Final

Lewis River Hatchery and Supplementation Plan (FERC Project Nos. 935, 2071, 2111, 2213)

December 23, 2009

Prepared for:

PACIFICORP ENERGY AND COWLITZ PUD

by:

Jones & Stokes

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

This report describes the Hatchery and Supplementation Plan (H&S Plan) proposed by PacifiCorp Energy and Cowlitz County PUD for the Lewis River Hydroelectric Projects (FERC Nos. 935, 2071, 2111 and 2213). The H&S Plan is required under Section 8 of the Lewis River Hydroelectric Projects Settlement Agreement (Settlement Agreement) dated November 30, 2004.

The goals identified by the parties to the Settlement Agreement formed the basis for actions proposed in this plan. The Settlement Agreement states that the goals of the Hatchery and Supplementation Program are to support:

1. Self-sustaining, naturally producing, harvestable native anadromous salmonids species throughout their historical range in the North Fork Lewis River, and

2. The continued harvest of resident and native anadromous fish species.

The H&S Plan is designed to be consistent with the priority objective of recovering wild fish stocks in the basin to viable and harvestable levels. When selecting between actions deference will be given to those that provided the greatest benefit to the protection of wild fish populations.

Because the H&S Plan is to be updated every 5-years, this report focuses on the approach to be used for reintroducing anadromous fish into the area above Swift No. 1 Dam. Reintroduction efforts for Yale and Merwin are not scheduled until year 8 and 12 of the new license period, respectively.

As called for in the Settlement Agreement, the hatchery component of the H&S Plan incorporates the recommendations of the Hatchery Scientific Review Group (HSRG), and the Northwest Power and Conservation Council's (NPCC) Artificial Production Review and Evaluation (APRE) program. Both programs were mandated by Congress as a means to reform artificial production in the Pacific Northwest. The recommendations in these reports represent the regions current understanding of what constitutes best hatchery practices. The supplementation approach used in the plan was selected based on the results obtained as part of the Yakima River and Cowlitz River supplementation programs.

Other plans or documents relied on in the development of the H&S Plan include:

- Lewis River Fish Planning Document

- Miscellaneous Relicensing Studies

A summary of the major points, strategies and assumptions present in the plan are presented below:

HATCHERY AND NATURAL PRODUCTION TARGETS

The combined actions proposed in the H&S Plan are designed to achieve the hatchery and natural production targets shown in Table ES-1. The values in the table are referred to as adult ocean recruits, which include escapement to the habitat plus the number of fish caught in ocean and freshwater fisheries. It should be noted that most representatives of the Lewis River Aquatic Coordination Committee (ACC) favor not including jacks in the ocean recruits calculation.

Table ES-1. Hatchery targets and natural production adult threshold levels (adult ocean recruits) for spring Chinook, steelhead and coho.

	Spring Chinook	Steelhead	Coho	Total
Hatchery Targets	12,800	13,200	60,000	86,000
Natural Production Threshold	2,977	3,070	13,953	20,000
Grand Total	**15,777**	**16,270**	**73,953**	**106,000**

As natural production for each species exceeds the threshold level identified in Table ES-1, hatchery production levels for that species would be reduced on a 1:1 (one wild fish for one hatchery fish) basis. For example, when natural spring Chinook adult returns equal 3,977 fish (1,000 fish over threshold), the hatchery production target for this same species would be reduced by 1,000 adults to 11,800. The decision to adjust hatchery production would be made by the ACC every 5-years based on the results of the ocean recruits analysis. However, as called for in the Settlement Agreement, hatchery production targets would not be reduced below the "Hatchery Target Floor" levels shown in Table ES-2.

Table ES-2. Hatchery target floor levels for spring Chinook, steelhead and coho.

	Spring Chinook	Steelhead	Coho	Total
Hatchery Target Floor	2,679	2,763	12,558	18,000

HATCHERY JUVENILE PRODUCTION

As defined in the Settlement Agreement, the suggested number of hatchery juvenile fish to be released each year is shown in Table ES-3. However, as noted above, these numbers could be reduced if natural production exceeds threshold levels.

Table ES-3. Hatchery juvenile production targets for spring Chinook, steelhead and coho.

Smolt Production	Spring Chinook	Steelhead	Coho	Total
Years 1-3	1.35 million	275,000	1.8 million	3.425 million
Years 4-5	1.35 million	275,000	1.9 million	3.525 million
Years 6-50	1.35 million	275,000	2.0 million	3.625 million

The proposed number of juveniles to be released both upstream and downstream of Merwin Dam is shown in Table ES-4. The spring chinook juveniles released upstream of Merwin Dam would be used as part of the supplementation/reintroduction effort and to provide test specimens for evaluating juvenile collection facilities at Swift No. 1 Dam. Juveniles released downstream of Merwin Dam would provide adults for harvest, hatchery broodstock, and the fish needed for adult supplementation program. These numbers would be adjusted over time as more information is gathered regarding the effectiveness of both strategies.

Table ES-4. The number of hatchery juveniles released by species upstream and downstream of Merwin Dam (initial planning targets).

Smolt Production	Spring Chinook	Steelhead	Coho	Total
Downstream	1.25 million	275,000	1.8 million	3.275 million
Upstream	100,000	50,000*		150,000
Total	**1.35 million**	**325,000**	**1.8 million**	**3.425 million**

* The 50,000 late winter steelhead juveniles would be of wild origin and initially released below Merwin Dam.

For spring Chinook and Type S coho, existing hatchery broodstock will be used to produce juveniles needed for the supplementation program. For steelhead, wild late winter run fish collected at the Merwin Dam adult trapping facility or in lower river tributaries will provide the broodstock needed for the supplementation effort.

Initially, juveniles will be released at the sizes shown in Table ES-5. These sizes were selected because they are typical of wild smolts observed in other basins. Releasing fish at sizes and times that are more representative of wild populations is consistent with HSRG recommendations for hatchery programs attempting to reduce negative interactions with native fish populations as well as restoring natural production.

Table ES-5. Release size (fish/per/pound) of juvenile spring Chinook, coho, and steelhead released both upstream and downstream of Merwin Dam.

Smolt Production	Spring Chinook	Steelhead	Coho
Upstream	8-12*	No Releases	No Releases
Downstream	8-12	4.8-8	14-16

* Size released from acclimation sites will attempt to mimic the size of naturally produced spring Chinook outmigrants

Hatchery juveniles release size and timing may be altered once wild fish are captured at the Swift Dam juvenile collection facility starting in year 4.5 of the license. These wild fish would be used as the template for evaluating release size and timing for the basin.

SUPPLEMENTATION PROGRAM

The H&S Plan provides an approach to reintroduce spring Chinook, steelhead, and Type S coho into stream reaches upstream of Merwin Dam. Both adult and juvenile supplementation strategies will be used as the tools to jump start fish production in the Upper Lewis River. The source of the supplementation fish will either be from the Lewis

River hatchery complex (spring Chinook and Type S coho) or native fish from the lower Lewis River basin (late winter steelhead).

For spring Chinook and Type S coho, adult fish in excess of hatchery broodstock needs will be transported and released in river reaches upstream of Swift Dam as part of the Upper Lewis River adult supplementation strategy. In addition, 100,000 juvenile spring Chinook will be transported to acclimation ponds in the upper basin as part of a juvenile supplementation effort. The 100,000 juvenile spring Chinook were selected based on the assumed rearing capacity of the three acclimation facilities to be built upstream of Swift No. 1 Dam. A Type S coho juvenile supplementation program is not proposed as data collected in both the Lewis River and Cowlitz River indicate that an adult supplementation program would be more successful at restoring coho production.

The number of juveniles released upstream of Swift No.1 Dam has been set conservatively until such time as more is known about the collection efficiency of the Swift Dam juvenile collection system.

Up to 50 wild late winter steelhead adults would be needed each year for broodstock. The program would release up to 50,000 1+ smolts that would be uniquely marked, and released downstream of Merwin Dam. Upon their return as adults, they would be transported and released above Swift Dam, thus constituting the adult supplementation program. In essence, the late winter steelhead hatchery program would be run as an Integrated type as defined by the HSRG. This new steelhead program began with broodstock collection in 2009.

As spring Chinook, Type S coho, and steelhead populations become established in the upper basin, hatchery releases into this area would be reduced. This action would ensure that local adaptation for each species is driven by the natural not the hatchery environment. However, this action would not be considered for implementation until at least year 9 for Type S coho, and year 15 for spring Chinook and late winter steelhead.

All hatchery fish will be mass-marked to provide fishing opportunities while limiting exploitation rates on natural stocks. Late winter steelhead program fish will be marked with a blank wire tag in the adipose fin. Spring Chinook juveniles used for supplementation would be uniquely marked to be distinguishable from those of the lower river spring Chinook hatchery harvest program. In addition, the marking of the supplementation smolts will allow researchers to estimate their survival to collection facilities, and distinguish them from naturally produced spring Chinook smolts originating from the Upper Lewis River basin.

ARTIFICIAL PRODUCTION MANAGEMENT

The long-term objective (>15 years) for spring Chinook and coho (Type S) hatchery programs will be to operate these as an Integrated type as defined by the HSRG. The ratio of wild and hatchery origin fish used as broodstock, and released into the upper basin, would be tightly controlled. The primary goal of an Integrated hatchery program is to ensure that the natural environment and not the hatchery environment drive local adaptation.

Over the short-term (9 to 15-years) the existing spring Chinook and coho (Type S) hatchery programs would be run as Segregated programs. In other words, no wild fish would be used as hatchery broodstock. This approach results from the lack of local stocks adapted to stream conditions in the Upper Lewis River from which to integrate the existing program. After 3-5 generations of wild production, it is suggested that the hatchery programs be converted to Integrated consistent with HSRG guidelines.

The late winter steelhead hatchery program would be operated as an Integrated type from the start. Wild late winter steelhead from the lower Lewis River would be used as the broodstock source.

All native spring Chinook, coho and steelhead stocks produced at the Lewis River Hatchery Complex would eventually be reared to produce high quality smolts. A quality hatchery smolt is defined as a fish that is similar in health status, physiology, morphology, and behavior to a naturally produced smolt originating upstream of Merwin Dam.

Non-transported species (reference sec. 4.1.7 of SA) would be reared to produce a smolt that migrates rapidly from the basin and maximizes adult production and contribution to fisheries. This will be achieved by implementing volitional release strategies to the extent possible given the limitation of hatchery facilities, and releasing fish at sizes that result in high survival or reduced effects on native salmonids. If volitional release is determined infeasible, then gill ATPase and smolt condition data would be collected on a weekly basis in the spring to determine when smoltification has occurred, thus defining release time.

Hatchery Facilities

Hatchery rearing conditions will be modified through hatchery upgrades defined in Section and Schedule 8.7 of the Settlement Agreement. These upgrades will improve operational flexibility. Hatchery programming will be based on providing optimum rearing conditions for stocks regardless of current or historical rearing and release sites. Use of pond loading and agreed upon density and flow index guidelines, mating protocols that maximize genetic variability, and modification of hatchery structures to allow volitional migration to the extent possible will enable hatchery populations to develop the physiological, morphological, and behavioral traits important to long-term fitness. Hatchery production levels or rearing strategies will not exceed the current hatchery capacity limit to be defined as part of the hatchery remodel process.

Fish Marking

All hatchery spring Chinook, coho, winter and summer steelhead released below Merwin Dam will be marked by removing their adipose fin. The one exception being that the double-index group used for fish management would still possess their adipose fin. Juvenile fish captured at collection facilities at Swift No. 1 Dam (and eventually other projects) will be subsampled at a rate defined in the Monitoring and Evaluation Plan. Upon completion of Yale downstream collection facility, juveniles will be differentially marked with a Coded-Wire-Tag (or other tag type) located in the cheek, nose or any other

location recommended by the resource agencies. This will allow fish to be distinguished as to their collection location; Swift No. 1 Dam and Yale Dam. Note that when Merwin fish passage facilities are constructed, naturally produced fish would no longer need to be differentially marked, as fish will be able to return to their natal stream by using passage facilities at each project.

Juvenile wild late winter steelhead released in the Lower Lewis River below Merwin Dam will be marked so they could be identified upon their return to the basin as adults. These fish would retain their adipose fin so that anglers would release them if captured in freshwater fisheries.

Harvest

Because harvest management is the responsibility of the resource agencies, the H&S Plan can only make recommendations as to best harvest policy for the basin. These recommendations include:

1. Anglers should be required to release any fish caught that possessed an intact adipose fin.

2. No targeted harvest would be allowed on spring Chinook, coho or steelhead released into the upper basin (above Merwin Dam) unless it can be assured that escapement goals are met for that species, and potential harvest (bycatch) impacts to resident bull trout populations are effectively managed. The H&S plan proposes the following minimum adult escapement goals for the Upper Lewis River basin:

    a. Spring Chinook - 2,000 (plus 65 for supplementation)

    b. Type S-Coho - 9,000

    c. Wild Winter Steelhead – 500

Monitoring and Evaluation

Life history performance measures to determine program success and data collection on hatchery practices are identified in Section 4.3.5 and 4.3.6 of this plan. The consistency of these measures with HSRG guidelines will continue to be developed and modified as part of the annual operation plan for each species

Plan Updates

The H&S Plan would be updated every 5-years as called for in the Settlement Agreement. At each 5-year interval, an independent consultant would be hired to review the program and make recommendations to the ACC regarding possible changes.

ADAPTIVE MANAGEMENT

The Adaptive Management Plan (AMP) presented in the H&S plan describes some of the key decision points, needed studies, and suggests possible directions the ACC may take in adjusting the fisheries program over time as new data become available. The AMP is focused around identifying actions that would best meet the goals and objectives of the Settlement Agreement.

EXPECTED OUTCOMES

The All-H Analyzer (AHA) model used in the development of the H&S Plan uses current habitat productivity/capacity, anticipated harvest rates, and proposed hatchery operations and supplementation strategies to estimate the average number of adult salmon and steelhead caught in fisheries, and returning to the spawning grounds or the hatchery complex (HSRG 2004). Table ES-6 summarizes the expected outcomes of each proposed program based on the above assumptions expressed as average annual adult ocean recruits (Catch + Escapement Methodology). Assumptions will be tested and evaluated using actual return data. Hatchery and supplementation programs will be modified, within the constraints of the Settlement Agreement, to achieve hatchery and natural production targets.

Table ES-6. Expected outcomes of the Lewis River H&S Plan for all species of interest.

Program/Phase	Average Adult Ocean Recruits
Spring Chinook	
Supplementation Program	~1,500
Segregated Harvest Program	~7,600
Total	~9,100
Coho	
Type-S Supplementation Program	~6,900
Type-S Segregated Harvest Program	~19,700
Type-N Segregated Harvest Program	~21,000
Total	~47,600
Steelhead	
Late-winter Supplementation	~1,400
Winter Segregated Harvest Program	~1,800
Summer Segregated Harvest Program	~4,000
Total	~7,200

* Table ES-6 does not include fish production from Yale or Merwin. These programs will begin in years 8-12 from license issuance.

The adult numbers presented in Table ES-6 were calculated based on the average smolt-to-adult survival rates presented in the Lewis River Fish Planning Document, EDT analysis, and those provided by WDFW as part of comments to the Draft H&S Plan. It is anticipated that due to both freshwater and ocean variability, adult production would vary

upwards of 1,000 percent for some brood years. Adult production numbers would increase if the methodology used to calculate the ocean recruits value for each species were based on Adult Equivalents, as recommended in this report (See section 4.2).

The proposed resident rainbow trout and kokanee programs are expected to maintain the existing recreational fisheries in Swift reservoir and Lake Merwin; however, the potential adverse effects of these programs on reintroduced salmon and steelhead are unknown. A monitoring program is proposed to investigate impacts of the rainbow trout program on juvenile anadromous fish. In addition, monitoring of anadromous fish impacts on resident bull trout populations is also proposed

Inconsistencies with Settlement Agreement

The H&S Plan was structured to be consistent with the Settlement Agreement. However, although some actions and analyses proposed in the H&S Plan meet the intent of the Settlement Agreement, they may be considered inconsistent based on Settlement Agreement language. Examples include:

Definition of Ocean Recruits (Section 8.1 of Settlement Agreement): In the Settlement Agreement jacks should be accounted for in calculating ocean recruits. However, after discussion with members of the ACC, a decision was made to not include this life stage in either defining or calculating ocean recruits for each species in the H&S plan.

Juvenile Supplementation (Section 8.5 of Settlement Agreement): In the Settlement Agreement juvenile supplementation above Swift is an action for spring Chinook, steelhead, and coho. However within the H&S Plan, active juvenile supplementation is only proposed for spring Chinook and late winter steelhead. Coho supplementation will rely on surplus adults from the hatchery. Data collected on both the Lewis River and Cowlitz River show that adult coho releases produce a large number of juvenile offspring. Initial steelhead juvenile supplementation will not occur above Swift, but from Merwin hatchery below Merwin Dam. The steelhead program will use wild adults from the lower river as the broodstock. As offspring of these wild fish return to the Merwin or Lewis River collection facilities as adults, they will be transported upstream and released.

1.0 INTRODUCTION

The Settlement Agreement for the Lewis River Hydroelectric Projects dated November 30, 2004 (Settlement Agreement) includes a comprehensive suite of salmon and steelhead protection, mitigation, and enhancement measures that PacifiCorp Energy and Cowlitz PUD have agreed to implement over the terms of the new project licenses (PacifiCorp and Cowlitz PUD 2004a). A central, significant feature of this agreement involves the reintroduction of spring Chinook (*Oncorhynchus tshawytscha*), winter steelhead (*O. mykiss*), and coho (*O. kisutch*) into their historical range above Merwin Dam by means of hatchery supplementation[1] and newly constructed fish passage facilities.

The salmon and steelhead supplementation program will follow a phased approach, where Spring Chinook, winter steelhead, and coho will first be reintroduced into habitat above Swift Dam (within 6 months of the 3rd anniversary of Merwin license issuance), and then introduced into the habitat located between Merwin and Swift dams (following the 13th and 17th anniversaries of the new licenses), unless otherwise directed by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) (Figure 1-1 and Figure 1-2).

To address hatchery operations and supplementation during the terms of the new licenses, Section 8 of the Settlement Agreement provides for a Hatchery and Supplementation Program. The primary goal of the Hatchery and Supplementation Program (Figure 1-3) is to use the existing Lewis River Hatchery Complex to support:

- Self-sustaining, naturally producing, harvestable native anadromous salmonid species throughout their historical range in the North Fork Lewis River basin, and

- The continued harvest of resident and native anadromous fish species.

To ensure the Hatchery and Supplementation Program is meeting its goals, PacifiCorp Energy and Cowlitz PUD are developing and will implement a Hatchery and Supplementation Plan (H&S Plan) to adaptively manage the program and guide its implementation. Specifically, the H&S Plan is designed to:

- Address the means by which PacifiCorp Energy and Cowlitz PUD will use the existing hatchery facilities to accomplish the goals and requirements of the Hatchery and Supplementation Program, including, without limitation, the ocean recruit targets identified in Table 1-1[2].

[1] Supplementation is defined as the use of artificial propagation to maintain or increase natural production while maintaining the long-term fitness of the target population, and keeping the ecological and genetic impacts to non-target populations within specified biological limits.
[2] Ocean recruits are defined as the total escapement (fish that naturally spawned above Merwin and hatchery fish) plus harvest (including ocean, Columbia River, and Lewis River harvest).

Table 1-1. Hatchery and natural production adult threshold levels (adult ocean recruits) for spring Chinook, steelhead and coho.

	Spring Chinook	Steelhead	Coho	Total
Hatchery	12,800	13,200	60,000	86,000
Natural Production Threshold	2,977	3,070	13,953	20,000
Grand Total	**15,777**	**16,270**	**73,953**	**106,000**

- Determine the methods to document the number of ocean recruits and to separately identify hatchery ocean recruits and ocean recruits from the natural spawning population, and identify the appropriate assessment time frame over which to measure hatchery adult ocean recruits and natural adult ocean recruits.

According to Section 8.3 of the Settlement Agreement, when the number of natural returning ocean recruits of any species exceeds the relevant natural production threshold for that species (see Table 1-1), PacifiCorp Energy and Cowlitz PUD would decrease the hatchery production targets on a one natural fish for one hatchery fish (1:1) basis. For example, when natural spring Chinook adult returns equal 3,977 fish (1,000 fish over threshold), the hatchery production target for this same species would be reduced by 1,000 adults to 11,800. The decision to adjust hatchery production would be considered by the ACC every 5-years based on the results of the ocean recruits analysis. However, the ACC does have the option of evaluating hatchery production each year with the submittal of the Annual Operating Report.

If hatchery production is reduced, it is anticipated that any adverse hatchery effects on natural stocks will decrease, thereby benefiting natural populations. PacifiCorp Energy and Cowlitz PUD would not decrease the hatchery targets below the hatchery target floor specified in Table 1-2.

Table 1-2. Hatchery target floors identified in the Settlement Agreement.

	Spring Chinook	Steelhead	Coho	Total
Hatchery Target Floor	2,679	2,763	12,558	18,000

The total number of hatchery juveniles that may be produced each year under the H&S Plan is shown in Table 1-3. Although, these numbers could be reduced if natural production exceeds threshold levels[3].

Table 1-3. Hatchery juvenile production targets for spring Chinook, steelhead and coho.

Smolt Production	Spring Chinook	Steelhead[4]	Coho	Total
Years 1-3	1.35 million	275,000	1.8 million	3.425 million
Years 4-5	1.35 million	275,000	1.9 million	3.525 million
Years 6-50	1.35 million	275,000	2.0 million	3.625 million

[3] The H&S Plan calls for adding 50,000 late winter steelhead juveniles to start the reintroduction effort.

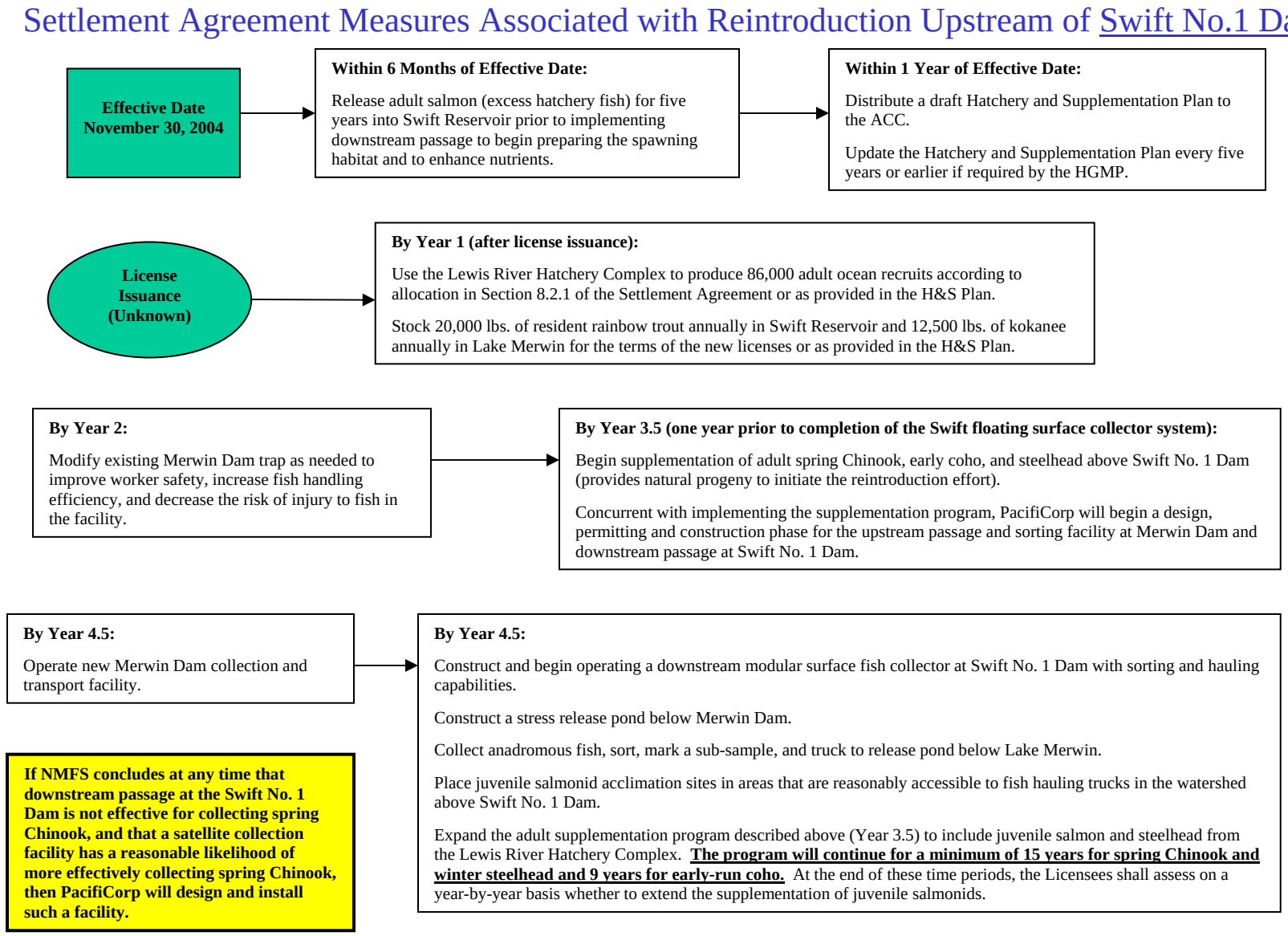


Figure 1-1. Settlement Agreement flow chart for anadromous fish reintroduction upstream of Swift No. 1 Dam.

Settlement Agreement Measures Associated with Reintroduction Upstream of Yale and Merwin Dams

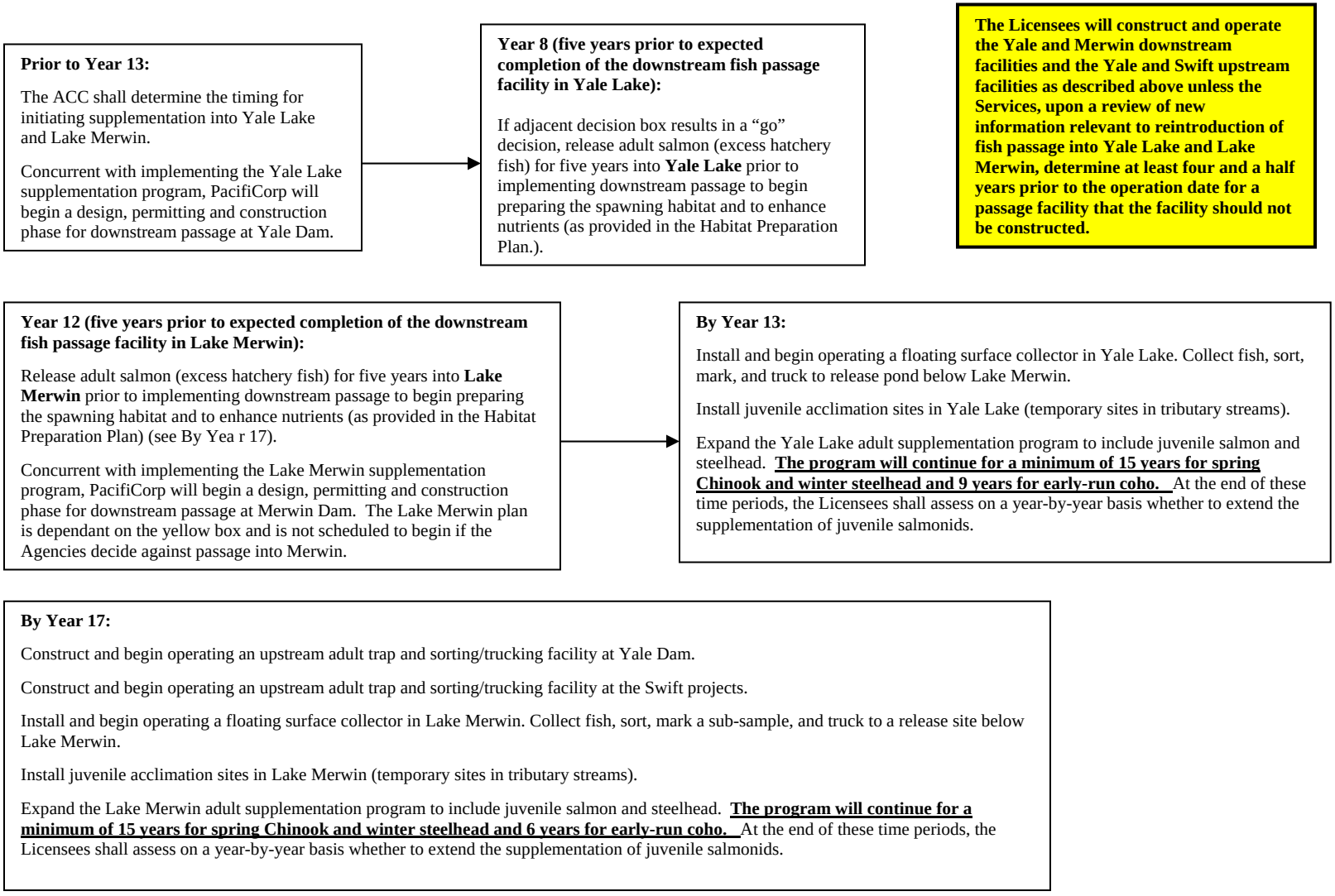


Figure 1-2. Settlement Agreement flow chart for anadromous fish reintroduction above Yale and Merwin dams.

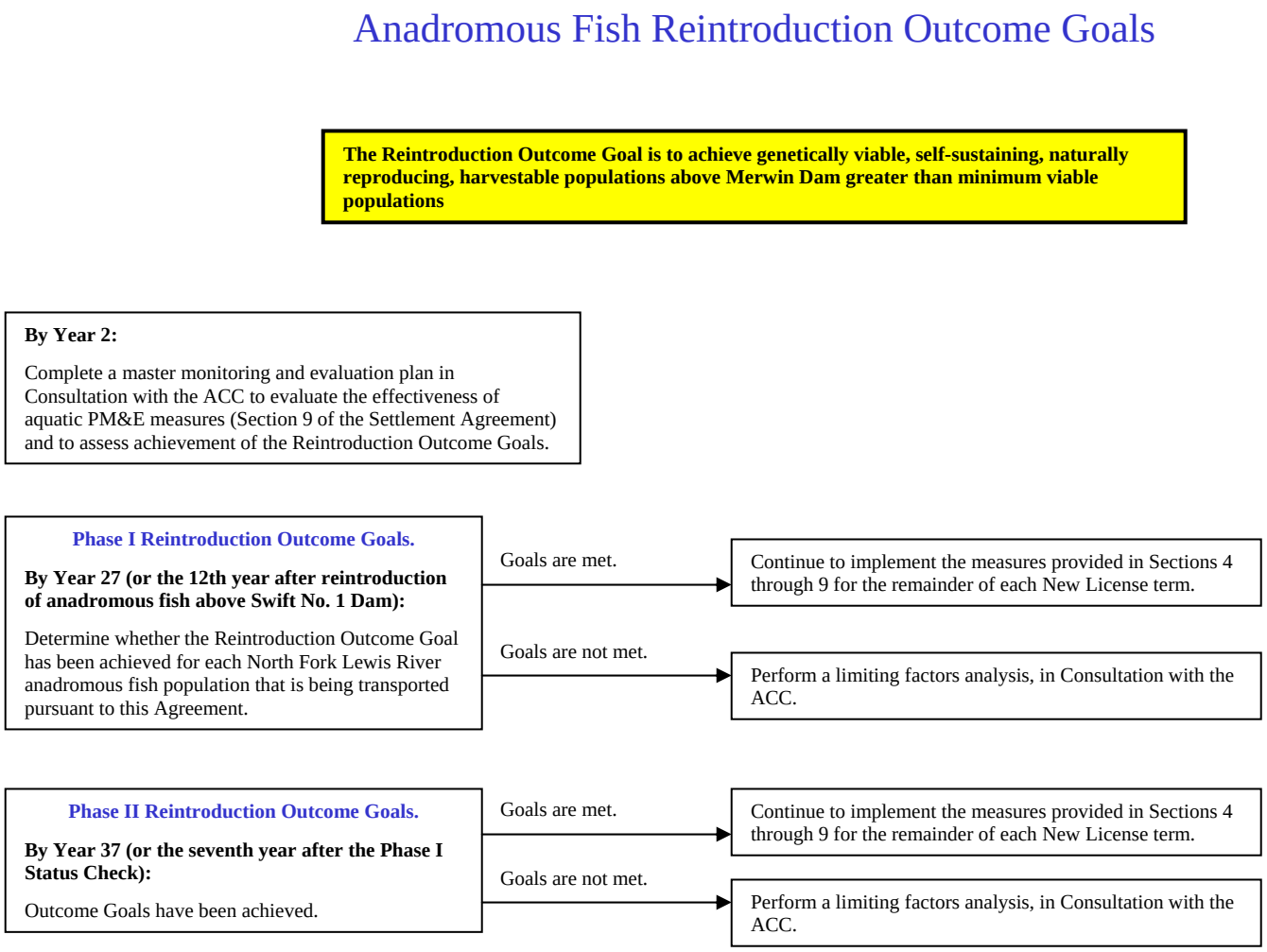


Figure 1-3. Settlement Agreement anadromous fish reintroduction outcome goals.

In addition to the above anadromous species, the Settlement Agreement calls for continued production and stocking of rainbow trout in Swift Reservoir, and resident kokanee in Lake Merwin. These fish will provide recreational opportunities for anglers and economic opportunities for local businesses.

This draft H&S Plan consists of six sections designed to address the requirements outlined in Section 8.2.2 of the Settlement Agreement. These include:

- Hatchery Programs and Operations
- Supplementation Program
- Monitoring and Evaluation (M&E)
- Adaptive Management
- Expected Outcomes
- Annual Operating Plan

It was developed using the concepts found in the following analyses and documents:

- Hatchery Reform: Principles and Recommendations of the Hatchery Scientific Review Group (HSRG 2004).
- Northwest Power and Conservation Council- Artificial Production Review and Evaluation Process (APRE)
- Monitoring and Evaluation of Supplementation Projects (ISAB 2005)
- Lewis River Fish Planning Document (Cramer and Associates 2004)

Lessons learned from the Yakima River and Cowlitz River supplementation and reintroduction programs were also used to help select effective approaches for the Lewis River.

Although the outcome goal of the Lewis River Hatchery and Supplementation Program has been defined in the Settlement Agreement (Figure 1-3), the metrics used to evaluate program success have yet to be developed. The identification of these metrics is the responsibility of NMFS and the USFWS. These two agencies (referred to as the "Services") will make this decision after consulting with the ACC, and taking into consideration the variability of the factors that may influence program success (i.e. ocean survival, fish passage success, freshwater variability etc.). According to the Settlement Agreement the Services decision process needs to be defined prior to the later of: (a) the 27th anniversary of the Issuance of the new license, or (b) the 12th year after reintroduction of anadromous fish above Swift No. 1 Dam.

Again, because the decision criteria are not yet available, the H&S Plan is designed to collect those types of data that may be used by the Services and ACC to determine program success. These data include:

- Ocean Recruits
- Smolt-to-adult survival rates (SAR)
- Juvenile-recruits-per-spawner (JRS)
- Adult-recruits-per spawner (ARS)
- Total juveniles entering reservoirs and collected at bypass facilities
- Adult returns to the spawning grounds

More detailed information on each of these factors can be found in the Monitoring and Evaluation (M&E) plan. A detailed description of existing hatchery facilities and operations in the Lewis River basin is presented in Appendix A of this report, and a complete copy of Section 8 of the Settlement Agreement is included in Appendix B.

Finally, the report presented below focuses on the methods and actions needed to reintroduce fish into stream reaches above Swift No.1 Dam, as the reintroduction of fish to Merwin and Yale does not begin until year 8 of the new license. A more detailed plan for Merwin and Yale will be developed as part of the H&S Plan update required in year 5. This approach will allow for the incorporation of new information regarding the success of the Swift adult and juvenile supplementation programs, fish passage collection efficiency, trap-and-haul mortality and harvest rates observed on wild populations.

2.0 HATCHERY PROGRAMS AND OPERATIONS

Hatchery programs and operations are discussed below under two headings, 1) Anadromous Fish, and 2) Resident Fish. Hatchery programs proposed for spring Chinook, coho, summer steelhead, winter steelhead and late winter steelhead are discussed in the Anadromous Fish section. The existing rainbow trout and kokanee hatchery programs are presented under Resident Fish.

2.1 ANADROMOUS FISH

2.1.1 Programs

The anadromous fish hatchery programs proposed were developed based on the recommendations put forth by two hatchery review processes:

- Northwest Power and Conservation Council- Artificial Production Review and Evaluation Process (APRE)

- Hatchery Reform: Principles and Recommendations of the Hatchery Scientific Review Group (HSRG 2004).

The APRE identified hatchery-operating procedures that maximize the benefits of artificial production while minimizing the risks to wild fish populations. The APRE was built upon the scientific principles and criteria put forth by the HSRG. The HSRG identified two primary purposes (or potential benefits) of artificial production, 1) help conserve naturally spawning populations, and 2) provide fish for harvest. To this end, the hatchery criteria put forth by the HSRG vary dependent on whether the hatchery is to operate as an Integrated or Segregated type program. The definitions for both types of programs are as follows:

- Segregated: A hatchery program is considered Segregated if the manager's intent is for the population to represent a distinct population that is reproductively isolated from naturally spawning populations. The principal intent of a Segregated program is to create a hatchery adapted population that can be used to meet harvest goals. Hatchery broodstock (and programs) are considered genetically segregated if the broodstock is maintained only with hatchery origin (HOR) adults. Therefore, gene flow from the natural origin population (NOR) to the hatchery broodstock is actively managed against in a Segregated program. In addition, hatchery origin adults are prevented from spawning in the wild to prevent gene flow from the less well-adapted hatchery population to the native or wild population.

- Integrated: A hatchery program is classified as Integrated if the manager's intent is for the natural environment to drive the adaptation and fitness of a composite population of fish that spawns both in the hatchery and the wild (i.e. natural environment). In an Integrated program, the proportion of natural origin broodstock in the hatchery and the proportion of hatchery fish on the spawning grounds determine the influence the hatchery and natural environments have on the composite population. The larger the ratio of wild fish to hatchery fish in either environment, the greater the influence wild fish genetics and adaptation will have on overall population

genetics. The greater the difference between the hatchery and natural stock components (e.g. run-timing), and the less natural the hatchery environment, the larger the ratio must be to reduce the effects of hatchery selection.

This H&S Plan calls for the development (over time) of up to eight hatchery programs (Table 2-1). The primary purpose of each program is to provide either fish for harvest (Segregated-Harvest), or to reintroduce anadromous fish to the upper river (Integrated-Conservation/Restoration).

Table 2-1. Hatchery program types by species for the H&S Plan.

Program	Program Type	Primary Program Purpose
Lower River Spring Chinook	Segregated	Harvest
Lower River Type N Coho	Segregated	Harvest
Lower River Type S Coho	Segregated	Harvest
Lower River Summer Steelhead	Segregated	Harvest
Lower River Winter Steelhead	Segregated	Harvest
Upper River Spring Chinook	Integrated (long-term goal)	Conservation/Restoration
Upper River Type S Coho	Integrated (long-term goal)	Conservation/Restoration
Upper River Late Winter Steelhead	Integrated (long-term goal)	Conservation/Restoration

The HSRG definitions fit well for those basins that have both wild and natural populations of the same species. The nomenclature doesn't fit as cleanly in the Lewis River because the wild fish populations in the Upper Lewis River basin have been extirpated. The exception is for the late winter steelhead program, which would have both a hatchery and wild fish stock component as wild steelhead are still found in the lower river.

The H&S Plan proposes to continue to operate most lower river hatchery programs as Segregated type, based on two assumptions:

1) The existing hatchery programs have had no systematic gene flow from the natural populations.

2) Natural spawning population genetics and fitness has been compromised by hatchery fish spawning in the wild.

In short, it is assumed that the hatchery environment, not the natural environment, has been driving fish fitness and genetics in the basin since anadromous fish were extirpated from the Upper Lewis River basin.

Table 2-2. HSRG guidelines for developing an Integrated hatchery program if natural production (and thus fitness) has been compromised by hatchery releases.

Scenario 3: Transition from an incompletely segregated program to an integrated program. (Most common scenario).
Hatchery broodstock has had no systematic gene flow from the natural population
Natural spawning population has had significant influence from hatchery fish

Approach #1 - Not recommended because of low likelihood of attaining stock goals	**Considerations**
• Incorporate a minimum of 10% NORs into hatchery broodstock each year. • Ensure that gene flow from the natural population to the hatchery population is greater than gene flow from the hatchery to the natural population (pNOB > pHOS). • Size program consistent with goals and the ability of the natural population to support hatchery broodstock requirements and gene flow limitations to the natural population. • Restrict natural spawning by HORs.	**Likelihood of achieving natural adaptation:** Lowest likelihood of all options in attaining stock goals in the immediate future since NORs incorporated into hatchery broodstock may themselves have suffered loss of productivity as a result of past hatchery influence. Likelihood of reaching stock goals increases as additional NORs are incorporated into the hatchery population through time or as proportion of NORs in hatchery broodstock is increased. Composite population is likely to have the lowest fitness in the natural environment of all the approaches. **Cost:** Increase in cost incurred for broodstock collection appears similar for all approaches. **Effect on Harvest:** Effect on harvest appears similar under all approaches other than Approach #2 in Scenarios 2 and 3.

Approach #2 - Recommended approach if attaining harvest goal can be interrupted during transition to integrated program.	**Considerations:**
• Take steps to reduce the number of hatchery fish in the natural population to less than five percent of the natural population. (Reduce hatchery program, selective harvest to limit strays, weir, other measures to control straying) . • Allow a minimum of three to four generations to promote adaptation to the natural environment. • Initiate a new hatchery program by collecting representative sample of natural fish. • Collect a number of brood that allows for an effective population size of the composite population (natural plus hatchery) to be in excess of 500 fish. • If a long-term goal of the hatchery program is to provide a conservation benefit, or if the natural spawning of hatchery-origin fish will be difficult to control, then the effective population size of the hatchery component should also be greater than 500 fish. • Incorporate a minimum of 10% NORs into hatchery broodstock each year. • Ensure that gene flow from the natural population to the hatchery population is greater than gene flow from the hatchery to the natural population (pNOB > pHOS). • For stocks of moderate or high biological significance and viability (or goals to maintain or improve the biological significance and viability of the stock) pNOB/(pHOS+pNOB) should be greater than 0.70. • Size program consistent with goals and the ability of the natural population to support hatchery broodstock requirements and gene flow limitations to the natural population. • Terminate segregated harvest program.	**Likelihood of achieving natural adaptation:** Intermediate likelihood of attaining stock goals because of the uncertainly of adaptation to the natural environment after three to four generations. The likelihood of meeting stock goals increases with the amount of time allowed before initiating new program and lower contribution of hatchery fish in the natural population. **Cost:** Increase in cost incurred for broodstock collection appears similar for all approaches. **Effect on Harvest:** Highest likelihood of loss of contribution to harvest of all the approaches since the segregated program would likely be reduced to allow adaptation of the natural stock and the segregated program would be terminated to initiate a new integrated program.

Scenario 3 (continued): Transition from an incompletely segregated program to an integrated program. (Most common scenario). Hatchery broodstock has had no systematic gene flow from the natural population Natural spawning population has had significant influence from hatchery fish	
Approach # 2 Plus Differential Marking - Recommended approach if attaining harvest goal cannot be interrupted during transition to integrated program	**Considerations**
• Take steps to reduce the number of hatchery fish in the natural population to less than five percent of the natural population (reduce hatchery program, selectively harvest to limit strays, use a weir or other measures to control straying). • Allow a minimum of three to four generations to promote adaptation to the natural environment. • Initiate a new hatchery program by collecting representative sample of natural fish. • Collect a number of brood that allows for an effective population size of the composite population (natural plus hatchery) in excess of 500 fish. • If a long-term goal of the hatchery program is to provide a conservation benefit, or if the natural spawning of hatchery-origin fish will be difficult to control, then the effective population size of the hatchery component should also be greater than 500 fish. • Differentially mark and release offspring of old/new broodstock. Preferentially use returns that represent the NOS broodstock. Phase out use of old broodstock as new broodstock returns. • Incorporate a minimum of 10% NORs into hatchery broodstock each year once new broodstock returns. • Ensure that gene flow from the natural to the hatchery population is greater than gene flow from the hatchery to the natural population (pNOB > pHOS). • For stocks of moderate or high biological significance and viability (or goals to maintain or improve the biological significance and viability of the stock), pNOB/(pHOS+pNOB) should be greater than 0.70. • Size program consistent with goals and the ability of the natural population to support hatchery broodstock requirements and gene flow limitations to the natural population.	**Likelihood of achieving natural adaptation:** Intermediate likelihood of attaining stock goals because of the uncertainly of adaptation to the natural environment after three to four generations. The likelihood of meeting stock goals increases with the amount of time allowed before initiating a new program and a lower contribution of hatchery fish in the natural population. **Cost:** Increase in cost incurred for broodstock collection appears similar for all approaches. An additional cost for differentially marking the two hatchery broodstocks would be incurred. Cost in terms of operational complexity is higher than all other approaches except Approach #4, but should be no greater than rearing an additional species. **Effect on Harvest:** Reduces loss of contribution to harvest during transition from the previous approach.

Comments received from some ACC members on the November 2005 Draft H&S Plan indicated that they would like to see the hatcheries run as Integrated programs as soon as feasible. The H&S Plan proposes to achieve this objective by following the HSRG methodology shown in Table 2-2 (Approach 2 or 3). Given the interactions that have likely occurred between Lewis River hatchery and wild fish in the past, the HSRG recommends that managers allow three to four generations to establish a locally adapted population before integrating the hatchery programs. If reintroduction is successful, then it is likely that sufficient locally adapted spring Chinook and Type S coho adults would be available for integration sometime between years 12-17 of the new license[4]. At that time, according to the HSRG guidelines, the ACC would need to chose between two integration approaches (#2 or #3), dependent on whether or not fish harvest goals can be interrupted (Table 2-2).

