

Appendix A

Special Project Operations & Studies

Table of Contents

1. INTRODUCTION	2
1.1. Purpose.....	2
1.2. Schedule	2
1.3. Spill for Juvenile Fish Passage.....	2
1.4. Navigation Lock Maintenance	2
1.5. Doble Testing.....	3
1.6. Spill for Adult Steelhead Overshoots.....	4
2. BONNEVILLE DAM	5
2.1. BON Special Operations.....	5
2.2. BON Studies	5
3. THE DALLES DAM.....	6
3.1. TDA Special Operations	6
3.2. TDA Studies.....	6
4. JOHN DAY DAM	6
4.1. JDA Special Operations.....	6
4.2. JDA Studies	6
5. McNARY DAM	7
5.1. MCN Special Operations.....	7
5.2. MCN Studies	8
6. ICE HARBOR DAM	9
6.1. IHR Special Operations	9
6.2. IHR Studies.....	10
7. LOWER MONUMENTAL DAM	11
7.1. LMN Special Operations	11
7.2. LMN Studies.....	12
8. LITTLE GOOSE DAM.....	13
8.1. LGS Special Operations.....	13
8.2. LGS Studies	14
9. LOWER GRANITE DAM	15
9.1. LWG Special Operations	15
9.2. LWG Studies.....	16

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 April 3 at the Lower Snake River projects (IHR, LMN, LGS, LWG) and 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 necessary to provide safe conditions for the fish transport barge in the tailrace.

1.4. Navigation Lock Maintenance

Annual lock outages are scheduled for routine maintenance and inspections, as well as some non-routine work such as repairs of gate structures, concrete, and machinery. In 2020, locks will be closed at McNary, Lower Monumental, and Lower Granite for 2 weeks (March 7–22), and at Ice Harbor and Little Goose for 4 weeks (March 7–April 5). Additional information about Corps Walla Walla District navigation lock outages is available online at:

www.nww.usace.army.mil/Missions/Navigation/

1.5. Doble Testing¹

Transformers at the Lower Snake River projects are required to undergo Doble testing¹ every three years to ensure they are functioning correctly and identify any 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.

The schedule for the current year is defined below in **Table A-1**. For more information, refer to the project-specific sections below and FPP Chapters 2-8.

Table A-1. Doble Testing Schedule in 2020.^a

Project	Dates	Outage (Transformer & Units)	Notes ^b
IHR	July 20–26	TW3 (Unit 3) and TW4 (Unit 4) all hours	Remaining available units operated per FPP priority order.
LMN	July 27–31	T1 (Units 1–4) all hours; T2 (Units 5, 6) daily 0600–1800	All units OOS daily 0600–1800 with Unit 5 at speed no load (5 kcfs) for station service. Units 5 & 6 RTS nightly 1800–0600 and operated per FPP priority order.
LGS	July 27 – August 6	T2 (Units 5, 6) all hours; T1 (Units 1–4) 0500–1700 on first/last day (Jul 27 and Aug 6)	All units OOS Jul 27 and Aug 6 from 0500–1700 with Unit 4 at speed no load (5 kcfs) for station service. During all other hours, Units 1–4 operated per FPP priority order.
LWG	Aug 3–14	T1 (Units 1-4) all hours; T2 (Units 5-6) Aug 3-6 daily 0600-1900 and Aug 14 1600-1900	All units OOS Aug 3–6 daily from 0600–1900 and Aug 14 from 1600-1900 with Unit 5 at speed no load (5 kcfs) for station service. During all other hours, Units 5–6 operated per FPP priority order.

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).

¹ “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.

1.6. Spill for Adult Steelhead Overshoots

In 2020, off-season surface spill will be implemented at McNary Dam and the four lower Snake River dams as a means of providing safe and effective downstream passage for adult Mid-Columbia River and Snake River steelhead that overshoot and then migrate back downstream through the dams during months when there is no spill for juvenile fish passage. This operation is pursuant to non-discretionary terms and conditions in the Incidental Take Statement of the 2020 NOAA Fisheries Columbia River System (CRS) Biological Opinion, issued July 24, 2020 (see section 2.17.4.G, “*Reduce Take of Overshoot Adult Steelhead*”, on pages 1399-1400 of the document, available online at: <https://www.fisheries.noaa.gov/webdam/download/109136871>).

At McNary Dam, surface spill will occur via the spillway weir from September 15, 2020, through November 15, 2020, three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00). The spill schedule will be designed to achieve the objectives of the steelhead overshoot study as a continuation of research conducted in 2019 and 2020 (see **MCN section 5.2.1** below).

At the four lower Snake River dams, surface spill will occur via the spillway weir from October 1, 2020, through November 15, 2020, at least three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00). During spill at Little Goose, the adjustable spillway weir will be operated in the high crest position.

