Appendix A

Special Project Operations & Studies

Table of Contents

1. INTRODUCTION

This Appendix to the Fish Passage Plan (FPP) describes special project operations and studies planned to occur during the current year that may affect fish passage at the eight Lower Snake and 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.

1.1. Schedules: All dates shown for studies and special operations 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 included 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 special operations requests or schedule changes with fisheries agencies and tribes through the appropriate regional forum to inform the final decision.

1.2. Spill: During the spring and summer juvenile salmonid outmigration seasons, spill operations for fish passage will be implemented as defined in the *Fish Operations Plan* (FOP), included in the Fish Passage Plan as **Appendix E,** or as coordinated in-season through TMT.

1.2.1. Spill for juvenile fish passage will begin on April 3 at Lower Snake River projects (IHR, LMN, LGS, LWG) and on April 10 at 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) regional workgroup.

1.2.2. During periods of high river flow, spill rates and forebay elevation may need to be adjusted at Lower Monumental and Lower Granite dams daily or every-other-day if necessary to provide safe conditions for the fish barge at the juvenile fish facility downstream of the dam.

1.3. Navigation: Annual lock outages are scheduled for routine maintenance and inspections, as well as some non-routine work such as gate and lock structural repairs and machinery replacement. The 2015 schedule for navigation lock outages is as follows:

(a) March 7 – March 21 (2 weeks): BON, TDA, JDA
(b) March 7 – April 4 (4 weeks): MCN, IHR, LMN, LGS, LWG

2. BONNEVILLE DAM

2.1. Bonneville Dam Special Operations.

2.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at Bonneville Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

2.2. Bonneville Dam Studies.

2.2.1. March 2015–June 2015: PH2 Fish Guidance Efficiency (FGE) Program – Biological Evaluation and Velocity Measurements in Turbine Units 14, 15.

Biological testing, April 1-May 31 (except during Spring Creek NFH peak passage periods): A daily schedule will be provided for test operations at Units 14 and 15. Flows representative of the middle 1% peak efficiency range will be 14.3-14.8 kcfs for Unit 14 and flows representative of the upper 1% range will be 18.0-18.5 kcfs for Unit 15. Adjacent units 13 and 16 operations in the 1% range are requested during the test periods to provide stable operations to minimize hydraulic changes in the gatewell.

Hydraulic testing, June 1-4: A daily schedule will be provided for test operations at Unit 15. Hydraulic measurements in gatewell slots 15A, 15B, and 15C are scheduled to occur in the upper 1% range (18.0-18.5 kcfs) during the test period. Adjacent units 14 and 16 operations in the 1% range are requested during the test periods to provide stable operations to minimize hydraulic changes in the gatewell.

Unit outages needed to install trashrack release mechanism:

1. Late March: one day to install equipment in 14A, 15A.
2. May 4-11: one day to relocate equipment from 15A to 15C.
3. June or July: 1 day following conclusion of testing to remove modified trashracks and re-install unmodified trashracks at 14A and 15C. This would occur after the 95% sockeye smolt passage index is estimated to have passed Bonneville Dam.

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.

2.2.1.a. FPP criteria affected: Unit 15 test operations in upper 1% range may be out of FPP criteria (see FPP BON section 5.2.1). Unit outages and test operations may result in PH2 units being operated out of FPP priority order (see FPP BON Table BON-14).

2.2.1.b. Reason/BiOp RPA/Other relevant info: B2 FGE Program Post-Construction. FCRPS BiOp Measure-Hydropower Strategy 2: RPA 18. AFEP study code: BPS-P-15-1.

2.2.1.c. Regional coordination (FFDRWG, FPOM, etc.) and related memos: Study methods, schedule, and test unit operations coordinated in AFEP and FFDRWG. Hydraulic test period June 1-4 coordinated at FFDRWG Oct. 27, 2014, to avoid impacts to the Little White Salmon hatchery releases in mid-June.

3. THE DALLES DAM

3.1. The Dalles Dam Special Operations.

3.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at The Dalles Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

3.2. The Dalles Dam Studies.

3.2.1. There are no studies scheduled for The Dalles Dam in 2015.

4. JOHN DAY DAM

4.1. John Day Dam Special Operations.

4.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at John Day Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

4.2. John Day Dam Studies.

4.2.1. There are no studies scheduled for John Day Dam in 2015.

5. McNARY DAM

5.1. McNary Dam Special Operations.

5.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at McNary Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

5.1.2. March 2015–September 2015: Unit 12 OOS. Unit 12 is expected to be taken out-of-service (OOS) in March 2015 upon the return of Unit 4, for winding and replacement of various other electrical and mechanical components from the old excitation system down to the wicket gate servomotors. If the rewind Units are to be commission tested correctly, they will be required to operate beyond the 1% range for short periods of time.