Given the fish population conditions assumed for the Lewis River, the HSRG does not recommend an approach where existing lower river origin unmarked natural fish are simply brought into the hatchery at a set rate (e.g. 10%). They rated this approach as having the

[4] Type N coho will not be released above Merwin Dam. Late winter steelhead will be run as an Integrated program from the start, as wild adults are available for use as broodstock.

lowest likelihood of achieving stock goals. As the Settlement Agreement requires that the H&S Plan be consistent with HSRG guidelines, the set rate approach for integration is not recommended.

2.1.2 Hatchery Operations

Hatchery production and facilities will be operated consistent with HSRG and APRE guidelines for Segregated and Integrated programs. The key HSRG guidelines used for each type of program is presented in Table 2-3.

Table 2-3. HSRG guidelines used for Segregated and Integrated hatchery programs.

Segregated (Harvest)	Integrated (Conservation)
Maintain an effective population N_e of at least 500 fish.	Use mating protocols that maximize the effective population size (N_e) in the hatchery, including factorial mating, maintenance of the individual pedigrees, and cryopreserved gametes when necessary.
Avoid the use of broodstock from natural populations or other hatchery populations	Collect and spawn adults randomly with respect to time of return, time of spawning, size and other characteristics related to fitness.
Mark or tag all hatchery released fish, so that the proportions of natural and hatchery origin fish among natural spawners and in the broodstock can be monitored and controlled.	Rear in a hatchery environment and with operational protocols that ensure all portions of the population are treated equally and have the same opportunity to contribute to the release population.
Produce fish that have the physiological fitness to migrate rapidly to saltwater and to survive in that environment through growth regimes that promote smoltification.	Mark or tag all hatchery-released fish to ensure correct identification for use in future broodstocks or in other monitoring programs.
Produce fish that have the morphological characteristics to meet harvest goals.	Use a hatchery environment that allows synchronization of adult maturation, incubation, and emergence, and out-migration with natural populations.
Produce fish that have the behavioral characteristics, such as adult run-timing to meet harvest goals.	Rear fish at reduced densities in enriched environments to improve cryptic coloration, territorial fidelity, and social behavior.
Avoid crowding and build-up of wastes and dead fish in fish holding units.	Release fish volitionally during the out-migration timing of the natural stock
Monitor fish health regularly and implement needed treatment immediately	Use a hatchery environment and operational protocols that maximize the survival of each individual including captive rearing.
Use prophylaxis by vaccination where feasible.	Use prophylaxis by vaccination where feasible, monitor the health of stocks regularly, and implement needed treatment immediately.
Use adequate diets that have been stored for only short periods.	Use adequate diets that have been stored for only short periods.
Use locally adapted stocks that are likely to develop reasonable resistance to pathogens likely to be present in the water supply.	Use locally adapted stocks that are likely to develop reasonable resistance to pathogens likely to be present in the water supply.
Avoid practices and situations likely to result in chronic stress (e.g. frequent fish handling etc.)	Avoid practices and situations likely to result in chronic stress (e.g. frequent fish handling etc.)

2.1.3 Hatchery Production

The number of hatchery juveniles to be released as part of the harvest and supplementation programs is presented in Table 2-4.

Table 2-4. Juvenile release numbers by species for the hatcheries and supplementation programs.

Smolt Production	Spring Chinook	Summer Steelhead	Winter Steelhead	Wild Late-Winter Steelhead	Coho
Hatchery	1,250,000	175,000	100,000	NA	1,800,000
Supplementation	100,000	NA	NA	50,000	NA
Total	**1,350,000**	**175,000**	**100,000**	**50,000**	**1,800,000**

Based on the conditions spelled out in the Settlement Agreement, hatchery coho production would increase to 1.9 million in years 4-5, and to 2.0 million in year 6 of the H&S Plan. For now it is assumed that the proportion of Type N and Type S coho released from the hatchery would remain constant as survival data presented in the Lewis River Fish Planning Document indicate that survival for both type is nearly equal (Cramer and Associates 2004).

Hatchery juveniles would be released at the following size ranges:

1. Coho- 14-16 fish per pound (fpp)
2. Spring Chinook- 8-12 fpp
3. Winter and Summer Steelhead 4.8-8 fpp

2.1.4 Broodstock Needs and Escapement Targets

The hatchery broodstock and adult escapement targets for the H&S Plan are presented in Table 2-5. The major change from current (2005) hatchery operations is the establishment of adult escapement targets for upper basin spring Chinook (2,065) Type-S coho (9,000) and late winter steelhead (500). These adults are needed for the supplementation program each year. To achieve these adult targets WDFW will establish a harvest policy in the Lower Lewis River that assists in achieving adult spring Chinook, late winter steelhead and coho return targets to adult collection facilities.

Table 2-5. Hatchery adult broodstock and adult escapement targets for the Lewis River*.

Smolt Production	Spring Chinook	Summer Steelhead	Winter Steelhead	Wild Late Winter Steelhead	Type-N Coho	Type-S Coho
Hatchery	800	160	90	NA	800	800
Supplementation	2,065	NA		500	NA	9,000
Total	**2,865**	**160**	**90**	**500**	**800**	**9,800**

*-Broodstock needed for the hatchery are approximate. These would be adjusted based on adult-to-smolt survival values achieved at the updated hatchery facilities.

2.1.5 Hatchery Production Adjustment

The combined actions proposed in the H&S Plan are designed to achieve the hatchery and natural production targets shown in Table 2-6. The values in the table are referred to as adult Ocean Recruits, which include escapement plus the number of fish caught or available in ocean and freshwater fisheries. The methodologies that can be used for estimating ocean recruits are presented in the M&E section of this report.

Table 2-6. Hatchery and natural production adult threshold levels (ocean recruits) for spring Chinook, steelhead and coho.

	Spring Chinook	Steelhead (Summer, Winter, Late Winter)	Coho (Type S and Type N)	Total
Hatchery	12,800	13,200	60,000	86,000
Natural Production Threshold	2,977	3,070	13,953	20,000
Grand Total	**15,777**	**16,270**	**73,953**	**106,000**

As natural production upstream of Merwin Dam for each species exceeds its threshold level, hatchery production levels for that species would be reduced on a 1:1 basis. For example, when natural spring Chinook adult returns equal 3,977 fish (1,000 fish over threshold value of 2,977), the hatchery production target for this same species would be reduced by 1,000 adults to 11,800 (12,800-1,000 = 11,800). This would be accomplished by reducing the number of juveniles released from the hatchery each year for that species based on the average survival rate calculated over a 5-year period. The decision to adjust hatchery production to achieve threshold levels would be considered by the ACC every 5-years based on the results of the Ocean Recruits analysis (See M&E)[5]. Note that hatchery targets may be increased back to initial levels if natural production were to decrease to below the threshold level.

However, as called for in the Settlement Agreement, hatchery production targets would not be reduced below the "Hatchery Target Floor" (HTF) levels shown in Table 2-7. In summary, no matter how many anadromous fish are produced above Merwin Dam, Lewis River hatcheries would continue to release sufficient juveniles to achieve the HTF.

Table 2-7. Hatchery target floor levels for adult spring Chinook, steelhead and coho.

	Spring Chinook	Steelhead	Coho	Total
Hatchery Target Floor	2,679	2,763	12,558	18,000

[5] The 5-year period was selected, as it is consistent with the independent review process established in the Settlement Agreement. The ACC will have the opportunity to evaluate hatchery production every year as part of their review of the Annual Hatchery operations plan.

2.2 RESIDENT FISH

2.2.1 Kokanee

No changes are proposed for the existing kokanee program as the continued release of this species poses little risk to the success of the reintroduction effort being undertaken above Swift.

However, as anadromous fish are reintroduced into Merwin reservoir starting in year 12 of the license, the ACC should review the program and determine if it should be continued[6]. The decision to maintain the program would need to consider the importance of Lake Merwin as a rearing area for coho juveniles and management implications and cost of possibly handling large numbers of kokanee juveniles at the proposed Merwin juvenile collection facility. Ideally, all juveniles collected at the Merwin facility would be bypassed directly to the lower river with a minimum of handling. Unless managers allow kokanee to be released below Merwin Dam, then these fish would have to be sorted and released upstream of the dam.

2.2.2 Resident Trout

The 2006 resident trout program calls for the release of approximately 60,000 catchable rainbow trout (3 fpp) into Swift Reservoir. These fish provide sport-fishing opportunities for both local residents and visitors to the area.

The H&S Plan proposes that the rainbow trout program continue so long as the number of these fish entering juvenile collection facilities is manageable (i.e. they can be easily sorted without anesthetization and returned upstream). Data collected on a similar program at Mayfield Reservoir on the Cowlitz River show that rainbow trout released for similar purposes are captured in large numbers (3,000 to 7,000) at the Mayfield juvenile collection facility (Mark LaRiviere, Tacoma Power, pers. comm. 2005). The disposition of any stocked rainbow trout collected at Swift will need to be incorporated into the facility operation plan.

The Settlement Agreement also calls for the release of anadromous adults above Swift for five years prior to the implementation of downstream fish passage facilities. Off-spring of the adult plants are likely to residualize in large numbers is Swift Reservoir. These juveniles could exceed the carrying capacity of Swift Reservoir thereby depressing growth and survival of native fish communities. The M&E plan (see below) calls for the resident rainbow hatchery stocking program to be evaluated in terms of effects on reintroduced anadromous salmonids and the interaction between anadromous salmonids and resident fish species[7].

[6] In year 12, anadromous fish may be released into Merwin, if agreed to by the ACC.
[7] Studies would be undertaken during this time frame as it is assumed that effects if any, would be the maximum likely to be observed, as juvenile fish cannot readily migrate from the system.

3.0 SUPPLEMENTATION PROGRAM

Supplementation was defined by the Regional Assessment of Supplementation Project (RASP 1992) as follows:

"Supplementation is the use of artificial propagation in an attempt to maintain or increase natural production, while maintaining the long-term fitness of the target population and keeping the ecological and genetic impacts on non-target populations within specified biological constraints."

Because anadromous fish have been extirpated from the Upper Lewis River basin, the supplementation program proposed is designed to re-establish self-sustaining populations of Type S coho, spring Chinook and late winter steelhead upstream of Merwin Dam.

Both adult and juvenile supplementation strategies would be employed to reintroduce spring Chinook to the Upper Lewis River basin. Juvenile spring Chinook (100,000) would be transported to acclimation facilities in the upper basin and then allowed to migrate volitionally from these facilities. Surplus hatchery adult spring Chinook would be transported annually upstream of Swift No.1 dam and released.

Adult supplementation would be emphasized for late winter steelhead and coho, as results of studies conducted on the Cowlitz River show good success with this type of an approach.

However, it should be noted that for steelhead, wild adults from the Lower Lewis River would be taken into the hatchery, spawned and the off-spring reared to, and released as, 1+ smolts below Merwin Dam[8]. Returning adults from these juvenile releases would then be collected at Merwin Dam, transported to the Upper Lewis River and released: thereby initiating the adult supplementation program. Wild adult steelhead collection would continue for 12-years to ensure that sufficient genetic diversity was obtained to prevent founder effects (i.e. starting with too little genetic resources)[9].

A more detailed description of the proposed supplementation program for each of the three species is presented by species below.

3.1 SPRING CHINOOK

3.1.1 Supplementation Strategy

The reintroduction strategy for spring Chinook will rely on two life stages: smolts and adults. A total of 100,000 smolts and a minimum of 2,000 hatchery adults (when available) will be released above Swift Reservoir to rebuild a natural spawning population[10]. The 2,000 adult minimum escapement target was selected based on EDT estimates of spawning capacity for

[8] The H&S plan considered rearing 2+ smolts for the late winter steelhead program, but this idea was rejected in favor of the 1+ smolt program. The logic being that the longer hatchery residence time would reduce the fitness of the population by selecting traits for traits that increase survival in the hatchery environment.
[9] Collecting 50 wild adults for 12 years meets/exceeds HSRG criteria for eliminating founder effects.
[10] The 2,000 release target is greater than the 1,200 recommended in the Lewis River Fish Planning Document (Table D-19)

habitat upstream of Swift No. 1 Dam, required passage survival and collection rates, and the average expected level of surplus hatchery adults (~3,200) available after ocean and freshwater fisheries (See Section 6).

The reintroduction strategy will be conducted as a 15-year[11] program that will continue throughout this period with no trigger points that would discontinue the program prior to its completion[12].

This supplementation program will initially use hatchery origin adults (HORs) for both the smolt and adult supplementation strategies. After adults begin returning from the natural or supplemented releases, hatchery origin fish would only be used in the event that the number of fish produced above Swift are insufficient to meet the desired release numbers (See 3.1.5). Again, the H&S Plan calls for the continuation of the adult and juvenile supplementation program for at least 15-years without interruption. Priority for the use of natural-origin returns will be as follows:

1. For use as broodstock for juvenile supplementation program: Up to 65 adults.

2. Use for adult supplementation into the upper watershed: All NOR's above juvenile supplementation needs (65 adults).

At the completion of this initial supplementation period, both smolt and adult supplementation will be annually evaluated and the population will be monitored to determine if reintroduction goals have been achieved. This action is consistent with the Settlement Agreement that states the primary goal of the program is to establish self-sustaining, naturally producing, harvestable native anadromous salmonid populations. To determine sustainability will require the elimination of the supplementation program at some time in the future. However, any decision to terminate the program would be made in consultation with the ACC.

3.1.2 Broodstock Origin

Broodstock for the reintroduction efforts will initially come from returns to the Lewis River hatchery complex. This stock has been chosen since the original wild stock has been extirpated and the existing hatchery population, although originating from multiple out-of-basin stocks, has been self-sustaining in the Lewis River for approximately four (4) generations (WDFW, 2004a). This stock therefore represents the stock most likely to adapt to environmental conditions in the Lewis River. The hatchery stock will be used in the first generation of the supplementation efforts. Once adult fish return from smolt or adult releases, the supplementation program will preferentially use these returns for both juvenile and adult releases. Hatchery origin spring Chinook will only be used if the number of adults produced from above Swift is not sufficient to meet the broodstock needs for the juvenile program (approximately 65 adults) or the adult supplementation objective of 2,000 adults.

[11] The Settlement Agreement calls for supplementation to continue for 15-years.
[12] However, the ACC may stop or continue the program based on collected data.

Although actual spring Chinook productivity and capacity of the upper watershed is currently estimated from modeling, the goal will be to reduce the use of hatchery-origin adults in the upper watershed over successive generations. The proposed approach is described in Table 3.1 below:

Table 3.1 Priorities for use of hatchery and natural-origin broodstock (NOR's)

Generation after Introduction	Broodstock Source, Number and Composition
1st Generation	65 NOR's used preferentially for the juvenile supplementation program; additional adult NOR's to upper watershed; all excess adult HOR's to upper watershed; 2,000 minimum total adults
2nd Generation	65 NOR's used for juvenile supplementation program; additional adult NOR's to upper watershed; goal of 2:1 NOR's/HOR as adults, 2,000 minimum total adults
3rd Generation	65 NOR's used for juvenile program; additional NOR's as adults to upper watershed; goal of 3:1 NOR's/HOR as adults, 2,000 minimum total adults
4th Generation	Only NOR's used for juvenile and adult supplementation, all NOR returns to the upper watershed (goal will be to eliminate juvenile supplementation program, and release of HOR adults)*

* Assumption is consistent with the Lewis River Fish Planning Document which recognized that at some time supplementation will end (Appendix D, Table D-24).

The approach described above should only be used as a guide for adaptive management decisions by the ACC. The decisions for broodstock use, composition of broodstock, and continuation or suspension of the supplementation program should be based on monitoring of survival rates and productivity in the upper watershed as well as demographic and genetic risks to the supplemented population.

3.1.3 Broodstock Collection and Mating

Broodstock for both the smolt and adult supplementation strategies will be collected so that fish for these programs will represent the entire run timing of the returning population. The juveniles released in the program will represent the full range of return timing of the existing stock. In order to accomplish this, eggs for this program must be taken throughout the run, or fish transported to upriver acclimation ponds should be collected as a sub-sample from the entire spring Chinook population rearing at Lewis River facilities. Since adults released into

the watershed will select their own mates, only the juvenile portion of the program requires mating protocols. Spawning protocols for the juvenile program should strive for selective neutrality and ensure that maximum genetic effective number of breeders represented in the population. The current protocol of single family pairing and incorporation of jacks into the spawning population should be sufficient to meet these needs when using the hatchery broodstock. Once returns from the upper watershed are used for broodstock, spawning protocols for the juvenile portion of the supplementation program should be modified to a 3x3 factorial mating approach when feasible to increase the genetic effective population size for this portion of the program.

3.1.4 Incubation and Rearing

Spring Chinook for this program will be incubated and reared at Speelyai Hatchery following the protocols described in the most recent WDFW spring Chinook HGMP (WDFW, 2004a). Rearing conditions at Speelyai Hatchery will be managed to provide optimal flow and density indexes given current and planned hatchery upgrades. Fish will be held at Speelyai Hatchery until the yearling stage when they will be transferred to upriver acclimation ponds following standard WDFW loading guidelines. If rearing conditions, particularly water temperature, in the acclimation ponds allow, feed rates will be reduced with the declining photoperiod in the fall at Speelyai Hatchery and increased at the acclimation ponds, as the photoperiod increases, to more closely represent natural growth patterns of spring Chinook. Yearling transfer will generally occur, approximately 6 weeks prior to release. Rearing conditions in the acclimation ponds will also be managed to provide similar flow and density indices reached at Speelyai Hatchery.

3.1.5 Release Location and Numbers Released

Up to 100,000 smolts and a minimum of 2,000 adults (when available) will be released above Swift Reservoir. Juveniles will be released volitionally from the acclimation facilities. The target release size will be approximately 8-12 fish per pound. Size released from acclimation sites will attempt to mimic the size of naturally produced spring Chinook outmigrants. A minimum of 2,000 adults will also be released near the head of the Swift Reservoir to spawn naturally in the upper Lewis River. This number of fish is based on the habitat capacity of 1,942 fish estimated by EDT for the Lewis River above Swift Reservoir considering both adult and juvenile passage survival once collection facilities are in place (99 percent and 80 percent respectively).

Although EDT may over or underestimate the habitat carrying capacity of the upper basin, the 2,000 adult release number can be met in most years. Currently, it appears that on average the number of surplus (not needed for hatchery broodstock) adult spring Chinook returning to the Lewis River may average ~3,000 fish, under current harvest regimes (See section 6). Thus, the 2,000 adult supplementation target is likely to be met in the majority of years.

Natural origin returns (NOR) will not be incorporated into the broodstock for the existing spring Chinook Segregated harvest program for the duration of the re-introduction program. At the completion of the 15 years and evaluation of stock sustainability, a decision will be

made whether or not to modify the current segregated harvest program into an Integrated program.

3.2 COHO SALMON (TYPE S)

3.2.1 Supplementation Strategy

The reintroduction strategy for Type S coho salmon will rely on adult supplementation. The strategy chosen is based on the availability of adult Type S coho from returns to the Lewis River Complex (averaging over 21,000 returns between 1996 and 2002) and relatively high natural productivity and capacity (over 4 recruits/spawner and capacity of nearly 9,000 adults) of the system above Swift Reservoir that is estimated using EDT. Adult supplementation alone, in this case, should provide both the abundant founding population and the mechanism to increase population fitness as described in the Lewis River Fish Planning Document (Cramer and Associates 2004).

Initially, 9,000 Type S Coho adults (when available) will be released above Swift Reservoir to rebuild a natural spawning population[13]. The 9,000 adult minimum escapement target was selected based on EDT estimates of spawning capacity for habitat upstream of Swift No. 1 Dam, required passage survival and collection rates, and the average expected level of surplus Type S coho hatchery adults (~14,500) available after ocean and freshwater fisheries (See Table 6-3)[14].

3.2.2 Broodstock Origin

Broodstock for the reintroduction efforts will initially come from returns of early Type S coho to the Lewis River hatchery complex[15]. This stock has been chosen since the native Lewis River coho provided the initial broodstock for the hatchery program and because historical information suggests that early coho were predominately upper Lewis River spawners (WDFW, 2004b). This stock therefore represents the stock most likely to adapt to environmental conditions in the Lewis River. The hatchery stock will be used only in the first generation of the supplementation efforts. Once adults return from upper basin adult releases, the supplementation program will preferentially use these returns for further introduction. Hatchery origin adult coho will only be used if the number of adults produced from above Swift No. 1 Dam is not sufficient to meet the adult supplementation objective of 9,000 adults.

Although actual productivity and capacity of the upper watershed is currently unknown, the goal will be to reduce the use of hatchery-origin adults in the upper watershed over successive generations. The proposed approach is described in Table 3.2 below:

[13] The 9,000 adult release target is greater than the 6,200 proposed in the Lewis River Fish Planning Document (Table D-19)

[14] In years when surplus exceeds 9,500 adults, the ACC will need to determine whether or not to release additional coho into the upper watershed. Note that the release number is greater than the 6,200 proposed in the Lewis River Fish Planning Document (Table D-19).

[15] Broodstock collection dates for Type S coho would be established by the WDFW.

Table 3-2. Priorities for use of Hatchery and Natural-Origin Type S coho broodstock

Generation after Introduction	Broodstock Source, Number and Composition
1st Generation	NOR's used preferentially for adult supplementation; all adult NOR's returned to the upper watershed; excess HOR's as adults to upper watershed; 9,000 minimum total adults
2nd Generation	NOR's used for preferentially for adult supplementation; all adult NOR's returned to the upper watershed; goal of 2:1 NOR's/HOR as adults, 9,000 minimum total adults
3rd Generation	NOR's used preferentially for adult supplementation; all adult NOR's returned to the upper watershed; goal of 3:1 NOR's/HOR as adults, 9,000 minimum total adults
4th Generation	Only NOR's used for adult supplementation, all adult NOR's returned to the upper watershed. No HOR's released.*

* Assumption is consistent with the Lewis River Fish Planning Document which recognized that at some time supplementation will end (Appendix D, Table D-24).

The approach described above should only be used as a guide for adaptive management decisions by the ACC. The decisions for broodstock use, composition of broodstock, and continuation or suspension of the supplementation program should be based on monitoring of survival rates and productivity in the upper watershed as well as demographic and genetic risks to the supplemented population.

3.2.3 Hatchery Protocols

Since only adult supplementation will be used, broodstock collection, mating, rearing and release protocols will not be necessary.

3.2.4 Broodstock Collection

Adults for the supplementation program will be collected so that fish will represent the entire run timing of the returning population.

3.2.5 Release Location and Numbers Released

Initially, 9,000 hatchery origin adults will be released above Swift Reservoir to naturally distribute themselves and reproduce. Data collected on adult coho released in the Upper

Lewis River basin indicate that hatchery adult coho distribute throughout the watershed and produce large numbers of juveniles (PacifiCorp and Cowlitz PUD. 2004b).

An adult release of 9,000 coho is based on the habitat capacity of 8,800 fish estimated by EDT for the Lewis River above Swift Reservoir considering both adult and juvenile passage survival once collection facilities are in place (99 percent and 80 percent respectively)[16]. As naturally produced adults from the supplementation program return, priority for introduction into the upper watershed will be given to fish that were produced in the upper watershed. All returning natural origin adults will be transported to the upper watershed to spawn naturally. Hatchery origin fish will only be used in the event that fish produced above Swift Reservoir are not sufficient to meet the 9,000 fish goal. At the completion of the 9-year period, adult supplementation with any hatchery origin fish will be annually evaluated to determine if only natural origin returns will be allowed to spawn in the upper watershed. The population will be monitored to determine if reintroduction goals for this species have been reached.

Natural origin returns will not be incorporated into the broodstock for the existing Type-S coho harvest program for the duration of the re-introduction program[17]. At the completion of the 9 years and evaluation of stock sustainability, a decision will be made whether or not to modify the current segregated harvest program for Type-S coho into an Integrated Harvest program.

3.3 STEELHEAD

3.3.1 Supplementation Strategy

The reintroduction strategy for steelhead will rely on two life stages: smolts and adults. Since relatively few wild steelhead adults are currently available, approximately 50 adults from that population will be collected at the Merwin Trap and reared to smolts within the hatchery complex to increase the number of adults from this stock available for adult supplementation above Swift Reservoir.

A total of 50,000 smolts produced from wild winter steelhead returning to the Merwin Trap (or other locations within the Lewis River basin, if necessary) will be released from Merwin Hatchery as 1+ smolts. Upon return, adults from this program will be transported above Swift Reservoir to build a natural spawning population in the upper watershed. Adults returning from the hatchery smolt releases will only be used for reintroduction. Broodstock for the program will be derived each year from the non-enhanced natural stock in order to improve the effective genetic effective population size of the reintroduced stock[18]. Supplementation will be conducted for 15-years, unless otherwise determined by ACC

[16] The ACC raised concerns that EDT estimates of carrying capacity may be too low, and suggested more fish be released upstream of Swift. The EDT release exceeds the 6,200 recommended in the Lewis River Fish Planning Document.
[17] The plan uses the HSRG assumption that it will require 3-4 generations to build a truly wild stock that can be used for integrating into the hatchery environment. Until this occurs, the HSRG does not recommend the development of an Integrated program.
[18] All natural origin steelhead collected at Swift would be marked with a CWT (location to be determined by ACC). Late Winter supplemented steelhead juveniles released below Merwin would be marked by removing their Right Ventral fin (Adipose would remain to prevent harvest in fisheries) subject to approval of the ACC.

through adaptive management. Throughout this period there are no proposed trigger points that would discontinue the program prior to its completion. The 15-year period was selected as it is required in the Settlement Agreement (Section 8.5.1 of Settlement Agreement) with provision for continuation of supplementation.

3.3.2 Broodstock Origin

Broodstock for the reintroduction efforts will come from wild late winter steelhead returning annually to the Merwin Trap (or other locations within the Lewis River basin, if necessary). Since these fish are thought to be from the native Lewis River steelhead stock, they are the obvious first choice for use in the supplementation program.

As in the re-introduction programs for spring Chinook and coho, the goal of this program will be to reduce the reliance on supplemented adult fish as natural stocks increase in the upper watershed. A proposed approach is described in Table 3.3 below:

Table 3-3. Priorities for use of hatchery and natural-origin late winter steelhead broodstock (NOR)

Generation after Introduction	Broodstock Source, Number and Composition
1st Generation (3-4yrs)	All broodstock for juvenile releases obtained from wild adults (50 fish goal, actual number considers estimated wild fish run size); all adult returns from the juvenile program transferred to the upper watershed; 500 minimum total adults is the target but may not be met early in the program.
2nd Generation (5-8yrs)	All broodstock for juvenile supplementation releases obtained from wild adults (not adult returns from supplemented juveniles); all adult returns from the juvenile supplementation; 500 minimum total adults is the escapement target. When adequate information is available, ACC needs to review juvenile release (or some portion) into upper basin.
3rd Generation (9-12 yrs)	All broodstock for juvenile supplementation releases obtained from wild adults (not adult returns from supplemented juveniles); all adult returns from the juvenile supplementation; 500 minimum total adults is the escapement target
4th Generation (12-15 yrs)	Juvenile supplementation program may be suspended after ACC review and decision; all adults with intact adipose fins arriving at Merwin released above Swift No.1 Dam

The approach described above should only be used as a guide for adaptive management decisions by the ACC. The decisions for broodstock use, composition of broodstock, and continuation or suspension of the juvenile supplementation program should be based on monitoring of survival rates and productivity in the upper watershed as well as demographic and genetic risks to the supplemented population.

3.3.3 Broodstock Collection and Mating

Broodstock for the smolt release strategy will be collected so that fish for this program will represent the entire run timing of the returning population. Hatchery returns from this

program will not be used as broodstock. Instead, 100 percent of the broodstock will be collected each year from the non-enhanced natural stock in order to improve the effective genetic effective population size of the reintroduced stock. Although only 50 to 150 fish annually return to this location (E. Kinne, WDFW, pers. comm. 2005), it should be possible to collect a sufficient number of broodstock throughout the duration of this program to prevent any significant genetic risks to the hatchery broodstock and reintroduced stock from founder effects and to prevent significant loss to the donor population from broodstock mining. Since adults released into the watershed will select their own mates, only the juvenile portion of the program requires mating protocols. Spawning protocols for the juvenile program should strive for selective neutrality and ensure that maximum genetic effective number of breeders represented in the population. Additionally, after disease certification has been met, all broodstock will be "live-spawned" and returned to the lower river or reconditioned when spawning is complete to minimize impacts to this species. Given the relatively small size of donors used to establish the introduced stock, a 2 X 2 factorial mating protocol should be used to maximize the genetic effective population size in the smolt release program.

3.3.4 Incubation and Rearing

Steelhead for this program will be incubated and reared at Merwin Hatchery following the protocols described in the most recent WDFW winter steelhead HGMP (WDFW, 2004c). The goal of the program will be to produce a one-year smolt that will rapidly emigrate from the system. The target release size will be between 4.8 and 8 fish per pound with a condition factor of < 1.0 and fork lengths between 180 – 210 mm. These targets were chosen to prevent residualism in undersized juveniles and maximize survival for adult supplementation (NMFS 1999). In order to reach these goals, incubation and/or early rearing water may need to be heated in order to allow multiple egg takes to be combined into a single rearing unit, and to reach the goals for release size.

3.3.5 Release Location and Numbers Released

Up to 50,000 smolts will be volitionally released starting in April, to coincide with smolt outmigration timing of wild juveniles. Currently, hatchery managers note that facilities are insufficient to allow for a true volitional release directly into receiving waters. Instead, fish will have to migrate from the raceways (or ponds) to a collection facility, and then transported and released as directed by the Annual Operations Plan for wild winter steelhead. The release location will need to be sited so that the recovery of returning adults is maximized. All returning adults from this program will be released near the head of the Swift Reservoir to spawn naturally in the upper Lewis River.

4.0 MONITORING & EVALUATION

The ISRP/ISAB (2005) developed recommendations for evaluating supplementation programs in the Pacific Northwest. In general, their evaluation program is designed to address the critical uncertainties regarding whether supplementation:

- Provides a demographic increase in natural production,
- Leads to decreased fitness of the natural population being supplemented
- Results in increased demographic, genetic, ecological and disease risks to native fish populations

Because native anadromous fish have been extirpated from the Upper Lewis River basin, the proposed supplementation program poses little risk to wild coho, spring Chinook or late winter steelhead stocks in this area. Therefore, monitoring is not needed to determine if supplementation decreases the fitness of the natural populations.

However, the program may pose ecological and disease risks to the native bull trout population. The large releases of both hatchery juveniles and adults may result in increased competition for both food and space that may reduce bull trout abundance. Conversely, the expected increase in marine-derived nutrients resulting from the adult supplementation program, and increased prey base, may increase the food availability resulting in greater bull trout abundance. Monitoring is needed to quantify possible impacts from supplementation activities on this species.

In addition to monitoring recommendations put forth by the ISAB/ISRP, the Settlement Agreement requires, or infers, that certain M&E activities take place, including:

- Supplementation juveniles must not be marked in the same manner as hatchery fish are for harvest.
- Documentation of ocean recruits for both the natural and hatchery components of the program.
- Ability to determine if hatchery fish are not a significant limiting factor to the establishment of self-sustaining, naturally producing, harvestable runs.
- Determine if the hatchery or supplementation programs pose unacceptable impacts on fishery management objectives such as the recovery of wild stocks in the basin.

The M&E program presented below is designed to address both ISAB/ISRP recommendations, and conditions and research needs established in the Settlement Agreement.

4.1 FISH MARKING

A fish marking program is needed to not only identify the origin (NOR or HOR) of adults returning to adult collection facilities, but also to determine if hatchery and supplementation goals are being achieved (See Ocean Recruits Methodology).

Currently, juvenile fish released from Lewis River hatchery facilities are marked to quantify overall survival rates, contribution to fisheries (ocean and freshwater), stray rate, and the proportion of hatchery fish that spawn naturally in the basin. Fish released from the hatchery are generally distinguished through a combination of marks:

- Adipose Clip: This mark is used to inform fishers and managers that the fish is of hatchery origin. These fish can be retained in selective fisheries. Almost all hatchery fish released in the Lewis River are marked in this manner: the exception is discussed below.

- Adipose Clip + CWT: A subset of the hatchery fish released is also marked with a CWT inserted into the nose. The CWT is used to determine overall survival rates of release groups, harvest rates, and stray rate into other basins etc.

- Adipose Present + CWT: This group is referred to as the Double-Index Group (DIG) and is used to estimate the impact mark selective fisheries have on natural populations (See Appendix D for more detail). In these fisheries, fish captured with adipose fins are released while adipose clipped fish are retained. The difference in survival between these groups quantifies harvest impacts to natural stocks.

These three marked groups will be retained as part of the H&S Plan as they are still necessary to determine hatchery performance. However, as wild production from the upper basin increases it is suggested that the DIG group be eliminated and replaced by marking the wild migrants.

A marking program will also be needed for managing the supplementation component of the H&S Plan. Fish will need to be marked so that upon their return to adult handling facilities they can be sorted, transported and released into one of two areas:

1. Upstream of Swift No.1 Dam (Swift)

2. Yale Dam to Swift No. 1 Dam (Yale)[19]

Once passage occurs at Merwin, all fish will be passed into Merwin where they sort themselves out as to whether they want to stay in a particular reservoir or move upstream.

As was the case with the hatchery releases, marking is needed to determine the success of the supplementation program for Yale and Swift.

[19] The ACC may have the option to release all fish into Yale if adult passage facilities are built and are effective at Swift.

The proposed marking scheme for hatchery, supplementation and natural origin fish is presented in Table 4-1. The marking program emphasizes the use of CWT's for spring Chinook and coho, and fin-clips for steelhead because few steelhead are captured in ocean fisheries.

Table 4-1. Marking program for supplementation, hatchery, and natural origin spring Chinook, coho and steelhead.

	Fish Origin	Spring Chinook	Steelhead	Coho
Lewis River Hatcheries	Hatchery	1) 750,000 AD Removed 2) 150,000 cwt (Nose) 3) 150,000 AD present, CWT (nose)	100 % AD removed	1) AD removed, 75,000 cwt (Nose) 2) AD present, 75,000 cwt (Nose) 3) 1.4 million, AD removed
	Supplementation	None	AD intact, 50,000 blank wire (nose)	None
Swift	Natural	None	None	None
	Supplementation	AD Intact, 100% CWT located in adipose fin)	None	None
Yale	Natural	None**	None	None
	Supplementation	AD Intact, 100% CWT*	None	None
Merwin	Natural	None	None	None
	Supplementation	AD intact, 100% CWT*	None	None

* Coded Wire Tags (CWT's) location to be determined at a later date. ** Differential marking will be required prior to Yale downstream collector to identify adult returns originating from Yale. Note: AD = adipose fin

No marking program is proposed for Merwin origin fish as by the time fish production occurs in this area, adult passage facilities would have been built at Yale and Swift; thereby allowing the fish to self-sort.

4.2 OCEAN RECRUITS

According to the Settlement Agreement, the H&S Plan needs to be designed to achieve the numeric adult hatchery targets shown in Table 2-5. These targets are referred to as Ocean Recruits.

Ocean Recruits is defined in the Settlement Agreement as:

"… the total escapement (fish that naturally spawned above Merwin and hatchery fish) plus harvest (including ocean, Columbia River, and Lewis River Harvest)."

Jacks are not included or counted as part of the ocean recruits analysis (May 11, 2006 ACC Meeting).

There are three possible methodologies that could be used to calculate Ocean Recruits:

Age 2 Recruits (Age2 Rec): Number of fish alive at the time of first recruitment into a fishery (typically at age 2). Represents the maximum number of fish available to be managed.

Adult Equivalent Run (AER): The total number of fish that would have returned to the spawning grounds at all ages in the absence of fisheries. AER represents the maximum number of spawners if no harvest occurred. In other words, our best estimate of run-size absent human interference.

Catch Plus Escapement (C+E): Total catch of all ages plus total escapement of all ages. This method is in reality the outcome of the harvest management activities affecting the species.

Because each methodology provides information that could be used to determine program success and improve management, it is recommended that each of the three analyses be completed for at least coho and chinook. Based on the Ocean Recruits definition provided above, it appears that program success should be based on the AER method as it defines total production absent fisheries. Calculations for each method are included in Appendix D.

However, because steelhead are not harvested in large numbers at young ages or in ocean fisheries, it appears that in reality the C+E and AER methods would produce very similar results. As the WDFW already reports both parameters on a yearly basis, it is recommended that only C+E be utilized for determining steelhead Ocean Recruits.

It should be noted that C+E, AER and Age2 Rec would also be calculated for Upper Lewis River origin fish as well as hatchery fish. As fish production increases in the Upper Lewis River basin, WDFW and the ACC should consider whether the Double Index group at the hatchery should be eliminated, as wild fish would provide data needed to estimate harvest impacts to wild Lewis River fish populations.

4.3 HATCHERY EFFECTS

4.3.1 Anadromous Fish Programs

The Settlement Agreement requires that the H&S Plan incorporate M&E protocols that can determine whether or not hatchery fish are a significant limiting factor to the establishment of self-sustaining, naturally producing, harvestable runs. It is difficult to quantify hatchery fish impacts on native fish populations. The term “significant” is also problematic since no numeric value has been assigned to the term. The task of defining this value shall be determined by the ACC.

Regardless, because hatcheries will provide the fish needed for the reintroduction effort, whatever effects these fish may have on program success will have to be accepted, at least for upper basin fish populations. Long-term, the H&S Plan calls for eliminating all hatchery releases into the Upper Lewis River basin if data indicate that runs achieve the self-sustaining goal established in the Settlement Agreement.

The proportion hatchery fish contribute to the entire composite spawning population (natural and hatchery) in river reaches below Merwin Dam will be used as the indicator of the level of risk hatchery fish pose to natural populations in this area. Based on HSRG guidelines, hatchery fish from Segregated programs shall not make up more than 5 percent of the total natural spawning population. Spawning and carcass surveys would be used to document whether these criteria are being met each year. Results of the surveys would be included in the Annual Operating Plan described in the Settlement Agreement. Note that it is unlikely that this HSRG guideline will be met early on in the reintroduction effort.

Whether or not hatchery programs should be changed if the criteria were violated, would be made in consultation with the ACC. Options for reducing impacts could include the development of new hatchery release strategies, reduction or elimination of some hatchery programs, or the establishment of new criteria.

4.3.2 Resident Fish Programs

Resident trout plants in Swift reservoir would 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.

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 that the Services will provide a value as part of their review of the program.

4.3.3 Harvest Effects

The calculation of the Ocean Recruits value for each species is heavily dependent on the resource manager's ability to account for all marked fish. Therefore, intensive monitoring programs are needed to sample fish in all fisheries, adult collection facilities and on the spawning grounds.

Responsibility for setting and monitoring fisheries is the responsibility of the resource co-managers. Therefore, the H&S Plan assumes that the co-managers have in place a well-designed harvest-monitoring plan sufficient to develop accurate estimates of:

1. The number, age and sex of marked fish captured in fisheries and spawning in the wild.

2. Survival rates for wild fish captured in fisheries and released.

3. Stray rates based on CWT's recovered in other basins.

4. Double Index Production (DIP) harvest rates

All fish returning to adult collections facilities in the Lewis River are to be 100 percent mark-sampled to ensure that not only all tags are recovered but that adult fish are transported and released to the correct portion of the upper basin (Yale or Swift).

A key assumption in the H&S Plan is that the implementation of selective fisheries by the co-managers creates a harvest program that still allows for significant recreational and commercial harvest without jeopardizing the success of the reintroduction program. Therefore, for management purposes it is assumed that fishery impacts would be managed based on the data presented in WDFW's Fish Management and Evaluation Plans (www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Salmon-Fishery-Management/Fishery-Plans.cfm). WDFW is also responsible for conducting the monitoring required to document that performance criteria established in the plans are met.

4.3.4 Index Stocks

The Lewis River Fish Planning Document (Cramer and Associates 2004) makes a sound argument for using index stocks as a means to determine whether the success or failure of the Lewis River H&S Plan is a result of in-basin or out-of-basin factors. This information would feed into the Limiting Factors Analysis (LFA) called for in Year 27 of the license. The LFA would be used to develop a working hypothesis for why program goals were not met.

It is suggested that the Lower Columbia River spring Chinook, coho and late winter steelhead populations be used as the Index stocks for the proposed analysis. Specific Lower Columbia River salmon and steelhead populations will be identified during the development of the limiting factors analysis. Populations will be selected based on similarities to Lewis River populations and available data.

Life-History Data and Performance

Basic life-history and performance data should be collected annually for each species and type (hatchery and wild). The following objectives should be used:

- Determine adult composition (hatchery vs. wild) on spawning grounds downstream of Merwin dam

- Determine spatial and temporal distribution of spawning downstream of Merwin dam

- Estimate adult abundance downstream of Merwin dam

- Estimate juvenile abundance (reproductive success) downstream of Merwin dam

- Estimate juvenile migration and residualism of hatchery releases downstream of Merwin dam

- Hatchery juvenile monitoring for ecological interactions with wild smolts

Specific procedures for the objectives above will be developed as part of the Annual Operating Plans for each species.

The data collected would be used to monitor the status of wild and hatchery populations, and to track program success over time.

In addition, data from the monitoring program would be used to develop a production function or model for each species. The empirically derived estimate of this function would be compared yearly to the one developed as part of the EDT analysis. The point of this comparison is to confirm that the working hypothesis put forward by the models used for developing the H&S Plan (EDT and Salmon PopCycle models) is correct. Ideally, the model estimates of system productivity and capacity should compare favorably to the observed data. If not, then a new working hypothesis regarding how the ecosystem responds to supplementation should be developed and tested.

4.3.5 Hatchery Operations

Data to be collected at each hatchery facility should include for each species:

- Environmental rearing conditions in the environment by life stage
- Tracking consistency of programs with HSRG guidelines
- Disease presence and loss by life stage
- Survival by life stage
- Growth rate by month from fry ponding to release as smolts
- Number of fish tagged, tag type and purpose (experimental, production, other?)
- Number of adult collected, spawned, recycled, disposition
- Number of wild fish collected, origin and disposition
- Number of hatchery fish collected that originated from outside of the Lewis River basin (based on CWT tag data)
- General hatchery operations data required for regulatory/permitting

4.4 IMPACTS ON ESA LISTED SPECIES AND LOWER RIVER FISH POPULATIONS

The primary impacts to ESA listed and other lower river fish populations' results from hatchery operations. The release of over 3.4 million hatchery juveniles to the lower river will put these populations at risk from competition, predation and disease. In addition, hatchery adults spawning with wild adults in lower river tributaries pose both genetic and competition risks to these same populations.

The H&S Plan attempts to reduce these risks by operating the hatchery programs consistent with HSRG guidelines, to the extent possible. The annual operating plans for each species will specify the methodology for applying HSRG guidelines to achieve recovery plan goals.

4.5 IMPACTS ON ESA LISTED SPECIES AND UPPER RIVER FISH POPULATIONS

Comments received from the ACC on the Draft H&S Plan indicated that they were concerned about the effect reintroducing anadromous fish into the upper basin may have on ESA listed bull trout and other resident species. For example, a concern was expressed that if coho entered and spawned in Rush Creek or Cougar Creek, they may negatively impact bull trout spawning success.

The H&S Plan proposes to conduct spawning/carcass surveys throughout the upper basin to collect marks, determine distribution etc. which should provide data to identify those areas

where species may compete. However, unless actions such as constructing weirs at the mouths of streams like Cougar Creek to prevent coho access are implemented, then collecting data on such interactions may have little value.

The H&S Plan assumes that since bull trout and other species were present historically in the upper basin, the reintroduction program would simply restore ecological function in the system. Impacts such as bull trout feeding on anadromous juveniles or vice-versa are simply accepted.

5.0 ADAPTIVE MANAGEMENT

The Adaptive Management Plan (AMP) presented below describes some of the key decision points, needed studies, and suggests possible directions the ACC may take in adjusting the fisheries program over time as new data become available.

5.1 ADAPTIVE MANAGEMENT FOR THE LEWIS RIVER

Adaptive management is defined as "an adaptive policy that is designed from the outset to test clearly formulated hypothesis about the behavior of the ecosystem being changed by human use" (Lee 1993). Generally, these hypotheses are predictions about how one or more important species will respond to management actions (Lee 1993).

The major assumption, or hypothesis, being tested in this plan is whether hatchery origin fish can be used to restore anadromous fish production above a series of dams. The ultimate goal being to achieve self-sustaining runs of harvestable fish in this habitat.

The H&S Plan assumes that the best approach for achieving program goals is to rear fish using HSRG and APRE guidelines, and implement a juvenile and adult supplementation program to restore upper basin anadromous fish production. And finally, it is assumed that these actions will not only be successful, but also that they will have little or at least acceptable impacts on other basin fish populations such as ESA listed bull trout and lower river coho, Chinook and steelhead.

The combined actions and analysis tools used to select these provide the conceptual framework for how basin fish populations will respond to the H&S Plan. An effective AMP should be designed to constantly test whether the conceptual framework remains valid in light of study results from both within and outside of the basin.

5.1.1 Key Hypotheses

The key hypotheses (as well as decision points) that will be used to test the conceptual framework are discussed by hypothesis below.

5.1.1.1 HSRG Guidelines

The H&S Plan relies on HSRG guidelines as the scientific basis for hatchery operations. However, these guidelines have never been tested, but simply represent HSRG understanding of best management practices for hatcheries attempting to achieve conservation or harvest goals. Although the H&S Plan will not attempt to validate these guidelines, data is needed to ensure that the recommendations are being carried out.

Of critical importance in the success of the reintroduction program is whether or not managers can effectively control the mix of wild and hatchery fish in lower basin tributaries and in the upper basin.

Key Hypothesis: The hatchery programs can be operated consistent with HSRG guidelines to meet recovery goals.

If the data collected as part of H&S Plan or WDFW sponsored spawning surveys conclude that the guidelines can be met then the programs may continue. If not, the ACC will need to review the collected data and evaluate management alternatives.

5.1.1.1.1 Key Decision Point

In year 5 of the H&S Plan, sufficient data should be available to answer this research question.

