## Appendix A

## **Special Project Operations & Studies**

### **Table of Contents**

1. INTRODUCTION				
1.1.	Purpose2			
1.2.	Schedule2			
1.3.	Spill for Juvenile Fish Passage2			
1.4.	Navigation Lock Maintenance2			
1.5.	Doble Testing			
2. BONNEVILLE DAM				
2.1.	BON Special Operations			
2.2.	BON Studies			
3 THE DALLES DAM 5				
3.1	TDA Special Operations 5			
3.2	TDA Studies			
4. JO	HN DAY DAM			
4.1.	JDA Special Operations			
4.2.	JDA Studies			
5. McNARY DAM				
J. 1910				
5.1.	MCN Special Operations			
5.1. 5.2.	MCN Special Operations			
5.1. 5.2. 6. ICI	MCN Special Operations			
5.1. 5.2. 6. ICI 6.1.	MCN Special Operations			
5.1. 5.2. 6. ICI 6.1. 6.2.	MCN Special Operations			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO	MCN Special Operations			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1.	MCN Special Operations			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2.	MCN Special Operations 6   MCN Studies 7   E HARBOR DAM 8   IHR Special Operations 8   IHR Studies 8   WER MONUMENTAL DAM 9   LMN Special Operations 9   LMN Studies 9			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT	MCN Special Operations 6   MCN Studies 7   E HARBOR DAM 8   IHR Special Operations 8   IHR Studies 8   WER MONUMENTAL DAM 9   LMN Special Operations 9   LMN Special Operations 9   LMN Studies 9			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT 8.1.	MCN Special Operations 6   MCN Studies 7   E HARBOR DAM 8   IHR Special Operations 8   IHR Studies 8   WER MONUMENTAL DAM 9   LMN Special Operations 9   LMN Special Operations 9   LMN Studies 9   LMN Studies 9   ILMN Studies 10   LGS Special Operations 10			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT 8.1. 8.2.	MCN Special Operations       6         MCN Studies       7         E HARBOR DAM       8         IHR Special Operations       8         IHR Studies       8         WER MONUMENTAL DAM       9         LMN Special Operations       9         LMN Special Operations       9         LMN Special Operations       9         LMN Studies       9         LMN Studies       10         LGS Special Operations       10         LGS Studies       10			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT 8.1. 8.2. 9. LO	MCN Special Operations       6         MCN Studies       7         E HARBOR DAM       8         IHR Special Operations       8         IHR Studies       8         WER MONUMENTAL DAM       9         LMN Special Operations       9         LMN Special Operations       9         LMN Studies       9         TLE GOOSE DAM       10         LGS Special Operations       10         LGS Studies       10         WER GRANITE DAM       11			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT 8.1. 8.2. 9. LO 9.1.	MCN Special Operations       6         MCN Studies       7         E HARBOR DAM       8         IHR Special Operations       8         IHR Studies       8         WER MONUMENTAL DAM       9         LMN Special Operations       9         LMN Special Operations       9         LMN Studies       9         TLE GOOSE DAM       10         LGS Special Operations       10         LGS Studies       10         LGS Special Operations       10         LGS Studies       10         LGS Studies       10         LGS Special Operations       10			
5.1. 5.2. 6. ICI 6.1. 6.2. 7. LO 7.1. 7.2. 8. LIT 8.1. 8.2. 9. LO 9.1. 9.2.	MCN Special Operations       6         MCN Studies       7         E HARBOR DAM       8         IHR Special Operations       8         IHR Studies       8         WER MONUMENTAL DAM       9         LMN Special Operations       9         LMN Special Operations       9         LMN Studies       9         TLE GOOSE DAM       10         LGS Special Operations       10         LGS Studies       10         LGS Studies       10         LWG Special Operations       10         LWG Special Operations       11         LWG Special Operations       11         LWG Studies       11			

#### 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 shown 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 some non-routine work such as gate cleaning, structural inspections, and repair/replacement of equipment and machinery.

In 2021, locks will be closed at McNary, Lower Monumental, and Little Goose for 2 weeks (March 6–21), and at Ice Harbor and Lower Granite for 3 weeks (March 6–28). Additional information about Corps Walla Walla District navigation lock outages is available online at: www.nww.usace.army.mil/Missions/Navigation/

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

Lower Snake River projects are required to undergo Doble testing<sup>1</sup> of transformers every three years to ensure they are functioning correctly and 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.

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**.

The current year's transformer outage schedule at the lower Snake projects and Dworshak Dam is defined in **Table A-1**. For more information, refer to the project-specific sections below.

