ANNUAL REPORT
FY 14

FISH HEALTH SERVICES
AND
TECHNICAL COORDINATION
FOR
FWS LSRCP HATCHERY PROGRAMS

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INTRODUCTION

The following is an annual report for all the activities scheduled for completion under each goal of the Idaho FHC Fish Health Program during Fiscal Year 2014. Specific objectives and tasks completed are listed and discussed below.

OBJECTIVES AND TASKS

GOAL 1 **Provide fish health services for the SCS program at Dworshak NFH to help ensure that its mitigation goal for the Lower Snake River Compensation Plan program is met.**

Approach: The mitigation goal for the Dworshak NFH spring Chinook salmon program is to return 9,135 adults above Lower Granite dam. A thorough evaluation of the success of this program requires careful documentation of the events and circumstances that occur throughout the fish's entire life history; including any and all aspects of fish health and its affect on the life history of spring Chinook salmon at Dworshak NFH. This life history is about five years from the time of egg fertilization and incubation to the time the last adults return from the ocean. At the end of the life cycle, a complete report and evaluation is written for that brood year. Because of the configuration of the federal fiscal year and the resultant lag time, data compilation and summary is being done on seven brood years simultaneously. Each year, a new brood year is started and one brood year life cycle is completed with the adult return that year. The objectives below are designed to provide the data and information necessary for completing these brood year evaluation reports.

Objective 1.1 Disease sampling at spawning of Dworshak NFH spring Chinook salmon adults that returned to the project area above Lower Granite Dam in 2014.

Approach: Specific samples were collected from adult salmon at spawning.

Task 1.1.1 All female SCS adults (~500) were injected with erythromycin at 10 mg/kg of body weight under veterinary extra label prescription beginning 21 days prior to spawning and continuing as adults returned until spawning started.

Task 1.1.2 Kidney samples were collected for Bacterial Kidney Disease (*Renibacterium salmoninarum*) testing by Enzyme-linked Immunosorbent Assay (ELISA) from each female spawned.

Task 1.1.3 ELISA assays were performed for quantitative BKD results of each female adult to provide recommendations for culling/segregation of eggs to Dworshak NFH production staff. For FY 2014, forty-one females had values over the Clearwater Annual Operation Plan (AOP) recommended ELISA optical density (O.D.) cut off level of 0.250 and were recommended to be culled. This was a significant increase compared to the most recent 8 years in which thirteen was the largest number of

females' eggs recommended to be culled (2013 and 2011). The average number of females culled for the most recent 8 years was 7 females.

Task 1.1.4 Kidney and spleen samples (60 fish put into twelve 5 fish pool samples) were collected throughout spawning for bacteriology testing:

A. *Yersinia Ruckeri:* All were found negative for this pathogen.
B. *Aeromonas salmonicida:* Two 5-fish pooled samples were found positive for this pathogen, which is not an uncommon finding occasionally in returning adults.

Task 1.1.5 Five fish pooled kidney/spleen samples (55) and 3 fish pooled ovarian fluid (152) samples were collected throughout the spawning season for virology testing:

A. Infectious Hematopoetic Necrosis Virus: 64% positive in kidney/spleens sampled (males) and 71% positive in ovarian fluid tested (females).
B. Infectious Pancreatic Necrosis Virus: not detected
C. Viral Hemorrhagic Septicemia Virus: not detected

Task 1.1.6 Cranial tissue (60) was collected throughout spawning for *Myxobolus cerebralis* testing by pepsin/trypsin assay. All tested were negative for this parasite.

Task 1.1.7 Intestinal scrapings (30) were collected throughout spawning for *Ceratomyxa shasta* detection. These adults were found positive for this parasite, as in most years.

Task 1.1.8 In FY 2014, there were sufficient numbers of ripe females to meet production goals. No females were injected with the GNRHa hormone.

Task 1.1.9 The IFHC served as INAD monitor for Dworshak NFH SCS program as necessary in FY 2014.

Task 1.1.10 For FY 2014, no drugs or chemicals were administered under INAD to the SCS adults.

Task 1.1.11 All SCS adults were treated with formalin bath for fungus during holding at Dworshak NFH with treatments administered up to every other day under veterinary extra label prescription.

Objective 1.2 Disease sampling and monitoring of SCS juveniles and smolts at Dworshak NFH

Approach: Specific samples were collected from juvenile salmon during rearing.

