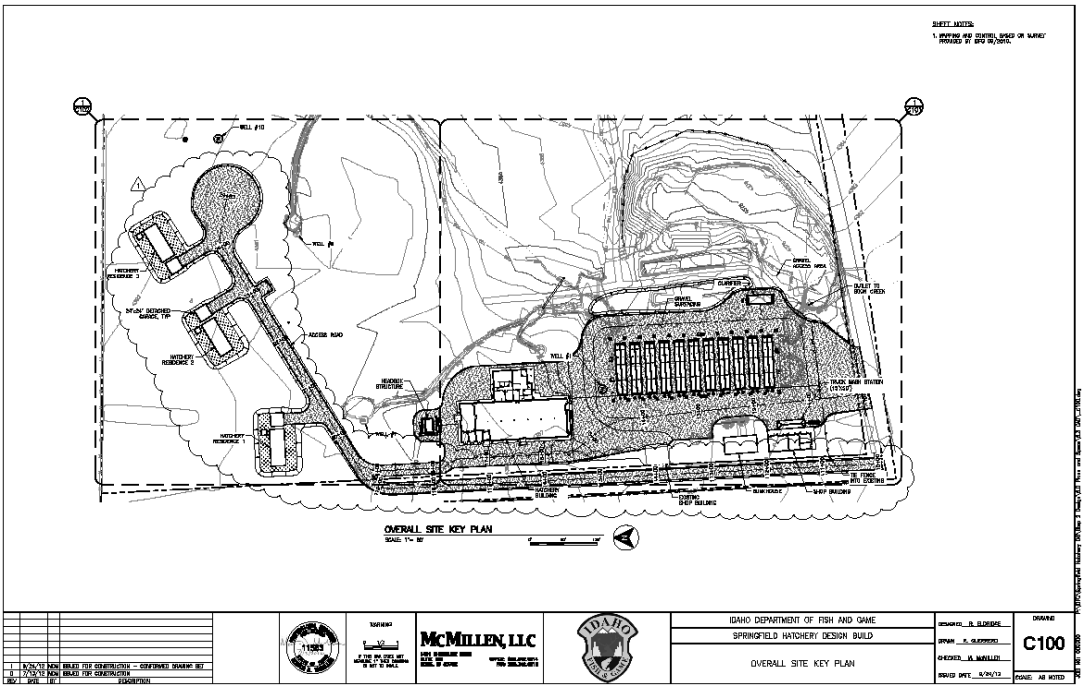
FISHERY RESEARCH

SNAKE RIVER SOCKEYE SALMON CAPTIVE BROODSTOCK PROGRAM SPRINGFIELD HATCHERY PLANNING AND DEVELOPMENT

Project Completion Report
October 1, 2010—December 31, 2012



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IDFG Report Number 13-10
December 2012

Snake River Sockeye Salmon
Captive Broodstock Program
Springfield Hatchery Planning and Development

Project Completion Report

October 2010 – December 2012 Report

By

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To

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Bonneville Power Administration
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TABLE OF CONTENTS

Page

LIST OF APPENDICES

Page

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 currently shared with the National Oceanic and Atmospheric Administration at two locations adjacent to Puget Sound in Washington State, the Idaho Department of Fish and Game's Sawtooth Fish Hatchery, and Oregon Department of Fish and Wildlife's Oxbow Hatchery. The Shoshone-Bannock Tribes are responsible for limnology work in the Sawtooth Basin and out-migration monitoring in Pettit and Alturas lakes.

In the 2008 FCRPS Biological Opinion (NOAA Fisheries 2008), NOAA Fisheries established a juvenile sockeye smolt production target of up to 1,000,000 smolts. It is anticipated that releasing up to 1,000,000 smolts should consistently return approximately 5,000 anadromous adults annually.

The Springfield Fish Hatchery addresses the next phase in the Snake River Sockeye Captive Broodstock program through construction and operation of a new sockeye smolt production facility and implementation of associated program tasks. The annual smolt production target for the new facility is up to 1,000,000 smolts at an average size of 10-20 fish per pound. To meet increased spawning and incubation activities associated with the required eyed egg supply to the Springfield Hatchery, the Eagle Fish Hatchery expansion project was completed in June 2008.

Funding for this Design-Build project is provided by Bonneville Power Administration and is subject to the Northwest Power and Conservation Council Three-Step Review requirements for project approval. Scientific and engineering services were contracted with the firms of D.J. Warren and Associates, Inc. and McMillen, LLC, respectively. Professional services performed include conceptual, preliminary, and final design services for the Springfield Hatchery and assistance with development of key deliverables throughout the Step Review process.

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INTRODUCTION

Numbers of Snake River sockeye salmon *Oncorhynchus nerka O. 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). At the time of listing, the only Sawtooth Valley lake receiving a remnant anadromous run was Redfish Lake.

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 & 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.

Initial steps to recover the species involved the establishment of captive broodstocks at the Eagle Fish Hatchery (Eagle FH) in Idaho and at NOAA facilities in Washington State (for a review, see Flagg 1993; Johnson 1993; Flagg and McAuley 1994; Kline 1994; Johnson and Pravecek 1995; Kline and Younk 1995; Flagg et al. 1996; Johnson and Pravecek 1996; Kline and Lamansky 1997; Pravecek and Johnson 1997; Pravecek and Kline 1998; Kline and Heindel 1999; Hebdon et al. 2000; Flagg et al. 2001; Kline and Willard 2001; Frost et al. 2002; Hebdon et al. 2002; Hebdon et al. 2003; Kline et al. 2003a; Kline et al. 2003b; Willard et al. 2003a; Willard et al. 2003b; Baker et al. 2004; Baker et al. 2005; Willard et al. 2005; Baker et al. 2006; Plaster et al. 2006; Baker et al. 2007; Peterson et al. 2007; Peterson et al. 2008; Baker and Green 2009a; Baker et al. 2009b; Peterson et al. 2010; Baker et al. 2011a; and Baker et al. 2011b).

