

# **Lookingglass Creek Salmonid Evaluation Studies**

## **Lower Snake River Compensation Plan**

### **Statement of Work for F14AC00013 October 1, 2014 through September 30, 2015**

Prepared by

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## Overview and Background

Dwindling numbers of spring Chinook salmon were seen throughout the Snake River and Grande Ronde basins in the 60's and 70's in part as a result of construction of hydroelectric facilities, overfishing, and loss of critical habitat. The native Lookingglass Creek stock of spring Chinook salmon was extirpated within a few years after establishment of Lookingglass Hatchery (LH) in 1982. Prior to LH being built, Lookingglass Creek had the second highest number of redds in the Grande Ronde River Basin. The start-up of LH represented the beginning of large-scale hatchery intervention in the Grande Ronde River Basin, with the exceptions of the Wenaha and Minam rivers that remain wild fish only. CTUIR, along with comanagers, began efforts in the early 1990s to reestablish natural production of spring Chinook salmon in Lookingglass Creek. Several stocks, including remnants of the endemic stock, Imnaha River, Wind River (Washington), Carson Hatchery (Washington), and Rapid River (Idaho) were used before comanagers selected Rapid River. The Rapid River stock was replaced with Catherine Creek stock (native to the Grande Ronde River Basin) beginning in 2001. Lookingglass Creek is within the "usual and accustomed" areas of gathering for the Confederated Tribes of the Umatilla Indians (CTUIR). The present management goal is to reintroduce spring Chinook salmon into Lookingglass Creek using Catherine Creek captive brood stock to support natural population restoration, tributary harvest, and maintain genetic diversity of a gene bank for the Catherine Creek stock.

Lookingglass Creek provides a unique study opportunity to observe and evaluate natural production from an endemic stock vs two different supplementation treatments. The reference condition (endemic stock) and two treatments in this unplanned experiment occur in the same stream over different time periods. The study takes place in a stream within a relatively healthy watershed with much less effect from human activities (e.g. grazing, water withdrawals, mining, and logging) that are common to other streams in the Basin. The Lookingglass Hatchery weir affords near complete control over fish that move upstream to spawn. In addition to this project on Lookingglass Creek, other supplementation projects in the Grande Ronde River Basin using local stocks include the Upper Grande Ronde River, the Lostine River, and Catherine Creek.

Burck (1993) studied the endemic stock (control) from late 1963 through late 1974 (Study Era 1). Metrics from juvenile and adult life history and production were reported. Rapid River stock (supplementation treatment 1) were used in a reintroduction effort from 1992-2000 (Study Era 2). The Rapid River stock was used in several streams in the Basin. Metrics similar to Burck (1993) were contained in annual reports that can be accessed at <http://www.fws.gov/lsnakecomplan/Reports/CTUIRreports.html>. Catherine Creek captive broodstock progeny (supplementation treatment 2) have been used since 2001 (Study Era 3).

The Rapid River stock was replaced with Catherine Creek stock because Catherine Creek stock was within-basin (local), had life history characteristics similar to the extirpated endemic stock, and surplus was available. Catherine Creek captive broodstock were collected as parr, hatchery-reared until maturity, and spawned. Those progeny were hatchery-reared, marked, and released in Lookingglass Creek as presmolts beginning in September 2001. Subsequent releases have usually been in the spring as smolts. Captive broodstock adults returning to Catherine Creek were released above the Lookingglass

Hatchery weir in 2004-2007. The first natural-origin returns of production above the Lookingglass Hatchery weir occurred as age 3 in 2007, age 4 in 2008, and age 5 in 2009.

