

# 2022 Fish Passage Plan

## Appendix A

### Special Project Operations & Studies

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## 1. INTRODUCTION

### 1.1. Purpose

This Appendix to the annual *Fish Passage Plan* (FPP) describes special project operations and studies planned to occur during the current year that may affect fish passage at the four Lower Snake River and four Lower Columbia River projects. All special operations and studies will be coordinated with the project and appropriate regional agencies. The Corps RCC will issue a teletype to authorize all necessary operational changes and provide guidance to project operators.

### 1.2. Schedule

All dates defined for special operations and studies are approximate and could shift earlier or later due to a variety of factors, including river flow, contractor schedules, equipment failures, or other real-time conditions. Some studies in this Appendix may not be implemented. Therefore, a final description of studies and outages/operations being conducted will be regionally coordinated prior to April 1 as part of the Corps' Anadromous Fish Evaluation Program (AFEP) via the Fish Facilities Design Review Workgroup (FFDRWG) and/or the Studies Review Workgroup (SRWG). The Action Agencies will coordinate all significant operational requests and/or schedule changes with fish agencies and tribes through the appropriate regional forum to inform the final decision.

### 1.3. Spill for Juvenile Fish Passage

Spring and summer spill operations for juvenile fish passage will be implemented as defined in the *Fish Operations Plan* (FOP; included in the FPP as **Appendix E**), or as otherwise coordinated in-season through TMT. Spill for juvenile fish passage will begin on April 3 at the Lower Snake River projects (IHR, LMN, LGS, LWG) and on April 10 at the Lower Columbia River projects (BON, TDA, JDA, MCN), and continue through August 31. Alternative spill patterns to manage total dissolved gas (TDG) and/or fish passage conditions will be coordinated through the Fish Passage Operations & Maintenance (FPOM) workgroup. During periods of high river flow, the spill rate and forebay elevation at Lower Monumental and Lower Granite may need to be adjusted daily or every-other-day if needed to provide safe conditions for the fish transport barge in the tailrace.

### 1.4. Navigation Lock Maintenance

Annual navigation lock outages are scheduled for routine maintenance and inspections, as well as non-routine work. In 2022, all locks require an extended outage for additional work (e.g., clean and realign gates, structural inspections, repair structural welds, and repair/replace equipment and machinery).

Project	Lock Outage
<b>BON</b>	13-FEB through 12-MAR
<b>TDA</b>	13-FEB through 19-MAR
<b>JDA</b>	13-FEB through 05-MAR
<b>MCN</b>	13-FEB through 13-MAR

Project	Lock Outage
<b>IHR</b>	13-FEB through 12-MAR
<b>LMN</b>	19-FEB through 19-MAR
<b>LGS</b>	13-FEB through 12-MAR
<b>LWG</b>	25-FEB through 19-MAR

## 1.5. Doble Testing<sup>1</sup>

The current year’s transformer outage schedule for Doble testing at lower Snake projects and Dworshak Dam is in **Table A-1**.

### 1.5.1. Lower Snake River Projects:

At the Lower Snake projects, Doble testing of transformers is required every three years to ensure they are functioning correctly and to identify issues that need repair. The testing must be conducted during warm, dry conditions (July–August) and requires an outage of the transformer and associated units. Testing is performed during already scheduled outages to the extent possible and timed to avoid or minimize impacts to fish. In years that Doble testing isn’t required, the project may still require an outage during the same timeframe to perform necessary transformer maintenance and repairs that were identified in previous Doble tests and inspections. For more information, see project-specific **sections 6-9** below.

### 1.5.2. Dworshak Dam:

At Dworshak Dam, required transformer maintenance and Doble testing occurs every two out of three years starting September 21. For more information on Dworshak maintenance and testing, see **Appendix I**.

