type runners employed in the Swift powerhouse. The rate of variance during past scientific studies to quantify turbine passage mortality in Francis type turbines is vast, with ranges of 5 to 90 percent, and are based mainly on the size of fish and the velocity (head) at which they travel through the turbine blades (Bell 1990, Larineir and Travade 2002).

Similar to Yale tailrace bull trout collection and transport, monofilament tangle nets were employed to try and capture any bull trout residing within the Swift Power Canal. Crews deployed nets from a power boat and allowed the nets to soak unattended for no longer than 10 minutes. Mesh size of the nets ranged from ½'' to 2.5'' in order to try and capture a greater range of size-class. All of the netting took place at the upstream end of the power canal near the discharge from the Swift No. 1 powerhouse. Netting typically occurred between the hours of 10:00 and 14:00 and due to safety concerns, Swift No. 1 and 2 powerhouses were taken off-line and not in operation. Like Yale powerhouse tailrace, a WDFW fish transport truck was on-site during all netting days to transport any captured bull trout upstream to Swift reservoir.

One bull trout was captured during the Swift Power Canal collection and transport activities. The captured bull trout had a fork length of 346mm and was inserted with PIT tag # 3D600053FF511. This fish was encountered during a survey on June 26, 2009, and was subsequently transported upstream to Swift reservoir and released at the Swift Campground boat launch.

All captured non-target species were measured and quantified and then returned to the power canal. One-hundred ten mountain whitefish ranging in size between 224-330mm fork length, twenty-nine rainbow trout ranging in size between 240-521mm, fifteen large-scale suckers ranging in size between 250-310mm, and five coastal cutthroat ranging in size between 385-343mm, were also encountered during the four power canal netting days (Figure 3.7-1).

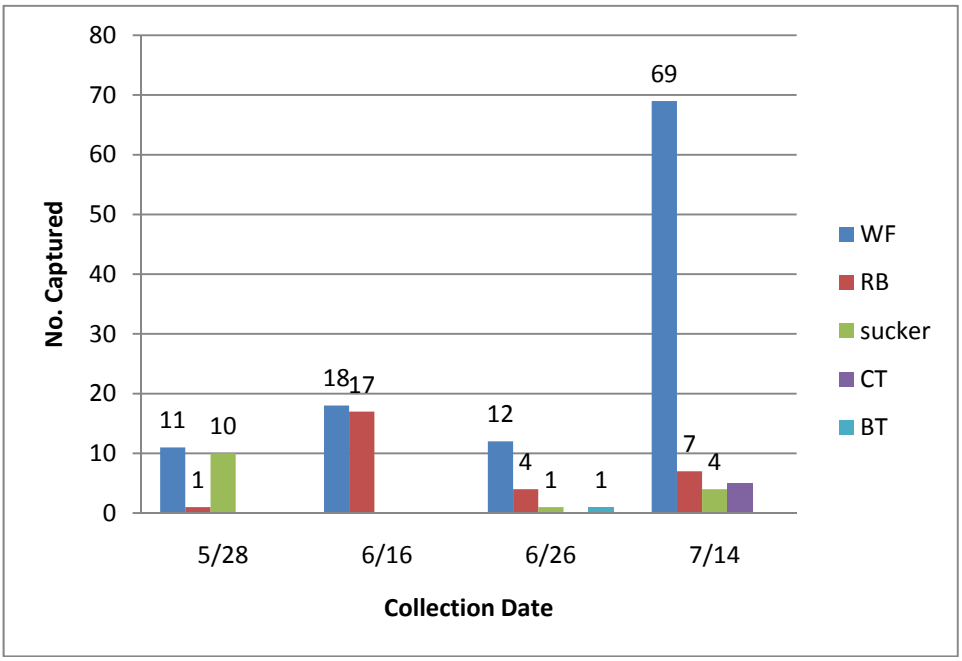


Figure3.7-1. Species and quantity encountered during Swift Power Canal collection activities.

3.8 BULL TROUT CONDITION FACTOR

A new endeavor first undertaken in 2008 and continued during 2009 monitoring activities, was the weighing of all captured bull trout encountered in the project area (Map 2.0-1). The goal of gathering this additional information is the intent to quantify the condition factor of bull trout in Merwin, Yale, and Swift reservoirs. This standardized information can then be used as a comparison tool to gauge the condition of reservoir bull trout populations from year to year. This data may also offer insights into reservoir productivity, K-factors, and the potential influence of these on bull trout spawning migration frequency.

Condition factor is a simple weight-length relation that is generally thought to be one of several indices of healthy fish (Nielson and Johnson 1983). T.W. Fulton (1902) established the weight-length relation equation that was used to estimate K-factors in this study.

The Fulton-type equation used is as follows;

K= (W/L^3)*X

Where;

K = metric condition factor
W = weight in grams
L = length in millimeters
X = Arbitrary scaling constant (for our purposes 10^5 was used)

A hand-held scale was used to weigh fish during Lewis River netting activities. To weigh bull trout, a landing net was attached to the hand-held scale, the scale was allowed to tare to zero, a

bull trout was placed in the landing net, and the weight was recorded in kilograms. The entire time bull trout were out of water was normally under 10 seconds. When feasible, bull trout were weighed on land. While in a boat, calm coves were sought out but a measure of inaccuracy was unavoidable when bull trout were weighed in a boat due to the pitch and roll of the boat in response to wave action. Surveyors felt this inaccuracy was acceptable if it alleviated any added undue stress to the captured bull trout due to over-handling or length of holding time.

A total of 112 bull trout were weighed from Merwin, Yale, and Swift reservoirs in 2009. Of those fish, 83 were from Swift reservoir, 24 from Yale Lake, and five from Lake Merwin (not all captured bull trout were weighed in 2009 due to lack of available equipment). For salmonids, K factor values usually fall between 0.8 and 2.0 (Nielson and Johnson 1983). A K-factor scale was used to filter the data and to help analyze the values for comparison. The scale is based on direct visual observations of all weighed bull trout within the North Fork Lewis River to date and may adaptively change in the future with the input of additional data. The scale used is as follows:

- Less than 0.99 = Poor
- 1.00 – 1.19 = Fair
- 1.20 – 1.39 = Healthy
- 1.40 – 1.59 = Excellent
- > 1.60 = Trophy

Figure 3.8-1 represents the percent distribution of weighed bull trout occurrences in the above mentioned K-factor scale. Bars in the graph are divided to represent bull trout from each reservoir. Figure 3.8-2 represents condition factors and their correlation to the corresponding fork length for all measured fish (n=112). Data sets from both Merwin and Yale reservoirs were limited due to the low number of fish collected and handled (n=5 in Merwin, n=25 in Yale), especially when compared to Swift Reservoir (n=83).

Median condition factor values were 1.29 for fish sampled in Lake Merwin, 1.12 for fish sampled in Yale Lake, 1.28 for fish sampled in Swift reservoir, and 1.27 for all fish sampled in 2009. When comparing numeric fish condition factors, care needs to be taken to only compare fish of like fork lengths (Nielsen and Johnson 1983). Figure 3.8-3 compares bull trout conditions factors sampled in 2008 to the condition factors observed in 2009 from all three reservoirs, each dot represents an individual fish.

