

# **Annual Bull Trout (*Salvelinus confluentus*) Monitoring Plan**

***North Fork Lewis River – 2008***

Merwin Hydroelectric Project (P-935)  
Yale Hydroelectric Project (P-2071)  
Swift No. 1 Hydroelectric Project (P-2111)  
Swift No. 2 Hydroelectric Project (P-2213)

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## I. INTRODUCTION

Monitoring of bull trout populations in the North Fork Lewis River (Figure 1) has occurred annually since 1989. Monitoring activities are a collaborative effort between PacifiCorp (through 2001) and Public Utility District No. 1 of Cowlitz County, Washington (Cowlitz PUD) (beginning in 2002), federal and state resource agencies, and local resource groups.

On June 28, 2002, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) issued Biological Opinions including associated incidental take statements for the operation of the Lewis River hydroelectric projects. Specified within the Biological Opinions are annual planning and consultation requirements with respect to bull trout monitoring activities within the basin. These activities are to be planned annually with consultation of the FWS and Washington Department of Fish and Wildlife (WDFW).

In May 2003, the Federal Energy Regulatory Commission (FERC) issued an amendment order for all Lewis River hydroelectric projects. Specifically, the following license articles were added to each of PacifiCorp and Cowlitz PUD's projects to ensure compliance with the Biological Opinion:

- Merwin – Article 57
- Yale – Article 35
- Swift No. 1 – Article 46
- Swift No. 2 - Article 31

The article is stated as follows for each project:

“Within one year of the issuance date of the order and on or before March 31 of each year thereafter, the Licensee shall file for commission approval a Threatened and Endangered Species Plan and Annual Report. The plan shall address the Licensee’s compliance with the terms and conditions of the Biological Opinion and its associated incidental take statement....”

“The Licensee shall prepare the Threatened and Endangered Species Plan and Annual Report after consultation with the NMFS and FWS. The plan shall include, at a minimum, any modifications to project facilities or operations proposed to minimize take of listed and proposed species occurring as a result of current facility operations. The plan shall also discuss progress on the reasonable and prudent measures and document and discuss any incidental take during the preceding year. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies’ comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and make

recommendations prior to filing the plan with the Commission for approval. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information. The Commission reserves the right to make any changes to the plan."

For 2008, the following seven programs are proposed.

1. Swift Reservoir Bull Trout Spawning Estimate
2. Yale and Swift No. 2 Tailrace Netting and Transportation
3. Pine Creek Tributary P10 Bull Trout Survey
4. Swift Creek Bull Trout Surveys
5. Swift Reservoir Rainbow Trout Stomach Analysis
6. Cougar Creek Spawning Estimate
7. Bull Trout Surveys of the Swift Bypass Reach

A schedule of activities and estimated effort to complete each task is provided in the task descriptions below. Many of the tasks or programs are designed to estimate the number of bull trout present in either known spawning locations (i.e., Rush, Pine and Cougar creeks) or in tailrace areas (i.e., Yale). The Yale tailrace sampling program is unique in that it transports bull trout from the Yale tailrace to Cougar Creek – an important bull trout spawning stream. Spawner survey data are used to anticipate population risks (e.g., sharp declines in numbers) and, if necessary, develop appropriate management actions to protect these populations.



## II. PROPOSED MONITORING PROGRAMS

### 1. SWIFT RESERVOIR BULL TROUT SPAWNING ESTIMATE

Radio tracking studies in 1990, 1991 and 1994 revealed a pre-migrant congregation of bull trout at the Swift reservoir headwaters. The studies further indicated that all bull trout tagged migrated into either Rush or Pine Creeks, with Rush Creek being preferred. These behavioral patterns have allowed the use of a Peterson estimator to document the number of spawners ascending the North Fork Lewis River (Lewis River) from Swift reservoir. The annual estimate of bull trout spawners is a joint effort between PacifiCorp, the U.S. Forest Service (USFS), the WDFW and the USFWS.

The Peterson estimator uses a mark-visual observation technique. In May, June (and sometimes July), pre-migrant bull trout are captured using 2.5-inch stretch mesh gill nets. With the use of boats, nets are either drifted along the bottom or passively set at the headwaters of Swift reservoir (Eagle Cliff area). Once a bull trout becomes entangled in the net, the net is pulled in and the bull trout is freed and placed in a live well. Only bull trout longer than 500 millimeters will be marked with a Floy® anchor tag. Bull trout smaller than 500 millimeters will not be marked because it is unlikely that these fish are sexually mature and actual spawning migrants. **This represents a new methodology for this year and 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 change will reduce error (positive bias) in the estimate by marking only true spawning migrants.