**Table A-1. Doble Testing Schedule in 2022.<sup>a</sup>**

Project	Dates	Outage (Transformer & Units)	Notes <sup>b</sup>
IHR	July 18–22	TW1 & TW2 (Units 1, 2) all hours	Remaining available units (3, 4, 5, 6) operated per FPP priority order.
LMN	Aug 22 – Oct 14	T2 (Units 5, 6) all hours T1 (Units 1-4) up to 2 hours on first and last day.	T-2 Doble tested while OOS for rehab. Units 5, 6 OOS all hours. T-1 and T-2 (all units) OOS for up to 2 hours on first/last day to open T-2 mod. See <b>section 7.1.4</b> for more info.
LGS	N/A	N/A	No Doble tests in 2022
LWG	Aug 8–12	T1 (Units 1-4) all hours T2 (Units 5-6) daily 0600-1900	All units OOS Aug 8–12 daily from 0600–1900 with Unit 5 at speed no load for station service. During all other hours, Units 5–6 available.
DWR	Sep 21-29	T1 (Unit 2 & 3)	Unit 3 and T1 500kv line outage for Doble. Unit 2 also out of service because of T1 outage.

**a.** The lower Columbia projects (BON, TDA, JDA, MCN) perform Doble testing concurrent with outages for maintenance and do not have specific outages for Doble tests.

**b.** OOS = Out of Service (unavailable to operate); RTS = Return to Service (available to operate).

<sup>1</sup> “Doble test” is a common term referring to a power factor test of transformers to measure performance of electrical insulation. Doble is the name of a manufacturer of the test equipment.

## 2. BONNEVILLE DAM

### 2.1. BON Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage and navigation lock maintenance.

### 2.2. BON Studies

#### **2.2.1. Powerhouse 2 Fish Guidance Efficiency (FGE) Program – Unit 15 Gatewell Hydraulic Velocity Measurements.**

- a) Dates: Work is scheduled to occur in spring 2022.
- b) Description: The B2FGE Program PDT has contracted work to install concrete gatewell flow modification devices in place of the metal plates that were installed and then removed due to structural failure. Installation has been complete in hydraulic test Unit 15 during 2021.

In spring 2022, hydraulic measurements will be taken in the gatewell and behind the VBS, expected to occur sometime in May–June. The gatewell measurements will be similar to what was done in 2014 and 2015. VBS screens in test gatewells will be raised, seals inspected, and cleaned at least once per week, or as coordinated with the project to account for environmental conditions. Hydraulic measurement equipment and framework will be in the Unit 15 gatewells during test periods. Unit 15 will be tested during operation in the middle 1% range and the upper 1% range, one day per gatewell for each treatment, during daylight hours (0600–1700). Adjacent Units 14 and 16 operations will be requested during the test periods to provide stable operations to minimize hydraulic changes in the gatewell. All unit operations will be within the existing 1% range (see FPP Table BON-15), with unit availability contingent on total river flow, spill, and unit priority. A daily schedule will be provided to Bonneville Dam Operations.

Test objectives include:

1. Measurements in all three gatewells of Unit 15: 15A, 15B, 15C.
  2. Two flow treatments per gatewell: 14.3–14.8 kcfs (mid-1%) and 18.0–18.5 kcfs (upper 1%).
  3. One day for testing each treatment per gatewell, totaling six working days. Testing will be conducted during daylight hours, 0600–1700.
  4. Additionally, pressure transducers will be installed in the 15A head gate slot near the concrete modification to collect information that will allow us to better characterize and understand the hydraulic environment at this location.
- c) Impacts to FPP Criteria: Unit 15 test operations during the upper 1% treatment (3 days, 0600–1700) may be out of criteria defined in FPP BON section 4.2.2. Unit outages and test operations may result in PH2 units being operated out of priority order defined in FPP Table BON-13.

### **3. THE DALLES DAM**

#### **3.1. TDA Special Operations**

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage and navigation lock maintenance.

#### **3.2. TDA Studies**

There are no studies planned at The Dalles Dam in 2022.

## 4. JOHN DAY DAM

### 4.1. JDA Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage and navigation lock maintenance.

#### 4.1.1. Blalock Island Operation

- a) Dates: April 10 – June 1 (or as feasible based on river flows).
- b) Description: As described in the 2020 CRS BA (page 2-57), the John Day reservoir will be held between elevation 264.5 feet and 266.5 feet (an average of 265.5 feet) from April 10 through June 1 (or as feasible based on river flows) to deter Caspian terns from nesting in the Blalock Islands Complex. The Action Agencies intend to begin increasing the forebay elevation prior to initiation of nesting by Caspian terns to avoid take of tern eggs; operations may begin earlier than April 10 (when the reservoir is typically operated between 262.0 to 266.5 feet). The operation may be adaptively managed due to changing run timing; however, the intent of the operation is to begin returning to reservoir elevations of 262.5–264.5 feet on June 1, but no later than June 15, which generally captures 95% of the annual juvenile steelhead migration. The results of this action will be monitored and communicated with USFWS and NMFS. During the operation, safety-related restrictions will continue, including but not limited to maintaining ramp rates for minimizing project erosion and maintaining power grid reliability. Following this operation, the John Day reservoir elevation will return to MIP through August 31.
- c) Impacts to FPP Criteria: None planned.