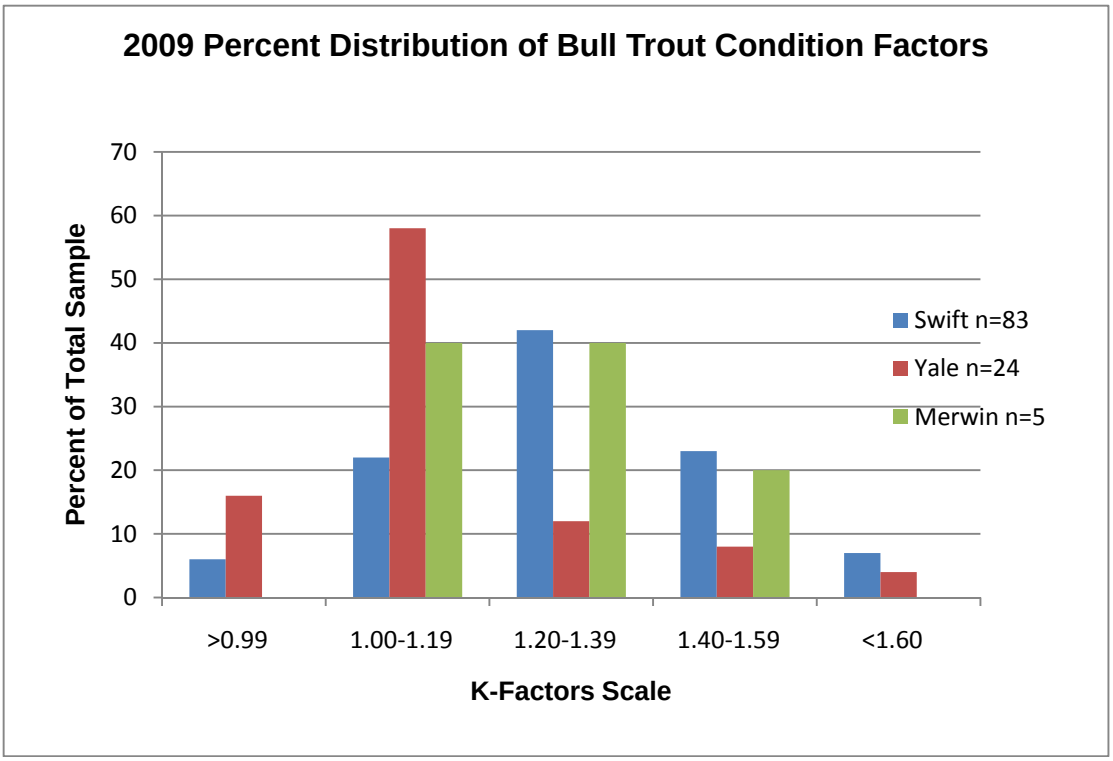


Figure 3.8-1. Distribution of all weighed bull trout in 2009 over established condition factor scale.

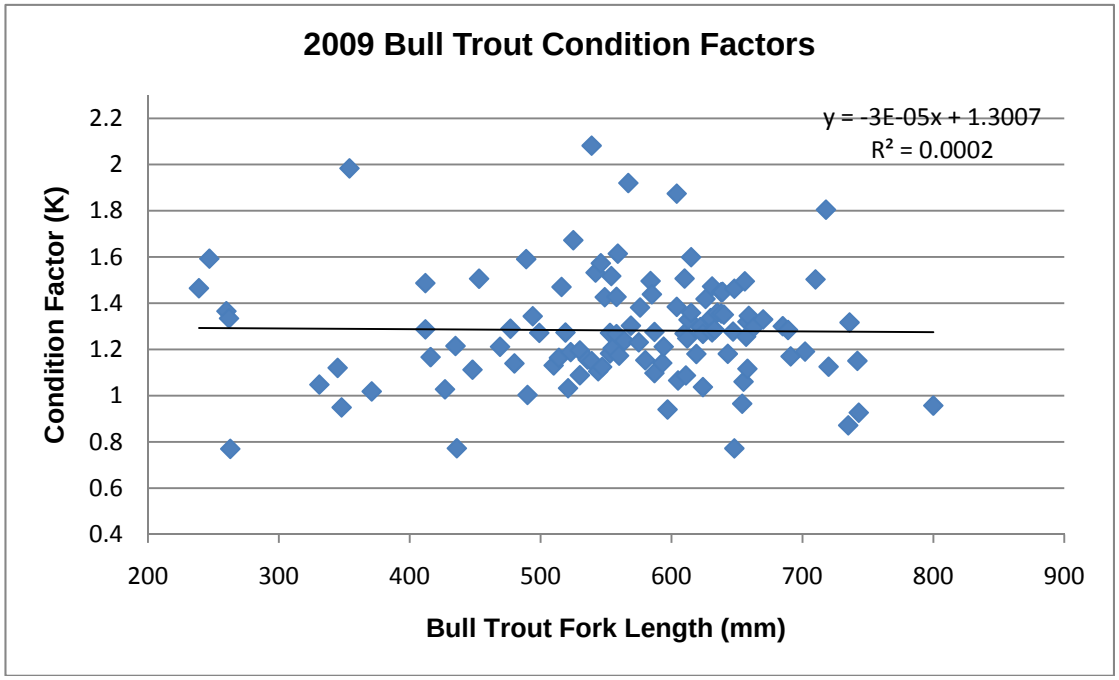


Figure 3.8-2. Individual bull trout condition factors in relation to corresponding fork lengths for entire sample from all three reservoirs combined in 2009. Each point represents an individual fish.

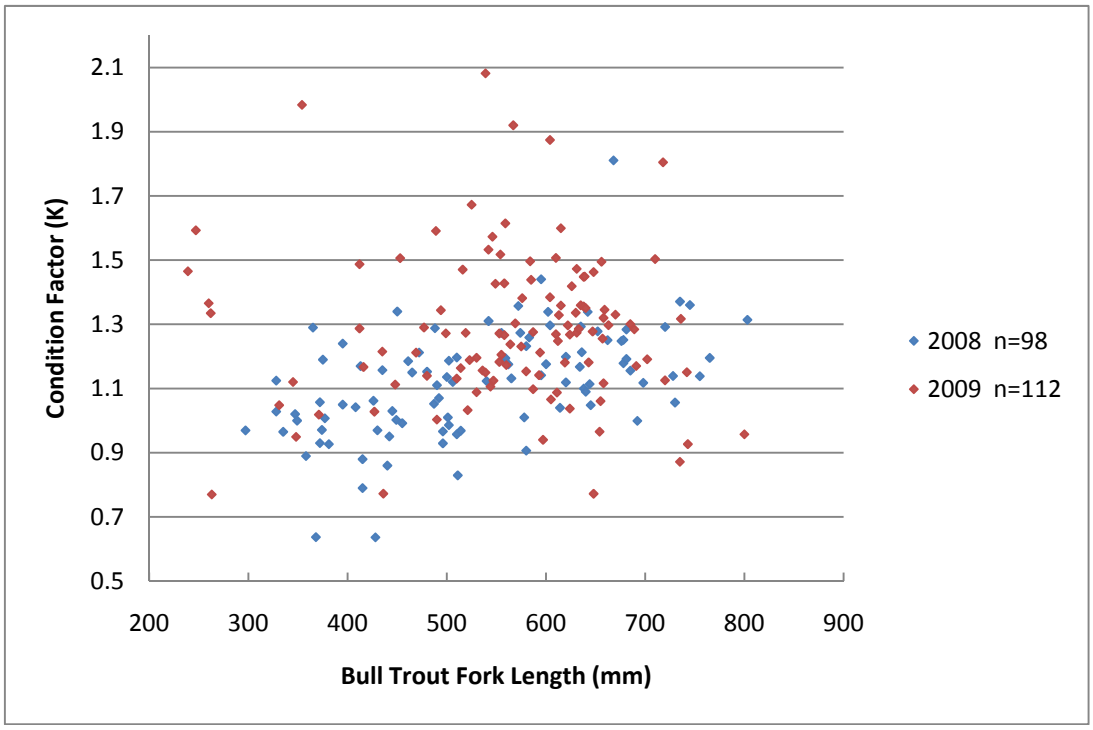


Figure 3.8-3. Comparison of condition factors of bull trout observed in 2008 to that of condition factors of bull trout observed in 2009. Each dot represents an individual fish.