5.1.3. April 2015: Units 4 and 11 RTS Testing (post-rewind). Units 4 and 11 are scheduled to be returned to service in February 2015. There is a chance that restoration procedures and testing may extend beyond April 1, 2015, during the 1% efficiency operating requirement. If the rewinds Units are to be tested correctly, they will be required to operate beyond the 1% range for short periods of time.

5.1.4. April 2015–July 2015: Waterfowl Nesting. Annually since 1982, McNary pool has been operated for waterfowl nesting on Lake Wallula from late April through early July. During this operation, the McNary pool may be restricted to an operating range of 337.0'–340.0' 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 four days.

5.1.5. July 2015: Doble Tests. From July 6–10, 2015, Doble testing of transformer bank T3, and July 13–17, 2015 for Transformer Bank T4, will require their respective turbine units to be out-of-service (OOS) during testing for up to 5 days each transformer bank. There may be some overlap between the two tests. Since McNary Dam has multiple transformer banks and transmission lines, and redundant switching capability, most turbine units will be available for operation during these tests. Turbine unit 1% efficiency operations and turbine priorities will continue to follow FPP requirements.

5.1.6. Long-Term (Bi-Monthly): Headgate Repair. This is a long-term program to return the headgates to a safe operating condition by adding new roller chain, seals, anodes and other miscellaneous components. The plan will require short unit outages throughout the year while transporting rebuilt gates from the turbine units to the repair pit and vice-versa. Each swap will take from 4-6 hours to complete, and occur approximately every 2 months. Headgate movements are to take place concurrently with other outages as they occur, and the project does not expect any special operations outside FPP criteria.

5.2. McNary Dam Studies.

5.2.1. Ongoing through March 2015: McNary Dam Adult Steelhead Temporary Spillway Weir (TSW) and Turbine Unit Passage Efficiency. This study is being conducted as follow-on to the adult steelhead direct injury and survival study. Approximately 10 kcfs spill over the TSW will be required 24 hours/day in a 6-day block design of: 3 days "TSW-on" and 3 days "TSW-off", which equates to TSW spill 50% of the study period. No specific turbine

operations are required as the powerhouse will operate as scheduled. Two 30-day study periods were identified and coordinated regionally to coincide with historically high steelhead fallback behavior: the first study period was November 15–December 15, 2014, and the second will start as early as January 2015 and no later than February 15, 2015, depending on when the second fallback period begins. Adult fish guidance efficiency (FGE) will be estimated from the first 30-day sample period. Adult behavior will be monitored in the forebay vicinity of the TSW to determine the start of the second 30-day study.

Hydroacoustic transducers were installed from outside of the trashrack in a single turbine unit intake slot on ten turbine units. Turbine unit intakes were randomly selected from those units currently in operation and rolling unit outages of three units at-a-time are required for installation and removal of the transducers. Three transducers were also installed on the TSW in spillbay 20. A dive is required to install and remove transducers and is expected to require 5-7 days at the beginning and end of the study. Transducer removal is expected to occur in July and final dates must be coordinated with the McNary Project. While study dates, turbine unit outages, installation and removal of equipment and TSW, and spill through the TSW have been appropriately coordinated through FPOM, RCC, BPA and the McNary Project, further coordination for the second 30-day study period will be necessary, particularly if beginning spill prior to February 15, 2015.

5.2.2. Ongoing through Spring 2016: Radio-Telemetry Monitoring of Adult Salmon and Lamprey. Radio-telemetry equipment previously installed for FY14 studies (adult salmon and lamprey) will be used to continue monitoring for tagged adult salmon and lamprey through spring 2015. Additional lamprey will be tagged in summer 2015 and monitored for passage evaluations through spring 2016. Access to antennas and receivers for downloading and maintenance will be needed through the winter maintenance period.

5.2.3. June 2015–October 2015: Evaluation of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at McNary Dam. A prototype adult lamprey passage structure was installed at the McNary Dam South (Oregon) Fish Ladder SFE2 in February 2014 to provide a lower velocity entrance into the adult fish ladder. Optical video and DIDSON acoustic cameras will be used to evaluate fine-scale passage behavior of Pacific lamprey at the entrance and exit of the passage structure. As with other lamprey study objectives, deployment and operation of the DIDSON and conventional video cameras will be supported by the research technician and will occur throughout the adult lamprey passage season (early June–October). Additionally, two half-duplex PIT-tag detectors (four loops) have been installed into the passage structure to determine the preferred passage route through the varied-velocity baffle box section. The passage structure includes a knife gate which will be opened on the first Monday of June by 0900 hours and closed on the first Monday of October by 0900 hours, as the adult lamprey migration begins and winds down, respectively. This study will require electrical power for equipment in the fishways; access for installation, repair and testing of electronic equipment; and access to download data from DIDSON and video camera equipment. Project support will be required to load test cranes for equipment deployment and maintenance, but will not require project crane services. This is the second year evaluation of the passage structure.