### 4.2. JDA Studies

There are no studies planned at John Day Dam in 2022.

## 5. McNARY DAM

### 5.1. MCN Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage and navigation lock maintenance.

#### 5.1.1. Fish Ladder Exit, Entrance, Regulating/Tilting Weir Maintenance

- a) Dates: Monthly (Long-Term).
- b) Description: The *Oil Accountability Program* PMs maintenance efforts require the project to operate all equipment monthly and semi-annually to assess oil/grease requirements and to ensure seals do not dry out or stick to shafts. The motors for each weir can be operated during the winter outage to exercise seals.
- c) Impacts to FPP Criteria: None planned. Minimal impact due to coordination of outages and use of non-peak adult fish passage times. Any modification or deviation from FPP criteria will be coordinated with FPOM.

#### 5.1.2. Spillway Safety Restrictions

- a) Dates: Long Term (year-round).
- b) Description: Spillway Hoist and Spillway Crane maintenance requires HECP safety boundaries to include the hoist being worked upon and the adjacent hoists on both sides of the affected hoist and the Spillway Cranes are both being set to step 4 and dogged in position to limit excessive actuation of the crane's electrical equipment. Also, due to the overloaded condition of the spillway hoists, it has been determined that any preventative or corrective maintenance will require spillway hoists to be lowered on seal and tagged out prior to any access onto hoists or gates. This ensures the safety of personnel and equipment.
- c) Impacts to FPP Criteria: None planned. Minimal impact due to spill pattern changes to support spillway cranes and potential intermittent spill pattern changes due to unforeseen hoist maintenance. Any modification or deviation from FPP criteria will be coordinated with FPOM.

#### 5.1.3. Waterfowl Nesting

- a) Dates: April through July (annually).
- b) Description: Since 1982, McNary pool is operated for waterfowl nesting on Lake Wallula annually from late April through early July. During this operation, the McNary pool may be restricted to an operating range of 337'–340' elevation. Pool elevations are also operated in the range of 338.5'–339.5' for 4-6 hours during daylight hours at least once every 4 days.
- c) Impacts to FPP Criteria: None. Provided for informational purposes only.

**5.1.4. Transformer Gasket Replacement, Capitol Project.**

- a) Dates: April to October.
- b) Description: Transformer gasket replacement will occur with associated unit outages.
- c) Impacts to FPP Criteria: When a unit is out of service for transformer gasket replacement, the next available unit in the priority order will be operated.

**5.1.5. Outages for Digital Excitation/Governor Upgrades.**

- a) Dates: FY22 – FY26
- b) Description: Replacing Exciters and Governors with digital systems to upgrade generators to current electrical standards, Mechanical Governor Upgrades, Power House Control Systems Upgrades, Isophase, HV Bus and XJ Switch upgrades.
- c) Impacts to FPP Criteria: Unit priority will be affected and commissioning requirements will require exceeding 1% generation during testing of Over Speed Protection, Upper and Lower Excitation Limits, Mechanical Governor Response Times, and other reliability tests necessary. Some specific testing will require raising ESBSs during testing periods, especially when determining new Generator Capability Curve data. Due to the extended period of these contracts, raising ESBSs and exceeding 1% may occur at any unknown time of the year.

**5.2. MCN Studies**

There are no studies planned at McNary Dam in 2022.

## 6. ICE HARBOR DAM

### 6.1. IHR Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage, navigation lock maintenance, and Doble testing.

#### 6.1.1. Unit 3 Turbine Runner Replacement

- a) Dates: Ongoing through mid-2022.
- b) Description: Unit 3 will be out of service through mid-2022 to replace the turbine runner. After the unit is returned to service, commissioning will require full load rejection testing, which needs to be completed with no submerged traveling screens (STS) installed. Unit 3 will return to service after March 2022, which would result in running the unit for the time required to complete commissioning (10 days) with no STS installed.
- c) Impacts to FPP Criteria: While Unit 3 is out of service and unavailable for operation, the project will operate the next available unit in the FPP priority order. Full load rejection testing will be coordinated with FPOM via a separate MOC.