Each year a different color tag is used to prevent counting duplication during snorkel surveys. All bull trout are measured, inspected for tag scars and other markings and then returned to the reservoir upstream of the capture point. The goal of this activity is to mark at least 60 bull trout larger than 500 millimeters.

In addition to Floy® marking, the WDFW has initiated a pit-tagging program for captured bull trout. All bull trout larger than 120 millimeters are tagged with a pit tag in the dorsal sinus. Pit tags are an alternative marking solution for captured bull trout with the intent of providing long-term biological and migratory data for individual bull trout. In addition to marking and obtaining length data, PacifiCorp will also weigh each captured bull trout larger than 120 millimeters. This information will serve three purposes: First, weight-length ratios can be calculated (K factors) for each fish; secondly, this information can be compared to previous years to determine if differences exist and whether these differences are correlated with any population trends observed. Thirdly, with previously PIT tagged bull trout, we will be able to determine both length and weight gain which may provide information on reservoir conditions and productivity since the last time the particular fish was handled.

To determine the number of “recaptures” as required by the Peterson model, snorkel surveys are conducted from late July through September in Rush and Pine creeks and the North Fork Lewis River. Snorkel surveys are used to visually identify marked fish – no

fish are handled. Typically, snorkel surveys are conducted weekly alternating between Rush and Pine creeks. To estimate spawning escapement, individual survey results are calculated and then averaged. A 10 percent tag loss is assumed in the estimate.

Proposed Schedule, Tasks and Effort:

Task	Schedule	Effort (person days)
Capture, mark and release premigrant bull trout at the head of Swift reservoir	10 May- 15 July	40
Conduct snorkel surveys in Rush and Pine creeks	1 Aug – 30 Sep	40
Conduct snorkel surveys in mainstem Lewis River (including Rush Creek hole) to enumerate bull trout	1 Aug – 30 Sep	12
Data Analysis (WDFW)	December	3
Total Effort = 95 person days		

**2. YALE TAILRACE SAMPLING AND TRANSPORTATION**

PacifiCorp, in cooperation with the WDFW, annually nets and transports bull trout from the Yale tailrace (Merwin Reservoir) to the mouth of Cougar Creek, a Yale reservoir tributary. A total of 114 bull trout have been captured at the Yale tailrace since the program began in 1995. Of these, 84 have been transferred to Cougar Creek (Yale reservoir).

To capture bull trout from the Yale tailwaters, monofilament gill nets (2.5 to 3 inch stretch), trammel nets and beach seines have all been used. Gill nets have proven to be the most effective and remain the method employed to date. Gill nets are tied to the powerhouse wall or shoreline areas and then stretched across the tailrace area using a powerboat. The nets are then allowed to sink to the bottom (about 30 feet). 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 before being pulled is 10 minutes. Upon capture of a bull trout, the fish is immediately freed of the net (usually by cutting the monofilament strands) and placed in a live well. Once biological information is gathered and a Floy® tag is inserted, the bull trout are placed in a flexible inner-tube partially filled with water. The tube is fastened closed on one end. A rope is tied to the other end, which allows hatchery crews on the powerhouse deck to hoist the bull trout out of the tailrace area and into hatchery trucks. The entire process, from capture to hatchery truck, takes only a few minutes. Bull trout placed into hatchery trucks are transported to Cougar Creek, whereby the tank water is tempered with Cougar Creek water to reduce stress on the bull trout. Bull trout are then released at the mouth of Cougar Creek.

Netting activities begin the first week of June and continue on a weekly basis until August 15. Frequency of visits may change due to capture efficiency or operational

constraints. For example, if no bull trout are captured on a particular week, researchers may skip a week to allow bull trout to again congregate in the tailwaters.

Netting days typically occur between the hours of 0800 and 1200; however generation schedules may cause netting activities to occur in the afternoon. During the time of fish collection, powerhouse generators are taken off-line to enable deployment of the nets. In years past researchers have netted for longer periods, however, capture efficiency drops substantially and very few if any fish are captured after about four hours of effort in the tailrace.