In the the 2008 Biological Opinion (NOAA Fisheries 2008), NOAA Fisheries established a hatchery smolt production target of up to a 1,000,000 sockeye smolts. This level of hatchery production, combined with natural production, is expected to achieve the adult production criterion required for delisting this species. The interim delisting criteria is for a population of 2,000 adult sockeye, of which 1,000 must be produced in Redfish Lake, and 500 in each of two additional lakes.

PROGRAM GOALS

The biological goal of the program is to increase the number of adults spawning naturally in the system. The survival boost afforded by the Springfield Fish Hatchery (Springfield FH) is expected to produce returning adults surplus to broodstock needs that can be used for this purpose. Over time, the objective is to have an average wild adult escapement of 2,000 fish

over two generations. To meet NOAA Fisheries' interim recovery criteria, 1,000 of these fish must be produced in Redfish Lake and 500 each produced in two additional lakes.

Current recovery efforts focus on production in Redfish, Pettit, and Alturas lakes. Information generated for Alturas Lake *O. nerka* suggests the possible presence of a remnant, native population that is genetically unique from anadromous and residual populations found in Redfish Lake. Spatial structure and diversity are critical elements of the proposed recovery strategy. Because maintaining this diversity and capturing the benefits of local adaptation are critically important, the IDFG recommends proceeding cautiously when it comes to identifying an appropriate donor broodstock for Alturas Lake recovery efforts. Ultimately, actions will need to be consistent with NOAA's recovery plan for Snake River sockeye salmon.

The conservation goal of the program is to utilize captive broodstock technology to conserve the population's unique genetics, ensuring the long-term persistence of a viable, healthy, and harvestable population of sockeye salmon in the Snake River. The program is designed to assist in the recovery of the Snake River ESU by protecting the remaining genetic resources of the species and by providing the juveniles and adults needed to restore natural production in Redfish Lake, Pettit Lake, and Alturas Lake (although, as noted above, use of Alturas Lake as an outlet for excess Snake River sockeye adults will be delayed pending a formal Recovery Plan in 2014). As natural production increases, the conservation program will be converted to an integrated conservation-type program following the April 2004 published recommendations of the Hatchery Scientific Review Group (HSRG). This program would serve as a safety net in case of future poor survival periods.

The program has a secondary goal of providing harvest opportunities to tribal and sport fishers in the Snake and Salmon rivers. This goal is not expected to be attained for at least another decade or more. Until this population is large and healthy enough to support even a minor level of direct harvest, the emphasis of the program will be on conservation.

PROJECT BACKGROUND

Juvenile sockeye salmon are reared to the smolt stage at IDFG's Sawtooth Fish Hatchery (Sawtooth FH), a Lower Snake River Compensation Plan facility, and at the Oregon Department of Fish and Wildlife's (ODFW's) Oxbow Fish Hatchery (Oxbow FH), a Mitchell Act facility. As both facilities are focused on higher priority mitigation mandates, limited rearing space is available for sockeye salmon smolt production.

Consistent with the Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) and the 2008 Idaho Fish Accord, a new Idaho sockeye salmon smolt production facility is needed. The facility would have the capacity to produce between 500,000 and 1,000,000 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.

The Idaho Department of Fish and Game anticipates that releasing up to 1,000,000 smolts could consistently return approximately 5,000 anadromous adults annually. Increased eggs for the expanded smolt program will be produced at IDFG's newly expanded Eagle FH broodstock station and from increased production from NOAA Fisheries facilities in Washington State.

Activities associated with site selection for future sockeye salmon smolt production were accomplished under BPA Contract 35436 (Baker 2008). Specific biological, environmental, and infrastructure requirements were evaluated to address the adequacy of three potential sites. Based on this evaluation, Springfield FH was selected as the site for the new production hatchery. A progress report detailing activities conducted under Contract 35436 may be viewed on BPA's website: (efw.bpa.gov/environmental_services/document_library/Springfield_Sockeye_Hatchery/).

Bonneville Power Administration Contract number 47285 funds facility planning and development work for the Springfield FH associated with the implementation of the BiOp-proposed action to rear 500,000 to 1 million sockeye smolts, while concurrently addressing the Northwest Power and Conservation Council's (NPCC) 3-Step Review process requirements (NPCC 2006). Scientific and engineering services were contracted with the firms of D.J. Warren and Associates, Inc. and McMillen, LLC, respectively for Step 1 through Step 3 programmatic requirements. In addition, McMillen, LLC was contracted to perform the final design and construction elements of the project; construction tasks and deliverables are funded separately under BPA Contract 57306. The balance of this document will address tasks and key deliverables associated with planning and development of the Springfield FH under BPA Contract 47285.

Objectives and Tasks

Key work elements and deliverables associated with this contract are as follows:

1) Complete required NPCC Step 1 activities

   a) Hire Contractor to prepare Master Plan

   b) Prepare Master Plan containing conceptual design, Hatchery Genetic Management Plan (HGMP), and cost estimates for construction of Springfield FH

c) Present Step 1 submittal documents to NPCC staff and the Independent Scientific Review Panel (ISRP) for review, comments, and approval

2) Revise conceptual design, cost estimates, HGMP, and provide additional information as requested based on NPCC and ISRP review

3) Renovate existing residence for Hatchery Manager during design and early construction phases of the project

4) Complete required Step 2 activities

   a) Work with contractor to prepare refined design submittals at the 30% and 60% preliminary design development checkpoints

   b) Hold meetings utilizing input from Design-Build contractor, IDFG Fisheries and Engineering Bureau personnel, and fish hatchery personnel during the preliminary design work

   c) Identify potential cost savings for value engineering analysis

   d) Work with BPA's environmental lead to assist with public review

   e) Work with BPA Environmental Compliance representatives and subcontractor to address Environmental Compliance requirements for the project, including National Environmental Policy Act (NEPA) Environmental Assessment, and Biological Assessment

   f) Present Step 2 submittal documents to NPCC staff and ISRP for review, comments, and approval

   g) Ascertain approval to proceed to Step 3

5) Complete required Step 3 activities

   a) Work with contractor to prepare 95% design submittal containing diagrams, drawings, and specifications for new facility

   b) Prepare responses to ISRP comments, final Design-Build cost estimate, complete NEPA requirements for project