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 Velocity Measurements.

a) Dates: *As of February 2020, this work is postponed until 2021.*

b) Description: The B2FGE Program PDT is working on 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. This is expected to occur in early spring in Unit 15 with a construction period of six weeks. Following installation, hydraulic measurements will occur in the gatewell and behind the VBS. This is expected to occur sometime 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 testing is being scheduled to occur during daylight hours, 0600-1700. Hydraulic measurement equipment and framework will be in the Unit 15 gatewells during test periods. Unit 15 would be held to a specific range of the 1% for each test day representing the middle 1% or upper 1% peak efficiency range. Adjacent Units 14 and 16 operations will be requested during the test periods to provide stable operations to minimize hydraulic changes in the gatewell. These 1% operations will be in the existing FPP operation range 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 three gatewells - 15A, 15B, 15C.
2. Two flow treatments in each – 14.3-14.8 kcfs and 18.0-18.5 kcfs.
3. Each gatewell - One day for testing totaling six working days.
4. Additionally, pressure transducers will be installed in the “A” 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 in upper 1% range may be out of FPP criteria (see FPP BON section 5.2). Unit outages and test operations may result in PH2 units being operated out of FPP priority order (see FPP BON 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 2020.

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.

4.2. JDA Studies

There are no studies planned at John Day Dam in 2020.

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. Fish Attraction Pumps.

- a) Dates: Ongoing through September 2020.
- b) Description: Fish pump (FP) 1 remains out of service through September 2020. Critical maintenance is scheduled for FP1 due to extended operation for 7-9 years without relief from FP2. FP1 has not been dewatered and inspected since 2006. Maintenance will include all below water inspections and repairs that the project staff can do within a timely manner. Unforeseen maintenance issues may extend the outage date. This maintenance will improve reliability for attraction water for adult salmonids utilizing the Oregon fish ladder system.
- c) Impacts to FPP Criteria: None planned. Minimal impact due to other two FPs being available. 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.

5.2. MCN Studies

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

- a) Dates: Spring 2020 and Fall 2020.
- b) Description:

In spring 2020, the objectives of this study are to:

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

In fall 2020, from September 15 until November 15, surface spill will occur via the spillway weir three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00). The spill schedule will be designed to achieve the objectives of the steelhead overshoot study. This operation is pursuant to terms and conditions in the 2020 NOAA CRS BiOp – for more information, see **section 1.6** above.

- c) Impacts to FPP Criteria: To be determined. 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. Unit 3 Turbine Runner Replacement.

- a) Dates: Ongoing through early 2021.
- b) Description: Unit 3 will be out of service in 2020 to replace the turbine runner. The unit is currently scheduled to return to service in early 2021. Commissioning of Unit 3 will require full load rejection testing, which needs to be completed with no submerged traveling screens (STS) installed. It is possible that Unit 3 will return to service after March 2021, 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: None. While Unit 3 is out of service and unavailable for operation, the project will operate the next available unit in the FPP priority order.

6.1.2. XJO Breaker Replacement

- a) Dates: April 20 – May 4, 2020
- b) Description: XJO station service breaker replacement. MU1 will be down in association with this work.
- c) Impacts to FPP Criteria: None. When Unit 1 is out of service, the next unit in the FPP priority order will be operated.

6.1.3. Units 4, 5 and 6 Turbine Oil Replacement

- a) Dates: Summer 2020.
- b) Description: 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:
 - U4, U6 July 20 – Aug 15, 2020
 - U5 July 27 –Aug 15, 2020
- c) Impacts to FPP Criteria: None. When a unit is out of service, the next unit in the FPP priority order will be operated. Impacts will be minimal if the oil replacement occurs during the normal annual maintenance window for each unit.

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

- a) Dates: Summer (annually). In 2020, the outage is scheduled for July 20–26.
- b) Description: The outage in 2020 is required to perform Doble testing of TW3 and TW4, which will take Units 3 and 4 out of service continuously during testing. Unit 3 is already out

of service until 2021 to rebuild the turbine runner. Remaining available units (1, 2, 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 maintenance. Since Ice Harbor has multiple transformer banks and transmission lines and redundant switching capability, remaining units will be available and operated pursuant to FPP priority order within $\pm 1\%$ of peak efficiency (1% range).

6.1.5. Spill for Steelhead Overshoots (see section 1.6 above for more information).

a) Dates: Fall 2020 (October 1 – November 15)

b) Description: At the four lower Snake River dams, surface spill will occur via the spillway weir from October 1, 2020, through November 15, 2020, at least three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00).

c) Impacts to FPP Criteria: None. This operation is pursuant to terms and conditions in the 2020 NOAA CRS BiOp – for more information, see **section 1.6** above.

6.2. IHR Studies

There are no studies planned for Ice Harbor Dam in 2020.

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 1–2 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 season (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: None. During validation testing, units will be out of service and the project will operate the next available unit in the FPP priority order.

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

- a) Dates: Summer (annually). In 2020, the outage is scheduled for July 27–31.
- b) Description: The outage in 2020 is required to perform intensive cleaning and retesting of T1 based on results of the Doble test in 2019. Concurrently, the project will also replace the station service breaker. The work will require T1 and T2 (all units) out of service July 27–31 daily from 0600-1800, with Unit 5 operated for station service power (5 kcfs). During all other hours, T2 will be in service and Units 5-6 will operate per FPP priority order.
- c) Impacts to FPP Criteria: All units will be out of service for 12 hours/day (0600-1800) July 27 through July 31 and all project outflow will be spilled except approximately 5 kcfs through Unit 5 for station service.