### Alternative Capture Methodology

At this time no method employed has been as feasible or efficient as gill nets in capturing bull trout from the Yale tailrace waters. Currently the Utility is pursuing the design of a floating upstream collector to trap and transport bull trout from the Yale tailrace. The upstream collector is currently in the design phase and will not be employed for the 2008 season.

Task	Schedule	Effort (person days)
Netting and Transportation of bull trout from the Yale tailrace to Yale reservoir	June 1 – Aug 15	44

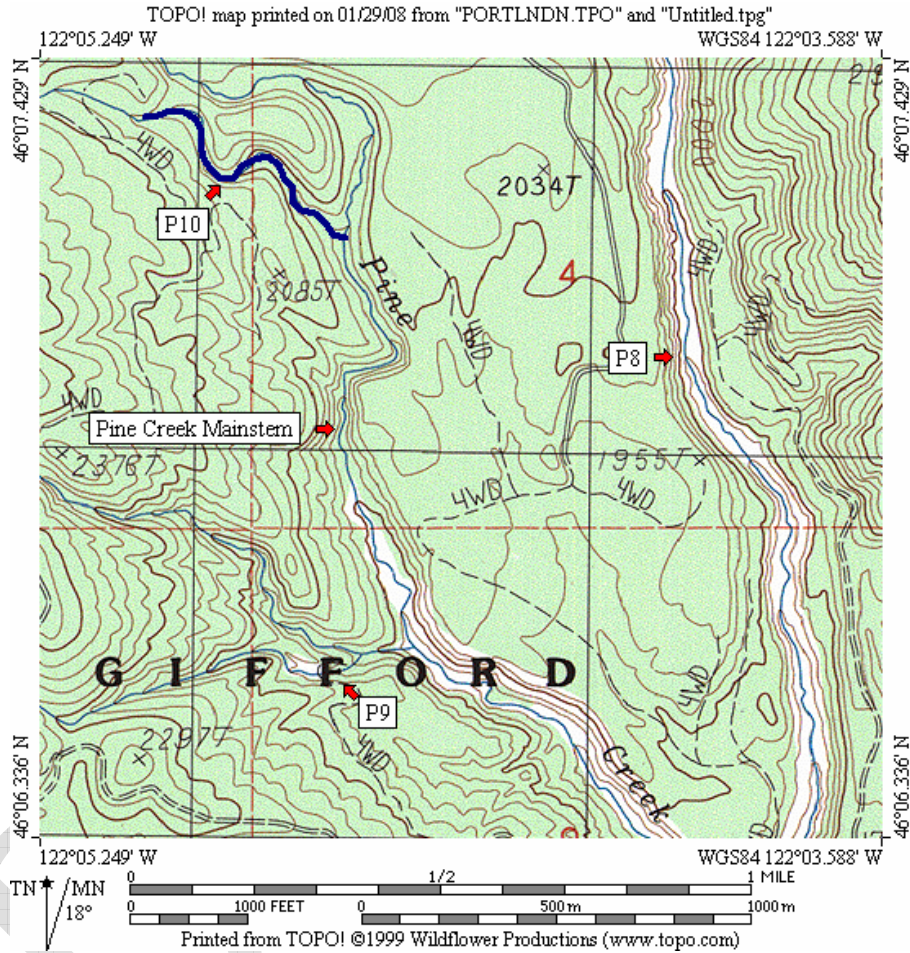
Total Effort = 44 person days

### **3. PINE CREEK TRIBUTARY P10 BULL TROUT PRESENCE-ABSENCE SURVEY**

In 2006, PacifiCorp and the WDFW surveyed P8, a tributary to Pine creek for the presence of juvenile bull trout. The initial survey observed one bull trout juvenile and due to this, the Utilities proposed in 2007 to sample other Pine Creek tributaries. Based on anadromous fish barrier surveys performed for the Utilities in 2000 the other Pine Creek tributaries thought to hold suitable habitat were P1, P3, P7, and P10. Shortly after scheduling sampling activities on these tributaries it was found that a juvenile bull trout had previously been captured in tributary P7 by the WDFW in 2006. Sampling activities on this stream were then cancelled. Survey activities went forward on P1 and P3 and they were sampled in 2007. Results of the P1 and P3 stream surveys can be found in the Utilities 2007 Annual Bull Trout Report submitted to the FERC in March of 2007. Unfortunately, due to logistical difficulties stream P10 was not surveyed.