CTUIR Management Objectives are to:

- 1) reestablish a naturally-reproducing, self-sustaining population of spring Chinook salmon in Lookingglass Creek of an average annual run size of 500 adults (ages 4 and 5) using Catherine Creek captive broodstock as the donor stock,
- 2) provide for a minimum annual tribal harvest of 100 returning adults,
- 3) retain production and life history characteristics similar to the natural Catherine Creek stock,

The preceding goals and objectives are consistent with the overall mission statement of the CTUIR Department of Natural Resources:

“To protect, restore, and enhance the First Foods; water, salmon, deer, cous, and huckleberry - for the perpetual cultural, economic, and sovereign benefit of the CTUIR. We will accomplish this utilizing traditional ecological and cultural knowledge and science to inform: 1) population and habitat management goals and actions; and 2) natural resource policies and regulatory mechanisms.”

Tribal goals fit within the framework of goals established for spring Chinook salmon and summer steelhead within the Lower Snake River Compensation Plan for spring Chinook salmon. These are to 1) establish adequate broodstock to meet annual production needs, 2) restore and maintain natural spawning populations, 3) reestablish historic tribal and recreational fisheries, 4) establish annual returns of 5,820 (spring Chinook salmon) and 9,184 (summer steelhead) adults, 5) maintain endemic wild populations of spring Chinook salmon in the Minam and Wenaha rivers, and 6) minimize impacts of hatchery programs on resident stocks of game fish. Annual reports describing the historical efforts at reestablishing natural production of spring Chinook salmon in Lookingglass Creek are available at <http://www.fws.gov/lsnakecomplan/Reports/CTUIRreports.html>

## **Study Area**

The Lookingglass Creek watershed is in the Blue Mountains of northeast Oregon with the headwaters at an elevation of 1,484 m above sea level (Figure 1). Flow is to the southeast for 25 river km (rkm) through the Umatilla National Forest and through private land before entering the Grande Ronde River at rkm 137, at an elevation of 718 m above sea level. Lookingglass Creek has one major (Little Lookingglass Creek) and four minor (Lost Creek, Summer Creek, Eagle Creek, and Jarboe Creek) tributaries. Nearly all spring Chinook salmon spawning occurs in Lookingglass Creek and Little Lookingglass Creek. Lookingglass Hatchery is located at approximately rkm 4.0 on Lookingglass Creek. Access to private lands to conduct work is obtained by verbal agreement, or in the case of Hancock Properties LLC lands, an annual written agreement and fee.



Figure 1. Map of Lookingglass Creek watershed.

### Monitoring and Evaluation Objectives and Tasks

The purpose of monitoring and evaluation objectives is to determine success in meeting the previously described management goals. The CTUIR shall furnish all supervision, labor, services, materials, tools, and equipment necessary to conduct an evaluation of LSRCP programs in their ceded and usual and accustomed areas to fulfill the objectives outlined below:

#### **Objective 1. Describe life history of juvenile spring Chinook salmon in Lookingglass Creek in order to evaluate supplementation success.**

Approach: Outmigrating brood year 2013 natural-origin (unmarked) juvenile spring Chinook salmon above the Lookingglass Hatchery weir will be progeny of either F<sub>1</sub> (marked) or F<sub>2</sub> (unmarked) Catherine Creek captive broodstock. We will sample outmigrating natural-origin juvenile spring Chinook salmon in order to describe life history and production characteristics by snorkel/seining and operating a rotary screw trap about 0.2 km below the adult weir and trap near the Lookingglass Hatchery (LH) water intake at rkm 4.1.

We will snorkel/seine to collect 50 parr from several standard sites to describe seasonal growth and condition. Parr will be collected on the 20<sup>th</sup> (+/- 5 d) of June, July, August and September, anesthetized, measured (FL mm), and weighed (0.1 g). Additional sampling at the standard site (Green Cabin) and possibly Vern and Linda's may be done to better describe seasonal growth. Scale samples and genetics samples will be taken from any precocial parr collected.

From 500-1,000 BY 2013 parr will be snorkel/seined from the major nursery area several km above the LH weir, anesthetized, PIT-tagged and released where captured during the first week in August 2014. Standard data (FL, mm) weight, 0.1 g) will also be collected from these fish. Precocials will be measured and weighed and scale samples taken but not PIT-tagged.

