Request for Access to Bonneville Dam

RESEARCH PROJECT:

Within-season indicators of fish condition related to differential delayed mortality

SUBMITTED TO:

Attn: Jerry Carroll
Operations Manager
U. S. Army Corps of Engineers
Bonneville Lock and Dam
P. O. Box 150
Cascade Locks, OR 97014

SUBMITTED BY:

Jennifer L. Gosselin
Columbia Basin Research,
School of Aquatic and Fishery Sciences,
University of Washington
1325 4th Avenue, Suite 1515
Seattle WA 98101
Phone (206) 685-7316
Fax (206) 616-7452
Email gosselin@uw.edu

Affiliate status:
Northwest Fisheries Science Center,
NOAA Fisheries
2725 Montlake Blvd. East
Seattle WA 98112
Phone (206) 861-8220
Fax (206) 206-860-3267
Email jennifer.gosselin@noaa.gov

DATE:

January 25, 2016

1. Project work plan, including a detailed schedule of planned activities.

a) Goal:

Our goal is to relate interannual and seasonal patterns of smolt-to-adult return rates (SARs) and differential delayed mortality (*D*) to both environmental and fish conditions. A better understanding of the ecological effects of transportation on SARs can help inform pre- and within-season decisions related to managed risk of the Juvenile Fish Transportation Program (i.e., Alternative 4 of the Transportation of Juvenile Salmonids, Snake River, Washington and Idaho, Configuration and Operations Plan; USACE 2015).

b) Background

The transportation program, initiated in 1985, was designed to improve survival of smolt passage through the Snake River. While the program more than doubled hydrosystem passage survival, increased mortality in the ocean and straying of adult upriver returns decreases the benefits of transportation (Anderson et al. 2012). In addition, improvement of the fish passage at dams has further reduced the benefits of transportation relative to run-of-river passage. For these reasons transportation of smolts has been decreased from about 90% in the last decade to the current level of well below 50%. Currently fish are transported on specific dates. However, continuing research points to a highly dynamic system in which the efficacy of transportation (T) relative to run-of-river (R) passage, expressed as the ratio $D = SAR_T/SAR_R$, changes over the migration season and inter-annually. In general, the R passage yields higher SAR earlier in the migration season while T passage yields higher SAR from mid-season through June for hatchery spring/summer Chinook salmon. Studies reveal that in some years the pattern reverses with SAR of T fish exceeding R fish over the entire season while in other years SAR in both passage groups exhibit no clear pattern. Consequently, the fixed transport schedule is suboptimal, especially under high river temperatures as occurred in 2001 in which *D* values were well above 3. Importantly, high temperature occurred in 2015 and is expected with greater frequency with climate change. Thus, the fixed transportation program that does not adapt to changing year-to-year and seasonal conditions will likely become more suboptimal in the near future. An ecological understanding of seasonal patterns of SAR and *D* will help improve implementation of Alternative 4 (Managed Risk Strategy) in the Transportation of Juvenile Salmonids Configuration and Operations Plan (USACE 2015). The within-season framework of adaptive management for the Juvenile Fish Transportation Program shown by Anderson (2015) can help increase SARs by 25% or more. This level of improvement would

significantly exceed the 10% additional straying of transported fish relative to R fish (Keefer et al. 2008).

Seasonal patterns of SARs and various ratio indices of transported to run-of-river survival rates in Chinook salmon and steelhead have been determined statistically (Smith et al. 2013). However, the degree to which survival is improved because of the transportation program remains uncertain due to the variability in ecological patterns related to run timing, origin, fish condition, environmental conditions and interactions among these factors. We reason that part of the variation in SARs is driven through the environment's nonlinear effects on fish condition related to seasonal changes in energetic reserves and smoltification. Fish tracking studies suggest the interaction between environmental stress, fish condition and mortality occur in a relatively brief period of time as fish pass through the predator gauntlet of the estuarine and plume environments. We further reason that the gauntlet transit time depends on the fish's state of smoltification (Wedemeyer et al. 1980, Schreck et al. 2006, Kennedy et al. 2007). We hypothesize opposing seasonal patterns of fish smoltification and energetic reserves shape the seasonal pattern of *D*. Early in the outmigration season *D* is typically below 1 because transported fish, with a lower smoltification level than R fish, take longer to transit the predator gauntlet and therefore experience higher mortality than R fish. Later in the season *D* is typically above 1 because R fish, experiencing higher passage temperatures than transported fish, enter the estuary with lower energetic reserves and therefore R fish are more susceptible to stress of transiting the gauntlet. Furthermore, seasonal and interannual variations in the plume size and predator and prey populations alter the effects of energetic reserves and smoltification on mortality.

