

Revised Study Plan
Boundary Hydroelectric Project (FERC No. 2144)

Study No. 13
Recreational Fishery Study

Seattle City Light

February 2007

TABLE OF CONTENTS

1.0 Introduction.....1

2.0 Study Plan Elements.....1

 2.1. Nexus Between Project Operations and Effects on Resources.....1

 2.2. Agency Resource Management Goals.....1

 2.3. Study Goals and Objectives.....2

 2.4. Need for Study.....2

 2.5. Detailed Description of Study.....4

 2.6. Consistency with Generally Accepted Scientific Practice.....14

 2.7. Consultation with Agencies, Tribes, and Other Stakeholders.....14

 2.8. Progress Reports, Information Sharing, and Technical Review.....15

 2.9. Anticipated Level of Effort and Cost.....15

3.0 Literature Cited17

List of Tables

Table 2.5-1. Schedule for completing the Recreational Creel and Angler Surveys..... 7

Table 2.5-2. Schedule for completing the Triploid Trout Biotelemetry investigation..... 11

Table 2.5-3. Schedule for completing the Triploid Trout Management study component..... 13

[This page intentionally left blank.]

Study No. 13 – Recreational Fishery Study

1.0 INTRODUCTION

Recreational fishing (boat and bank) is one of the activities enjoyed at the Boundary Project (Project). Information on the current level of recreational fishing activity in the Project reservoir is sparse, and additional information is needed to characterize recreational fishing resources and demand for recreational fishing opportunities at the Project. During electrofishing and gillnetting surveys of fish populations in Boundary Reservoir in 2000, over 60 percent of the fish captured were either northern pikeminnow or largescale suckers (McLellan 2001), both species of which are typically not considered to be popular sport fish. Sterile triploid trout have been planted at the Project to increase sport fishing harvest while minimizing the risk of hybridization with native species. Planting triploid trout as part of a recreational fish planting program can help balance the demands for both consumptive fishing opportunities and conservation of native stocks. Information on the distribution and abundance of sport fish species will be developed through the Fish Distribution, Timing and Abundance Study (described in Attachment 2, Study No. 9 of this RSP). The Recreational Fishery Study is designed to obtain information about the level of effort and harvest in the recreational fishery and the level of angler satisfaction.

2.0 STUDY PLAN ELEMENTS

2.1. Nexus Between Project Operations and Effects on Resources

Boundary Project operations may affect recreational fishing opportunities by altering aquatic habitats that support the distribution and diversity of fish species. Pool level fluctuations as part of Project operations may also affect recreational user access to the reservoir by changing conditions at boat ramps available to the public. Currently, Seattle City Light (SCL) voluntarily contributes to the recreational sport fishery through the purchase and release of triploid rainbow trout in Boundary Reservoir. In addition, SCL voluntarily holds the reservoir pool level within the top 10 feet (1,980 feet NGVD 29 [1,984 NAVD 88]) during the summer recreation season so that boat ramps are accessible during much of the day. This study examines the post-stocking distribution of triploid trout, harvest level, and potential interactions of triploid rainbow trout and native salmonids.

2.2. Agency Resource Management Goals

A broad set of agency management goals are provided in the Mainstem Aquatic Habitat Modeling Study plan (see Attachment 2, Study No. 7). In regards to fisheries for the Colville National Forest, one of the Forest Management goals is to “Provide a diversity of high quality aquatic habitats which insures viable populations of fish in sufficient numbers to meet angler demands” (USFS 1988). The Colville National Forest Land and Resource Management Plan (USFS 1988) states that trout are to be used as the management indicator species for aquatic habitat, in part because they are a species commonly fished. Colville National Forest standards and guidelines (USFS 1988) include: “Emphasize management of native fish species habitat. Non-native species may be managed for in waters where they can be expected to provide at least

15 percent more biomass production or 15 percent more angler days recreation than native species. Non-native species may be used to provide diversity only where they will not adversely affect native fish or other native organisms in the affected or adjacent waters.”

The overarching goal of the bull trout and Dolly Varden management plan by the Washington Department of Fish and Wildlife (WDFW 2000) is “To restore/maintain the health and diversity of bull trout and Dolly Varden stocks and their habitats to/at self-sustaining levels that would allow recreational utilization within resource protection guidelines.” As part of the joint Washington Department of Fish and Wildlife (WDFW)/Tribal Wild Salmonid Policy (WDFW and WWTT 1997), the overarching goal is “to protect, restore, and enhance the productivity, production, and diversity of wild salmonids and their ecosystems to sustain ceremonial, subsistence, commercial, and recreational fisheries, non-consumptive fish benefits, and other related cultural and ecological values.”