### **Rotary screw trap sampling**

Outmigrant production will be estimated for the adults liberated to spawn above the Lookingglass Hatchery weir in 2013. Outmigrants collected in the rotary screw trap will be enumerated, measured (FL, mm) and weighed (0.1 g). Unmarked fish from 40-60 mm FL will receive partial fin clips (lower caudal) and unmarked fish  $\geq 61$  mm will receive PIT tags (TX1411SST). Marked fish will be released above the screw trap to estimate trap efficiency, total outmigrants, and outmigration timing. PIT tags used for outmigrants collected in the screw trap will be provided by the CSS project (Jack Tuomikoski, personal communication). Outmigrant abundance will be estimated for each month of the migration year using DARR 2.0 for R (Bjorkstedt 2005). Observations at sites in the Columbia/Snake River hydrosystem will be used to estimate survival probabilities and arrival timing to Lower Granite Dam for two seasonal groups (winter and spring). The winter group consists of presmolts leaving Lookingglass Creek from July-December and the spring group of smolts leaving from January-June. Goals will be to tag 600 in each of the winter and spring groups.

### ***Analysis***

Estimates of survival and migration timing for parr PIT-tagged in early August 2014 and outmigrants PIT-tagged and released at the screw trap during July 2014-June 2015 will be made using PitPro (Westhagen and Skalski 2009) or SURPH (Lady et al. 2013) and the PTAGIS database maintained by the Pacific States Marine Fisheries Commission. Estimates of smolt equivalents will be obtained for the winter (July-December) and spring groups (January-June) of migration year 2015 by adjusting the seasonal outmigrant estimates by the survival probability to Lower Granite Dam for that period. Smolt equivalents will be used to estimate the smolt-to-adult ratio for brood year 2013 (migration year 2015). Precocials collected in the screw trap will be measured, weighed, scale samples collected and opercle-punched to distinguish recaptures and provide genetics tissues. Precocials will not be used in population estimates of outmigrants.

Estimates of outmigrant abundance, outmigration timing, growth, and condition will be compared to the extirpated endemic stock as well as the previous hatchery reintroduction effort (Rapid River). Estimates of outmigrant abundance, outmigration timing, growth, condition, and survival and arrival timing to Lower Granite Dam will be compared to other Grande Ronde Basin stocks and any hatchery releases into Lookingglass Creek in 2014.

We will synthesize juvenile life history and production data from Lookingglass Creek spring Chinook salmon with data from other streams in the Grande Ronde and Columbia

River basins. We will compare juvenile metrics to 1) determine whether we have been successful in meeting management goals, and 2) place performance of the current reintroduced stock in historical, local, and regional contexts, including the 3 stock comparison (extirpated endemic, Rapid River reintroduction, current reintroduction).

Task 1.1. Check the rotary screw trap every 2-3 days or more frequently if needed and enumerate, examine for marks, and interrogate for PIT tags all juveniles collected.

***Completed***

Task 1.2. Mark (PIT-tag and/or fin clip) and release 25-50 fish per week for estimating trapping efficiency.

***Completed***

Task 1.3. Collect FL and weight data from a representative sample of at least 25 outmigrants per week.

***Completed***

Task 1.4. PIT-tag and release at least 600 fish collected in the screw trap for each season of the migration year (winter, spring).

***Completed*** – 196 tagged in spring, and 885 in fall.

Task 1.5. PIT-tag and release approximately 500-1,000 spring Chinook salmon parr captured by snorkel seining from several locations in the primary nursery area above the Lookingglass Hatchery weir.

***Completed*** – 1,000 fish tagged.

Task 1.6. Tabulate numbers of parr (non-precocial and precocial) at the various sites during completion of Task 1.5.

***Completed***

Task 1.7. Collect and sample (FL (mm) and weight (0.1 g) 50 parr per month at established sites above and below the hatchery weir.