In 2008 PacifiCorp proposes to finish sampling activities on Pine Creek tributary P10 (Map 3.0-1). The stream will be electrofished from its confluence with Pine Creek mainstem to its anadromous fish barrier for the presence of juvenile bull trout (stipulated at being 450 meters up from the stream mouth, based on anadromous fish barrier surveys conducted in 2000 in conjunction with PacifiCorp and Cowlitz County PUD's 2001

Technical Study Status Reports for the Lewis River Hydroelectric Projects). Other fish species encountered will be enumerated, documented and returned to the stream. Sampling will terminate if and when a bull trout juvenile is encountered. The use of electrofishing equipment will follow protocols as set forth by the USFWS and the WDFW.



**Map 3.0-1: Proposed survey site of Pine Creek tributary P10.**

If bull trout abundance proves significant in this tributary, future habitat enhancement efforts may be focused on this stream.

Task	Schedule	Effort (person days)
Survey of Pine Creek tributary P10	Late June or early July	3



#### 4. SWIFT CREEK PRESENCE/ABSENCE SURVEYS

In August and September of 2006 and in June through October of 2007 bull trout were observed in Swift Creek and Swift Creek Cove. Though bull trout are present in Swift Creek, the extent of their use of this stream is still not fully understood. Temperature data shows the water to be cold (7° C in August) and based on past surveys, forage is abundant. The presence of bull trout during spawn time (September-October) indicates this stream may not only be used as refugia but as spawning habitat as well. As part of the continued goal to find an additional local bull trout population, the Utilities propose electrofishing the margins and performing several snorkel surveys of Swift Creek for bull trout.

The stream margins will be electrofished one time in July from the stream mouth up to the anadromous fish barrier. The survey will be single-pass and will follow all electrofishing protocols as stipulated by the USFWS and the WDFW. Several surveys in the past were not finished due to safety concerns from the high flow and volatile nature of Swift Creek, therefore surveys will only be done flows permitting. All bull trout captured will be fin-clipped for genetic material to be analyzed at a later date and compared to genetic material from the Pine and Rush Creek populations.

Several snorkel surveys of Swift Creek and Swift Creek Cove will also be done to document the presence of bull trout within the cove and stream. While snorkeling care will be taken to identify any Floy® tagged fish.

Task	Schedule	Effort (person days)
Electrofishing stream margins for juvenile bull trout	July-August	3
Snorkel surveys	August - September	6
Total effort = 9 person days		

#### 5. SWIFT RESERVOIR RAINBOW TROUT STOMACH ANALYSIS

In 2006, the WDFW began planting 'jumbo' trout (2-3 fish per pound) into Swift reservoir to try and combat the poor over-wintering success of previously planted rainbow trout fry (*Oncorhynchus mykiss*). The survival success of these "jumbo" trout and their increased presence in creel surveys in 2006 and 2007 means the WDFW will continue the "jumbo" plants in 2008. The total poundage of fish released into Swift reservoir (20,000 lbs.) will not change from 2007 to 2008.

The rainbow trout stomach analysis evaluation is ongoing from 2006 and its primary purpose is to determine if the larger planted rainbow trout are foraging on juvenile bull trout. Researchers propose using two sampling methods: First, stomach samples will be taken from angler creels obtained during opening day, and second, biologists will lavage non targa rainbow trout captured during annual bull trout collection activities at the headwaters of Swift reservoir in May and June. All samples will be stored in ethanol

filled vials for analysis. Each vial will be numbered and identified by size of fish sampled, species, location and date. PacifiCorp biologists will perform analysis on stomach samples.

Task	Schedule	Effort (person days)
Collection of stomach contents from rainbow trout	April – June	11
Analysis and documentation	November	7
Total Effort = 18 person days		

## 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 (*Oncorhynchus nerka*) in Cougar Creek. Along with the kokanee counts, bull trout spawners are also counted, as their spawn time overlaps with that of kokanee. Foot surveys are used to visually count kokanee and bull trout. Surveys are performed by two biologists, each enumerating the number of kokanee and bull trout on one half of the creek. The entire length of Cougar Creek is surveyed – a distance of about 1.5 miles. All bull trout are observed for tags to identify bull trout transported from the Yale tailrace or bull trout tagged during Swift Bypass Reach sampling activities. Bull trout population estimates have ranged from 0 to 40 fish. This variability is due in part to sampling error, but is also indicative of low run size. Results of Cougar Creek kokanee surveys are reported annually and provided to the WDFW.