2.3. Study Goals and Objectives

The goal of this study is to obtain information regarding the recreational fishery that can aid SCL and relicensing participants in understanding the effects of the Boundary Project on recreational fisheries, potential interactions between planted fish and native salmonids, and determine if opportunities to enhance the triploid trout program are considered desirable and appropriate. The study objectives are to: 1) conduct recreational creel surveys (creel survey and angler survey components) that identify current recreational fishing activity and success rates (boat and bank) on the reservoir; 2) determine angler opinions and values regarding maintaining or improving recreational fishing opportunities in the future at Boundary Reservoir, addressing both native salmonids and non-salmonids; 3) use biotelemetry to identify movements of newly released and carry-over triploid rainbow trout in Boundary Reservoir; 4) evaluate habitat-use characteristics of triploid rainbow trout; 5) identify potential positive and negative effects of the triploid trout stocking program; and 6) evaluate stocked triploid trout patterns of dispersal, growth, survival, and susceptibility to angling.

2.4. Need for Study

Summary of Existing Information

Boundary Reservoir currently supports a recreational fishery that targets planted triploid rainbow trout and naturally reproducing populations of non-native warm and cool water species such as smallmouth bass and yellow perch. However, most of the fish in Boundary Reservoir are non-sport species, and during a baseline fisheries assessment in 2000 less than 9 percent were found to be trout or bass (McLellan 2001).

Access to Boundary Reservoir for recreational fishing occurs primarily from three boat ramps. SCL operates one boat ramp located at the Forebay Recreation Area in the Forebay Reach (the reach from Boundary Dam to Z Canyon). Other boat ramps are located at Metaline Waterfront Park (operated by the Town of Metaline) and near Box Canyon Dam at Campbell Park (operated by the Pend Oreille County Public Utility District [PUD]). Creel surveys are a useful method for understanding what species and how many fish are being captured in the sport fishery and where sport fishing effort is expended. During the summer of 1997, creel surveys indicated the Upper

Reservoir Reach (the reach from Metaline Falls to Box Canyon Dam) was the most heavily fished area of the reservoir (R2 Resource Consultants 1998). Over 92 percent of the fishing effort in Boundary Reservoir was expended in the Upper Reservoir Reach on the 17 days surveyed over a 6-week period. Northern pikeminnow were the most commonly caught sport fish (1.4 fish per hour) in the 1997 summer recreational fishery, although northern pikeminnow are not considered a popular catch. Rainbow trout were the second most commonly captured fish in the recreational fishery (less than 0.1 fish per hour), but at a much lower frequency than northern pikeminnow. Excluding northern pikeminnow, combined sport fish catch rates in the Upper Reservoir Reach during the summer of 1997 were less than 0.2 sport fish per hour (1.2 sport fish per angler) (R2 Resource Consultants 1998). In contrast, creel surveys at Box Canyon Reservoir between 1948 and 1969 yielded an average of approximately 3.5 sport fish per angler hour (FERC 2004). No information is available on whether northern pikeminnow were killed and discarded, kept, or released unharmed after capture. Presumably, most legal-sized trout were retained by anglers, but records for triploid trout suggest that some anglers release a substantial number of captured triploid trout (Solonsky 2005).

Trout have been stocked into the Pend Oreille River by the WDFW on a periodic basis since 1946, but the available stocking records do not always specify whether releases occurred in Box Canyon Reservoir or Boundary Reservoir or where in the reservoirs the stocking occurred (McLellan 2001). Extensive stocking of rainbow trout occurred in 1946, 1947, and 1951 (77,000 to 1.9 million per year), but then ceased until 1989. Smaller releases occurred in 1989 and 1991–1993. Beginning in 1995, fingerlings were reared in net pens to a catchable size before release. Most of these releases occurred in Box Canyon Reservoir, but 15,000 fish were planted in Boundary Reservoir near Boundary Dam in 1998 (McLellan 2001). With the exception of 600 eastern brook trout released into the Pend Oreille River in 1999, all fish plants have been rainbow trout.

In addition to plantings by WDFW, since 2001 SCL has sponsored the stocking of triploid rainbow trout into Boundary Reservoir (Solonsky 2005). Triploid rainbow trout are sterile but have higher growth rates than diploid trout because little to no energy is utilized for reproductive processes. Triploid trout provide a benefit to the recreational fishery, but do not pose a threat to the genetic integrity of naturally spawning trout populations. Stocking of triploid trout into Boundary Reservoir has generally occurred during the spring (March) or fall (October or November) and has ranged from 450 to 6,300 triploid rainbow trout per year (Solonsky 2005).

Since 2002, the two-day annual springtime Bassin' Assassin Derby, hosted by the Western Star Bar and Grill (in Metaline), has been held in Boundary Reservoir. Only smallmouth bass are counted in the derby. Participants may each weigh-in as many smallmouth bass as they want on both days, but only their largest fish for the day counts. Cash prize winners are the top three anglers with the largest combined weight of their largest fish on both days.