Project	Dates	Outage (Transformer & Units)	Notes <sup>b</sup>
IHR	July 19–23	Line 3 (Units 5, 6) all hours	Remaining available units (1, 2, 4) operated per FPP priority order.
LMN	July 29 – August 13	T1 (Units 1–4) all hours T2 (Units 5, 6) daily 0530–1630	All units OOS daily 0530–1630 with Unit 5 at speed no load (5 kcfs) for station service. Units 5 & 6 RTS nightly 1630–0530 and operated per FPP priority order.
LGS	August 2–13	T1 (Units 1–4) all hours T2 (Units 5, 6) 0500-1700 Aug 2-5 and Aug 9-13	All units OOS for up to 12 hours (0500-1700) Aug 2-5 and Aug 9-13, with Unit 6 at speed no load (5 kcfs) for station service. During all other hours, Unit 6 available.
LWG	Aug 9–13, Aug 15–17	T1 (Units 1-4) daily 0600-1900 Aug 9-13 and Aug 16-17 T2 (Units 5-6) all hours	All units OOS daily for up to 13 hours (0600- 1900) Aug 9–13 and Aug 16–17, with Unit 5 at speed no load (5 kcfs) for station service. During all other hours, T1 (Units 1-4) available.
DWR	N/A		No Doble testing scheduled in 2021.

#### Table A-1. Doble Testing Schedule in 2021.<sup>a</sup>

**a**. The lower Columbia projects (BON, TDA, JDA, MCN) have no specific outage for Doble tests and testing is done concurrent with outages for maintenance.

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

<sup>&</sup>lt;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. <u>Powerhouse 2 Fish Guidance Efficiency (FGE) Program – Unit 15 Velocity</u> <u>Measurements</u>

a) <u>Dates</u>: Spring 2021.

**b)** <u>Description</u>: The B2FGE Program PDT has awarded a contract to install a concrete gatewell flow modification device in place of the metal plates that were installed and then removed due to structural failure. Installation is planned in Unit 15, currently scheduled for March 1 through April 20.

Following installation, 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) <u>Impacts to FPP Criteria</u>: 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 2021.

#### 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) <u>Dates</u>: April 10 – June 1 (or as feasible based on river flows).

**b)** <u>Description</u>: As described in the 2020 CRS BA, from April 10 through June 1 (or as feasible based on river flows), the John Day reservoir will be held between elevation 264.5 feet and 266.5 feet (an average of 265.5 feet) 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 be limited to maintaining ramp rates for minimizing project erosion and maintaining power grid reliability. Following this operation, the John Day reservoir elevation would return to MIP + 2 ft operation through August 31.

c) <u>Impacts to FPP Criteria</u>: None planned.

#### 4.2. JDA Studies

There are no studies planned at John Day Dam in 2021.

#### 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) <u>Dates</u>: Monthly (Long-Term).

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: 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) <u>Dates</u>: Long Term (year-round).

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: 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. <u>T-1 and T7 - Replacing the Calisto - Transformer H2O/H2 Monitoring Unit</u>

a) <u>Dates</u>: April 5-6 and 19-20.

**b)** <u>Description</u>: T1 Calisto replacement will require Main Units 1 & 2 to be tagged out. T7 Calisto replacement will require Main Units 13 & 14 to be tagged out.

c) <u>Impacts to FPP Criteria</u>: This will reduce attraction water to the ORFL South Entrance and then the ORFL North Entrance as each portion of this maintenance is conducted.

#### 5.1.4. <u>Waterfowl Nesting</u>

d) <u>Dates</u>: April through July (annually).

e) <u>Description</u>: 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.

f) <u>Impacts to FPP Criteria</u>: None. Provided for informational purposes only.

#### 5.2. MCN Studies

#### 5.2.1. Study of Adult Steelhead Fallback (Overshoots) through the Spillway Weir

a) <u>Dates</u>: February 15 – April 9.

**b)** <u>Description</u>: The 2020 NOAA CRS BiOp calls for off-season surface spill for adult steelhead overshoots at McNary and the four lower Snake River projects from March 1 through March 30 and October 1 through November 15, three times each week on non-consecutive days for four hours in the morning (generally between 05:00 and 11:00).

In spring 2021, a study will be implemented at McNary Dam to evaluate surface spill for adult steelhead overshoots from February 15 through April 9 (spring spill for juvenile fish passage begins April 10). Units 1 and 10 will need to be taken out of service for the installation of transducers on fish screens during the second week of February. Screens for these units will be deployed into operating position following equipment installation. Units 1, 2, 9, 10, and 11 might need to be taken out of service during the second week of February if diving is needed for replacement of transhucers. The TSW and spillway bays (12-22) might be taken out of service for replacement of transducers during the second week of February. The spill schedule will be designed to comply with the BiOp and to achieve the following study objectives:

- Estimate the seasonal duration of spring spill for steelhead overshoots;
- Estimate weekly timing and duration of spring spill for steelhead overshoots;
- Determine if early spring spill at McNary Dam has unintended consequences for overwintering upstream stocks of steelhead.

c) <u>Impacts to FPP Criteria</u>: None planned. Any modification to or deviation from FPP criteria will be coordinated with FPOM.

