



**EVALUATION OF PREDATION IMPACTS ON HABITAT  
PREPARATION PLAN (HPP) FISH PROGENY FROM STOCKED  
RESIDENT TROUT IN SWIFT RESERVOIR**

**HATCHERY & SUPPLEMENTATION PLAN SECTION 4.3.2**

**Study Plan**

***Swift Reservoir – 2010***

Swift No. 1 Hydroelectric Project (P-2111)

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## I. INTRODUCTION

The Lewis River Hatchery and Supplementation Plan (H&S Plan) submitted to the Federal Energy Regulatory Commission (FERC) on December 23, 2009, states in section 4.3.2:

*“Resident trout plants in Swift reservoir will be evaluated to determine impacts on reintroduced anadromous fish. The study will be undertaken during the last two years of the 5-year period when anadromous adults are released above Swift to increase nutrients, and prepare stream habitat for anadromous fish reintroduction.*

*A sampling program will be established to capture the stocked trout and examine their stomach contents. Examining fish captured by local anglers and through bull trout netting activities would likely be the preferred sampling method as it is relatively low cost. Estimates would be made of the number of each species consumed by the rainbow trout. These data would be used to determine the predation impacts these fish are having on each species consumed.”*

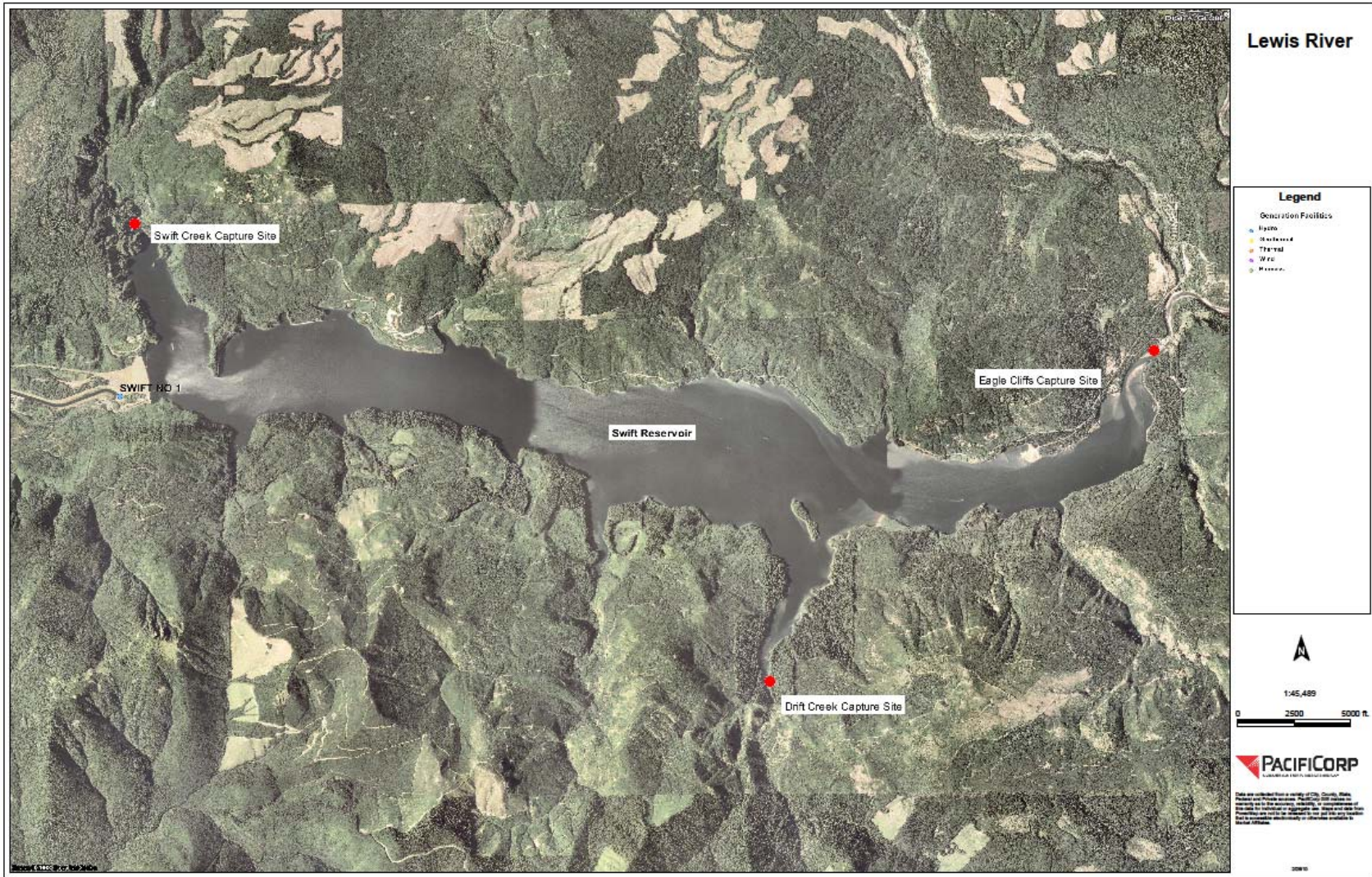
Section 4.3.2 of the H&S Plan specifically pertains to interactions between progeny from Habitat Preparation Plan anadromous fish and resident hatchery trout. HPP program anadromous fish adults have been released into Swift reservoir at the Swift Forest Camp boat launch since 2005. The goal of the HPP program is to prepare the habitat for full anadromous fish reintroduction through HPP adult fish tilling gravel during spawning events and providing nutrients in the form of carcasses after the fish expire. No monitoring of HPP fish is required after release into Swift reservoir. For specific information regarding the HPP program (including the total number of fish per specie stocked as well as date, time, and location of prior fish releases) please refer to the 2010 Habitat Preparation Plan Annual Report (PacifiCorp).