c) Objectives

To help resolve the relationships among fish and environmental conditions to SARs, we propose continued research that involve the following:

1. Refine our SAR and *D* models by including data on conditions of the environment (i.e., river, estuary, plume, and ocean) and of spring/summer and fall Chinook (i.e., indices of energetic reserves, smoltification, travel time, and predation risk) in context of interannual baselines and seasonal patterns.
2. Develop a pre-season forecast of hatchery-specific smolt condition and passage timing at Lower Granite Dam to compare with SAR and *D* models in Objective #1.
3. Collect various measurements of fish condition related to energetic reserves and smoltification at Lower Granite, Little Goose, McNary and Bonneville dams during outmigration year 2016, to help refine models developed in Objectives #1 and #2.
4. Collaborate and share fish samples with other researchers conducting independent studies for the overall goal of a more comprehensive understanding of the natural

development of smolts from the hatchery to the early ocean environments. Sampling in 2016 will overlap with other ongoing research sampling efforts and help provide data on fish and environmental condition data at a time of changing climate conditions (i.e., "the Blob", positive Pacific Decadal Oscillation index, large snowfall prior to a likely strong El Niño, negative North Pacific Gyre oscillation index).

d) Project work plan

In the 2016 juvenile salmon outmigration season, we will evaluate various indicators of fish condition related to differential delayed mortality (*D*) for hatchery, spring/summer and fall Chinook salmon collected at hatcheries and Lower Granite (LGR)/Little Goose (LGS), McNary (MCN), and Bonneville (BON) dams. The indicators of fish condition are 14 measurements related to energetic reserves, smoltification, and health indices (Goede and Barton 1990, Adams et al. 1993, Wood 2004, Hostetter et al. 2012, 2015, Scholz et al. 2015). These data will improve efforts in modeling SARs and *D* in pre- and within-season modeling frameworks (Anderson 2015, Anderson and Gosselin 2015).

Justification of Proposed Study Area: Bonneville Dam Juvenile Fish Facility. Collecting data on fish condition as juvenile, spring/summer and fall Chinook salmon exist the hydropower system and before they enter the estuary, plume, and early ocean environments will allow us to compare to the fish condition of juvenile Chinook salmon observed at Lower Granite Dam, Little Goose Dam, and McNary Dam. Seasonal patterns of fish conditions across the hydropower system can be related to models of smolt-to-adult-return rates and differential delayed mortality that also include environmental and climatic conditions.

Schedule of work activities: We plan to sample for 10 "weekly" samples at Lower Granite/Little Goose, McNary, and Bonneville dams (Table 1). Each "weekly" sample collected at each dam will be collected as subsamples from existing Smolt Monitoring Program activities or other ongoing sampling activities (e.g., "A Study to Determine Seasonal Effects of Transporting Fish from the Snake River to Optimize a Transportation Strategy" at LGR; *pers. comm.* T. Marsh).

Table 1. 2016 Sampling schedule at the dams.

Fish run	Sampling schedule		
	Lower Granite Dam (LGR) or Little Goose Dam (LGS)*	McNary Dam (MCN)*	Bonneville Dam (BON)
Hatchery, spring/summer, yearling Chinook	March 26-June 15, 10 "weekly" samples, 100 fish/sample	March 26-June 15, 10 "weekly" samples, 100 fish/sample	March 26-June 15, 10 "weekly" samples, 100 fish/sample
Hatchery, fall, subyearling Chinook	May 10-July 31, 10 "weekly" samples, 70 fish/sample At Little Goose Dam, In lieu of LGR**: mid-August, 1 sample of 70 fish mid-September, 1 sample of 70 fish October, 2 "bi-weekly" samples, 70 fish/sample	May 10-July 31, 10 "weekly" samples, 70 fish/sample mid-August, 1 sample of 70 fish mid-September, 1 sample of 70 fish October, 2 "bi-weekly" samples, 70 fish/sample	May 10-July 31, 10 "weekly" samples, 70 fish/sample mid-August, 1 sample of 70 fish mid-September, 1 sample of 70 fish October, 2 "bi-weekly" samples, 70 fish/sample

*A similar request for access to LGR, LGS, and MCN was submitted to USACE, Walla Walla District.
**Sampling ends at LGR in August due to construction at the Juvenile Fish Facility.