5.1.1.2 Juvenile Supplementation Effectiveness

Four research questions are associated with the juvenile supplementation program.

Is the survival and collection rate of juveniles released above Swift No.1 Dam sufficient to meet program goals?

The Settlement Agreement requires that juvenile supplementation be used as one of the approaches to restore anadromous fish production to the upper basin. For this program to be successful, the juveniles released above Swift must survive at a high rate to juvenile bypass facilities, and then the majority of these effectively collected, transported and released downstream of Merwin Dam. If not, the ACC should consider altering or stopping the program temporarily until survival increases (e.g. collection efficiency improves).

Do supplemented juveniles have the same or greater SAR than hatchery fish released below Merwin Dam?

There may be a survival cost associated with releasing juvenile fish above Swift No.1 dam in comparison to below Merwin Dam. Juveniles released in the upper basin have to migrate through reservoirs and dams to reach the lower river, which may result in significant loss. If the overall SAR for supplemented juvenile fish is lower than for fish released below Merwin Dam, then the ACC may want to revisit the need for this strategy. This decision would be influenced by the answer to the third question.

Will returning adults from the late winter juvenile supplementation program spawn successfully in the Upper Lewis River basin?

The H&S Plan collects wild late winter steelhead adults from the lower river, rears the off-spring to 1+ smolts, and then releases these fish below Merwin Dam. Upon their return as adults, they are transported and released above Swift Reservoir. As the behavior of these fish is unknown, a portion will need to be radio-tagged and their distribution tracked. If these fish do not distribute themselves throughout the watershed, then the program may need to be revised. Possible changes include transporting adults to other locations within the upper basin.

Do adults from supplemented juveniles have a higher spawning success rate than hatchery adults released into the same streams?

A key assumption of any juvenile supplementation effort is that acclimating or releasing juvenile fish near the spawning grounds results in increased homing fidelity and improved

spawning success compared to releases of hatchery adults. If this assumption is false, then considerable resources are being expended for no increase in fish production. Because both adult and juvenile supplementation programs are proposed, at least for spring Chinook, it will be difficult to determine the success of both strategies at the same time, as they confound each other (can not tell whether resulting juvenile production was from hatchery adults or adults supplemented as juveniles). DNA testing might be used to track parentage over time, but costs may be prohibitive.

5.1.1.2.1 Key Decision Point

The juvenile collector at Swift is schedule for testing in Year 4.5 of the license. It is suggested that at least one year of testing be conducted before juvenile fish are released as part of the supplementation program. If juveniles were released in the same year as testing, coordination would be needed with the facility evaluation program.

Additionally, SAR values will first be available within 3 years of the first releases. The ACC should review the adult survival data to determine if program changes need to be made.

5.1.1.3 Adult Supplementation Effectiveness

What is the egg-to-smolt (or recruits per adult spawner) survival of hatchery adults released in the upper basin?

Because surplus adult hatchery fish are generally available, the H&S Plan relies on adult supplementation as the only method to reintroduce Type S Coho and late winter steelhead into the upper basin. This strategy has been highly successful for these species on the Cowlitz River according to WDFW biologists (WDFW 2004d). For example, in 2004 WDFW estimated a smolt yield of over 300,000 coho smolts. Studies conducted during Lewis River relicensing also showed large numbers of coho juveniles resulting from adult releases. However, as the Settlement Agreement emphasized juvenile supplementation, data is needed on the effectiveness of the adult supplementation strategy to produce smolts. The juvenile collector will be used to estimate egg to smolt survival and to derive an overall survival estimate for all reintroduced species.

5.1.1.3.1 Key Decision Point

The evaluation of the spawning and reproductive success of hatchery adults released into the upper basin will start in the first year of reintroduction. Estimates will be derived as part of the M&E plan and reported annually to the ACC. The ACC will then make decisions to make program changes to be reflected in the annual operating plan for each species.

5.1.1.4 EDT Modeling Results

Do EDT estimates of system productivity align with observed data?

EDT modeling was used to estimate potential juvenile and adult production originating from streams located above Swift No.1 Dam. The accuracy of these estimates is unknown, but do provide a template for which to compare to observed data once fish production is re-

established. The EDT estimates of production are important for they were used to set the minimum adult escapement targets for the upper basin. Determining the accuracy of these estimates would help the ACC better adaptively manage the number of juveniles and adult released as part of the supplementation program.

In addition, the Beverton-Holt production function produced by EDT provides managers the ability to forecast resulting juvenile production that may result from different spawner escapements. These estimates could then be compared to the number calculated entering reservoirs and juvenile collection facilities. If numbers do not match, then studies should be undertaken to identify erroneous assumptions in the model. This data would be useful in developing the limiting factors analysis required in year 27.

5.1.2 Independent Review

The Settlement Agreement calls for an independent review of the program in year 5. This review will provide the ACC with a chance to revisit proposed actions and implement corrective measures. The AMP should also be revisited at this time and adjusted as needed.

6.0 EXPECTED OUTCOMES

The All-H Hatchery Analyzer (AHA) model used in the development of this H&S Plan used current EDT habitat productivity/capacity estimates, anticipated harvest rates, and proposed hatchery operations to estimate the number of adult salmon and steelhead returning to the upper basin, the hatchery complex, and caught in freshwater and ocean fisheries.

It should be noted that the harvest and smolt-to-adult survival rates used in this analysis were approximated from the Lewis River Fish Planning Document (Cramer and Associates 2004), and comments received from WDFW on the November 2005 Draft H&S Plan. The SAR values used in the AHA analysis are shown in Table 6-1. It should be recognized that survival values could change by an order of magnitude for any given brood year[20].

Table 6-1. A comparison of SARs developed or reviewed as part of the development of the H&S Plan.

Species	Cramer Hatchery[1]	AHA Hatchery	EDT (Wild or NOR)
Spring Chinook	0.5%- 2.2%	0.7%	3%
Type N Coho	2%-4.4%	2.2%	NA
Type S Coho	2%-4.4%	2.2%	4.8%
Late Winter Steelhead	NA	NA	6%
Winter Steelhead	1.4%-2.8%	1.6%*	NA
Summer Steelhead	6.8%-13.6%	2%*	NA

NA- Not applicable as wild fish production is not included in the H&S Plan.
1-Data taken from Table D-5, Cramer and Associates 2004 (Lewis River Fish Planning Document)
*- WDFW supplied survival estimates for winter and summer steelhead

A key difference in the SAR values used in this analysis and the Cramer and Associates (2004) analysis are the values for summer steelhead. Cramer and Associates (2004) used an SAR values greater than 6%, while this plan uses the 2% value submitted by WDFW. To meet steelhead hatchery production targets requires that the combined steelhead SAR (both species) average 4.8%. This SAR assumption would include all steelhead caught in fisheries, observed on the spawning grounds, and collected at the hatcheries or fish ladders. Because of this difference in SAR assumptions between the two analyses, the H&S Plan indicates that hatchery steelhead adult targets may be difficult to achieve.

[20] Note that the AHA model varies SAR by brood year over a range of SAR values.

6.1 SPRING CHINOOK

The H&S Plan spring Chinook supplementation program uses 65 adults from the existing Lewis River hatchery program to produce approximately 100,000 smolts that will be released into the upper watershed (Table 6-2). The upper watershed is also seeded with up to 2,000 adults (based on a corrected (for fish passage) habitat capacity of 1,942 fish).

Table 6-2. Expected outcomes of the Lewis River H&S Plan spring Chinook program.

Phase	Broodstock	NOR's Spawning Naturally	HOR's (Supplemented) Spawning Naturally	Mixed Stock Harvest	Terminal Area Harvest	Average Adult Ocean Recruits
Supplementation Phase	65	1,159	390	372	66	~2,100
End of Supplementation	NA	1,215	NA	264	47	~1,500
Segregated Harvest Program	800 (+3,123 surplus)	NA	NA	1,308	2,319	~7,600

Ideally, the spring Chinook supplementation program will collect 100 percent of its broodstock from natural origin fish resulting from the "start-up" phase. Also, only natural origin adults would be allowed to spawn in the upper watershed. Hatchery origin spring Chinook will only be used if the number of adults produced from above Swift is not sufficient to meet the broodstock needs (approximately 65 adults) or the adult supplementation objective of 2,000 adults. Under this scenario, the number of spawners of natural origin or produced from the juvenile supplementation program is expected to be approximately 1,559 adults (NOR + HOR Supplemented). Harvest occurs primarily in mixed-stock fisheries, with little harvest occurring in the terminal fishery. On average, in Years 1-12 of the program approximately 2,100 adults would be produced.

Once supplementation efforts are ended, upper basin adult escapement is reduced to 1,215. Harvest still occurs primarily in mixed-stock fisheries, with little terminal harvest. However, WDFW and NOAA may alter harvest patterns as needed. The estimated number of naturally produced adult ocean recruits produced under this scenario is about 1,500 (Table 6-2).

The Spring Chinook segregated harvest program represents the total catch and escapement of hatchery origin spring Chinook produced from the proposed Segregated harvest program. The total contribution of hatchery origin fish from the proposed segregated harvest program is on average about 7,600 fish (Table 6-2). This includes meeting the hatchery broodstock needs of 800 fish, having a surplus of 3,123 fish at the hatchery and contributing 3,627 fish to harvest (1,308 in mixed stock harvest and 2,319 in the terminal area). The expected surplus of hatchery fish indicates that on average, the existing hatchery program can supply the juveniles (100,000) and adults (2,000) for re-introduction into the upper watershed.

6.2 COHO

Because of the large number of surplus early coho (Type-S) adults available from the hatchery and the potential productivity and capacity of the upper watershed, no juveniles are needed for the proposed early coho supplementation program. Based on the estimates of habitat productivity and capacity, simply relying on adult supplementation (up to 9,000 adults) results in an average of 5,812 Type-S coho spawning in the upper watershed (Table 6-3). Initially they will be 100 percent hatchery origin, but ultimately should consist of 100 percent natural origin fish.

Table 6-3. Expected outcomes of the Lewis River H&S Plan early (Type-S) coho program.

Phase	Brood-stock	NOR's Spawning Naturally	HOR's Spawning Naturally	Mixed Stock Harvest	Terminal Area Harvest	Average Adult Ocean Recruits
Type S After Supplementation	NA	5,812	NA	1,013	69	~6,900
Type S Segregated Harvest Program	800	NA	NA	2,895	1,971	~19,700*
Type-N Segregated Harvest Program	800	NA	NA	8,663	2,119	~21,000**

* Includes 14,044 surplus hatchery fish. ** Includes 9,547 surplus hatchery fish.

Under the proposed Type S coho Segregated Harvest program, the total contribution of hatchery origin fish is on average about 19,700 (Table 6-3). This includes meeting the hatchery broodstock needs of 800 fish, having a surplus of 14,044 fish at the hatchery and contributing 4,866 fish to harvest (2,895 in mixed stock harvest and 1,971 in the terminal area). This program contributes a much lower proportion of the total run to harvest (24.6 percent) than the late coho harvest program (51 percent). However, the expected surplus of hatchery fish indicates that on average, the existing hatchery program can supply the 9,000 Type S adults needed for reintroduction into the upper watershed.

The proposed Lewis River Type N coho segregated harvest program produces 900,000 smolts that are 100 percent derived from adult returns to the hatchery. This scenario assumes that 100 percent of the hatchery origin returns from the Segregated Harvest program return to the hatchery. The total contribution of hatchery origin fish from this program is on average about 21,000 fish (Table 6-3). This includes meeting the hatchery broodstock needs of 800 fish, having a surplus of 9,547 fish at the hatchery and contributing 10,782 fish to harvest (8,663 in mixed stock harvest and 2,119 in the terminal area). This program contributes a much higher proportion of the total run to harvest (51 percent) than the early coho harvest program (24.6 percent).

6.3 STEELHEAD

The proposed Lewis River late-winter steelhead supplementation program (Years 1-15) uses 50 adults returning to Lewis River traps to start an Integrated Conservation/Restoration recovery program. These 50 adults produce about 50,000 smolts. When these smolts return as adults, they will all be allowed to spawn in the upper watershed. Harvest is expected to be

minimal as it is assumed selective fisheries are in place. Broodstock will continue to be taken from other adult returns to the trap in order to increase the effective population size of the spawners in the upper watershed. On average this strategy results in about 2,000 fish spawning in the upper watershed, with 40 percent being wild origin supplemented spawners (Table 6-4).

Table 6-4. Expected outcomes of the Lewis River H&S Plan winter and summer steelhead program.

Phase	Brood-stock[1]	NOR's Spawning Naturally	Wild (Supplemented) Spawning Naturally	Mixed Stock Harvest	Terminal Area Harvest	Average Adult Ocean Recruits
Late-winter Supplementation Years (wild broodstock)	50	1,200	800	65	108	~2,200
Late-winter After Supplementation (NOR)	NA	1,300	NA	42	70	~1,400
Winter Segregated Harvest Program	90	NA	NA	55	915	~1,800*
Summer Segregated Harvest Program	160	NA	NA	239	2,383	~4,000**

1-Broodstock numbers are an estimate; will vary based on fecundity and survival values for upgraded hatchery facilities

* Includes 779 surplus hatchery fish.

** Includes 1,211 surplus hatchery fish.

NA- Not Applicable

The late-winter steelhead (NOR) row represents a potential long-term conservation program for above Swift No. 1 Dam winter steelhead with supplementation efforts eliminated[21]. Under the conditions modeled, spawning escapement in the upper watershed is ~1,300. There is harvest opportunity but it is limited to approximately 112 adults (Table 6-4).

The winter steelhead Segregated harvest program produces approximately 4,000 ocean recruits, 55 adults to mixed stock fisheries and 915 to terminal area harvest. These adults were produced from a release of 100,000 smolts.

The proposed Lewis River summer steelhead Segregated Harvest program produces about 175,000 smolts that are 100 percent derived from adult returns to the hatchery. The total contribution of hatchery origin fish from this harvest program is on average approximately 13,800 fish (Table 6-4). This includes meeting the hatchery broodstock needs of 160 fish, having a surplus of 4,573 fish at the hatchery and contributing 9,055 fish to harvest (827 in mixed stock harvest and 8,228 in the terminal area).

6.4 RAINBOW TROUT AND KOKANEE

The proposed resident rainbow trout and kokanee programs are expected to maintain the existing recreational fisheries in Swift Reservoir and Lake Merwin; however, the potential

[21] Note that total adult ocean recruits are lower because the lower river wild later winter steelhead population is no longer being mined for supplementation.

adverse effects of these programs on reintroduced salmon and steelhead are unknown. Resident trout plants in Swift reservoir would be evaluated to determine impacts on reintroduced anadromous fish.

7.0 ANNUAL OPERATING PLAN

The Settlement Agreement Calls for the development of an annual operating plan (AOP), which will be designed to implement the H&S Plan. The AOP needs to provide the following information:

1. Production Plan: Specifies the species to be reared and broodstock source.

2. Hatchery and Juvenile Production Targets: Identifies adult and juvenile targets by species for each hatchery program.

3. Fish Release Schedule: Identifies by species the rearing schedule and planned distribution of fish and the schedules and locations of release.

4. List of Hatchery Facility Upgrades: Identifies upgrades to be implemented at each hatchery facility

A discussion of each of the four AOP elements is presented below.

7.1 PRODUCTION PLAN

The species (and stocks) to be released as part of the H&S Plan are presented in Table 7-1.

Table 7-1. Species and broodstock source of hatchery fish reared and released as part of the H&S Plan.

Species and Stock	Broodstock Source
Type N Coho	Lewis River Hatchery Complex
Type S Coho	Lewis River Hatchery Complex
Late Winter Steelhead	Lower Lewis River Wild
Winter Steelhead	Lewis River Hatchery Complex
Summer Steelhead	Lewis River Hatchery Complex

7.2 HATCHERY AND JUVENILE PRODUCTION TARGETS

The adult and juvenile production targets are shown in Table 7-2.

Table 7-2. Adult and juvenile hatchery production targets

Species and Stock	Adult Hatchery Production Targets	Juvenile Hatchery Production Targets
Coho	60,000	1.8 million*
Late Winter Steelhead	None	50,000
Steelhead	13,200	275,000
Spring Chinook	12,800	1.35 million
Total	86,000	3.475 million

* For years 1 through 4.

7.3 FISH RELEASE SCHEDULE

The location and schedule for all hatchery fish releases will be developed once the hatchery upgrades are completed.

7.4 HATCHERY FACILITY UPGRADES

The hatchery upgrades that will be implemented include the following as provided for in Schedule 8.7 of the Lewis River Settlement Agreement:

Lewis River Hatchery

- Adult Pond Modification to provide the ability to safely collect, handle, sort and crowd species
- Convert rearing ponds to raceways
- Repair downstream water intake
- Maintain upstream intake and conveyance pipe

Merwin Hatchery

- Ozone treatment upgrade
- Rearing pond flow increases
- Modification of release ponds to accommodate adult steelhead

- Purchase two fish hauling trucks

Speelyai Hatchery

- Convert Pond 14 into raceways
- Convert burrow's ponds into raceways
- Repair water intake structure
- Improve adult fertilization area
- Improve adult kokanee trap
- Expand Incubation area

8.0 REFERENCES

Cramer, S.P. & Associates, Inc. 2004. Lewis River fish planning document. PacifiCorp and Cowlitz PUD, Gresham, Oregon.

Hatchery Scientific Review Group (HSRG) 2004-Lars Mobrand (chair), John Barr, Lee Blankenship, Don Campton, Trevor Evelyn, Tom Flagg, Conrad Mahnken, Robert Piper, Paul Seidel, Lisa Seeb, and Bill Smoker. 2004. Hatchery reform: principles and recommendations of the HSRG. Long Live the Kings , 1305 Fourth Avenue, Suite 810, Seattle, WA 98101 (available from www.hatcheryreform.org).

Independent Scientific Advisory Board (ISAB). 2005. Memorandum (ISAB 2005-4A). ISAB clarification on mass marking and mark-selective fisheries.

Lee, K. N. 1993. Compass and gyroscope integrating science and politics for the environment. Island Press, Washington, D.C.

National Marine Fisheries Service (NMFS). 1999. Biological Opinion on Artificial Propagation in the Columbia River Basin: Incidental Take of Listed Salmon and Steelhead from Federal and Nonfederal Hatchery Programs that Collect, Rear, and Release Unlisted Fish Species. Endangered Species Act Section 7 Consultation. Portland, Oregon.

PacifiCorp and Cowlitz PUD. 2004a. Settlement Agreement for the Lewis River Hydroelectric Projects. November 30, 2004.

PacifiCorp and Cowlitz PUD. 2004b. Lewis River Hydroelectric Projects: Final Technical Studies Status Reports. PacifiCorp, Portland, OR and Cowlitz PUD, Longview, WA. April 2004.

RASP (Regional Assessment of Supplementation Project). 1992. Regional assessment of supplementation project. Mobrand Biometrics, Inc., Vashon, Washington.

WDFW 2004a. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River Spring Chinook. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. . Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/chinook/lewisrrsprck.pdf

WDFW 2004b Draft Hatchery and Genetic Management Plan (HGMP). Lewis River Type S coho. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/coho/lewisrcohos.pdf

WDFW 2004c. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River (Merwin) winter steelhead. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/steelhead/merwinssthd.pdf

WDFW 2004d. Draft Annual Report for the Cowlitz Falls Project. Prepared by John Serl and Charles Morrill of WDFW.

Appendix A

Existing Hatchery Facilities and Operations in the Lewis River Basin

APPENDIX A
EXISITNG HATCHERY FACILITIES AND OPERATIONS IN THE LEWIS RIVER BASIN

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXISITNG HATCHERY FACILITIES AND OPERATIONS IN THE LEWIS RIVER BASIN

Hatchery fish production in the Lewis River basin originates from the Lewis River, Speelyai, and Merwin hatcheries (collectively known as the Lewis River Hatchery Complex). The three hatcheries are currently operated as a complex, sharing adult return, rearing, and release functions. A detailed description of each of these facilities is presented in the following paragraphs. A description of current hatchery operations is presented in Section 2.0.

1.0 EXISTING HATCHERY FACILITIES

1.1 LEWIS RIVER HATCHERY

The Lewis River Hatchery is located adjacent to the mainstem Lewis River at RM 15.7, approximately 8 miles east of Woodland, Washington. Constructed in 1932, it is the oldest of the three fish production facilities in the Lewis River basin. PacifiCorp Energy funded its construction and currently funds 100 percent of its operation; although, the hatchery is owned by the Washington Department of Fish and Wildlife (WDFW). The Lewis River Hatchery currently produces spring Chinook and Type-S (early) and Type-N (late) coho.

Situated on 119 acres, the Lewis River Hatchery has 410,000 cubic feet of outdoor rearing/adult holding space, including four half-acre ponds, and twelve 10-by-100-foot raceways that are 4 feet deep (Table 1-1) (Figure 1-1). Inside there are 50 incubator stacks (WDFW 2005a). The hatchery has an eyeing capacity of 13 million eggs and a hatching capacity of 7.7 million fry (Tetra Tech/KCM, Inc. 2002). On-site support facilities include three residences, a hatchery/office building, freezer building, two three-bay storage buildings, public restrooms, two intake structures, two pump control buildings, two compressor buildings, and a domestic water well (WDFW 2005a).

Table 1-1. Lewis River Hatchery facilities.

Function	Facilities
Water Supply	Pumped from the Lewis River via two intakes and nine pumps (29,000 gallons per minute maximum capacity)
Adult Trap	A denil steep pass fish ladder located at the hatchery
Adult Holding	One-half acre juvenile rearing/adult holding pond
Incubation	Fifty double stacks of FAL vertical incubators
Early Rearing	Three 18 foot-long deep cell troughs and four shallow starter troughs
Raceways	Twelve 10x100x4 foot raceways
Rearing Ponds	Three one-half-acre juvenile rearing ponds

Source: WDFW 2005a

Source: modified photograph from Tetra Tech/KCM, Inc. 2002

Figure 1-1. Lewis River Hatchery facilities.

Water is currently supplied to the Lewis River Hatchery only from the Lewis River via two intakes and nine pumps (WDFW 2004a). Three booster pumps permit further distribution of water to other areas of the facility as needed. Approximately 29,000 gpm can be delivered to the facility depending on hatchery needs (WDFW 2005a). According to WDFW (2004a), the upstream pump station has a capacity of approximately 22,000 gpm and conforms to the latest NMFS screening requirements. The lower pump station has a capacity of 6,000 gpm and the screening does not currently meet NMFS criteria (Tetra Tech/KCM, Inc. 2002). As part of the hatchery upgrades (described below), the pump and screen will be upgraded to meet NMFS criteria.

If water entering the Lewis River Hatchery is supersaturated with gas, it is passed through four gas stabilization towers to reduce gas levels prior to being supplied to rearing units. Pumped water can bypass the aerators if gas level is acceptable. All rearing units are supplied with single pass water and the water supply is protected by flow alarms at the intake head box, and holding ponds.

Broodstock used at the Lewis River Hatchery is collected at adult trapping facilities at the Lewis River Hatchery and at the base of Merwin Dam (RM 19) (the Merwin Dam trap). The Lewis River Hatchery trap uses a denil ladder supplied with first run river water (75 percent) and hatchery effluent water (25 percent) as attractant. Upon reaching the top of the ladder the fish pass through a V-weir into a 200-foot long, 7-foot wide channel with an automatic crowder system and a sorting brail (WDFW 2004a).

The Merwin Dam trap has a one jump opening to the orifice opening into a V-weir inlet. The fish enter into a darkened single chamber approximately 60 feet long, 12 feet wide, and 7 feet deep with a flow of 25,000 gpm (WDFW 2004a). Captured fish are sorted,

inoculated and then transported to the Lewis River, Speelyai, and Merwin hatcheries for spawning (Tetra Tech/KCM, Inc. 2002).

As a component of the Settlement Agreement (PacifiCorp and Cowlitz PUD 2004a), several upgrades are scheduled for the Lewis River Hatchery (see Schedule 8.7 of the Settlement Agreement). These upgrades include:

- Rebuild the current adult holding pond (pond 15) to accommodate adult collection processes and provide the ability to safely collect, handle (electro-anesthetic or acceptable alternative), sort (by species), and crowd by automation.

- Rebuild all asphalt rearing ponds (ponds 13, 14, and 16) into concrete raceways to provide rearing versatility and to increase the water exchange rate to maximize smolt to adult survival.

- Replace the two existing water supply pumps at the downstream intake with turbine motors, replacing the common header to handle the additional flow, stabilize the current structure, and bring the intake screens into compliance with NMFS standards.

- Test and repair the upstream intake and conveyance pipe.

1.2 SPEELYAI HATCHERY

Speelyai Hatchery is located near confluence of Speelyai Creek and Lake Merwin (RM 26), approximately 21 miles east of Woodland, Washington. PacifiCorp Energy owns the 15-acre hatchery property; Cowlitz PUD and PacifiCorp Energy jointly funded its construction, and PacifiCorp Energy has financed subsequent capital improvements. PacifiCorp Energy currently funds approximately 90 percent of the current hatchery operation and maintenance expenses and Cowlitz PUD provides the remaining amount. As described in PacifiCorp and Cowlitz PUD (2004a), the facility was originally built in 1958 to provide coho mitigation for lost habitat in the Lewis River above Swift Dam. Speelyai Hatchery currently produces rainbow trout and kokanee to supplement reservoir fisheries. The facility also provides support for the Lewis River spring Chinook and coho programs.

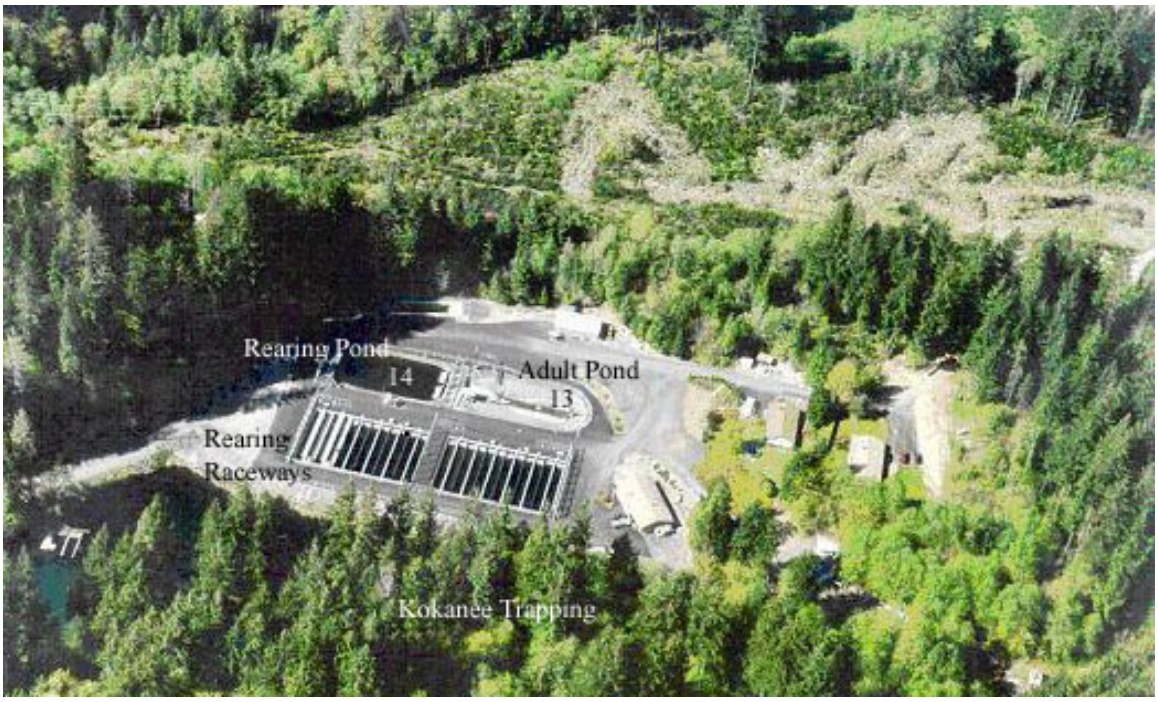
Speelyai Hatchery has approximately 166,450 cubic feet of outdoor rearing space, including two quarter-acre holding/rearing ponds, four 17x3x3 foot starter ponds, and twelve 20x80x4 foot concrete raceways (Table 1-2) (Figure 1-2) (WDFW 2005a). Incubation facilities include fifty stacks of FAL vertical incubators, two standard shallow troughs, and four 17x1.5x1.5 foot deep troughs. Total available flow at Speelyai Hatchery is reported to be 9,200 gpm from a gravity flow intake on Speelyai Creek (KCM/Tetra Tech 2002).). The available flow to the Speelyai Hatchery intake was recently measured at 30 cfs (13,496 gpm) in August, and the hatchery intake has the capacity to take up to 24 cfs (10,797 gpm). Much of what does not flow into the intake flows past the existing diversion dam and into Speelyai Creek downstream of the diversion dam. Because the water quality in Speelyai Creek above the hatchery is excellent and water temperatures are relatively cool year round (48 to 55°F), the facility is used to hold broodstock and to incubate eggs collected at the Lewis River Hatchery

and at the Merwin Dam trap. Net pens are also used to rear approximately half of the Lake Merwin kokanee program. The net pens also support non-mitigation summer steelhead production for release into the North Fork Lewis River.

Table 1-2. Speelyai Creek Hatchery facilities.

Function	Facilities
Water Supply	Gravity flow intake on Speelyai Creek (9,200 gallons per minute maximum capacity)
Adult Trap	Small adult trap for kokanee
Adult Holding	One quarter-acre asphalt holding/rearing pond
Incubation	Fifty stacks of FAL vertical incubators
Early Rearing	Two standard shallow troughs and four 17x15x1.5 foot deep troughs
Raceways	Twelve 20x80x4 foot concrete raceways
Starter Ponds	Four 17x3x3 foot starter ponds
Rearing Ponds	One quarter-acre asphalt rearing pond

Source: WDFW 2005a



m

Source: modified photograph from Tetra Tech/KCM, Inc. 2002

Figure 1-2. Speelyai Hatchery facilities.

On-site support facilities at Speelyai Hatchery include two residences, a hatchery building, a storage building, a shop/garage, domestic pump house, and the water supply intake (WDFW 2005a).

There are also 7 net pens located in the Echo Park Cove at RM 10 on the North Fork Lewis River that provide approximately 50,000 cubic feet of rearing space. A portion of

the spring Chinook reared in these pens are included as part of PacifiCorp Energy's mitigation requirements.

As a component of the Settlement Agreement, the following upgrades are scheduled for Speelyai Hatchery (see Schedule 8.7 of the Settlement Agreement):

- Convert rearing pond 14 into raceways for rearing versatility.
- Convert the existing Burrow's Ponds into two raceways and modify the raceways to provide flexibility to segregate fish into three sections.
- Make the necessary repairs needed to stop leaking between raceways.
- Replace the existing water supply diversion dam with new intake diversion adjacent to the hatchery, stabilize the intake location, and replace the intake valves.
- Increase the size of the adult fertilization area by extending existing roof and pouring a larger concrete apron, and increase the capacity of the kill bins.
- Construct an adult kokanee trap to allow kokanee broodstock collection.
- Expand the incubation building to cover the existing intermediate troughs and incorporate new early rearing vessels to provide capacity for multiple species.
- Install net pens with capacity not to exceed 20,000 pounds in either Swift Reservoir or in the Swift No. 2 canal.

1.3 MERWIN HATCHERY

Merwin Hatchery is located just downstream of Merwin Dam at RM 19, near the town of Ariel, Washington. Constructed in 1993, it is the newest hatchery facility in the Lewis River basin. PacifiCorp Energy owns the facility and currently funds 100 percent of its operation. Merwin Hatchery currently produces summer and winter steelhead and rainbow trout.

Merwin Hatchery facilities include four quarter-acre rearing ponds, ten 9.5x80x2.5 foot fingerling raceways, four covered 7.5x33x4 foot adult holding raceways, two small smolt collection ponds, and two effluent settling ponds (Table 1-3) (Figure 1-3). Indoors are six 4.5x34x2 foot intermediate raceways, four 20 cubic foot fry troughs and 15 double stack Mari Source incubators. Approximate rearing space is 216,500 cubic feet. Support facilities include an operations building with management offices, the ozone plant, a storage building, and three residences (WDFW 2005a, Tetra Tech/KCM, Inc. 2002).

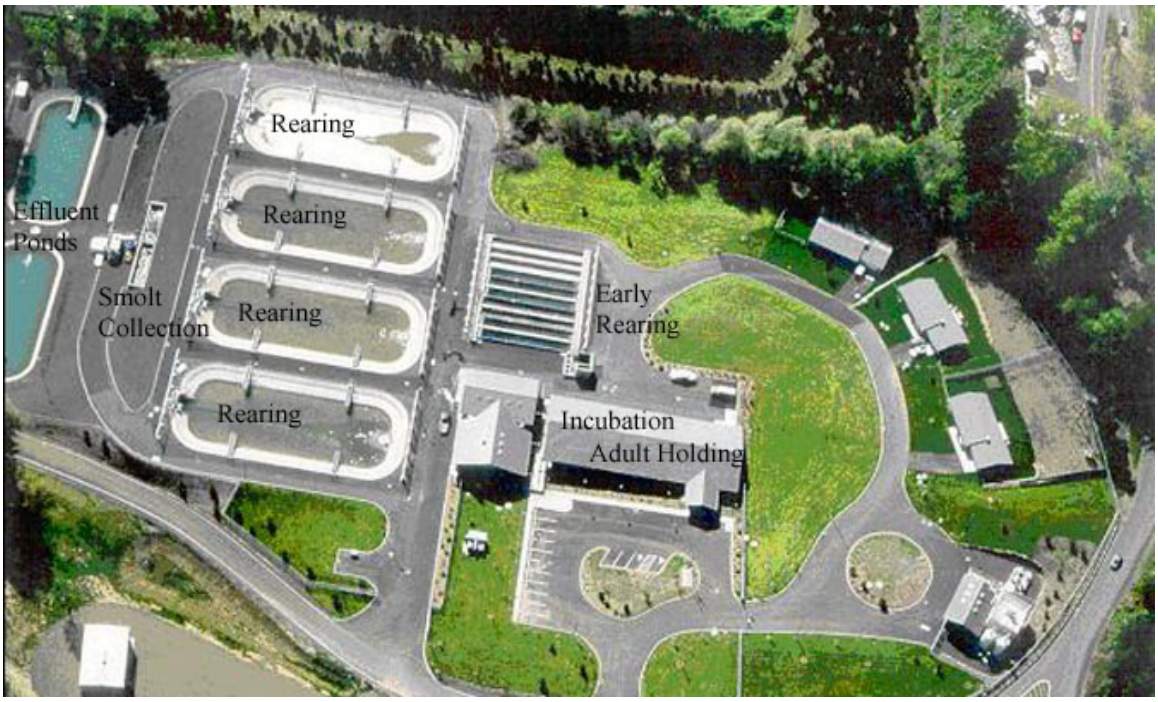
Water is supplied to the hatchery from Lake Merwin using a 5,600 gpm pump station on the dam face. Two screened intakes are used at depths of 15 and 90 feet. Ozone water sterilization is used to meet fish health needs and about two-thirds of the flow is ozone-disinfected prior to use. A maximum flow of 3,800 gpm can be sterilized and supplied to the hatchery building, raceways, and rearing ponds. The disinfected water is used in incubation and adult holding. The remaining water is routed to outdoor rearing ponds

after passing through packed column degassing units. In addition to treating a portion of the incoming water, all water exiting the adult holding ponds and incubation building is routed into two effluent settling ponds (Tetra Tech/KCM, Inc. 2002).

Table 1-3. Merwin Hatchery facilities.

Function	Facilities
Water Supply	Pumped from Lake Merwin via two intakes (approximately 5,600 gpm)
Adult Trap	Lewis River Hatchery and Merwin Dam trap
Adult Holding	Four 7.5x33x4 adult holding ponds
Incubation	15 double stack Mari Source incubators
Early Rearing	Four 20 cubic foot fry troughs
Raceways	Six 4.5x34x2 foot intermediate raceways and ten 9.5x80x2.5 foot fingerling raceways
Rearing Ponds	Four quarter-acre rearing ponds

Source: WDFW 2005a



Source: modified photograph from Tetra Tech/KCM, Inc. 2002

Figure 1-3. Merwin Hatchery facilities.

The following upgrades are scheduled for Merwin Hatchery (see Schedule 8.7 of the Settlement Agreement):

- Upgrade and replace the existing ozone system with current technology, and add a small backup system for incubation.

- Replace the rearing pond risers in the ponds with screened up wells and larger valves to improve flow patterns and exchange rates.

- Modify release ponds to accommodate adult steelhead (plumb new inflow into the ponds and extend the pond wall and screen heights)

- Purchase two additional fish hauling trucks designed to handle juveniles and adults for hatchery, supplementation and reintroduction purposes.

1.4 MERWIN DAM TRAP

The Merwin Dam trap, located at the base of Merwin Dam, is approximately 60 feet long, 12 feet wide, and 7 feet deep. It has a one jump orifice opening into a V-weir inlet (fyke). The fish then enter a darkened single chamber approximately 60 feet long, 12 feet wide, and 7 feet deep with a flow of 25,000 gpm (WDFW 2004a). The trap is used to collect adult spring Chinook, coho and steelhead for the Lewis Rive Hatchery Complex.

As a component of the Settlement Agreement, PacifiCorp Energy is modifying the existing Merwin Dam trap as needed to improve worker safety and increase fish handling efficiency without introducing additional risk to fish (PacifiCorp and Cowlitz PUD 2004a). PacifiCorp Energy has repaired the fyke portion of the Merwin Dam trap in an effort to decrease the risk of injury to fish in the facility. PacifiCorp Energy will also, to the extent feasible, limit the discharge from the generation facilities at Merwin Dam for safety purposes to a maximum flow to be determined by PacifiCorp Energy and WDFW when personnel are working in the existing fish trap. Until construction of the Merwin Upstream Collection and Transport Facility is complete (by six months after the fourth anniversary of the issuance of the new license), the upgraded Merwin Dam trap will be operated to collect hatchery fish returning from the ocean and to transport any bull trout to Yale Lake.

2.0 EXISTING HATCHERY OPERATIONS

As describe in the previous section, the Lewis River Hatchery Complex currently produces spring Chinook, Type-S (early) coho, Type-N (late) coho, summer steelhead, winter steelhead, resident rainbow trout, and kokanee. Existing hatchery operations and production levels are guided by FERC license articles (as amended) and by subsequent mitigation agreements between PacifiCorp Energy, Cowlitz PUD, and WDFW (PacifiCorp and Cowlitz PUD 2004b, Tetra Tech/KCM, Inc. 2002, and WDFW 2005b). The actual operation and management of the Lewis River Hatchery Complex is the responsibility of WDFW. WDFW determines annual release goals, planting locations, policies regarding fish disease, harvest and general day-to-day operations. In 2005, the Lewis River Hatchery Complex released more than 3.87 million fish, including approximately 1.03 million spring Chinook, 1.69 million coho, 102,000 winter steelhead, 176,000 summer steelhead, 869,000 rainbow trout, and 12,500 pounds of juvenile kokanee (WDFW 2005a, WDFW 2006)). Current release numbers were negotiated with FERC and are part of the amended Merwin Project license. Past and current production levels at the Lewis River Hatchery Complex are summarized in Table 2-1.

Historically, PacifiCorp Energy and Cowlitz PUD funded 70 percent of the operation and maintenance costs at the Lewis River Hatchery Complex. The remaining 30 percent was funded through the Mitchell Act. Mitchell Act funds were used by WDFW to produce additional fish for other WDFW programs, and for broodstock to provide eggs to other lower Columbia River hatcheries both of which are not part of PacifiCorp Energy's mitigation program. The Mitchell Act funding was eliminated in 2000 and production goals were subsequently reduced by 1.3 million fish (81,000 pounds) (Tetra Tech/KCM 2002).

Table 2-1. Past and current fish production levels at the Lewis River Hatchery Complex.

Species	License Article 50 and 51 Production Levels	2002 Production Modification*	Current Production Levels
Spring Chinook	250,000 juveniles to produce 12,800 adult fish	1,050,000 juveniles	1,050,000 juveniles (900,000 yearlings at 8 fpp released into the Lewis River and 150,000 smolts for the Echo Bay Net Pens)
Coho	2,100,000 juveniles to produce 71,000 adult fish	1,800,000 juveniles	815,000 Type N smolts at 16.0 fpp and 880,000 Type S coho smolts at 16.0 fpp
Steelhead	250,000 juveniles (about 41,600 pounds)	275,000 juveniles	175,000 summer steelhead at 4.8 fpp and 100,000 winter steelhead at 4.8 fpp
Sea-run Cutthroat	25,000 juveniles (up to 6,250 pounds).	Discontinued**	Discontinued**
Rainbow Trout	800,000 rainbow trout juveniles at 25-30 fpp	None	Beginning in 2006: 20,000 pounds at 3 fpp. The 2005 goal was: 800,000 at 40 fpp
Kokanee	100,000 juveniles at 7-8 fpp	None	45,000 at 12 fpp - Speelyai Hatchery 48,000 at 5.4 fpp – Speelyai Bay Net pens

* In September 2002, PacifiCorp Energy informed FERC of changes to Article 50 production goals that were initiated by WDFW to "align hatchery production with current fish management goals and to improve recreational fisheries and survival of anadromous fish released into the Lewis River."

** WDFW discontinued hatchery production of sea-run cutthroat trout in 1999 and increase steelhead production by 25,000 to 275,000 smolts. Accordingly, FERC modified the Merwin License article to reflect the changes in production.

Source: Tetra Tech/KCM 2002 and WDFW 2005b

In June 2000, the ESA listing of Columbia River Chinook and steelhead required WDFW to file Draft Hatchery Genetic Management Plans (HGMPs) for several Lewis River Hatchery Complex stocks. These HGMPs have resulted in a number of recent operational changes at the Lewis Rive facilities. The following paragraphs describe the current hatchery and fish management goals, production levels, and hatchery operations associated with each species produced at the Lewis River Hatchery Complex.

2.1 SPRING CHINOOK

2.1.1 Current Management Goals and Production Levels

According to WDFW (2004a) and WDFW (2005b), the primary purpose of the Lewis River Hatchery Complex spring Chinook program is to "mitigate Columbia River spring Chinook production (predominantly from hatcheries), which is a major contributor to the catches in Washington and Oregon ocean fisheries[1]." Additional goals are to:

1. Plant 900,000 smolts at 8 fish per pound (fpp) into the Lewis River (Table 2-1);

2. Provide 200,000 eyed eggs for transfer to the Grays River Hatchery for the Deep River Net Pen Programs (not part of PacifiCorp Energy's mitigation program);

3. Provide 150,000 smolts for release from the Fish First (WDFW Co-op) Echo Bay Net Pens (Table 2-1)[2]; and

4. Operate hatcheries consistent with the recovery of spring Chinook salmon in the Lewis River[3]. The major hatchery issues are: 1) to maintain the genetic diversity of spring Chinook in the Lewis River, and ensure the reproductive success of wild spring Chinook meets or exceeds recovery goals, 2) minimize the ecological interactions of hatchery spring Chinook on naturally produced salmon and steelhead, and minimize the mortality of naturally produced juvenile and adult salmon and steelhead due to facility operations.

According to WDFW, the number of juvenile spring Chinook produced at the hatcheries is adjusted on the basis of a 5-year rolling average of adult returns in an ongoing attempt to provide the number of adult salmon (12,800 spring Chinook) that are identified in Article 50 of the existing Merwin Project license.

2.1.2 Broodstock Origin

Historically, the Lewis River basin supported an indigenous stock of spring Chinook salmon, but with the construction of Merwin Dam in 1932, the majority of the upper basin spawning habitat became inaccessible and the stock subsequently declined. Early attempts to maintain the stock through hatchery production failed, and by the mid-1950s spring Chinook had completely disappeared from Merwin Dam trap catches (PacifiCorp Energy and Cowlitz PUD 2004b).

---

[1] WDFW (2004) also notes that significant commercial net catches and recreational fishing occurs in the mainstem as well as minor catches in the individual tributaries streams.

[2] This program rears and releases Lewis River Hatchery spring Chinook in net pens downstream of the hatchery to spread out fishing opportunities in the lower river.

[3] The spring Chinook recovery goal was not noted in the Draft HGMP; however, the recovery goal presented in the Lower Columbia River Salmon Recovery & Subbasin Plan (December 2004) is 2,200 adults.

Spring Chinook from the Cowlitz River, Carson National Fish Hatchery, and Willamette River were introduced into the Lewis River in the late 1950s; however, relatively few were planted until 1972 (PacifiCorp and Cowlitz PUD 2004b). In 1972, the Lewis River Hatchery manager used Carson and Cowlitz stocks to help reestablish spring Chinook in the basin (Myers et al. 1998). Since then, spring Chinook for the Lewis River Hatchery program have originated from a variety of sources including Cowlitz, Kalama, Carson, and Klickitat stock (Table 2-2) (Hymer et al. 1993, Myers et al. 1998). The stocks used now include Cowlitz and Kalama, along with on-station returns to the Lewis River. The last release of non-Lewis River spring Chinook was in 1997; since then, all broodstock has been from returning adults collected at the Lewis River Hatchery and Merwin traps. Recent genetic data compiled by Myers et al. (1998) and Marshall et al. (1995) have shown that Lewis River spring Chinook are closely related to Cowlitz, Kalama and Klickitat stocks. WDFW (2002) considers Lewis River spring Chinook to be a mixed stock with composite production. Acceptable stocks that can be used as broodstock in years of low returns to the Lewis River include Cowlitz and Kalama (WDFW 2006).

Table 2-2. The origin of spring Chinook broodstock used at the Lewis River hatchery Complex.