   c) Secure Step 3 approval for project funding

   d) Secure construction notice to proceed from NPCC

6) Produce Final Design Specifications

   a) Prepare final issued for construction drawings, including technical drawings and specifications and/or budgets required for the construction/installation of all hatchery structures

b) Complete bid specifications package

c) Secure required state and local permits

CONTRACT PHASES

Conceptual Design and Step 1 Activities

In May 2010, IDFG contracted with the science and engineering team of D.J. Warren and Associates, Inc. / McMillen, LLC to provide the Springfield FH Master Plan for the Springfield FH Snake River Sockeye Program. The Master Plan was completed and submitted to the NPCC in November 2010. The Master Plan contains conceptual level hatchery design and cost estimates for construction and operation of the Springfield FH. The Master Plan also describes how the proposed Springfield FH will be integrated into the ongoing Snake River Sockeye Program. Six appendices in the Master Plan provide supporting technical details that will contribute to an understanding of the program origins, conceptual design and construction details, as well as the preliminary monitoring and evaluation program. The Appendices contain required NPCC Step 1 documents including a preliminary HGMP and Sockeye Salmon Recovery Language Document. The Springfield FH Sockeye Master Plan can be viewed on BPA's website: (efw.bpa.gov/environmental_services/document_library/Springfield_Sockeye_Hatchery/).

At the Council's December 22, 2010 request, the ISRP reviewed the Master Plan, provided comments and concerns, and documented that the Springfield FH project qualified for scientific approval in February 2011. Idaho Department of Fish and Game moved forward with a request to the NPCC Fish and Wildlife Committee in the March 2011 meeting and to Full Council in April 2011 to proceed to NPCC Step 2 work and activities. The Council approved the Master Plan in April 2011 and authorized a notice to proceed to NPCC Step 2 activities.

An IDFG Hatchery Manager was appointed to the project in August 2010. The existing residence was renovated during February and early March 2011. A new and separate work element was added to the contract to specify funding for this work. The Manager moved into the residence on-site in late March 2011 and began working out of the existing hatchery office. The Manager's responsibilities include participation in NPCC Step 2 / Step 3 work assignments and activities, coordination of design team input throughout the design phase, attendance at all program specific meetings, and maintenance of existing facilities throughout the design phases of the project.

Preliminary Design and Step 2 Activities

To select the best qualified candidate needed to provide deliverables for the next phase of the Springfield FH Design-Build project, the IDFG Engineering Bureau Chief submitted an advertisement to local newspapers for interested parties to apply. The advertisement was posted April 19, 2011. Interested parties were encouraged to submit Statement of Qualifications (SOQ) to IDFG's Engineering Bureau for subsequent review and rating. A five member team consisting of four Fisheries Bureau staff members and one Engineering Bureau staff member was selected to rate the SOQ's.

Applicants were rated based on knowledge and experience in six categories: Science, Construction, Project Approach, Project Team Qualifications, Design-Build Experience, NPCC

Experience, and ISRP Protocols and Processes. The end date for SOQ submission was May 27, 2011. Based on the rating process described above, the Design-Build team of McMillen, LLC and D.J. Warren and Associates, Inc (McMillen/Warren) was chosen for the preliminary design phase work inclusive in NPCC Step 2 / Step 3 processes on July 7, 2011.

An internal design review team consisting of IDFG Hatchery Managers, Assistant Hatchery Managers, Fisheries Bureau, and Engineering Bureau personnel was assembled to work with key McMillen/Warren personnel to provide design input for the Springfield facility. In the preliminary design phase, the 30 percent and 60 percent design submittals were critical checkpoints. Team priorities were to address and refine proposed hatchery layout, architecture relative to program function and daily logistics, and equipment needs for the new facility. Team communication consisted of weekly phone conferences, "GoToMeeting" web conferences to address specific project questions and problems, and formal design review meetings at the 30 percent and 60 percent design submittal checkpoints. Action items, questions, and other feedback generated from the team efforts was coordinated by the Springfield FH Manager and forwarded to design team, Fisheries Bureau, and McMillen/Warren personnel as appropriate for response and decisions.

The 30% and 60% Design Submittal Packages were completed on March 14, 2012 and April 6 2012, respectively. Each design submittal package contained design drawings, technical specifications, and a Design Documentation Report (DDR). The DDR featured a brief narrative detailing each hatchery component, copies of design submittal meeting minutes, teleconference meeting notes, and engineering calculations used in the preparation of the submittal. Key changes in engineering and design aspects of the program were realized during the preliminary design stage of the project. The most significant change was a flow index adjustment requiring approximately 50% more flow to the rearing units, and the decision to build water supply infrastructure capable of delivering the full 50 cfs water right for the property. During the course of the design review work, significant cost savings (Value Engineering) were realized, and a separate document detailing these savings was submitted prior to the 95% Design Review checkpoint.

Bonneville Power Administration's Environmental Compliance Lead coordinated the NEPA requirements for the project. The firm of ICF International was contracted by BPA to perform the field sampling duties, investigation, and document preparation associated with NEPA compliance reporting. McMillen/Warren, IDFG, and BPA were key cooperators in the NEPA compliance process.

The NEPA process commenced with a public scoping meeting on June 14, 2011. The scoping meeting was held at the IDFG Southeast Region Office in Pocatello, Idaho. The purpose of the meeting was to educate the public about the scope and purpose of the project, and identify questions and concerns regarding potential impacts resulting from Springfield FH construction or operation.

Reconnaissance-level biological and wetland surveys were conducted by ICF International biologists at the proposed Springfield FH site on July 11-12, 2011. During the course of preliminary NEPA investigation, it was determined that NEPA requirements would not necessitate the preparation of an Environmental Impact Statement (EIS), but would rather be met with an Environmental Assessment (EA) document. The findings of the EA were of "No Significant Impact." The EA draft was posted on BPA's website, and the public response period opened on December 13, 2011. The public review period closed on January 18, 2012. The final

EA document, complete with Finding of No Significant Impact (FONSI) attachment, was posted on BPA's website for public display on May 9, 2012 (BPA 2011; BPA 2012).