Task 1.2.1 Fish health exams for disease detection were performed as needed with a

total of 10 diagnostic cases, 15 monitoring and 3 inspections for the SCS program at Dworshak in FY14. Monitoring results were combined with the SCS density study and can be found under Objective 3.2. In late fall, low levels of the parasite Costia (*Ichthyobodo*) and low levels Gas Bubble Disease were detected on gills of the excess SCS in system 3 burrows ponds and in some of the raceways. In December, one 2-fish pool sample was found positive for *Renibacterium salmoninarum* (causative agent of Bacterial Kidney Disease) at low ELISA levels in system 3 burrows ponds. In addition, low levels of the parasite *Ambiphyra* were detected on the skin of fish in burrows ponds.

In July, SCS juveniles in raceway B25 were detected positive for IHN (Infectious Hematopoietic Necrosis) virus. Mortalities remained at a low chronic level through August in this raceway.

Task 1.2.2 Kidney samples (10 each month) were collected on a monthly basis for 6 months prior to release for *Renibacterium salmoninarum* (BKD) monitoring by the ELISA test. By the ELISA analysis, *Renibacterium salmoninarum* was not detected in any monitoring samples (see density study results under Objective 3.2).

Task 1.2.3 Tissue samples (60) were collected prior to release to assess smolt readiness and disease status. Assays included virology, bacteriology, parasitology, hematocrits, and visual notations of smolt stage. By the ELISA analysis, *Renibacterium salmoninarum* (BKD) was detected in one prerelease sample at a low ELISA level. No viruses or other bacteria were detected.

Task 1.2.4 SCS juveniles were not treated under an INAD (Investigational New Animal Drug) in FY 14.

Task 1.2.5 Summary reports were provided as requested for FY 2014 and to Idaho FRO for Brood year reports.

Objective 1.3 Participate in the preparation of spring Chinook salmon brood year reports for Dworshak NFH.

Approach: Brood Year Reports were recommended in the Region One, U.S. Fish and Wildlife Service, Fisheries Vision Action Plan and are intended to provide a broad overview of stock performance and is a compilation of data from various other reports. Data on adults that are spawned to create the brood year, egg production, nursery rearing, juvenile rearing, smolt releases, fish health, smolt emigration, adult contribution to fisheries, and adult returns to the hatchery are summarized. Evaluation projects and other research studies involving the pertinent brood years are only briefly described in these reports. Because brood year reports are a relatively new activity, there is a large backlog of reports that need to be completed. Emphasis for this activity will be for the brood years most recently completed with backlog reports being completed as time permits.

Task 1.3.1 All fish health related information was compiled for BYs of spring Chinook salmon as requested and submitted to Idaho FRO for compilation into complete Brood Year Reports.

GOAL 2 **Disease sampling and monitoring of STT juveniles and smolts at Hagerman NFH to provide assistance in meeting its summer steelhead smolt production goal for the Lower Snake River Compensation Plan program.**

Approach: The mitigation goal for Hagerman NFH in the LSRCP program is to return 13,600 adult summer steelhead above Lower Granite Dam. The program at Hagerman NFH is unique in that it is a cooperative effort between the U.S. Fish and Wildlife Service (Service) and the Idaho Department of Fish and Game (State). The State is responsible for selecting the stocks to be used in the program, for brood stock collection and spawning, and delivering the fertilized eggs to Hagerman NFH. Hagerman NFH is responsible for incubation, hatching, rearing, and transportation of summer steelhead smolts to locations in the upper Salmon River selected by the State.

Objective 2.1 Monitor summer steelhead rearing activities at Hagerman NFH.

Approach: The production goal established for Hagerman NFH is about 1.3 million smolts. In cooperation with hatchery and FRO personnel, steelhead culture at Hagerman NFH will be monitored to identify factors that may be affecting fish quality and survival. Production space and water use is limited. Reaching established mitigation goals for adult steelhead by increasing production much beyond present levels is not a viable strategy. Therefore, it is imperative that every opportunity is taken to improve fish quality and survival.