4.0 DISCUSSION

As directed in Article 402 of the Federal Energy Regulatory Commission issued operating licenses for Merwin, Yale, Swift No.1, and Swift No.2 hydroelectric projects (issued June 26, 2008) and pursuant to Section 9.6 and 4.9 of the Lewis River Settlement Agreement, the Utilities are to monitor bull trout populations in Swift reservoir and Yale Lake annually as well as annually capture and transport bull trout from the Yale and Swift No.2 tailrace areas. The Utilities collected the data contained in this report to accomplish these monitoring objectives.

After four consecutive years of decline, the estimate of bull trout that stage at Eagle Cliffs and then migrate up the North Fork Lewis River increased in 2009. The 2009 increase over the 2008 estimate was not large (380 in 2008 vs. 445 in 2009, or 15 percent), but it may signal that the population is rebounding. A more interesting fact in comparing 2009 to prior years was the amount of previously encountered bull trout captured during Eagle Cliffs netting activities (52 recaptures from 107 captures, forty-nine percent). This was the highest recapture rate experienced on record. Eagle Cliffs bull trout capture methodologies and the amount of effort expended remained similar since 2000. The assumption that an estimate of bull trout that stage at Eagle Cliffs in the spring and subsequently migrate up the North Fork Lewis River provides a reasonable estimator of the reservoir population size of fish greater than 360mm, is one that will be addressed in the 2010 Annual Bull Trout Monitoring Plan for the North Fork Lewis River.

Bull trout collection in the Yale Tailrace experienced below average capture numbers (five) in 2009. Capture methods (tangle nets) and total effort (eight netting days) was similar to 2008 when 15 fish were captured. New methodologies to capture these fish continue to be

investigated, though at this time tangle nets remain the most effective and efficient. With the construction in late 2009 of the Yale Entrainment Reduction Net, pursuant to section 4.9.3 of the Lewis River Settlement Agreement, capture numbers of bull trout in the Yale tailrace are anticipated to decline over time.

Collection and tagging activities within the Swift Bypass Reach continued in 2009. Capture numbers in 2009 increased dramatically (25) over what was encountered in 2008 (six). The amount of effort expended and capture methods used in 2009 were similar to what was performed in 2008 with one exception, an additional capture area not surveyed in prior years was utilized. The section of the bypass reach that discharges into Yale reservoir was discovered in 2009 to contain numerous holding bull trout. This area was extensively sampled and may have partially accounted for the increase in bull trout captures. As in prior sampling years, all captured bull trout were sampled for their biological data, genetics, tagged, and then returned to the point of capture. Currently the FWS is in the process of updating the Lewis River bull trout genetic baseline, this work is scheduled to be completed in early spring 2010. Based on this genetic baseline and new for 2010, per the direction of the FWS, bull trout captured in the Swift Bypass Reach will be held while their DNA is analyzed. If the captured bull trout is found to be endemic to stocks residing within Swift reservoir, that fish will be transported upstream and released into Swift reservoir at the Swift Campground boat launch. If the captured bull trout is found to be of Cougar Creek/Yale reservoir ancestry, that fish will be returned to the Swift Bypass Reach. Where these captured fish will be held while awaiting genetic analysis will be determined after consultation with the FWS.

Survey methodologies for Cougar Creek continue to be standardized; especially with concern to bull trout redd surveys. Bull trout redds observed in the creek and the number of bull trout observed during the peak snorkel/foot count in 2009 was slightly less than what was observed in 2008. Multiple redd surveys encountered bull trout physically on redds and at times in the process of excavating. Information concerning a bull trout-per-redd expansion factor is still needed. An underwater color video camera was operated at the mouth of the creek in September and October, 2009. The camera utilized a directional weir which helped to funnel fish closer to the camera lens. The data from the underwater video camera has yet to be analyzed but is scheduled to be completed in late spring 2010.

Spawning bull trout were again observed in Pine Creek tributary P8 during 2009 redd surveys. Based on lack of evidence supporting Pine Creek mainstem spawning, P8 recently has been thought to contain the bulk of available bull trout spawning habitat within the Pine Creek drainage. The observation of 12 large redds during a mainstem Pine Creek bull trout snorkel survey on September 30th, 2009 opens up the discussion of where the majority of bull trout in Pine Creek spawn. Bull trout redd surveys of Pine Creek mainstem, as well as tributary P8, will be further investigated in the future.

Once again bull trout were observed in Swift Creek and Swift Creek cove within Swift reservoir for an extended period of time during the summer and fall of 2009. For the first time, a bull trout juvenile (182mm) was encountered within the confines of Swift Creek itself during an electrofishing survey in August 2009. Whether or not this fish hatched and emerged from the gravel in Swift Creek is not known. A genetic sample taken after capture of this fish will be analyzed and compared to the Lewis River bull trout genetic baseline in spring 2010. Results

from this analysis will be reported in the 2010 Annual Bull Trout Monitoring Report. Surveys of Swift Creek will continue in 2010 to document the presence or absence of bull trout.

Per the direction of the FWS, the Swift Power Canal that connects Swift No. 1 to Swift No. 2 was netted for bull trout for the first time since the canal failure in 2001. One bull trout was captured and transported upstream to Swift reservoir. At this time, it is anticipated that these netting activities will continue in 2010. Discussion concerning these activities will occur at the annual bull trout coordination meeting in spring 2010 which involves all stakeholders to bull trout monitoring in the Lewis River basin.

Weights of most handled bull trout were again taken in 2009. Individual weights were then compared to corresponding fork lengths and fish condition factors were assigned. The number of weights recorded in 2009 (112) is similar to what was recorded in 2008 (98). When the calculated condition factors of like-sized individuals are compared, the year 2009 showed an overall K-factor increase over 2008 in all size-classes. It is anticipated that this information may offer insight to reservoir productivity as it relates to bull trout, and the overall health of individual bull trout. This information can then be related to how fish condition may affect their behavior especially in terms of gamete production from one year to the next. Collection of condition factor information will continue in 2010.

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APPENDIX A

SWIFT RESERVOIR BULL TROUT CAPTURE DATABASE FOR 2009

Record #	DATE	LENGTH (mm)	FLOY COLOR	FLOY #	PIT #	RECAP COLOR	RECAP PIT #	Weight (grams)
1334	5/13/2009	655	Pink	1		yellow 11	3D91H1BF24052B0	2980
1335	5/13/2009	585	Pink	2	3D91H1C2C3EC817			2880
1336	5/20/2009	710	Pink	3		LOST was B84	3D91H1BF23C7C3B	5380
1337	5/20/2009	626	Pink	4	3D91H1C2C46C250			3480
1338	5/20/2009	584	Pink	5		B053	3D91H1BF23DC04B	2980
1339	5/20/2009	354	too small		3D91H1BF2407CB6			880