Broodstock Source	Origin	Year(s) Used
Cowlitz River Spring Chinook	Hatchery	1967 to 1970
Carson National Fish Hatchery Spring Chinook	Hatchery	1960 to 1984
Kalama River Spring Chinook	Hatchery	Unknown
Willamette River Spring Chinook	Hatchery	1986
Lewis River Spring Chinook	Hatchery	1960 to present

Source: WDFW 2004a

2.1.3 Broodstock Collection

Broodstock for the Lewis River spring Chinook program is collected at the Lewis River Hatchery trap and Merwin Dam trap. The Lewis River Hatchery trap is operated approximately 4 months of the year (September through December). The Merwin trap is currently operated year-round.. Adult spring Chinook usually arrive in early April and peak in May, June, and July.

All Lewis River Hatchery-origin spring Chinook have been mass marked (adipose fin clip only) since 2002, except for a group of 150,000 that are coded-wire tagged with no adipose fin clip and another group of 150,000 that is coded-wire tagged and adipose fin clipped. When adults are handled, all fish with adipose fins are checked for presence of CWT (WDFW 2006). Those with adipose fins and no tags are top caudal marked and returned to the river as wild fish. All hatchery-origin fish collected in the trap are transported to Speelyai Hatchery and spawned as broodstock. Excess hatchery-origin fish are killed, sold, or donated to food banks (they are not transported to Speelyai Hatchery) (WDFW 2004a). After spawning, all spring Chinook carcasses are used for nutrient enhancement or are disposed of at a local landfill.

WDFW has a spring Chinook egg take goal of 1.6 million eggs. To meet this goal, the broodstock collection goal is set at 800 adults (400 males and 400 females) and 20 jacks, based on an average fecundity of 4,400 eggs/female and a pre-spawning mortality of 10 percent (Table 2-3) (WDFW 2004a). Between 1994 and 2004, an average of 729 adult male and 450 adult female spring Chinook were collected as broodstock at the Lewis River Hatchery Complex annually (Table 2-3).

Table 2-3. The spring Chinook broodstock collection level and egg take at the Lewis River Hatchery Complex (1994 through 2004).

Year	Adult Males	Adult Females	Jacks	Egg Take
Goal	400	400	20	1,600,000
1994	223	357	4	1,563,300
1995	272	362	3	1,522,000
1996	306	403	5	1,612,000
1997	379	407	3	1,696,000
1998	498	497	2	1,990,000
1999	287	365	40	1,460,000
2000	330	417	7	1,579,630
2001	280	419	14	1,373,232
2002	371	456	7	1,326,200
2003	396	395	8	1,638,459
2004	405	413	17	1,586,241
Average	340	408	15	1,577,006

Source: WDFW 2003, WDFW 2004a, WDFW 2004b, WDFW 2005a, and pers. comm. Eric Kinne, WDFW, September 27, 2005

2.1.4 Incubation and Rearing

According to WDFW (2004a), spring Chinook eggs are incubated in vertical incubators at Speelyai Hatchery consistent with loading densities recommended by Piper et al. (1982). Water temperature is monitored with thermographs and recorded temperature units (TU) are tracked during embryonic development. During incubation, all eggs are treated with formalin at 600 part per million (ppm) to keep them free of fungus (WDFW 2004a).

Spring Chinook fry are ponded when the yolk sac slit is approximately 1 millimeter wide (approximately 1,200 TU's) or based on 95 percent yolk sac absorption. Ponding takes place from December through January. In May of each year, approximately 830,000 spring Chinook are transferred from the Speelyai Hatchery to the Lewis River Hatchery (WDFW 2006). Approximately 75,000 spring Chinook are transferred from Speelyai Hatchery to the Echo Bay Net Pens in December for release into the North Fork Lewis River in January. The Echo Bay Net Pen project is located on the Lewis River at RM 10 and is maintained through a cooperative effort between WDFW and Fish First. Another 75,000 spring Chinook are transferred from Speelyai Hatchery to the Echo Bay net pens in January for release into the North Fork Lewis River in March. The remaining 100,000 spring Chinook at Speelyai Hatchery are transferred to Lewis River Hatchery in January

for a February through March volitional release. According to WDFW, rearing densities are also consistent with those recommended by Piper (1982).

2.1.5 Release Location and Numbers Released

All spring Chinook produced at the Lewis River Hatchery (and Echo Bay net pens) are released on-site into the North Fork Lewis River. Prior to 2003, releases usually occurred from February through March. Releases are now scheduled for late January and March (WDFW 2006). According to WDFW, release timing is determined by fish behavior such as aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance and scale loss during feeding. Prior to release, an area Fish Health Specialist evaluates the population's health and condition.

The vast majority of spring Chinook produced at the Lewis River Hatchery Complex since 1994 have been released as yearlings in February and March (Table 2-4), although fry and fingerlings have been released in the past (WDFW 2004a). Between 1994 and 2004, an average of just over 1 million spring Chinook yearlings were released into the Lewis River annually. WDFW's current release strategy is designed minimize the amount of interaction with native fish populations.

Table 2-4. The number, size, and release dates of spring Chinook yearlings released into the Lewis River (1994 through 2004).

Year	Number Released	Release Dates	Size (fpp)
1994	642,000	3/5	7.0
1995	1,312,600	2/12 through 3/20	6.0
1996	1,178,272	2/8 through 3/22	6.0
1997	1,108,045	2/14 through 3/23	6.0
1998	1,096,841*	1/1 through 3/28	6.5
1999	868,180	2/1 through 3/31	8.5
2000	1,045,056	2/1 through 3/31	5.1 to 7.6
2001	924,115**	2/1 through 3/31	5.3 to 6.2
2002	1,013,814	2/1 through 3/31	8.4 to 7.6
2003	1,076,972	3/1	9.0
2004	1,028,765	3/1	9.0
Average	1,026,787	--	--

Source: WDFW 2004a, WDFW 2004b, WDFW 2005a

* Low numbers due to a BKD outbreak.

** Numbers do not included fish released from the Echo bay net pens.

2.1.6 Adult Abundance

Between 1994 and 2004, an average of 1,684 adult and 93 jack spring Chinook have returned to the Lewis River Hatchery Complex annually (Table 2-5), exceeding the 400 males and 400 females needed to meet current egg take goals.

2.2 COHO

2.2.1 Current Management Goals and Production Levels

According to WDFW (2004c) and WDFW (2005b), the primary purpose of the Lewis River Hatchery Complex Type S coho program is to:

1. Produce coho salmon to mitigate for hydroelectric system development in the Lewis system and for activities within the Columbia River Basin for the loss of early coho salmon stock that would have been produced naturally in the North Fork Lewis River system in the absence of the hydroelectric dams.

2. Plant 880,000 yearling Type S coho smolts at 16.0 fpp into the Lewis River (Table 2-5).

3. Incorporate natural stock into the existing hatchery population to support overall ESU recovery goals.[4]

[4] Under existing operations, natural stocks are not incorporated into the hatchery population (i.e. the program is not integrated at this time) (WDFW 2006).

Table 2-5. Adult and jack spring Chinook returns to the Lewis River Hatchery Complex (hatchery escapement) from 1994 through 2004 (includes wild and hatchery fish).

Year	Total Hatchery Escapement	
	Adult Spring Chinook	Jack Spring Chinook
1994	776	10
1995	1,553	21
1996	1,054	26
1997	2,245	28
1998	1,188	11
1999	846	78
2000	777	50
2001	1,178	53
2002	1,869	58
2003	3,037	357
2004	3,999	336
Average	1,684	93

Source: http://wdfw.wa.gov/hat/escape/1977-1997index.htm and WDFW 2005a

The primary purpose of the N coho program is to:

1. Produce coho salmon to mitigate for hydroelectric system development in the Lewis system and for activities within the Columbia River Basin for the loss of late coho salmon stock that would have been produced naturally in the North Fork Lewis River system in the absence of the hydroelectric dams.

2. Plant 815,000 Type N smolts at 16.0 fpp into the Lewis River (Table 2-1).

3. Incorporate natural stock into the existing hatchery population to support overall ESU recovery goals

4. Provide for enough returning broodstock to fill the egg needs of regional programs (not part of PacifiCorp Energy's mitigation program). Obligations as of 2005 also include: transferring 460,000 eyed eggs to Fish First for remote site incubator (RSI) production in the North Fork Lewis River tributaries, transferring 1,150,000 eyed eggs to Klickitat Hatchery, transferring 6,250 eyed eggs to Region 5 Salmon in the Classroom (SIC), transferring 5,000 eyed eggs to Steve Syversion project, and if needed transferring 2,700,000 eyed eggs to Washougal Hatchery for the Klickitat River direct release (WDFW 2004d).

2.2.2 Broodstock Origin

Although the original Lewis River Hatchery coho stock was taken from indigenous coho trapped at the Merwin Dam, coho released into the basin in the past 70 years have originated from a variety of stock sources. The majority of these releases have been Cowlitz River (Type-N) and Toutle River (Type-S) stocks. Because of these extensive stock transfers, WDFW considers the existing Lewis River coho population to be a mixed

stock of composite production (WDFW 2002). Allozyme analysis of Lewis River Hatchery coho has shown them to be genetically distinct from other Washington coho stocks examined (WDFW 2002).

2.2.3 Broodstock Collection

Both Type S and Type N coho and are collected at Lewis River Hatchery and Merwin Dam traps. The traps are opened for coho collection during the entire the run and run timing is used to identify each stock. Type S coho are trapped from September through early November and Type N coho are trapped from mid November through early January (WDFW 2004c and WDFW 2004d). Like spring Chinook, all Type S and Type N coho are mass marked (adipose fin clipped) except for a group of 75,000 of each stock that are coded-wire tagged with no adipose fin clip and another group of 75,000 each stock that is coded-wire tagged and adipose fin clipped (termed double-indexing).

Adult coho collected at the Lewis River Hatchery and Merwin Dam traps are identified as to wild or hatchery origin, through the examination of fin clips or coded wire tags. All hatchery Type S coho selected for spawning purposes are transported to the Speelyai Hatchery holding pond prior to spawning at Speelyai Hatchery. All Type N coho selected for spawning are held and spawned at the Lewis River Hatchery. Coho with adipose fins and no tags are marked, and returned to the river as wild fish (WDFW 2004c and WDFW 2004d). After spawning, all spawned carcasses are either used for nutrient enhancement or are disposed of through the existing carcass contract (WDFW 2006). In recent years, live coho have also been transferred into the upper Lewis River basin for research purposes and to prepare the habitat for anadromous fish reintroduction.

WDFW has a Type S coho has an egg take goal of 1,100,000 and a broodstock collection goal set at 400 females and 400 males, excluding jacks (Table 2-6). The Type N coho egg take goal is 5,100,000 eggs (a 1,900 females and 1,900 males, excluding jacks) (Table 2-7). Both goals are based on an average fecundity of 3,000 eggs per female and pre-spawning mortality of 10 percent. As described previously, the Lewis River Type N coho program also provides eggs to Fish First, the Region 5 Salmon in The Classroom Program, the Steve Syversion project, and to the Klickitat and Washougal hatcheries, if needed (not part of PacifiCorp Energy's mitigation program) (WDFW 2005a).

The vast majority of the coho collected at the Lewis River Hatchery and Merwin Dam trap are hatchery fish. Between 1994 and 2004, an average of 764 adult male and 712 adult female Type S coho and 1,703 adult male and 1,516 adult female Type N coho were collected and used for broodstock at the Lewis River Hatchery Complex (Tables 2-6 and 2-7).

Table 2-6. The Type S coho broodstock collection level and egg take at the Lewis River Hatchery Complex (1994 through 2004).

Year	Type S Coho			
	Adult Males	**Adult Females**	**Jacks**	**Egg Take**
Goal	400*	400*	NA	1,100,000
1994	1,024	887	17	2,517,000
1995	459	438	4	1,054,800
1996	773	682	7	2,252,700
1997	1,246	1,106	17	3,239,600
1998	1,237	1,142	41	3,463,200
1999	1,148	1,063	28	3,214,000
2000	775	770	13	2,307,000
2001	457	452	8	1,325,300
2002	396	399	3	1,363,157
2003	450	450	10	1,201,600
2004	441	443	24	1,134,119
Average	**764**	**712**	**16**	**2,097,498**

* Current goal, in the past additional brood was collected for use at other facilities.

Source: WDFW 2004b, WDFW 2004c, WDFW 2005a, and pers. comm. Eric Kinne, WDFW, September 27, 2005

Table 2-7. The Type N coho broodstock collection level and egg take at the Lewis River Hatchery Complex (1994 through 2004)

Year	Type N Coho			
	Adult Males	**Adult Females**	**Jacks**	**Egg Take**
Goal	1,900*	1,900*	NA	5,100,000
1994	3,986	2,331	36	8,936,900
1995	545	521	10	1,680,200
1996	2,453	1,920	40	7,696,400
1997	3,414	3,442	42	9,996,987
1998	2,262	2,296	39	7,750,612
1999	1,714	1,753	35	6,570,833
2000	1,150	1,159	11	4,154,920
2001	462	469	15	1,734,806
2002	584	566	8	2,228,766
2003	1,106	1,120	135	3,510,000
2004	1,052	1,099	48	3,979,051
Average	**1,703**	**1,516**	**38**	**5,294,498**

* Current goal if eggs are needed for the Klickitat program.

Source: WDFW 2004b, WDFW 2004d, WDFW 2005a, and pers. comm. Eric Kinne, WDFW, September 27, 2005

2.2.4 Incubation and Rearing

Lewis River Type S coho are spawned at Speelyai Hatchery and the resulting eyed eggs are shipped to the Lewis River Hatchery in November for incubation in Heath stack incubators.

According to WDFW (2004c), incubation conditions are consistent with loading densities recommended by Piper et al. (1982). Water quality and temperatures are generally very good. Stack flows during incubation are 3.6 gpm and all eggs are treated with formalin to keep them free of fungus (WDFW 2004c).

Lewis River Type N coho are held, spawned, incubated (approximately 2.5 million eyed eggs, and reared at the Lewis River Hatchery. Health stack incubators are also used for this stock and incubation conditions are similar to those described for Type S coho. Lewis River water quality is generally very good but water temperatures are quite cold (40°F) during incubation and into the early rearing period (WDFW 2004d). Like Type S coho, stack flows during incubation are 3.6 gallons per minute (gpm) and all eggs are treated with formalin to keep them free of fungus (WDFW 2004d).

Both the Type S and Type N coho fry are ponded when the yolk sac slit measures less than 1 mm. The current practice is to start the fry in raceways and then move them into a large pond for rearing until released. To keep the size similar, the growth of Type S coho is slowed until the late coho reach a similar size. The two stocks are then mixed and reared until released on-site. According to WDFW (2004c) and WDFW (2004d), rearing densities are based on standardized agency guidelines, life-stage specific survival studies conducted on-site, life-stage specific survival studies conducted at other facilities, and staff experience. The rearing densities are also consistent with those recommended by Piper et al. (1982).

2.2.5 Release Location and Numbers Released

Both the Type S and Type N coho are released volitionally over a six-week period beginning on or after April 15. According to WDFW staff, approximately 80 percent of the stock migrates volitionally during that time period. The remaining 20 percent are forced out prior to May 20th. Release timing is determined by fish behavior such as aggressive screen and intake crowding, swarming against sloped pond sides, leaner condition factors, a more silvery physical appearance, and scale loss during feeding (WDFW 2004c and WDFW 2004d).

Prior to release, an area Fish Health Specialist evaluates the coho population's health and condition. According to WDFW, the production and release of only smolts through fish culture and volitional release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally produced fish. However, fry and fingerling Type N coho fry and fingerlings were also released into to the Lewis River reservoirs in 1993, 1998, 1999, and 2001 (WDFW 2004b).

Between 1994 and 2004, an average of just over 940,000 Type S coho yearlings and 1.6 million Type N coho yearlings were released into the Lewis River annually (Tables 2-8

and 2-9). It should be noted that prior to 2002, the Lewis River Hatchery Complex also produced one million Type S coho smolts (and 750,000 eyed eggs) as part a Mitchell Act funded tribal program[5]. With the termination of the Mitchell Act funding, the tribal program was discontinued.

Table 2-8. The number, size, and release dates of Type S coho yearlings released into the Lewis River (1994 through 2004).

Year	Number Released	Release Dates	Size (fpp)
1994	839,300	April-May	14.0
1995	888,400	April-May	13.9
1996	897,200	April-May	13.2
1997	968,369	April-May	14.1
1998	945,321	April-May	13.0
1999	902,448	April-May	11.8
2000	1,395,072*	April-May	14.4
2001	909,038	April	14.7
2002	874,579	May	16.3
2003	912,230	May	15
2004	856,919	May	15
Average	**944,443**	--	--

Source: WDFW 2004 b, WDFW 2004c, WDFW 2005a

* 440,406 of the type S coho released in 2000 were funded by the Mitchell Act (WDFW 2006).

Table 2-9. The number, size, and release dates of Type N coho yearlings released into the Lewis River (1994 through 2004).

Year	Number Released	Release Dates	Size (fpp)
1994	869,400	April-May	14.0
1995	2,199,200	April-May	14.1
1996	2,414,000	April-May	13.0
1997	1,981,379	April-May	14.8
1998	2,289,440	April-May	13.3
1999	2,193,653	April-May	14.2
2000	2,126,655	April-May	13.2
2001	868,756	April	10
2002	841,000	May	10
2003	840,219	May	15
2004	833,786	May	15
Average	**1,587,044**	--	--

Source: WDFW 2004b, WDFW 2004d, WDFW 2005a

[5] In 1997, the Yakama Nation initiated a reintroduction program for selected tributaries in the Mid-Columbia Region with early stock coho salmon from lower Columbia River hatcheries to restore natural production identified in the Yakima Nation's "Coho Salmon Species Plan (CSSP) for the Mid-Columbia Basin. The goal of this program was to initiate restoration of coho salmon populations in mid-Columbia tributaries to levels of abundance and productivity sufficient to support sustainable annual harvest by tribal and other fisheries.

2.2.6 Adult Abundance

From 1994 through 2004, the total adult Type S coho hatchery escapement (to the Lewis River hatchery and Merwin Dam trap) has ranged from a low of 1,145 in 1995 to 38,783 in 2001, with an average of approximately 15,600 fish (Table 2-10). During this same period, jack Type S coho escapement averaged approximately 2,500 fish. The vast majority of the Type S coho returning to the facilities are marked hatchery fish.

Table 2-10. Adult and jack Type S coho returns to the Lewis River Hatchery Complex (hatchery escapement) from 1994 through 2004 (includes wild and hatchery fish).

	Total Hatchery Escapement	
Year	**Adult Type S Coho**	**Jack Type S Coho**
1994	3,916	136
1995	1,145	641
1996	4,784	1,007
1997	5,943	260
1998	7,142	3,528
1999	14,962	2,343
2000	17,031	7,281
2001	38,783	1,291
2002	17,334	8,177
2003	38,367	1,933
2004	21,853	1,438
Average	**15,569**	**2,549**

Source: http://wdfw.wa.gov/hat/escape/1977-1997index.htm and WDFW 2005a

From 1994 through 2004, the total adult Type N coho hatchery escapement has ranged from a low of 1,299 in 1995 to 60,873 in 2001, with an average of approximately 16,000 fish (Table 2-11). During that same time period, the Type N coho jack escapement averaged approximately 3,100 fish. The vast majority of these are hatchery fish and the goal is to remove as many hatchery stock Type N coho as possible to minimize the interaction with those fish that result from wild spawners.

Table 2-11. Adult and jack Type N coho returns to the Lewis River Hatchery Complex (hatchery escapement) from 1994 through 2004 (includes wild and hatchery fish).

Year	Total Hatchery Escapement	
	Adult Type N Coho	**Jack Type N Coho**
1994	8,513	121
1995	1,299	460
1996	5,291	2,619
1997	12,571	307
1998	10,817	2,089
1999	17,724	6,757
2000	24,006	10,910
2001	60,873	533
2002	6,294	6,212
2003	21,898	2,573
2004	10,768	1,663
Average	**16,369**	**3,113**

Source: http://wdfw.wa.gov/hat/escape/1977-1997index.htm and WDFW 2005a

2.3 STEELHEAD

2.3.1 Current Management Goals and Production Levels

According to WDFW (2004e) and WDFW (2005a), the primary purpose of the Lewis River summer steelhead program is to[6]:

1. Rear and release 175,000 summer steelhead smolts at 4.8 fpp into the Lewis River (Table 2-1),

2. Provide adult harvest under the selective fishery regulations (retention of adipose clipped fish only),

3. Provide some escapement for broodstock for continued Merwin Hatchery production,

4. Cover transfers of 35,000 subyearlings to the Elochoman Hatchery, 60,000 yearlings to the Fish First Echo Bay Co-op Net Pens, 60,000 eyed eggs to Skamania Hatchery (not part of PacifiCorp Energy's mitigation program), and

5. Operate the hatcheries consistent with the recovery of ESA listed steelhead in the Lewis River (i.e. maintain the genetic diversity of naturally spawned steelhead and minimize ecological interactions with naturally produced salmon and steelhead) (WDFW 2004e).

The primary purpose of the winter steelhead program is to[7]:

[6] A more detailed description of the program goals is available in WDFW 2004e.

1. Release 100,000 winter steelhead smolts at 4.8 fpp into the Lewis River (Table 2-1).

2. Provide adult harvest under the selective fishery regulations (retention of adipose clipped fish only) and provide protection to listed fish,

3. Provide some escapement for broodstock for continued Merwin Hatchery production,

4. Operate the hatcheries consistent with the recovery of ESA listed steelhead in the Lewis River (i.e. maintain the genetic diversity of naturally spawned steelhead and minimize ecological interactions with naturally produced salmon and steelhead) (WDFW 2004e) (WDFW 2004f).

2.3.2 Broodstock Origin

Summer and winter steelhead are indigenous to the Lewis River basin; however, large numbers Skamania Hatchery summer steelhead and Skamania Hatchery and Beaver Creek Hatchery winter steelhead have been released into the Lewis River since the late 1950s (PacifiCorp and Cowlitz PUD 2004b). Skamania Hatchery summer steelhead were developed from Washougal River and Klickitat River summer steelhead at the Skamania Hatchery, Washington (Crawford 1979). This stock has been widely used in Washington, Idaho, Oregon, and California. Skamania Hatchery winter steelhead were derived from Beaver Creek Hatchery and Skamania Hatchery winter steelhead stocks. Skamania stock early-winter steelhead has been the source of nearly all the early winter hatchery smolts that WDFW releases in the Lower Columbia River region with the exception of Cowlitz River. Following the completion of Merwin Hatchery in 1993, the Lewis River Hatchery Complex egg take needs have been met using eggs from returning steelhead in the Lewis River system or by importing eggs from the Skamania Hatchery. It should be noted that Skamania eggs have not been used at the facility since 1998 (WDFW 2006).

2.3.3 Broodstock Collection

All summer and winter steelhead broodstock for the Lewis River Hatchery Complex program are volunteers to the Lewis River Hatchery and Merwin Dam traps. All hatchery-origin steelhead are adipose-fin clipped and only adipose fin-clipped adults are used for broodstock. According to WDFW (2004e), the vast majority of the steelhead collected in the traps are of hatchery stock. Adult collection and spawning guidelines for summer steelhead at Merwin Hatchery are as follows:

1. Broodstock will be collected from July through September. However, shortfalls may require additional collections through the fall.

2. There will be no size selection.

[7] A more detailed description of the program goals is available in WDFW 2004f.

3. Spawning will occur from December through January and will be completed by January 31.

4. Spawning will be one-to-one female unless shortfalls in broodstock occur; then half of the eggs from one female will be spawned with a different male.

Winter steelhead collection and spawning guidelines at Merwin Hatchery are as follows:

1. Fish entering the racks prior to December 7 will be marked so that they can be identified and will not be used for broodstock.

2. Broodstock retained for spawning from December 7 through January. New fish will be recruited into spawning population throughout the period. Males will be used once, opercle-punched, and returned to the river.

3. Bright (indicating recent freshwater entry) females that are running eggs will not be spawned.

4. There will be no selection for size.

5. Spawning will occur from December through January and will be completed by January 31.

6. Spawning will be one-to-one male to female unless shortfalls in broodstock occur, then half of the eggs from one female will be spawned with a different male.

WDFW has a summer steelhead broodstock collection goal of 225 males and 225 females and a winter steelhead broodstock collection goal of 200 males and 100 females (spawning at 1:1 ratio with a backup male) (Tables 2-12 and 2-13). The egg take goals are 400,000 for summer steelhead and 150,000 for winter steelhead (WDFW 2006).

Table 2-12. The summer steelhead broodstock collection level and egg take at the Lewis River Hatchery Complex (1995 through 2004).

	Summer Steelhead		
Year	**Adult Males**	**Adult Females**	**Egg Take**
Goal	225	225	400,000
1995	NA	53	230,060
1996	NA	NA	276,500
1997	NA	NA	66,500
1998	196	132	247,500
1999	92	46	325,200
2000	206	104	440,609
2001	109	158	634,331
2002	293	227	399,000
2003	305	161	444,500
2004	399	215	669,594
Average	**229**	**137**	**373,379**

* Current goal, in the past additional brood was collected for use at other facilities.

Shortfalls can be made up from Skamania Hatchery. Eyed eggs were transferred from Skamania Hatchery to Merwin Hatchery in 1997 (252,000).Source: WDFW 2004b, WDFW 2004e, WDFW 2004f, WDFW 2005a, and pers. comm. Eric Kinne, WDFW, September 27, 2005

Table 2-13. The winter steelhead broodstock collection level and egg take at the Lewis River Hatchery Complex (1994 through 2004).

Year	Winter Steelhead		
	Adult Males	Adult Females	Egg Take
Goal	**200**	**100**	**150,000**
1995	NA	NA	570,657
1996	122	122	573,000
1997	136	136	401,575
1998	137	198	546,000
1999	102	102	282,800
2000	122	93	371,957
2001	260	130	398,919
2002	270	136	998,107
2003	322	326	NA
2004	205	102	423,935
Average	**186**	**149**	**507,439**

* Current goal, in the past additional brood was collected for use at other facilities.

Source: WDFW 2004b, WDFW 2004c, WDFW 2005a, and pers. comm. Eric Kinne, WDFW, September 27, 2005

The first adult summer steelhead begin arriving at Merwin Hatchery in April; however, they are not collected until July. After being collected they are held until December before spawning begins. Fish can be held in raceways or holding ponds for maturation. The first adult winter steelhead begin arriving at Merwin Hatchery in December and are held briefly until before spawning begins. Holding adults are treated with formalin or hydrogen peroxide or a combination of both (up to 7 days per week) to control fungus growth. According to WDFW staff, pre-spawn mortality for summer steelhead can be as high as 20 percent due to IHN.. After spawning, all summer steelhead carcasses are taken to the local landfill for disposal. Winter steelhead carcasses fit for human consumption are donated to local food banks. Treated carcasses are taken to a local rendering plant (WDFW 2004e, WDFW 2004f, and (WDFW 2006).

Between 1995 and 2004, an average of 229 adult male and 137 adult female summer steelhead broodstock were collected at the Lewis River Hatchery Complex annually (Table 2-12). During this same period, an average of 186 adult male and 149 adult female winter steelhead broodstock were collected at the complex (Table 2-13). Returning hatchery steelhead that are not used for broodstock are marked and returned to the Lewis River just below the confluence with the East Fork Lewis River (RM 3.4) for additional harvest opportunity.

2.3.4 Incubation and Rearing

All adult summer and winter steelhead are held, spawned, and incubated at Merwin Hatchery. Juvenile rearing also takes place at Merwin Hatchery and in net pens located in Lake Merwin near Speelyai Bay[8] (WDFW 2004e and WDFW 2004f). The water used to supply the Mari stack incubators at Merwin Hatchery is pumped directly from Lake Merwin, treated with ozone, and passed through an enclosed stripper. Water quality is generally very good; however, high water temperatures in the summer (58°F to 59°F) can be a problem (Tetra Tech/KCM 2002). According to WDFW staff, 3 fish pool spawnings are incubated separately during the green to eyed-egg stage to monitor for IHN (WDFW 2006). Water temperatures are monitored continuously during incubation and Formalin is used to control of fungus and ecto-parasites.

Initial feeding and early rearing occurs in the incubation trough and ponding is on TU's and visual inspection (WDFW 2006). The fry are then transferred to the appropriate starter raceway. Ponding dates each year run between February 25th and April 5th (WDFW 2004e). According to WDFW, rearing densities are consistent with the loading densities recommended by Piper et al. (1982). In addition, flow rates, water temperatures, dissolved oxygen, and TSS is monitored on a routine basis throughout the rearing period.

2.3.5 Release Location and Numbers Released

Summer and winter steelhead releases occur from approximately mid-April to May 10th. Prior to release into the Lewis River, all steelhead volitionally migrate from two rearing ponds to a "smolt collection pond". They are then pumped into tank trucks on a daily basis and hauled to the release site at the I-5 bridge (RM 5.0) (WDFW 2004e and WDFW 2004f). According to WDFW, this is below much of listed Chinook habitat but above the confluence with the East Fork Lewis River minimizing straying into the East Fork. Prior to release, an area Fish Health Specialist evaluates the population's health and condition. This is commonly done 1 to 3 weeks prior to release and up to 6 weeks on systems with pathogen free water and little or no history of disease.

Between 1996 and 2004, an average of 162,145 summer steelhead yearlings and 105,838 winter steelhead yearlings have been released into the Lewis River annually (Tables 2-14 and 2-15). In the past 10 years, steelhead fry and fingerlings surplus to the anadromous program have also been planted in Lake Merwin and Swift Creek Reservoir to help support the landlocked trout lake fishery (not part of PacifiCorp Energy's mitigation program) (WDFW 2004e and WDFW 2004f).

[8] Approximately 60,000 juvenile steelhead are transferred to the net pens.

Table 2-14. The number, size, and release dates of summer steelhead yearlings released into the Lewis River (1996 through 2004).

Year	Number Released*	Release Dates	Size (fpp)
1996	122,279	April 13 - May 1	5.9
1997	123,776	April 20 - May 11	6.3
1998	155,218	April - May	6.4
1999	149,242	April 17 - May 7	5.7
2000	172,038	April 16 - May 1	4.8
2001	238,188	April 16 - May 17	4.5 - 5.0
2002	178,160	April 16 - May 8	4.9
2003	144,104	May	4.7
2004	176,304	April 18 - May 7	4.7
Average	**162,145**	--	--

Source: WDFW 2004 b, WDFW 2004e, WDFW 2005a

* Releases do not include Echo Bay and Speelyai net pen releases, except in 2001.

Table 2-15. The number, size, and release dates of winter steelhead yearlings released into the Lewis River (1996 through 2004).

Year	Number Released	Release Dates	Size (fpp)
1996	123,248	April 13 - May 1	5.9
1997	123,776	April 20 - May 11	6.3
1998	104,018	April 16 - May 1	6.2
1999	101,542	April 19 - May 7	5.6
2000	101,473	April 17 - May 1	4.8
2001	104,110	April 16 - May 1	4.7
2002	102,633	April 30 - May 6	4.8
2003	89,585	May	4.7
2004	102,154	April 21 - May 7	4.6
Average	**105,838**	--	--

Source: WDFW 2004 b, WDFW 2004c, WDFW 2005a

2.3.6 Adult Abundance

From 1995/1996 through 2004/2005, the adult summer steelhead hatchery escapement has ranged from a low of 830 in 1995/1996 to 14,578 in 2004/2005 (Table 2-16). Winter steelhead escapement has ranged from 378 in 1997/1998 to 4,952 in 2001/2002. In the past three years hatchery escapement of both stocks has increased dramatically.

Table 2-16. Summer steelhead returns to the Lewis River Hatchery Complex (hatchery escapement) from 1995/1996 through 2004/2005 (includes wild and hatchery fish).

	Total Hatchery Escapement	
Year	**Summer Steelhead**	**Winter Steelhead**
1995/1996	830	642
1996/1997	2,069	581
1997/1998	1,216	378
1998/1999	1,446	923
1999/2000	1,126	401
2000/2001	2,079	935
2001/2002	6,960	4,952
2002/2003	14,166	2,132
2003/2004	12,330	2,967
2004/2005*	14,578	NA
Average	**5,680**	**1,546**

* Preliminary estimate.

Source: http://wdfw.wa.gov/hat/escape/1977-1997index.htm and WDFW 2005a

2.4 RESIDENT RAINBOW TROUT

2.4.1 Current Management Goals and Production Levels

The overall goal of the Lewis River Hatchery Complex resident rainbow rout program is to maintain the fishery in Swift Reservoir. Prior to 2006, approximately 800,000 to 1,000,000 rainbow trout fry at approximately 40 per pound were stocked in Swift Reservoir annually (as required by Article 51 of the Merwin license) (WDFW 2006). Beginning in 2006, the resident rainbow trout goal is to plant approximately 20,000 pounds of rainbow trout at 3 fpp (Table 2-1) (pers. comm. Eric Kinney, WDFW, Lewis River Complex Manager, October 5, 2005).

2.4.2 Broodstock Origin

Over the past 25 years, the primary resident rainbow stock source for the Lewis River program has been from the Goldendale Hatchery in Washington; however, rainbow trout from the Spokane Hatchery (Washington) and Mt. Whitney Hatchery (California) have also been released into Swift Reservoir. According to Crawford (1979), Goldendale rainbow trout are derived from a combination of "McNott, Meander, and Cape Cod rainbow trout strains." Meander rainbow trout were originally obtained from the meander trout farm in Pocatello, Idaho using eggs from the U.S. Fish Commission's hatchery at Springville, Utah. Cape Cod rainbow trout, originally produced at the Cape Cod Trout Company of Wareham, Massachusetts, were obtained from the McCloud River near Mt. Shasta. Spokane rainbow trout, produced at the Spokane Hatchery since 1942, were also originally obtained from the McCloud River. Mt. Whitney rainbow trout are a mixture of Sacramento River rainbow trout and Klamath River steelhead. This stock was originally obtained by WDFW in 1962 (Crawford 1979). Goldendale rainbow trout spawn from October through February, Spokane rainbow trout spawn from November through December, and Mt. Whitney rainbow trout spawn from February through March (Crawford 1979).

2.4.3 Broodstock Collection

All eggs currently used for the Lewis River resident rainbow trout program are transferred to the Lewis River Hatchery Complex from the Goldendale Hatchery or Spokane Hatchery. In December 2005, approximately 150,000 eyed eggs were transferred to Merwin Hatchery from the Goldendale Hatchery (WDFW 2006).

2.4.4 Incubation and Rearing

Under existing operations (as of 2006), all juvenile rainbow trout are incubated and reared at Merwin Hatchery to approximately 10 fpp. They are then transferred to Speelyai Hatchery where they are rearing to 3 fpp prior to planting in Swift Reservoir in April. Prior to 2006, the goal was to plant 800,000 rainbow trout at 40 fpp into Swift Reservoir. In the past, trout plants often show up in the creel beginning in September following planting, but mainly over-winter in the reservoir before contributing to the fishery the following year.

2.4.5 Release Location and Numbers Released

The vast majority of resident rainbow trout produced at the Lewis River Hatchery Complex are released directly into Swift Reservoir; however, rainbow trout also been released into the Swift Power Canal to provide angling opportunities. Between 1995 and 2004, an average of 758,262 resident rainbow trout fingerlings have been released into Swift Reservoir annually (Table 2-17). Releases are typically made in June and July.

Table 2-17. The number, size, and release dates of resident rainbow trout released into Swift Reservoir (1994 through 2004).

Year	Number Released	Size (fpp)
1995	958,193	28 - 43
1996	726,656	25 - 26
1997	679,580	13 - 30
1998	930,361	22 - 31
1999	227,998	25 - 34
2000	547,361	36 - 42
2001	918,187	34 - 38
2002	867,924	29 - 40
2003	857,695	40
2004	868,662	40
Average	**758,262**	--

Source: PacifiCorp and Cowlitz PUD 2004

2.4.6 Adult Abundance

As part of Merwin Project studies in 1990, PacifiCorp Energy biologists completed a creel survey on Swift Reservoir (PacifiCorp 1996). From May through October 1990, anglers on Swift Reservoir had an average catch rate of 0.97 fish per hour. Rainbow trout

comprised approximately 99 percent of the fish harvested (PacifiCorp 1996). From April 24 through October 1999, WDFW conducted an additional creel survey in Swift Reservoir and Swift canal (PacifiCorp and Cowlitz PUD 2004b). During this survey, a total of 496 anglers were interviewed. These bank and boat anglers fished a total of 1,800 hours to harvest 1,504 fish. Rainbow trout and cutthroat trout comprised 84.7 percent and 14.7 percent of the fish harvested (PacifiCorp and Cowlitz PUD 2004b).

2.5 KOKANEE

2.5.1 Current Management Goals and Production Levels

The current kokanee production goal at the Lewis River Hatchery Complex is 45,000 fingerlings (12 fpp) and 48,000 yearlings (5.4 fpp) (12,500 pounds) (Table 2-1) (WDFW 2005a). All kokanee associated with this program are planted in Lake Merwin. The WDFW management objective for kokanee is to maintain the fishery.

2.5.2 Broodstock Origin

Kokanee are not native to the Lewis River basin. In the late 1950s and early 1960s, Swift Reservoir, Yale Lake and Lake Merwin all were stocked with kokanee from Kootenay Lake and Cultus Lake, British Columbia. A self-sustaining population currently exists in Yale Lake. Lake Merwin kokanee are thought to persist through escapement over Yale dam (PacifiCorp 1999). In 1996, WDFW decided to supplement the kokanee population in Lake Merwin using hatchery kokanee spawned and reared at Speelyai Hatchery. In 1999, Yale Lake received its first planting of kokanee since 1957 due to low numbers of returning kokanee in Cougar Creek (PacifiCorp and Cowlitz PUD 2000). Plants in Yale Lake were temporary and discontinued in late 2001.

2.5.3 Broodstock Collection

All broodstock used for the Speelyai Hatchery kokanee program are collected at Speelyai Hatchery. The present method of collecting broodstock involves using a dip net, whereby a weir directs fish into the hatchery outlet structure. As a component of the Settlement Agreement, PacifiCorp Energy plans to construct a permanent adult kokanee trap as part of the diversion dam rebuild to facilitate broodstock collection. The Speelyai Hatchery water diversion dam, located at the mouth of Speelyai Creek, is a total barrier to upstream fish migration. As a result, fish are not able to access the creek from Lake Merwin. Between 1995 and 2004 the total number of kokanee collected at Speelyai Hatchery has ranged from 224 in 1996 to 1,701 in 1998 (Table 2-18). Following spawning, all kokanee carcasses are disposed of at a local landfill.

Table 2-18. The kokanee broodstock collection level and egg take at the Lewis River Hatchery Complex (1995 through 2004).

Year	Total Hatchery Escapement	Egg Take
Goal	NA	140,000
1995	240	48,000
1996	224	14,021
1997	917	69,000
1998	1,701	237,500
1999	1,396	181,200
2000	929	180,000
2001	1,191	162,000
2002	836	145,200
2003	944	144,000
2004	1,075	208,190
Average	**945**	**138,911**

Source: http://wdfw.wa.gov/hat/escape/1977-1997index.htm and WDFW 2005a

2.5.4 Incubation and Rearing

Kokanee eggs are incubated at Speelyai Hatchery and are ponded in February of each year. As described previously, the kokanee program consists of two releases of unmarked fish, and early fingerling release directly from the hatchery in the October (45,000 at 12 fpp) and a yearling release from the Lake Merwin net pens in the spring (48,000 at 5.4 fpp).

2.5.5 Release Location and Numbers Released

All kokanee produced at the Lewis River Hatchery Complex are released directly into Lake Merwin. Release numbers and size at release have been highly variable in the past 8 years and recently; releases have exceeded the production targets (Table 2-19). Releases that exceed production targets have been unfed fry plants (except for Cougar Creek plants) (WDFW 2006). There is currently an escapement goal for Cougar Creek and if it is not met WDFW may augment that production with hatchery kokanee fry.

Table 2-19. The number, size, and release dates of kokanee released into Lake Merwin (1995 through 2004).

Year	Number Released	Size (fpp)
1997	41,560	6
	4,800	2,600
1998	0	--
1999	20,234	14
	49,925	5
	222,151	461
2000	4,348	11
	39,772	4.8
2001	37,356	330
	45,742	42
	45,014	16
2002	47,336	9.0
	50,236	12.8
2003	51,980	6.2
	111,733*	8.0
2004	112,830*	10.6

Source: PacifiCorp and Cowlitz PUD 2004b.

The releases in 2003 and 2004 have overlapping numbers due to fall plants of one year and spring plants of the following year (the same brood year).

2.5.6 Adult Abundance

Kokanee are the primary target species for anglers in Lake Merwin. Current adult abundance estimates are no available; however, a 1995 creel survey in Lake Merwin (May through August) estimated that 19,337 hours were expended to catch 3,068 kokanee, 511 resident coho (excess hatchery coho), 20 rainbow trout, and 20,764 northern pikeminnow (Hillson and Tipping 1999).

2.6 SEA-RUN CUTTHROAT TROUT

Prior to 1999, as a condition of the Merwin Project license, Merwin Hatchery annually released about 25,000 sea-run cutthroat smolts (Cowlitz and Skamania stocks) into the North Fork Lewis River. The original goal of the program was to produce sea-run cutthroat trout to mitigate for lost habitat due to construction of the three PacifiCorp Energy dams on the Lewis River (Hillson and Tipping 1999). Because of a low return to the creel in 1997 and 1998 and concerns over potential interactions (predation and competition) with wild cutthroat and fall Chinook salmon, the program was discontinued in 1999. The existing Lewis River coastal cutthroat trout population is considered native with wild production (WDFW 2000).

3.0 REFERENCES

Crawford, B.A. 1979. The origin and history of the trout brood stocks of the Washington Department of Game. Washington State Game Dep., Fishery Research Report, 76 p. (Available from Washington Department of Fish and Wildlife, 600 Capital Way N., Olympia, WA 98501.)

Hillson, T.D. and J. Tipping. 1999. Lewis River Hatchery Complex Fish Biologist Annual Report for 1998. Washington Department of Fish and Wildlife, Salmon and Steelhead Division. Report #99-7.

Hymer, J., R. Pettit, M. Wastel, P. Hahn, and K. Hatch. 1993. Stock summary reports for Columbia River anadromous salmonids - Volume III: Washington subbasins below McNary Dam for the Coordinated Information System. WDF, WDW, and CRITFC report # 88-108; prepared for Bonneville Power Administration, Portland, Oregon.

Marshall, A.R., C. Smith, R. Brix, W. Dammers, J. Hymer, and L. LaVoy. 1995. Genetic diversity units and major ancestral lineages for chinook salmon in Washington. In C. Busack and J. B. Shaklee (eds.), Genetic diversity units and major ancestral lineages of salmonid fishes in Washington, p. 111-173. Wash. Dep. Fish Wildlife. Tech. Rep. RAD 95-02. (Available from Washington Department of Fish and Wildlife, 600 Capital Way N., Olympia WA 98501-1091.)

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

PacifiCorp and Cowlitz PUD. 2004a. Settlement Agreement for the Lewis River Hydroelectric Projects. November 30, 2004.

PacifiCorp and Cowlitz PUD. 2004b. Lewis River Hydroelectric Projects: Final Technical Studies Status Reports. PacifiCorp Energy, Portland, OR and Cowlitz PUD, Longview, WA. April 2004.

PacifiCorp. 1996. Swift Reservoir Creel Survey: 1990. Prepared by PacifiCorp Portland Oregon.

Piper, R. 1982. Fish Hatchery Management; U.S. Department of Interior, Fish and Wildlife Service, Washington D.C.

Tetra Tech/KCM, Inc. 2002. Lewis Hatchery Complex Evaluation (Draft). December 2002. Prepared for: PacifiCorp Energy, Portland, Oregon. Prepared by: Tetra Tech/KCM, Inc. and Associated Firms, Portland, Oregon. Project Number 2290003.

Washington Department of Fish and Wildlife (WDFW). 2000. 2000 Washington State Salmonid Stock Inventory; Coastal Cutthroat Trout. Olympia, Washington. June 2000.

WDFW. 2001. Draft Fisheries Management and Evaluation Plan, Lower Columbia River. Prepared by Washington Department of Fish and Wildlife. Olympia, Washington. February 21, 2001.

WDFW. 2002. 2002 Salmonid Stock Inventory (SaSI). Washington Department of Fish and Wildlife, Olympia, WA. Retrieved from: https://fortress.wa.gov/dfw/salmonscape/

WDFW 2004a. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River Spring Chinook. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. . Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/chinook/lewisrrsprck.pdf

WDFW 2004b. Lewis River Complex Operations for January 1, 2003 to March 31, 2004. Washington Department of Fish and Wildlife Hatcheries Program. Washington Department of Fish and Wildlife.

WDFW 2004c Draft Hatchery and Genetic Management Plan (HGMP). Lewis River Type S coho. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/coho/lewisrcohos.pdf

WDFW 2004d. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River Type N coho. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/coho/lewisrivencho.pdf

WDFW 2004e. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River (Merwin) Summer Steelhead. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/steelhead/merwinssthd.pdf

WDFW 2004f. Draft Hatchery and Genetic Management Plan (HGMP). Lewis River (Merwin) Winter Steelhead. Washington Department of Fish and Wildlife. Lewis Subbasin/Lower Columbia Province. August 16, 2004. Retrieved from: http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/steelhead/merwinwsthd.pdf

WDFW 2005a. Lewis River Complex Operations for April 1, 2004 to March 31, 2005. Washington Department of Fish and Wildlife Hatcheries Program. Washington Department of Fish and Wildlife.

WDFW 2005b. Hatcheries Fish Production Planning: 2005 Future Brood Document. Annual pre-season hatchery production plans for the upcoming brood year. Prepared by Washington Department of Fish and Wildlife. Retrieved from: http://wdfw.wa.gov/hat/reports/brood/2005/region_5_2005_final.pdf

WDFW 2006. Comments on and Public Utility District No.1 of Cowlitz County's November 2005 Draft Lewis River Hatchery and Supplementation Plan. Letter from Craig Burley, WDFW Region 5 Fish Program Manager to Ms. Kim McCune Project Coordinator PacifiCorp Energy. February 9, 2006.