During 2006, SCL took advantage of the event to collect information on recreational fishing. A questionnaire was developed for the derby, and SCL staff interviewed 59 anglers from 24 boats. A total of 135 anglers entered the derby, and 55 fish were weighed-in over the two-day event. The size of smallmouth bass ranged from less than 1 pound to 4.1 pounds. Based on reported size at age (Wydoski and Whitney 2003), 23 of the fish were at least six years old. Anglers

reported catching 93 smallmouth bass during the derby. Fish lengths were available for 54 of the smallmouth bass weighed-in at the derby. Based upon length categories in Anderson and Neuman (1996), 1 fish (2 percent of measured submitted fish) would have been considered trophy-sized, 19 memorable (35 percent), 17 preferred (32 percent), and 14 (26 percent) quality-sized fish. Anglers reported catching several other species, including largemouth bass, walleye, triploid rainbow trout, whitefish, northern pikeminnow, peamouth, and sucker. River flows through the reservoir were relatively high during the derby (in the range of 50,000 cfs), so reservoir velocities were relatively high and, according to anglers, fishing was difficult. Mean catch rate was about 0.2 smallmouth bass per angler per hour based on interviews. A common comment by anglers was that high currents and the lack of a dock at the Metaline Waterfront Park boat ramp made access challenging for the derby.

Need for Additional Information

Little existing information is available to discern the level of satisfaction by anglers for fishing in Boundary Reservoir or the desirability for expanded fishing opportunities (i.e., increased abundance of specific sport fish species). In some cases, the desire of the recreational angling community for harvestable fish stocks may be in conflict with some state and federal fish management objectives which, in part, may be in response to recovery efforts for ESA-listed species.

2.5. Detailed Description of Study

This study includes three components: Recreational Creel and Angler Surveys, Triploid Trout Biotelemetry, and Triploid Trout Management. Each of these components is described in more detail below, under Description of Study Components.

Study Area

The study area for all three study components is Boundary Reservoir from Boundary Dam to Box Canyon Dam (Refer to section 1.3 of the Proposed Study Plan [PSP; SCL 2006b] for a description of the Boundary Project location, facilities, and reservoir.). Sampling will occur along selected sections of the shoreline (to be coordinated with relicensing participants) and at the three boat launch areas. Information on recreational fishing in Boundary Reservoir tributary streams will be collected as part of the fishing surveys, but the primary focus of this study will be Boundary Reservoir. Roving boat surveys are not anticipated in this study.

Description of Study Components

Recreational Creel and Angler Surveys

Proposed Methodology

The proposed study component includes both creel and angler surveys. The methodology assumes that responses from anglers surveyed are representative of all boat and bank anglers that fish Boundary Reservoir during the survey period.

This study component includes four tasks, as described below.

Task 1) Creel Survey

Coordinate with the Boundary Project relicensing Recreation, Land Use, Aesthetics and Socioeconomics (RLAS) Workgroup in the design of creel survey questions and appropriate methodology to estimate the spatial and temporal level of effort, catch rate (i.e., kept or released), and harvest rate (i.e., fish kept) during the 2007 and 2008 recreational fishery seasons at Boundary Reservoir and its tributaries. Identify target species sought by anglers. Fishing effort and catch rates will be estimated for the Upper Reservoir, Canyon, and Forebay reaches plus reservoir tributaries. Surveys will primarily involve angler interviews at boat ramp access points, but will also include interviews with bank anglers.

Task 2) Tagged Fish Reward Program

In coordination with the Fish Distribution, Timing and Abundance Study (Study No. 9), and Triploid Rainbow Trout Management and Biotelemetry elements of this study, implement a reward program for the reporting of tagged fish by recreational anglers. Brochures and signs detailing the information desired and preferred release of tagged fish will be developed and distributed in areas frequented by recreational anglers potentially fishing Boundary Reservoir.

Task 3) Angler Survey

Coordinate with the Boundary Project relicensing RLAS Workgroup in the design of angler survey questions and appropriate methodology to collect information on the human dimension of recreational fishing at Boundary Reservoir. This survey component will be designed to estimate angler values and opinions regarding:

- potential reduction, maintenance, or enhancement of the triploid rainbow trout stocking in Boundary Reservoir;
- potential reduction, maintenance, or enhancement of non-native sport fish (especially smallmouth bass, largemouth bass, and yellow perch) in Boundary Reservoir sport fishery;
- potential opportunities to catch native trout and less popular native fish, such as northern pikeminnow and mountain whitefish in the sport fishery;
- potential reservoir pool level fluctuations and boat ramp access under alternative Project operational scenarios;
- potential future fishery management goals at Boundary Reservoir; and
- concerns about exotic macrophyte distribution and density.

Additional information will also be collected from angler survey participants including their origin, party size, watercraft type, where they launched their boat, do they go bank fishing, other activities enjoyed while in the Project area, where they are staying the night, other alternative fishing locations compared to the Project, and perceptions of crowding or conflicts encountered.

Depending upon the complexity or length of angler survey questions and its methodology, this component of the overall Recreational Creel and Angler Surveys may be conducted separately or in combination with the creel survey component. If conducted separately, the angler survey component may be distributed as a follow-on, mail-in questionnaire to creel survey respondents, or questionnaires may be provided at kiosks located at the three public boat ramps on the reservoir. This angler survey component will be conducted during the 2007 recreational fishing season at Boundary Reservoir. Based on the results of the 2007 survey effort, this survey component may be continued during the 2008 recreational fishing season to increase the number of completed questionnaires.

