



**SNAKE RIVER SOCKEYE SALMON  
CAPTIVE PROPAGATION:  
EXPANSION SITE SELECTION**

**BPA PROGRESS REPORT  
September 1, 2007—March 31, 2011**



Prepared by:

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**IDFG Report Number 11-16  
May 2011**

**Snake River Sockeye Salmon  
Captive Propagation:  
Expansion Site Selection**

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**Contract Completion Report**

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## EXECUTIVE SUMMARY

On November 20, 1991, the National Marine Fisheries Service listed Snake River sockeye salmon *Oncorhynchus nerka* as endangered under the Endangered Species Act of 1973. In 1991, the Idaho Department of Fish and Game, the Shoshone-Bannock Tribes, and the National Marine Fisheries Service initiated efforts to conserve and rebuild populations in Idaho.

Initial steps to recover sockeye salmon included the establishment of a captive broodstock program at the Idaho Department of Fish and Game Eagle Fish Hatchery. Sockeye salmon broodstock and culture responsibilities are shared with the National Oceanic and Atmospheric Administration at two locations adjacent to Puget Sound in Washington State.

Rearing facilities for juvenile fish were not identified in the original scope of this project. The project has borrowed rearing space at two different facilities during the past five years and has demonstrated that a sockeye smolt rearing program would benefit the project's long-term goals for recovery. This contract was initiated to identify available water and facilities in Idaho to produce up to 1,000,000 sockeye smolts annually.

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## INTRODUCTION

Numbers of Snake River sockeye salmon *Oncorhynchus nerka* have declined dramatically in recent years. In Idaho, only the lakes of the upper Salmon River (Sawtooth Valley) remain as potential sources of production. Historically, five Sawtooth Valley lakes (Redfish, Alturas, Pettit, Stanley, and Yellowbelly) supported sockeye salmon (Bjornn et al. 1968; Chapman et al. 1990). Currently, only Redfish Lake receives a remnant anadromous run.

On April 2, 1990, the National Oceanic and Atmospheric Administration Fisheries Service (NOAA—formerly National Marine Fisheries Service) received a petition from the Shoshone-Bannock Tribes (SBT) to list Snake River sockeye salmon as endangered under the United States Endangered Species Act (ESA) of 1973. On November 20, 1991, NOAA declared Snake River sockeye salmon endangered.

In 1991, the SBT, along with the Idaho Department of Fish and Game (IDFG), initiated the Snake River Sockeye Salmon Sawtooth Valley Project (Sawtooth Valley Project) with funding from the Bonneville Power Administration (BPA). The goal of this program is to conserve genetic resources and to rebuild Snake River sockeye salmon populations in Idaho. Coordination of this effort is carried out under the guidance of the Stanley Basin Sockeye Technical Oversight Committee (SBSTOC), a team of biologists representing the agencies involved in the recovery and management of Snake River sockeye salmon. National Oceanic and Atmospheric Administration Fisheries Service ESA Permit Nos. 1120, 1124, and 1481 authorize IDFG to conduct scientific research on listed Snake River sockeye salmon.

This contract was initiated to address the Biological Opinion (BiOp) proposed action to identify a sockeye smolt rearing facility capable of rearing between 500,000 and 1,000,000 smolts annually. Two rearing facilities currently provide space to rear up to 200,000 sockeye smolts annually (Sawtooth Fish Hatchery and Oxbow Fish Hatchery).

## PROGRAM GOALS

The immediate goal of the program is to identify a facility and associated water rights capable of rearing between 500,000 and 1,000,000 sockeye smolts annually. This would eliminate the need to rear smolts at Sawtooth Fish Hatchery and Oxbow Fish Hatchery.

### Objectives and Tasks

1. Develop facility evaluation criteria for ranking potential facilities.
2. Identify real properties capable of meeting program goals.
3. Provide a prioritized list to BPA for review and approval.
4. Appraisal of real property.
5. Identify NEPA concerns.