Section 7 of the Endangered Species Act (ESA) necessitated a Biological Assessment (BA) to address potential impacts to native species, particularly bull trout *Salvelinus confluentus* and related habitat, and Ute-ladies'-tresses *Spiranthes diluvialis*, resulting from construction and/or operation of the Springfield FH. The BA was prepared in parallel with the NEPA EA review, and the BPA-contracted firm of ICF International worked with project cooperators from BPA, IDFG, USFWS, and NOAA to complete the BA.

The draft BA was submitted to the United States Fish and Wildlife Service (USFWS) in December 2011. The BA determined that the proposed action of construction and operation of the Springfield FH was not likely to adversely affect bull trout, its designated critical habitat, or the Ute-ladies'-tresses. The USFWS requested additional clarification and revisions during their review of the draft BA. The revised BA document was submitted to USFWS for informal consultation and request of concurrence on February 27, 2012. The USFWS letter of concurrence was received on April 3, 2012.

A Cultural Resources Study and evaluation of the Springfield property was conducted under the National Historic Preservation Act, which requires federal agencies to consider the effects of actions they fund or authorize on historic properties. In mid-March 2012, BPA contracted with Historical Research Associated (HRA) to provide historical context for the Springfield FH Sockeye Hatchery Project. Based on HRA's analysis, no historic properties were identified within the property site. The State Historic Preservation Office and Historic Sites office (SHPO) subsequently concurred with the finding of no historic significance as determined by BPA.

Final Design and Step 3 Activities

In order to expedite construction in a timely manner, IDFG chose to provide a combined NPCC Step 2 and Step 3 submittal. The submittal was completed and sent to the NPCC for review in April 2012. This submittal contained all required NPCC Step 2 / Step 3 materials as required by the NPCC 3-Step Review Process. The submittal included responses to ISRP comments received during the Preliminary Design phase, NEPA and permitting summaries, cost revisions from NPCC Step 1 planning in all program areas, detailed cost estimates for the hatchery, hatchery program updates, near final design details, revised Marking and Evaluation Plan, and summaries of preliminary design work including a 60 percent design documentation report.

Idaho Department of Fish and Game formally presented the combined NPCC Step 2 and Step 3 submittal at the NPCC meeting in Missoula, Montana on June 14, 2012. The submittal was approved by the Council, and IDFG received a notice to proceed to construction on June 18, 2012. Overviews of existing and proposed facilities, as well as estimated construction and operating costs can be found in the appendices. The NPCC Step 2 / Step 3 submittal may be found on the NPCC website.

McMillen/Warren completed the 95% Design Submittal on May 31, 2012. The IDFG internal design team met with McMillen/Warren to review the 95% package and receive a tentative construction schedule and activities breakout on June 25, 2012. This was the last meeting for the IDFG internal design team.

In accordance with section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, IDFG submitted a Joint Application for Permits (JAP) package to the U.S. Army Corps of Engineers on May 4, 2012. The permits are necessary for projects potentially affecting navigable waters of the United States and for discharge of dredged or fill materials into waters of the United States. The project was authorized to proceed on August 20, 2012.

New hatchery construction must be reviewed and approved by the Idaho Department of Environmental Quality (DEQ) as per Idaho Code Title 39-118. Proposed hatchery layout and function, fish production parameters, anticipated waste generation, and a formal Waste Management Plan are required for the submittal. IDFG and McMillen personnel prepared and submitted the required paperwork complete with Waste Management Plan in October 2012.

McMillen completed *Issued for Construction Drawings* on July 13, 2012. Subsequent review by project engineering/construction personnel resulted in an *Issued for Construction Conformed Drawing Set* in September 2012. This was the final construction drawing set issued for the project.

Project Completion

The Springfield FH Planning and Development contract was completed on December 31, 2012. The final deliverable for the Springfield FH Planning and Development project was the initiation of work on a facility Operation and Maintenance Manual. A core group from the original Planning and Design team was assembled in December 2012 to begin work on the contents of the manual. The manual outline was developed during the course of NPCC Step 2 / Step 3 activities.

Work on the Operation and Maintenance manual shall continue to be a collaborative effort among the IDFG team, D.J. Warren and Associates, Inc. and McMillen, LLC. It is anticipated the work will extend well into the timeframe of the construction period.

BUDGET SUMMARY

The final budget for contract 47285 under Project 2007-402-00 totaled $1,298,111. The contract began on May 1, 2010 with the original funding of $1,419,864. The original contract end date was March 31, 2012. Due to time demands throughout the NPCC process, the contract was given two no-cost time extensions (amendment 1 and amendment 2), eventually resulting in a final contract end date of December 31, 2012. Savings realized during the conceptual and final design stages totaled $121,753**.** Additional information and documents can be found in BPA PISCES program for Project 2007-402-00.

ACKNOWLEDGMENTS

I wish to thank the IDFG Planning and Design team for their input and hard work during the planning phase of this project. I thank the members of the Stanley Basin Technical Oversight Committee for their involvement and input throughout the year.

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BPA's Jenna Peterson served as Environmental Compliance lead and coordinated much of the NEPA related activities, and I thank her for her hard work on this project. Finally, BPA COTR (Contracting Officer's Technical Representative) Greg Baesler and Jan Brady provided an invaluable level of service and support throughout this project, and I extend a sincere thank you for their support and guidance.

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APPENDICES

Appendix A. Existing Facility Description from Step 2 / Step 3 Submittal.

6.2 EXISTING FACILITIES

This section reiterates the existing facilities descriptions that were presented in the Step 1 Master Plan (IDFG 2010), but updates the descriptions of facility designs that have been modified since the Master Plan was submitted in November 2010.

6.2.1 Adult Collection Facilities

Adult anadromous fish for the Snake River Sockeye Program are presently collected at the following locations:

- A permanent trap at a barrier on the Upper Salmon River at IDFG's Sawtooth Hatchery
- A temporary trap, installed each year in Redfish Lake Creek approximately 1 mile below the outlet of Redfish Lake
- An existing trap at Lower Granite Dam is a secondary collection site that potentially will be used in years when fish returns are low.

Collected fish are transported daily to adult holding facilities at Eagle Hatchery, near Boise. The Snake River Sockeye Draft HGMP, presented in Appendix A, includes a detailed description of the support and safety net facilities in Oregon, Washington, and Idaho. The Draft HGMP recommends adult collection infrastructure improvements to support increased sockeye smolt production; however, these improvements are not included in the scope of the proposed action.