Task 2.1.1 Diagnostic work for disease detection was performed as needed. In FY 2014 there were 11 diagnostic and 8 monitoring cases conducted. Bacterial results included Bacterial Coldwater Disease (*Flavobacterium psychrophilum*) and *Aeromonas hydrophila*. For the Bacterial Coldwater Disease, florfenicol medicated feed treatment was recommended and Veterinary Feed Directives (VFDs) were provided for BY13 in Jan and Feb for several raceways. For BY14, several tanks in the nursery were also found positive and treated for Bacterial Coldwater Disease with florfenicol by VFD in July. For BY 13, potassium permanganate (KMnO4) external bath treatments were recommended to prevent bacteria from invading external lesions in Dec. 2013. In Sept, taggers cut too deeply when removing adipose fins resulting in external lesions in BY 14 steelhead.

Parasites detected included *Nucleospora salmonis*, *Ichthyophthirius multifiliis* (Ich), *Gyrodactylus*, *Chilodonella*, and *Ambiphyra.* Gas Bubble Disease was also noted. Ich was found in BY 2013 steelhead at the pre-release exam (see task 2.1.2). For BY 2014, Ich was found much earlier, in Aug of 2014 and raceways were treated with formalin drip at 50 ppm for 6 hours three times per week. Sculpin were

found positive for Ich in Riley spring, but found negative in Bickle spring in Sept of 2014.

Task 2.1.2 Tissue samples were collected prior to release (60 from each stock, East Fork and Sawtooth) to assess smolt readiness and disease status. Assays included virology, bacteriology, parasitology, PCR, and visual notations of smolt stage. At pre-release exam, the parasite *Ichthyophthirius multifiliis* was detected in moderate to heavy levels in two raceways. Immediate release was recommended or if not possible, formalin drip treatments of 50 ppm over 12 hours for three times per week. As co-managers did not agree to the immediate release option, formalin treatments were started, given at the 167 ppm for one hour dosage. *Flavobacterium psychrophilum* was detected in 2 of the Sawtooth raceways out of the 5 sampled and in the one East Fork raceway that was sampled. *Aeromonas hydrophila* was also detected in one of the Sawtooth raceways sampled. By the ELISA analysis, *Renibacterium salmoninarum* (BKD) was detected in one prerelease sample at a very low level. No viruses were detected in prerelease samples. *Nucleospora salmonis* was detected in both the Sawtooth and East Fork stocks. Other external parasites including *Gyrodactylus* and *Ambiphyra*, as well as Gas Bubble Disease were also detected in both stocks. Except for the *Ichthyopthirius*, all above pathogens were found in low levels; not warranting any action or treatment before release.

Task 2.1.3 Monthly visits for monitoring/diagnostic work were performed, except when no fish were on station.

Task 2.1.4 Summary reports were provided as requested for FY 2014 and to IFRO for Brood year reports.

GOAL 3 Participate in the development of recommendations for Dworshak and Hagerman NFHs that will produce sufficient smolts to meet each hatchery's LSRCP mitigation goals.

Approach: In the light of completed brood year evaluation reports and other information, constraints or problems in the production programs at Dworshak and Hagerman NFHs may be identified which are preventing the hatcheries from successfully meeting their respective mitigation goals. The objectives under Goal 1 and 2 are designed to generate the information necessary to develop recommendations for changes in the production programs that will overcome any problems or constraints that are identified. Specific projects will be designed and conducted to examine alternatives to existing hatchery practices. Recommendations for improving hatchery production will be based on the results of these projects.

Objective 3.1 Participate as a member of the Dworshak and Hagerman Hatchery Evaluation Teams.

Approach: In order to increase the effectiveness and efficiency of the LSRCP Hatchery Evaluation Programs at the Dworshak and Hagerman NFHs, Hatchery Evaluation Teams (HETs) were formed for both facilities. The Teams are represented by personnel from the Idaho FRO, the respective hatchery production staffs, and the Dworshak FHC. Although formation of HETs at federal hatcheries in Region 1 is primarily a Service program, the IDFG is an equal participant on the Hagerman HET because of their role in that program. The Teams are involved with most aspects of evaluations. Activities concentrate on problem identification, development of projects to examine alternative production strategies, development of recommendations for improving hatchery production, and facilitation of information transfer.

Task 3.1.1 All HET meetings were attended by IFHC personnel during FY14.

Task 3.1.2 Assistance was given in development of study plans for specific evaluation projects as requested and as problems were identified, such as with Gas Bubble Disease. All meetings to address problems were attended.