Appendix B

Section 8 of the Lewis River Settlement Agreement

SECTION 8: HATCHERY AND SUPPLEMENTATION PROGRAM

8.1 Hatchery and Supplementation Program. The Licensees shall undertake a hatchery and supplementation program. The goals of the program are to support (i) self-sustaining, naturally producing, harvestable native anadromous salmonid species throughout their historical range in the North Fork Lewis River Basin, and (ii) the continued harvest of resident and native anadromous fish species (the "Hatchery and Supplementation Program"). The Hatchery and Supplementation Program shall be consistent with the priority objective of recovery of wild stocks in the basin to healthy and harvestable levels. The intention of the foregoing sentence is not necessarily to eliminate the hatchery program but it recognizes the importance of recovering wild stocks and a potential that hatchery production may adversely affect recovery. The Hatchery and Supplementation Program shall be consistent with the ESA, applicable state and federal fisheries policies, and regional recovery plans, and should be consistent with recommendations of the Hatchery Science Review Group and the Northwest Power Planning Council's Hatchery Review (Artificial Production Review & Evaluation) to the extent practicable. The supplementation portion of the program shall be a part of the reintroduction program (in addition to fish passage) and shall be limited to spring Chinook, steelhead and coho as provided in this Section 8.

To ensure that the Hatchery and Supplementation Program is meeting its goals, the Licensees, in Consultation with the ACC and with the approval of the Services, shall develop and implement a hatchery and supplementation plan to adaptively manage the program and guide its management as set out in Section 8.2 below ("Hatchery and Supplementation Plan" or "H&S Plan"). The Licensees shall incorporate best methodologies and practices into the Hatchery and Supplementation Plan. The Hatchery and Supplementation Plan shall be designed to achieve the numeric Hatchery Targets provided for in Section 8.3 below, and those targets shall be calculated in terms of ocean recruits of hatchery origin, taking into account harvest and escapement. For purposes of this Agreement, "Ocean Recruits" shall mean total escapement (fish that naturally spawned above Merwin and hatchery fish) plus harvest (including ocean, Columbia River, and Lewis River harvest). Subject to the ESA, applicable federal and state fisheries policies, regional recovery plans, other applicable laws and policies, and the terms of this Agreement, the Licensees shall provide for the implementation of the Hatchery and Supplementation Program for the terms of the New Licenses.

As of the Effective Date, WDFW owns the existing Lewis River Hatchery facility. Use and operation of the Lewis River Hatchery is subject to agreements between PacifiCorp and WDFW. The Licensees shall ensure the existing Lewis River, Merwin, and Speelyai hatchery facilities (the "Hatchery Facilities") are modified pursuant to Section 8.7 below to meet their obligations under this Section 8. The Licensees shall ensure the Hatchery Facilities, including the relevant or necessary support facilities (e.g., employee housing, shops, hatcheries, and related infrastructure), as modified, are maintained as necessary to consistently deliver a high-quality hatchery product that will meet their obligations. The Licensees' hatchery production obligations as set forth in Section 8.4 below, including both anadromous and resident fish, shall be limited by the combined production capacity

of the Hatchery Facilities ("Hatcheries Capacity Limit") as established after implementation of upgrades as set forth in Section 8.7. The Licensees may, after Consultation with the ACC, use different hatcheries than those described above; provided that such different hatcheries (a) have equal or greater capacity than the Hatchery Facilities if that capacity is still required to meet the Licensees' obligations under this Section 8, (b) are of quality equal to or greater than that of the Hatchery Facilities, and (c) comply with transfer and disease protocols and other requirements of the H&S Plan.

8.2 Hatchery and Supplementation Plan. The Licensees, in Consultation with the ACC and subject to the approval of the Services, shall develop a Hatchery and Supplementation Plan to address hatchery operations, supplementation, and facilities as provided in Section 8.2.1 below. Until implementation of the Hatchery and Supplementation Plan, PacifiCorp shall continue to implement the hatchery program set forth in Articles 50 and 51 of the 1983 Merwin license, as amended.

The Hatchery and Supplementation Plan will address both anadromous and resident fish. The Licensees shall incorporate best methodologies and practices into all components of the H&S Plan, including, but not limited to, the Hatchery Facilities and supplementation facilities. When developing the H&S Plan, the Licensees and the ACC shall be guided, at a minimum, by the Fish Planning and Hatchery Review Documents (submitted as AQU-18 with the Licensees' applications for the Merwin, Swift No. 1, and Swift No. 2 Projects in April 2004), and shall take into consideration the results of ongoing relevant hatchery reviews and the experience of other supplementation programs in the region, such as the Yakama Nation's Cle Elum facility. The Licensees shall transition from the hatchery program set forth in Articles 50 and 51 of the 1983 Merwin license, as amended, to implementing the Hatchery and Supplementation Plan as soon as practicable after Issuance of the New License(s) for the Merwin Project or the Swift Projects, whichever occurs earlier, provided that supplementation will commence as provided in Section 8.5. When finalized, the Licensees shall submit the Hatchery and Supplementation Plan to WDFW and NOAA Fisheries for consideration in their development of applicable hatchery genetic management plans ("HGMPs").

8.2.1 Development of Plan/Timing. The Licensees, in Consultation with the ACC, shall produce and distribute a draft Hatchery and Supplementation Plan to the ACC by the first anniversary of the Effective Date. The Yakama Nation may chair a subgroup of interested members of the ACC for purposes of coordinating the ACC's input regarding the supplementation elements of the draft H&S Plan. The members of the ACC shall have 60 days to comment on the draft H&S Plan. The Licensees shall provide a 60-day period for the public to provide written comments. The Licensees shall consider and address in writing the written comments provided by the members of the ACC, including the rationale behind the Licensees' decision to not address a comment in the final H&S Plan. The Licensees shall consider comments and submit a revised H&S Plan to the Services for approval within 120 days of the first anniversary of the Effective Date.

8.2.2 Hatchery and Supplementation Plan Contents. The H&S Plan shall address the means by which the Licensees shall use the Hatchery Facilities to accomplish

the goals and requirements of the Hatchery and Supplementation Program, including, without limitation, the Hatchery Targets. It shall also be consistent with the objective of restoring and recovering wild stocks in the basin to healthy and harvestable levels. The H&S Plan shall address, at a minimum, the following topics:

8.2.2.1 A description of the Hatchery Facilities, including the upgrades identified in Schedule 8.7;

8.2.2.2 Identification of species and broodstock sources to be used for the Hatchery and Supplementation Program;

8.2.2.3 The quantity and size of fish to be produced;

8.2.2.4 The allocation of smolts and adults between the hatchery and supplementation programs and a description of how the two programs are to be implemented at the same facility without causing unacceptable adverse impacts on each other;

8.2.2.5 Rearing and release strategies for each stock including, but not limited to, timing, planned distribution, locations for release, procedures to transport smolts to acclimation sites for supplementation purposes, and upward and downward production adjustments to accommodate natural returns;

8.2.2.6 The Ocean Recruits Methodology referenced in Section 8.3.2.2 below;

8.2.2.7 Plans and protocol for supplementation stocks;

8.2.2.8 Broodstock collection and breeding protocols;

8.2.2.9 Policies in effect regarding in-basin and out-of-basin stock transfers;

8.2.2.10 Measures to minimize potential negative impacts of the Hatchery and Supplementation Program on ESA-listed species;

8.2.2.11 Measures to protect production processes from predators, e.g., netting, consideration of evolving hatchery practices to condition fish to avoid predators;

8.2.2.12 A description of how the Hatchery and Supplementation Program monitoring and evaluation requirements will be implemented, including, but not limited to, marking strategies;

8.2.2.13 A description of the methods to prevent unacceptable adverse impacts, if any, of (1) the hatchery program on the reintroduction program, and

(2) the supplementation program on native resident species; and

8.2.2.14 Fish health protocols.

8.2.3 Annual Operating Plan. The Licensees shall provide for the implementation of the Hatchery and Supplementation Plan through an annual plan ("Annual Operating Plan"). The Annual Operating Plan shall be consistent with the Hatchery and Supplementation Plan. The Licensees, in Consultation with the hatchery managers and with the approval of the Services, shall develop the initial Annual Operating Plan as part of the Hatchery and Supplementation Plan. The Licensees shall develop subsequent Annual Operating Plans in Consultation with the hatchery managers and subject to the approval of the Services. The Annual Operating Plan may

be included as part of the detailed annual reports of the ACC activities required by Section 14.2.6.

The Annual Operating Plan shall, at a minimum, contain: (1) a production plan, which shall specify the species and broodstock sources; (2) the current Hatchery Target and Juvenile Production Target for each species to be produced at the Hatchery Facilities; (3) a release plan which shall identify by species the rearing schedule and planned distribution of fish and the schedules and locations for releases; (4) a list of facility upgrades to be undertaken that year; and (5) a description of relevant monitoring and evaluation to be undertaken that year.

8.2.4 Reporting Requirements. On an annual basis, the Licensees shall provide to the ACC for review and comment a report compiling all information gathered pursuant to implementation of the Hatchery and Supplementation Plan. The report also will include recommendations for ongoing management of the Hatchery and Supplementation Program. The ACC shall have 60 days to comment on the annual report. Within 60 days of the close of the comment period, the Licensees shall finalize the report after consideration of all comments. The Licensees shall also provide the comprehensive periodic review undertaken pursuant to Section 8.2.6 below to the ACC. The Licensees shall provide final annual reports and the comprehensive periodic review to the Services during the development of any required ESA permit or authorization for hatchery operations, including NOAA Fisheries' HGMP process. The report may be included as part of the detailed annual reports of the ACC activities required by Section 14.2.6.

8.2.5 Plan Modifications. The Licensees shall update the Hatchery and Supplementation Plan every five years or earlier if required by the HGMP, in Consultation with the ACC and with the approval of the Services, using the process set out in Section 8.2 above in order to adaptively manage the Hatchery and Supplementation Program. The Licensees shall consider recommendations from members of the ACC and the comprehensive review set forth below, and identify those recommendations that have not been incorporated into the H&S Plan with a brief statement as to why the changes were not made.

8.2.6 Comprehensive Periodic Review. The Licensees shall undertake a comprehensive periodic review within 5 years after reintroduction above Swift No. 1 Dam, within 5 years after reintroduction into Yale Lake, and within 5 years after reintroduction into Lake Merwin, and then every 10 years after that. This schedule is to be followed even in the event that reintroduction into either Yale Lake or Lake Merwin does not occur. The Licensees, in Consultation with the ACC, shall hire an independent consultant to review the Hatchery and Supplementation Program to assess (i) the Program's impact on the reintroduction program and on listed species, (ii) the Program's effectiveness in achieving the goals set out in Section 8.1 above, and (iii) efficiency of hatchery operations. Factors to be considered in the review include current federal and state policies and plans, relevant best practices, and existing information regarding recent scientific advances. The reviewer will provide recommendations regarding ongoing management of the Hatchery and Supplementation Program and, if needed, recommend

amendments to the Hatchery and Supplementation Plan. The Licensees shall incorporate recommendations for ongoing management of the Hatchery and Supplementation Program set forth in the review into the Hatchery and Supplementation Plan pursuant to Section 8.2.5 or explain why the recommendation is not being adopted.

8.3 Anadromous Fish Hatchery Adult Ocean Recruit Target by Species. The Licensees shall develop and implement the Hatchery and Supplementation Plan to achieve hatchery adult Chinook, steelhead, and coho ocean recruit targets ("Hatchery Targets") as described below.

8.3.1 Hatchery Targets. The following Hatchery Targets shall be in effect at the commencement of the Hatchery and Supplementation Program:

Table 8.3.1 – Hatchery Targets

	Spring Chinook	Steelhead	Coho	Total
Hatchery Targets (adult Hatchery Ocean Recruits)	12,800	13,200	60,000	86,000

8.3.2 Modifications to Hatchery Targets.

8.3.2.1 Hatchery Targets. The Licensees shall not increase any of the Hatchery Targets above the Hatchery Targets in Table 8.3.1 above during the terms of the New Licenses without the unanimous approval of the ACC.

8.3.2.2 Methods to Document Ocean Recruits. The Licensees, in Consultation with the ACC, shall determine the methods to document the number of Ocean Recruits and to separately identify Hatchery Ocean Recruits and Ocean Recruits from natural spawning in the Hatchery and Supplementation Plan ("Ocean Recruits Methodology"). The Ocean Recruits Methodology shall identify the appropriate assessment time frame over which to measure Hatchery Ocean Recruits and Natural Ocean Recruits.

8.3.2.3 Reductions in Hatchery Targets. When the Licensees determine, in Consultation with the ACC, through application of the Ocean Recruits Methodology that the number of Ocean Recruits from natural spawning grounds of any species exceeds the relevant natural production threshold(s) for that species identified in Table 8.3.2 ("Natural Production Threshold"), the Licensees shall decrease the appropriate Hatchery Target(s) identified in Table 8.3.1 on a fish-for-fish (1:1) basis. The Licensees shall not apply the amount of excess numbers of one species against another species' Hatchery Target. The Licensees shall not decrease the Hatchery Targets below the hatchery target floor ("Hatchery Target Floor") specified in Table 8.3.2.

8.3.2.4 Unacceptable Adverse Impacts on Reintroduction Program or

Fisheries Management Objectives. If the Services determine that there are unacceptable impacts from hatchery production on the reintroduction program or fishery management objectives including, but not limited to, the recovery of wild stocks in the basin, then the Licensees, in Consultation with the ACC, shall identify and consider options to mitigate or avoid such unacceptable impacts. In Consultation with the ACC and at the direction of the Services, the Licensees shall implement options necessary to address such unacceptable adverse impacts, including, without limitation, modifying hatchery practices, reducing Hatchery Targets, or implementing other options that are identified pursuant to this Section 8.3.2.4.

8.3.2.5 Increases in Previously Reduced Hatchery Targets. If the Licensees reduce Hatchery Targets based on the number of Natural Ocean Recruits as determined by the Ocean Recruits Methodology, but the number of Ocean Recruits subsequently declines under such methodology, the Licensees, in Consultation with the ACC and at the direction of the Services, shall increase the Hatchery Targets on a fish-for-fish (1:1) basis, provided that the increased Hatchery Targets shall not exceed the initial Hatchery Targets in Table 8.3.1, and available data demonstrates that the hatchery fish are not the cause of decline or a significant limiting factor to self-sustaining, naturally producing, harvestable native anadromous salmonid species.

Table 8.3.2 – Numbers Governing Modifications to Hatchery Targets

	Spring Chinook	Steelhead	Coho	Total
Natural Production Threshold for Hatchery Reduction	2,977	3,070	13,953	20,000
Hatchery Target Floor	2,679	2,763	12,558	18,000

8.4 Anadromous Fish Hatchery Juvenile Production. Each year, the Licensees shall provide for the production of spring Chinook salmon smolts, steelhead smolts, and coho salmon smolts at levels specified below ("Juvenile Production"). The Licensees shall use the Juvenile Production to provide (1) juveniles for the supplementation program under Section 8.5, and (2) juveniles for harvest opportunities. To the extent that there are not sufficient juveniles for the Hatchery and Supplementation Program and to ensure that enough adults will return to ensure adequate broodstock for the Hatchery and Supplementation Program in future years, the Licensees shall, in Consultation with the ACC and subject to the approval of the Services, determine how best to allocate juveniles.

8.4.1 Juvenile Production Targets. The Licensees shall provide for the implementation of the following Juvenile Production targets ("Juvenile Production Targets") when the Hatchery and Supplementation Program commences. The following Juvenile Production Targets shall be used unless and until modified by the Licensees pursuant to Section 8.4.2 as part of the Hatchery and Supplementation Plan in accordance

with Section 8.2.5:

Table 8.4 – Juvenile Production Targets

Smolt Production	Spring Chinook	Steelhead	Coho
H&S Plan Years 1 – 3	1.35 million	275,000	1.8 million
H&S Plan Years 4 – 5	1.35 million	275,000	1.9 million
H&S Plan Years 6 – 50	1.35 million	275,000	2.0 million

8.4.2 Adjustment of Juvenile Production. The Licensees, in Consultation with the ACC, shall adjust the Juvenile Production as needed to achieve the Hatchery Targets subject to the Hatcheries Capacity Limit, e.g., at some point in the future a smaller number of juveniles may be needed to get the same number of returning adults. When determining whether adjustments should be made, the Licensees, in Consultation with the ACC, shall consider the hatchery practices component of the Hatchery and Supplementation Plan (e.g., density, best management practices), data from the Monitoring and Evaluation Plan identified in Section 9 (including, but not limited to, fish quality and adult return requirements), the periodic comprehensive review described in Section 8.2.6 above, and the terms of Section 8.1.

8.4.3 Stock Selection. The Licensees shall select stocks for the production of juveniles that are the most appropriate for the basin. The stock selected and the rationale shall be set forth in the Hatchery and Supplementation Plan. The following stocks shall be used unless and until modified by the Licensees as part of the Hatchery and Supplementation Plan in accordance with Section 8.2.5:

Table 8.4.3 – Broodstock

	Spring Chinook	Steelhead	Coho
Juveniles for Supplementation (release above Merwin)	Lewis River hatchery stock with Cowlitz River hatchery stock as contingency	Lewis River wild winter stock with Kalama hatchery stock as contingency	Lewis River hatchery early (type S) stock
Juveniles for Harvest (release below Merwin)	Same as for supplementation	Same as for supplementation **and** existing Lewis River hatchery summer and winter stock	Same as for supplementation **and** Lewis River hatchery late (type N) stock

8.5 Supplementation Program.

8.5.1 Juvenile Salmonids Above Swift No. 1 Dam. The Licensees shall, for the purpose of supplementation, provide for the transport of juvenile anadromous salmonids to acclimation sites selected pursuant to Section 8.8.1, for the following periods of time:

(1) Spring Chinook and Steelhead. The Licensees shall provide the means to

supplement juvenile spring Chinook and steelhead for a period of 15 years commencing upon completion of the Swift Downstream Facility pursuant to Section 4.4.1; and

(2) Coho. The Licensees shall provide the means to supplement juvenile coho salmon for a period of 9 years commencing upon completion of the Swift Downstream Facility.

At the end of these time periods, the Licensees shall assess on a year-by-year basis whether to extend the supplementation of juvenile salmonids. Upon ACC agreement and subject to the Services' approval, the Licensees shall continue to supplement juvenile salmonids. In evaluating whether to extend the supplementation of juveniles, the ACC shall consider, among other things, the impact of continuing supplementation on the overall reintroduction program and on ESA-listed species.

8.5.2 Juvenile Salmonids to Yale Lake and Lake Merwin. PacifiCorp shall, for the purposes of supplementation, provide for the transport of juvenile anadromous salmonids to appropriate release sites in Yale Lake and Lake Merwin, as described in Section 8.8.2 below, for the following periods of time:

(1) Spring Chinook and Steelhead. PacifiCorp shall provide the means to supplement juvenile spring Chinook and steelhead for a period of 15 years to Yale Lake commencing upon completion of the Yale Downstream Facility as provided in Section 4.5; and for a period of 15 years to Lake Merwin commencing upon completion of the Merwin Downstream Facility as provided in Section 4.6; and

(2) Coho. PacifiCorp shall provide the means to supplement juvenile coho salmon into Yale Lake for a period of 9 years commencing upon completion of the Yale Downstream Facility and into Lake Merwin for a period of 6 years commencing upon completion of the Merwin Downstream Facility.

At the end of these time periods, PacifiCorp shall assess on a year-by-year basis whether to extend the supplementation of juvenile salmonids. Upon ACC agreement and subject to the Services' approval, the Licensees shall continue to supplement juvenile salmonids. In evaluating whether to extend the supplementation of juveniles, the ACC shall consider, among other things, the impact of continuing supplementation on the overall reintroduction program and on ESA-listed species.

8.5.3 Adult Salmonids. The Licensees shall begin providing for the supplementation of adult fish one year prior to completion of the Swift Downstream Facility. Throughout the terms of the New Licenses, the Licensees shall provide for the transport and release of supplementation stocks of adult spring Chinook, coho, and steelhead above Swift No. 1 as directed by the ACC. Throughout the terms of the New Licenses, PacifiCorp shall provide for the transport and release of supplementation stocks of adult spring Chinook, coho, and steelhead into Yale Lake and Lake Merwin as directed by the ACC. The ACC shall determine the timing for initiating supplementation into

Yale Lake and Lake Merwin. The ACC, subject to the approval of the Services, may recommend discontinuing or recommencing the supplementation of such supplementation stocks, provided that any such recommendations are biologically based and not contrary to the goals of the ESA.

8.5.4 Supplemental Juveniles. The Licensees shall not mark supplementation juveniles in the same manner as hatchery fish are marked for harvest.

8.6 Resident Fish Production.

8.6.1 Rainbow Trout Production. Each year, for the terms of the New Licenses, subject to Section 8.6.3, the Licensees shall provide for the production of 20,000 pounds of resident rainbow trout. When the New License is Issued for either the Merwin Project or the Swift Projects, whichever is earlier, the Licensees shall fulfill their obligation by providing for the production of 800,000 juveniles with an estimated weight of 40 juvenile fish per pound, or an equivalent number, in pounds, of resident rainbow trout of a different life stage as directed by WDFW, following Consultation with the ACC. The Licensees shall provide for the stocking of such rainbow trout in Swift Reservoir. Resident rainbow trout will be managed separately from steelhead and shall not significantly interfere with the recovery of self-sustaining, naturally producing, harvestable populations of native steelhead.

8.6.2 Resident Kokanee Production. Each year, for the terms of the New Licenses, subject to Section 8.6.3, PacifiCorp shall provide for the production of 12,500 pounds of resident kokanee. When the New License is Issued for either the Merwin Project or the Swift Projects, whichever is earlier, PacifiCorp shall fulfill its obligation by providing for the production of 93,000 juveniles of various sizes which have an estimated weight of 12,500 pounds or an equivalent number, in pounds, of resident kokanee of a different life stage as directed by WDFW, following Consultation with the ACC. Unless otherwise determined by the ACC through the Hatchery and Supplementation Plan, PacifiCorp shall provide for the annual stocking of such resident kokanee in Lake Merwin.

8.6.3 Modifications in Resident Rainbow Trout and Kokanee Production. The Licensees shall modify resident rainbow trout and kokanee production numbers as part of the Hatchery and Supplementation Plan, in Consultation with the ACC and subject to the approval of the Services and WDFW, to address other management goals, including, without limitation, harvest considerations and impacts of the resident fish hatchery program on the reintroduction program; provided that the Licensees shall not increase (i) resident rainbow trout production above a cap of 20,000 pounds and, (ii) resident kokanee production above a cap of 12,500 pounds.

8.7 Hatchery and Supplementation Facilities, Upgrades, and Maintenance. The Licensees shall, in collaboration with the hatchery managers and hatchery engineers and in Consultation with the ACC, undertake or fund facility additions, upgrades, and maintenance actions as provided in Schedule 8.7, consistent with best methodologies and

practices. The Licensees, in collaboration with the hatchery managers and hatchery engineers, and in Consultation with the ACC, shall design these facilities, upgrades, and maintenance actions to include elements that ensure usefulness of the facilities for supplementation and production fish culturing practices and to accommodate the facility additions, upgrades, and maintenance actions identified in Schedule 8.7. The Licensees shall complete the upgrades or actions by the deadlines identified in Schedule 8.7, provided that the Licensees shall schedule the updates or actions consistent with (i) the required hatchery production or (ii) the reintroduction program. The Licensees shall not be required to construct new hatchery facilities or to expand the existing Hatchery Facilities except as provided pursuant to this Section 8.7. WDFW retains the right and authority to operate its hatchery and conduct other or additional fish production activities that do not impact the goals set forth in Section 8.1 at the state-owned Lewis River Hatchery at no additional cost to the Licensees.

8.8 Juvenile Acclimation Sites.

8.8.1 Above Swift No. 1 Dam. Beginning upon completion of the Swift Downstream Facility, the Licensees shall place juvenile salmonid acclimation sites in areas reasonably accessible to fish hauling trucks and in practical areas in the upper watershed above Swift No. 1 Dam, as determined by the Licensees in Consultation with the Yakama Nation and the ACC. The acclimation sites shall consist of fish containment areas that allow juvenile fish to acclimate in natural or semi-natural waterways and allow necessary pre-release juvenile fish management; such sites will not consist of or include concrete-lined ponds or waterways, but may include other concrete structures necessary for facility functionality and structural integrity during the supplementation program.

8.8.2 In Yale Lake and Lake Merwin. Beginning upon completion of the Yale Downstream Facility and the Merwin Downstream Facility, respectively, PacifiCorp shall provide in-stream enclosures to confine juvenile salmonids in tributaries to Yale Lake and Lake Merwin after they are transported from rearing facilities for the purpose of allowing juveniles to adjust to the natural environment for a short period of time, to be determined by the Licensees, in Consultation with the ACC and with the approval of the Services, prior to being exposed to natural mortality factors such as predators. These enclosures are intended to provide an opportunity for the juveniles to acclimate to the natural environment prior to being exposed to predators. While it is assumed that there will be sufficient food in the natural stream, if evidence suggests, prior to placing juveniles in the enclosures, that this is not the case, the Licensees will Consult with the ACC to determine if feeding of juveniles in the enclosures should occur. Prior to completion of the Yale Downstream Facility and the Merwin Downstream Facility, respectively, the Licensees shall, in Consultation with the ACC, evaluate whether Hatchery and Supplementation Program goals will be cost-effectively served by establishing and operating acclimation sites for any of the targeted stocks in Yale Lake, Lake Merwin, or their tributaries. In the event that funding becomes available for acclimation facility establishment and operation in Yale Lake, Lake Merwin or their tributaries from Parties other than the Licensees or from third parties, the Licensees shall amend the H&S Plan, subject to the approval of the Services, to provide for placing of

juvenile anadromous salmonids in such acclimation facilities for so long as the funding continues to be available and placement does not negatively impact the supplementation program or otherwise alter the obligations of the Licensees.

Appendix C

ISAB Clarification on Mass Marking and Mark-Selective Fisheries

Independent Scientific Advisory Board
for the Northwest Power and Conservation Council,
Columbia River Basin Indian Tribes,
and National Marine Fisheries Service
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
ISAB@nwcouncil.org

MEMORANDUM (ISAB 2005-4A) July 29, 2005

TO: Melinda Eden, Chair, Northwest Power and Conservation Council

FROM: Eric J. Loudenslager, ISAB Chair

SUBJECT: ISAB Clarification on Mass Marking and Mark-Selective Fisheries

---

Purpose

On July 12, 2005, the ISAB report on harvest management of Columbia River Salmon and Steelhead was summarized for the Northwest Power and Conservation Council (Council). In response to several questions raised by Council members during the ISAB presentation, this briefing paper summarizes technical issues surrounding the impacts of mass marking and mark-selective fishing.

Background – the critical importance of the Coded-Wire Tag (CWT) system

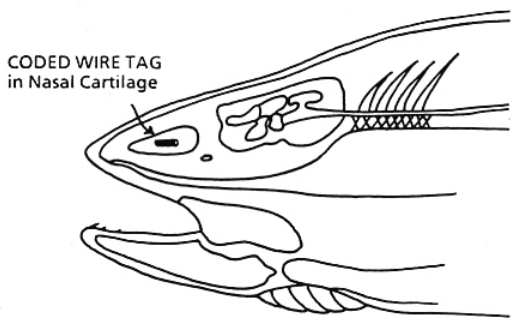


FIGURE 1.—Longitudinal section through the head of a juvenile salmonid showing the correct placement of a coded wire tag in the nasal cartilage. (After Koerner 1977.)

Coded-Wire Tag (CWT) data are central to the management of natural stocks of Chinook and coho salmon. These species are impacted by a variety of commercial and recreational fisheries at various stages of the life history throughout their migratory ranges, making efficient coastwide data collection systems essential for stock and fishery assessments. Current fishery regimes for Chinook and coho salmon are inextricably linked to the CWT system. In his introductory remarks to a CWT Workshop, convened by the Pacific Salmon Commission in June 2004, Larry Rutter from the National Marine Fisheries Service described this relationship as follows:

"Over the past thirty years or so we have constructed an elaborate and interdependent fishery management and stock assessment scheme that is heavily reliant upon data comprised of CWT recoveries. Billions of CWTs have been placed in salmon over the years, mostly in Chinook and coho salmon. And, through an elaborate,

coastwide sampling program that sifts through escapements and catch in fisheries far and wide, millions of CWTs have been recovered. Over time, we have accumulated what surely must be one of the most extensive fishery management data sets found anywhere in the world. This data set is analyzed and manipulated with increasingly complex models and algorithms; the results of these analyses provide the backbone of our system for managing Chinook and coho salmon fisheries coastwide."

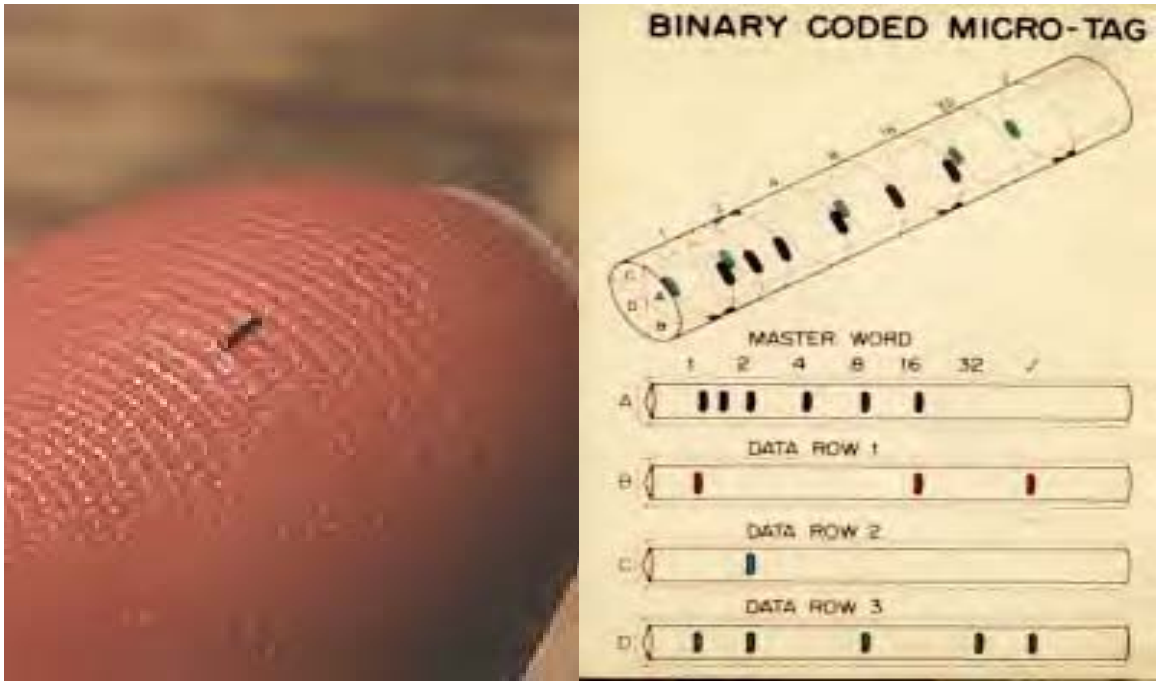


Fig 2. CWT size and coding system.

Harvest management regimes for *natural stocks* of Chinook and coho salmon are largely based upon data collected through a system of CWT releases of hatchery indicator stocks that are selected to represent specific natural stocks and are based on brood stock and rearing/release strategies.[1] Direct tagging of wild fish is rarely performed due to the costs and logistics of marking and recovering sufficient numbers of fish; hatcheries provide large concentrations of juvenile salmon for tagging and represent convenient places where mature salmon can be recovered.

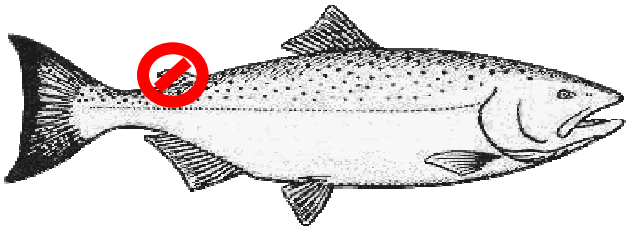
Prior to the advent of mass marking and mark-selective fishing, both the hatchery indicator stocks and the natural stocks they represent were subject to the same fishing patterns (locations and exploitation rates). Consequently, estimates of fishery impacts derived from cohort reconstruction (e.g., maturation rates, fishery-age exploitation rates) of CWT hatchery indicator stock groups could be employed as surrogate measures for naturally spawning populations (i.e., the hatchery indicator and the associated natural

[1] Wild smolt tagging experiments in Puget Sound, southern British Columbia, and the Washington Coast support the belief that hatchery indicator and wild coho salmon stocks are subjected to similar fishing patterns. This relationship is less clear for Chinook salmon, but tagging experiments with progeny from wild and hatchery brood stock suggest that the use of indicator stocks is reasonable, but not certain.

stock were assumed to experience the same exploitation history and impacts). The advent of mark-selective fishing, however, can seriously compromise the ability to make inferences regarding fishery impacts on natural stocks from CWT data.

Mass Marking and Mark-Selective Fisheries

When survivals plummeted in the early 1990s, conservation concerns resulted in several natural stocks being listed under the Endangered Species Act (ESA). To a large degree, the data necessary to establish jeopardy standards for ESA listed stocks and monitor compliance is provided by the CWT system through the use of hatchery indicator stocks.



In fisheries that exploit complex stock mixtures, mass marking and mark-selective fishing developed as a means to increase utilization of hatchery fish within constraints established to protect natural stocks of concern. Currently, mass marking involves clipping the adipose fin to provide a visual cue that allows differential retention of marked fish while requiring unmarked fish to be released in mark-selective fisheries. While some of the unmarked fish will die as a result of stress and injury when caught and released in mark-selective fisheries, some will survive. In theory, the lower mortality suffered by natural fish enables more hatchery fish to be caught while allowing more natural fish to escape to their natal streams and increase the spawning abundance.

The United States and Canada share common issues that exert pressure for the wider application of mass marking and mark-selective fisheries in management of Chinook and coho salmon. Both countries have experienced severe fishery restrictions resulting from the need to conserve natural stocks. Both countries have large investments in hatchery infrastructure to mitigate for destruction of fish production due to damage to habitat and to provide harvest opportunity for fisheries. Both countries are suffering from intense budgetary pressures for fiscal austerity. Both countries recognize that if investment in their hatchery programs is to continue, then some means must be found to provide harvest opportunity that relies upon hatchery production to support economically and socially viable fisheries, while constraining impacts to wild salmon stocks at levels appropriate for their conservation and rebuilding.

Canada and the United States currently mass mark millions of hatchery coho salmon each year. The United States has also mass marked millions of Chinook salmon in recent years (Canada has not mass marked Chinook salmon). New technology has been developed to automate the process of mass marking and/or inserting CWTs into large numbers of hatchery-produced Chinook and coho salmon. The concept of mass marking to support mark-selective fisheries has become so appealing to some that it recently found its way into federal legislation in the United States in the 2004

appropriation bill for the U.S. Fish and Wildlife Service (USFWS) (Bowhay 2004), regardless of potential adverse consequences for the future viability of the CWT system. Under the provisions of the appropriations bill, the USFWS is directed to *" ...implement a system of mass marking of salmonid stocks, intended for harvest, that are released from Federally operated or Federally financed hatcheries including, but not limited to fish releases of coho, chinook, and steelhead species. Marked fish must have a visible mark that can be readily identified by commercial and recreational fisheries.*" As a consequence of this legislation, many millions more Chinook and coho salmon originating in the Pacific Northwest will be mass marked.

In the early 1990s, when mass marking and mark-selective fisheries were in their infancy, the Pacific Salmon Commission (PSC) found itself at the center of heated policy and technical debates over potential impacts of mass marking and mark-selective fisheries to the CWT system. Recognizing the reality that political pressures would press for continued implementation of mass marking and mark-selective fishing and that these methods could adversely affect the viability of the CWT system that has been essential to Chinook and coho salmon management for three decades, the Pacific Salmon Commission ultimately adopted an "Understanding of the PSC Concerning Mass Marking and Selective Fisheries" and established a permanent Selective Fishery Evaluation Committee (SFEC) in 1998. This committee has addressed the technical issues surrounding mass marking and mark-selective fisheries and has documented the extent and magnitude of mass marking and mark-selective fisheries in various reports (http://psc.org/publications_tech_techcommitteereport.htm#SFEC).

Issues Pertaining to Mass Marking and Mark-Selective Fisheries

Differential fishery impacts on natural fish and their hatchery indicators

Because marked hatchery fish and unmarked natural fish are no longer subject to the same patterns of exploitation under mark-selective fisheries, CWTs on hatchery indicator stocks can no longer serve as suitable surrogates to evaluate and monitor fishery impacts on natural stocks. In the presence of mass marking and mark-selective fisheries, impacts on natural stocks cannot be inferred from direct samplingbecause unmarked fish must be released. In addition, analytical results increasingly rely upon new assumptions on fishery impacts that are difficult to validate (e.g., assumed values for release and drop off mortality rates, plus mark retention and unmarked recognition error).

A concept termed Double Index Tagging (DIT) has been proposed as a means to provide data to help evaluate the impact of mark-selective fisheries on natural stocks. With DIT, two groups of fish with CWTs are released, identical in every respect except that: (a) the groups carry different CWT codes; and (b) only one of the groups is mass marked. When these fish are subjected to mark-selective fishing, fish from the unmarked DIT pair are released while fish from the marked DIT pair are retained. In mark-selective fisheries, only CWTs from the marked DIT pair can be recovered while in non-mass-selective fisheries, CWTs from both marked and unmarked DIT releases could be collected.

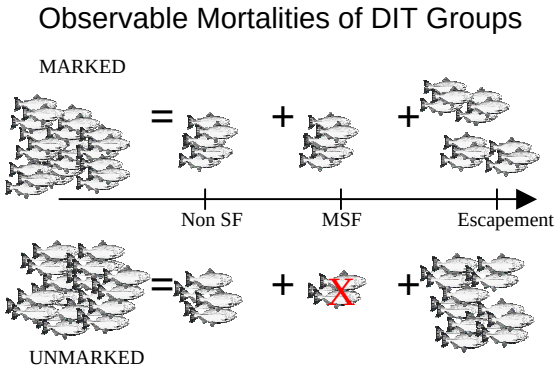


Fig 3. Observable recoveries of Double Index Tag Releases

With DIT, CWT recovery programs for fisheries and spawning escapements now must sample both marked and unmarked fish, and there must be provisions for recovering CWTs in both mark-selective and non-mark selective fisheries on the same stock. In theory, differences in recovery patterns between the DIT pairs would be used to assess the effect of mark-selective fishing.

DIT effectively doubles tagging costs for indicator stocks because now two groups of fish would need to be tagged. The number of fish in each group could not be reduced because of increased uncertainty surrounding recovery statistics.

In addition to differential patterns of fishery impacts on marked and unmarked fish, mass marking also poses an additional problem with the capacity of the CWT system to provide the data necessary to evaluate impacts of mark-selective fisheries and other fisheries. Prior to the advent of mass marking, the adipose fin clip had long been sequestered to indicate the presence of a CWT so sampling programs could efficiently identify fish with CWTs for analysis. With mass marking, the number of fish with missing adipose fins would increase many times over, so electronic tag detection (ETD) has been developed to identify fish containing a CWT. ETD equipment detects the presence of the CWT as magnetized wire. Two main types of ETD equipment are used: a hand-held wand and a tube. Wands are designed for use by field samplers who inspect fish in catches and escapements. They are passed over the head of a fish and a beep identifies the detection of metal. With a tube, the entire fish is passed through and the presence of a tag detected. Tubes are designed to be employed in high-volume installations such as hatcheries and processing plants. ETD technology must be used by trained samplers and employed throughout the migratory range of the stocks to recover the CWTs required for cohort analysis.

Fig. 4. Wand Detector and Tube Detector

Some jurisdictions that do not conduct mark-selective fisheries, however, continue to rely upon the missing adipose fin as the potential indicator of a CWT. Agreement to deploy ETD has not been reached in some areas because of increased cost of equipment and sampling plus unresolved technical or operational concerns. Consequently, since many mass-marked fish migrate to areas where there are no plans to employ ETD, CWT recoveries, particularly for unmarked DIT releases, will be incomplete, resulting in biased estimates of exploitation rates.[2] For many natural stocks, particularly, those listed under the ESA with jeopardy standards tied to exploitation rates, such bias can be problematic since accurate, unbiased estimates of exploitation rates are essential to monitor compliance and evaluate the effectiveness of fishery management measures.

Even with ETD and DIT, however, the capacity to generate the stock-age-fishery specific exploitation rates needed to preserve the viability of the CWT system as a means to estimate fishery impacts on natural stocks remains uncertain. The Selective Fishery Evaluation Committee (SFEC) established by the Pacific Salmon Commission in 1998, noted that no methods had yet been found to generate reliable estimates of mark-selective fishing impacts on unmarked fish when more than one mark-selective fishery impacts, particularly in the presence of substocks[3].

The potential impact of mass marking and mark-selective fishing is situational, depending on the biological characteristics of the stocks involved and the location and intensity of the mark-selective fishery. Under certain circumstances, mass marking and mark-selective fishing could seriously and adversely affect the future utility of the CWT system, which currently serves as the foundation for stock and fishery assessments of Chinook and coho salmon.

Effectiveness of mass marking and mark selective fisheries have not been demonstrated

Despite their "common sense" appeal, mass marking and mark-selective fisheries have not been shown to be an effective management tool to constrain impacts on natural stocks of Chinook and coho salmon to allowable levels. The effectiveness of mass marking and mark-selective fishing has not been evaluated prior to widespread application, and has instead, been blindly accepted as a matter of faith.

[2] For a given stock, if mark selective fisheries occur in pre-terminal fishing areas, CWTs of unmarked DIT groups will not be recovered in non-selective fisheries that do not employ ETD; consequently, impacts of mark selective fisheries cannot be estimated by differences in exploitation patterns between marked and unmarked DIT pairs.

[3] Substocks are portions of a larger population that have different migratory patterns, for example, some coho originating in Puget Sound may reside in Puget Sound, while other portions migrate to the ocean. It is not possible to know in advance which fish will migrate to a given area. In the absence of mark-selective fisheries, the presence of substocks does not matter because marked and unmarked fish are subjected to the same fishing patterns. But when substocks are subjected to different mark-selective fishing patterns, fishery-specific impacts of mark-selective fisheries on unmarked fish cannot be readily estimated.

Management targets have not been adjusted to compensate for increased uncertainty

Statistical uncertainty surrounding CWT-based estimates has two general components, precision and bias. Precision relates to the amount of variability in the estimates, while bias concerns the accuracy of the estimates. Mass marking and mark-selective fisheries increase uncertainty and introduce additional bias in estimates of fishery impacts on unmarked fish due to the necessity to rely upon assumptions (e.g., release mortality rates) that cannot be readily validated. Current management regimes do not adjust allowable exploitation rates on natural stocks to compensate for this increased uncertainty; therefore, the risk that management objectives for natural stocks will not be achieved is increased, and the risk is an added burden on the viability of natural stocks.

Mass marking and mark-selective fishery have increased the cost of the CWT data collection system

DIT, changes in sampling requirements, requirements for ETD, and the need for sampling all fish in all fisheries and escapements greatly increases the cost of maintaining the CWT system. There is a potential for budget pressures resulting from the costs of mass marking and mark-selective fishery to reduce the amount of funding that agencies have available to operate other aspects of their program responsibilities.

The Pacific Salmon Commission's CWT Workshop

Since the early 1980's, the CWT system has served as the foundation for Chinook and coho salmon management in the Pacific Northwest and the scientific basis for the Pacific Salmon Treaty. Concerns over statistical uncertainty, the adequacy of reliance upon hatchery stock surrogates for associated natural stocks, and the impact of mass marking and mark-selective fisheries have been building in recent years. Taken together, these concerns have generated questions regarding the continuing utility of the CWT and associated sampling regimes and analytical tools that the Pacific Salmon Commission has relied upon for decades. As a result, the ability of the CWT system to continue to serve in that capacity is now very much in doubt.

As more and more of the fishing mortality on natural stocks is accounted for by non-landed catch (e.g., shaker loss, drop off, release and non-retention), the capacity of the CWT system to provide the data necessary for stock and fishery assessments is being increasingly challenged. Requirements to constrain exploitation rates on depressed natural stocks are increasing. Although reliable estimates of total mortalities are being demanded, the information systems necessary to provide the required data are deteriorating. Estimates of mortalities on natural stocks are becoming ever more dependent upon assumptions, inferences, and methods that cannot be readily validated, as well as programs for sampling and tag recovery in natural spawning populations whose accuracy is unknown. In June 2004, the Pacific Salmon Commission convened an expert panel to develop recommendations for addressing emerging concerns over the future of the CWT system. The Panel's report is scheduled for release this fall.

Other Considerations

There are other potential adverse impacts of mass marking and mark-selective fisheries, including:

a. the high costs associated with mass marking and sampling could reduce funding available to agencies to perform other program functions;
b. the implementation of fisheries that target the harvest of hatchery fish may reduce the motivation to protect the quantity and quality of habitat for production of natural fish;
c. the potential for agencies to try to increase production of hatchery fish could result in increased interactions that can reduce the survival of naturally produced fish.

Summary and Discussion

The effectiveness of mass marking and mark-selective fisheries as a management tool to constrain impacts on natural stocks to levels that effectively conserve natural populations has not been operationally demonstrated. Instead, that effectiveness in general has been accepted blindly. This change in management effectiveness is completely contrary to the management successes evident during the 1980s when coded-wire tag analyses provided reliable information for the coastwide management and assessment of coho and Chinook salmon populations.

Mass marking and mark-selective fisheries increase uncertainty and bias in the estimates of fishery impacts on natural stocks. Increased uncertainty resulting from different fishing pressures on hatchery and natural stocks, coupled with less than complete coverage of electronic tag detection throughout the migratory ranges of stocks, can substantially reduce the ability to monitor and evaluate fishery impacts on natural stocks. While these problems will exist to some extent in the presence of any mass marking and mark-selective fishery, their severity will vary among different salmon stocks, depending on the location, timing, and intensity of the mark-selective fishery.