Similar studies documenting interactions between resident fish and reintroduced anadromous fish, specifically addressing Section 9.7 of the Lewis River Settlement Agreement (SA), will be conducted in the future after full anadromous fish reintroduction beginning in 2012. Methods, locations, time-frames and analysis of future interaction evaluations are included in the Monitoring and Evaluation Plan (M&E Plan) which is scheduled to be finalized June 26, 2010.

This Evaluation of Predation Impacts on Habitat Preparation Plan Fish Progeny from Resident Trout Plants in Swift Reservoir operating plan (Plan) will address methods, locations, time-frames and analysis from which this evaluation will occur.

## II. STUDY AREA

Interactions between hatchery planted rainbow trout (*Oncorhynchus mykiss*) and reintroduced anadromous fish juveniles from the HPP program will be evaluated in Swift reservoir (Figure 2.1) on the North Fork Lewis River located in Southwest Washington. Specifically, capture locations to document any predation of HPP fish progeny by hatchery planted rainbow trout within Swift reservoir will occur in three areas; 1.) near the Eagle Cliff area which is the confluence of the North Fork Lewis River with Swift reservoir, 2.) at the confluence of Drift Creek with Swift reservoir, and 3.) at the confluence of Swift Creek with Swift reservoir (Figure 2.1).



**Figure 2.1** Map of study area showing Swift Reservoir and proposed capture locations.

### III. METHODS

In 2006, the Washington Department of Fish and Wildlife (WDFW) began stocking 'catchable' size rainbow trout (3 fish per pound) into Swift reservoir in an effort to improve poor over-wintering survival of previously planted rainbow trout fry. The primary purpose of this Plan is to determine if the larger planted rainbow trout are foraging on juveniles from adult anadromous fish species planted in Swift reservoir as part of the HPP program. The stocking requirement for resident rainbow trout released into Swift reservoir is 20,000 pounds of fish.

To determine if hatchery rainbow trout are consuming HPP program fish progeny, PacifiCorp proposes using lavage sampling techniques. Hatchery rainbow trout (morphometrically differentiated from naturally produced rainbows by size, coloring, and physical condition of fins) will be captured from three sites in Swift reservoir. The Eagle Cliff sample site will coincide with annual bull trout collection activities and is located at the headwaters of Swift reservoir (Figure 2.1). In May-July 2010, bull trout will be captured for the annual upstream migration survey using variable mesh tangle nets. During this time, a by-catch of other species in the area includes hatchery rainbow trout. All or a sub-sample (depending on amount of catch and time) of by-catch hatchery rainbow trout collected during these activities will be lavaged and their stomach contents preserved for later analysis.

The second sample site is the confluence of Drift Creek with Swift reservoir (Figure 2.1). Rainbow trout are known to congregate in this area during the summer and fall months. This location will be sampled utilizing tangle nets and hook-and-line techniques, one day in July 2010, and one day in September 2010. All captured hatchery rainbow trout will be lavaged and their stomach contents preserved for later analysis.

The third sample site is located at the confluence of Swift Creek with Swift reservoir and the surrounding cove (Figure 2.1). High densities of rainbow trout are known to inhabit this area, especially in the months of July-September. Tangle nets and targeted hook-and-line methods will be employed one day in July 2010, and one day in September 2010, to capture holding rainbow trout. All captured hatchery rainbow trout will be lavaged and their stomach contents preserved for later analysis.

A wash down pump with adjustable flow and flexible tube nozzle will be used to lavage captured fish. The flexible, clear piece of vinyl tubing is six inches long and a quarter of an inch in diameter and is affixed to the end of the wash down nozzle. The tip section of the clear vinyl tubing will be gently inserted down the gullet of the fish and a weak pulse of water will be pumped into the fish's stomach to disgorge the contents. Stomach contents will be captured using a 500 micron sieve and then transferred to a vial filled with ethanol to be analyzed at a later date. Each vial will be numbered and identified by size of rainbow trout sampled, capture location, capture method, and date.