Facilities for the Snake River sockeye captive broodstock program operate at Eagle Hatchery and NOAA's Manchester Research Station and Burley Creek Hatchery. Because modifications are not proposed to these facilities, they are not further described in this section.

6.2.2 Springfield Fish Culture Facilities

The existing Springfield facilities are located in Bingham County, on a 73-acre parcel owned by IDFG that is made up of two smaller parcels (Figure 6-1). The 43-acre northern parcel supports all existing facilities and is separated from the 30-acre southern parcel by Edwards Road, a county maintained road. Both parcels are relatively flat, sloping from elevation 4,394 feet near the northeast property corner to 4,380 feet near the southwest property corner.

The northern parcel was developed as a private trout farm, known as Crystal Springs Hatchery, which is now abandoned. Existing improvements include nine artesian wells, two large banks of concrete raceways, an office/hatchery building, a small shop, a cannery/processing plant that also contains offices, a feed storage silo, and a single family residence. With the exception of the residence, all facilities are abandoned and in deteriorating condition. The parcel also features a 4-acre public fishing pond known as Crystal Springs Pond, which has a recently constructed concrete outlet control structure.

A public parking area and access trail to the pond is immediately west of the former cannery building. A 50 cfs water right was perfected by the former trout hatchery and will be used for the sockeye hatchery. The limits of the water right use encompass the southerly portion of the

northern parcel and northerly portion of the southern parcel as shown on Figure 6-1. The southern parcel is generally an unimproved field and wetland. There is an existing sanitary drainfield system on the north edge of the parcel that was used to dispose of wastewater from the cannery building. Barbed wire fencing marks the site boundaries, and a barely visible dirt road extends along the western perimeter.

Existing facilities are described in more detail below and unless otherwise stated, are all on the 43-acre northern parcel.

6.2.3 Process Water Systems

As noted above, there are nine artesian wells located on the northern parcel. The wells are approximately 250 feet deep, tapping into a productive, confined aquifer that has a water bearing stratum of sand and gravels approximately 45 feet thick. Each well has a vertical steel pipe casing with coarse openings cut with a Mills Knife, shut-off valve, and an overflow outfall pipe consisting of a short section of horizontal steel discharge pipe as shown in Figure 6-2.

Water discharging from seven of the wells flows over land in small artificial channels or pipes into Crystal Springs Pond. The other two wells, in addition to a small spring, flow into an artificial channel that enters the north end of the abandoned rearing raceways. From the raceways, this water flows to the south, eventually combining with the Crystal Springs Pond overflow stream before leaving the site. A 48-inch-diameter corrugated metal culvert conveys the combined flow under Edwards Road as it leaves the site and forms Boom Creek. Boom Creek flows southwesterly 2 to 3 miles and enters the Snake River at American Falls Reservoir.

Over the last 5 years, IDFG conducted studies of the artesian flow rates and the underlying aquifer. The combined artesian flow from the wells has been measured at 17 to 18 cfs (7,600 to 8,082 gallons per minute [GPM]), although flows dropped as low as 8 cfs in spring 2008. An additional 5 to 6 cfs is estimated to be entering Crystal Springs Pond directly from subsurface springs. Overflow outfall pipe elevations at each wellhead range from 4,388 to 4,393 feet, with shut-in static water levels 3 to 7 feet above the overflows when wells are closed one at a time (Clearwater Geosciences 2008) or up to 20 feet above overflow when closed simultaneously (SPF Water Engineering 2010).

6.2.4 Utility Systems

All existing facilities interconnect with utility systems. Services include electrical power from Idaho Power and communications lines. Potable water is provided from separate on-site wells using pumps and hydropneumatic tank systems. In addition, two propane tanks are located near the abandoned cannery building. Both single phase and three-phase overhead power lines service the existing buildings from the southwest corner of the parcel, and a three phase underground service extends to the cannery building via a pad-mounted transformer on the north side of the building. Idaho Power's existing three phase overhead power lines roughly parallel Edwards Road.

6.2.5 Hatchery Housing, Administration and Support Facilities

There is one single-family residence, currently occupied by an IDFG caretaker, adjacent to the raceways. Offices and indoor rearing facilities were housed in a 3,600-square-foot building near

the abandoned rearing raceways. These are in poor condition and will be demolished as part of the proposed project.

6.2.6 Crystal Springs Pond Fishing Access

As a condition of the property purchase, IDFG agreed to maintain the 4-acre Crystal Springs Pond as a public fishing site (Figure 6-3). The pond is supplied by artesian flows from up to seven existing wells. A paved parking area, an access trail, and two 16-foot docks are maintained by IDFG, which also periodically stocks the pond with rainbow trout.

Appendix B. Proposed Facility Description from Step 2 / Step 3 Submittal.

6.3 PROPOSED FACILITIES

The following sections summarize the proposed facilities at Springfield Hatchery. More detailed facility descriptions are provided in Appendix G (60% Design Documentation Report and Design Drawings).

6.3.1 Adult Collection Facilities

No improvements to adult collection facilities are proposed. Eyed eggs will be supplied to the proposed hatchery from IDFG's Eagle Hatchery and/or NOAA facilities.

6.3.2 Hatchery Building and Residences

Proposed facilities for the Springfield Sockeye Hatchery include a new 18,620-square-foot hatchery building with offices, lab, restrooms, chemical storage, feed storage, vehicle maintenance, incubation and early rearing tankage, and mechanical/electrical rooms.

The hatchery building is basically divided into two separate zones due to the functional requirements. Constructed with stud construction, the 4,620 square-foot administrative area will house offices and work stations for hatchery staff, along with support spaces (e.g., conference/break room, locker rooms, and visitor functions). Finishes are envisioned to be standard office materials that are durable and easy to maintain.

The 14,000 square-foot main hatchery area of the building, due to its wet environment, will be constructed of non-combustible, moisture resistant materials. Exterior walls will be 12-inch thick insulating concrete masonry with a mixture of split and standard finish on the exterior face. Interior walls will be 8-inch standard block, finished with an epoxy paint to enhance cleaning and provide durability. The roof structure and decking will be steel with insulation on the exterior side to minimize any potential moisture issues.