Task 4) Smallmouth Bass Derby Monitoring

In coordination with the existing organized fishing derby at Boundary Reservoir, SCL will request that derby participants record their catch, effort, and approximate fishing location while at the reservoir. SCL will use this derby as an opportunity for public outreach to inform anglers about tagging and other fishery-related studies being conducted as part of relicensing and the need to recover tags from harvested fish or tag information from fish captured and released. SCL will distribute Task 3 survey questions during the derby and/or interview anglers.

Work Products

The work products for the Recreational Creel Surveys include the following:

- Tabular summaries and analysis of creel survey responses.
- Tabular summaries and analysis of angler survey responses.
- Tabular summaries and descriptions of the smallmouth bass derby monitoring.
- Interim and final study reports describing the methods and results of the study component.

Schedule

The schedule for completing the Recreational Creel and Angler Survey is provided in Table 2.5-1.

Table 2.5-1. Schedule for completing the Recreational Creel and Angler Surveys.

Activity	2007				2008				2009
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Technical Consultant study refinement									
Design of recreational creel survey components, questionnaires, and other public information material									
Conduct creel survey component		▲	▲▲	▲		▲	▲▲	▲	
Conduct angler survey component		▲	▲▲	▲			▲*▲	▲*▲	▲*
Fishing derby activities		▲▲					▲▲		
Prepare interim study report (first-year results)									●
Distribute interim study report									●
Meet with relicensing participants to review first year efforts and results and discuss plans for any second year efforts									●
Include interim study report in Initial Study Report (ISR) filed with FERC									●
Hold ISR meeting and file meeting summary with FERC									●
Prepare “draft” final study report									●
Distribute “draft” final study report for relicensing participant review									●
Meet with relicensing participants to review study efforts and results and “cross-over” study results									●
Include final study report in Updated Study Report (USR) filed with FERC									●
Hold USR meeting and file meeting summary with FERC									●

* Additional field sampling, if needed.

Triploid Trout Biotelemetry

Proposed Methodology

Biotelemetry is the proposed method to collect behavioral, habitat utilization, and periodicity information for triploid trout.

A number of assumptions, listed below, are associated with the use of the proposed methodology. If the following assumptions are false, the study may fail to meet one or more of its objectives or may require substantial changes to the methodology:

- Behavioral effects of fish tagging can be differentiated from behavioral effects of stocking stress and response to habitat fluctuations associated with Project operations. The behavior of newly-released triploid trout may be different from the behavior of carry-over triploid trout that have overwintered a year or more in the Boundary Reservoir area.
- Radio transmitters or combined acoustic and radio transmitters (CARTs) will be used to track triploid trout.¹
- A range of transmitter sizes and longevities (5 to 10 sec pulse interval) will be used depending upon fish size:²
 - 295 to 400 grams (approximately 325 to 360 mm in length)
 - Position only – 180 to 320 day tag life
 - 400 grams (approximately 360 mm in length) or larger
 - Position only – 265 to 400 day tag life
- Triploid trout will be available in the spring and fall as part of typical triploid trout stocking procedures. Carry-over triploid trout that have overwintered at least one year in the Boundary Reservoir area can be captured by fishing or as part of the Passive and Active Sampling component of the Fish Distribution, Timing, and Abundance Study (Study No. 9).
- An array of fixed directional and omnidirectional antennas/receivers will be available as part of the Biotelemetry component to the Fish Distribution, Timing, and Abundance Study (Study No. 9) to detect tagged fish at strategic locations within Boundary Reservoir. The number, type and location of receivers and other aspects of study design will be developed by the Technical Consultant in coordination with SCL and relicensing participants. For planning purposes, receiver coverage is expected to consist of the following locations³:
 - Upstream of Boundary Dam
 - Base of Peewee Falls
 - Pend Oreille River at the lower opening of the Canyon Reach
 - Pend Oreille River below Metaline Falls
 - Pend Oreille River above Metaline Falls
 - Pend Oreille River near the Box Canyon tailrace

¹ Fixed tracking locations will be installed with radio receiving equipment only. Field tests conducted during 2006 (Sisak and Nass 2007) indicated that ambient noise levels were too high for acoustic receiving equipment in the immediate forebay area and near the turbine outflow. However, acoustic biotelemetry can be advantageous if fish occupy deep water in other areas of the Project. Mobile tracking will have a combination of acoustic and radio receiving equipment to allow survey of both deepwater and shallow habitats if CART-tagged native trout are at large in the reservoir. Results from the 2007 field season will be used to determine if selected fixed locations should be supplemented with acoustic receiving equipment during 2008.

² Fish sizes, pulse intervals, and tag longevity ranges are approximate and subject to change depending upon the choice of vendor for biotelemetry equipment and transmitters.

³ The description of the biotelemetry receiving array has been modified to remain consistent with Study Plan No. 9 – Fish Distribution, Timing, and Abundance Study.

- Pend Oreille River near the mouths of Sweet Creek, Sullivan Creek, and Slate Creek
- During mobile tracking, the location of the tracking boats, when maneuvered close to the apparent tagged fish position, is presumed to be the tagged fish location.