On the days (approximately once a week at each dam) when we subsample for our target fish at the Juvenile Fish Facilities at each dam, we will euthanize the fish we collect and make quick measurements of fish, including:

- Fork length
- Wet body mass
- Presence/Absence of descaling
- Presence/Absence of pale coloring of gills
- Presence/Absence of pale coloring of liver
- Presence/Absence of external parasites

Fin clips will also be collected for future genetic stock identification or parentage-based tagging by interested groups. Fish samples will be frozen for further processing at a laboratory for quantification of lipid content and Na+/K+-ATPase activity. For some of our samples, we will also collect blood, liver, and stomach samples before freezing our fish samples.

Facilities and Equipment Requirement:

Bonneville Dam Juvenile Fish Facility:

- Location where we can setup a table to record fish condition metrics listed above and collect tissue samples.
- Access to water, degassed water if supersaturated.
- Electrical outlets for plugging in a laptop, digitizer, scale, and centrifuge.
- If available, a -20°C chest freezer where we can temporarily leave our samples before we transport them to facilities at the Northwest Fisheries Science Center, NOAA Fisheries in Pasco, WA or Seattle, WA.

2. Project impact statement.

Project Services
N/A

Security
The fish collections will take place at the Bonneville Dam Juvenile Fish Facility. We will need access on the days we subsample from the Smolt Monitoring Program daily activities.

Safety
I have read the relevant sections of Corps of Engineers General Safety Requirements Manual #385-1-1 that pertain to my research. The list of personnel, the expiration dates of their First Aid and CPR certifications, and descriptions of vehicles are listed below (Table 2). I will ensure that all personnel have also read the relevant sections of COE General Safety Requirements Manual. After meeting or talking with all personnel, I will email brief weekly updates to my POCs (Mr. Ben Hausmann, Supervisory Fisheries Biologist; Ms. Ida Royer, Fisheries Research Coordinator; or other fish biologists appointed to us as our POC at Bonneville Dam).

3. Activity Hazard Analysis (AHA)

Overall, the main activities are: 1) subsampling fish from existing Smolt Monitoring Program and other research activities and anesthetizing or euthanizing the fish, 2) recording simple fish condition metrics, 3) collecting blood, liver, and stomach samples from our fish samples, and 4) storing our fish samples in a freezer. The activity hazards are listed below (Table 5).

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS (FROM EM 385-1-1)
1. Anesthetizing or euthanizing fish with MS-222	Storing, handling and disposing hazardous substances.	06.B.01. Material Safety Data Sheets are to be maintained on site. 06.B.03 Transportation, use, storage, and disposal of hazardous substances shall be under the supervision of a qualified person. All storage of hazardous substances shall be in accordance with the recommendations of the manufacturer and accessible only to authorized persons. Disposal of surplus or excess materials and containers shall occur in a manner that will not contaminate or pollute any water supply, ground water, or streams; and will comply with Federal, State, and local regulations and guidelines. 14.C.01-04, 08. Practice good housekeeping when doing the work and cleaning up.
EQUIPMENT	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
MS-222	Read label on MS-222 container.	06.B.01. Use and store MS-222 according to the manufacturers' instructions and MSDS sheets. Material Safety Data Sheets to be maintained on site.
PRINCIPLE STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS (FROM EM 385-1-1)**
2. Moving fish samples and recording simple fish condition metrics	Moving large, heavy tanks or buckets of water.	14.A.04. Move heavy or bulky material by means appropriate and safe relative to the weight, size, distance, and path of movement. Materials can be moved by manual means with handling aid (e.g., dolly or cart), or with safe lifting techniques such as lifting with legs rather than with your back. Get assistance when necessary. When lifting, keep the load close to the body and lift with the legs.