Objective 3.2 Provide fish health disease sampling and monitoring for Dworshak Fisheries Complex HET Density Study.

Approach: With the goal of improving adult returns of spring Chinook salmon adults to Dworshak National Fish Hatchery, the Dworshak HET proposes to increase densities in the SCS raceways at Dworshak NFH for broodyears of 2012, 2013, and 2014. In order to evaluate the fish health component of increased densities, fish health will increase sampling and testing for pathogens accordingly. All pathogen screening will be conducted in accordance with the USFWS/AFS-FHS Blue Book (2012). If significant fish health issues or an epidemic occurs anytime during the experiment in the Treatment group, established treatment and contingency actions will be taken accordingly. In the event an epidemic occurs that does not respond to treatment, the experiment may be terminated. An epidemic is defined as 1% mortality in a single raceway for three successive days (Integrated Hatchery Operations Team 1995).

Task 3.2.1 Ten spring Chinook salmon were randomly collected from the Treatment and Control groups monthly and were subjected to the standard monthly fish health monitoring program at Dworshak National Fish Hatchery.

Task 3.2.2 Standard observations were made of gills, skin, fins, internal organs, parasite presence, gas embolisms, fat levels in viscera and feeding behavior. Of the one hundred spring Chinook salmon screened for external parasites during monthly monitoring from the Control and Treatment groups, only four low level observations were made of external protozoan parasites. No abnormalities were detected in any of the Control or Treatment raceways during the experiment that indicated the presence of a pathogen.

Task 3.2.3 Screening for *Renibacterium salmoninarum* was conducted on two-five fish pools of kidney tissue from each treatment monthly starting six months prior to release. No *Renibacterium salmoninarum* was detected during the monthly monitory.

Task 3.2.4 Hematocrits levels were measured for all 10 fish as described above. Hematocrit levels for Control and Treatment groups were normal during monthly monitoring.

Task 3.2.5 Thirty spring Chinook salmon smolts were randomly collected each from the Treatment and Control group 21 days prior to release for viral, bacterial and parasite pathogens of concern.

Task 3.2.6 Kidney, spleen and gill tissue were five-fish pooled for viral detection using conventional cell culture technique. No viral pathogens were detected from the Control or Treatment group.

Task 3.2.7 Viral pellets were used for screening of the bacterial pathogens *Aeromonas salmonicida* and *Yersinia ruckeri* on trypticase soy agar with negative detection.

Task 3.2.8 Kidney tissues were two-pooled and screened for *Renibacterium salmoninarum* using the Enzyme Linked Immunosorbent Assay. *Renibacterium salmoninarum* was detected in one two fish pool from the Control group at low levels.

Task 3.2.9 Six five-fish pools of cranial elements from the Control and Treatment group each were screened for the mxyospridian parasite *Myxobolus cerebralis* by the pepsin-trypsin digest technique. *Myxobolus cerebralis* was not detected in the Control or Treatment group.

Task 3.2.10 Viral pellets were screened for the microsporidian parasite *Nucleospora salmonis* using conventional nested Polymerase Chain Reaction with negative detection

Task 3.2.11 Hematocrit levels were determined for twenty spring Chinook salmon for the Control and Treatment group. Blood samples were taken from the caudal vein in a heparinized 70 µL micro-hematocrit tube will be centrifuged at 10,000 RPM for five minutes. The percent packed cell volume (PCV) was determined by measuring the volume of packed red blood cells divided by the total volume of the blood sample. Hematocrit levels were normal for the Control and Treatment group

Task 3.2.12 The fish health data was used to build qualitative comparison table for each month during rearing and for pre-release conditions (Table 1).

Table 1: Spring Chinook salmon density study Brood Year 12 fish health monitoring results for low and high density raceways (low density: B22-30, high density: B16-22).