#### 6.1.2. Line #2 Protective Relay Replacement

- a) Dates: February 28 – April 1, 2022
- b) Description: Line #2 will be down for BPA to replace the protective relays. MU3 & MU4 will be down in association with this work.
- c) Impacts to FPP Criteria: None. When a unit is out of service, the next unit in the FPP priority order will be operated.

#### 6.1.3. Doble Testing (see section 1.5 above for more information)

- a) Dates: Summer (annually). In 2022, the outage is scheduled July 18–22.
- b) Description: The outage in 2022 is required to perform Doble testing of TW1 and TW2, which will take Units 1 and 2 out of service continuously during testing. Remaining available units (3,4, 5, 6) will be operated per FPP priority order.
- c) Impacts to FPP Criteria: None. Doble testing is conducted in conjunction with scheduled outages for unit 1 runner replacement and unit 2 annual maintenance. If the start of the outage for the unit 1 runner replacement is projected to slip to later in the year, Doble testing and associated unit 1 outage will be coordinated with FPOM via a separate MOC. Since Ice Harbor has multiple transformer banks and transmission lines and redundant switching capability, remaining available units will be available and operated pursuant to FPP priority order. River flows are typically lower this time of year, so it is unlikely that additional spill will be needed above the voluntary spill for juvenile fish that will already be occurring.

## 6.2. IHR Studies

### 6.2.1. IHR Unit 3 Direct Injury and Sensor Fish Characterization.

- a) Dates: September 2022 – October 2022
- b) Description: Juvenile spring Chinook salmon and Sensor Fish will be directly released into turbine unit 3 to evaluate the new Kaplan runner. The study is expected to require approximately four weeks of total study time. Direct release pipes will be installed in all three intakes of Unit 3 for direct fish and Sensor Fish releases. Release pipes will be installed on the STS frames. Three specific turbine operations will be tested. Project support will be provided for equipment install, removal, and turbine operations. A one-day Unit 3 outage is expected for release pipe install and removal. Another consideration will be river flow and unit priority during the study period. Specific dates for Project support, outages, and operations will be scheduled appropriately with the Project and through FPOM closer to study implementation.
- c) Impacts to FPP Criteria: Any modification to unit priority order or other FPP criteria will be coordinated through FPOM.

## 7. LOWER MONUMENTAL DAM

### 7.1. LMN Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage, navigation lock maintenance, and Doble testing.

#### 7.1.1. Lower Monumental Head Gate Rehab

- a) Dates: Ongoing through 2029.
- b) Description: Under the BPA Large Cap Program, parts and materials have been acquired to rehabilitate the head gates at Lower Monumental Dam. The work started in December 2012. To facilitate the process, units will be scheduled out of service to remove or replace head gates. The head gates will be serviced in the repair pit and then placed back into service.
- c) Impacts to FPP Criteria: Deviation from unit priority will be necessary to swap head gates from the unit to the pit. The duration of the outage is expected to be one day.

#### 7.1.2. Model Validation Testing

- a) Dates: September through March (annually).
- b) Description: Western Electricity Coordinating Council (WECC) requires steady state model validation testing periodically to ensure generating equipment will meet real and reactive power ratings. All units are tested on a one to two-year cycle. Tests are also required when equipment is replaced or upgraded. Tests will require running the unit out of FPP priority and outside the 1% range. Testing can occur any time from September 1–March 31 and will not occur during peak juvenile fish passage (April 1–August 31). Tests will preferably be conducted just after annual maintenance but may happen at other times. Test durations will be minimized to the extent possible and will only be run for the purpose of completing required model validation testing.
- c) Impacts to FPP Criteria: May require running a unit out of FPP priority and outside 1%.