	Setting up fish recording devices to a laptop computer.	Inspect devices to ensure there are no frayed cords or other obvious defects. Ensure equipment is properly maintained and grounded. Protect electrical cords from damage by using cord covers. Do not overload outlets. When working with electrical equipment in damp areas, wear boots with soles of rubber or other insulating materials.
	Tripping hazards	05.A.08. Wear protective footwear, such as rubber boots, protective covers and safety-toed boots, shall be worn by all persons exposed to hazards to the feet (including, but not limited to, puncture, slipping, electrical, or chemical hazards). 14.C.01-04, 08. Practice good housekeeping in keeping work area uncluttered. Be aware of potential tripping hazards that cannot be removed.
EQUIPMENT	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
Laptop computer, digitizer, scale	Inspection prior to use.	03.A.02. Review instructions in using equipment according to the manufacturer's instructions. When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified to administer first aid and CPR.
Buckets / water tanks	Inspection prior to use.	Use appropriately sized buckets to limit weight of water lifted. Check that buckets and water tanks are in good working condition and that they do not become a tripping hazard if broken and/or dropped.
PRINCIPLE STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS (FROM EM 385-1-1)**

3. Collecting fin clips, gill, blood, liver, and stomach samples from our fish samples.	Storing, handling and disposing hazardous substances.	06.B.01. Material Safety Data Sheets are to be maintained on site. 06.B.03 Transportation, use, storage, and disposal of hazardous substances shall be under the supervision of a qualified person. All storage of hazardous substances shall be in accordance with the recommendations of the manufacturer and accessible only to authorized persons. Disposal of surplus or excess materials and containers shall occur in a manner that will not contaminate or pollute any water supply, ground water, or streams; and will comply with Federal, State, and local regulations and guidelines. 14.C.01-04, 08. Practice good housekeeping when doing the work and cleaning up.
EQUIPMENT	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
MS-222, alcohol, EDTA, imidazole	Read labels on containers.	06.B.01. Use and store chemicals according to the manufacturers' instructions and MSDS sheets. Material Safety Data Sheets to be maintained on site.
Centrifuge	Inspection prior to use.	03.A.02. Review instructions in using equipment according to the manufacturer's instructions. When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified to administer first aid and CPR.
PRINCIPLE STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS (FROM EM 385-1-1)**
4. Storing our fish samples in a freezer, in liquid nitrogen (dry ice)	Storing, handling and disposing hazardous substances.	06.B.01. Material Safety Data Sheets are to be maintained on site. 06.B.03 Transportation, use, storage, and disposal of hazardous substances shall be under the supervision of a qualified person. All storage of hazardous substances shall be in accordance with the recommendations of the manufacturer and accessible only to authorized persons. Disposal of surplus or excess materials and containers shall occur in a manner that will not contaminate or pollute any water supply, ground water, or streams; and will comply with Federal, State, and local regulations and guidelines. 14.C.01-04, 08. Practice good housekeeping when doing the work and cleaning up.

EQUIPMENT	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Chest freezer	Inspection prior to use.	03.A.02. Review instructions in using equipment according to the manufacturer's instructions. When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified to administer first aid and CPR.
Liquid nitrogen (dry ice)	Storing, handling and disposing hazardous substances.	06.B.01. Material Safety Data Sheets are to be maintained on site. 06.B.03 Transportation, use, storage, and disposal of hazardous substances shall be under the supervision of a qualified person. All storage of hazardous substances shall be in accordance with the recommendations of the manufacturer and accessible only to authorized persons. Disposal of surplus or excess materials and containers shall occur in a manner that will not contaminate or pollute any water supply, ground water, or streams; and will comply with Federal, State, and local regulations and guidelines. 14.C.01-04, 08. Practice good housekeeping when doing the work and cleaning up.

4. Accident Prevention Plan (APP)

Please see APP at end of this Request for Access (p.13-17).

5. Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS).

For the following list of chemical substances, we will have MSDSs or SDSs presented to the appropriate Project Fishery Biologists prior to bringing them on site, and will have them available to anyone working in the area.

- MS-222
- isopropyl alcohol
- EDTA
- imidazole
- sucrose
- liquid nitrogen (dry ice)

6. ESA documents, status of application.

Application # 20141 submitted 01/25/2016 for "ESA listed species take coverage for scientific purposes covered under the 2008/2014 FCRPS Biological Opinion".

7. State collection permits, status of applications.

Washington Department of Fish and Wildlife Scientific Collection Permit application submitted 01/20/2016, and Oregon Department of Fish and Wildlife Scientific Take Permit application submitted 01/25/2016.