Sampling in 2008 will be consistent with sampling efforts seen in 2007. Surveys will consist of weekly bull trout redd counts from September to November; or until no bull trout and no new redds are observed for two consecutive weeks. Bull trout will continue to be enumerated where seen, but the surveys will focus on locating redds. Redds will be mapped using a GPS and flagged until no longer visible to avoid double counts. Along with a more accurate population estimate these surveys will also give a better understanding of preferred spawning habitat within the stream. Four snorkel surveys of Cougar Creek will also be conducted; additional surveys may be completed by the WDFW. Past snorkel surveys have shown to be helpful in documenting the presence of juvenile and adult bull trout.

In addition to redd and snorkel surveys, underwater video will also be used to document bull trout passage. 2007 marked the first time this methodology was used within Cougar Creek. Based on the initial effectiveness, underwater video will continue in 2008 with several slight modifications. The first modification will be the use of color instead of a black and white camera. The use of a color camera will enable the recognition of different colored Floy® tags (e.g., indicating bull trout from the Yale tailrace or the Swift Bypass Reach sampling activities). Color video will also facilitate recognition of bull trout among large groups of kokanee. That is, bull trout will be easily distinguishable

among the crimson colored kokanee schools.

The second and most significant modification will be the construction of a partial directional weir within the creek. The partial weir will consist of an ecology block with two picket fences leading from an angle to the shore. The angle of the picket fence will divert both upstream and downstream migrants to the color video camera. This will enable the underwater video camera to get a closer and clearer picture of all fish that migrate upstream (or downstream). All appropriate permits for doing instream work will be obtained prior to construction of the temporary weir.

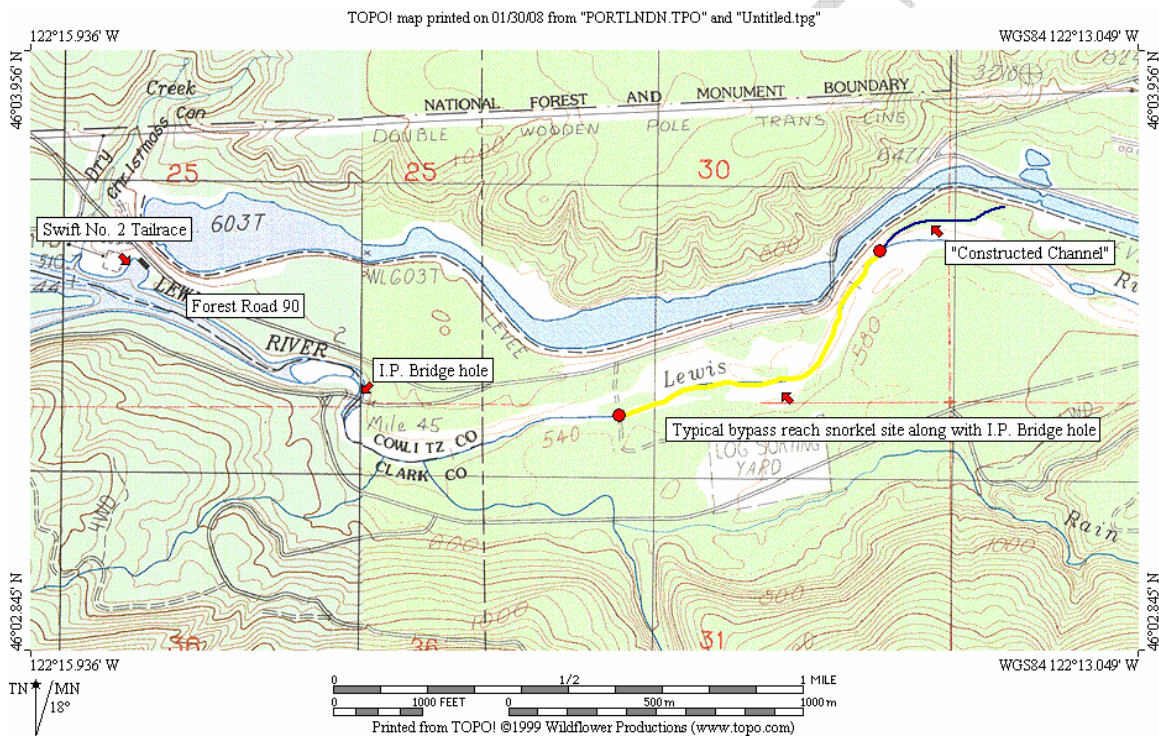
Task	Schedule	Effort (person days)
Preliminary survey to identify and document migration barriers (debris survey)	July	2
Redd surveys of Cougar Creek (weekly)	Sep – Nov	16
Snorkel surveys(4)	Sep -- Nov	8
Additional surveys if “new redds” are present in the creek.	December	2
Installment and removal of weir	August, November	6
Installment and removal of Underwater video camera	September, November	4
Review/data analysis of video	November - December	10
Total Effort = 48 person days		