#### 7.1.3. Doble Testing (see section 1.5 above for more information)

- a) Dates: There is no outage specifically for Doble testing in 2022. Line T-2 will be Doble tested while it is out of service for rehabilitation (see **section 7.1.4** below).
- b) Description: N/A
- c) Impacts to FPP Criteria: N/A

#### 7.1.4. T-2 Rehabilitation

- d) Dates: August 22 - October 14, 2022.
- e) Description: On the first and last day of the outage, T-1 (Units 1–4) and T-2 (Units 5, 6) will be out of service for up to 2 hours (0700-0900 on August 22 and 1500-1700 on October

14) to support opening of T-2 modification. Units 5, 6 will be out of service for the duration of the outage for refurbishment, Doble testing, Unit 5 XJ5 breaker annual, and Unit 6 annual.

f) Impacts to FPP Criteria: Units 5 and 6 will be unavailable for the duration of the work but will likely not be needed at flows expected for that time of year. The 2-hour outage of all units on August 22 and October 14 may have an impact at the north adult fish ladder.

#### 7.1.5. MU1 Maintenance/Turbine Priority Change

g) Dates: November 14–30, 2022.

h) Description: Unit 1 will be out of service from November 14, 2022, to January 27, 2023, to replace the wicket gates packing with new mechanical seals. The unit being out of service will affect the FPP unit priority order from November 14 to November 30.

i) Impacts to FPP Criteria: Deviation from unit priority will be necessary to complete the maintenance. The priority order for fish passage starts with Unit 1 then proceeds in order from north to south. Removing Unit 1 from service will change the attraction flow to the north adult fish ladder.

#### 7.2. LMN Studies

There are no studies planned for Lower Monumental Dam in 2022.

## **8. LITTLE GOOSE DAM**

### **8.1. LGS Special Operations**

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage, navigation lock maintenance, and Doble testing.

#### **8.1.1. Powerhouse Roof Repair**

- a) Dates: Continuous line outage either April 5–9 or June 27 – July 1, 2022.
- b) Description: Modification to the high voltage buswork on powerhouse roof.
- c) Impacts to FPP Criteria: All units will be out of service April 5–9 or June 27–July 1. All project outflow will be spilled except Unit 6 for station service (approx 7 kcfs). Project will be running on the Emergency Diesel Generator (EDG) for approximately 1 hour at the beginning and end of the line outage. While on EDG, fish ladder cooling pumps will not be functional.

### **8.2. LGS Studies**

#### **8.2.1. Kelt Collection & Reconditioning**

- a) Dates: April to July 2022
- b) Description: The Nez Perce Tribe (NPT) Department of Fisheries Resources Management will collect wild/natural post-spawned, emigrating steelhead from the separator at Little Goose Juvenile Fish Facility. These fish will be transported to the Nez Perce Tribal Hatchery (NPTH) or Dworshak National Fish Hatchery (DNFH) to be utilized in the kelt reconditioning program.
- c) Impacts to FPP Criteria: None.

## 9. LOWER GRANITE DAM

### 9.1. LWG Special Operations

Special project operations that may require deviations from FPP criteria will be coordinated with FPOM either by inclusion in this Appendix or in-season via a Memo of Coordination (MOC), pursuant to **FPP Chapter 1 (Overview)**. See **section 1** above for special operations related to spill for juvenile fish passage, navigation lock maintenance, and Doble testing.

#### 9.1.1. Head Gate Repair

- a) Dates: Bi-Monthly (long-term).
- b) Description: This is a long-term program to return head gates to a safe operating condition by adding new roller chain, seals, anodes, and other miscellaneous components. The plan will require brief unit outages throughout the year while transporting rebuilt gates from the turbine units to the repair pit and back. Each swap will take 4–6 hours to complete and occur approximately every 2 months.
- c) Impacts to FPP Criteria: None anticipated. Head gate movements are expected to take place concurrently with other outages. As the program progresses and fewer head gates need repair, it may require an occasional outage on a priority unit. Available units will be operated pursuant to FPP priority order within  $\pm 1\%$  of peak turbine efficiency.

#### 9.1.2. ESBS Repair

- a) Dates: Bi-Monthly (long-term).
- b) Description: This is a long-term program to return ESBSs to a safe operating condition by tearing down, repainting, and rebuilding the screens. The plan will require brief unit outages throughout the year while transporting rebuilt ESBSs from the turbine units to the repair pit and back. Each swap will take 4–6 hours to complete and occur approximately every 2 months.
- c) Impacts to FPP Criteria: None anticipated. ESBS movements are expected to take place concurrently with other outages. As the program progresses and fewer screens need repair, it may require an occasional outage on a priority unit. Available units will be operated pursuant to FPP priority order within  $\pm 1\%$  of peak turbine efficiency.