8. Funding arrangements for project support.

The modeling effort (Objectives #1 and #2) conducted at Columbia Basin Research, School of Aquatic and Fishery Sciences, University of Washington is funded by Bonneville Power Administration. The field work (Objective #3) is sponsored by the Northwest Fisheries Science Center, NOAA Fisheries and is funded by the Bonneville Power Administration.

9. Lists of personnel and vehicles on site

Table 2. List of Personnel

			EXPIRATION	
NAME	**AGENCY**	**ACTIVITY**	**1ST AID**	**CPR**
BECKMAN, BRIAN R.	NOAA Fisheries	Sample juvenile fish and record fish condition metrics monthly (04/01/16-06/30/16)	09/2016	09/2016
GOSSELIN, JENNIFER L.	NOAA Fisheries	Sample juvenile fish and record fish condition metrics (03/26/16-10/31/16)	04/22/2016; recertification course in 03/2016*	04/22/2016; recertification course in 03/2016*
JOURNEY, MEREDITH	NOAA Fisheries	Sample juvenile fish and record fish condition metrics monthly (04/01/16-06/30/16)	recertification course in 03/2016*	recertification course in 03/2016*

LAMB, JESSE J.	NOAA Fisheries	Sample juvenile fish and record fish condition metrics weekly (03/26/16-10/31/16)	09/2017	09/2017
NESBIT, MATTHEW G.	NOAA Fisheries	Sample juvenile fish and record fish condition metrics weekly (03/26/16-10/31/16)	01/13/2017	01/13/2017
SPANGENBERG, DINA	NOAA Fisheries	Sample juvenile fish and record fish condition metrics monthly (04/01/16-06/30/16)	recertification course in 03/2016*	recertification course in 03/2016*

* Recertification in 1st Aid and CPR will be completed before access to Bonneville Dam.

Table 3. List of Vehicles. Any one of vehicles from the motor pool of the Northwest Fisheries Science Center, NOAA Fisheries will be used. The vehicles from the NWFSC motor pool in Pasco, WA are listed below. The vehicles from the NWFSC motor pool in Seattle, WA are too many to enumerate here, but the list can be provided upon further request, or the vehicle information can be provided as soon as it is reserved.

LICENSE	ST	DESCRIPTION	COLOR	AGENCY	OWNER	POC/CREW
1216L	WA	Chevy 3500	white	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.
1459M	WA	Chevy 2500	white	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.
1935H	WA	Chevy Suburban	gold	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.
0246M	WA	Chevy Tahoe	white	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.
2107G	WA	Ford F350	gold	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.
0854M	WA	Ford F350	white	NWFSC, NOAA Fisheries	NWFSC, NOAA Fisheries	GOSSELIN, JENNIFER L.

References

Adams, SM, AM Brown, and RW Goede. 1993. A Quantitative Health Assessment Index for Rapid Evaluation of Fish Condition in the Field. Transactions of the American Fisheries Society, 122:1, 63-73.

Anderson JJ, JL Gosselin, and KD Ham. 2012. Snake River Basin Differential Delayed Mortality. Technical report prepared by Anderson Consultant, Seattle, Washington and the Pacific Northwest National Laboratory, Richland, Washington for the U.S. Army Corps of Engineers, Walla Walla District, Walla Walla, Washington, PNWD–4283, 466 pages.

Anderson JJ. 2015. Seasonal Pattern of Differential Marine Survival of Barged to Run-of-River Juvenile Spring Chinook Salmon Explain By Counteracting Patterns of Smoltification and Fish Condition. Oral presentation at the American Fisheries Society 145th Annual Meeting, 16th-20th August 2015, Portland, Oregon.

Anderson JJ and JL Gosselin. 2015. Seasonal Patterns of River Temperature and Smolt Migration Velocity Explain Within-season but not Interannual Patterns of Differential Delayed Mortality Between Run-of-river and Transported Smolts. Oral presentation at the Anadromous Fish Evaluation Program Annual Meeting, 8th-10th December 2015, Walla Walla, WA.

Goede RW and BA Barton. 1990. Organismic indices and an autopsy-based assessment as indicators of health and condition in fish. American Fisheries Society Symposium 8:93-108.