7.1.4. Digital Governor Installation & Commissioning.

- a) Dates: Mid to late 2020.
- b) Description: Digital Governors have been installed on all units. Unit 2 was commissioned with fixed blades and is scheduled to be commissioned as a Kaplan Unit in 2020 after liner and repair work is completed.
- c) Impacts to FPP Criteria: None. During work, the unit will be out of service and the project will operate the next available unit in the FPP priority order.

7.1.5. Spill for Steelhead Overshoots (see section 1.6 above for more information).

- a) Dates: Fall 2020 (October 1 – November 15)
- b) Description: At the four lower Snake River dams, surface spill will occur via the spillway weir from October 1, 2020, through November 15, 2020, at least three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00).
- c) Impacts to FPP Criteria: None. This operation is pursuant to terms and conditions in the 2020 NOAA CRS BiOp – for more information, see **section 1.6** above.

7.2. LMN Studies

There are no studies planned for Lower Monumental Dam in 2020.

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. Little Goose- XJ0 Station Service Breaker Replacement.

- a) Dates: February 18–28 and March 16–27, 2020
- b) Description: Little Goose will be replacing the Station Service Breakers in 2020. The Breakers are original equipment and are at the end of their usable life. Due to the critical nature of the circuit breakers, the indication of degradation leading to end of life conditions or decreased reliability is sufficient cause to consider replacement. A long-term failure of a station service circuit breaker will cause an elevation of risk and increase the potential for flooding of the dam. An additional new breaker will be installed to provide redundant power supply to the Juvenile Fish Facility and Fish Ladder Cooling Water Pump. There will be two outages for replacement, one to install the fabricated XJ01/XJ7 breakers and the other to install the XJ02/XJ8 breakers. The first outage is scheduled February 18 through February 28, 2020, and requires all units to be out of service for about half the day on the first and last day, February 18 and 28. The second outage is scheduled for March 16 through March 27, 2020, and requires Unit 5 to be out of service during the entire outage to replace an existing breaker and install the new breaker.
- c) Impacts to FPP Criteria: Installation and commissioning may require operating units out of FPP priority order and/or occasional temporary line outages. When a unit is out of service, the next unit in the FPP priority order will be operated. Activities that may impact FPP compliance will be coordinated with FPOM via MOC.

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

- a) Dates: Summer (annually). In 2020, the outage is scheduled for July 27 – August 6.
- b) Description: During the outage in 2020, the project will upgrade the iso-phase bus which will consist of replacing the dog house 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, July 27 and August 6, to hang and remove clearances on T2. During these hours, all project outflow will be spilled except 5 kcfs through Unit 4 for station service power. During all other hours, Units 1-4 will be available and operated per FPP priority order.
- c) Impacts to FPP Criteria: All units will be out of service for up to 12 hours (0500-1700) on July 27 and August 6 and all project outflow will be spilled except approximately 5 kcfs through Unit 4 for station service. This may also impact operation of the adult fish ladder cooling pump.

8.1.3. OPTO 22 Upgrade.

- a) Dates: September through November 2020
- b) Description: OPTO 22 upgrades will be completed on Units 2 and 3 while units are out of service for annual maintenance, which will be extended from the normal 3 week outage to a 4 week outage.
- c) Impacts to FPP Criteria: Units 2 and 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 units are out of service, the project will operate the next available unit in the priority order.

8.1.4. Spill for Steelhead Overshoots (see section 1.6 above for more information).

- a) Dates: Fall 2020 (October 1 – November 15)
- b) Description: At the four lower Snake River dams, surface spill will occur via the spillway weir from October 1, 2020, through November 15, 2020, at least three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00).
- c) Impacts to FPP Criteria: None. This operation is pursuant to terms and conditions in the 2020 NOAA CRS BiOp – for more information, see **section 1.6** above.

8.2. LGS Studies

No studies are planned at Little Goose Dam in 2020.

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 2020, the outage is scheduled for August 3–14.
- b) Description: The outage in 2020 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 of the 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 3 at 0600 through August 6 at 1900, with Unit 5 operating for station service power (5 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 14, another outage of the powerhouse line (all units) is required from 1600-1900 in order 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 3 through August 6, then again on August 14 for up to 3 hours (1600-1900). During these hours, all project outflow will be spilled except approximately 5 kcfs through Unit 5 for station service power.

9.1.5. Spill for Steelhead Overshoots (see section 1.6 above for more information).

- a) Dates: Fall 2020 (October 1 – November 15)
- b) Description: At the four lower Snake River dams, surface spill will occur via the spillway weir from October 1, 2020, through November 15, 2020, at least three times each week on non-consecutive days for four hours in the morning (between 05:00 and 11:00).
- c) Impacts to FPP Criteria: None. This operation is pursuant to terms and conditions in the 2020 NOAA CRS BiOp – for more information, see **section 1.6** above.

9.2. LWG Studies

No studies are planned at Lower Granite Dam in 2020.