The administrative portion of the facility will be clad with metal siding and hollow metal doors and frames that are durable and low maintenance. Roofing for the entire building will be prefinished metal standing seam roofing.

6.3.3 Process Water Systems

Process water system improvements are a key element of the proposed hatchery. The artesian aquifer that underlies the site provides an excellent source of high quality water for fish rearing, and is the primary reason this site was selected for the project. In general, the design approach will be to use gravity flow artesian well water to the greatest degree possible in order to minimize pumping costs. However, due to long-term trends showing a declining aquifer level, and the need to de-gas and aerate the groundwater prior to use, the use of gravity flow groundwater will likely be limited to periods of low demand. Once pumps are turned on, the amount of artesian flow available from the non-pumped wells will likely decline or stop.

The water delivery system features a flexible design in order to supply water to critical hatchery functions during low water years, while minimizing pumping to reduce energy costs. The

preliminary water budget shown in Table 6-1 indicates increase in the anticipated water demand by month to meet the Flow Index of 1.0 selected by IDFG.

Table 6-1. Projected peak monthly flows (in cubic feet per second) at Flow Index of 1.0 vs. Flow Index of 1.5.

Month	Flow at End of Month FI=1.5 (cfs)	Flow at End of Month FI=1.0 (cfs)
January	19.2	28.4
February	21.2	31.8
March	22.5	33.8
April-at transfer out	28.6	42.9
May	3.2	4.85
June	4.4	6.6
July	6.7	10.0
August	7.7	11.5
September	9.5	14.2
October	12.1	18.1
November	14.4	21.1
December	16.0	23.5

In order to achieve energy efficiency, flexibility and reliability in the water system design, the following factors have been considered and discussed with IDFG:

- **Elevation to which gravity flow artesian flow can be delivered.** The existing wells are widely spaced around the site as shown in Figure 6-1. Static water elevations under shut-in conditions range from 4,391 to 4,398 feet. Overflow outlet pipe elevations range from 4,388 to 4,393 feet. Groundwater modeling results indicate that if all wells are closed, the shut-in pressure of the aquifer will be up to 20 feet above grade.

- **Aquifer productivity has been in decline for an extended period due to increased irrigation withdrawals and weather conditions.** Pump sizes and setting depths will be designed to accommodate this.

- **Existing ground elevations.** The existing grade of the proposed hatchery building site is 4,387 to 4,388 feet. The existing top of slab elevation at the proposed raceway area is from 4,377 feet on the south end to 4,380 feet on the north end.

- **Dissolved oxygen and total gas pressure in the existing supply.** This will indicate to what degree oxygenation and degassing treatment will be required as a pretreatment measure.

- **Shallow groundwater elevations and poor soils at the proposed building, raceway and effluent treatment pond locations.** In the course of geotechnical work performed in 2007 and 2012, several test pits were excavated on the northern parcel. These pits, and piezometer monitoring by IDFG, indicate groundwater elevations are 4.5 to 6.5 feet below existing grades. In addition, clay soils were found in several locations, which increase the chances of settlement problems at the proposed structures.

- **Elevation of receiving waters for hatchery effluents.** The wetlands below the Crystal Springs Pond outlet control structure have an approximate water surface elevation of 4,374.25 feet. The invert elevation of the proposed raceways and settling ponds are set a least 4 feet above this elevation to ensure gravity flow drainage.

The proposed hydraulic profile (Drawing G06 in Appendix G) shows the following key elevations:

- Static water level in artesian wells 4,393 to 4,397 feet
- Water surface of proposed outdoor rearing ponds 4,383.5 feet
- Floor elevation of proposed hatchery 4,389 feet
- Incubator/early rearing water surface 4,392 feet
- Hatchery headbox water surface elevation 4,403 feet
- Hatchery outfall 4,374.25 feet

These elevations have been refined during the preliminary design process to ensure that the hatchery water supply system is flexible, reliable, and energy efficient.

6.3.3.1 Wellhead Design

The wellheads will be designed to allow the wells to deliver either pumped or artesian flow to the headbox. The wellheads will incorporate check valve actuators with minimum head differential to pass the artesian flow to the pipe when pumping is not occurring.

The existing water right requires that flow be measured at the points of diversion, dictating that each well have a meter configured to measure both artesian and pumped flows. General weather and freeze protection is an important wellhead design consideration and several alternatives are under consideration.

Preliminary investigations indicated that drawdown of the aquifer during pumping would have been minimal, on the order of 10 to 20 feet based on the original flow index of 1.5 and a 28.6-cfs peak water use. With the new peak flow rates of up to 43 cfs continuous and 50 cfs short term, the aquifer drawdown will be significantly higher.

Friction losses in piping systems and static lift to the degassing headbox will add an additional 20 to 30 feet to pump head requirements. Medium head, high volume pumps are proposed for two of the existing wells. Three new, larger, high production wells are proposed for normal duty during peak demand periods with the two remaining pumps for standby duty, and/or use during lower flow periods. Each new pump would have a preliminary design point of approximately 6,500 gallons per minute, at 100 feet of total dynamic head. Pump motors will be in the 120-150 horsepower range, and will be equipped with soft starters, perhaps some with variable frequency drives, and automatic controls. Each pump will be connected to an emergency generator to reduce the risk of interruptions to the hatchery water supply.

6.3.3.2 Headbox Design

Groundwater typically has low (below saturation point) dissolved oxygen (DO) levels, and high nitrogen or total dissolved gas (TDG) levels. Dissolved oxygen levels of 6.0 to 6.7 were measured during the aquifer testing conducted in November 2010. Total dissolved gas pressure was measured at 107%, and high levels of carbon dioxide (up to 60 parts per million), are

indicated by pH and alkalinity measurements. This confirms that counter-current degassing/aeration will be needed to strip CO2 and produce water with saturated oxygen levels.