Increased costs of implementing mass marking and mark-selective fisheries can adversely affect the ability of agencies to fulfill other responsibilities. In some quarters, there is concern that reliance on mass marking and mark-selective fisheries to sustain fisheries can lead to reduced protection of habitat and survival rates of natural fish. If hatchery production is increased to support mark-selective fishery, there are additional concerns that the accompanying increases in hatchery-wild interactions (competition, interbreeding) will adversely affect the future viability of natural stocks.

The issues associated with mass-marking and mass-mark selective fisheries are technical in nature and can be difficult for the public to appreciate; i.e., what could be wrong with selectively removing hatchery fish while reducing harvest impacts on naturally produced salmon that require increased conservation actions? What seems very logical in words, however, does not guarantee that the desired outcome will be reached. Fundamentally, mass marking and mark-selective fishing together represent a trade-off

from what we can now measure and assess versus what we hope will be the case based on largely untested assumptions. The issue is further complicated because the level of concern over mass marking is dependent upon the application and magnitude of the mark-selective fishery. Even though a small, localized, terminal mark-selective fishery will likely have minimal increase in uncertainty, the scale of mass marking being conducted is not consistent with a plan for limited use of mark-selective fishing. Large-scale mass marking and mark-selective fisheries will substantially compromise the technical bases that have been established to assess and manage Chinook and coho salmon. In the presence of mass making and mark selective fisheries, how would an agency assess the role of harvest in the continued decline in abundance of a listed ESU? Will it be adequate to assume that 1) unvalidated values for the incidental mortality rates (e.g., release mortality rates) are accurate and known without error, 2) the incidence of multiple catch-and-release events is inconsequential, and 3) the physiological impact of multiple catch-and-release on reproductive potential of spawning fish is negligible? Will reduced levels of harvest impacts to natural stocks be assumed and risks ignored?

Although technical advisors working on CWT, mass-marking, and mark-selective fisheries have identified these concerns for several years now, the mass marking proceeds, and the benefit of mark-selective fisheries seems broadly accepted without thorough evaluation. These benefits may be realized in the end, but they have not been demonstrated to date.

Accurate, unbiased data are essential to decision-making and cooperative management approaches to conserve naturally spawning stocks of Chinook and coho salmon. In the 1970s and early 1980s, management actions to address declining Chinook salmon spawning escapements were frequently delayed because of uncertainty in the data and the lack of "proof" that particular user groups were contributing to a problem. Very few groups would have believed that total exploitation rates on Chinook salmon exceeded 80% and that many groups contributed to this over-fishing. Reliable CWT programs produced the "hard evidence" that allowed managers coastwide to resolve these issues and ultimately to agree on a coastwide management plan for rebuilding depressed populations of Chinook salmon in the Pacific Salmon Treaty.

In this period where stock rebuilding is given priority, increased uncertainty in outcomes should be explicitly accounted for in fishery regimes, management objectives, and assessment standards. Furthermore, technical debates over CWT data must NOT overshadow the three points noted previously under "Other Considerations." As the ISAB explained in their Harvest Report, harvest is only one component of the impacts imposed on natural populations throughout their life cycle. If the issues associated with the other three H's are ignored due to an assumption that mass marking and mark-selective fisheries will protect naturally spawning stocks, then natural populations may not recover. In addition, if mass marking and mark-selective fisheries continue to be promoted without adequate scientific evaluation, costs for assessments will have been substantially increased, critical information lost, and additional costs imposed on other users groups without obtaining the desired benefits. Resolution of the data concerns merits investment in studies to assess the validity of key assumptions involved in mass

marking and mark-selective fishing. These issues will be further developed in the report of the Pacific Salmon Commission's Expert Panel report due in the fall, 2005.

Appendix D

Ocean Recruits Calculations

There are three possible options for calculating Ocean Recruits for the H&S Plan:

1) Catch Plus Escapement (CPE)
2) Adult Equivalent Run Size (AER)
3) Age 2 Recruitment

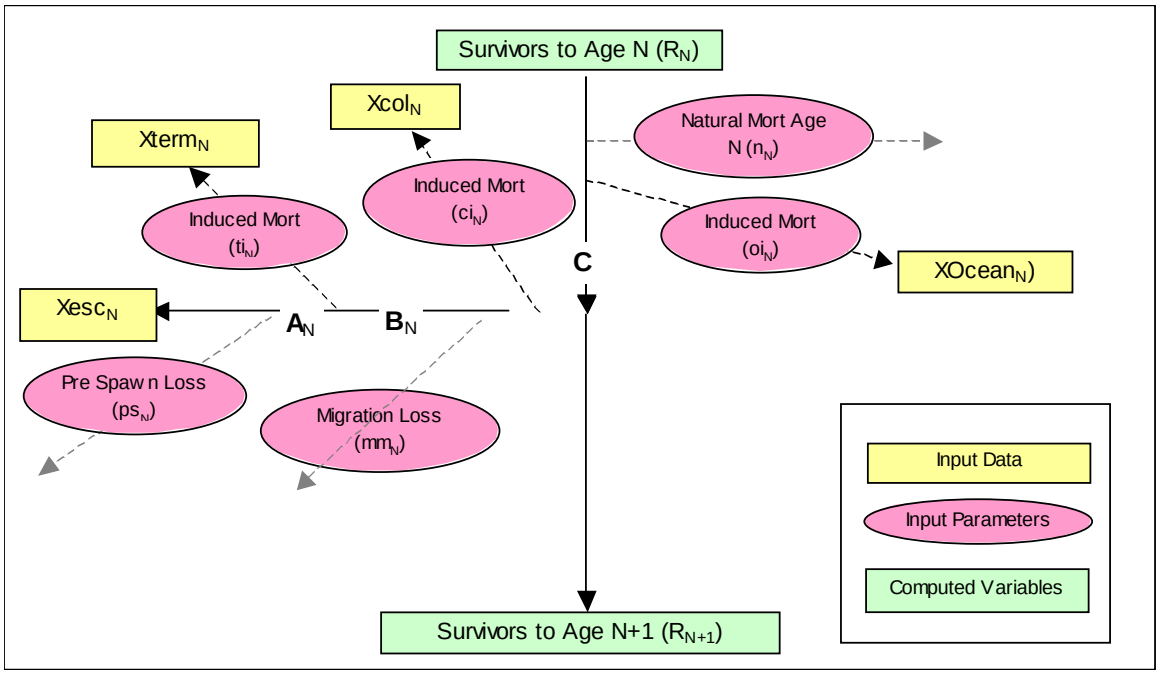
The calculations used for completing each of the three analyses are performed as follows:

1. Catch plus escapement, $(C+E)_Y$, for brood year Y is computed as:

$(C+E)_Y = Xesc_Y + Xterm_Y + Xcol_Y + Xocean_Y$, where
$Xesc_Y, Xterm_Y, Xcol_Y, and\ \_\ Xocean_Y$ are brood year escapement, terminal, mainstem, and ocean harvest based on expanded CWT recoveries.

2. Adult equivalent return, $(AER)_Y$, for brood year Y is computed as:

$(AER)_Y = \sum_{age=1}^{NN} R_{Y,age}$, where
$R_N = C_N + Xocean_N(1+oi_N)(1-n_N)^{(na_N-1)}$, and
$C_N = R_{N+1} + B_N/(1-mm_N) + Xcol_N(1+ci_N)$, and
$B_N = A_N + Xterm_N(1+ti_N)$, and
$A_N = Xesc_N/(1-ps_N)$, and $R_{NN+1} = 0$
symbols are defined in the chart below.



3. Age 2 recruitment, A2R, is computed as R_2 in AER equations above.

Appendix E

Response to Comments on Draft Hatchery and Supplementation Plan

Commenter	Comment Number	Comment	Response
Fish First	FF1	Fish First supports the comments and recommendations submitted by WDFW & Janne Kaje for the Cowlitz Tribe.	Comment noted
Fish First	FF2	In addition, we recommend that the process for estimating adult ocean recruits be conservative, that is err on the side of under-estimating rather than over estimating those recruits since the estimating process has to be rather imprecise. Fish First is convinced that the models used to estimate pre-dam (above Merwin) productivity grossly under estimated historic populations. We believe that actual productivity was at least 6 to 10 times the model estimates. Those unrealistically low estimates were used to establish the low target numbers adopted in the settlement for hatchery production. We should not compound this failure to set realistic hatchery production targets for project mitigation by systematically overestimating adult recruits and counting jacks as adults as the draft report suggests.	Currently, the plan proposes using all three methods: Age 2 recruits, Adult Equivalent run and catch plus escapement for estimating ocean recruits for Chinook and coho salmon. For steelhead, catch plus escapement methodology would be used. Pre-dam estimates are based on available scientific reports. If additional reports exist we would appreciate receiving that information.
Peter J. Carlos	Carlos1	I have grave concerns about the elimination of the winter steelhead program as well as the reintroduction of salmon to the upper Lewis River. Elimination of the winter steelhead production would further reduce the fast disappearing fishing opportunities in the area and place more pressure on the remaining fisheries.	The recommendations set forth in the H&S plan are derived from requirements of the Settlement Agreement. Reintroduction programs were included at the request of the settlement parties. Therefore, the utilities are required to pursue reintroduction. Assuming that hatchery capacity is available, no reduction in hatchery winter steelhead production will occur.
Peter J. Carlos	Carlos2	I'm also concerned on the impact on the upper Lewis, above Eagle Cliff Bridge [that] the reintroduction of salmon will have on the existing trout fishery. This is one of the very few existing trout fisheries in the area with fish that achieve a reasonable size. Increasing the pressure there with a salmon fishery, legal or not, would have a serious negative impact on the trout population. I can also foresee an elimination of the legal season to protect the salmon population and an increase in the illegal taking of fish and an inability of a seriously understaffed and overworked enforcement agency to prevent it. Then there is the effect on a delicate ecosystem to consider also.	As part of the Settlement Agreement, PacifiCorp and Cowlitz PUD will fund additional enforcement officers that are dedicated to the Lewis River. This will help in illegal angling and poaching activities that undoubtedly will occur from time to time. At this time there are no plans to eliminate or reduce the hatchery releases of rainbow trout into Swift reservoir. As for effects of reintroduction on the upper basin ecosystem, the H & S plan assumes that historically all species interacted naturally and that there continued interactions are what we would expect in a naturally functioning ecosystem.

Commenter	Comment Number	Comment	Response
Peter J. Carlos	Carlos3	There seems to be a movement on by the power company's to get out from under the conditions mandated during the original agreements to license the dams. I don't think anyone thought that mitigation was going to be easy or inexpensive, but I do think the power companies are very quick to point [to] their perceived failure of their attempts to solve a problem they created. If there was a profit to be made "no" or "can't" wouldn't be in their vocabulary. It shouldn't be when it comes to destroying a resource belonging to all of the people of the State of Washington.	The H & S plan does not refer to the original licensing agreements. Rather, the plan focuses on the current Settlement Agreement. The utilities are committed to implementing the conditions of the Settlement Agreement and their respective licenses. It should also be noted, that the utilities have been in full compliance throughout the term of their existing license obligations.
John F. Comes	Comes1	The recent article in Clark County's Columbian newspaper has raised concerns among sport anglers about diminished angling opportunities in SW WA. A few good friends have brought this to my attention. I wanted to pass along my concerns with the plan. According to the article, the plan would: • End winter steelhead which return to the river from November to February (closer to October to March) • End early coho, which return to the river from mid-August to Sept. • Decrease late coho, which return to the river from Sept to Dec. • Increase spring Chinook for ocean and in river (Columbia) harvest. It also calls for the trucking and reintroduction of salmon and steelhead into the North Fork of the Lewis upstream of Swift Reservoir. Prior to the dams this area was part of the salmon and steelhead historic range. However because of the dams, it has since become viable and active trout fishery. The reintroduction has the potential to destroy the trout fishery. Add up all the components and it appears to equal less in-river angling opportunities in-river and shifts to a Chinook ocean harvest program	The Lewis River Settlement Agreement defines certain hatchery production target floors (Table 8.3.2 of the Settlement Agreement). That is, production will not go below a certain level despite production in the upper basin. Therefore, hatchery production is guaranteed through the Settlement Agreement. Within these guidelines, however, the plan attempts to meet a balance between hatchery production and production for reintroduction efforts into the upper basin. While, species such as winter steelhead may be reduced (dependent on hatchery capacity) in favor of building naturally producing stocks of winter steelhead, spring Chinook hatchery production is increasing. This approach should provide enhanced angling opportunities in the lower river when angling pressure is highest.
John F. Comes	Comes1	I'm still trying to digest the 106 page PDF version of the report from PacifiCorp (http://www.pacificorp.com/File/File58569.pdf), and may comment again.	As required under the Settlement Agreement, the company has provided the necessary 60-day comment period. However, the Services will likely provide additional review time for the ACC and public to comment.

Commenter	Comment Number	Comment	Response
Mike Gamby	Gamby1	I would like to post my concerns over the possible changes with the North Fork Lewis River, especially the Upper section, above Swift Reservoir. In my opinion, The upper Section is the ONLY Blue Ribbon, moving water, Trout Fishery in SW Washington. It is a GEM that should be protected and maintained as a Seasonal Selective Rules Trout Fishery. It is by far, my favorite place to fish, and the only place I will Fish for trout in the summer. I can't wait for June, and I am bummed out in October. But that is the price we pay for a wonderful fishery. I am a Recreational Fly fisherman. What that means, is that I fish waters that are mostly catch and release, that I fish waters that are mostly catch and release, selective rule, or fly only. There are very few places to fish around here that cater to this type of recreationalist. I have also been an "ambassador" to the upper river, taking it upon myself to educate fisherman about the regulations, especially around Eagles Cliff Bridge Area, to help maintain this wonderful fishery. I have confronted individuals on the river, explaining them the regulations. I absolutely love it up there, and find it to be a very peaceful place to hike, fish, and relax. I don't want you to close the upper river all together. Why can't we keep it a selective gear fishery, for trout? I feel introducing the salmon, coho, and Chinook in this stretch, would invite the "Wrong type of angler", which have to tendencies to destroy a wonderful fishery by fishing against the rules, and also to completely wipe out the Bull Trout population. I don't mean to stereotype, but I have seen the lower river around the hatchery, and have witnessed first hand what kind of damage can be caused by the unethical, immoral sportsman. The Upper River is an escape from that. Please think twice about the proposed changes, and please Protect the Upper River, for future generations to enjoy. Sincerely, Mike Gamby	Season setting and regulations are the responsibility of the Washington Department of Fish and Wildlife. The reintroduction of salmon and steelhead to the upper basin are part of the utilities obligations under the Settlement Agreement. Additional enforcement activities are also part of the Agreement and should provide immediate protection to resident species such as bull trout as well as reintroduced salmonids.
Jerry Downey	Downey1	I am writing to express my concerns that the proposed management plan will have a negative effect on the trout fishery on the upper river. Reducing the number of winter steelhead also does not seem to be a positive. The stocking or not stocking of coho and Chinook seems to be in conflict. Sincerely, Jerry Downey	Winter steelhead production will remain the same (assuming hatchery capacity is not exceeded). Any negative impacts to the trout fishery need to be discussed among the fish management agencies. The H & S plan, assumes however that historically both anadromous and resident salmonids existed in the upper basin.

Commenter	Comment Number	Comment	Response
William Olsen	Olson1	I am writing this inquiry to hopefully gain some information about the upcoming management changes to this river system as were listed in the Columbian on 1/19/06. A little background is that I travel to SW Washington several times per year from Salt Lake City. To steelhead fish. I just recently started trout fishing the upper river and am quite impressed that such a high quality fishery exists tucked away. This means adding additional trips to just come all the way out to trout fish. More money pumped into local businesses. In fact I am also looking at potentially moving to SW Washington. This trout fishery is one more reason to get me out there and call the region home. I am very concerned over the future of this fishery with the regulations that will likely be put into place to protect the attempt at reintroduction. And the impacts the introduction itself will biologically have on the wild trout population. As I am sure you are aware there are some impressive specimens in that stretch of river. Those that rival Alaska. Or anywhere else in the western US.	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.
William Olsen	Olson2	I am also very concerned over this attempt to reintroduce a wild reproducing population. I am well versed in the poor reproductive ability of hatchery, even bloodstock, fish in the wild. Couple that with using a diversion collection system to capture smolts at Swift Dam and using a truck to move fish around the system. I don't see how this and using a truck to move fish around the system. I don't see how this will fulfill mitigation. The anadromous fish of the upper river are extinct. Creating a viable population is very risky at best. The potential damage to the created wild trout fishery is a big gamble investing in something that realistically doesn't have the science or background to succeed. Even if the dams were removed and the habitat 'restored' the chances of creating a viable wild anadromous population through hatchery stocks (or brood stocks) just isn't realistically going to happen. Why take that chance on damaging the upper river? Why take the early coho and winter steelhead harvest opportunities away from the lower river angler?	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. The methods by which the utilities perform this are subject to review and modification by the ACC and Services.
William Olsen	Olson3	These upcoming decisions will quickly determine how much of my money will be spent supporting local businesses. And my friends too. If the trout fishery is closed and or biologically reduced to nothing I will be forced to spend my money elsewhere. And in doing so I will move the other 6 trips per year I make to SW Washington (and Skagit County) to both Oregon and Idaho as their fisheries are in far greater overall shape. Don't get me wrong...I really like SW Washington. I have been purchasing a season non-resident fishing license with catch card since 1994. I bring my father to your state almost every year just for the fishing. Even my kids have come out and enjoyed the steelhead fishing. I was truly hoping that we as a	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.

Commenter	Comment Number	Comment	Response
		family could enjoy the upper river trout fishery together. It sounds as though this may no longer be the case. A blow that I can't accept. The fallout from it will force me, my family, and numerous friends, to find other locales to recreate. Thank you, William Olson	
Heather McNeill	McNeill1	I'm writing regarding the recent article in the Columbian newspaper (Thursday January 19th.) about PacifiCorp and hatchery operations on the N. Fork Lewis River. I am not a buoy 10 Columbia River fisher. The problems with the Columbia are profound. Using the Lewis to jack around with the numbers for the lower Columbia seems like cutting off our nose to spite our face. There is a current strong fishery in the Lewis that is working for the local community and the local economy. Albeit its still a damned river and facing its own issues from that. Unless someone can offer me specific evidence that this plan improves the watershed health, the Lewis River community, and the economy of the Lewis, then I am opposed to shifting the program.	The decision to shift the program was made when the Settlement Agreement was signed November 2004. A intensive monitoring program will be established to determine what effects the reintroduction efforts may be having on resident species especially bull trout. Results from this monitoring will be provided and reviewed by the ACC, which may result in further program changes.
Heather McNeill	McNeill2	I love the Lewis River. I had the great fortune of working for MSHNVM the Forest Service in 1993 mostly on the south side of St. Helens. The upper watershed is a wonderland. More recently I've started fly-fishing, and have enjoyed the upper rivers trout fishery and put in some time in the lower river for steelhead. Using the Lewis as a factory for Columbia harvest fish is wrong. Those dams did local damage to the Lewis. Seems to me that mitigation of the dams should focus on the local situation and local concerns. I think that if you would focus the management to improve the fishery in the Lewis itself, you would find that naturally the marine and Columbia situation would improve too. To treat the Lewis as a feedlot for destroyed downriver fishery is wrong. Trucking fish is not a proven solution.	The utilities are obligated to meet provisions set forth in the Lewis River Settlement Agreement. While this agreement defines what will be done, it does not necessarily determine how or what methods will be used to complete various obligations. These type of decisions are coordinated through the Aquatics Coordination Committee (ACC). The ACC is composed of all signatories to the Settlement Agreement.
Heather McNeill	McNeill3	Maybe you have more research that shows the benefits to the Lewis River system? Are you trying to reach historic fish diversity and counts in the Lewis? Are you working to help the folks in Woodland, Cougar, and Eagle Cliff who live off of the current fishery? I would very much appreciate a reply to these questions. Thank you for your consideration. I look forward to hearing from you. Heather McNeill 5680 River St. West Linn, OR	The utilities are implementing requirements as described in the Settlement Agreement. The goals for reintroduction include among others, establishing viable naturally reproducing stocks of anadromous salmonids. At this time, there are no proposed changes to the resident fish plants and increases to spring Chinook releases. The increase in spring Chinook should provide additional angling opportunity in the lower river.

Commenter	Comment Number	Comment	Response
Kurt Sherwood	Sherwood1	I am deeply concerned over the plans to make changes on the Lewis river regarding the hatchery programs, and what is being suggested about reintroducing anadromous fish into the upper river. While I support conservation and logical hatchery reform to help wild stocks, I have questions about the scientific validity of trucking fish over dams as a realistic answer to mitigating the dams impact. The upper Lewis river is now an established ecosystem adapted to the dam on the lower stretch of the river. This area provides pristine trout fishery and quite a stretch of free flowing river. I hope the WDFW listens to the public comment. Thank You, Kurt Sherwood, Lifetime Washington resident, Member Trout Unlimited, Member Wild Steelhead Coalition	The decision to shift the program was made when the Settlement Agreement was signed November 2004. A intensive monitoring program will be established to determine what effects the reintroduction efforts may be having on resident species especially bull trout. Results from this monitoring will be provided and reviewed by the ACC, which may result in further program changes. In regards to the fishery, WDFW will continue to set regulations. WDFW provides for public review and comment during this period.
Brad Rodgers	Rodgers1	I am writing to express my concerns about the proposed reintroduction of hatchery-raised salmon in the upper watershed of the North Fork of the Lewis River. Although this may appear to be advantageous and beneficial in the short term I think there is a great possibility that the fishery could be closed off for significant periods of time in an effort to protect the re-introduced species for incidental catch and or poaching. Myself and many others would lose a valuable natural resource if this watershed is closed to recreational opportunities. And the local economies that depend on the tourism and recreational dollars circulating in the areas would diminish as a result of declining recreational dollars to the area. Please leave the watershed and the fishery as it is now. In a pristine, beautiful, natural habitat. Thank you, Brad Rodgers	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.
Bob Williams	Williams1	I would like to voice my concern about the proposed changes for the North Fork Lewis River fishery. I note that these changes are, at least in part, are proposed to help PPL meet their requirements for amelioration of the effects three dams have on salmon population. Some of the proposals mention trucking adult salmon above Swift Reservoir, and juveniles down from there. It seems to me that if this happens, then there will be additional regulations and restrictions on trout fishing on the NFL above the reservoirs. Frankly, there are not a lot of rivers that have decent trout fishing in this area, so to lose the NFL above Swift Reservoir will be a big blow to those of us who love to fish there.	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.

Commenter	Comment Number	Comment	Response
Bob Williams	Williams2	I am also concerned about moving around the emphasis on steelhead and salmon hatcheries. If we are to use hatcheries to augment runs, then the benefit of that augmentation should go to the river's watershed, not to gill-netters or trawlers in the Columbia or the ocean. I'd like to see the first and foremost focus on these hatcheries to be for recreational use on the NFL itself. Thanks for taking the time to read this. I will watch with great interest the developments in this area, and hope that it will not mean the loss of fishable waters. Sincerely, Bob Williams, 8008 N.E. 100th Circle, Vancouver, Washington 98662, (360) 944-4459	The Lewis River Settlement Agreement defines certain hatchery production target floors (Table 8.3.2 of the Settlement Agreement). That is, production will not go below a certain level despite production in the upper basin. Therefore, hatchery production is guaranteed through the Settlement Agreement. Within these guidelines, however, the plan attempts to meet a balance between hatchery production and production for reintroduction efforts into the upper basin. While, species such as winter steelhead may be reduced (dependent on hatchery capacity) in favor of building naturally producing stocks of winter steelhead, spring Chinook hatchery production is increasing. This approach should provide enhanced angling opportunities in the lower river when angling pressure is highest.
Shane Hall	Hall1	To whom it may concern: This message is an inquiry regarding the future of the NFL fishery. Surprisingly, I have never fished the North Fork - not for steelhead, not for Chinook, nor for coho. Would I fish it if I had the chance? Of course. It's just that in my last three years here in SWW I somehow have ended up on different waters. I guess that is why I don't have the connection with the North Fork that some others have. Perhaps one must actually fish the water in order to understand its worth and appreciate what the fishery can afford in its present condition. From the sounds of it, it may be too late for me to do just that. The Upper Lewis however is a different story. I've known this water. I love this water. To me it is one of those places that you never talk to anyone about until they agree to go fishing with you there. It’s wild, majestic and truly beautiful. Its one of the few outdoor places in SWW where I've felt a distinct spiritual connection with nature. For those that have felt it, they know what I am talking about. It's almost gospel, in that you want to preserve it and share it with family and friends. That being said, my questions are these: What does this fishery proposal mean? How will trucking anadromous species over the dams and up to Swift affect the Upper NFL and the trout fishery specifically? Does this spell doom for the trout? Will it spell doom for anglers? Does this translate into a shorter trout season or no season at all? I know it seems selfish that I am overlooking the winter hatchery woes and problems with the lower river but like I said earlier, I just don't have the same connection with that part of the drainage system. Any response to these concerns and questions would	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.

Commenter	Comment Number	Comment	Response
		be greatly appreciated. Sincerely, Shane Hall, Battle Ground, WA, 687-1786.	
Brian K. Kuhta	Kuhta1	Dear Sir or Madam, This email is to express my concern about the proposed changes to the management of anadromous fish species (salmon and steelhead) in the North Fork of the Lewis River, as recently reported in the Columbian North Fork of the Lewis River, as recently reported in the Columbian newspaper. Although the article was unclear as to what specific changes might occur to the fishing regulations as a result of the PGE dam relicensing and WDFW management objectives, I want to express my support for decisions that keep recreational fishing opportunities open and available to anglers on the entire NF Lewis River system. As a fly fisherman, I have enjoyed many floats on the lower section of the Lewis River, chasing both summer and winter run steelhead. Although these runs may not be spectacular in number, the ability to enjoy a day on the river with the chance of hooking and landing (and in my case, releasing!) this spectacular fish is one of the unparalleled benefits of living in SW Washington. When you consider the number of fly and gear fishermen who frequent this popular waterway, the economic benefit of managing the steelhead and salmon runs for continuation of this sport fishery is self evident. Consider also the potential for increased pressure on other SW Washington rivers and resulting negative effect on other fish runs, should the popular lower NF Lewis be closed to anglers.	The Lewis River Settlement Agreement defines certain hatchery production target floors (Table 8.3.2 of the Settlement Agreement). That is, production will not go below a certain level despite production in the upper basin. Therefore, hatchery production is guaranteed through the Settlement Agreement. Within these guidelines, however, the plan attempts to meet a balance between hatchery production and production for reintroduction efforts into the upper basin. While, species such as winter steelhead may be reduced (dependent on hatchery capacity) in favor of building naturally producing stocks of winter steelhead, spring Chinook hatchery production is increasing. This approach should provide enhanced angling opportunities in the lower river when angling pressure is highest.
Brian K. Kuhta	Kuhta2	I am especially concerned about insuring the continued ability to fish the Upper NF Lewis (above Swift Reservoir). While I do not have any objection to fish management decisions which include trucking salmon and/or steelhead to these waters for the overall benefit of the runs, I would NOT be in favor of further limiting access to this already heavily regulated area in the name of protecting those experiments. The Upper NF Lewis fishery is one of the true gems of SW Washington. Current regulations closing the waterway from November to June, combined with the special regulations above Eagle's Cliff Bridge, have served the river well in protecting the bull trout population, as well as limiting overall pressure on the river. With some few exceptions (which could be mitigated with increased law enforcement vigilance) those of whom fish the upper reaches of the NF Lewis are conscientious anglers who would do little harm to any anadromous fish populations being managed for the lower river. By simply disallowing the taking of salmon or steelhead in the upper river, this wonderful trout fishery could stay open to those of us who love it, with little effect on experimental efforts to increase anadromous fish counts. I sincerely hope the WDFW recognizes the value	The reintroduction of anadromous salmonids to the upper basin is a requirement of the Settlement Agreement. Any regulation changes that affect the trout fishery in Swift will be at the discretion of the fish commission after public review.

Commenter	Comment Number	Comment	Response
		of keeping both the upper and lower NF Lewis rivers open and available to sport anglers. Please keep them open! Regards, Brian K. Kuhta, 3036 NW Astor Street, Camas, WA 98607	
Wes Hill	Hill1	Basically what I get out of the article as a whole is consideration is being given to removing as much as six months of recreational fishing opportunity on the lower river, a tremendous blow to viable winter fishing options for SW WA, to provide fishing opportunity in other areas for other species during other seasons.	The recommendations set forth in the H & S plan are derived from requirements of the Settlement Agreement. Reintroduction programs were included at the request of the settlement parties. Therefore, the utilities are required to pursue reintroduction. Assuming that hatchery capacity is available, no reduction in hatchery production will occur, until such time that natural production is sufficient to allow a reduction. However, there is a hatchery production "floor" which ensures that hatchery production will continue despite progress made with the reintroduction efforts.
Wes Hill	Hill2	I am especially concerned by the attitude I read into Mr. Shrier's last comment quoted, which seems to me to express - "well the result of our mitigation effort isn't doing so well so we're going to just stop trying to mitigate the loss of the fishery and put our efforts somewhere else".	Comment Noted
Wes Hill	Hill3	I also don't understand the apparent contradiction in and between the comments in 2, 3 and 4 above. In 2 I read that early coho contribute fewer adults to the fishery, yet we have an apparent surplus of fish that is causing a management problem. In 3 I'm told late coho hatchery production far exceeds needs and the surplus is a management problem. Yet in 4 I'm to believe that we need to create a much bigger supply of spring Chinook and though not mentioned, the implication certainly is, this huge number of spring Chinook wouldn't be a detriment to re-introduction efforts of Chinook like the (supposed) surplus apparently is to coho. I certainly don't need to spell out how this could be read.	Adult coho returns to the Lewis River are often much higher than the hatchery can process. Therefore, many fish are surplused. This is not the case for spring Chinook. Spring Chinook returns have been low in recent years, but they are highly sought after by anglers. The proposed increase in spring Chinook production is partly to provide increased angler opportunity.

Commenter	Comment Number	Comment	Response
Wes Hill	Hill4	Moving on to the upper watershed, I am fairly conversant with many of the issues and controversy surrounding hatcheries and hatchery fish and the idea of restoring wild, naturally spawning anadromous fish runs to historical waters. Yet I have to ask, at what point are we shooting ourselves in the foot to follow what almost appears to be a pipe dream. I don't have access to all the studies currently going on but I have yet to read any glowing reports on reintroduction efforts that have occurred in watersheds above multiple dams, especially with trucking involved. If just moving the fish around the dams is the answer, where is the success on the Columbia? You don't really have to try answering that; I know it is a complex issue, yet the complexity exists on the NFL as well. The upper watershed has "historically" provided my family and friends an excellent trout fishery. I have been fishing it for the past 27+ years. There are not many places in SW WA for a person to enjoy this type of experience -5 year old Olivia with nearly 27 inches of rainbow. This fish came out of the upper NFL. Am I going to loose the opportunity to watch my children play, tail and release fish like this? What are the re-introduction efforts going to do to the summer sport fishing seasons on the upper river? Reduced or eliminated seasons? Reduced or eliminated seasons on the upper river and the loss of the winter steelhead fishery on the lower river combined are a blow to our local fisheries that I have trouble accepting.	Large trout in Swift reservoir are stocked annually. These trout are planted by WDFW following the Merwin fishing derby. The fish are excess and leftover fish from the derby. These fish are quite large and have provided additional fishing opportunity in the Eagle Cliff area. This planting is undertaken by the WDFW and utilities; however, the continued planting of these derby fish is at the discretion of WDFW. Also at the discretion of WDFW is setting of regulations. The H & S plan does not recommend any changes to sport fishing regulations.
Wes Hill	Hill11	We don't really have many viable trout fisheries in SW WA except for a few lakes with planted trout. Please don't misread my comment, I have no problem with providing a fishery for folks with stocked trout, but it needs to be recognized there are those for whom fishing is a different type of endeavor than floating around in a crowd chasing stocked fish. The upper NFL (and a very few other streams) provide that type of experience with the opportunity of enjoying really large trout. On a recent outing up there last summer my oldest son (10) tailed five fish, the smallest was around 25 inches and the largest right at 29 inches. While the fishing isn't all about big fish, there aren't many areas anywhere affording this type of fishing experience anymore, especially to children.	Large trout in Swift reservoir are stocked annually. These trout are planted by WDFW following the Merwin fishing derby. The fish are excess and leftover fish from the derby. These fish are quite large and have provided additional fishing opportunity in the Eagle Cliff area. This planting is undertaken by the WDFW and utilities; however, the continued planting of these derby fish is at the discretion of WDFW.
WDFW	WDFW4bt	Page A-3 -- 1.2 Speelyai Hatchery – Second paragraph- The (four) troughs should be 17x1.5x1.5 foot deep troughs, not 17x15x1.5.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4bu	Page A-7 -- Release #'s are part of the amended license. Goals are negotiated with FERC. Kokanee production is 12,500 lbs.	We have edited Appendix A to reflect your comment.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4bv	Page A-9 -- #4 What is the recovery goal for Spring Chinook on the Lewis.	The management goals for spring Chinook were summarized directly from the WDFW Draft Spring Chinook HGMP. The spring Chinook recovery goal was not noted in the Draft HGMP; however, the recovery goal presented in the Lower Columbia River Salmon Recovery & Subbasin Plan (December 2004) is 2,200 adults. We have added a description of this goal to the referenced paragraph.
WDFW	WDFW4bv	Page A-9 -- No out of Basin stocks have been used since 1997.	We have modified Appendix A to reflect your comment.
WDFW	WDFW4bw	Page A-9 -- Last paragraph should say that acceptable stocks that can be used are Cowlitz and Kalama.	We have added this information to the referenced paragraph.
WDFW	WDFW4bx	Page A-10 -- Tagging data for the springs is incorrect, Should Be 150k of each. Also, Excess hatchery springs are not shipped to Speelyai.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4by	Page A-10 -- Tagging data for the springs is incorrect, Should Be 150k of each. Also, Excess hatchery springs are not shipped to Speelyai.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4bz	Page A-10-11: Table 2-3 Average broodstock collection for males, is not 729 fish, there is a typo in the table 2.3. 1999 – 287 males, 2002 – 371 males, 456 females and 7 jacks. 2004 – 405 males. The correct average for males is 340. The correct average for females is 408	Thank you for your corrections. We have edited Appendix A to reflect your comment.
WDFW	WDFW4ca	Page A-11, Section 2.1.4. Second paragraph has many mistakes – Spring Chinook are transferred to Lewis in May, not April. The Echo fish are not included in the transfer. The remaining fish at Speelyai are for Echo, and only 100k are transferred to Lewis.	We have edited Appendix A based on input from Eric Kinne.
WDFW	WDFW4cb	Page A-11 -- Releases from Echo are late January and March	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cc	Page A-12. Table 2-4. Release numbers for 1999 were due to BKD outbreak. 2001 does not include Echo Net Pens.	Thank you for your correction. We have edited Appendix A to reflect your comment.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4cd	Page A-12 -- makes reference to Table 2-8, Should be 2-5.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4ce	Page A-13 -- #3 states we incorporate natural stocks into the hatchery population? Not integrated at this time.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cf	Page A-14, Section 2.2.3 Second paragraph, we no longer remove unmarked coho after they return the second time. Carcasses are not taken to the local landfill; they are disposed of through the carcass contract.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cg	Page A-16, Section 2.2.5 Second paragraph – type N coho fry and fingerling releases were only in reservoirs.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4ch	Page A-17, Table 2-8. Of the 1,395,072 released in year 2000, 444,406 were funded by Mitchell Act. Was not mitigation production, paid for by Mitchell Act dollars?	Thank you for the clarification. We have edited Appendix A to reflect your comment.
WDFW	WDFW4ci	Page A-20. We haven't used any Skamania eggs since 1998.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cj	Page A-20, Section 2.3.3, #1 – Broodstock collection percentages are incorrect; I have no idea where this came from. Needs to look at what we really do.	We have edited Appendix A based on input from Eric Kinne.
WDFW	WDFW4ck	Page A-20, Spawning %s #3 – Again, where did these percentages come from?	We have edited Appendix A based on input from Eric Kinne.
WDFW	WDFW4cl	Page A-21. Winter Steelhead: #2 – All males are kill spawned, not returned to river. #5 – Where did these numbers come from?	We have edited Appendix A based on input from Eric Kinne.
WDFW	WDFW4cm	Page A-21, Broodstock goal for winter steelhead is 200 males, 100 females, with an egg take goal of 150k. Spawning is 1:1, but we use a backup male as well.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cn	Page A-22: First arrivals of summer steelhead are in April. We do not start collection until July1st. Adults are treated up to 7 days a week. Pre-spawning mortality on summer steelhead can be as high as 20%, due to IHN. We only transferred adults to Horseshoe Lake twice, in 1997 & 1998. 2.3.4 – First	Thank you for the additional information. We have edited Appendix A to reflect your comment.

Commenter	Comment Number	Comment	Response
		paragraph – we do not incubate steelhead in family units we use 3 fish pools. Second paragraph – ponding is not on a volitional basis, it based on TU's and visual inspection.	
WDFW	WDFW4co	Page A-23, Section 2.3.5, second paragraph: We have not planted steelhead into Yale Lake but have into Swift Reservoir.	Thank you for your correction. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cp	Page A-23, Table 2-14. Does not include Echo and Speelyai net pen releases, except in 2001.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cq	Page A-25. Current Program was this 2.4.1 – rainbows were planted at 40 fpp, not 25.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cr	Page A-25, Section 2.4.3: Egg transfers for 2005 were 150k of Goldendale stock, no Spokane stock.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cs	Page A-28, Section 2.5.5, Table 2-19: Releases that exceed production targets have been unfed fry plants, except for Cougar creek plants.	We have edited Appendix A based on input from Eric Kinne.
WDFW	WDFW4ct	Page A-28. The plants listed for 2003 and 2004, have overlapping numbers, due to fall plants of one year and spring plants of the following year, same brood year.	Thank you for the additional information. We have edited Appendix A to reflect your comment.
WDFW	WDFW4cu	Page A-28, Section 2.5.6: Uses a 1995 creel survey for angler success, should use a more current survey to show effects of Tiger Musky plants.	We appreciate your comment but we are unaware of any more recent creel survey data for Lake Merwin.
WDFW	WDFW1	We are concerned with the proposed draft plan prepared by Mobrand-Jones and Stokes because their document departs from the letter and intent of the Settlement Agreement and it appears to have been prepared without consideration of the various outside influences and expectations that drive hatchery production decisions. We were also disappointed to find specific recommendations in the plan that are inconsistent with the goals identified in Section Eight of the Settlement Agreement.	All recommendations have been removed from the document. The H&S Plan was constructed based on our best understanding of the conditions and requirements provided by the Settlement Agreement.

Commenter	Comment Number	Comment	Response
WDFW	WDFW1a	In what appears to be a major divergence from the Settlement Agreement, the draft plan seems to propose a plan of hatchery operations that does not achieve the Hatchery Targets as identified in Section 8.3.1 of the Settlement Agreement. Section 8.3 of the Settlement Agreement says: "The Hatchery and Supplementation Plan shall be designed to achieve the numeric Hatchery Targets". Table ES-6 suggests that the outcome of the Plan will provide 72,700 average adult ocean recruits. As you know, the Settlement Agreement calls for 86,000.	The numbers presented in the Outcome section of the report describe expected results at approximately year 15 of the H&S Plan. Thus, estimates of adult production do not include fish produced at Yale or Merwin. As fish production is restored to these areas it is expected that the goals of the program will be achieved.
WDFW	WDFW1b	In addition, the time frame and methods for handling juveniles as discussed in the draft plan are inconsistent with those specified in the Settlement Agreement. The draft plan is also inconsistent in the recommendations for supplementation of adults.	At the direction of the ACC we have added a section detailing where the H&S Plan may be inconsistent with the Settlement Agreement.
WDFW	WDFW1c	Section 8.2.2 of the settlement agreement provides a list of the items that must be included in the Hatchery and Supplementation Plan. It is not clear where or how this draft plan incorporates the specific information items identified in Section 8.2.2. The revised plan should include references to the location of these required items.	We have added more sections to the report to cover all required elements, as defined in the Settlement Agreement
WDFW	WDFW1d	The draft plan also proposes the elimination of fish production programs that directly support the harvest goals identified in Section 8.1 of the Settlement Agreement. Section 8.1 includes the following: "The goals of the program are to support (i) self-sustaining, naturally producing, harvestable native anadromous salmonid species throughout their historical range in the North Fork Lewis River Basin, and (ii) the continued harvest of resident and native anadromous fish species (the "Hatchery and Supplementation Program")." The proposal to eliminate the early winter hatchery steelhead program will result in the elimination of the very popular and economically valuable winter steelhead fishery in the Lewis River. Eliminating the hatchery fish would result in eliminating the fish on which the fishery depends. To be clear, the Department entered into the Settlement Agreement with the understanding that all existing fisheries for early and late coho, early winter and summer steelhead, kokanee, and resident rainbow would continue. That understanding is included in the language regarding harvest opportunity in 8.1, resident fishing opportunity included in Section 8.6 and broodstock in Section 8.4.3.	All recommendations have been removed from the document. The H&S Plan was constructed based on our best understanding of the conditions and requirements provided by the Settlement Agreement.

Commenter	Comment Number	Comment	Response
WDFW	WDFW2	All four recommendations developed by your consultant, and included in the draft Lewis River Hatchery and Supplementation Plan are inappropriate and should be retracted. They fail to meet the twin goals of the Hatchery and Supplementation Program. The goals of the program are to support (i) self-sustaining naturally producing, harvestable native anadromous salmonid species throughout their historical range in the North Fork Lewis River Basin, and (ii) the continued harvest of resident and native anadromous fish species. The recommendations are also inappropriate because they propose to exceed the production caps identified in section 8.4 of the Settlement Agreement.	All recommendations have been removed from the document. The H&S Plan was constructed based on our best understanding of the conditions and requirements provided by the Settlement Agreement.
WDFW	WDFW3	When it is complete the Hatchery and Supplementation Plan must integrate with the larger world of fisheries management. The various outside influences and expectations that drive modern hatchery production decisions including harvest expectations, agreements, treaties and policy at the local, state, regional, and international levels are critical components that must be considered during the development of this plan. Eliminating hatchery programs on the Lewis River as proposed by the draft plan has far reaching consequences because of the direct link between those programs and established fisheries.	All recommendations have been removed from the document. The H&S Plan was constructed based on our best understanding of the conditions and requirements provided by the Settlement Agreement.
WDFW	WDFW4a	Page. iv, fifth paragraph – The list of sources for recommendations used in the development of this plan fails to include the Fish Planning and Hatchery Review Document (AQU18). Section 8.2. of the settlement agreement clearly directs the use of this specific document.	This has been added.
WDFW	WDFW4b	Page. v, Table ES1-needs to specify Adult Hatchery Ocean Recruits as stated in Table 8.3.1 of the SA. The intent was never to include jacks – a run of jacks doesn't meet our view of success nor does it achieve the intent of the Outcome Goal identified in Section 3 of the Settlement Agreement. The Fish planning document page 237- Adult production Goal Monitoring states **"**The Lewis River adult production goal for Spring Chinook, Coho and steelhead includes total adults produced prior to harvest. This is referred to as ocean adult abundance. Monitoring would include total accounting of adults including ocean, Columbia River, and Lewis harvest, as well as escapement to the hatcheries and spawning grounds."	This has been corrected as directed by the ACC.
WDFW	WDFW4c	Page. vi, Table ES4 Hatchery Juvenile Releases – not consistent with SA Section 8.5.1 or Lewis River Hatchery Review Document Appendix Table D16 –D18.	Inconsistencies with the Settlement Agreement have been identified as directed by the ACC.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4d	Page. vi, Table ES-5 These fish sizes at release seem larger than those for naturally produce smolts of the same species. The table should show current size at release at hatcheries. Current Coho program release size is 16 fish per pound (fpp) and steelhead should be 4.8 fpp. The size at release for coho and steelhead supplementation juveniles, as required in the SA Section 8.5.1, needs to be developed. An evaluation that correlates size at release with adult return ratio should be completed before changes are made.	Edits have been made accordingly. The plan recognizes that as more is known about wild fish size hatchery production may be adjusted accordingly.
WDFW	WDFW4e	Page vi, Supplementation program – "control hatchery releases to 10% and below". Use of hatchery origin recruits (HORs) for upper river supplementation will decrease when wild adults are produced and can be successfully collected or provided with downstream passage from the upper system. Over generations, natural origin recruits (NORs) should be managed to outnumber HORs as populations are established but putting a 10% cap on HORs might hinder reintroduction success and upriver productivity especially if upriver habitats are dependent on HORs for nutrients. The Supplementation Program Description of the integration is not fully developed. A more developed description is needed that includes short term, mid-term and long term objectives, the 10% hatchery escapement and 50% natural origin broodstock (NOBs) could be long term objectives, but would require more development before adopted.	The H&S Plan has been developed based on HSRG guidelines, as directed by the Settlement. The ACC will need to review recommendations in the H&S Plan and make adjustments as needed.
WDFW	WDFW4f	Page vii, fourth paragraph - The discussion on artificial production management includes an incorrect distinction between native spring Chinook, coho and steelhead that are produced at the hatchery and "non-native" winter and summer steelhead that are reared to produce a smolt that maximizes adult production. To designate these species as native and non-native is incorrect and could lead to inappropriate application of the goals for the Hatchery and Supplementation Plan. Chinook, coho and steelhead are all native to the Lewis River. A correct differentiation that is consistent with the Settlement Agreement would be to call them transported and non-transported species.	We have changed this to "non-native stock".
WDFW	WDFW4g	Page vii, Fish Marking - The draft H&S Plan states that all hatchery fish released downstream of Merwin Dam would be marked by removing their adipose fin. "Juvenile fish captured at collection facilities at Swift no. 1 Dam (and eventually other projects) would be marked with Coded-Wire-Tags located either in the cheek or nose." Currently, a portion of the Spring Chinook, early and late Coho have a double index group that are not adipose clipped. There is a need to look at	We provide more detail on this topic and note that WDFW will need to review plan for consistency with Harvest Management.