The work effort for this study component has been divided into five tasks, as described below.

Task 1) Pre-stock Tagging

During each spring and fall of 2007 and 2008 implant radio tags into 10 triploid trout prior to release in the lower and upper reservoir areas (total 40 fish per year). Radio transmitters will be attached intraperitoneally using surgical techniques similar to those described by McLeod and Clayton (1997) and Brown et al. (1999). Each fish implanted with a radio tag will be identified with a numbered external tag that is visibly different from tags used to identify triploid trout to help anglers identify fish that have an implanted transmitter and should be reported and returned to the water.⁴

Task 2) Carry-over Tagging

In conjunction with the Fish Distribution, Timing, and Abundance Study (Study No. 9), capture 10 carry-over triploid trout that have overwintered in Boundary Reservoir in the upper and lower reservoir areas (total 20 fish per year) and implant CARTs with temperature and depth sensors into trout of sufficient size prior to release. CARTs will be attached intraperitoneally using surgical techniques, and each fish implanted with a CART will be identified with a numbered external tag to help anglers identify fish that have an implanted transmitter and should be reported and returned to the water.

Task 3) Fixed and Mobile Tracking

As part of the biotelemetry component of the Fish Distribution, Timing, and Abundance Study (Study No. 9), mobile tracking by boat during 2007 will occur approximately every other week, weather permitting, during April through October. Mobile tracking will include the use of acoustic receiving equipment when CART-tagged fish are suspected of being in areas too deep for detection by radio receiving equipment⁵. During November to March mobile tracking will occur once per month, weather permitting. Downloading and any required maintenance of fixed receivers will occur as part of tracking field trips. Monitoring will continue for a second year (2008), but the frequency may be scaled back if the results of this and other ongoing studies indicate little movement occurs during some months. Any change to sampling frequency will be developed in coordination with relicensing participants. During mobile tracking, GPS will be utilized to the extent adequate signals are available. Alternatively, tagged fish locations will be pinpointed on aerial photographs. Habitat information, utilizing underwater video, if necessary, will be collected at the location of tagged fish including water depth, velocity, temperature, substrate type, macrophyte density, and cover.

⁴ The description of proposed external tags has been modified to remain consistent with Study Plan No. 9 – Fish Distribution, Timing, and Abundance Study.

⁵ The description of mobile tracking techniques has been modified to remain consistent with the biotelemetry component of Study Plan No. 9 – Fish Distribution, Timing, and Abundance Study.

Task 4) Angler Outreach Program

Develop and implement an outreach program with local sport fishermen to recover transmitters and external tags attached to fish captured in the sport fishery.

Task 5) Data Analysis and Report Preparation

Evaluate the movement of newly released and carry-over triploid trout. Hourly operational information on Box Canyon Dam (flow) and Boundary Dam (flow and pool elevation) will be obtained. Conduct analyses to determine if spatial or temporal movement patterns of tagged triploid trout are correlated with Box Canyon and/or Boundary operations. Analyze and discuss overlaps in habitat utilization between triploid trout and native salmonids (bull trout, westslope cutthroat trout, and mountain whitefish). Use the information to evaluate triploid trout stocking strategies, including the number and size of planted fish.

Work Products

The work products for the Triploid Trout Biotelemetry Study component include the following:

- Tabular summary of tagged fish species, length, weight, tag size and number, tagging date, and release site.
- Tabular summary and GIS maps of tagged fish movements.
- Tabular and/or graphic summary of tagged fish habitat utilization.
- Interim and final study reports describing the methods and results of the study component.

Schedule

The schedule for completing the Triploid Trout Biotelemetry investigation is provided in Table 2.5-2.

Table 2.5-2. Schedule for completing the Triploid Trout Biotelemetry investigation.

Activity	2007				2008				2009
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Technical Consultant study refinement									
Install fixed receivers ¹	▲								
Monitor fish movements using fixed receivers ²									
Monthly mobile tracking ²		▲▲	▲▲	▲	▲	▲▲	▲▲	▲	
Prepare interim study report (first-year results)				●					
Distribute interim study report					●				
Meet with relicensing participants to review first year efforts and results and discuss plans for any second year efforts					●				
Include interim study report in Initial Study Report (ISR) filed with FERC					●				
Hold ISR meeting and file meeting summary with FERC					●				
Prepare “draft” final study report								●	
Distribute “draft” final study report for relicensing participant review								●	
Meet with relicensing participants to review study efforts and results and “cross-over” study results									●
Include final study report in Updated Study Report (USR) filed with FERC									●
Hold USR meeting and file meeting summary with FERC									●

1 Fixed receivers installed as part of biotelemetry component of the Fish Distribution, Timing, and Abundance Study (Study No. 9).

2 Timing and duration of fish tracking assumes that target species implanted with radio/acoustic tags are available for tracking.