***Completed***

Task 1.8. Describe migration timing out of Lookingglass Creek and migration timing and survival to Lower Granite for fish PIT-tagged after capture at the screw trap or from field group (Tasks 1.2 and 1.5).

***Completed***

Task 1.9. Validate and upload all PIT tag data to the PTAGIS database.

***Completed***

Task 1.10. Collect life history data on precocial, natural-origin fish caught during summer parr PIT-tagging and screw trap operations (FL (mm), weight (0.1 g), genetics tissues, scales).

***Completed*** - Genetic samples of precocial captured were passed to CRITFC for inclusion

*in parentage analysis.*

Task 1.11. Mount, press and read any scales collected from juvenile spring Chinook salmon.

***Partial Completion*** – *small samples of scales taken from larger outmigration fish. Samples not yet read (as of December 2015).*

Task 1.12. Collect water temperature data using recording thermometers in Little Lookingglass Creek and at the screw trap.

***Completed***

Task 1.13. Perform quality control on all data collected and enter into databases developed to make data web-accessible.

***Partial Completion*** – *not all data has been uploaded to Tribes CDMS. Task is in progress and has some backlog of data to be uploaded.*

Task 1.14. Compare life history metrics (outmigrant abundance, outmigration timing, size, condition factor, and survival and arrival timing to Lower Granite Dam) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks.

***In progress*** – *Analysis will be reported in Annual Progress Report – March 2015*

Task 1.15. Compare productivity metrics (smolts/redd, smolt-to-adult ratios) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks.

***In progress*** – *Analysis will be reported in Annual Progress Report – March 2015*

## **Objective 2. Describe life history and production of adult spring Chinook salmon in Lookingglass Creek in order to evaluate supplementation success.**

Approach: Catherine Creek stock spring Chinook salmon (captive broodstock) were selected by comanagers as the donor stock to reintroduce the species into Lookingglass Creek. The initial liberation of Catherine Creek captive broodstock occurred as ad-clipped presmolts released into Lookingglass Creek in September 2001. Since that time, additional liberations of ad-clipped donor stock juveniles have occurred as they were available. Releases of returning donor stock adults above the Lookingglass Hatchery weir to spawn naturally have occurred beginning in 2004. Additionally, some returning adults have been spawned at Lookingglass Hatchery and their progeny liberated into Lookingglass Creek as ad-clipped juveniles.

Adults returning in 2015 will include ad-clipped hatchery-origin and unmarked progeny

of ad-clipped adults that returned to Lookingglass Creek and spawned naturally. Ad-clipped returns used as hatchery broodstock means that two successive generations of captive broodstock will be cycled through the hatchery, a practice not allowed for the other three streams in the Grande Ronde basin (Lostine River, Catherine Creek, and the upper Grande Ronde River) due to the high potential for negative consequences. As time progresses, there will be substantial numbers of unmarked and marked returns, and the program will become more clearly a supplementation program.

Adult returns below the Lookingglass Hatchery weir will probably be dominated by the donor stock or their progeny, but will also include some strays (hatchery- and natural-origin) from other streams.

CTUIR will obtain adult life history data and tissues from returning adults collected at the Lookingglass Hatchery weir and trap, barrier weir, and on spawning ground surveys (or Catherine Creek returns, if they are to be used for spawning or release above the Lookingglass Hatchery weir). ODFW Lookingglass Hatchery staff installs and operates the Lookingglass Hatchery weir and trap and collect data and tissues from returning adult spring Chinook salmon. CTUIR and ODFW staff will collect data and tissues from fish destined for release above the Lookingglass Hatchery weir before release. Data and tissues will include FL (mm), sex, marks/tags, scales (for age determination), and opercle punches (for estimating the population spawning above the hatchery weir and relative reproductive success study). We will obtain information on adults from the coded wire tag and PIT tag databases maintained by the Pacific States Marine Fisheries Commission and other sources. If harvest is permitted, data for tribal fishers will be collected by CTUIR and NPT harvest biologists and for sport fishers by ODFW.