The headbox structure is divided into two separate systems, an upper head tank system for pumped water and a lower head tank system for artesian flow. Each system is separated into two tanks, one for upwelling of supply water, and one tank to provide the degassing/aeration treatment and a constant hydraulic head for the hatchery and raceways. Both the upper and lower head tanks will have a packed media degassing system installed in them that will help remove carbon dioxide and nitrogen supersaturation from the water and increase the amount of dissolved oxygen. Each system will consist of a distribution plate that distributes water even across the top of the packing media. Water will then flow down through a 4 foot thickness of plastic packing media in a thin film to maximize the contact between the water and air. Blowers mounted on the headbox structure will be used to force air upwards through the packed column to increase the air to water contact ratio. The blowers and packed media will be sized during the final design phase of the project. Isolation valves will be installed on the lines from the north and south well lines. The isolation valves will allow operators to isolate a well line for maintenance or have flow be directed to either the upper or lower head tank in the headbox.

6.3.4 Incubation Facilities

Eyed eggs will be delivered to the Springfield Hatchery each November. The eggs will be disinfected with an iodophor solution in small batches in an egg preparation room and then loaded into heath tray incubators at 4,000 eggs per tray. Excess iodophor solution will be disposed of by land application or stored in a pump-out tank for periodic remote disposal.

Due to concerns with horizontal disease transmission, the incubators will be configured in eight tray stacks with isolation baffles in between each stack. Pathogen-free groundwater will be provided at a flow rate of 5 to 6 GPM to each stack. A total of 44 stacks and 220 to 264 GPM of supply flow will be required. A smaller separate quarantine incubation room will be provided for research and experimental egg handling operations. Both chilled and ambient groundwater supplies will be provided to each incubator.

A hard-piped chemical feed system will be used to deliver iodophor solution or formalin treatments to the main water supply for the incubator stacks on a daily basis to prevent fungus growth on the eggs. Overflow water from the incubators will fall through gratings into floor trenches that convey the water into the hatchery drain system separately from the early rearing drain system. Adequate dilution flow will be maintained through the hatchery drain system avoid exceeding chemical concentration limits in the hatchery outfall.

There will be a need for a chiller and associated heat exchanger and chilled water piping system that will be used to slow the development rate of eggs and fry in order to produce smolts that meet targets for fish size and release dates. IDFG has requested the ability to chill 25% of the incubation flow by 5°F. A 25-ton chiller will be required for this 70 GPM, single pass, flow-through system. The final sizing of the chilling system will be determined in during the final design process.

6.3.5 Rearing Facilities

Swim-up fry will be transferred in February to the early rearing troughs. The early rearing room will be adjacent to the incubation room, and will contain a total of 22 fiberglass troughs configured in 11 pairs. Aisles will provide access between each pair of early rearing troughs.

Groundwater will be supplied to each tank at a typical flow rate of 134 GPM. A flow control valve and standpipes will provide water control measures. Cleaning waste will be collected at the effluent end of the trough and conveyed via a pipe to the effluent clarifier.

Fish marking will occur during transfer from the early rearing troughs to the outdoor rearing raceways. Fish will be pumped from the hatchery building to a marking trailer mobilized between the hatchery and the outdoor raceways. After marking, fish will be transferred to the outdoor raceways via gravity flow.

After marking, juvenile fish will reside in 22 outdoor, concrete raceways. Each raceway will be 95 feet long and 9 feet, 3 inches wide. An approximate 800 GPM supply of groundwater will be required for each raceway. Given the proximity of Crystal Pond and the increased potential for disease transmission, a metal roof and bird netting will be constructed over the outdoor raceways to reduce the risk of mortalities from predators and disease.

The 11 pairs of concrete raceways will use screens to segregate fish, while stop logs and standpipes will be used for flow control. A downstream kettle in each raceway will aid in fish harvesting activities. This kettle will also serve as the quiescent zone to allow suspended solids to settle. A vacuum system will transfer the waste to the off-line settling pond.

6.3.6 Effluent Treatment Facilities

Discharge from the original Crystal Springs Trout Hatchery facility was factored into the 2006 total maximum daily load (TMDL) allocations established for the American Falls Subbasin Assessment (IDEQ et al. 2006). Fish production at the Springfield site has an authorized discharge allocation of 1.63 tons/year of phosphorus, and 347 tons/year of suspended sediment.

A single cell off-line clarifier will receive the wastes from both the early rearing and outdoor rearing troughs. A vacuum waste system will pipe the material primarily composed of fish fecal matter and uneaten food to the clarifier. The clarifier is designed to handle a peak flow of 200 GPM. The design follows the guidelines of the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency CFR 40 for confined animal feeding operations. The settling cell is 30 feet wide by 40 feet long. The chamber bottom will be flat, with a water depth of 3 feet. As suspended solids settle in the chamber bottom, the clean water will be decanted from the top of the water column and discharged to the drain piping system for the hatchery, which discharges to Boom Creek. The sludge will be biannually pumped from the clarifier while still sodden, and distributed as a fertilizer to nearby agriculture land.

6.3.7 Utility Systems

Groundwater will be used to supply potable water to the residences and the hatchery facility. Currently, it is anticipated that the wellhead on Well #7 will be modified and a small submersible pump will be placed into the well to supply the potable water system for the residences and the hatchery facility. The potable water system will consist of the submersible pump, hydropneumatic tanks and instrumentation to operate the potable water system. Power will be supplied to the new hatchery facility from the existing Idaho Power Company infrastructure that runs along the south side of the site. The hatchery building and north well line will be supplied with a 1,200-amp, 480-volt, 3-phase service and be backed up by an approximate 400-kilowatt generator. Due to distance from hatchery building, the south well line will be metered separately. The south well line will be supplied with be 400-amp, 480-volt, 3-phase service.

Each of the residences will have a 200-amp single-phase service and be metered separately. The service into the existing residence will remain unchanged.

Communications lines are available to the project site and will be extended to points of use as needed.

Fire protection requirements have been reviewed with the local fire officials. Fire sprinkler systems will not be required at any of the proposed buildings. An outdoor hose station or pumper connection will be provided off the headbox or via direct connection to Crystal Pond.

Stormwater run-off will generally sheet flow from paved areas to filter strip treatment areas prior to entering water ways. Any concentrated flows will be captured and treated with oil separators.

On-site septic systems will be utilized to treat domestic wastewater.