Record #	DATE	LENGTH (mm)	FLOY COLOR	FLOY #	PIT #	RECAP COLOR	RECAP PIT #	Weight (grams)
1340	5/20/2009	558	Pink	6		Y013	3D91H1C2C159FF6	2200
1341	5/20/2009	516	Pink	7	3D61H00053FD682			2020
1342	5/27/2009		THIS YEAR			P 02	3D91H1C2C3EC817	
1343	5/27/2009	604	Pink	8		B96	3D91H1BF2406526	4130
1344	5/27/2009	489	Pink	9		Y32	3D91H1C2C13419D	1860
1345	5/27/2009	656	Pink	10	3D61H00053FD923			4220
1346	5/27/2009	639	Pink	11		C/G109	3D91H1BF240612B	3780
1347	5/27/2009	542	Pink	12	3D91H1C2CEA1D19			2440
1348	6/3/2009	530	Pink	13		LOST	3D91H257C6A5979	1780
1349	6/3/2009	477	Pink	14	3D61H00053FD8EC			1400
1350	6/3/2009	736	Pink	15	3D61H00053FD91F			5250
1351	6/3/2009	587	Pink	16	3D61H00053FD5F9			2580
1352	6/3/2009	469	Pink	17	3D61H00053FF22B			1250
1353	6/3/2009	536	Pink	18	3D61H00053FD6DA			1780
1354	6/3/2009	448	Orange/ White	1	3D61H00053FD91C			1000
1355	6/3/2009	604	Pink	19		Y 007	3D91H1C2C4878A0	3050
1356	6/3/2009	580	Pink	20		Y 042, B051	3D91H1BF2405A79	2250
1357	6/3/2009	553	Pink	21	3D61H00053FD73D			2150
1358	6/3/2009	569	Pink	22	3D61H00053FD87E			2400
1359	6/3/2009	773	Mort			Y 016	3D91H1C2C460287	1780
1360	6/10/2009	663	Pink	23		Y 039	3D91H1BF23DAA65	3780
1361	6/10/2009	624	Pink	24		Y 004	3D91H257C666811	3080
1362	6/10/2009	648	Pink	25	3D61H00053FD7A0			3980
1363	6/10/2009	564	Pink	51	3D61H00053FD67B			2220
1364	6/10/2009	494	Pink	52	3D61H00053FD7D1			1620
1365	6/10/2009	611	Pink	53		Y 020	3D91H1BF23DC302	2480
1366	6/10/2009	514	Pink	54		LOST Y 03	3D91H1C2C458AF4	1580
1367	6/10/2009	742	Pink	55		LOST B57	3D91H1BF1587417	4700
1368	6/10/2009	631	Pink	56		R 012	3D91H257C665547	3700
1369	6/10/2009		THIS YEAR			P 21	3D61H00053FD73D	
1370	6/10/2009	743	Pink	57	3D61H00053FD629			3800
1371	6/10/2009	654	Pink	58	3D61H00053FD7EE			2700
1372	6/10/2009	554	Pink	59	3D61H00053FD85C			2580
1373	6/17/2009	633	Pink	60		CG 102	3D91H1BF2407D92	3260
1374	6/17/2009		THIS YEAR			P 08, B96	3D91H1BF2406526	
1375	6/17/2009		THIS YEAR			P 19, YO7	3D91H1C2C4878A0	
1376	6/17/2009	638	Pink	61		B 73	3D91H257C666058	3520
1377	6/17/2009	612	Pink	62		CG 73	3D91H1BF2406140	2860
1378	6/17/2009	348	too small		3D61H00053FD57D			400
1379	6/17/2009	619	Pink	63	3D61H00053FD5D9			2800
1380	6/17/2009	635	Pink	64		LOST THIS YEAR'S P04,	3D91H1C2C46C250	3480
1381	6/17/2009	658	Pink	65		Y 27	3D91H1C2C48AE0E	3760
1382	6/17/2009	560	Pink	66	3D61H00053FD85B			2060
1383	6/17/2009	659	Pink	67	3D61H00053FD72F			3850

Record #	DATE	LENGTH (mm)	FLOY COLOR	FLOY #	PIT #	RECAP COLOR	RECAP PIT #	Weight (grams)
1384	6/17/2009	435	Orange/ White	2	3D61H00053FD930			1000
1385	6/17/2009	685	Pink	68		Y12, & MONO?	3D91H1BF23C64C7	4180
1386	6/17/2009	558	Pink	69		Y 44, B66	3D91H1BF2405AD8	2480
1387	6/17/2009	647	Pink	70	3D61H00053FD866			3460
1388	6/17/2009		THIS YEAR			P 13	3D91H257C6A5979	
1389	6/17/2009		THIS YEAR			P 51	3D61H00053FD67B	
1390	6/17/2009	539	Pink	71	3D61H00053FD94C			3260
1391	6/24/2009	457	Pink	72		R/G 06	3D91H1C2C456B91	
1392	6/24/2009	648	Pink	73		B 58	3D91H1BF23C8820	2100
1393	6/24/2009	523	Pink	76	3D61H00053FCFEE			1700
1394	6/24/2009	555	Pink	76	3D61H00053FD758			2060
1395	6/24/2009	427	Orange/ White	4	3D61H00053FF4A1			800
1396	6/24/2009	657	Pink	77		LOST B 22 RUSH 08	3D91H1BF23DA3C B	3560
1397	6/24/2009		Pink	78	3D61H00053FD8E1			2140
1398	6/24/2009	610	Pink	79		RUSH SCREW, Y 51	3D91H1BF10E964E	2880
1399	6/24/2009	281	Pink	SM	3D61H00053FD7BE			
1400	6/24/2009	593	Pink	77	3D61H00053FC483			2380
1401	6/24/2009	553	Pink	78		Y 30	3D91H1C2C48AC93	2000
1402	6/24/2009		THIS YEAR			P 15	3D61H00053FD91F	
1403	6/24/2009	587	Pink	79		LOST R 161	3D91H1BF23C9758	2220
1404	6/24/2009	631	Pink	80		LOST R 132	3D91H257C6A83EE	3200
1405	6/24/2009	670	Pink	81	3D61H00053FF5B5			4000
1406	6/24/2009	689	Pink	82		B 27	3D91H1BF2406C0F	4200
1407	6/24/2009	499	Pink	83	3D61H00053FEAC9			1580
1408	7/1/2009	615	Pink	80	3D61H00053FD596			3160
1409	7/1/2009		THIS YEAR			P 82 LAST WEEK	3D91H1BF2406C0F	
1410	7/1/2009	567	Pink	81	3D61H00053FD7A0			3500
1411	7/1/2009		THIS YEAR			P 77 @657 LAST WEEK	3D91H1BF23DA3C B	
1412	7/1/2009	638	Pink	82		Y 55, B 71	3D91H1BF23C6EC8	3760
1413	7/1/2009	576	Pink	83		GG 40, R 134	3D91H1BF1525E5B	2640
1414	7/1/2009	525	Pink	84	3D61H00053FD693			2420
1415	7/1/2009	691	Pink	85	3D91H257C6678B2			3860
1416	7/1/2009	613	Pink	86	3D61H00053FEAC9			3060
1417	7/1/2009	412	Orange/ White	6	3D61H00053FD89E			1040
1418	7/1/2009		THIS YEAR			O/W 02	3D61H00053FD390	
1419	7/1/2009		THIS YEAR			O/W 04	3D61H00053FF4A1	

Record #	DATE	LENGTH (mm)	FLOY COLOR	FLOY #	PIT #	RECAP COLOR	RECAP PIT #	Weight (grams)
1420	7/1/2009	247	Pink	SM	3D61H00053FD898			240
1421	7/1/2009	262	Pink	SM	3D61H00053FF36E			240
1422	7/1/2009	260	Pink	SM	3D61H00053FD757			240
1423	7/1/2009	510	Pink	88		Y 25, B 145	3D91H1C2C489331	1500
1424	7/1/2009	412	Orange/ White	7	3D61H00053FEAC9			900
1425	7/7/2009		THIS YEAR			P 13	3D91H257C6A5979	
1426	7/7/2009		THIS YEAR			P 81	3D61H00053FF5B5	
1427	7/7/2009		THIS YEAR			P 84	3D61H00053FD693	
1428	7/7/2009		THIS YEAR			P 05, B 53	3D91H1BF23DC04B	
1429	7/7/2009	718	Pink	89		LOST	3D91H1C2C456BD1	6680
1430	7/7/2009	260	THIS YEAR			SMALL	3D61H00053FD757	
1431	7/7/2009	482	Pink	90	3D61H00053FD78D			2700
1432	7/7/2009	486	Pink	91	3D91H1C2C460806			2800
1433	7/7/2009	345	too small	SM	3D61H00053FD5FF			1980
1434	7/7/2009	397	Orange/ White	O/W 08`	3D61H00053FD653			2380
1435	7/7/2009	411	Orange/ White	O/W 09	3D61H00053FD8D0			2400
1436	7/7/2009	658	Pink	92	3D61H00053FD899			3180
1437	7/7/2009	610	Pink	93		Y 21	3D61H00053FD613	3420
1438	7/7/2009				3D91H257C665B4C			
1439	7/7/2009	575	Pink	94	3D61H00053FD937			2340
1440	7/7/2009	263	too small	SM	3D61H00053FD919			140
1441	7/7/2009	239	too small	SM	3D61H00053FD931			200