Some returning adults collected in the adult trap at Lookingglass Creek will be released above the Lookingglass Hatchery weir to spawn naturally in 2015. If returns to Lookingglass Creek are inadequate to meet natural and hatchery production goals, some returning adults captured at the Catherine Creek adult trap may also be released into Lookingglass Creek. The precise number of fish and their origin depends on the number of adults returning to Lookingglass Creek and Catherine Creek and application of the sliding scale used for broodstock management. Some fish may be kept and held at Lookingglass Hatchery for use as conventional broodstock and their progeny later released in Lookingglass Creek. Until an effective water treatment facility is in operation for all life stages of spring Chinook salmon reared at Lookingglass Hatchery, CTUIR will recover carcasses by frequent wading surveys. A barrier weir will also be constructed and maintained by ODFW staff about 0.6 km above the hatchery weir in order to keep carcasses from accumulating near the hatchery water intake.

We will synthesize adult life history and production data from Lookingglass Creek spring Chinook salmon with data from other streams in the Grande Ronde and Columbia River basins. We will compare adult metrics to 1) determine whether we have been successful in meeting management goals, and 2) place performance of the current reintroduced stock in historical, local, and regional contexts, including the 3 stock comparison (extirpated endemic, Rapid River reintroduction, current reintroduction).

Task 2.1. Obtain data and tissues (FL, sex, marks/tags, scales, genetics samples) from Lookingglass Hatchery staff for all spring Chinook salmon collected at the adult trap that are released above the Lookingglass Hatchery weir to spawn naturally in 2015.

**Completed**

Task 2.2. Conduct spawning ground surveys throughout the stream once a week for 3 consecutive weeks in late August and early September 2015, enumerating redds and logging locations with GPS and collecting carcass data and tissues.

**Completed** – 15 days of survey conducted.

Task 2.3. Mount, press and age scales collected from natural-returns.

**In Progress** – approximately 44 Chinook scales taken (plus 354 adult steelhead scales). Results will be presented in 2015 Annual Report.

Task 2.4. Link carcass data and snouts and provide data and snouts to ODFW for transfer to the ODFW CWT lab in Clackamas.

**Completed**

Task 2.5. Obtain CWT ages from the RMIS database.

**Not Completed** – Awaiting tag data back from RMIS

Task 2.6. Estimate total redds, redd distribution, fish/redd, sex ratio, age composition, run timing, spawn timing, total escapement, and length frequency of adults, and progeny-per-parent ratios for natural-origin spawners above the Lookingglass Hatchery weir.

**Completed**

Task 2.7. Enumerate redds and describe carcass characteristics for spawners below the Lookingglass Hatchery weir.

**Completed**

Task 2.8. Describe hatchery-origin strays recovered on spawning ground surveys above and below the Lookingglass Hatchery weir.

**Not Completed** – No tag data on RMIS – Results will be included in Annual Report (March 2015).

Task 2.9. Perform quality control on all data collected and enter into databases developed to make data web-accessible.

**Partially Complete** - some data has not been posted to the CTUIR website.

Task 2.10. Compare adult life history metrics (run and spawn timing, redd distribution, sex ratio, age composition, length-at-age, prespawning mortality) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks.

*In Progress – Results will be reported in Annual Report 2015*

Task 2.11. Compare adult productivity (progeny-per-parent) within the three stock scenario of Lookingglass Creek (extirpated endemic, Rapid River reintroduction, and current reintroduction (Catherine Creek captive brood) stocks), current hatchery-origin releases into Lookingglass Creek, and natural-progeny of other Grande Ronde Basin stocks.