## 7. SWIFT BYPASS REACH SURVEYS

Water discharge from the Swift No. 1 project has been flowing into the bypass reach since May 2002. From 2002 through 2005, this water was shunted over the canal spillway and into the bypass reach. In 2006, the amount of water entering the bypass reach was limited to the amount of water passing through the canal drain and into the constructed channel. The presence of this cold water attracts bull trout (as well as other fish species) into the reach from Yale reservoir. Fish can also enter the bypass from either the canal wasteway or Swift No. 1 spillway. Snorkel, capture/mark, and electrofishing surveys of the Swift Bypass Reach are all proposed for 2008.

In 1999, PacifiCorp and the WDFW began netting the Swift No. 2 tailrace as part of Yale enhancement measures filed as part of the Yale license application with FERC in April 1999. However, due to the canal breach in May 2002 and low reservoir conditions, there was no netting at the Swift No. 2 powerhouse from 2001-2005; netting resumed in 2006. Due to the low capture numbers at Swift No. 2 (two fish in 1999 and zero since then) and the presence of multiple bull trout in the Swift Bypass Reach from July through October, Swift No. 2 tailrace netting was abandoned in 2007 in favor of capturing and marking fish from the Swift Bypass Reach.

Fifteen bull trout were captured and marked in 2007 during netting activities conducted in the I.P. Bridge hole (Map 7.0-1) within the Swift Bypass Reach. The Utilities propose sampling in 2008 of the I.P. Bridge hole consistent with efforts seen in 2007. Weekly or bi-weekly surveys (depending on catch rate) using a combination of gill nets, beach seines, and hook and line techniques will be conducted in July and August of the I.P. Bridge hole within the Swift Bypass Reach. Captured bull trout will be returned to the point of initial capture after the recording of biological information and marking with a uniquely colored Floy® tag. This will allow recognition of these fish if encountered anywhere within the system.



**Map 7.0-1 Area map showing location of survey sites within the Swift Bypass Reach.**

In 2007, PacifiCorp, along with biologists from the WDFW identified numerous bull trout in the Swift bypass reach and side channels on four separate snorkel surveys. PacifiCorp will continue these efforts in 2008 to document fish use in the Swift bypass reach and lower release channel. Snorkel surveys will commence at the lower release channel inlet and continue downstream to the “International Paper” (IP) bridge crossing (Map 7.0-1). Other species identified included: rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarkii*), large-scale suckers (*Catostomus macrocheilus*), sculpins (*Cottid spp.*), three-spine stickleback (*Gasterosteus aculeatus*), mountain whitefish (*Prosopium williamsoni*), kokanee (*Oncorhynchus nerka*) and brook trout (*Salvelinus fontinalis*). The WDFW may conduct additional surveys (than those proposed below) of the reach. The primary purpose of snorkel surveys will be to document bull trout presence and distribution, as well as enumerate any Floy® tagged fish in the lower release channel and Swift Bypass Reach.

In 2007 one single pass, depletion, mark/recapture electrofishing survey of the lower release channel (Map 7.0-1) was performed to get a total population estimate of 1+ fish within the stream prior to habitat restoration work scheduled to be performed in 2009. To add to this baseline information, one more single pass depletion, mark/recapture electrofishing survey is proposed for 2008. These population estimates will be used as a comparison to future population estimates of the lower release channel after restoration work has been completed. Additional electrofishing surveys will occur only if flows are reduced in the lower release channel due to maintenance activities.

Task	Schedule	Effort (person days)
Netting of I.P. Bridge hole	September - August	16
Snorkel survey of bypass reach and lower release channel	August - October	15
Electrofishing survey of lower release channel	July - August	4
Total Effort = 35 person days		