PacifiCorp biologists will perform analysis on stomach samples. The samples will be split into two groups based on method of capture (hook and line or tangle net) to see if a difference exists between the two methodologies percent of total stomachs containing fish. Analysis will consist of viewing the stomach samples under a dissecting microscope for the presence of fish or small

fish bones. To the extent practical, all consumed fish or fish bones will be identified to species. For reporting purposes, biologists will also need to estimate how many juvenile anadromous fish may have entered Swift reservoir that year. This total number of juvenile fish production will be based on number of adults released, sex ratio, and average species fecundity. This information will be acquired from Lewis River Hatchery staff. The total number of juvenile anadromous fish production will also be a best case scenario, as variables such as redd scour, non-viable eggs, and mortality from other sources is unknown at this time.

Based on the sub-sample of rainbow trout stomachs analyzed, what percent of juvenile anadromous fish that may have been consumed by hatchery rainbow trout will be estimated.

#### **IV. REPORTING**

A report summarizing results from the previous year will be included within the 2010 Lewis River Hatchery and Supplementation Plan Annual Report submitted to the FERC in the spring of 2011. At a minimum, the report will identify the number of hatchery rainbow trout lavaged by date and location, size of fish lavaged, and method of capture. Each fish will be an individual sample and data will be reported as number of fish per stomach as well as the percent of total of the captured rainbow trout whose stomach contents contained any fish or fish bones. This will provide a proportion that will be used to estimate the total percentage of juvenile anadromous fish consumed.

The amount of juvenile anadromous fish consumption by hatchery rainbow trout and how the information determines adaptive management practices is addressed in the H&S Plan section 4.3.2 which states:

*“In regard to anadromous fish, if the rainbow trout were consuming more than 3 percent of the total estimated number of juvenile anadromous fish of any species entering Swift reservoir, it is recommended the rainbow trout program be altered or eliminated. The 3 percent value should be considered a placeholder until reviewed by the ACC. It is expected the Services will provide a value as part of their review of the program”.*

## V. AGENCY COMMENTS

AGENCY	COMMENT	PACIFICORP RESPONSE
WDFW	<p>The third and fourth paragraphs of the Methods section describe how hatchery stocked trout will be captured for the purpose of determining stomach contents. These data will subsequently be used to estimate predation rates of hatchery stocked rainbow trout on naturally produced juvenile salmonids. One of the methods used to collect the hatchery stocked rainbow trout is hook-and-line, which has the potential to bias the results. Data analysis should include separate estimates of diet composition for fish collected using tangle net and hook-and-line to determine if a bias does or does not exist between sampling methodologies.</p>	<p>Agreed. Plan has been changed to reflect comment.</p>
WDFW	<p>The last paragraph under of the Methods section includes an estimate for number of juvenile anadromous fish that may have entered Swift Reservoir that year. Annual fecundity of female anadromous salmonids is a key piece of data that will be used produce this estimate, but it is not clear how fecundity will be estimated. The document should include a description of what methodology will be used to estimate fecundity of female anadromous salmonids.</p>	<p>Agreed. Plan has been changed to reflect comment.</p>
WDFW	<p>The final paragraph of the Methods section includes an estimate of percent of fish consumed by hatchery rainbow trout. The only paragraph of the Reporting section includes an estimate of the amount of juvenile anadromous fish consumed by hatchery stocked rainbow trout. There is not clear description of what level of precision will be associated with both of these estimates. Both estimates need to include and point estimate and the 95% confidence interval around the point estimate to verify the precision of these estimates. This precision information is especially important because these data will be used to make decisions regarding future management actions for the hatchery trout stocking program.</p>	<p>Plan has been changed and additional information concerning method used has been added. Given each fish is an individual sample, confidence intervals of 95% will not be used.</p>
WDFW	<p>In general this study focuses only on hatchery produced rainbow trout. It would be valuable to compare the predation rates of hatchery produced rainbow trout to predation rates from other naturally produced salmonids, included resident cutthroat trout and anadromous salmonids (e.g. coho salmon) alike. These data will assist in evaluating the possible risks the hatchery trout stocking program poses to anadromous production, in comparison to other predation mortality sources that also impact anadromous production.</p>	<p>The Hatchery and Supplementation Plan section 4.3.2 concerns only predation of HPP progeny fish by hatchery planted rainbow trout. Predation of reintroduced anadromous juveniles by all resident species is something that will be addressed by Annual Operation Plans (AOP) after full anadromous fish reintroduction in 2012.</p>