6. ICE HARBOR DAM

6.1. Ice Harbor Dam Special Operations.

6.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at Ice Harbor Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

6.1.2. Ongoing through March 2015: Units 1, 2, 3 Digital Governor Upgrades. Starting in October 2014 and continuing through March 2015, the Main Unit Digital Governors at Ice Harbor will be replaced starting on Unit 2, followed by Units 1 then 3. Each unit will take about 5 weeks. In March 2015, model validation testing will occur for Units 1, 2 and 3, that will require operation outside of the 1% range and out of FPP unit priority order. This testing will occur prior to the FPP 1% operating constraints that begin April 1.

6.1.3. June 2015: Unit 5 Head Gate Cylinder Replacement. See FPOM Memo of Coordination (MOC) **15-IHR-003** (12-Feb-2015). Tentatively scheduled for June 22-25, 2015, Unit 5 will be out of service for replacement of the head gate cylinder in gatewell slot 5B. There have been instances of an oil sheen in slot 5B with no causes found. While there have not been any oil sheens recently, the project needs to ensure there are no issues with the cylinder. This work cannot be performed in conjunction with annual maintenance because head gates are required to be down as a hazardous energy control point. Since the project has multiple transformer banks, transmission lines and redundant switching capability, the remaining units will be available for operation during these tests and will operate within the 1% range in accordance with FPP priority order. In the event of high river flows that exceed project generating capacity, additional spill beyond FOP levels would occur in accordance with FPP spill patterns.

6.1.4. July 2015: Doble Testing. See FPOM Memo of Coordination (MOC) **15-IHR-002** (12-Feb-2015). Tentatively scheduled for July 20-24, 2015, Doble testing will take the following out-of-service: two transformers, TW5, and TW6, and turbine units 5 and 6. Both Units 5 and 6 are already scheduled to be out-of-service for routine maintenance from July 6, 2015, through July 31, 2015 (Unit 5) and August 28, 2015 (Unit 6). Since Ice Harbor Dam has multiple transformer banks, transmission lines, and redundant switching capability, the remaining turbine units will be available for operation during these tests and will operate within the 1% range in accordance with FPP priority order.

6.1.5. August 2015: Line Disconnects Maintenance. Tentatively scheduled for August 2015, line disconnects maintenance will take the following out-of-service: Line 2, transformers TW3 and TW4, and Turbine Units 3 and 4. Since Ice Harbor Dam has multiple transformer banks, transmission lines and redundant switching capability, the remaining turbine units will be available for operation during these tests. Turbine units will operate within the 1% range and in accordance with FPP priority order.

6.1.6. September 2015–March 2016: Steady State Model Validation Testing. Western Electricity Coordinating Council (WECC) requires steady state model validation testing on a periodic basis to ensure the generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Tests will involve running the unit out of FPP priority

sequence and outside the 1% range. Testing can occur any time from September 1–March 31. Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

6.1.7. September 2015: Unit 6 OOS for Hydrographic Spill Bay Survey: Dam Safety has scheduled hydrographic spill bay surveys at Ice Harbor Lock and Dam in September 2015. The survey will require Unit 6 out-of-service for approximately one day for boat requirements.

6.1.8. October 2015: Unit 2 Thrust Bearing and Turbine Guide Bearing. Unit 2 is scheduled to be out-of-service in October 2015 to install new thrust bearing and turbine guide bearing pumps. This work must be accomplished prior to bringing the unit down for turbine replacement in December 2015.

6.2. Ice Harbor Dam Studies.

6.2.1. Ongoing through Spring 2016: Radio-Telemetry Monitoring of Adult Salmon and Lamprey. Radio-telemetry equipment previously installed for FY14 studies (adult salmon and lamprey) will be used to continue monitoring for tagged adult salmon and lamprey through spring 2015. Additional lamprey will be tagged in summer 2015 and monitored for passage evaluations through spring 2016. Access to antennas and receivers for downloading and maintenance will be needed through the winter maintenance period.