Triploid Trout Management

Proposed Methodology

A number of assumptions, listed below, are associated with the use of the proposed methodology. If the following assumptions are false, the study may fail to meet one or more of its objectives or may require substantial changes to the methodology:

- In addition to the data collection efforts described below, this study will draw upon the results of the Triploid Trout Biotelemetry, the Recreational Creel Survey, and the Fish Distribution, Timing, and Abundance studies.

- The number and size of triploid trout to be stocked into Boundary Reservoir during 2007 and 2008 will be similar those stocked in 2006. During 2006, approximately 4,500 fish were stocked in March and 4,300 were stocked in November. During 2007 and 2008, the stocked fish will be split between two locations: near the Forebay Recreation Area boat ramp and near the Metaline Waterfront Park boat ramp.

This study component includes four tasks, as described below.

Task 1) External tagging

Prior to being stocked in Boundary Reservoir, a subsample of the fish to be released will be tagged using colored, numbered Floy, Petersen disc, or other external tags, but different from the external tags placed on fish used for biotelemetry studies. For planning purposes, it is assumed that at least 10 percent of the fish will be tagged, but the number of tagged fish may be adjusted based on early tag returns. For planning purposes it is assumed that triploid trout will be released from two locations (Upper Reservoir reach and Forebay reach) during three time-periods (Spring 2007, Fall 2007 and Spring 2008). Each tagged fish will be weighed and measured (total length) before release.

Task 2) Angler Outreach Program

In coordination with the Recreational Creel and Angler Surveys study, sport anglers will be encouraged to report the time, location and length of recaptured tagged fish through implementation of a reward program for the reporting of tagged fish. Brochures and signs detailing the information desired and preferred release of tagged fish will be developed and distributed in areas frequented by recreational anglers potentially fishing in Boundary Reservoir.

Task 3) Habitat Use

Analyze the spatial distribution patterns of triploid trout captures and compare habitat use information developed from the triploid trout and Fish Distribution, Timing, and Abundance biotelemetry studies. Describe potential spatial and temporal habitat overlaps between triploid trout and bull trout, cutthroat trout, and smallmouth bass.

Task 4) Demographics

Based upon tag returns, biotelemetry and other information, describe post-stocking movements of triploid trout and the growth, catch, and harvest of stocked triploid trout.

Task 5) Management Options

In combination with the available scientific literature, use the results of the external tagging, recreation creel survey, biotelemetry, and the reservoir fish distribution and abundance studies to develop a range of alternative triploid trout management options for Boundary Reservoir. Discussion will include the potential benefits and drawbacks of alternative strategies.

Work Products

The work products for the Triploid Trout Management Study components include the following:

- Tabular summary of externally-tagged triploid trout release and recovery locations and time between release and recapture.
- Text description comparing triploid trout habitat use to bull trout and cutthroat habitat use.
- Tabular summary and discussion of externally-tagged triploid trout growth, catch and harvest.
- Text description of triploid trout management options in the Boundary Reservoir.
- Interim and final study reports describing the study methods and results.

Schedule

The schedule for completing the Triploid Trout Management study component is provided in Table 2.5-3.

Table 2.5-3. Schedule for completing the Triploid Trout Management study component.

Activity	2007				2008				2009
	1 Q	2 Q	3 Q	4 Q	1 Q	2 Q	3 Q	4 Q	1 Q
Technical Consultant study refinement									
External Tag Triploid Trout	▲	▲▲		▲▲		▲▲			
External Tag Recovery									
Prepare interim study report (first-year results)				•					
Distribute interim study report					•				
Meet with relicensing participants to review first year efforts and results and discuss plans for any second year efforts					•				
Include interim study report in Initial Study Report (ISR) filed with FERC					•				
Hold ISR meeting and file meeting summary with FERC					•				
Prepare “draft” final study report								•	
Distribute “draft” final study report for relicensing participant review								•	
Meet with relicensing participants to review study efforts and results and “cross-over” study results								•	
Include final study report in Updated Study Report (USR) filed with FERC									•
Hold USR meeting and file meeting summary with FERC									•

2.6. Consistency with Generally Accepted Scientific Practice

Recreational Creel and Angler Surveys. Creel and angler surveys such as proposed in this study plan are a common sampling method used to understand the effects of sport fishing on fish populations and to understand the perspectives and desires of anglers (Malvestuto 1996; Knuth and McMullin 1996).

Triploid Trout Biotelemetry. Biotelemetry studies of native salmonids and other fish species have occurred as part of licensing studies for the Box Canyon Project (FERC No. 2042) (Pend Oreille County PUD 2000) and the Lower Clark Fork Projects (Noxon Rapids and Cabinet Gorge, FERC No. 2058) (Avista Corporation 2005, Weitkamp et al. 2003). Biotelemetry studies have also been recently completed at the federal Albeni Falls Project to evaluate the need and feasibility of providing passage at that project (Geist et al. 2004, Scholz et al. 2005). The Triploid Trout Biotelemetry component of this study proposal utilizes methods similar to those used at these nearby hydroelectric projects.

Triploid Trout Management. Externally tagging sport fish to monitor post-release movement and catch returns is a traditional method in fisheries science (Murphy and Willis 1996).