APPENDIX B

YALE TAILRACE BULL TROUT CAPTURE DATABASE

	LIVE FISH CAUGHT	LIVE FISH TO YALE	INITIAL CAPTURE DATE	LOCATION	TAG #	TAG TYPE	LENGTH (mm)	COMMENTS
1995	1	1	11-Sep-95	Yale TR	00051	Yellow Floy	590	
	2	M	11-Sep-95	Yale TR	00052	Yellow Floy	640	still in Merwin reservoir
	3	M	11-Sep-95	Yale TR	00053	Yellow Floy	700	still in Merwin reservoir
	4	M	11-Sep-95	Yale TR	00054	Yellow Floy	525	still in Merwin reservoir

	5	M	11-Sep-95	Yale TR	00055	Yellow Floy	690	still in Merwin reservoir
	6	M	11-Sep-95	Yale TR	00056	Yellow Floy	820	still in Merwin reservoir
	7	M	11-Sep-95	Yale TR	00057	Yellow Floy	565	still in Merwin reservoir
	8	2	11-Sep-95	Yale TR	00058	Yellow Floy	625	
	R	R	18-Sep-95	Yale TR	00051	Yellow Floy	Recapture	Released in Yale
	R	R	18-Sep-95	Yale TR	00058	Yellow Floy	Recapture	Released in Yale
	9	3	18-Sep-95	Yale TR	00101	Yellow Floy	620	
	10	4	18-Sep-95	Yale TR	00102	Yellow Floy	450	
	11	5	18-Sep-95	Yale TR	00103	Yellow Floy	770	
	12	6	18-Sep-95	Yale TR	00104	Yellow Floy	550	
	13	7	26-Sep-95	Yale TR	00059	Yellow Floy	680	
	14	8	26-Sep-95	Yale TR	00060	Yellow Floy	750	
	15	9	26-Sep-95	Yale TR	00061	Yellow Floy	440	
1996	16	10	10-Sep-96	Yale TR	00076	Yellow Floy	535	
	17	11	10-Sep-96	Yale TR	00077	Yellow Floy	545	
	18	12	10-Sep-96	Yale TR	00078	Yellow Floy	575	
	19	13	10-Sep-96	Yale TR	00079	Yellow Floy	615	
	20	14	10-Sep-96	Yale TR	00080	Yellow Floy	590	
	21	15	10-Sep-96	Yale TR	00081	Yellow Floy	490	
	R	R	10-Sep-96	Yale TR	00051	Yellow Floy	710*	*Recapture from 1995 sampling
	22	16	10-Sep-96	Yale TR	00083	Yellow Floy	660	
	23	17	10-Sep-96	Yale TR	00084	Yellow Floy	460	
	24	18	1-Oct-96	Yale TR	00085	Yellow Floy	453	
	25	19	1-Oct-96	Yale TR	00086	Yellow Floy	452	
	26	20	1-Oct-96	Yale TR	00088	Yellow Floy	384	Harvested by angler in Yale
	27	21	1-Oct-96	Yale TR	00089	Yellow Floy	422	
	28	22	1-Oct-96	Yale TR	00090	Yellow Floy	530	
	29	M	31-Oct-96	Yale TR	00091	Yellow Floy	510	Released in Merwin
	30	M	31-Oct-96	Canyon Cr. Mouth	00975	Orange Floy	330	Released in Merwin
1997	31	23	10-Sep-97	Yale TR	00506	Pink Floy	444	
	32	24	10-Sep-97	Yale TR	00507	Pink Floy	489	
	33	25	10-Sep-97	Yale TR	00508	Pink Floy	533	
	LIVE FISH CAUGHT	**LIVE FISH TO YALE**	**INITIAL CAPTURE DATE**	**LOCATION**	**TAG #**	**TAG TYPE**	**LENGTH (mm)**	**COMMENTS**
	34	26	10-Sep-97	Yale TR	00509	Pink Floy	381	
	35	27	10-Sep-97	Yale TR	00510	Pink Floy	400	
	36	28	17-Sep-97	Yale TR	00511	Pink Floy	546	Possible tag loss from past marking
	37	29	17-Sep-97	Yale TR	00512	Pink Floy	572	
	38	30	24-Sep-97	Yale TR	00513	Pink Floy	582	

	39	31	24-Sep-97	Yale TR	00514	Pink Floy	635	Recap RD, mouth chewed up, died at Cougar weir
	40	32	24-Sep-97	Yale TR	00515	Pink Floy	520	
1998	41	33	10-Sep-98	Yale TR	00302	YELLOW	610	Released in Yale, no tag scars
	42	34	10-Sep-98	Yale TR	00303	YELLOW	692	Released in Yale, no tag scars
	43	35	10-Sep-98	Yale TR	00304	YELLOW	673	Released in Yale, no tag scars
	44	36	10-Sep-98	Yale TR	00305	YELLOW	736	Released in Yale, no tag scars
	45	37	10-Sep-98	Yale TR	00306	YELLOW	724	Released in Yale, no tag scars
	46	38	16-Sep-98	Yale TR	00307	YELLOW	737	Released in Yale, no tag scars
1999	47	M	13-Aug-99	Yale TR	00105	YELLOW	695	Male, released in Merwin
	48	M	13-Aug-99	Yale TR	00107	YELLOW	362	Female, released in Merwin
	49	M	13-Aug-99	Yale TR	00108	YELLOW	686	Revived, female, released in Merwin
	50	M	13-Aug-99	Yale TR	00109	YELLOW	534	Female, released in Merwin
	51	M	13-Aug-99	Yale TR	00110	YELLOW	483	Male, released in Merwin
	52	M	13-Aug-99	Yale TR	00111	YELLOW	715	Male, released in Merwin
2000	53	39	6-Sep-00	Yale TR	00777	PINK	749	Male
	54	40	6-Sep-00	Yale TR	00778	PINK	559	Female
	55	41	6-Sep-00	Yale TR	00779	PINK	457	Female
	56	42	6-Sep-00	Yale TR	00780	PINK	425	Male
	57	43	6-Sep-00	Yale TR	00781	PINK	572	
	58	44	13-Sep-00	Yale TR	00782	PINK	495	Back Injury, skinny
	59	45	27-Sep-00	Yale TR	00783	PINK	711	
2001								surveys 9/5; 9/12; 9/19 yielded no bull trout
2002	60	46	12-Sep-02	Yale TR	05425	Yellow Floy	381	ADFG Floy Tag
	61	47	12-Sep-02	Yale TR	05426	Yellow Floy	468	ADFG Floy Tag, right pec. fin missing
	62	M	12-Sep-02	Yale TR	05427	Yellow Floy	660	ADFG Floy Tag
	63	48	26-Sep-02	Yale TR	05431	Yellow Floy	590	Released in Merwin, Motor failure, spillway hole
	64	49	24-Sep-02	Yale TR	05429	Yellow Floy	335	1 HR fished, hatchery truck trouble
	65	50	24-Sep-02	Yale TR	05430	Yellow Floy	465	2 HR fished, hatchery truck trouble
2003	66	51	9-Jul-03	Yale TR	00001	BLUE	750	
	67	52	9-Jul-03	Yale TR	00002	BLUE	636	
	68	53	9-Jul-03	Yale TR	00003	BLUE	453	
	LIVE FISH CAUGHT	**LIVE FISH TO YALE**	**INITIAL CAPTURE DATE**	**LOCATION**	**TAG #**	**TAG TYPE**	**LENGTH (mm)**	**COMMENTS**
	69	54	9-Jul-03	Yale TR	00004	BLUE	400	Too small for sonic tag
	70	MORT	16-Jul-03	Yale TR			586	HATCHERY MORTALITY
	71	MORT	16-Jul-03	Yale TR			516	HATCHERY MORTALITY
	72	MORT	16-Jul-03	Yale TR			408	HATCHERY MORTALITY
	73	MORT	16-Jul-03	Yale TR			347	HATCHERY MORTALITY
	74	MORT	16-Jul-03	Yale TR			572	HATCHERY MORTALITY
	75	MORT	16-Jul-03	Yale TR			546	HATCHERY MORTALITY