6.2.2. February 2015–April 2015: Spillbay 2 Ogee/Deflector Post-Construction Evaluation. Following the reshaping of the spillbay 2 ogee and deflector, a direct injury and survival study including sensor fish releases will occur to evaluate the new fish passage and hydraulic conditions. This study will replicate and compare one or two release elevations tested in 2005 after the removable spillway weir (RSW) was installed.

6.2.2.a. Yearling Chinook salmon will be supplied by Dworshak National Fish Hatchery. This study will require holding and handling facilities off the dam where fish may be held and reevaluated pre- and post-release. Fish will be transported to the forebay deck, tagged with balloon tags and released through an induction system that will run off of water supplied by submersible pumps (110v). Two 4-inch release pipes will be placed at the RSW where yearling Chinook and sensor fish will be released simultaneously at 1.5 feet and 6.5 feet above the spillbay ogee crest. Pipes will be installed by the contractor with mobile cranes. Boaters will recapture fish in the tailrace and will require BRZ access. Upon recapture, fish will be transferred to another tank and transported back to the holding facility for a 48-hour survival evaluation.

6.2.2.b. It is anticipated that approximately 7.5 kcfs spill will be required through the RSW from 0700-1700 hours for approximately 14 days. Anticipated Project support needs will be to assist with 110v power supplies, operating the RSW, equipment install placement and scheduling suggestions and safety clearances during equipment installation and removal.

6.2.2.c. Spill requirements and dates will be coordinated with BPA, RCC and FPOM. Final study dates will be coordinated with Ice Harbor Project personnel through NWW Operations Division. Study dates will be dependent on completion of the spillbay 2 ogee and deflector reshaping, and may require a reduction in study scope to only one release pipe to facilitate releases 1.5 feet above the spillbay ogee crest. The Post-Construction Evaluation is planned to be completed before the initiation of spring spill operations for fish passage on April 3, 2015; however, if construction is not completed in time for the evaluation to occur before April 3, the evaluation would be conducted during the early part of spring spill and coordinated through FPOM for a modified spill pattern that would reduce entrainment and retention of balloon-tagged fish in the stilling basin. An 8-hour RSW outage for removal of the release pipe at the end of the biological evaluation will be needed.

6.2.3. March 2015–August 2015: Characterization of Juvenile Salmon Turbine Unit Intake Distribution. See FPOM Coordination (MOC) **15-IHR-001** (12-Feb-2015). A hydroacoustic study to evaluate the distribution of juvenile Chinook and steelhead within the turbine unit before and after encountering the intake screen will occur at Ice Harbor Dam in 2015 (spring study April 1-May 31, 2015; summer study June 1-July 31, 2015). Results will be used to validate the elevation of release points used in future direct injury, survival and sensor fish studies. Data will be collected during the fish passage season April–July.

Hydroacoustic transducers will be installed on the trashrack and STS frame in Unit 1 slot B. Dive work to install and remove transducers on the trashrack will require mobile crane support (provided by the contractor) and outages of Unit 1 and adjacent Unit 2. The dive will occur on the upstream side of the trashrack and is expected to require no more than 1 day on both ends of the study for installation (early March 2015) and removal (August 2015). The dive is not expected to require Project support beyond holding safety clearances.

Installation of the STS transducers is tentatively planned to occur concurrent with the scheduled screen deployments the week of March 23, 2015, when unit 1 will be out-of-service and screens pulled. No specific turbine operations are required. Project support will be required for the gantry crane to raise the STS and dog it high for install on the bottom frame support, then lower it into place on schedule with the other screens for fish passage season.

An equipment shed with 110v power supply will be needed on the powerhouse deck to house hydroacoustic operating and data collection equipment. Trashrack transducer data and power cables are proposed to run up the turbine unit pier nose, into the collection channel under the deck, then up through gatewell or under a speed bump across the powerhouse deck to where they will meet the STS transducer data cables. STS data cables are proposed to run up the STS frame through D-rings or chain links welded to the frame. Collectively, the cables will run across the powerhouse deck to the shed. Final equipment installation and study dates will be coordinated with Ice Harbor Project personnel through NWW Operations Division.

6.2.4. March 2015–December 2015: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. A study of Snake River adult lamprey passage is planned for the 2015 adult passage season, June to October. The primary goals of the research are to determine fish ladder entrance preferences, migration timing through

the ladders, turn-around points in the ladders, fallback rates, and conversion rates between the Lower Snake River dams. Lamprey will be captured and tagged with radio tags and half-duplex (HD) PIT-tags at John Day Dam, transported for release below Ice Harbor Dam, and monitored at the four Lower Snake River projects. Radio-telemetry equipment is used for both adult lamprey and salmonid studies with equipment installed in previous years. Although equipment installation has occurred, periodic maintenance and downloading of radio-telemetry equipment is required throughout the year. Maintenance of HD-PIT antennas will occur during the winter maintenance period when adult fishways are dewatered.