*In Progress – Results will be reported in Annual Report 2015*

**Objective 3. Determine if there are negative artificial propagation effects of utilizing Catherine Creek stock F<sub>1</sub> generation captive broodstock returns as broodstock in Lookingglass Creek.**

*In Progress – Results will be reported in Annual Report 2015*

Task 3.1. Compare life history, survival and production metrics of Catherine Creek stock F<sub>1</sub> generation conventional broodstock (derived from conventional and wild crosses) versus Catherine Creek stock F<sub>1</sub> generation captive broodstock that are used for conventional broodstock in Lookingglass Creek.

*In Progress – Results will be reported in Annual Report 2015*

Task 3.2. Compare life history, survival and production metrics of Catherine Creek stock F<sub>1</sub> generation captive broodstock returns utilized to spawn in the wild (Catherine Creek program or adult outplants to Lookingglass Creek) versus F<sub>2</sub> generation which are utilized to spawn in the wild (Lookingglass program utilizes F<sub>1</sub> captive broodstock returns as broodstock then F<sub>2</sub> returns spawn in the wild).

*In Progress – Results will be reported in Annual Report 2015*

**Objective 4. Assist comanagers and cooperators in completing LSRCP-related project tasks as time and budget allow.**

Approach: Various tasks of this and related projects are completed more efficiently and effectively by working collaboratively with comanagers and cooperators. As time and budget allow, CTUIR will continue to provide staff and equipment assistance to comanagers and cooperators.

Task 4.1. Assist ODFW in completing spring Chinook salmon spawning ground surveys in the Grande Ronde Basin.

***Completed***

Task 4.2. Assist ODFW in collecting data and tissues during spawning of spring Chinook salmon broodstock at Lookingglass Hatchery.

***Completed***

Task 4.3. Assist ODFW in pretransfer sampling of juvenile spring Chinook salmon

reared at Lookingglass Hatchery and destined for release from Catherine Creek or Upper Grande Ronde River acclimation facilities or from Lookingglass Hatchery into Lookingglass Creek.

***Completed***

Task 4.4. Assist ODFW in other LSRCP-related activities when CTUIR staff and equipment are available.

***Completed***

### **Objective 5. Synthesize and disseminate project information.**

Approach: Project information will be disseminated through annual reports, peer-reviewed publications and presentations, website(s), and informal consultations and correspondence. Authorizations for take of ESA-listed fish will be obtained (bull trout through comprehensive CTUIR permit from USFWS and spring Chinook salmon and summer steelhead through Lookingglass Creek HGMP process) and data reported.

Task 5.1. Submit Performance Report for the 2014-2015 contract with objectives, tasks, and completion status by 31 December 2015.

***Completed***

Task 5.2. Submit a draft annual report for the 2013-2014 contract to reviewers by 31 August 2015.

***Completed***

Task 5.3. Make project information and reports available over the Internet.

***Partially Complete - some data has not been posted to the CTUIR website.***

Task 5.4. Consult with other professionals to improve project efficiency and work products.

***Completed***

Task 5.5. Complete final project funding proposal, statement of work and budget for the 2015-2016 contract year by 1 September 2015.

***Completed***

Task 5.6. Report bull trout take to Joe Krakker, USFWS as requested.

***Not Completed – Will be submitted by December 31<sup>st</sup>.***

Task 5.7. Report take of spring Chinook salmon and summer steelhead in annual report.