76	MORT	16-Jul-03	Yale TR				HATCHERY MORTALITY
77	MORT	16-Jul-03	Yale TR				HATCHERY MORTALITY
78	MORT	16-Jul-03	Yale TR				HATCHERY MORTALITY
79	M	23-Jul-03	Yale TR	1201	GREEN		Released at Speelyai Bay
80	55	30-Jul-03	Yale TR	16	BLUE	800	Released at Cougar Park
81	56	30-Jul-03	Yale TR	12	BLUE	325	
82	MORT	30-Jul-03	Yale TR			403	
83	57	6-Aug-03	Yale TR	11	BLUE	375	
84	58	6-Aug-03	Yale TR	10	BLUE	371	
85	59	10-Jun-04	Yale TR	289	WHITE	650	Released at Saddle Dam
86	60	10-Jun-04	Yale TR	290	WHITE	603	Released at Saddle Dam
87	M	6/24/2004	Yale TR	662	WHITE	291	Female, caudal erosion, Speelyai Bay release
R	R	6/24/2004	Yale TR	698			Recapture of 444, looked good, wounds all healed, no floy
88	M	7/8/2004	Yale TR	292	WHITE	583	Released in Speelyai Bay
89	M	7/22/2004	Yale TR	293	WHITE	585	Released in Speelyai Bay
90	M	7//22/04	Yale TR	294	WHITE	538	Released in Speelyai Bay
91	61	8/5/2004	Yale TR	295	WHITE	595	Not Sonic Tagged (tag was not working)
91	61	6/24/2005	Yale TR				No fish caught, experimental seine used
92	62	7/12/2005	Yale TR	827	ORANGE	590	**Recap of Sonic Tag #457, growth of 52 mm in 1 year**
93	63	7/12/2005	Yale TR	828	ORANGE	690	
94	64	7/21/2005	Yale TR	829	ORANGE	565	Using Gill Nets
95	65	7/21/2005	Yale TR	830	ORANGE	475	White Floy 294, Taken to Yale
R	R	7/21/2005	Yale TR				Recapture of Sonic Tag 457
96	66	7/28/2005	Yale TR	831	ORANGE	763	Large fish
96	66	8/11/2005	Yale TR				NO BULL TROUT CAUGHT (4 nets fishing)
96	66	9/1/2005	Yale TR				No bull trout, 1 adult chinook salmon (done for year)
97	67	6/1/2006	Yale TR	1501	GREEN	561	Left Eye old injury, probably blind in left eye (picture available in Picasa
LIVE FISH CAUGHT	**LIVE FISH TO YALE**	**INITIAL CAPTURE DATE**	**LOCATION**	**TAG #**	**TAG TYPE**	**LENGTH (mm)**	**COMMENTS**
97	67	6/8/2006	Yale TR				No Bull Trout (Experimental Purse Seine Used) Deployment problems
97	67	6/15/2006	Yale TR				No Bull Trout Captured
97	67	6/22/2006	Yale TR				No Bull Trout Captured
98	68	7/6/2006	Yale TR	00001	GREEN	620	Good healthy Fish
99	69	7/6/2006	Yale TR	00002	GREEN	450	Good healthy Fish
100	70	7/6/2006	Yale TR	00003	GREEN	600	Good healthy Fish
100	70	7/13/2006	Yale TR				No Bull Trout Captured

2004

2005

2006

101	71	7/20/2006	Yale TR	00004	GREEN	368	CT X RB cross (285, 280, 280, 285) lavaged, 4 diptera, 2 ephemeroptera,1 isopoda
101	71	8/3/2006	Yale TR				RB 210, lavage = algae; CT 285, lavage = 68mm stickleback; no bull trout
101	71	8/16/2006	Yale TR				CT 300 mm various fish bones
101	71	8/31/2006	Yale TR				SCCS
102	72	6/7/2007	Yale TR	00001	Chartreuse	642	Good healthy Fish
103	73	6/7/2007	Yale TR	00002	Chartreuse	430	Good healthy Fish
104	74	6/7/2007	Yale TR	00003	Chartreuse	474	Wrapped in net with mouth closed, initially thought mort but fish was revived, gilling and swimming freely when released.
105	75	6/7/2007	Yale TR	00004	Chartreuse	610	Good healthy Fish
106	76	6/14/2007	Yale TR	00005	Chartreuse	394	Good healthy Fish
107	77	6/14/2007	Yale TR	00006	Chartreuse	420	Good healthy Fish
108	78	6/14/2007	Yale TR	00007	Chartreuse	395	Good healthy Fish
109	79	6/21/2007	Yale TR	00008	Chartreuse	521	Healthy fish, recap of fish from previous year green floy #00002, fish grew 71mm in one year
109	79	6/28/2007	Yale TR				No Bull Trout Captured
110	80	7/19/2007	Yale TR	00010	Chartreuse	542	Old puncture wound by LP, wound to LV. Released at Saddle Dam, no hatchery truck.
111	81	7/26/2007	Yale TR	00009	Chartreuse	527	Good healthy Fish
112	82	7/26/2007	Yale TR	00011	Chartreuse	363	Good healthy Fish
113	83	7/26/2007	Yale TR	00012	Chartreuse	362	Good healthy Fish
114	84	7/26/2007	Yale TR	00013	Chartreuse	523	Good healthy Fish
114	84	8/2/2007	Yale TR				No Bull Trout Captured
114	84	8/23/2007	Yale TR				No Bull Trout Captured, end surveys by 8/15 next year.

2007

LIVE FISH CAUGHT	LIVE FISH TO YALE	INITIAL CAPTURE DATE	LOCATION	TAG #	TAG TYPE	LENGTH (mm)	PIT#	Weight	Comments
115	85	6/19/2008	Yale TR	0001	1/2 Yellow 1/2 Green	365	985121012736452	1lb. 6oz.	Water temp. 10°C. Caught via hook & line, new bite wound to ventral area.
116	86	6/19/2008	Yale TR	0002	1/2 Yellow 1/2 Green	413	985121012653443	1lb. 13oz.	Good healthy Fish
117	87	6/19/2008	Yale TR	0003	1/2 Yellow 1/2 Green	395	985121012655977	1lb. 7oz.	Good healthy Fish