Hostetter NJ, AF Evans, DD Roby, and K Collis. 2012. Susceptibility of Juvenile Steelhead to Avian Predation: the Influence of Individual Fish Characteristics and River Conditions. Transactions of the American Fisheries Society 141(6):1586-1599.

Hostetter NJ, AF Evans, FJ Loge, RR O'Connor, BM Cramer, D Fryer, and K Collis. 2015. The Influence of Individual Fish Characteristics on Survival and Detection: Similarities across Two Salmonid Species. North American Journal of Fisheries Management 35(5):1034-1045.

Keefer ML, CC Caudill, CA Peery, and SR Lee. 2008. Transporting juvenile salmonids around dams impairs adult migration. Ecological Applications 18(8):1888-1900.

Kennedy BM, WL Gale, and KG Ostrand. 2007. Relationship between smolt gill Na+, K+, ATPase activity and migration timing to avian predation risk of steelhead trout (*Oncorhynchus mykiss*) in a large estuary. Canadian Journal of Fisheries and Aquatic Sciences 64:1506-1516.

Scholz, AM, L Bünger, J Kongsro, U Baulain, and AD Mitchell. 2015. Non-invasive methods for the determination of body and carcass composition in livestock: dual-energy X-ray absorptiometry, computed tomography, magnetic resonance imaging and ultrasound: invited review. Animal 9(7):1250-1264.

Schreck CB, TP Stahl, LE Davis, DD Roby, and BJ Clemens. 2006. "Mortality Estimates of Juvenile Spring-Summer Chinook Salmon in the Lower Columbia River and Estuary, 1992-1998: Evidence for Delayed Mortality?" Transactions of the American Fisheries Society 135(2):457-475.

Smith SG, DM Marsh, RL Emmett, WD Muir, and RW Zabel. 2013. A study to determine seasonal effects of transporting fish from the Snake River to optimize a transportation strategy. Report of the National Marine Fisheries Service to the US Army Corps of Engineers, Walla Walla, Washington.

USACE (U.S. Army Corps of Engineers), Walla Walla District. 2015. Transportation of Juvenile Salmonids - Snake River, Washington and Idaho. Configuration and Operations Plan, 2015 Update.

Wedemeyer GA, RL Saunders, and WC Clarke. 1980. Environmental Factors Affecting Smoltification and Early Marine Survival of Anadromous Salmonids. Marine Fisheries Review 42:1-14.

Wood SE. 2004. The effectiveness of dual energy X-ray absorptiometry to non-invasively determine body composition of hybrid striped bass. Master of Science thesis, Department of Animal and Avian Sciences, University of Maryland.

Accident Prevention Plan
Bonneville Dam

Northwest Fisheries Science Center
Request for Access 2016

I. Preparer: Jennifer L. Gosselin

Research Scientist
Columbia Basin Research,
School of Aquatic and Fishery Sciences,
University of Washington
1325 4th Avenue, Suite 1515
Seattle WA 98101
Phone (206) 685-7316
Email gosselin@uw.edu

Affiliate status:
Northwest Fisheries Science Center,
NOAA Fisheries
2725 Montlake Blvd. East
Seattle WA 98112
Phone (206) 861-8220
Email jennifer.gosselin@noaa.gov

II. Project: Within-season indicators of fish condition related to differential delayed mortality

Agency name: Northwest Fisheries Science Center, NOAA Fisheries

Brief project descriptor: Collect various measurements of fish condition related to energetic reserves and smoltification of juvenile Chinook salmon during outmigration year 2016, to help refine models of interannual and seasonal rates of smolt-to-adult survival rates and differential delayed mortality.

Location of the project: Bonneville Dam Juvenile Fish Facility (JFF)

Safety concerns:

1. Trip/fall hazards on stairs and walkways.
   All NWFSC personnel associated with this research study (Table 2 of

Request for Access to Bonneville Dam) will receive orientation/training in JFF operations from Corps staff and be familiar with NWFSC's Fall Protection Plan. They will use handrails and not go on unprotected walkways. They will practice good housekeeping in keeping work area uncluttered, and be aware of potential tripping hazards that cannot be removed.

2. Collecting fish tissue and blood samples with scissors, scalpels, and sharp needles that can penetrate skin.
   All NWFSC personnel associated with this research study will be trained in proper tissue sampling procedures and used blades and needles will be disposed of in biohazard containers.