#### 9.1.3. Replace Powerhouse 480 Volt and 125 Volt DC Control Voltage Switchgear

- a) Dates: 2020–2023 (dates to be determined).
- b) Description: Replace all PH 480 Volt and 125 Volt DC control voltage switchgear. This work will involve multiple outages on various units and systems over the next 3 years. Outage times and dates have not been determined and will be dependent on the contractor's schedule. Available units will be operated in FPP unit priority order during outages.
- c) Impacts to FPP Criteria: None. When a unit is out of service, the next unit in the FPP priority order will be operated.

#### **9.1.4. Doble Testing (see section 1.5 above for more information)**

- a) Dates: Summer (annually). In 2022, the outage is scheduled August 8–12.
- b) Description: The outage in 2022 is required to perform maintenance on T1, including upgrading all transformer instrumentation and rehabbing the iso-phase bus. The upgraded instrumentation will monitor transformer conditions and provide indication to the control room to prevent transformer failures and unplanned outages of all main generating units connected to the transformer. The iso-phase bus rehab will install bushing inspection covers and replace inspection hatch gaskets through the bus housing. This work will reduce the risk of water intrusion that has caused transformer/unit outages lasting up to a week. Some of the work needs to be done from the top of the transformer on both T1 and T2, which will require the powerhouse line (all units) out of service from August 8 at 0600 through August 12 at 1900, with Unit 5 operating for station service power (approx 7 kcfs). After this work is complete, T2 will return to service and Units 5-6 operated per FPP priority order. On the last day of work, August 12, another outage of the powerhouse line (all units) is required from 1600-1900 to remove clearances on T1.
- c) Impacts to FPP Criteria: All units will be out of service for up to 13 hours/day (0600-1900) daily from August 8 through August 12. During these hours, all project outflow will be spilled except approximately 7 kcfs through Unit 5 for station service.

## **9.2. LWG Studies**

### **9.2.1. Genetic Stock Identification (Idaho Department of Fish & Game)**

- a) Dates: March 1 – June 28
- b) Description: Fish collected as part of the Lower Granite juvenile condition sample are used to enumerate and characterize age composition and genetic stock profiles of naturally producing yearling Chinook and juvenile steelhead. IDFG will sample Monday through Friday through mid-June with a goal of collecting 2,000-5,000 yearling Chinook and juvenile steelhead genetic samples.
- c) Impacts to FPP Criteria: None.

### **9.2.2. Kelt Study (Nez Perce Tribe, University of of Idaho, CRITFC)**

- a) Dates: March 1 – June 29
- b) Description: This research investigates steelhead kelt physiology and endocrinology to evaluate the feasibility and success of rehabilitating strategies. Selected kelts collected at Lower Granite are transported by NPT to Dworshak National Fish Hatchery for reconditioning and later release as part of this study.
- c) Impacts to FPP Criteria: None.

### **9.2.3. PIT-Tag Adult Wild Chinook and Adult Steelhead for ISEMP-Related Dispersal Monitoring (NOAA Fisheries)**

- a) Dates: TBD

b) Description: The goal of this project is to PIT-tag up to 4,000 unclipped adult Chinook and 4,000 unclipped adult steelhead collected in the adult trap daily sample for dispersal monitoring.

c) Impacts to FPP Criteria: None.

#### 9.2.4. Lower Granite Dam Juvenile Lamprey Survival

a) Dates: March through June 2022

b) Description: In Spring 2022, from Mid-March till late-May, juvenile lamprey will be tagged and released twice a month. The RSW might be taken out of service for a few hours for one day in early March to test the acoustic arrays in the forebay. This study will help inform Pacific Lamprey passage conditions, migration behavior, and fate. The objectives of this Juvenile Lamprey passage and survival study at Lower Granite are to:

- Determine distribution and approach routes (including vertical, horizontal, and temporal) of juvenile lamprey in the forebay of Lower Granite Dam.
- Determine primary routes (removable spillway weir [RSW], Deep Spill, juvenile bypass systems [JBS], Turbine) of passage (proportions) by juvenile lamprey based on juvenile lamprey migration occurring in spring (March 2022 – June 2022).
- Calculate whole project survival of juvenile lamprey (from forebay to tailrace)
- Relate project operations (including hydrograph) to passage and route selection
- Track collection location of all lamprey used in the studies
- Determine reach survival of juvenile lamprey and reservoir residence time.

c) Impacts to FPP Criteria: To be determined. Any modification to or deviation from FPP criteria will be coordinated with FPOM.