2008

	118	88	6/19/2008	Yale TR	0004	1/2 Yellow 1/2 Green	450	985121012609398	2lb. 11oz.	Good healthy Fish
	119	89	6/26/2008	Yale TR	0005	1/2 Yellow 1/2 Green	395	985121012726802	1lb. 11oz.	Good healthy Fish, captured whitefish 312mm
	120	90	7/3/2008	Yale TR	0006	1/2 Yellow 1/2 Green	440	985121012645857	1lb. 10oz.	LP gone/water temp 11.5°C
	121	91	7/3/2008	Yale TR	0007	1/2 Yellow 1/2 Green	465	985121012722258	2lb. 9oz.	Good healthy fish
	122	92	7/3/2008	Yale TR	0008	1/2 Yellow 1/2 Green	415	985121012610730	1lb. 6oz.	captured via hook&line, healthy
	123	93	7/11/2008	Yale TR	0009	1/2 Yellow 1/2 Green	375	985121012610175	1lb. 6oz.	Good healthy fish
	124	94	7/17/2008	Yale TR	0010	1/2 Yellow 1/2 Green	372	985121012645476	1lb. 1oz.	Good healthy fish. Water temp 12°C
	125	95	7/24/2008	Yale TR	0011	1/2 Yellow 1/2 Green	430	985121012742843	n/a	Healthy fish - Water temp 13°C - No scale for weight
	126	96	7/24/2008	Yale TR	0012	1/2 Yellow 1/2 Green	410	985121012609337	n/a	Healthy fish
	127	97	7/24/2008	Yale TR	0013	1/2 Yellow 1/2 Green	398	985121012762089	n/a	Healthy fish
	128	98	7/24/2008	Yale TR	too small	n/a	310	985121012747328	n/a	Healthy fish, too small for Floy tag
	129	99	7/31/2008	Yale TR	too small	n/a	349	985121012653305	15 oz.	Healthy fish, water temp 12°C
	129	99	8/6/2008	Yale TR						No bull trout captured many kokanee.
2009	129	99	6/4/2009	Yale TR						No bull trout captured, H2O 12°C
	130	100	6/11/2009	Yale TR	001	Yellow	630	3D91C2CEBCC91	3340g	Healthy fish, H2O 13°C
	131	101	6/11/2009	Yale TR	too small	n/a	345	3D91C2CE9E603	460g	Healthy fish
	131	101	6/25/2009	Yale TR						No bull trout captured, H2O 13°C
	LIVE FISH CAUGHT	**LIVE FISH TO YALE**	**INITIAL CAPTURE DATE**	**LOCATION**	**TAG #**	**TAG TYPE**	**LENGTH (mm)**	**PIT#**	**Weight**	**Comments**
	132	102	7/2/2009	Yale TR	002	Yellow	521	3D91C2CE9E176	1460g	Recap from 2008 Yellow/Green #004, 71mm and 213 gram growth
	133	103	7/2/2009	Yale TR	003	Yellow	549	3D600053FE71B	2360g	Healthy fish, H2O 12.5°C, caught SPCH 468mm
	133	103	7/9/2009	Yale TR						No bull trout captured, H2O 13°C, caught SPCH 544mm

133	103	7/16/2009	Yale TR						No bull trout captured. H2O 12.5°C
134	104	7/23/2009	Yale TR	004	Yellow	622	3D600053FE6DA	3120g	Healthy fish. H2O 13°C
134	104	8/6/2009	Yale TR						No bull trout captured. H2O 11°C (sump) 21°C (surface)

APPENDIX C

AGENCY COMMENTS

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	In list of ongoing and completed tasks, Task 1 should be changed to reflect an adult migration estimate.	Comment noted and report changed
WDFW	I think it's important that readers are aware of the fact that we do not place the PIT tags in the standard location (peritoneal cavity)	Comment noted and report changed
WDFW	What measures/values of reservoir productivity and behavior are being collected for comparison to the bull trout k-factors?	No direct measure of reservoir productivity, apart from bull trout k-factors, is being gathered at this time. Being that bull trout are an apex fish predator at the top of the food chain we believe their condition factor to be a good stand alone indicator for the current analysis. In the future additional data may be gathered, but at this time is unplanned.
WDFW	How were unknowns (you knew it was a bull trout but you couldn't be sure if it was/wasn't tagged) handled? Normally unknowns are assigned to a group (either marked or unmarked) using the ratio of known marked to unmarked that were observed during that survey. This is another key assumption in the model that should be addressed. May want to mention how re-sights of previous years tag colors are handled.	Unknowns, which do not occur very frequently, were not included within the analysis. The text states that only fish with that years tag color are counted within the "tagged" group, all other observations are counted as "untagged".
WDFW	(the estimate is made at the tagging location, not the re-sight areas, something like: A total of 445 (95% CI 367-554) adult bull trout were estimated to have staged in the Eagle Cliff area of Swift Reservoir prior to migrating into upstream areas.	The report already states such at the bottom of page 3.
WDFW	My understanding is that the 10% reduction in the marked number used in the No-Remark model is a combination of mark loss and non-recruitment to the survey areas based on the radio tagging work back in the 90's. I also think the 5% assumed mark (Floy) loss rate is too high and could now be accurately estimated since we now have a permanent secondary mark (PIT tag) to measure Floy tag loss.	Historically this was cited as in-season tag loss. It's hard to base this percentage on only one or two year's worth of migration data from radio-tag data from the mid 90's. New USFWS long term radio telemetry work may shed better light on the subject though it will be hard to pin down a hard number for a non-migration rate as this number may be highly variable. The other factor not taken into account is mortality.

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	No mention of assumption testing on combining counts/re-sights from Pine, Rush and Rush hole (chi-square analysis), no mention of observer efficiency assumptions, no mention of the radio tagging USFWS did and it's possible bias on the estimate, no mention of what surveys were used to generate the estimate (quick look says they all can be combined in 2009). Small (360-450mm) fish were given different color marks than large (>450mm) fish. If your assumption was that different sized adults recruit to the survey areas at different rates (which I agree could be happening) where are the results (were both marks re-sighted at similar rates, where these rates significantly different, is it valid to combine both groups to make a combined estimate)? If this is in fact the case, separate estimates for fish above and below 450mm should be made. However, to do that you would need un-marked counts of fish above and below 450mm to be made during snorkel surveys which could prove to be a problem. Test of observer accuracy at distinguishing these two size classes would need to be done and you may not always have sufficient numbers of marks and re-sights in both groups to make independent estimates.	The same core of observers has been performing this work for the last four years. Fish are surgically implanted with a radio tag to assess migration/population estimates often and this is an accepted method for doing so. Of the 17 fish implanted with a radio tag in 2009, 15 were detected above the Eagle Cliffs bridge (pers com Mike Hudson, USFWS). The dual color tag groups were only meant to assess if smaller fish are present on the re-sight grounds during the time of the resight surveys. They were not meant to assess the migration rates of smaller fish to large fish. Researchers did not want to include tagged small fish encountered in the Eagle Cliffs area into the migration estimate if those fish were simply in that area at that time to feed and then move out into the reservoir.
WDFW	In the proposed monitoring activities for 2009, discussion ensued over using two colored tags and monitoring movements of smaller 260-450 mm fish. "The use of two color groups represents a new methodology first implemented in 2008 and planned for continuation in 2009; it is intended to address a key assumption in the Peterson estimator – "that every fish has an equal probability of being observed during the snorkel surveys". This methodology will help determine if a positive bias exists in the current estimate of bull trout abundance." There was no discussion or evaluation of the assumption or of 360-450mm fish movements. It should have been included.	Comment noted and changes made within the report.

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	**3.4 The percentage of bull trout Floy tagged and then subsequently observed in Cougar Creek appears relatively low 16-28%, over three years considering Cougar Creek is the only recognized spawning area within Yale Reservoir. Tagged fish fork lengths in 2009 ranged from 416 to 800mm. Mean for length was 565mm. Twelve fish were greater than 550mm and eight exceeded 600mm. Some of these fish were certainly spawner sized. Totals observed in 2008 and 2009 included a mix of fish tagged in both the previous two years. The low percent of tagged fish seen in Cougar Creek may indicate tagged fish are spawning in a yet undiscovered portion of the by-pass or an unknown section of Yale Reservoir or one of its tributaries. Fish should be trying to home on Swift Reservoir waters, if they are of Swift origin.**	Comment noted
WDFW	Based on the presence and detection of multiple bull trout redds in Cougar Creek since 2006, redd count spawning population estimate methodology has become the main source for the annual Cougar Creek bull trout spawner abundance estimate – why? .	PacifiCorp maintains that redd counts have a greater precision of how many fish used the creek to spawn that year than a one day peak count which was traditionally used.
WDFW	Though redd count methodology has effectively replaced live peak counts as the metric used to estimate spawner abundance, peak counts are still performed during redd surveys in order to continue this established trend for comparison and calibration (how will peak count data calibrate a redd count expansion?) for the new method.	They both generate a trend up or down independently of one another. If we have a high peak count of large spawner sized bull trout within the creek during redd surveys, then we would expect a large amount of redds to be dug.
WDFW	Assumption testing still needs to be done on redd surveys within Cougar Creek. No mention of redd life.	Dunham et al. states that surveying the entire length of available habitat with the same experienced observers during the entire run-time is an appropriate and accepted way of performing reliable bull trout redd counts. This was all accomplished in 2009 on Cougar Creek. Due to the stable nature of Cougar Creek as well as the cold extremely clean water thus inhibiting algae growth, redds persist for months and this statement will be reflected within the body of text.