Commenter	Comment Number	Comment	Response
		alternatives in marking location and technology such as elastomers, V.I., etc.	
WDFW	WDFW4h	Page vii, - Several elements through out the draft H & S Plans deal with the proposed delay of potential integration plans of coho and spring Chinook programs including the Executive Summary, H & S Plan Sections 2.0, 3.0, 4.0 and 6.0. Delaying integration of the coho and spring Chinook programs could make sense if the upriver re-introductions and resultant M & E plans will provide valuable recovery information from the start of the re-introduction program, such things as reproductive success of hatchery fish would be valuable knowledge for current hatchery reform efforts. However, this capability would need to be available immediately, not in 9-12 years. Development and construction of fish collection or passageway facilities at all dams and the evaluation of those facilities would be required prior to undertaking a study of this type (This has taken 10 years at Cowlitz Falls).	More information has been added to the Section 3 to describe why this approach was selected (HSRG recommendation).
WDFW	WDFW4i	If this research is not proposed, then the option of integration should be examined in the short term and not delayed until ~2015-2018. Current coho and spring Chinook hatchery populations are included in NOAA Fisheries Hatchery Listing Policy (June 2005) and as such are included a part of the listed populations. With the coho and spring Chinook components being part of the listing policy, integrated programs could begin during the reintroduction of these species in this watershed. Conceivably, some level of wild adults produced downstream could be used to begin integrating the hatchery broodstocks. Hatchery programs listed in Table 2-1 on page 9, could take advantage of productivity in the lower river in combination with future upper river productivity. Populations above the dams and below the dams can have different purposes as spelled out in Table 2.1, but basin wide it would not be consistent to operate segregated programs below the dams except for segregated early timed winter and summer steelhead programs. For example, running the Lower River coho as segregated (Type N coho) will be difficult. because of Cedar Cr wild late type coho production.	It is our opinion that the approach proposed is not consistent with HSRG recommendations, and has not been incorporated. However, the ACC may want to review this issue and make a determination as to the best approach to be followed.
WDFW	WDFW4j	Case in point for beginning integration earlier: If Type S coho upriver supplementation consists of 9,000 adults (8,500 Hatchery Origin Recruits (HORs) and 500 Natural Origin Recruits (NORs), the ratio will be heavily dominated by HORs for the first couple of years, maybe longer, depending on the success of that initiative. The current hatchery broodstock could start at minimal integration level of 10% (HSRG recommendations) simply by using 80 NORs out of the 800 total broodstock needed. This could also be the case for Type N coho and to a certain	See previous comment.

Commenter	Comment Number	Comment	Response
		extant with spring Chinook. If coho survivals similar to those in 2000–2004 return in future years, possibly higher rates would be realized in the short term. With the first return of NORs from upriver productivity, the ratio of wild fish to HORs will increase for both the upriver escapement and integration of NOBs into the hatchery program at higher levels.. Although hatchery integration levels will initially be below guidelines...even integration into the broodstock (pNOB) at 20 – 30%...improves the fitness of the natural population (AHA modeling)...NOBs should be..consistent with minimal mining of natural population below Merwin.	
WDFW	WDFW4k	Page viii HARVEST – The draft H&S plan recommends no harvest in the upper basin on unmarked fish until populations meet escapement goals for that species. This should be a decision made in the future once more is known about the productivity of the upper basin and the success of the reintroduction program. Transport of additional hatchery fish could form the basis for earlier harvest opportunity in the upper watershed. This discussion of harvest and escapement goals should be deleted because this is not a harvest plan. A discussion of the ideal number of fish for utilizing upstream habitats should be discussed in terms of transportation targets. The settlement agreement proposes to transport all naturally spawned adult fish that are the product of upstream habitats.	The plan recognizes that Harvest management is the responsibility of the Co-managers and Services. Escapement data and goals are included as set numbers of adult are needed for the supplementation programs. The H&S Plan requires all naturally produced fish to be released above Swift (exception is for 65 spring Chinook adults needed for juvenile supplementation).
WDFW	WDFW4l	Page. ix – ADAPTIVE MANAGEMENT – a mechanism needs to be in place so that for example with the new facilities, changes can be made in the 1st 5 years, as per SA Section8.1 paragraph 2.	The Adaptive Management Plan has been updated in this version of the H&S Plan to identify key issues and decision points in the first 5-years.
WDFW	WDFW4m	Page. ix EXPECTED OUTCOMES – the intent of the SA was not to include jacks in the Ocean recruit analysis. If we rely on high number of jacks we would not meet outcome goals of Section 3 of the SA.	Based on ACC input, jacks have been removed.
WDFW	WDFW4n	Page. x - Table ES-6 The title specifically identifies the spring Chinook program. The table also includes coho and steelhead. The title should match the table. Page. x - Table ES-6 identifies the expected outcomes of the Hatchery and Supplementation Plan. It suggests that two of the three anadromous species will fail to meet the Settlement Targets.	Edit made.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4o	Page. x- The discussion in the second paragraph incorrectly refers to the Settlement Agreement as a source for including jacks in the fish production analysis. The settlement discussions revolved around the concept of pre-harvest ocean recruits. It seems unlikely that a jack would be considered ready for harvest in the ocean. Section 8.3 specifically includes only adults. In addition fisheries professionals would generally agree that a run made up of a high percentage of jacks would not be a desirable fish management output.	jacks have been removed.
WDFW	WDFW4p	Page. x - Recommendations. All four recommendations should be retracted. They fail to meet the twin goals of the Hatchery and Supplementation Program. The goals of the program are to support (i) self-sustaining naturally producing, harvestable native anadromous salmonid species throughout their historical range in the North Fork Lewis River Basin, AND (ii) the continued harvest of resident and native anadromous fish species. The recommendations are also inappropriate because they propose to exceed the production caps identified in section 8.4 of the Settlement Agreement.	Recommendations have been removed.
WDFW	WDFW4q	Page 2 paragraph 3 Strike sentence "As hatchery production is reduced…", this sentence as written makes many assumptions that are not provided and without the associated assumptions is not appropriate to include.	This sentence has been changed to better reflect intention.
WDFW	WDFW4r	Table 1.1 Hatchery Targets box should include (adult ocean recruits)	Edit made.
WDFW	WDFW4s	Table ES 1.1. Table title is adult threshold levels. The assumption was these numbers do not include jacks. Jacks have less biomass than adults and are viewed by most anglers and commercials as of less value than a true adult.	Edit made.
WDFW	WDFW4t	Page 3 Under the box, By Year 4.5, the text states late coho and should state early coho.	Edit made.
WDFW	WDFW4u	Page 4 Figure 1-2. Flow chart. By Year 8 box indicates adults into Yale. The most likely spawning stream will be Cougar Ck. which containing robust populations of kokanee and healthy numbers of listed bull trout. Coho and steelhead spawning could have negative interactions for bull trout and kokanee with superimposition of spawning over existing bull trout redds. In 2005, bull trout were present from 8/8 – 11/23 occurring in both early and late coho spawn timing. Kokanee and bull trout spawning areas will need specific monitoring effort and	More detail has been added to address these comments.

Commenter	Comment Number	Comment	Response
		bull trout spawning may require some additional protection.	
WDFW	WDFW4v	Page 4 Under the By Year boxes 13 and 17 the text states late coho and should state early coho.	edit made.
WDFW	WDFW4w	Page 6, paragraph 2 Show where each requirement of SA Section 8.2.2 is met in the plan under the six headings	New sections have been added to the document to address this comment.
WDFW	WDFW4x	Page 6&7 Data collection. Additional data collection is needed: All native species in reservoir and tributaries need to be monitored for reintroduction effects + or – (whitefish, suckers, rainbow, cutthroat, etc.). Bull trout need to be monitored for reintroduction effects + or -. Effects of bull trout (predation) on reintroduced species need to be quantified. (stomach analysis)	Detailed monitoring of these species is not proposed as we cannot see how impacts for example, to white fish would change the program.
WDFW	WDFW4y	Page 7 This page includes a list of data types that the Settlement Agreement suggests should be collected to determine program success. The list includes a Beaverton-Holt Production Function, which was not mentioned in the Settlement Agreement. If it is proposed to be a component of the monitoring and evaluation plan, it should be proposed with proper supporting recommendations and a discussion of alternatives. Then, the ACC should make a decision regarding its usefulness and applicability.	Beverton-Holt removed. However, additional discussion is added about the need for a production function, and its utility.
WDFW	WDFW4z	Page 10 Hatchery Operations – The department requires an opportunity to review Appendix C before it is published in a final Hatchery and Supplementation Plan	Appendix C (APRE) has been removed until such time as the HGMP's and Managing for Success web site has been implemented.
WDFW	WDFW4aa	Page 10# 2. At a minimum 50 % of the broodstock should consist of wild or natural origin fish so that the natural environment drives local adaptation? This option will need additional clarification and specific discussion with the ACC before it can be considered	Comment noted.
WDFW	WDFW4ab	Page 10 "2.1.2 Hatchery operations" . The section on the APRE might overstate how well hatchery programs meet HSRG guidelines. The summaries only indicate the intent of the hatchery programs	Comment noted.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4ac	Page 12 There are multiple problems with steelhead recommendations and data handling on this page. Eliminating the winter steelhead program, or even cutting it in half (both proposals are found on these pages) would have unacceptable recreational and economic impacts in the Lewis River area. There will need to be a better effort to balance between hatchery winter and summer programs to provide for the new late winter program. There is a strong constituency for winter steelhead angling partially because there is little else to fish for through the winter months until spring Chinook arrive. Hatchery winter steelhead are important both for harvest opportunity and the local economy. Adjusting the number of summer steelhead would provide a less impacting alternative.	Recommendations have been removed.
WDFW	WDFW4ad	Table 2.3 Should be amended to change the recommended 50% cut in the level of the hatchery winter steelhead program to a more balanced program between summer and winter steelhead.	See previous comment.
WDFW	WDFW4ae	The consultant should also revisit the calculation of return rates because we question the reported steelhead percent survivals. Average marine survival from the Lewis River Hatchery Review Document is reported at; 1.4% survival winter steelhead at Oak Creek Hatchery and Eagle Creek Hatchery, and 6.8% survival summer steelhead at Kalama Hatchery. Analysis done by the WDFW for return years 1996-2000 indicate survival for winter steelhead 1.64% and summer steelhead is 2.03% for the Lewis River. Recent harvest rates for Lewis River hatchery summer steelhead is 66% and 53% for hatchery winter steelhead.	Edit made.
WDFW	WDFW4af	Finally, the plan is correct that harvest management is the responsibility of the resource agencies. Unfortunately the planners don't seem to recognize that production decisions cannot be substantially and unilaterally changed because they are not disconnected from harvest decisions that are already in place.	Comment noted.
WDFW	WDFW4ag	Page 12 2.1.4 Broodstock Needs and Escapement Targets. First paragraph calls for reduction in harvest to meet escapement goals. This document is not the appropriate place to discuss harvest. The record shows that current management policies, which include harvest reductions during years with low run sizes, have resulted in adequate broodstock collection. It is appropriate to state that management decisions will continue to prioritize escapement to facilitate wild spawning requirements and hatchery broodstock targets.	The plan simply points out that escapement targets have been increased which requires more adults to return to trapping facilities. We suggest that this will affect harvest rates, but defer to WDFW for appropriate measures.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4ah	Page 13 Table 2.5 title states adult threshold levels. This is consistent with our beliefs that ocean recruits do not include jacks but inconsistent with other parts of the document.	Comment noted.
WDFW	WDFW4ai	Table 2.5. One group of salmon will not substitute for another. There is there a separate threshold for each species and jacks do not count toward the threshold.	jacks have been removed.
WDFW	WDFW4aj	Page 14 2.2.1 Kokanee –This recreationally and economically important fishery, shouldn't be eliminated simply based on operational challenges like the costs of handling juveniles. The only reason for changing the kokanee program would be its impact on the ability to meet the reintroduction outcome goals	Agreed.
WDFW	WDFW4ak	Page 14 2.2.2 Resident Trout. The 2006 program is 60K at 3 fpp.	Edit made.
WDFW	WDFW4al	2.2.2 RESIDENT TROUT – 20,000 lbs resident trout currently 60,000 catchables, refers SA.	Edit made.
WDFW		Effects of catchable plants on bull trout and bull trout predation on catchables should be evaluated. Stomach lavage is an existing method for this analysis which should include each species.	The plan calls for a study to be developed.
WDFW	WDFW4an	Page 14 Again the plan contemplates eliminating existing and popular recreational fisheries. The stakeholders involved in the negotiation of the Settlement Agreement were quite clear in their interest in retaining these fisheries. Simply eliminating these recreationally and economically important fisheries is inconsistent with the goal identified for the Hatchery and Supplementation Plan. Complex systems will require creative solutions.	Recommendations have been removed.
WDFW	WDFW4ao	Page 15, paragraph 4 – the HSP puts a priority on Spring Chinook contrary to the SA, references to species priority should be removed from the plan.	Edits made.
WDFW	WDFW4ap	Page 15, paragraph 5 – The adult supplementation plan is in conflict with the SA. Section 8.5.1 also requires juvenile supplementation.	Section added on conflicts to address this concern.
WDFW	WDFW4aq	Page 16, 3.1.1, paragraph four, plan calls for stopping supplementation and monitoring. SA 8.5.1 calls for evaluation on year-to-year basis.	Edits made. However, to determine when populations are self-sustaining

Commenter	Comment Number	Comment	Response
WDFW	WDFW4ar	Page 16, 3.1.2 – language – "Hatchery origin adult" . Broodstock Origin. In order to run an integrated spring Chinook program in the Lewis River system, the infusion of Natural Origin Broodstock (NOBs) into the hatchery broodstock will be consistent with the principles of integration. As the stock is acknowledged to be the stock most likely to adapt to conditions in the upper Lewis River, it would not be consistent to purposely diverge the population below the dams (by running a segregated program) especially as the hatchery population has been identified in NOAA Fisheries Hatchery Listing Policies. This would be the case in both coho (both types) and spring Chinook.	The H&S Plan has been developed based on HSRG guidelines, as directed by the Settlement. The ACC will need to review recommendations in the H&S Plan and make adjustments as needed.
WDFW	WDFW4as	Page 19, paragraph two Delete paragraph – first sentence is inconsistent with program goals. The second sentence refers to harvest and this is not the proper document to discuss this topic.	Could not find this sentence. No edits made.
WDFW	WDFW4at	Page 20, Naturally produced steelhead smolts are two years old and ÿmm long. This plan calls for much larger fish. For all species, larger smolts typically lead to greater jack returns.	The plan notes that smolt size will be adjusted as more is learned on wild fish size from the Upper Lewis.
WDFW	WDFW4au	Page 21, Steelhead smolt volitional release at the Merwin Hatchery on site is not feasible. The connections between the hatchery and the river would need significant reconstruction and that method of release completely ignores potential negative interaction with the fall Chinook fry. Accepted strategy is to allow for volitional migration into the smolt collection ponds then fish are transported downstream for release.	Edits have been made to clarify the approach.based on WDFW comments.
WDFW	WDFW4av	Page 22, The settlement agreement and the H & S Plan anticipate program changes if there are negative impacts on native resident fish or resident fish impacts on reintroduction. Baseline data will be required in order to make this determination. Prior to initiation of reintroduction we should have a greater understanding of what fish populations are currently in the reservoir and in what relative numbers. Unless we have an accurate species inventory and their relative proportion to one another; we will be unable to determine if we are causing a positive or negative impact. Baseline data is critical.	Monitoring required to address some of these concerns are in the H&S Plan. The ACC should review for adequacy, but if more studies are needed clear hypotheses need to be developed, this includes performance criteria.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4aw	Listed bull trout will require additional emphasis. They could be threatened by predation from reintroduced parr and smolt size salmonids. Tributaries that sustain spawning bull trout should be monitored for the presence of reintroduced spawners. Reintroduced parr and smolts in these tribs should be subject to stomach analysis to see if they are consuming bull trout juveniles.	Not proposed at this time. If required by the ACC, then clearly stated hypotheses need to be established so that study plans can be developed.
WDFW	WDFW4ax	Conversely, the more likely scenario is that bull trout will devour many out migrating reintroduced smolts as they enter the reservoir. During netting activities adult bull trout should be subject to stomach lavage.	Comment noted.
WDFW	WDFW4ay	Currently there are ÿ 550 PIT tagged bull trout swimming in this system. A remote PIT tag detector should be mounted in Rush Creek to record adult movements into and out of this major spawning tributary. An additional detector on Pine Creek should be incorporated into the habitat restoration projects, and both sites funded by the ACC. All or a portion of all species returning upper river broodstock could also be PIT tagged. Remote detectors will indicate if returning salmon and steelhead are competing with bull trout for spawning areas in these tributaries.	Not included in H&S Plan, but could be considered in the monitoring plan for the Upper Lewis River basin.
WDFW	WDFW4az	We should determine: survivals of all species from egg to fry, fry to smolt; smolt transit thorough reservoirs; transit timing, reservoir survival; transport survival to release point; trap efficiency; trap mortality; and smolt to adult survival.	Have added detail in the monitoring plan to develop these survival estimates. Egg-to-fry data would not be collected as this data is difficult to collect over such a wide area.
WDFW	WDFW4ba	Page 24, Ocean Recruits…What happened to the coho and Chinook methods developed by WDFW biometricians? See attached. **(WDFW 5)**	These methods are included in the 3-options. Note that the WDFW paper submitted to us had comments from the author noting that he/she was uncertain as to what was required in the Settlement.
WDFW	WDFW4bb	Page 24, The numbers for spring Chinook are incorrect and should be 150K cwt and 150K ad+cwt. Steelhead are not cwt'ed.	Edit made.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4bc	Page 25, "Hatchery Effects" Hatchery fish from segregated programs (early winter or summer steelhead) could be monitored in spawning or carcass surveys. In some areas, numbers may be in excess of 5% but it is important to note that the 5% refers to only those that would contribute to the natural spawning population. For example, in the case of early steelhead spawn timing, there is little opportunity for most of those adults to be included in the natural spawning population due to spawn timing differences between wild and hatchery fish in the watershed, even if the numbers of fish exceeded established limits.	Spawning surveys are included in the H&S Plan. However, we note that the 5% does apply to genetics, but that data collected in multiple rivers show that offspring of hatchery fish do compete for food and space.
WDFW	WDFW4bd	Page 25 4.3.1, The ACC will have a difficult time determining "significant" limiting factor unless we know as much as possible about native fish. This will require substantial monitoring efforts (see above).	Comment noted. The ACC will need to review and develop testable hypotheses regarding resident fish impacts on the program. But more importantly, identifying acceptable management actions that could be implemented if problems found.
WDFW	WDFW4be	Page 25, The plan recommends the use of spawning ground surveys to collect CWT from naturally spawning fish. This effort (spawning ground surveys and CWT collection) should be added to the activities identified in the Monitoring Plan so it is actually accomplished.	Added.
WDFW	WDFW4bf	Page 25-26, The triggers for determining hatchery effects seem inappropriate. If hatchery origin steelhead comprise more that 5% of the population in the lower river, that is an impact. Due to the limited steelhead spawning habitat in the lower river is seems difficult to assess where the fish are actually located. The proposed study of rainbow trout stomach contents prior to the start of downstream transport is inappropriately designed to find a high level of interaction. The juvenile coho that will be in the reservoir and potential predation targets are the offspring of the habitat preparation plan fish and they are unable to migrate out because there is no collection facility and they are trapped in the reservoir.	Again, the plan is based on HSRG recommendations. The predation study was purposely designed to occur during this time frame as impacts are expected to be at their highest. This will allow researchers the ability to detect and measure predation levels more readily. If data indicate that predation rates are unacceptable, then the study may be repeated after collection facilities are in place. It must be emphasized, that the ACC need to identify what an acceptable rate of predation would be prior to study initiation so that sample sizes can be determined.
WDFW	WDFW4bg	Page 26, 4.3.2, 3rd paragraph - "No" ACC needs to agree on evaluation program and develop criteria.	Agreed.
WDFW	WDFW4bh	Page 26 4.3.2 Drop last sentence in third paragraph. This does not apply to run success.	Opinion noted.

Commenter	Comment Number	Comment	Response
WDFW	WDFW4bi	Page 26 4.3.3, paragraph 2 #2 – There is some misunderstanding regarding monitoring responsibility and the harvest data that will be provided by the co-managers. The plan should not anticipate that existing harvest monitoring will provide data regarding age or sex of marked fish in the fishery or those escaping to the spawning grounds. This additional monitoring needs to be done at licensee expense.	It is suggested that the WDFW provide documents describing what data they are currently collecting on harvest and how it can be incorporated into the H&S Plan.
WDFW	WDFW4bj	Page 27, 1st paragraph – Monitoring to document compliance with the performance criteria is also the responsibility of the licensee. WDFW will assist as possible and as funded.	Topic for ACC discussion. Our understanding is that WDFW has agreed to conduct this monitoring as part of the FMEP process.
WDFW	WDFW4bk	Page 27 4.3.4 - To make this comparison useful, the plan should more fully describe how the Cowlitz mirrors the Lewis program.	This information is presented under Index stocks.
WDFW	WDFW4bl	Page 28 – Should also describe the information that will be collected from the hatchery.	Added to monitoring section.
WDFW	WDFW4bm	Page 28, 4.3.5 - We need more discussion with ACC on the last two paragraphs as it pertains to the outcome goals in section 3. The production function as identified is not our expectation as an end product for the monitoring program.	Production function removed.
WDFW	WDFW4bn	Page 29, 5.0 ADAPTIVE MANAGEMENT. We don't agree that there should be a delay in developing an adaptive management plan.	Adaptive Management Plan added.
WDFW	WDFW4bo	Page 30 – 33, 6.0 EXPECTED OUTCOMES. We are unable to agree with or accept a plan with expected outcomes that don't achieve the production targets in the settlement agreement.	Comment noted.
WDFW	WDFW4bp	Page 34, 7.0 RECOMMENDATIONS Delete all four recommendations. The plan must be consistent with the Settlement Agreement. Eliminating and reducing fish production programs due to some level of management complexity does not help achieve the outcome goal or the Hatchery Target.	Recommendations have been removed.

Commenter	Comment Number	Comment	Response
Cowlitz Tribe	Cowlitz1	The Plan relies exceedingly on modeled production capacity as determined by Ecosystem Diagnosis and Treatment (EDT). As we have argued on numerous occasions throughout the relicensing process, EDT was never intended as a tool for estimating the absolute production capacity of a system for any species. It is a useful model with many potential applications primarily related to the relative productivity of a system under various habitat conditions, and for identifying priorities for restoration. We have consistently stated that in our view the production estimates generated by EDT are extremely low, possibly by an order of magnitude. The reintroduction program should not be initiated with the starting assumption that "EDT is right". The Plan should be crafted in such a way that we are able to learn the "true" capacity of the system and optimize the likelihood for success. See next comment.	EDT was simply used as a planning tool for establishing the logic for the H&S Plan. The numbers produced in EDT are consistent with those developed by Cramer as part of the Lewis River Fish Planning Document. As hatchery fish production is limited, the H&S Plan used EDT inputs, hatchery returns and SAR data to determine minimum adult escapement targets for the upper watershed. Note that we have added more discussion as to the logic for the supplementation program in section 3 of the document.
Cowlitz Tribe	Cowlitz2	Starting numbers for supplementation are very small (e.g., 100,000 juvenile Chinook). Apparently these values are based on EDT assumptions about capacity. The concept of capacity relates to limitations on the ability of the available habitat to support ever-larger populations. In other words, there are presumably some inherent limits on fish production that – over the long term – will keep average production from exceeding a certain level. The Plan should be structured in such a way that we learn what the capacity of the system is, rather than assuming that we know what it is, based on a model that wasn't designed to do that. It is very difficult to learn what the capacity of the system is 'from below'; i.e., by using a conservative supplementation plan that features a low number of juveniles and a fairly low number of adults, particularly when fish passage produces an as-yet-unknown level of impact. It would be much more useful to start with fairly aggressive levels of supplementation, and INCREASE them over time, until the data suggests that production is leveling off despite higher levels of supplementation. In other words, we should be discovering the true capacity 'from above' rather than 'from below'.	The 100,000 juveniles was based on the assumption that there will be two acclimation sites in the upper basin with a capacity of 50,000 each. Secondarily, the plan recognizes that until more is known about the collection efficiency of the Swift juvenile bypass system, numbers should be conservative. Note that releasing large numbers of smolts into the watershed does little to estimate system capacity as they migrate rapidly through the system. Capacity is determined by having fish spawn in the wild and complete their life cycle. This is why we suggested an adult supplementation program and not a juvenile program.
Cowlitz Tribe	Cowlitz3	When starting with low numbers, an even worse situation may develop where dispensation occurs due to a too-low density of spawners. Production levels may never even approach 'capacity' if the number of fish is so low that normal production processes are unable to take hold. In this worst-case scenario, we might erroneously conclude that self-sustaining runs are not possible to achieve, when the problem was that we didn't invest enough in the process.	See previous comment.

Commenter	Comment Number	Comment	Response
Cowlitz Tribe	Cowlitz4	The primary goal of the reintroduction program – and of the SA itself – is the establishment of self-sustaining runs capable of meeting production goals for fish in the upper basin. The Plan basically concludes that this is unlikely to happen. First, the assumptions that were used to come up with this bleak conclusion are not well stated, and not verifiable until we actually start getting fish into the basin. The Plan should recommend measures that are going to help us achieve the SA objectives. That may mean, for example, higher numbers of fish devoted to supplementation.	More information has been added to the plan to describe assumptions and logic.
Cowlitz Tribe	Cowlitz5	The Plan assumes that fish passage standards will be met. That is very unlikely during the early years of the program, especially for juvenile collection efficiency. The Plan should provide a way to calibrate supplementation effort (e.g., number of juveniles and adults supplemented) to quantitative estimates of passage success based on monitoring data.	This is one of the reasons the plan releases few juveniles in the early years. If collection facilities are poor, then these fish would be lost.
Cowlitz Tribe	Cowlitz6	Adaptive management. To say that the SA is clear enough to guide actions - and that adaptive management is therefore not proposed – is absurd. Adaptive management can and should operate on a variety of time-scales. While it is true that the Plan will be updated every five years, that does not mean that adaptation should be absent in the meantime. For instance, if Years 1 and 2 of juvenile fish collection clearly indicate that the Swift juvenile collector is not even close to meeting collection efficiency standards, shouldn't the plan call for the reallocation of effort to ensure sufficient spawners/juveniles in the upper basin?	The AMP has been updated to list key decision points and hypotheses.
Cowlitz Tribe	Cowlitz7	Monitoring data (List on p.7). The bullet that reads "Total juveniles entering reservoirs and collected at bypass facilities" should probably be broken out into two pieces – the number entering reservoirs, and the number being collected. Recall that there is an explicit standard for juvenile capture efficiency. This means that we either need to know both of the values listed above, or we need to assess capture efficiency through other means with a suitably large sample that gives us confidence in the results.	This has been clarified in the document.
Cowlitz Tribe	Cowlitz8	For purposes of 'counting' fish in the context of production goals, jacks must not be counted as 'adults'. This would be completely contrary to the intent of the settlement agreement. Monitoring jacks may have some value from an adaptive management perspective, but despite	Jacks removed at the direction of the ACC.

Commenter	Comment Number	Comment	Response
Cowlitz Tribe	Cowlitz9	Ocean recruits. The Plan proposes three general answers to the question: "What should we count?", but does not provide anything in the way of a methodology for any of them. We need to see the proposed algorithms coupled with the proposed data sources. All of the 'methods' refer to fish "of all ages". It is our opinion that this must not include jacks. When we discussed ocean recruits in the context of settlement, the term consistently referred to the number of adult fish 'available for harvest' just prior to the beginning of targeted harvest. Jacks are never the target of harvest, even if they are occasionally caught in offshore and inshore fisheries. In the case of coho, ocean recruits should refer to the number of adults in the ocean just prior to the onset of offshore troll and recreational fisheries. Currently, for areas north of Cape Falcon, offshore troll and recreational seasons start around May 1st, though only for a few days at a time until the main 'open' season begins in July. Some salmon fisheries south of Cape Falcon open as early as March. So, in the case of coho, the ocean recruit age should be roughly 2.5 (counted from the time of spawning), one year after ocean entry. This should eliminate coho jacks by definition, since jacks typically return in the fall following the spring of ocean entry.	Formulas have been added as an appendix.
Cowlitz Tribe	Cowlitz9		
Cowlitz Tribe	Cowlitz10	The description of juvenile production targets (p.v; also see SA section 8.4.2) is inaccurate in that it does not allow for the possibility of increasing juvenile production in response to survival data. This issue was discussed at length during the SA negotiations. We agreed that these were appropriate starting numbers, and that production would be limited by the physical capacity of the hatcheries (as modified by the SA), but also agreed that if these levels of juvenile production are not enough, the numbers can be increased in order to meet production goals.	The ACC will need to discuss this assumption in more detail and provide direction. Currently it is assumed that hatchery juvenile production capacity would be defined once the hatchery remodel was completed.
Cowlitz Tribe	Cowlitz11	What is the basis for these escapement goals (p. viii)? Again, we do not know the capacity of the system well enough. Early years should probably have much higher escapement to provide more margin for error in early fish passage implementation and to provide opportunity to monitor for density dependent effects.	The escapement targets are based on the average number of surplus hatchery adults expected in the future, EDT estimates of habitat carrying capacity and harvest levels.
Cowlitz Tribe	Cowlitz12	Escapement goals clearly need to be adjusted when Yale and Merwin production areas come into play as part of reintroduction. While this may occur only after Year 5, the Plan should provide some guidance for these adjustments.	Comment noted.

Commenter	Comment Number	Comment	Response
Cowlitz Tribe	Cowlitz13	For the benefit of the public, it is worth noting that the Hatchery Floor (i.e., minimum) level of production is intended to partially mitigate for the fact that even with the best efforts, intentions and passage technologies, the projects will continue to inundate mainstem and tributary habitats in perpetuity, thus reducing the productive potential of the basin.	We direct people to the Settlement Agreement for more detail on the logic behind assumptions.
Cowlitz Tribe	Cowlitz14	In Figure 1-1, last box "By Year 4.5", the last sentence should note that the ACC and the Services have a role in deciding whether supplementation should continue.	The Services are included in the ACC.
Cowlitz Tribe	Cowlitz15	Re hatchery production adjustment in response to increases in natural production. This should refer to the adjustments in the licensees' obligation to pay for production. Presumably, WDFW could continue higher production (unless adverse effects are apparent) if other funds are available.	Comment noted. The ACC should discuss this with the WDFW to see if they agree.
Cowlitz Tribe	Cowlitz15	Re Incubation and Rearing for supplementation, please explain the flow index and density index and their significance.	The flow and density index pertains to rearing conditions proposed at the remodeled hatchery. Currently the engineers and WDFW hatchery staff are working to define these conditions. Both the index and density value are assumed to provide better rearing conditions for spring Chinook, but data to support this assumption is lacking at this time.
USFWS	USFWS1	The USFWS defers to NMFS for comments on this plan. Lou Ellyn Jones U.S. Fish and Wildlife Service 510 Desmond Drive Lacey, WA 98503 telephone: 360-753-5822 fax: 360-753-9008	Thank you!
NMFS	NMFS1	The Plan and the subsequent Annual Operating Plans require approval of NMFS and U.S. Fish and Wildlife Service (the Services) (Settlement Agreement [SA] Sections 8.2 and 8.2.3). The Plan has examples of where decisions are to be made by the Aquatic Coordinating Committee (ACC). These instances should also acknowledge that approval of the Services is required. One example is on page 15, 3.0 Supplementation Program, third paragraph, "The decision to pursue one approach over the other would be made in consultation with the ACC."	As the Services are members of the ACC it was not deemed necessary to distinguish between the two groups.

Commenter	Comment Number	Comment	Response
NMFS	NMFS2	The initial Annual Operating Plan (SA Section 8.2.3) is supposed to be part of this Plan. Please explain how this is to be incorporated into this Plan. The initial Annual Operating Plan should be clearly set apart since it will he updated on an annual basis	Added to next version of document.
NMFS	NMFS3	Within the next couple of years, NMFS expects to complete recovery plans for the Endangered Species Act-listed anadromous fish in the Lewis River basin. These will be helpful in later updates of the Plan.	This has been noted in the plan.
NMFS	NMFS4	At the beginning of our collaborative work through the ACC, it is timely for us to include a comment on our expectation of how the licensees should develop required plans (and non- required items) with the ACC. While we are happy with the overall coordination that has been occurring, we expect that a minor refinement of the consultation process will make future efforts even better and preclude possible future problems. The SA (Section 8.2.1) calls for the licensees, in consultation with the ACC, to produce and distribute a draft Hatchery and Supplementation Plan to the ACC by the first anniversary of the effective date. With regard to "Consultation with the ACC," we think the process would be improved if the licensees engage in consultation with the ACC during the development phase prior to the required review time. This allows for early in-depth discussions and considerations which should make a better product and reduce comments on the drafts.	Comment noted.
NMFS	NMFS5	Page iv, Executive Summary, 3rd paragraph: "Reintroduction efforts for Yale and Merwin are not scheduled until year 8 of the new license." This could be misread to imply that Merwin efforts start in year 8. It would add clarity to modify this sentence to something like: "year 8 and 12 of the new license, respectively." We are interpreting your use of "Reintroduction efforts" here as including the Habitat Preparation Plan identified in Section 7.4 of the SA. Thus the reason for the use of 8 years rather than 13. Is this correct?	Edit made.
NMFS	NMFS6	Page v, Executive Summary. Hatchery and Natural Production Targets. 1st paragraph: The Plan proposes for the ACC to adjust hatchery production every 5 years. Why is it limited to 5 years? SA Section 8.1 states that the Plan will be carried out to adaptively manage the program and guide its management. Although SA Section 8.2.5 calls for Plan updates every 5 years , SA Section 8.2.3 calls for an Annual Operating Plan. Why not adjust hatchery production annually after enough	Clarified to say that the ACC can review production each year with the submittal of the Annual Operating Report.

Commenter	Comment Number	Comment	Response
		data is collected? This needs more explanation and discussion.	
NMFS	NMFS7	Page v, Executive Summary, Table ES-2. Hatchery target floor levels for spring Chinook, steelhead and coho: The number under coho should be 12,558 not 12,588.	Edit made.
NMFS	NMFS8	Page viii, Executive Summary, Harvest, 2: We believe the escapement goals for the Upper Lewis River basin that are listed were derived from habitat productivity/capacity models that rely on values that were filled based on professional judgments. Is this correct? If so, because these are judgments, the outcome may turn out to be different than predicted. Therefore, these goals may be adjusted in the future and the Plan should include such a possibility. Also, the Plan recommends that no harvest be allowed on spring Chinook, coho, or steelhead until escapement goals are met for that species. While that may be wise, given that the group will be learning as monitoring and evaluation of the reintroduction program occurs, there may be a different level at which harvest could occur (i.e., this could be at higher escapement goals than listed). This should be a decision that is made in the future once more is known about the productivity of the upper basin and the success of the reintroduction program.	Escapement goals based on habitat modeling work, number of surplus hatchery fish available under current harvest regulations. The plan notes that harvest is the responsibility of the Co-managers and Services.
NMFS	NMFS9	Page ix, Monitoring and Evaluation, last bullet: Regarding "Habitat data both upstream and below Merwin Darn (mainstem Lewis River only)," does the "mainstem Lewis River only" apply just to the area below Merwin Darn? If so, please modify this bullet so that it is clear that habitat data will include tributaries in the area above Merwin Dam. If not, it should cover tributaries as there will be spawning and rearing of the reintroduced populations in such.	More detail has been added to address these comments.
NMFS	NMFS10	Page ix. Adaptive Management: There should be an adaptive management plan included now, even if it is limited to the use of the monitoring and evaluation by the ACC. This is a new program that should adapt quickly to new information. This Plan and the Annual Operating Plans (SA Section 8.2.3) should incorporate such a possibility.	An Adaptive Management Plan has been included.
NMFS	NMFS10	Page x. Expected Outcomes, 1st partial paragraph: It would be helpful to add something like the following at the end of the paragraph for clarity: "Kokanee are not being monitored at this time because reintroduction of salmon and steelhead is not going to occur in Lake Merwin for over a decade."	Comment noted.

Commenter	Comment Number	Comment	Response
NMFS	NMFS11	Page 1. Introduction, 2nd paragraph: The Plan states that salmon and steelhead would be introduced into the habitat located between Merwin and Swift dams following the 13th and 17th anniversaries of the new licenses. Please modify this to incorporate (1) the Habitat Preparation Program which calls for fish placed there 5 years prior to the completion of the downstream collectors and (2) that the timing of the supplementation program in this area is up to the ACC and could be earlier than 13 and 17 years. If the ACC were to follow the same rationale as with above Swift, this would be one year prior to the completed construction of the downstream collectors.	Comment noted. This comment was missed in our initial review, and the change was not made to the April Services draft.
NMFS	NMFS12	Page 2, Introduction. 1st non-bullet paragraph: The same comment as above for Page v, Executive Summary, Hatchery and Natural Production Targets, 1st paragraph.	Edit made.
NMFS	NMFS13	Page 5, Figure 1-3. Settlement Agreement anadromous fish reintroduction outcome goals: The box on "Phase I Reintroduction Outcome Goals" misses that the SA (Section 3.1.1) calls for this prior to the later of either (a) the 27th anniversary of the new licenses or (b) the 12th year after reintroduction. The l2th year was in case there was an unforeseen delay in the issuance of the new licenses. The boxes under the Goals not met that cover a limiting factors analysis should also include the approval of the Services as well as consultation with the ACC (SA Section 3.5.2).	Could not find this edit.
NMFS	NMFS14	Page 7, last paragraph: ". . . as the reintroduction of fish to Merwin and Yale does not begin until year 8 of the new license" could be rewritten as ". . . as the reintroduction of fish to Yale and Merwin does not begin until year 8 and 12 of the new license, respectively" or something similar to avoid looking like reintroduction to Merwin occurs in year 8.	Edited appropriately where it occurs in the plan.
NMFS	NMFS15	Page 9. last paragraph: The Plan states that the earliest the decision on how best to operate the hatchery programs is likely between license years 12 — 17. Why is this? We would like further discussion on this. As we stated earlier, the group will be learning as we go and will be gaining information from the monitoring and evaluation program	The plan now says that the ACC will review hatchery production each year.

Commenter	Comment Number	Comment	Response
NMFS	NMFS16	Page 9, 1. Convert the Segregated programs for native populations into Integrated: The decision to change the segregated programs to integrated programs should be based on the abundance of naturally produced fish from the upper basin. If returns increase to the point where there are enough adult returns, such that removing some of the adults for broodstock will not adversely affect the population, then natural fish should be integrated into those programs that produce fish for harvest. This could he done even before the 12-17 year decision period.	More info has been added regarding HSRG assumptions about integration and why the 12-17 year period is needed.
NMFS	NMFS17	Page 10, 2. Discontinue hatchery releases in upper Lewis River basin convert native Segregated programs to Integrated: We expect this to occur as described above. The proportion of natural origin broodstock (NOBs) depends on the abundance of natural origin fish. If no hatchery fish are released into the upper basin then under the All H Analyzer (better known as AHA) modeling, the proportion of NOBs in the hatchery broodstock does not need to be 50 percent but can be less since for the population as a whole the naturally produced fish will always be the majority of the spawners. The level could exceed 50 percent NOBs if abundances are high enough. After the naturally produced population has been established, a decision matrix should be developed to determine the proportion of natural origin fish that can be removed for broodstock. Also note that as the naturally produced population increases above the thresholds identified in the Plan, hatchery production will be reduced, leading to fewer adults needed for broodstock.	We have added more detail to this section of the report, hopefully clarifying the discussion.
NMFS	NMFS18	Page 10, 3. Discontinue hatchery releases in upper Lewis River basin and maintain Segregated programs: NMFS tends not to support this option because the hatchery population would diverge from the naturally spawning population. In the case of the spring Chinook, and coho salmon, NMFS would like to make the listed hatchery program as similar to the natural population as possible even though it is providing fish for harvest. An integrated hatchery program provides greater conservation benefits than a segregated program. Furthermore, if hatchery fish spawn naturally below the darns and return as unmarked adults, which are then passed upstream, these fish may adversely affect the naturally spawning populations in the upper basin.	Comment noted.
NMFS	NMFS19	Page 10, 4. Continue Segregated Program Maintain a Smaller Integrated/eliminate hatchery stocking above Merwin: This option would not be supported for the same reasons listed above, and it would probably be difficult to maintain two programs	Comment noted.

Commenter	Comment Number	Comment	Response
		at the hatchery.	
NMFS	NMFS20	Page 12. 2nd paragraph: Does Washington Department of Fish and Wildlife (WDFW) support the contention that early winter steelhead production has to be reduced to make room for the late winter steelhead program? Isn't the hatchery being remodeled to support the new late winter steelhead program and for the increased production of coho salmon?	Comment noted. Winter steelhead production no loner reduced in new version.
NMFS	NMFS21	Page 12. 2.1.4 Broodstock Needs and Escapement Targets. 1st paragraph: How were escapement target numbers derived? We believe the escapement goals for the Upper Lewis River basin that are listed were derived from models that rely on professional judgments of the habitat productivity/capacity. Is this correct? This should be explained in the document. Also, these capacity predictions may turn out to be incorrect. Therefore, these goals may be adjusted in the future and the Plan should include such possibility.	Escapement goals based on habitat modeling work, number of surplus hatchery fish available under current harvest regulations. The plan notes that harvest is the responsibility of the Co-managers and Services.
NMFS	NMFS22	Page 13: Harvest Recommendation 1 needs to be changed so that the language in the parentheses is (including fish with an intact adipose tin and RV or LV clip).	Will be looking for WDFW and the Service to review the harvest section and make adjustments as needed to be consistent with harvest regulations.
NMFS	NMFS23	Page 13, 2.1.4 Broodstock Needs and Escapement Targets, 2. The Plan states that no direct harvest would be allowed on salmon or steelhead unless it was certain that escapement goals would be achieved. Since the Settlement Parties are aiming for higher numbers than this, we may want to change our escapement goals to increased amounts in future years. It is too early to decide when to harvest. One aspect the group should consider is that we may want to wait for higher population numbers before having harvest.	ACC to address.
NMFS	NMFS24	Page 13, 2.1.5 Hatchery Production Adjustment, 2nd paragraph: In the paragraph it says that after thresholds are met, the number of juveniles released from the hatchery each year would be reduced based on the average survival rate calculated over a 5-year period. But it also says that the decision to adjust the hatchery production would be made by the ACC every five years. How do these two go together? This needs more explanation or clarification.	The ACC will use the survival data (ocean recruits) to make adjustments as needed. We simply suggest a 5-year period as it is consistent with the independent review process.

Commenter	Comment Number	Comment	Response
NMFS	NMFS25	Page 14, Table 2-6. Hatchery target floor levels for adult spring Chinook, steelhead and coho: The number under coho should be 12,558 not 12,588	edit made.
NMFS	NMFS26	Page 14. 2.2.2 Resident Trout. 2 paragraph: In the discussion of the resident trout program, any problems resulting from resident trout entering the fish collection facilities can be addressed. For example, resident trout in Lake Scanewa, above Cowlitz Falls Dam are not released into the reservoir until the high spring flows have subsided. Also, fishing regulation changes in the reservoirs (especially Swift) may be needed in the future to protect out-migrating juvenile salmon and steelhead (e.g., opening season end of May, marking all resident trout releases to provide for selective fisheries, using off channel areas for concentrated fishing efforts, no releases until after June 15).	Comment noted.
NMFS	NMFS27	Page 14. 2.2.2 Resident Trout, 3rd paragraph: What is the carrying capacity of Swift Reservoir, and what are the native fish communities?	Unknown. See Fisheries Technical Reports conducted during licensing.
NMFS	NMFS28	Page 15. 6th paragraph: When supplementing late winter steelhead, when would wild adult late winter steelhead be put upstream?	This is a decision for the WDFW and Services. It is assumed that any fish returning with an intact adipose fin would be returned upstream.
NMFS	NMFS29	Page 16, 1st partial paragraph: The 12-year period is not the decision point for the Services defining the metrics that would be used to define program success. As explained earlier, the SA (Section 3.1.1) calls for this prior to the later of either (a) the 27th anniversary of the new licenses or (b) the 12th year after reintroduction. Also, there should not just be one strategy that is continued for 12 years and then stopped. There needs to be the ability to adapt as we proceed with this new program and there must be other ways to assess the reintroduction program without stopping the supplementation piece. Please explore this and open a dialogue with the parties. Additionally, the last sentence acknowledges that the supplementation program may continue through year 15 if it meets certain criteria. It can be extended beyond that by the ACC with Services approval on an annual basis (SA Section 8.5) and the Plan should acknowledge such,	This has been changed to 15-years. Also, this is defining what the H&S Plan call for, that is no changes for 15 years unless directed by the ACC or Services. Edits have been made throughout the document to clarify ACC role, decision points etc.
NMFS	NMFS30	Page 16, 1st full paragraph, 1.: The last part of the first priority for the use of adults should be changed from gravel-to-gravel to adult-to-adult.	Comment noted. Kept gravel-to-gravel as recommended by the tribes.