***Will be included in 2015 Annual Report.***

## Task Schedule

Task	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1.1	X	X	X	X	X	X	X	X	X	X	X	X
1.2	X	X	X	X	X	X	X	X	X	X	X	X
1.3	X	X	X	X	X	X	X	X	X	X	X	X
1.4	X	X	X	X	X	X	X	X	X	X	X	X
1.5											X	
1.6											X	
1.7									X	X	X	X
1.8	X	X	X	X	X	X	X	X	X	X	X	X
1.9	X	X	X	X	X	X	X	X	X	X	X	X
1.10	X	X	X	X	X	X	X	X	X	X	X	X
1.11	X	X	X	X	X	X	X	X	X	X	X	X
1.12	X							X	X	X	X	X
1.13	X	X	X	X	X	X	X	X	X	X	X	X
1.14	X	X	X	X	X	X	X	X	X	X	X	X
1.15	X	X	X	X	X	X	X	X	X	X	X	X
2.1								X	X	X	X	X
2.2											X	X
2.3	X	X	X									X
2.4	X	X	X									X
2.5	X	X	X									
2.6	X	X	X	X	X	X	X	X	X	X	X	X
2.7	X	X	X	X	X	X	X	X	X	X	X	X
2.8	X	X	X	X	X	X	X	X	X	X	X	X
2.9	X	X	X	X	X	X	X	X	X	X	X	X
2.10	X	X	X	X	X	X	X	X	X	X	X	X
2.11	X	X	X	X	X	X	X	X	X	X	X	X
3.1	X	X	X	X	X	X	X	X	X	X	X	X
3.2	X	X	X	X	X	X	X	X	X	X	X	X
4.1											X	X
4.2											X	X
4.3					X							
4.4	X	X	X	X	X	X	X	X	X	X	X	X
5.1	X	X	X									
5.2	X	X	X	X	X	X	X	X	X	X	X	
5.3	X	X	X	X	X	X	X	X	X	X	X	X
5.4	X	X	X	X	X	X	X	X	X	X	X	X
5.5	X	X	X	X	X	X	X	X	X	X	X	X
5.6	X	X	X	X	X	X	X	X	X	X	X	X
5.7	X	X	X	X	X	X	X	X	X	X	X	X

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Appendix. Lookingglass Creek Management Guidelines (adapted from draft 2013 LSRCP Annual Operations Plan).

The goal of the Lookingglass Creek spring Chinook hatchery program is to reintroduce spring Chinook into Lookingglass Creek using Catherine Creek stock to support tributary harvest, natural population restoration, and maintenance of a gene bank for the Catherine Creek stock.

Current production targets for Catherine Creek and Lookingglass production, per the *2008-2017 United States v. Oregon* Management Agreement are outlined in Table 1.

Table 1. Lookingglass Creek and Catherine Creek production outlined in Table B1 of the 2008-2017 United States v. Oregon Management Agreement.

<b>Release Site</b>	<b>Rearing Facility</b>	<b>Stock</b>	<b>Life Stage</b>	<b>Target Release Number</b>	<b>Primary Program Purpose</b>	<b>Funding</b>
LGC	LGC/Capt Br	CC	Smolt	250,000	Fishery/Reintro	LSRCP/BPA
CC	LGC/Capt Br	CC	Smolt	150,000	Suppl/ Fishery	LSRCP/BPA

LGC=Lookingglass Creek

CC=Catherine Creek

All Lookingglass Creek adults arriving at the Lookingglass Hatchery intake weir prior to July 4 will be ponded into the adult holding ponds. Disposition of these adults will occur in early July according to the guidelines in Table 2, and adults designated to be passed upstream will be outplanted at that time. Disposition of Lookingglass Creek adults arriving after July 4 will be based on the percentages outlined in Table 2. All adults passed upstream will have genetic samples taken.

Table 2. Disposition of Lookingglass Creek adult spring Chinook salmon arriving at the Lookingglass Hatchery intake weir.

<b>Escapement Level</b>	<b>% Pass Above</b>	<b>% Keep for Brood</b>
150	67	33
200	60	40
250	55	45
300*	50	50

\*if greater than 300, adjustments will be made based on brood needs. If brood need has been met, remainder to be released upstream.

An estimated 158 adults (47 natural origin and 111 hatchery origin) required to meet 250,000 smolt production level. Broodstock for the program will be collected from returns to either the Lookingglass Hatchery weir or the Catherine Creek weir. Either conventional or captive hatchery adults may be used for brood. The goal for broodstock composition will be to incorporate 30% natural origin adults, with no more than 25% of the returning natural origin Chinook retained for brood. If a shortage of natural origin adults occurs, then additional hatchery adults will be collected to meet the brood target.