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	Concerning fish per redd expansion factors for Cougar Creek, how was two fish per redd landed on? You state in the text that the number is variable and most likely basin or watershed specific.	Based on direct observations of fish on or near the vicinity of a redd(s), PacifiCorp maintains that the number of fish per redd is in the vicinity of two. As the text states, at this time we do not know exactly what that number is so two is an approximate estimate. Analyzing the underwater video is a priority, but even with an analysis of fish per redd during those spawning years, future years use of that number of fish per redd will still be an estimate as this number can change from one year to the next.
WDFW	It's been my experience that peak counts combine still visible and new redds (peak counts of spawners include lives and deads combined).	In this case, peak counts consist only of new redds.
WDFW	(are current surveys that same as past?, hasn't the timing (moved later in the fall to encompass the bull trout spawning season not just those observed during the kokanee spawning time frame) and manner (only a couple of foot surveys annually to now weekly surveys that include not only walking but snorkeling observations) of the surveys changed over the years.	The method of the walking surveys has not changed from years past, they may occur at a greater frequency, but the method remains the same. Since 2006, the peak count has incorporated both the snorkel and walking peaks. Prior to 2006, it was simply a walking survey. Text will reflect this change.
WDFW	(due to differences in assumptions/biases/observation rates, it's not appropriate to combine counts from different methods into one value),	Due to the physical characteristics of Cougar Creek (small, low-flow, clear water), PacifiCorp maintainsthat the differences in assumptions/biases/observations rates of snorkeling vs. walking surveys are minimal.

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	I suggest the different methods (foot and snorkel) and results be reported separately and contrasted against comparable historical data. The only way to compare historical peak counts (when only a few counts were only done during the kokanee spawning run) to current values would be to report the peak counts from the same time periods. Comparisons of a snorkel peak count in 2009 to a walking survey peak count in 2002 have little value. Figure 3.4-2 can be very misleading to a casual reader who didn't understand how the methods changed and would not know which years are actually comparable.	Due to the physical habitat characteristics of Cougar Creek (small wetted width, low-flow, clear water), PacifiCorp maintains that the differences in assumptions/biases/observations rates of snorkeling versus walking surveys are minimal.
WDFW	two 100 meter index sites were electrofished three times over the course of five months. The sites were the first available one hundred meters of habitat within the creek (should reconcile the two previous sentences, one says two 100 meter index sites and the other says sites were the first 100 meters available).	Comment noted and change made within report.
WDFW	Thus, the established index site that was just up from the stream mouth during the survey in June was now 800 feet upstream from the mouth in August. The bull trout was encountered near the upstream end of the first one hundred meter index site, approximately 350 meters upstream from the reservoir. It's not clear what sections/length of the stream were surveyed in Aug and Oct. Did you start at the "new" mouth and go to the end of the section(s) that were established in June or just do the same sections as done in June? How much of and where did the October survey occur?	Text states that even though the mouth of the stream changed, the surveyed index sites remained the same.

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	**3.7** Collection of fish in the power canal without power generation occurring is difficult. There is no ability to drift nets, and without generation fish in the power canal can disperse, instead of being attracted to the head of the canal near the turbine outfall. If one turbine could be operated at reduced capacity or the turbine be allowed to motor, increased success may be obtained. Of course, boater safety in the power canal is paramount.	Agreed and comment noted. Based on safety concerns, it is not typical to be in the tailrace during times of turbine generation.
WDFW	**3.8** Collection of condition factor weights is difficult in a rocking boat. We have made attempts to determine fish weight either on shore or in shallow near shore sheltered environments. Sometimes, tareing the scale is difficult. It becomes difficult to measure smaller fish in the large soft sided landing net, as the net wants to tip on the scale and spill its contents. No reference for K-Factor scale is provided**.**	Agreed and comment noted. This is why these values are estimates, especially for values gathered while in a boat.
WDFW	(I'm confused here, during seining activities at the top of Swift Reservoir during 2008 and 2009 I was the person who collected/measured over 95% of this data and I never made a visual call on the "condition" of the fish. The scale reported below looks like one I've seen in reference to resident trout fisheries, hence the "trophy" category. Is there anything in the literature that links K-factor values and a bull trout health, condition or fitness)	WDFW gathered the data on Swift reservoir though PacifiCorp assisted during every sampling event and were able to make a visual call. The visual call on condition of weighed fish also includes fish from Yale and Merwin where WDFW was not involved.
WDFW	(looking at Figure 3.1-1 and the data in Table 3.1-2 the last three years population estimates have overlapping 95% CI and are not significantly different from each other. At best you can say that the estimate has been stable for the last three years after declining from the high estimates seen in the 2004-06 seasons.	Comment noted

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	I'm not sure where you're going with the recapture percentage. Higher than previously experienced within-year recap rates could be a result of too short of a sampling interval or indicate a change in movement behavior due to temperature, flow or turbidity, i.e. fish just stayed in the capture area longer than we've seen in prior years. A higher than normal recapture rate for previously sampled/tagged adults could mean a decline in the overall population (as the index indicates) or it could just be an artifact of seven years of PIT tagging with no tag loss (almost 800 individual fish have been tagged), or a change in the Floy tag loss rate. You recommend determining the relationship between the estimate made at Eagle Cliff and the overall Swift reservoir population and I agree. But I see no work in the 2010 plan to make that determination. This population has suffered a significant decline and we don't really know why the decline occurred or what to do to correct it.	PacifiCorp is simply stating the fact that many of the fish captured during 2009 Eagle Cliffs sampling were recaptures from within that year and previous years. We agree that many previous years recaptures indicate a small population size. Many within year recaps may indicate that fish are not migrating and violate the core assumption of the migration estimate.
WDFW	WDFW agrees that survey methodologies for Cougar Creek continue to be standardized; especially with concern to bull trout redds. Accurate determination of a bull trout-per-redd expansion factor is still needed. Data from underwater color video camera was operated at the mouth of the creek, needs to be analyzed. Redd surveys accompanied by video analysis need to be completed during 2010. Redd counts without video counts are inadequate to determine abundance.	Comment noted
WDFW	Since only one juvenile (182mm) bull trout has been captured In Swift Creek, in a minimum of five electroshocking surveys, it will be interesting to determine the genetic origin of this fish. No young of the year or smaller juvenile bull trout have been captured in the creek, so this fish may be from elsewhere on a foraging foray. Genetic analysis will be crucial.	Comment noted

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	Weights of all handled bull trout were again taken in 2009 (you stated earlier that not all fish were weighed due to lack of available equipment).	Comment noted and change made within report.
WDFW	When the calculated condition factors of like-sized individuals are compared, the year 2009 showed an overall K-factor increase over 2008 in all size-classes (I can't find this analysis in the report, there is only a graph of the data).	The graph is the analysis. The graph compares the 2009 bull trout k-factors to the 2008 bull trout k-factors and is labeled as such.
WDFW	(have you looked at the values for fish that were captured in 2008 and 2009, does there appear to be a change or trend?).	Figure 3.8-3 compares 2009 to 2008 and states as such in the body of text. 2009 k-factors were greater than 2008.