Case Number	Date	Case Type	#	R.sal.	Virology	Bacteria	External Parasite	*Myxobolus cerebralis*	Hematocrit Mean	*Nucleospora salmonis*
14-015-LD	10/30/2013	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	44.1	NA
14-016-HD	10/30/2013	Monitoring	10	0/5-2fp +	NA	NA	1/5 +	NA	43.9	NA
14-030- LD	11/25/2013	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	42.1	NA
14-031- HD	11/25/2013	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	37.6	NA
14-048- LD	12/27/2013	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	44.9	NA
14-049- HD	12/27/2013	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	40.0	NA
14-065-LD	01/30/2014	Monitoring	10	0/5-2fp +	NA	NA	3/5 +	NA	40.3	NA
14-066- HD	01/30/2014	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	45.1	NA
14-088-LD	02/26/2014	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	40.1	NA
14-089-HD	02/12/2014	Monitoring	10	0/5-2fp +	NA	NA	0/5 +	NA	42.0	NA
14-096-LD	03/06/2014	Inspection	30	1/15-2fp +	0/6-5fp +	0/6-5fp +	0/5 +	0/30 +	43.5	0/6-5fp +
14-097-HD	03/06/2014	Inspection	30	0/15-2fp +	0/6-5fp	0/6-5fp	0/5 +	0/30 +	45.4	0/6-5fp +

					+	+				
TOTAL (LD)			**80**	**1/40 +**	**0/6-5fp**	**0/24-5fp**	**3/25 +**	**0/30 +**		**0/6-5fp +**
TOTAL (HD)			**80**	**0/40 +**	**0/6-5fp**	**0/24-5fp**	**1/25 +**	**0/30 +**		**0/6-5fp +**

GOAL 4 Facilitate inter- and intra-agency coordination and cooperation with FWS LSRCP hatchery production and evaluation programs in Idaho.

Approach: IDFG and the NPT have management authority for fishery resources in Idaho. Therefore, coordination of FWS hatchery operations with the IDFG and the NPT is an operational necessity. In addition, various other agencies, such as the National Marine Fisheries Service, the Fish Passage Center, and the University of Idaho routinely conduct research projects and other studies involving the LSRCP programs at Dworshak and Hagerman NFHs. Close involvement by the Idaho FRO is necessary with all research and evaluation projects at these facilities to insure smooth and efficient production and evaluation of the programs. Most of this activity will be handled through the HETs.

Objective 4.1 Virus testing of Dworshak NFH steelhead adults at spawning for transfer of eggs to Magic Valley State Hatchery.

Task 4.1.1 Individual ovarian samples were collected during one take of the 2014 Dworshak NFH steelhead spawning season for virology testing for eggs transferred to Magic Valley State Hatchery:

A. Infectious Hematopoietic Necrosis Virus:
Dworshak Take 8: 40 of 106 samples or 37.7% were positive in ovarian fluid.

B. Infectious Pancreatic Necrosis Virus: not detected.

C. Viral Hemorrhagic Septicemia Virus: not detected.

Objective 4.2 Coordinate LSRCP activities between the Idaho FHC and the LSRCP Coordinator's Office.

Task 4.2.1 Upon request, the LSRCP Coordinator's Office was provided with technical assistance in reviewing and/or writing project proposals, progress reports, completion reports, position papers, or other pertinent materials.

Task 4.2.2 LSRCP coordination meetings, project reviews, and other meetings were attended as required and presentations given at those meetings as requested.

Task 4.2.3 Assistance was provided on an as requested basis regarding LSRCP federal programs to the Coordinators Office and Fish and Wildlife

Service, Regional Office on the Columbia River Fishery Management Plan and fish harvest negotiations.

Objective 4.3 Develop an Annual report for FY 2015 and a Statement of Work for FY16.

Approach: A yearly statement of work was developed to clearly outline the objectives and tasks for the upcoming fiscal year.

Task 4.4.1 The Statement of Work for FY15 was written with modifications and adjustments that reflected any anticipated changes in the FHC Fish Health Program for FY15.

Task 4.4.2 The LSRCP office was provided with out-year budgets, work plans, and project proposals as requested.

Objective 4.5 Participate in meeting HRT recommendations for Hagerman NFH.

Approach: The USFWS initiated a series of hatchery reviews to assure that its hatchery programs in the Northwest are part of a scientifically-sound and integrated strategy, consistent with State, Tribal and other Federal strategies, for conserving wild stocks and managing fisheries in watersheds within the Region. The Hatchery Review Team (HRT) developed a list of recommendations specific to the Hagerman NFH.

Task 4.5.1 Fish health input for HRT recommendation implementations were submitted from the IFHC as requested. In addition, the IFHC has a FONs project submitted for HRT recommended research studies regarding the pathogen *Nucleospora salmonaris*.