## **CURRENT SMOLT REARING FACILITIES**

### **Sawtooth Fish Hatchery**

Sawtooth Fish Hatchery (Sawtooth FH) was completed in 1985 as part of the U.S. Fish and Wildlife Service Lower Snake River Compensation Plan and is located on the Salmon River, 3.5 km upstream from the confluence of Redfish Lake Creek. Sawtooth FH personnel and facilities have been utilized continuously since 1991 for various aspects of the sockeye captive broodstock program, including 1) prespawn anadromous adult holding, 2) egg incubation, and 3) juvenile rearing for presmolt and smolt releases. In addition, hatchery personnel assist with many field activities, including 1) net pen fish rearing, 2) fish trapping and handling, and 3) fish transportation and release.

Eyed eggs, received at Sawtooth FH from Eagle FH or NOAA, are incubated in vertical-stack incubators. Fry are ponded into fiberglass troughs, juveniles are transferred to concrete vats, and overwinter smolts are reared in 200-foot raceways. Typically, juvenile sockeye salmon reared at Sawtooth FH are released as presmolts or smolts. Prespawn anadromous adults captured at Redfish Lake Creek or Sawtooth FH weirs are transferred from the trap directly onto fish transport tanks and transferred to Eagle FH. Sockeye may be temporarily held (two days maximum) in adult holding facilities at Redfish Lake Creek prior to transfer to the Eagle FH.

Generally, well water supplies water flow for incubation, rearing, and holding. Well water temperature varies by time of year from approximately 4.0°C minimum in March and April to 10.0°C maximum in September and October. When sockeye salmon are held for smolt releases, they may be moved to outside raceways that receive water from the Salmon River. Salmon River water temperature varies by time of year from approximately 2.0°C in January and February to 20.0°C in August and September. Backup and redundancy water systems are in place. Rearing protocols are established cooperatively between IDFG personnel and reviewed at the SBSTOC level.

### **Oxbow Fish Hatchery**

The Oregon Department of Fish and Wildlife's (ODFW) Oxbow Fish Hatchery (Oxbow FH) was originally constructed in 1913 and was operated as a state-funded hatchery until 1952. In 1952, the facility was modified and expanded using funding from the Mitchell Act, a Columbia River Fisheries Development Program set up to enhance declining fish runs in the Columbia River Basin. Oxbow FH receives 7.2°C water through gravity flow from Oxbow Springs. Flow rate is highly variable depending on the time of year with the lowest flows reaching 1,135.5 liters per minute (300 GPM) in the summer and fall. Water rights for Oxbow FH are 3.30 cubic meters per second (116.51 cfs). Calendar year 2009 represents the sixth year that Oxbow FH personnel and facilities have been utilized for sockeye smolt rearing with the captive broodstock program.

Eyed eggs, received at Oxbow FH from Eagle FH or NOAA, are incubated in vertical-stack incubators. Fry are ponded to fiberglass troughs. Juvenile sockeye (>1 g) are held in larger fiberglass troughs (4.53 cubic meters). Sockeye salmon are transferred to outside raceways (133 cubic meters) for final rearing to the smolt stage. Juvenile sockeye salmon reared at Oxbow FH are transferred back to Idaho and released as smolts into Redfish Lake Creek and the Salmon River. Rearing protocols are established cooperatively between IDFG and ODFW personnel and reviewed at the SBSTOC level.

## SMOLT PROGRAM EXPANSION

### Facility Justification

Bonneville Power Administration funded the initiation of the process to identify and scope the availability, value, and suitability of property dedicated to the rearing of Snake River sockeye salmon (Project No. 2007-402-00; Contract 35436). The acquisition of a suitable property is critical to satisfy specific language contained in the current National Oceanic & Atmospheric Administration Fisheries (NOAA) Remand Draft Biological Opinion (BiOp) dated October 30, 2007:

*Section 8.4.5.1.5 – Effects of the Hatchery Proposed Actions: Fund expansion of the safety-net program to increase smolt releases to between 500,000 and 1 million fish; Expanding the numbers of smolts released is the program’s next step toward meeting the goal of amplifying the wild population.*