6.3.8 Hatchery Housing, Administration and Support Facilities

Three new residences will be constructed to the north of the hatchery building. Each three bedroom residence will have its own driveway. An individual domestic well will be designed near the residences to provide potable water for the residences. Each house will have a septic tank; effluent from the tanks will drain to a common drainfield located on the north side of the site.

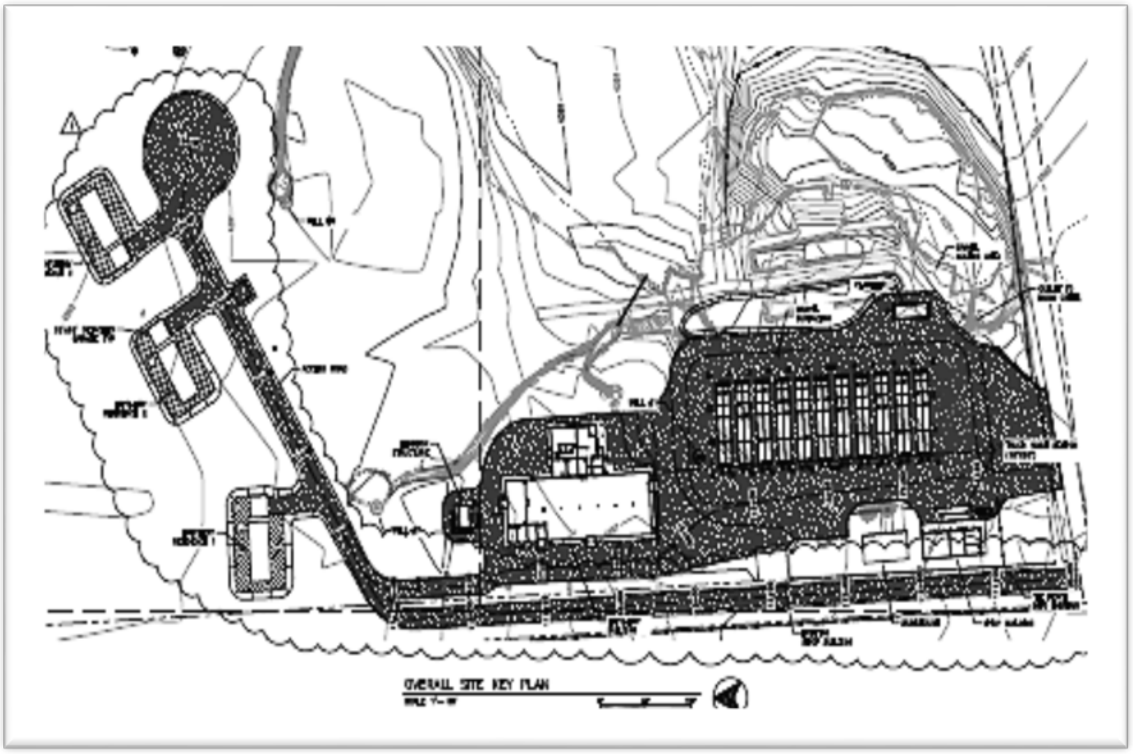
A 2,340 square-foot shop building will house support facilities. The shop building consists of four individual rooms, each designated with a specific purpose. Feed storage, maintenance activities, shop activities, and dry storage will all be housed in the shop building. The dry storage room will also include a walk-in freezer. Rooms within the shop will not be interconnected, but will each have their own egress.

The building will be constructed using steel stud framing and clad with metal siding on the exterior. A 4-foot, 0-inch-high block veneer wainscot that matches the main hatchery building will be applied to assist with protecting the facility from potential damage. Interior walls will be clad with durable plywood in lieu of standard gypsum board, which provides a durable surface and will allow maintenance and shop items to be attached. Metal roofing will match the main hatchery building and provide a cohesive appearance to both staff and visitors.

6.3.9 Crystal Springs Pond Fishing Access

Public access to Crystal Springs Pond will be maintained throughout the construction process, though no improvements to the public facility are included in the project.

Appendix C. New Facility Site Plan.



Appendix D. Construction Cost Estimate from PISCES Application.

Description	Total
Indirect Costs - General Requirements	$319,447
Bid Item #1 – Procurement	$474,843
Bid Item #2 – Demolition	$96,632
Bid Item #3 - Hatchery Site Work and Utilities	$1,260,917
Bid Item #4 - Head box and Degassing	$380,837
Bid Item #5 - Water Supply and Yard Piping	$2,698,168
Bid Item #6 - Hatchery Building	$2,360,820
Bid Item #7 - Roads and Access	$47,950
Bid Item #8 - Remodel Residence #1	$84,340
Bid Item #9 – Raceways	$2,291,886
Bid Item #10 - Secure State and Local Permits	$30,000
Bid Item #11 - Construct Three Residences	$578,443
Bid Item #12 - Construct Shop / Storage Building	$301,959
Bid Item #13 - Effluent / Settling Basin	$220,024
Bid Item #14 - Mobilization / Demobilization	$283,250
Construction Cost Subtotal	$11,429,515
5% Overhead	$678,994
10% Profit	$1,357,988
Bond	$113,388
Project Total Cost	$13,579,885

Appendix E. Step 2/3 Projected Annual Operating Expenses, Springfield Hatchery from Step 2 / Step 3 Submittal to NPCC.

Expense Area	Step 2/3 Estimated Operations Costs (2014 Dollars)
Payroll (Taxes, Benefits, Mark-ups)	$199,751
Vehicles (Fuel, Oil, Maintenance, Mileage, Insurance)	$10,262
Repairs and Maintenance (Site, Buildings, Equipment)	$4,407
Rent and Lease (Equipment, Vehicles)	$47,256
Program Supplies (Shop, Office)	$3,485
Program Supplies (Lab, Water System, Egg-Take, Incubation)	$6,970
Program Supplies (Tagging and Release)	$106,292
Utilities (Electrical, Telephone)	$151,639
Travel Costs (Mileage, Lodging, Per diem)	$10,892
Education and Training	$717
Subcontracts (Professional Fees, Testing, Sampling)	$5,945
Facility Insurance	$2,442
Total	**$550,059**

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