#### 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. <u>Unit 3 Turbine Runner Replacement</u>

- a) <u>Dates</u>: Ongoing through 2021.
- **b)** <u>Description</u>: Unit 3 will be out of service in 2021 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. The time required to complete commissioning is 10 days.
- c) <u>Impacts to FPP Criteria</u>: Operating units are required to have STSs installed from April 1 through December 15. The full load rejection testing of Unit 3 without STSs would result in fish passing through Unit 3. The progress of the runner replacement and timing of the subsequent commissioning will be monitored. If the testing is slated to occur during that period, an in-season MOC will be submitted.

#### 6.1.2. <u>Units 4, 5, and 6 Turbine Oil Replacement</u>

- **a)** <u>Dates</u>: Summer 2021.
- b) <u>Description</u>: Each unit will be out of service for approximately 3 weeks to replace the turbine oil. Projected outage order is dependent on when work is scheduled to possibly align with other scheduled outages (e.g., annual maintenance). Tentative dates are: Unit 4 Aug 9 Sep 3, Unit 5 July 6 July 30, and Unit 6 July 19 Aug 13.
- c) <u>Impacts to FPP Criteria</u>: None. When a unit is out of service, the next unit in the FPP priority order will be operated.

#### 6.1.3. <u>Doble Testing</u> (see section 1.5 above for more information)

a) <u>Dates</u>: Summer (annually). In 2021, the outage is scheduled for July 19–23.

**b)** <u>Description</u>: Transformer Doble testing of Line 3 and associated equipment will require Main Units 5&6 down continuously in association with this work.

c) <u>Impacts to FPP Criteria</u>: None. Since Ice Harbor has multiple transformer banks and transmission lines and redundant switching capability, remaining available units (1, 2, 4) 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

There are no studies planned for Ice Harbor Dam in 2021.

#### 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) <u>Dates</u>: Ongoing through 2029.

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: 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) <u>Dates</u>: September through March (annually).

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: May require running a unit out of FPP priority and outside 1%.

#### 7.1.3. <u>Doble Testing</u> (see section 1.5 above for more information)

a) <u>Dates</u>: Summer (annually). In 2021, the outage is scheduled for July 29–August 13.

**b)** <u>Description</u>: During the 2021 outage, the project will upgrade the T1 iso-phase bus, which will consist of replacing doghouse covers, replacing gaskets with upgraded materials, cleaning, and inspections. The work requires T1 and T2 (all units) out of service daily for up to 11 hours (0530-1630) and all project outflow spilled except 5 kcfs through Unit 5 for station service. T2 (Units 5, 6) will return to service nightly by 1630.

c) <u>Impacts to FPP Criteria</u>: All units will be out of service daily for up to 11 hours (0530-1630) and all project outflow will be spilled except 5 kcfs through Unit 5 for station service.

#### 7.2. LMN Studies

There are no studies planned for Lower Monumental Dam in 2021.

#### 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. <u>Doble Testing</u> (see section 1.5 above for more information)

a) <u>Dates</u>: Summer (annually). In 2021, the outage is scheduled for August 2–13.

**b)** <u>Description</u>: During the outage in 2021, the project will continue to upgrade the T1 isophase bus which will consist of replacing the doghouse covers, replacing the gaskets with upgraded materials, cleaning, and inspections. The outage will require all units out of service for up to 12 hours (0500-1700) on the first and last day, August 2 and 13, to hang and remove clearances on T1, and during work days, August 3-5 and August 9-12. During these hours, all project outflow will be spilled except 5 kcfs through Unit 6 for station service power. T1 (Units 1-4) will remain out of service for the duration of the outage. T2 (Unit 6) will be returned to service nightly and all hours over the weekend Aug 6–8 (Fri-Sun).

c) <u>Impacts to FPP Criteria</u>: All units will be out of service for up to 12 hours (0500-1700) each day August 2-5 and 9-13, and all project outflow will be spilled except 5 kcfs through Unit 6 for station service.

#### 8.1.2. OPTO 22 Upgrade

a) <u>Dates</u>: September and October 2021

**b)** <u>Description</u>: OPTO 22 upgrades will be completed on Unit 3 while it is out of service for annual maintenance, which will be extended from the normal 3-week outage to a 4-week outage.

c) <u>Impacts to FPP Criteria</u>: Unit 3 annual maintenance will be extended to 4 weeks for the OPTO 22 upgrade, which is 1 week longer than FPP criteria (see FPP Chapter 8, section 4.3.1.2.). While the unit is out of service, the project will operate the next available unit in the priority order.