Currently, insufficient incubation and juvenile rearing space is available to meet the project’s long-term goal of species recovery. Juvenile sockeye salmon are reared at the IDFG Sawtooth Fish Hatchery (a Lower Snake River Compensation Plan facility) and at the Oregon Department of Fish and Wildlife’s Oxbow Fish Hatchery (a Mitchell Act facility). As both facilities are focused on higher priority mitigation mandates, limited rearing space is available for sockeye salmon. As such, the Department is currently pursuing the acquisition of suitable hatchery space to meet this objective. Consistent with the Federal Columbia River Power System (FCRPS) Biological Opinion and the Idaho Fish Accord, the new Idaho facility would have the capacity to produce between 500,000 and 1 million full-term smolts annually for release to locations in the Sawtooth Valley. Focusing on a smolt release strategy maximizes the potential to return anadromous adults.

### Facility Evaluation

Consistent with FCRPS BiOp language and regional recommendations (Idaho Fish Accords, NOAA Fisheries Draft Recovery Plan), IDFG staff, aided by BPA representatives, devoted due diligence to the process of site selection and evaluated three potential locations as candidates for a smolt production program:

- OPTION 1: Lost River Trout Hatchery – Mackay, Idaho
- OPTION 2: Springfield Fish Hatchery – Springfield, Idaho
- OPTION 3: Crystal Springs Hatchery – Springfield, Idaho

Specific biological, environmental, and infrastructure requirements were evaluated to address the adequacy of each site:

Water quantity: Minimum of **14.0 cubic feet per second (cfs)** to support lower limits of program expansion (500,000 smolts annually / assumes ~9.0 fish/pound release size).

Minimum of **27.0 cfs** to support upper limits of program expansion (1 million smolts annually / assumes ~9.0 fish/pound release size).

- Water temperature: Maximum of **10.0°C** (50.0°F) rearing temperature to accommodate growth requirements of program fish (ideally, unchilled ambient source water).
- Water source: Ideally, **pathogen-free** spring and/or artesian water source that is not pumped and/or augmented (pumped water source requires backup power generation and system redundancy for listed species). Prior to initiation of production program, facility and/or source should have demonstrated history of rearing salmonids through a predetermined life history stage.
- Water treatment: Adequate **facility size** (exclusive of rearing requirements) critical for successful treatment of hatchery effluents (quiescent zones, settling basins).

In addition to water-specific criteria, key factors in site selection addressed property size (to provide for adequate infrastructure), geography (climate, contour, grade, etc.), accessibility, proximity to the Stanley Basin (transportation and release), as well as fiscally-sound capital investment and/or annual operating expenditures.

## **RESULTS AND DISCUSSION**

### **Option 1: Lost River Trout Farm**

Lost River Trout Farm was initially identified as the best option for rearing sockeye smolts. This facility is located near Mackay, Idaho and was historically used for trout production. Extensive modifications would be required to meet program goals, but water rights and temperature made this facility a high priority. Unfortunately, BPA made an offer to purchase this facility and the offer was later countered with a “First Right of Refusal” clause associated with this property. Negotiations with new property owner failed to reach an acceptable agreement to purchase. The project moved on to Option 2.

### **Option 2: Springfield Fish Hatchery**

Springfield Fish Hatchery, located near American Falls, Idaho, was identified as number two on the priority list. Infrastructure at this facility cannot be salvaged; this facility would require extensive modifications to meet program goals. Water rights are for 50 cfs and temperature is approximately 50 degrees Fahrenheit. This property was appraised and BPA purchased this facility for the sockeye smolt rearing facility. This contract has ended and a new contract has been set up to address the Planning and Design Phase of Springfield Hatchery.

### **Option 3: Crystal Springs Facility**

Crystal Springs Facility was visited and discussed as a possibility for sockeye production. This facility was purchased by BPA in 1999 to provide a fish rearing facility for Shoshone-Bannock Tribe (SBT). No improvements had been made up to this time, although planning is underway to develop this site for SBT. Water rights at this facility are for 20 cfs of 50 degree Fahrenheit water. Layout, land availability, and water rights made this option a lower priority.

## **ACKNOWLEDGMENTS**

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