#### 9.2.5. Post-Construction Assessment of PIT Detection Efficiencies in Spill Bay 1

a) Dates: Spring 2022 – exact dates TBD; either at or before start of spring spill (April 3).

b) Description: The goal of this evaluation is to assess post-construction conditions of Lower Granite Dam's spillbay 1 and PIT-tag detection efficiencies. Release PIT-tagged hatchery yearling Chinook salmon (*O. tshawytscha*) into the entrance of Bay 1 at three locations horizontally across the spillbay and at low and high elevations within the water column for each to evaluate single fish detection efficiencies at the recently installed ogee PIT detection system. Sample sizes will be sufficient to determine single fish detection efficiencies with a precision of  $\pm 5\%$  @ 90% CI. This study addresses Reasonable and Prudent Alternatives (RPA) 54 and 55 in the 2008 BiOp. This study also addresses Question 3 of the Ten Key Questions for Salmon Recovery in the NMFS-NWFSC Salmon Research Plan (NWFSC 2002). Releases would require additional spill (4 more hours) for 1 day if the study is done before spring spill, preferably 0900 to 1700.

c) Impacts to FPP Criteria: Any modification to or deviation from FPP criteria will be coordinated with FPOM. Before start of spring spill on April 3, a one-day spillway outage will be needed to install three release pipes, preferably on a day the RSW is not in operation. A spillway outage will be required after the end of the study to remove the pipes (may be less than 1 day), preferably during the reduced spill portion of a day.

**9.2.6. Sampling of Adult Steelhead, Chinook, and Sockeye for Biological Data Collection (IDFG and NOAA Fisheries)**

- a) Dates: April 4 – December 15
- b) Description: Upriver migrating adult steelhead, spring/summer Chinook salmon, and sockeye salmon are collected from the adult trap from April 4 through December 15. The goal is to collect 5–20% of adult steelhead, spring/summer Chinook salmon, and sockeye salmon ascending the ladder. Data collection includes fish scales, genetics tissue, sex and length, wild/hatchery composition, and non-adipose clipped hatchery fish assessment. All natural-origin adult steelhead and spring/summer Chinook salmon trapped will be PIT-tagged to estimate headwater tributary escapement. Sockeye salmon may be PIT-tagged in the future to estimate metrics regarding conversion rates. Some steelhead and spring/summer Chinook salmon may be radio-tagged or spaghetti-tagged. This information on adult fish forms the basis for status information used in several forums including BiOp-RPA identified needs.
- c) Impacts to FPP Criteria: None.

**9.2.7. Bull Trout PIT-Tagging and Genetic Sample Collection for USFWS**

- a) Dates: April 4 – December 15
- b) Description: Bull trout will be collected as part of the normal adult trap daily sample and using the adult sort-by-code (SbyC) system to recapture previously PIT-tagged fish. Untagged bull trout will be PIT-tagged, fin clipped for genetic analysis, and have morphometric data collected including weight and length, etc. Fin clips will be sent to USFWS to determine the fish's origin. Previously PIT-tagged bull trout will only have morphometric data collected. All fish will be released back into the adult fish ladder.
- c) Impacts to FPP Criteria: None.

**9.2.8. Subyearling Chinook Parentage-Based Tagging (USGS)**

- a) Dates: June 1–15 and July 1–15
- b) Description: The goal of this project is to determine the abundance of unmarked, untagged, natural- and hatchery-origin subyearling Chinook salmon in Lower Granite sample collection. Fin clips will be taken from 30 unclipped, untagged subyearling Chinook each day from June 1-15 and for another two weeks in July depending in fish passage numbers.
- c) Impacts to FPP Criteria: None.

**9.2.9. Collection of Adult Fall Chinook and Coho for Hatchery Broodstock – (WDFW and Nez Perce Tribe)**

- a) Dates: August 18 until broodstock requirements are met
- b) Description: Adult fish are collected in the adult trap. Fall Chinook are transported by WDFW employees to Lyons Ferry hatchery and by NPT employees to Dworshak hatchery. Coho are transported by NPT and transported to Dworshak hatchery.
- c) Impacts to FPP Criteria: None.