Commenter	Comment Number	Comment	Response
NMFS	NMFS31	Page 16, 3rd full paragraph: The termination of releases of hatchery spring Chinook in the upper basin will depend on two things, first is the completion of the juvenile fish collection facility and the determination that it can collect juvenile spring Chinook at levels that can support a self sustaining population. Once this is achieved, then the decision of when to end releases can be made. Second, the release of hatchery spring Chinook could be terminated sooner, if collection efficiencies are high enough and adult returns exceed supplementation goals.	Unless we rely on model estimates, the only way to determine if the population is truly self-sustaining is to eliminate supplementation. It will be the survival rate for the entire life cycle that determines population sustainability. Collection efficiency will be just one component of the survival equation. As long as adult or juveniles are supplemented into the population, one component of survival will always be unknown.
NMFS	NMFS32	Page 16. last paragraph before 3.1.2 Broodstock Origin: The Plan calls for stopping smolt and adult supplementation after 12 years to be able to monitor the population to determine if reintroduction goals have been achieved. We have already explained that the 12-year timeframe is incorrect. We also feel that there may be ways to assess the reintroduction goals without completely stopping supplementation or by the time when the reintroduction, goals are assessed, the supplementation may have already been stopped. It is too early to be making this decision.	Agree that this is a decision for a later date.
NMFS	NMFS33	Page 16, 3.1.2 Broodstock Origin: The priority of the use of returning hatchery spring Chinook should be set as the following: the first 800 returning adults should be used to continue juvenile production, the next 2000 should be used for adult releases into the upper basin. For those naturally produced fish above the 2000 needed for the upper basin, a decision matrix should be developed for incorporating a portion of those fish into the broodstock. The matrix should also show what will happen when returns of both naturally produced and hatchery fish are less than 800 and less than 2800. The Plan needs to identify the minimum number of adults that would be released into the upper basin to prevent demographic effects (not finding a partner).	More detail has been added to Section 3 to address these comments.
NMFS	NMFS34	Page 17, 3.1.4 Incubation and Rearing: Access to acclimation ponds may be difficult in February.	Agreed.

Commenter	Comment Number	Comment	Response
NMFS	NMFS35	Page 17, 3.1.5 Release Location and Numbers Released: Please revise the first sentence with something like: "A minimum of 2000 adults and up to 100,000 smolts will be released. . ." to reflect the next sentence that says a minimum. The way the first sentence is written in the Plan implies that up to 2000 adults will be used. Also, considering that the number of adults being placed above is based on the habitat capacity estimated by Ecosystem Diagnostic and Treatment (EDT), the number of adults should be re-evaluated as we get results from the monitoring and evaluation program. The predicted habitat capacity may not be the actual habitat capacity and the Plan should be adapted as we learn. We are not sure this is the correct number to start with. It may be based on current EDT estimates, but perhaps that should not be our only scale. This needs more discussion. Additionally, the pre-spawning mortality of spring Chinook adults transported to the upper basin should be estimated. If the pre-spawning mortality is high, then the total number of adults released must be increased to compensate.	More detail has been added to address these comments.
NMFS	NMFS36	Page 17, last partial paragraph: Why is the decision to modify the current Segregated harvest program into an Integrated program proposed to occur after 15 years? Why couldn't this be looked at sooner?	More information on HSRG guidelines have been added to clarify this assumption.
NMFS	NMFS37	Page 18, 3.2.2 Broodstock Origin: Can more than 9,000 coho be released in the first few years to allow for pre-spawning mortality and to provide for some harvest? Also, as with spring Chinook, a decision matrix should be developed to show how adults will be used when coho returns are between zero and 9,000, and when naturally produced fish exceed the escapement goal and can be incorporated, into the broodstock.	Yes. Clarified in Section 3.
NMFS	NMFS38	Page 18, 3.2.4 Broodstock Collection: Program should identify when the cut-off date is between Type-S and Type-N coho.	Will be clarified once Annual Operating Report is finalized.
NMFS	NMFS39	Page 19. 3.2 coho salmon, 3.2.5 Release Location and Numbers Released, 1st paragraph: Why is adult supplementation stopped at the end of 9 years when the ACC with Services approval can decide to continue supplementation on an annual basis? Also, as stated earlier, the reintroduction goals will not be determined at year 9.	The plan recognizes that the ACC can over-rule this decision. It was assumed that at least 3 generations are required to produce a fully adapted coho stock in the upper basin. See section 3.0 for HSRG assumptions regarding this issue.
NMFS	NMFS40	Page 19, 3.2.5 Release Location and Numbers Released, 2nd paragraph: At the completion of the 9 year period, before discontinuing the release of adult hatchery	We are suggesting that the Services provide the methodology they would use to demonstrate that

Commenter	Comment Number	Comment	Response
		coho, it should be determined by the Services that the collection efficiency is enough to support a self sustaining population. If the juvenile collection efficiency is less than the 80 percent goal then the program should continue until a number of years have passed with collection efficiencies meeting the goal before considering termination of hatchery releases.	collection efficiencies are sufficient to produce sustainable runs. This information would help us develop a better logic path for discontinuing the supplementation program.
NMFS	NMFS41	Page 19, 3.2 coho salmon, 3.2.5 Release Location and Numbers Released. 2nd paragraph: Again, we are not sure that we have to wait as long as proposed and for the completion of the evaluation of stock sustainability to decide on whether or not to modify the current Segregated harvest program for Type-S coho into an Integrated Harvest program.	This decision will be up to the ACC. We simply provide a plan that is consistent with HSRG guidelines.
NMFS	NMFS42	Page 19, 3.3 Steelhead: We have the same comments in this section as with the spring Chinook and coho sections regarding the need for an adaptive management program, when the reintroduction strategy stops, when the reintroduction goals are evaluated, etc	More detail has been added to the adaptive management plan. However, as noted in NMFS previous comments, it appears that there is already considerable disagreement with both when and how such decisions can and should be made. The plan provides one approach, with a rationale. it would be helpful if the Services could provide more detail on the criteria they would use to make these decisions.
NMFS	NMFS43	Page 19. 3.3.1 Supplementation Strategy, 2nd paragraph: What happens to the naturally produced late run winter steelhead that exceed the 50 needed for broodstock? Will these be released downstream or will they be passed upstream with returning hatchery late run winter steelhead? At what time would all naturally produced steelhead be passed upstream?	The plan calls for the co-managers and Services to provide direction on this issue.
NMFS	NMFS44	Page 20, 3,3.3 Broodstock Collection and Mating: A decision matrix should be established that will show what will happen to returning naturally produced late winter steelhead at abundances from 0 to 1,000. These protocols should identify when and if hatchery late winter steelhead will be used in the broodstock if returns are less than 50 adults. It should also identify the minimum number of adult late winter steelhead that would be released into the upper basin if returns are low.	More detail has been added to this topic in Section 3. At this time the plan assumes that the current winter steelhead hatchery stock is not suitable for release into the upper basin. Past hatchery practices have severely altered run timing to the point where this stock is a poor fit for upper basin environmental conditions.

Commenter	Comment Number	Comment	Response
NMFS	NMFS45	Page 20, 3.3.4 Incubation and Rearing: The citation given in the first sentence for the WDFW winter steelhead Hatchery and Genetic Management Plan (HGMP) is listed in the Reference section as being the Lewis River (Merwin) Summer Steelhead. Is this correct? Also, does the WDFW agree that the early winter steelhead program has to be reduced to make room for the late winter steelhead program? Are there other changes at the hatcheries to support current production and the new programs? Also, how will the hatchery late run winter steelhead be marked so they can be identified at the trap? The mark will have to be different than those provided to juveniles produced in the upper basin.	Citation should be for winter steelhead. See appendix A for complete citation. The winter program will not be reduced based on ACC input. However, this is being confirmed with WDFW staff to ensure that rearing space exists at the hatchery. The exact mark to be used will be coordinate with WDFW and NMFS staff once an agreed upon plan is developed. Currently, the plan calls for these fish to retain their adipose fin, have an rv clip.
NMFS	NMFS46	Page 21, Steelhead, 3.3.5 Release Location and Numbers Released: The Plan states that all returning adults will be released near the head of the Swift Reservoir. While this may be an acceptable way to start, there may be reasons to modify this in the future to include different locations e.g., if it is found that fish are not distributing well in the upper basin, etc. This is another reason there should be an adaptive management component built into the Plan.	Agreed. The Adaptive management plan proposes to test this assumption over time.
NMFS	NMFS47	Page 22. 4.0 Monitoring and Evaluation, 2nd paragraph: Monitoring is needed to inform whether or not the supplementation program is working. Monitoring is needed to enable changes where necessary (adaptive management).	Data will be collected on the number of juveniles entering the reservoirs, spawning distribution of adults etc. These data will document the success of the supplementation effort.
NMFS	NMFS48	Page 22, 4.0 Monitoring and Evaluation, 3rd paragraph: The Plan states that monitoring is needed to quantify possible impacts from supplementation activities on bull trout. Monitoring is also needed to understand the possibility of impacts from bull trout to the supplementation activities. This will allow for adaptation.	We see no reason to collect these data as it is assumed, and the literature confirms, that bull trout will prey on anadromous juveniles and eggs.
NMFS	NMFS49	Page 24, Table 4-1. Marking program for supplementation, hatchery, and natural origin spring Chinook, coho and steelhead: In the first row there are the terms “snout” and “nose.” What is the difference? The table under Natural states a “minimum of 50,000 cwt’s”. Why does it say minimum? What happens to those naturally produced fish collected at Swift that exceed the 50,000 minimum? Will not all fish be marked with coded wire tags? All of these fish should be marked. How will juveniles be marked as part of the evaluation of the juvenile collection facilities?	Edited to refer to nose only. Also, the 50,000 number was selected for statistical purposes (survival estimates). Depending on whether the WDFW proposes to continue Double Index Groups or not, all upper basin fish may be tagged. The Co-managers will need to provide input on this topic. Note that the evaluation plan for juvenile collection facilities has not yet been developed and was not a component of the plan. However, for spring Chinook, the acclimated smolts could be used to test the efficiency of the

Commenter	Comment Number	Comment	Response
			facilities. Finally, as the Settlement Agreement calls for enumerating the number of juveniles entering each reservoir, it is likely that screw traps would situated at the head of the reservoir to sample these fish. These fish could be uniquely marked for testing purposes.
NMFS	NMFS50	Page 24, 4.2 Ocean Recruits: When including jacks in the calculation there must be consideration of reasonableness. In other words, we want to make sure that there is a representative percentage of jacks here in the Lewis as seen in other similar runs.	Jacks have been eliminated from the analysis at the direction of the ACC.
NMFS	NMFS51	Page 25. 4.3.1 Anadromous Fish Programs. 3rd paragraph: Because the goal for a segregated program is not to exceed 5 percent of the natural spawning population, this goal provides more reason to integrate the hatchery harvest programs for spring Chinook, coho, and steelhead. There is a concern with interactions between naturally spawning hatchery summer and early winter steelhead down stream of the hatchery. However, returns of naturally produced summer and early winter steelhead (based on condition and run timing) have been very low (e.g. in 2001, 12 out of 6,948 summer steelhead returns were unmarked, these could also include mis-marked hatchery fish).	See Section 3.0 for a more detailed analysis of HSRG guidelines supporting the plan.
NMFS	NMFS52	Page 26. 4.3.2 Resident Fish Programs: While it may be useful to have the information during the Habitat Preparation Program, it is possible that the impacts from the resident trout plants could be higher after the full reintroduction program starts. In other words, the number of juvenile reintroduced fish is expected to be higher than those during the Habitat Preparation Program. It is not a given that with a changing prey base the resulting impacts by a predator will result in consistent ratios. Therefore, this analysis should occur again after the reintroduction program starts. Also, what is the rationale behind 3 percent as the threshold impact at which the resident trout program should be eliminated? We would like to understand your rationale to help us determine if we agree with this value. Also, if the Lake Scanewa on the Cowlitz River resident trout program can be used as an example, there are number of measures that can be taken to reduce predation and incidental catch of naturally produced juveniles that should be evaluated before considering	The predation study could be repeated after collection facilities are constructed. The 3% value was simply a placeholder value to note that the ACC must develop the criteria to be used for evaluating this program. Study methodology would be set up to be able to determine if the criteria were being achieved.

Commenter	Comment Number	Comment	Response
		eliminating the resident trout program in Swift Reservoir.	
NMFS	NMFS53	Page 26, 4.3.3 Harvest Effects, 2nd paragraph. 2. Catch and release mortality associated with selective fisheries has been calculated in other basins (e.g.. Willamette River, Oregon), however, a study to measure this would be supported by NMFS. Associated with this study would be the continuation of creel surveys to get an accurate estimate of the encounter rate for naturally produced (or unmarked) fish in the fishery. This encounter rate is used to estimate the overall mortality associated with the fisheries.	The plan calls for conducting some harvest/creel surveys. However, it is assumed that the WDFW will provide much as this information as they are responsible for harvest management.
NMFS	NMFS54	Page 27, 4.3.4 Index Stocks: The data proposed to be gathered for the Index Stocks would also be collected as part of the Lower Columbia River recovery plans for listed species. These data could be used to estimate if limiting factors are internal or external to the Lewis River basin.	Agreed.
NMFS	NMFS55	Page 27, 4,3.4 Index Stocks, 1st paragraph: Please change “would” to “could” in the second sentence so that it reads “This information could feed into the Limiting Factors Analysis (LFA) called for in year 27 of the license.”	If we are to g0 through the effort to collect the data then it should be used as part of the limiting factors analysis. The index information was to be used to determine if conditions "outside" of the basin were limiting fish production.
NMFS	NMFS56	Page 27, 4.3.4 Index Stocks, 3rd paragraph: We caution special emphasis on use of the Cowlitz River reintroduction program as while there are similarities there are also differences e.g., collection efficiencies, how fish are released, etc. While the concept of using index stocks is good, the group needs to be careful on how we use or interpret that information.	Agreed.

Commenter	Comment Number	Comment	Response
NMFS	NMFS57	Page 27-28, 4.3 Hatchery Effects: There needs to be included in the Monitoring and Evaluation section activities that will address the evaluation of the hatcheries once they are remodeled. The upgraded facilities will need to go through an evaluation to determine the best hatchery rearing practices for the production of fish that will support the supplementation efforts.	hatchery monitoring has been added to the document.
NMFS	NMFS58	Page 28, 4.3.5 Life-History Data and Performance, last bullet: Regarding "Habitat data both upstream and below Merwin Dam (mainstem Lewis River only)," does the "mainstem Lewis River only" apply just to the area below Merwin Dam? If so, please modify this bullet so that it is clear that habitat data will include tributaries in the area above Merwin Dam. One possible way to modify this is: "Habitat data both upstream of Merwin Dam and in the mainstem Lewis River below Merwin Dam." If this is not what is meant, it should cover tributaries as there will be spawning and rearing of the reintroduced populations in such.	More information on monitoring fish populations in the lower Lewis River basin have been added to the document.
NMFS	NMFS59	Page 29, 5.0 Adaptive Management: As stated throughout this comment letter, there needs to be an adaptive management component in this Plan. As the group learns how things are working, there may be some adaptive management actions identified that need to occur prior to the 5-year review and a mechanism needs to be place for such.	An Adaptive Management Plan has been included.
NMFS	NMFS60	Page 30, 6.0 Expected Outcomes: This section should be redone as data is collected and this section should acknowledge such.	The contents and analysis included in future plans will be provided by the ACC and also the independent reviewer.
NMFS	NMFS61	Page 30. 6.1 Spring Chinook. 1st paragraph: Will releases be limited to 2000 adults in the upper basin? This assumes that habitat capacity is reached. Hatchery adult spring Chinook releases into the upper basin should be maximized, as long as surplus hatchery fish are available.	This is clarified to be a minimum value. More info on escapement targets over time have been added to the document.
NMFS	NMFS62	Page 31, 6.2 coho, 1st paragraph: Same question as above, will releases be limited to 9,000 adults?	Clarified to show that this is a minimum value.

Commenter	Comment Number	Comment	Response
NMFS	NMFS63	Page 32, 6.3 Steelhead: Does the NORs spawning include all naturally produced late winter steelhead, or just those that result from the juvenile releases (i.e., those collected at Swift Dam)? It should be noted that the harvest estimate reported for the winter steelhead segregated program is very low reflecting past harvest levels. In 2001, in the North Fork Lewis River alone over 2,100 hatchery winter steelhead were harvested, up from 530 in 2000; and this occurred with no changes in the number of juveniles released. The harvest of 2,100 hatchery winter steelhead is substantial and reflects the importance of this program to the basin.	All naturally spawning fish will be counted as NORs. Harvest rates came from the Lewis River Fish Planning Document.
NMFS	NMFS64	Page 34, 7.0 Recommendations, 1. Elimination of the existing winter (early) steelhead program: As described above, the harvest of hatchery winter steelhead in the Lewis River has increased in recent years reflecting higher survivals that those cited in the Plan. The program currently supports a popular fishery in the basin and provides fishing opportunities during the winter months when other hatchery steelhead are not present. Also, we believe that modifications to the hatchery complex could provide room to continue this program and still provide for the late winter steelhead program.	This recommendation has been removed.
NMFS	NMFS65	Page 34, 7.0 Recommendations, 2. Elimination of Segregated Type-S Coho program: We do not agree with this recommendation, the Type-S coho program should not be eliminated but should become a program that is fully integrated with the natural population. This program can continue to support harvest as well as act as a conservation reserve in case of a disastrous decline in the abundance of naturally produce coho.	This recommendation has been removed.
NMFS	NMFS66	Page 34, 7.0 Recommendations, 3. Reduction in Type-N Coho hatchery production: We support an evaluation of this program, with regards to interactions of hatchery Type-N coho spawning below the dams. As the production of coho salmon in the upper basin increases to the point that triggers reductions in hatchery production, it should be determined by the ACC and Services which coho program would be reduced. It should be noted that in the future, Type-N coho may be the appropriate stock for supplementing tributaries in Merwin and Yale reservoirs; currently Type-N coho eggs are used to supplement natural spawning populations in tributaries in the lower Lewis River using remote site incubators. Also, we are not sure that naturally spawning Type-N coho are a problem in the lower river but this should be investigated as part of the Monitoring and Evaluation program.	This recommendation has been removed.

Commenter	Comment Number	Comment	Response
NMFS	NMFS67	Page 34. 7.0 Recommendations, 4. Increase spring Chinook hatchery production: The proposed increase in spring Chinook production is based on modeled expectations and may not accurately reflect the potential for natural production in the upper basin. Additional production space for spring Chinook may also be available after the remodeling of the hatchery such that reductions in other programs may not be necessary. Furthermore, if natural production of coho and steelhead in the upper basin increases to the level where production of hatchery coho and steelhead is required to be reduced under the Section 8.3 of the SA, then space will be made available for added spring Chinook production.	This recommendation has been removed.
American Rivers and Trout Unlimited	ARTU1	The Settlement Agreement speaks to the Hatchery and Supplementation program in Section 8. Specifically, it states in §8.1 that "[t]he Hatchery and Supplementation Program shall be consistent with the priority objective of recovery of wild stocks in the basin to healthy and harvestable levels." (emphasis added). It goes on to require that the program "shall be consistent with the ESA, applicable state and federal fisheries policies, and regional recovery plans, and should be consistent with recommendations of the Hatchery Scientific Review Group and the Northwest Power Planning Council's Hatchery Review (Artificial Production Review & Evaluation) to the extent practicable." The H&S Plan acknowledges these guiding principles but then does not explain how the proposed actions are in fact consistent with recovery, or the ESA, applicable state and federal fisheries policies and regional recovery plans. This is a glaring omission. Indeed, looking at the Settlement Agreement in the context of these other documents, the priority objective for recovery of wild stocks takes on even great importance.	It is assumed that the Services (NMFS and USFWS) will review the plan for consistency with the ESA etc. Their review will then be included as an appendix to this document to support compliance.
American Rivers and Trout Unlimited	ARTU2	In 2004 the State of Washington and NOAA Fisheries proposed a salmon recovery plan for the Lower Columbia River watersheds, including the Lewis River. (Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, Dec. 14, 2004) (hereinafter "Recovery Plan"). This recovery plan is a requirement under the Endangered Species Act, 16 U.S.C. §§1533 (f). The recovery plan found that all of the stocks in the Upper Lewis River had a high risk of extinction and the overall goal for salmon recovery is to reverse that risk completely, especially spring Chinook. Furthermore, the recovery plan found that "harvest has moderate impacts on spring Chinook and coho, but its effects on winter steelhead are minor. Hatchery impacts include domestication of natural populations (most applicable to Chinook and coho) and ecological interactions which can impact all species to variable degrees. Hatcheries moderately impact all three species in the upper North Fork Lewis" (pg G-183). Interestingly, the recovery plan focused on the	As upper basin fish populations are no longer present (exist), we do not see how extinction risk is a concern for these populations. It is assumed that following HSRG guidelines and other measures outlined in the Settlement Agreement were selected by the parties to address these issues.

Commenter	Comment Number	Comment	Response
		analysis and development of the H&S Plan to address these impacts, an analysis and discussion that is completely lacking within the H&S Plan, including a complete lack of any reference to the recovery plan itself! The H&S Plan and its supporting documents do not address how the proposals within the H&S Plan will meet the goals of the recovery plan, nor how, in fact some of the recommended changes move away from the recovery goal.	
American Rivers and Trout Unlimited	ARTU3	Second, the federal government convened an independent science team, the Lower Columbia/Upper Willamette Technical Recovery Team. This TRT is operating to satisfy the recovery requirements under the Endangered Species Act. In July, 2004, the TRT released a status report on the viability of the listed salmon stocks in the Lower Columbia River. (McElhany et al., 2004). Relative to the Lewis River, the status report concluded that Lewis River Spring Chinook and coho had a high extinction risk (low persistence), while the winter steelhead had a high to medium extinction risk (low to moderate level of persistence), and summer steelhead had a very high risk of extinction (very low level of persistence). As a result of these conclusions, the recovery plan requires that all "Upper North Fork Lewis River salmon and steelhead will need to be restored to high or medium levels of viability to meet regional recovery objectives" by ensuring that "populations are productive, abundant, exhibit multiple life history strategies, and utilize significant portions of the subbasin." (pg. G-121). The recovery plan specifically states that the "main threats from hatchery released salmon are domestication of wild fish and ecological interactions between hatchery smolts and wild fall Chinook, chum, and coho in the lower river. The main threats from hatchery steelhead are potential domestication of the naturally-produced steelhead as a result of adult interactions or ecological interactions between natural juvenile salmon and hatchery released juvenile steelhead." (G-171).	See previous comment.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU4	Third, NOAA Fisheries listed Lower Columbia River coho as a threatened species on June 28, 2005. (70 Fed. Reg. 37217). This listing impacts the H&S Plan in terms of the predation on coho stocks and the hatchery production, yet is not referenced at all in the H&S Plan. Specifically, the proposed listing of Lower Columbia River coho cites to high hatchery production and harvest rates as the two leading causes of decline of coho and the very reason for the listing itself. The proposed listing expresses "concern that the magnitude of hatchery production continues to pose significant genetic and ecological threats to the extant natural populations in the ESU." 69 Fed. Reg. 33102, 33133 (June 14, 2004). While the Lewis River S-type and N-type hatcheries are included in the actual listed population "NMFS' assessment of the effects of artificial propagation of the ESU extinction risk concluded that hatchery programs collectively mitigate the immediacy of extinction risk for the Lower Columbia River coho ESU in-total in the short term, but that these programs do not substantially reduce the extinction risk of the ESU in the foreseeable future." Id. (emphasis added, internal citations omitted).	Comment noted.
American Rivers and Trout Unlimited	ARTU5	Finally, two cases have recently ruled that federal and state agencies must meet a recovery standard when implementing the Endangered Species Act, specifically in critical habitat and jeopardy decisions. Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service, 378 F.3d 1059, 1069 (9th Cir. 2004); and National Wildlife Federation v. NMFS, CV 01-640-RE (D.Or. 2005) (2005 WL 1278878). These two cases are critical in our review of the H&S Plan. They give more than priority weight to the language in the SA, but in effect give it the force of law.	Comment noted.
American Rivers and Trout Unlimited	ARTU6	The H&S Plan is missing a foundational component: the status and health of the wild, naturally spawning stocks within the basin, both of listed salmon and steelhead as well as resident fish such as bull trout, cutthroat and lamprey. It is impossible to adequately evaluate the hatchery proposal without this watershed context, especially the levels of hatchery production. While we were able to track down some of the information in the TRT status report, it should be one of the first pieces of information contained in the H&S Plan and should include other species such as cutthroat trout (anadromous and resident), bull trout, and lamprey. These inter-specific interactions are as important as the intra-specific interactions. This is of special concern with the production of resident trout, kokanee and the summer and early winter steelhead programs. For example, a WDFW study in the Cowlitz system found listed anadromous fish in the stomach contents of 3% of the resident fish stocked into the reservoir. Finally, this information is required under SA §	It is assumed that hatchery production agreed to by the parties to the settlement meet ESA requirements. However, this would be confirmed as part of the services review of the H&S Plan. Section 8.2.2 does not require a description of species population health. The Plan notes that the decision to reintroduce results in impacts to resident fish species that are acceptable, as the Settlement Agreement has been approved by the Services and WDFW.

Commenter	Comment Number	Comment	Response
		8.2.2 et seq.	
American Rivers and Trout Unlimited	ARTU7	The H&S Plan immediately proposes to produce the maximum level of juveniles called for in the SA without first exploring how these production levels impact recovery, and second looking at ways to increase the smolt to adult survival rates. Notably, the plan proposes to release 1.35 million Chinook to achieve a target of 12,800 returning adults, a success rate of less than 1%. Similarly, steelhead smolt production of 275,000 for only 13,200 returning adults represents a survival rate of less than 5%, and the coho production of 1.8 million smolts results in barely a 3% success rate. We were unable to find the survival data referenced in the Lewis River Fish Planning Document (Cramer and Associates, 2004) that is used to justify this output. Furthermore, the survival data are low relative to other studies on hatchery fish, and abysmally low compared to wild fish (Berejikian and Ford, 2003; Chilcote, 2003). Given the ESA goal of recovering wild Spring Chinook, coho and steelhead in the Upper Basin, which must necessarily pass through the Lower River and interact with the nearly 3.5 million smolts being released and 86,000 returning adults, it begs the question, especially in light of the TRT status report, recovery plan and Lower Columbia River coho listing, of whether the production will undermine the recovery goals. (See also Nickelson, 2003). The H&S Plan makes no attempt to propose alternatives that would alternatively reduce juvenile output but maintain the number of adult targets outlined in the SA. Further, given these concerns, the H&S Plan should also address why the juvenile output increases over time but the hatchery targets do not. This trend suggests an inherent inefficiency and failure in the hatchery plan proposal.	See Tables B2, D4, D5 of the Lewis River Fish Planning Document. Also, the WDFW provided data at the last ACC meeting showing that SARs are even lower for steelhead than assumed. These new SAR values have been incorporated into the next version of the plan. The plan assumes that the juvenile hatchery target values in the Settlement Agreement are to be followed, as they were agreed to by the parties. At this time, we can see no rationale for changing these numbers as there is no data to support this action. We have however, proposed to run hatcheries as Segregated programs which require that managers reduce the number of hatchery fish spawning in the lower river. In fact, the HSRG calls for this value to be 5% or less (# of hatchery fish on spawning grounds). This action should reduce hatchery impacts considerably. Whether the increase in coho production is an inefficiency is an opinion that should be brought up in the next ACC meeting.
American Rivers and Trout Unlimited	ARTU8	Finally, the Conservation Groups believe that the 1:1 credit mechanism that reduces hatchery production as natural production exceeds threshold levels is critical not only to the success of recovery efforts, but also to our continued support of the SA. The rationale behind the reduction (and corresponding increase in other years), is that as the wild fish rebound, the need for the hatchery fish both from a recovery and mitigation perspective, is reduced. Indeed, continuing to produce large numbers of hatchery fish while wild fish are rebounding flies in the face of the recovery plan and the TRT status report. The clear language of the SA in §	The credit mechanism is based on fish not cost

Commenter	Comment Number	Comment	Response
		8.3.2.3 states that this is a fish to fish ratio, not a cost ratio. In fact, based on data compiled by Berejikian and Ford (2003), and the ratio used in the Cowlitz River Fisheries and Hatchery Management Plan, this is a very liberal ratio that maintains high levels of hatchery production. Any re-interpretation of this reduction mechanism at this late stage would prompt the Conservation Groups to reconsider their support for the SA.	
American Rivers and Trout Unlimited	ARTU9	The Conservation Groups support the Hatchery Scientific Review Group (HSRG) approach and the use of "segregated" and "integrated" concepts in hatchery reform (H&S Plan, pg. 8). Thus, we are perplexed by the use of segregated type salmon for reintroduction into the upper watershed. While we understand that there simply are no wild fish left in the upper watershed, there are certainly "naturalized" hatchery fish in the lower basin that could be passed into the upper watershed for spawning, thus eliminating the impacts of domestication on the reintroduction plan.	See the new detail presented in Section 3 to justify this approach.
American Rivers and Trout Unlimited	ARTU10	The H&S Plan appears to propose to use a segregated hatchery program for recovery into the upper watershed, an inherently integrated type purpose. The H&S Plan should clarify how it will be successful in using these out of basin, domesticated stocks for a reintroduction strategy in the upper basin. The plan suggests that it will use hatchery origin broodstock in the upper basin only if the naturalized hatchery returns are insufficient to seed the upper watershed habitat. However, that lack of adult returns indicates the segregated reintroduction program is not working. How will introducing more segregated type fish, which have a very high risk of reducing the fitness of the few naturalized Chinook that are returning (see Recovery Plan pg. G-178, G-183), actually improve the success of the program? Furthermore, there is an inconsistency within the H&S Plan in that on pg vi, the plan states that as the populations in the upper watershed become "more established," the hatchery releases will be limited to less than 10% of the total escapement, but in the actual plan itself on pg. 16 states that hatchery fish will only be released, without limit, if the adult returns are insufficient. This inconsistency needs clarification and the phrase "more established" needs to be further defined. Will the program convert to an integrated type program in the meantime to continually supply hatchery fish in the upper basin? Instead, the H&S Plan proposes to convert to an integrated program for Spring Chinook and coho at year 12. If the program is successful in years 1-12, why is it necessary to even convert to an integrated program?	See the new detail presented in Section 3 to justify this approach. Additionally, the plan now calls for eliminating all hatchery releases in the upper basin in the future. As the Settlement Agreement states that hatchery production will never be released below the target floor, it is important that these programs are still operated in a manner that reduces negative interactions with lower river fish populations, even after fish are successfully reestablished in the upper basin.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU11	We were perplexed as to why the size of juveniles and the "smolt quality" would be the same for both the upper and lower watershed, when the goal of the releases in to the lower watershed were simply as a segregated harvest program. The similarity of size and timing at release could impact the supplementation program by increasing competition for food, attracting predators, competition for overwintering habitat or other "safe" habitat. How will the different programs prevent these interactions? While we understand the need to release smolts that are the same size and timed with wild smolts in a reintroduction effort (and integrated program), we question how this strategy is consistent with a segregated program based on the definitions provided, especially Table 2-2 on pg. 11 of the H&S Plan.	The HSRG guidelines in Table 2-2 indicate that fish in a segregated program should be reared so that they migrate quickly to saltwater, and survive in that environment by implementing growth regimes that promote smoltification. It is assumed that the more hatchery fish mimic wild fish in behavior and size (morphology) the more likely these fish will survive and thrive over time.
American Rivers and Trout Unlimited	ARTU12	The H&S Plan does discuss some of the potential downstream impacts of a segregated program, and states that the hatchery fish will not make up more than 5 percent of the natural spawners in the lower river. We support this limit and believe it should be more prominent in the monitoring and evaluation discussion.	More detail has been added to the monitoring program.
American Rivers and Trout Unlimited	ARTU13	The use of an integrated program for steelhead is also confusing in light of the fact that the other programs will not be integrated. While we support the use of the integrated program for the reintroduction efforts, we would like to see an elaboration on why there is differential treatment for the steelhead program. We would also like to see a discussion as to why the wild adult steelhead are being incorporated into the broodstock program and not just passed into the upper basin to jump start the population. What is the necessity of hatchery intervention by way of an integrated program? How will the integration of wild fish into the broodstock avoid mining the wild population when the wild population has a better spawning success rate in the wild than planted hatchery fish? (Berejikian and Ford, 2003). There should be a discussion of the status of the wild population embedded in the supplementation proposal. Furthermore, the H&S Plan should explain, in addition to the 12 year collection cycle, the number of wild adults the program will integrate as broodstock to overcome the genetic diversity and founder effect issues, and how those adults will be differentiated from the previous generations wild offspring to prevent a "grandfather" effect. Finally, we support the use of the live-spawning but would recommend that the ACC consider planting the live spawned broodstock in the upper watershed to improve nutrient enrichment that has been absent from the upper basin for so long. We find it hard to see the value in placing the live spawned broodstock in the lower river.	The definition of integrated may be confusing in this example. In reality, we are not proposing to implement a permanent late winter steelhead hatchery program. Instead, wild fish are "mined" from the Lower River, spawned and their offspring reared to smolt size. They are brought into the hatchery to increase the number of adults available for the reintroduction effort. By releasing 50,000 smolts we assume that at a minimum 1,000 adults will be produced (50,000 * .02 = 1,000). These 1,000 adult would then be transported and released as part of the adult supplementation program. The large number of adults released should increase the probability that fish are able to find mates, and spawn successfully in the upper basin. In contrast, releasing 50 adults upstream of the dams may result in a condition where fish are unable to find a mate and thus perish.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU14	We also disagree with the H&S Plan conclusion on pg. 15 that if the reintroduction efforts are found to be "unachievable" than an Integrated program would be appropriate to continue releases in the upper watershed. The logic simply doesn't follow. First, this statement all but admits that the segregated program to jumpstart this reintroduction effort is not sufficient. Second, it ignores the fact that there are naturalized fish in the lower watershed that can be transported into the upper watershed, and that there will be naturalized fish in the upper watershed already. How will removing those fish from the basin to start an integrated program that exposes the fish to the selection effects of the hatchery environment, only to place them back in the upper watershed, solve the problem? This suggestion simply perpetuates hatchery production in the face of failure of the priority objective. Further, the admission of failure contradicts the recovery plan goals of achieving high viability for the upper basin stocks in order to reach recovery. We believe that an integrated program should be used initially and that if the monitoring and evaluation indicates the program is not succeeding, then the ACC must take a hard look at the collective actions in the watershed to determine how recovery is achievable. There is simply nothing in the H&S Plan to suggest that switching from a Segregated to an Integrated program for reintroduction in the face of failure will actually change anything.	The decision to change the program would be made by the ACC. However, if we are unable to establish self-sustaining runs fish upstream of the dams, there would still be some fitness benefits to the hatchery population by constantly incorporating adults from the upper basin into the broodstock. We agree with the commenter that other actions (e.g. improving habitat conditions) may be a better response to so-called program failure. We simply provided one possible approach or path that could be taken at a key decision point. See Section 3 for more detail on the rationale to not integrate hatchery programs in year 1.
American Rivers and Trout Unlimited	ARTU15	We also disagree with the H&S Plan's sole emphasis on spring Chinook. Given the high extinction risk for Lower Columbia River coho, we believe the coho should be given equal priority and weight in recovery.	Agreed.
American Rivers and Trout Unlimited	ARTU16	The discussion of ocean recruit computation should be expanded to explore the plusses and minuses of each of the different methodologies, as well as the ease of differentiating between the hatchery and wild fish (not just Upper Lewis River supplemented fish) in the computation. Furthermore, the computation should explore how harvest is calculated. For example, there is currently a requirement by NMFS that Washington and Oregon recalculate the harvest impacts of the spring Chinook gill net fishery on the Lower Columbia River to determine if there are differential impacts in various rivers. That research is ongoing, which increases the uncertainty around the calculation of harvest impacts. At the very least, the different methodologies should explain what assumptions are being made. Finally, we believe that the different methodologies should all explicitly include jack counts. Jacks have been found to contribute to the spawning population, increase age structure and life history diversity such that they should be considered in ocean	The ACC agreed to eliminate jacks from the calculations. We have provide an appendix to the report that shows the calculations used for each method. The assumptions to be used for harvest rates, handling, dropped marks etc would be based on those used by the Co-managers.

Commenter	Comment Number	Comment	Response
		recruit methodologies.	
American Rivers and Trout Unlimited	ARTU17	The H&S Plan proposes juvenile supplementation in addition to adult supplementation in the upper watershed, but does not explain its rationale. The juvenile production requirements are provided in the SA §8.4.1, but only to the extent that they are consistent with recovery or that alternatives for better efficiency in production are unavailable. The H&S Plan should explain the recovery rationale and explore the alternatives.	we have added a section describing which elements of the plan are inconsistent with the Settlement Agreement. As you note, we believe the data support the use of adults to jump start a reintroduction effort. However, since this action (juvenile supplementation) is required, it is included in the plan.
American Rivers and Trout Unlimited	ARTU18	Until further explanation is given, we are very skeptical of the use of juveniles for supplementation. This skepticism is based in part on the Lower Columbia Recovery Plan when it states "main threats from hatchery released salmon are domestication of wild fish and ecological interactions between hatchery smolts and wild fall Chinook, chum, and coho in the lower river. The main threats from hatchery steelhead are potential domestication of the naturally-produced steelhead as a result of adult interactions or ecological interactions between natural juvenile salmon and hatchery released juvenile steelhead." (G-171). Increasing the hatchery juvenile supplementation will therefore increase the risk from hatcheries and move the watershed further from its recovery goals.	See previous response.
American Rivers and Trout Unlimited	ARTU19	In addition to the Recovery Plan, additional science reviews have also suggested that the hatchery juvenile releases are not conducive to a recovery strategy. According to NOAA Fisheries' own independent Recovery Science Review Panel (RSRP), "one of the major factors affecting the status of listed Pacific salmon is the potential negative effect that hatchery fish exert on populations of wild fish." (Meeting Notes Aug. 30-Sept. 1, 2004). The RSRP goes on to state that "despite recent improvements in the practices of some hatcheries... hatcheries will never produce salmonids with the same evolutionary potential as those spawned in the wild." Id. Thus, placing more hatchery raised juveniles into the Upper Basin will not reach the recovery requirements as quickly as placing adults that spawn naturally in the wild. This position was further supported in a recent modeling study by Oosterhaut et. al., 2005, which found that even the most favorable hatcheries did not result in recovery. This has been supported in other research as well (Fleming, et. al., 1994; Waples, et. al. 1994; Byrne, et. al., 1992; Hilborn, 1992; and Miller, et. al., 1990) which suggest that hatcheries do not provide the expected increase in wild stocks, when used as supplementation, and may result in replacement rather than enhancement of native stocks.	See previous response.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU20	Given the affirmative duty on the part of NOAA Fisheries, U.S. Fish and Wildlife Service, and FERC to show that the proposed activity supports recovery under the ESA and consequently the SA, we do not believe that the juvenile supplementation is warranted at this time. Furthermore, there are additional ecosystem benefits to focusing on adult, rather than juvenile, releases including the preparation of the spawning grounds, nutrient supplementation and the natural selection that will occur when those offspring emerge from the gravel.	See previous response.
American Rivers and Trout Unlimited	ARTU21	We generally support the use of adult supplementation for the reintroduction of species. However, the H&S Plan raises some questions regarding why the proposal calls for using segregated type hatchery origin adults instead of simply passing the "wild" Chinook, steelhead and coho in the lower river to the upper watershed. The goal of the program is to naturalize the hatchery stocks, yet the lower river has many "naturalized" stocks already that could easily be transported into the upper watershed without necessitating an additional stress and selection pressure of passing through the hatchery. Furthermore, these lower river naturalized stocks are further removed from the hatchery environment and more likely better adapted to the natural ecosystem.	We are of the opinion that mining lower river fish populations to seed the upper basin is a high risk action that should not be undertaken lightly. We have proposed to use steelhead in this manner as we believe these fish can be live-spawned and returned to the lower river. additionally, given the impacts hatchery fish have likely had on lower river fish populations we do not believe that the genetics of the lower river populations are any different than those found in the hatchery.
American Rivers and Trout Unlimited	ARTU22	We do support the supplementation strategy for a minimum of 12 years, and encourage its continuation through year 15 to ensure that the appropriate number of generations is captured in the monitoring and evaluation. We also support the use of jacks in the broodstock to capture the entire life history diversity in the upper watershed (Young, 1999; Van Doornik, 2001). All remaining jacks should be passed upstream and allowed to spawn naturally.	Agreed.
American Rivers and Trout Unlimited	ARTU23	We fully support the marking strategy in the H&S Plan and the differential marking strategy for different stocks. We therefore support a complete selective fishery on the Lewis River stocks, and would like to see further discussion of the harvest management and impacts discussed in the H&S Plan. The executive summary of the H&S Plan makes recommendations that we support but does not explain the basis for these recommendations, the harvest impacts, direct or incidental, on the wild, native stocks either in the lower river or ocean, or even the impacts of catch and release fishing. A discussion of this information is necessary to provide context to the recommendations as well as support the high continued hatchery production.	The WDFW and Tribes have jurisdiction for managing harvest in the basin (of course consistent with ESA). Based on comments received by the co-managers we have de-emphasized the harvest section of this plan.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU24	The H&S Plan should address the impacts of the stocking of resident fish on other resident species such as bull trout, cutthroat and lamprey. Furthermore, WDFW research in the Cowlitz River has indicated that some anadromous fish have passed into the reservoirs and become food sources for the stocked resident fish. The H&S Plan should discuss these other factors, in addition to the call for monitoring and evaluation on pg. 26.	As this action is required by the Settlement Agreement we have not proposed to estimate effects of the program on other resident fish populations. Even if we did proposes such an effort, the program has been on-going for many years so that at any impacts the program proposes to other species have already occurred. What may be of interest however, is to eliminate the program to see how resident fish populations respond. But this action is not consistent with the Settlement Agreement.
American Rivers and Trout Unlimited	ARTU25	The Monitoring and Evaluation Plan is comprehensive in the type of information collected, but does not detail the methods, or the mechanism for distinguishing these parameters for the hatchery and naturally produced fish. (We acknowledge that the metrics for evaluating the data will be developed by NMFS and USFWS at a later date). It is imperative that the information collected apply separately to the hatchery fish and wild fish. Furthermore, there should be a discussion of how this type of information will be rolled up to evaluate the impacts of the hatchery program on the natural populations and the overall success of the hatchery programs in meeting their stated goals. The relevant information should also explore the impacts on other native, resident fish to capture any inter-species impacts. There is the potential for large hatchery production to impact the bull trout and cutthroat trout in the system that should be monitored and evaluated. Finally, it is necessary to describe the monitoring and evaluation that will go into determining the success of the supplementation program for the purposes of meeting the 1:1 crediting ratio required for wild fish returning above the threshold. (SA, §8.3.2.3).	See Section 4.0 for the details added to the Monitoring Program. We have included more detail on the Credit Calculation etc.
American Rivers and Trout Unlimited	ARTU26	The Conservation Groups strongly recommend the development of an adaptive management plan. There failure to include an adaptive management plan undermines the very purpose of monitoring and evaluating the programs. We disagree that the SA clearly describes the approach and actions that must be taken. In fact, the SA clearly states that all of the actions are subject to the recovery goals of the system and the ESA. Failing to include an adaptive management plan in the H&S Plan in essence cements the actions in place regardless of the contribution or deviation from recovery goals and the ESA. To this end, we support the use of index stocks discussed in section 4.3.4 of the H&S Plan.	An AMP has been included in Section 5.

Commenter	Comment Number	Comment	Response
American Rivers and Trout Unlimited	ARTU27	The expected outcomes of the supplementation program are unacceptable. There is simply no justification for the failure of the supplementation and the continuation of the hatchery mitigation programs in spite of the failure. The inability of the program to not only meet the modeled targets from the EDT modeling, never mind the historical numbers which are magnitudes higher than the EDT modeling (Recovery Plan, G-131), indicates that the H&S Plan proposal falls short of what is needed. Based on the priority goal of recovery as well as the requirement under the ESA for the restoration of spring Chinook, coho and steelhead into the upper watershed, the H&S Plan must take a precautionary approach and strive to achieve more, not less.	Expected outcomes are based on the assumptions included in the Lewis River Fish Planning Document. As noted by the author of this report, there was a high risk that goals would not be achieved for some species. The analysis completed as part of the plan confirms this conclusion. However, the numbers reported are simply estimates of adult production by year 15. As such they do not include fish production from Merwin or Yale. it is too soon to say conclusively one war or the other as to whether goals would be achievable, the expected outcomes section is simply meant to point out that if all assumptions are realized, goals would not be met for some species by year 15.
American Rivers and Trout Unlimited	ARTU28	In addition the expected outcome details the potential for high numbers of hatchery surplus fish. We believe the H&S Plan should address these surplus fish in years 1-12 and not just in recommendations after year 12.	The H&S Plan uses surplus hatchery fish to seed the upper basin as part of the adult supplementation strategy.
American Rivers and Trout Unlimited	ARTU29	The H&S Plan makes a number of recommendations. First on pg. 9, it explores different options with respect to years 12-17 presuming that the reintroduction efforts into the upper Lewis River are successful. While we are generally supportive of these recommendations, we do not believe they should be included in the H&S Plan at this time because they raise more questions than they answer and are clearly based on hypothetical future scenarios with hypothetical data.	Most recommendations have been removed from the report.
American Rivers and Trout Unlimited	ARTU30	For example, we do not understand the recommendation that if the reintroduction fails, the hatchery programs should convert to an integrated program. If the reintroduction of segregated fish that have "naturalized" over 3-5 generations has not worked, how will an integrated program solve the problem by adding less fit fish into the upper basin? The second option is to convert to an integrated program if there is a catastrophic failure in the upper watershed. But isn't that the current situation? Why is this option only proposed starting in year 12? Relative to option 3, what is the justification for continuing the segregated program downstream if recovery has failed? First and foremost, we do not believe failure is an option under the Settlement Agreement, or federal law. The notion that in the face of failure we continue to achieve the second objective of harvest and hatchery	See Section 3 for more rationale on the use of Segregated and Integrated programs by the HSRG.

Commenter	Comment Number	Comment	Response
		production in the lower river seems to us to continue the very problems that have caused the listing of some of the wild, native fish in the first place. We do not believe this is an appropriate course of action.	
American Rivers and Trout Unlimited	ARTU31	The H&S Plan also makes recommendations in Section 7. We support these recommendations in principle, but believe there should be more discussion of the recommendations and how they contribute to recovery.	At the direction of the ACC we have removed these recommendations.
American Rivers and Trout Unlimited	ARTU32	We generally support the H&S Plan but believe there could be significant improvements in the discussions and supporting information in the final H&S Plan. There are other components of the H&S Plan which we believed should be changed. Thank you for your consideration of these comments.	Thank you for your comments. The H&S Plan will continue to be refined over time. The next version is being sent to the services for review and consistency with their mandates. The H&S Plan will be updated further based on the Services and ACC input.