2.7. Consultation with Agencies, Tribes, and Other Stakeholders

Input regarding the Recreational Creel and Angler Survey and the Triploid Trout Management components to the Recreational Fishery study was provided by relicensing participants during a June 27, 2006, Fish and Aquatic Resources Workgroup meeting held in Metaline Falls, Washington. During this meeting, an outline for each of these study components was presented and discussed. Input from relicensing participants regarding the Triploid Trout Biotelemetry component was provided during an April 20, 2006, workgroup meeting held in Spokane, at which the outline for this study component was presented and discussed. The proposed study plan was developed from the outlines and relicensing participant comments. Comments provided by relicensing participants on the review outlines for this study plan are summarized in the PSP Attachment 4-1 (SCL 2006b) and can also be found in the workgroup meeting summaries (available on SCL's relicensing website (<http://www.seattle.gov/light/news/issues/bndryRelic/>)).

In its PAD/Scoping comment letter (USFWS 2006), the USFWS endorsed the Triploid Trout Biotelemetry and Recreational Creel Survey study outlines presented at the workgroup meetings. The USFWS noted that the results of the triploid trout study should describe both positive and negative aspects related to potential interactions with native species. The USFWS also noted a concern about the use of Floy tags as external markers for native salmonids. Because Floy tags will also be used for triploid trout, the USFWS noted that anglers may misidentify native salmonids which could lead to inadvertent take of protected species. SCL acknowledges the problem and has modified the study plans to consider the use of alternative types of external tags. As noted in the proposed study plan, details such as the color, size, and marking of external tags, if used, will be developed by species and coordinated with relicensing participants.

In its PAD/Scoping comment letter (USFS 2006), the USFS did not specifically reference the Triploid Trout Biotelemetry or Recreational Creel Survey study outlines, but did request a

Recreation Resource study. SCL's proposed Recreation Resource study plan is provided in Attachment 2, Study No. 21. In a follow-up conference call on September 8, 2006 (see PSP Attachment 4-1, SCL 2006b), USFS staff indicated that there was general agreement on the study plan outlines.

In a letter to SCL dated August 28, 2006 (see PSP Attachment 4-1, SCL 2006b), WDFW provided suggestions to improve the study, and cautioned about the expectations and applicability of the results to defining species interactions. In response, SCL incorporated WDFW's suggestions in the study plan and scaled back the stated study objectives.

Since filing the PSP with FERC on October 16, 2006, SCL has continued to work with relicensing participants on its proposed study plans, and field tests of biotelemetry equipment have been completed (Sisak and Nass 2007). Comments made during the November 15 study plan meeting and comments filed with FERC by the USFS (2007) support the Recreational Fishery Study plan proposed in the PSP. (Comments are summarized in Attachment 3 and consultation documentation is included in Attachment 4 of this RSP.) SCL has made minor modifications to the Recreational Fishery Study plan to reflect the results of Sisak and Nass (2007), to clarify specific aspects of the approach, and to provide consistency with other study plans. Additional specifics will be developed in early 2007 as the Technical Consultant finalizes the study implementation details in coordination with SCL and relicensing participants (Attachment 1, section 2.2 of this RSP).

2.8. Progress Reports, Information Sharing, and Technical Review

An interim study report describing survey methods and results of 2007 monitoring, and a final study report describing the methods and results of 2007 and 2008 survey efforts will be produced. Prior to release of the Initial and Updated Study Reports (which will include the results of this study), SCL will meet with relicensing participants to discuss the study results, as described in Attachment 1, section 2.3 of this RSP. Relicensing participants will also have opportunities to discuss and comment on the progress of the study during quarterly workgroup meetings and ad hoc subcommittee meetings, as needed.

2.9. Anticipated Level of Effort and Cost

Recreational Creel and Angler Surveys — Based on a review of study costs associated with similar efforts conducted at other hydropower projects, the estimated cost to implement the Recreational Creel and Angler Surveys at the Boundary Project ranges from \$100,000 to \$150,000; estimated study costs are subject to review and revision as additional implementation details are developed.

Triploid Trout Biotelemetry — Significant cost efficiencies for this study component are available since fixed and mobile tracking will be conducted as part of the Boundary Reservoir Biotelemetry component of the Fish Distribution, Timing and Abundance Study (Study No. 9). The total estimated cost of implementing the triploid trout biotelemetry study is expected to range from \$60,000 to \$80,000; estimated study costs are subject to review and revision as additional implementation details are developed.

Triploid Trout Management — Based on a review of study costs associated with similar efforts conducted at other hydropower projects, the estimated cost to implement at the Triploid Trout Management study component for the Boundary Project ranges from \$55,000 to \$85,000; estimated study costs are subject to review and revision as additional implementation details are developed.