#### 8.2. LGS Studies

#### 8.2.1. <u>Kelt Collection & Reconditioning</u>

a) <u>Dates</u>: April to July 2021

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: 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. <u>Head Gate Repair</u>

a) <u>Dates</u>: Bi-Monthly (long-term).

**b)** <u>Description</u>: 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) <u>Dates</u>: Bi-Monthly (long-term).

**b)** <u>Description</u>: 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. <u>Replace Powerhouse 480 Volt and 125 Volt DC Control Voltage Switchgear</u>

a) <u>Dates</u>: 2020–2023 (dates to be determined).

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: None. When a unit is out of service, the next unit in the FPP priority order will be operated.

#### 9.1.4. <u>Doble Testing</u> (see section 1.5 above for more information)

a) <u>Dates</u>: Summer (annually). In 2021, the outage is scheduled for August 9–13 and 15–17.

**b)** <u>Description</u>: The outage in 2021 is required to perform Doble testing and routine maintenance on T2 (Units 5 & 6). During this time, T2 transformer instrumentation will be upgraded, the iso-phase bus will be rehabbed, and transformer oil will be added to the T2B phase. 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 T2, which will require the powerhouse line (all units) out of service from August 9 at 0600 through August 13 at 1900, and from August 16 at 0600 through August 17 at 1900. T2 (Units 5 and 6) will remain OOS continuously through the entire outage period. T1 (Units 1-4) will RTS nightly and over the whole weekend August 14-15. Unit 5 will be operated for station service power (5 kcfs) while the PH line is OOS during the day August 9-13 and August 16-17.

c) <u>Impacts to FPP Criteria</u>: All units will be out of service for up to 13 hours/day (0600-1900) daily from August 9 through August 13, and August 16-17. During these hours, all project outflow will be spilled except approximately 5 kcfs through Unit 5 for station service.

#### 9.2. LWG Studies

#### 9.2.1. <u>Genetic Stock Identification (Idaho Department of Fish & Game)</u>

a) <u>Dates</u>: March 1 – June 28

**b)** <u>Description</u>: 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) <u>Dates</u>: March 1 – June 29

**b)** <u>Description</u>: 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. <u>PIT-tagging of Adult Wild Chinook and Adult Steelhead for ISEMP-Related</u> <u>Dispersal Monitoring (NOAA Fisheries)</u>

a) <u>Dates</u>:

**b)** <u>Description</u>: 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. <u>Post-Construction Assessment of PIT Detection Efficiencies in Spill Bay 1</u>

a) <u>Dates</u>: Spring 2021 – exact dates are still flexible; either at the start of spill (April 3) or before spring spill.

**b)** Description: The goal of this evaluation is to assess post-construction conditions of Lower Granite Dam's spill bay 1 and the passive integrated transponder (PIT-tag) detection efficiencies following installation of a new detection system. Release PIT-tagged hatchery yearling Chinook salmon (*O. tshawytscha*) into the entrance of Spill Bay 1 at three locations horizontally across the spill bay 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 at Lower Granite Dam. 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 spilling (4 more hours) for 1 day if the study is done before spring spill.

c) <u>Impacts to FPP Criteria</u>: Any modification to or deviation from FPP criteria will be coordinated with FPOM. Before April 3, a one-day spillway outage will be needed to install three release pipes, preferably on a day the RSW is not scheduled 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 performance spill.

#### 9.2.5. <u>Sampling of Adult Steelhead, Chinook, and Sockeye for Biological Data Collection</u> (IDFG and NOAA Fisheries)

a) <u>Dates</u>: April 4 – December 15

**b)** <u>Description</u>: 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 trapped will fish forms the basis for status information used in several forums including BiOp-RPA identified needs.

c) Impacts to FPP Criteria: None.

#### 9.2.6. Bull Trout PIT-Tagging and Genetic Sample Collection for USFWS

a) <u>Dates</u>: April 4 – December 15

**b)** <u>Description</u>: 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) <u>Impacts to FPP Criteria</u>: None.

#### 9.2.7. Subyearling Chinook Parentage-Based Tagging (USGS)

a) <u>Dates</u>: June 1–15 and July 1–15

**b)** <u>Description</u>: 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.

# 9.2.8. <u>Collection of Adult Fall Chinook and Coho for Hatchery Broodstock – (WDFW and Nez Perce Tribe)</u>

a) <u>Dates</u>: August 18 until broodstock requirements are met

**b)** <u>Description</u>: 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.