3. Storing, handling and disposing hazardous substances.
   All NWFSC personnel associated with this research study will be trained in proper transportation, use, storage, and disposal of hazardous substances. They will practice good housekeeping when doing the work and cleaning up. MSDSs or SDS will be maintained on site.

4. Moving large, heavy tanks or buckets of water.
   All NWFSC personnel associated with this research study will be trained in proper safe lifting techniques, to check for proper equipment, to wear proper footwear and clothing, and be advised to use appropriately sized buckets to limit weight of water lifted.

III. Safety and Health Policy:

NWFSC actively promotes safety awareness and safe work practices for all its employees: "Program success depends on all employees, contractors, and affiliates being aware of situations that can cause injury, illness, death or destruction to material, property or the environment and taking action before loss or damage occurs. The foundation of a safe environment is training, prevention and intervention."

IV. Responsibilities/Line Authority:

Jennifer Gosselin (Research study co-principal investigator [co-PI]; 206-850-2711; jennifer.gosselin@noaa.gov) is responsible for weekly safety meetings and reporting to our BON POC, Mr. Ben Hausmann (Supervisory Fisheries Biologist, 541-374-4598; ben.j.hausmann@usace.army.mil). All safety violations are documented and reported to him.

Employee training records are maintained through an internal NWFSC website (https://inside.nwfsc.noaa.gov). Jennifer Gosselin will ensure that all NWFSC personnel associated with this research project are properly trained and certified before accessing BON.

The NWFSC emergency and safety personnel are:

Mr. Jon Buzitis
Safety & Environmental Compliance Officer Assistant
Tel: 206-302-2438
Cell: 206-419-6135
Email: jon.buzitis@noaa.gov
Address: 2725 Montlake Blvd. E., Seattle, WA 98112

Mr. Thanh Trinh
Safety & Environmental Compliance Officer
Tel: 206-860-6798
Cell: 206-310-5468
Email: thanh.m.trinh@noaa.gov
Address: 2725 Montlake Blvd. E., Seattle, WA 98112

V. Safety and Occupational Health Training of New Hires and retraining/Recertification requirements:

Laboratory Safety Training, Hazard Communication (HazCom) with Globally Harmonized System (GHS) of Safety Data Sheets (SDS) Training, and Defensive Driving Training through the Occupational Safety and Health Admnistration and/or Northwest Fisheries Science Center, NOAA Fisheries.