3.0 LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 *in* Murphy, B. R. and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Avista Corp. 2005. The Clark Fork Project 2004 Annual Report. Implementation of PM&E Measures. Avista Corp. PO Box 3727, Spokane, WA 99220-3727.
- Brown, R.S., S.J. Cooke, W.G. Anderson, and R.S. McKinley. 1999. Evidence to challenge the “2% rule” for biotelemetry. *North American Journal of Fisheries Management*. 19:867-871.
- FERC (Federal Energy Regulatory Commission). 2004. Final Environmental Impact Statement, Box Canyon Hydroelectric Project, Washington and Idaho. Federal Energy Regulatory Commission.
- Geist, D.R., R.S. Brown, A.T. Scholz, and B. Nine. 2004. Movement and survival of radio-tagged bull trout near Albeni Falls Dam (Final Report). Prepared for the Department of the Army, Seattle District, Corps of Engineers, Battelle Pacific Northwest Division, Richland, WA and Eastern Washington University, Cheney, WA.
- Knuth, B. A. and S. L. McMullin. 1996. Measuring the human dimensions of recreational fisheries. Pages 651-684 *in* Murphy, B. R. and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Malvestuto, S. P. 1996. Sampling the recreational creel. Pages 591-624 *in* Murphy, B. R. and D.W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- McLellan, J.G. 2001. 2000 WDFW Annual Report for the Project, Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams. Part I. Baseline Assessment of Boundary Reservoir, Pend Oreille River, and its Tributaries. Report to Bonneville Power Administration, Contract No. 00004619, Project No. 199700400.
- McLeod, C.L. and T.B. Clayton. 1997. Use of radio telemetry to monitor movements and locate critical habitats for fluvial bull trout in the Athabasca River, Alberta. Pages 413-419 *in* W.C. Mackay, M.K. Brewin, and M. Monita (editors). Friends of the Bull Trout Conference Proceedings. Bull Trout Task Force (Alberta), Trout Unlimited Canada, Calgary.
- Pend Oreille County PUD No.1. 2000. Application for New License Box Canyon Hydroelectric Project FERC No. 2042. Public Utility District No.1 of Pend Oreille County.
- R2 Resource Consultants, Inc. 1998. Boundary Hydroelectric Project Bull Trout Field Investigations, Draft Data Report. R2 Resource Consultants, Inc.

- Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fish. Res. Bd. Can. Bull. 191. 382 pp.
- Scholz, A., H.J. McLellan, D.R. Geist, and R.S. Brown. 2005. Investigations of Migratory Bull Trout (*Salvelinus confluentus*) on Relation to Fish Passage at Albeni Falls Dam. Final Report prepared for US Dept. of the Army, Corps of Engineers, Seattle District. Contract No. DACW68-02-D-001.
- SCL (Seattle City Light). 2006a. Pre-Application Document for the Boundary Hydroelectric Project (FERC No. 2144). Seattle, Washington. May 2006. Available online at http://www.seattle.gov/light/news/issues/bndryRelic/br_document.asp
- SCL. 2006b. Proposed Study Plan for the Boundary Hydroelectric Project (FERC No. 2144). Seattle, Washington. October 2006. Available online at http://www.seattle.gov/light/news/issues/bndryRelic/br_document.asp
- Sisak, M. M. and Nass, B. L. 2007. An Assessment of Acoustic and Radio Telemetry Performance at Boundary Dam, WA. Final Report to Seattle City Light. Lotek Wireless, Inc. and LGL Limited. 61 pp.
- Solonsky, A. 2005. Triploid Stocking Data. Personal Communication. Seattle City Light.
- USFS (USDA Forest Service). 1988. Land and Resource Management Plan (Forest Plan), Colville National Forest. U.S.D.A., U.S. Forest Service. 240 p.
- USFS. 2006. Boundary Hydroelectric Project, FERC No. 2144-035, Response to Scoping Document 1, Comments on Pre-Application Document, and Study Requests. Colville National Forest. August 31, 2006.
- USFS. 2007. Boundary Hydroelectric Project, No. 2144-035, comments to Proposed Study Plan. Colville National Forest. Letter dated January 9, 2007.
- USFWS (U.S. Fish and Wildlife Service). 2006. Seattle City Light, Boundary Dam Relicensing (FERC No. 2144), Comments on Pre-Application Document, Study Proposals, and Scoping Document 1 (TAILS #14421-2006-FA-0012, File #503.0006). September 1, 2006.
- WDFW (Washington Department of Fish and Wildlife). 2000. Bull Trout and Dolly Varden Management Plan. Olympia, Washington. 19 pp.
- WDFW and WWTT (Washington Department of Fish and Wildlife and Western Washington Treaty Tribes). 1997. Final Joint WDFW/Tribal Wild Salmonid Policy. Internet URL: <http://wdfw.wa.gov/fish/wsp/joint/final/fwsptoc.htm>.

Weitkamp, D. E., R.D. Sullivan, T. S. Swant, and J. DosSantos. 2003. Behavior of resident fish relative to total dissolved gas supersaturation in the Lower Clark Fork River. Transactions of the American Fisheries Society: Vol. 132, No. 5, pp. 856-864. Doc

Wydoski, R. S. and R. R. Whitney. 2003. Inland Fishes of Washington. University of Washington Press. Seattle and London.

[This page intentionally left blank.]