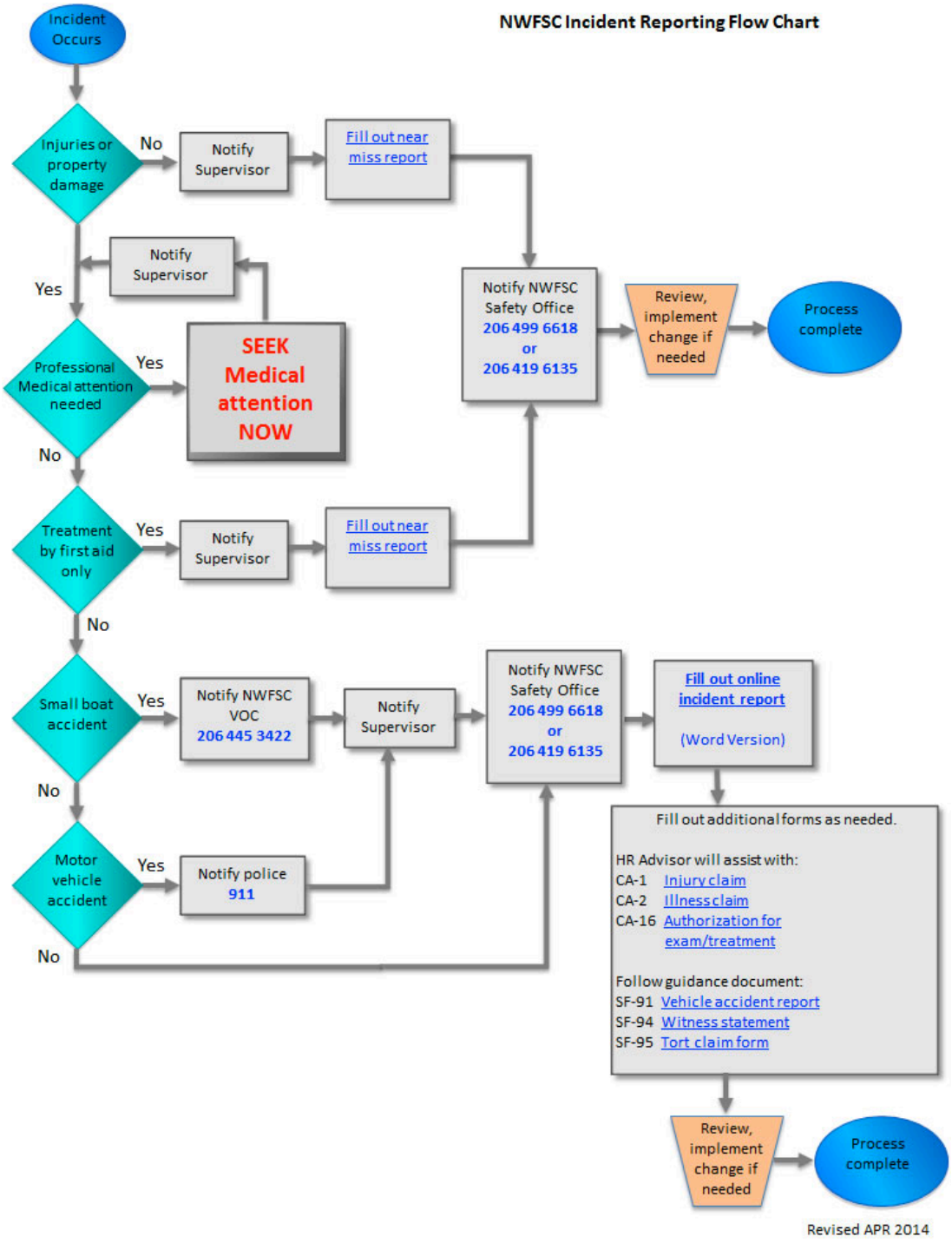
VI. Procedures for Job Site Inspections, Responsibilities and Frequency:

Jennifer Gosselin (Research study co-PI) will coordinate with the NWFSC personnel associated with this research study, our BON POC, Fish Biologists working at the BON JFF to ensure the site is safe for access and research activities. It is also the responsibility of all NWFSC personnel to practice safe procedures and report any accidents, safety violations or concerns.

VII. Procedures for Reporting and Investigating Accidents:

Accidents will be reported to the Research study co-PI, Jennifer Gosselin, the BON POC, Mr. Ben Hausmann, and reported within 24 hours through a NWFSC incident report form (https://inside.nwfsc.noaa.gov/resources/safety/accidents.cfm).

NOAA Online incident reporting website



- Incident Report Form
- Example of Electronic Report Form
- Near Miss Report Form

VIII. Emergency Planning:

In case of an emergency, crew leaders (Jesse Lamb and Matthew Nesbit) can administer first aid and CPR. There are also on-site phones on the internal project phone system for dialing the BON emergency extension (2223).

IX. Drinking Water Provision, Toilet and Washing Facilities:

Available at the BON JFF.

X. First Aid and CPR:

All NWFSC personnel will be certified and trained before accessing BON.

XI. Personal Protective Equipment:

All NWFSC personnel will wear hard hats, long pants, and steel-toed boots when working at the BON JFF.

XII. Machine Guards and Safety Device:

N/A

XIII. Hazardous Substances:

NWFSC personnel will be working with a chemical fish anesthetic (MS-222), liquid nitrogen (dry ice), isopropyl alcohol, and SEI (a mixture of EDTA, imidazole, and sucrose). Before use of these chemicals, they will familiarize themselves with the MSDSs or SDSs and be trained on its proper use and handling. NWFSC personnel will also be using hypodermic needles to collect blood samples and scissors or scalpels for gill, liver, and stomach sampling. They will be trained in proper sampling techniques and used needles and scalpel blades will be placed into biohazard containers for disposal.

XIV. Traffic Control:

All NWFSC personnel will practice safe driving at BON.

XV. Control of Hazardous Energy and Lockout/Tagout:

All NWFSC personnel will attend a pre-work safety meeting with project staff and abide by lockout/tagout rules.

XVI. Driving and Working with Equipment on Slopes or from a Boat:

All NWFSC personnel will practice safe driving at BON. We do not anticipate any work with boats or large equipment.