6.2.5. January 2016: Turbine Characterization Study. In support of the Ice Harbor turbine replacement program, baseline Sensor Fish data will be collected in turbine unit 1. Sensor Fish data were collected in November 2014; however, with Unit 3 OOS for blade repairs and the difficulty in recapturing Sensor Fish released through Unit 1, a second effort is needed to collect the remainder Sensor Fish data.

It is expected that approximately 10 days of operations are needed to complete data collection in January 2016. Four specific turbine operations will be required for testing with three Sensor Fish release elevations within the turbine unit intake:

1. lower 1% @ 62 MW;
2. peak @ 72 MW;
3. best operating point for fish @ 87 MW;
4. and upper 1% @ 102 MW.

This study will implement the new generation of Sensor Fish as well as a new release mechanism; therefore, data collection may occur in multiple timeframes as equipment optimization may be intermittently required. The Ice Harbor Project staff support beyond adjusting turbine operations is not expected for this evaluation. Study dates, specific turbine units, unit operations and the potential for having screens deployed in unit 1 during the winter with either primary bypass or gatewell dipping will be coordinated with the Ice Harbor Project and with FPOM through the NWW Operations Division.

7. LOWER MONUMENTAL DAM

7.1. Lower Monumental Dam Special Operations.

7.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at Lower Monumental Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

7.1.2. March 2015–April 2015: Model Validation (Governor Step Response). Western Electricity Coordinating Council (WECC) requires a Governor response calibration to ensure the generating equipment responds as planned to system requirements and disturbances. Unit calibrations will be accomplished on all six units at Lower Monumental. Calibration will involve running each unit in the manual GDACS mode and stepping the MW set point by 5 MW through the 1% range. To accomplish this, at least two other units will need to be operating in automatic to ensure a steady plant output while stepping through the operating range. This may result in operating units out of the sequence of the FPP priorities when calibrating units 4-6 if there is not sufficient water to operate four units. Each unit's calibration is expected to take approximately 1 day. Calibration will take place between March 29 and April 16.

7.1.3. June 2015–December 2015: Unit 2 Liner Replacement. Under the BPA Large Cap Program, Unit 2 is scheduled to receive a liner replacement. The work is scheduled to start in June of 2015 and go to December of 2015. During this time, Unit 2 will be out-of-service. Testing following the repairs will be follow paragraph 4.3.5, 6 year overhaul when Unit 2 has its liner replaced

7.1.4. July 2015: T2 Doble Testing. Transformer bank T2 and turbine units 5 and 6 will be taken out-of-service for maintenance work in 2015 subject to available water flows. The outage is tentatively scheduled for July 27 to July 31, 2015. This work will require a total powerhouse outage and 100% spill (except for approximately 5 kcfs for station service) on the first day of testing for up to 4 hours. By then, all clearance tags should be hung, and the line would be re-energized allowing generation availability of Units 2, 3, 4, and 1. Turbine unit 1% efficiency operations and turbine priorities will continue to follow FPP requirements during this maintenance work. Another total plant outage will be required on the last day of testing to remove clearance tags and restore T2 bank.

7.1.5. September 2015–March 2016: Steady State Model Validation Testing. Western Electricity Coordinating Council (WECC) requires steady state model validation testing on a periodic basis to ensure generating equipment will meet real and reactive power ratings. All units will be tested on a 1-2 year cycle. Tests will involve running the unit out of FPP priority sequence and outside the 1% range. Testing can occur any time from September 1–March 31, and will not occur during fish passage season (April 1–August 31). Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

7.1.6. December 2015–November 2016: Unit 1 Rehab. Current schedule shows that onsite work starting in December 2015 and ending November 2016. The unit will be removed from the hole, the hub disassembled and new blade linkages installed, cavitation repair will be done to the blades and scroll case, and a new discharge ring installed. The unit will then be reinstalled and final machining done to achieve proper profiles of the scroll case, blades, and hub. There may be other work, not part of the contract, which will occur at this same time such as blade packing replacement, wicket gate inspections and servo-motor refurbishment. The generator is also scheduled to be re-wound as part of the overall job.

7.1.7. Long-Term (through 2018): Lower Monumental Head Gate Rehab: Under the BPA Large Cap Program, parts and materials have been acquired to rehabilitate the headgates at Lower Monumental Dam. To facilitate the process, units will be scheduled out-of-service to remove or replace headgates. The headgates will be serviced in the repair pit and then placed back into service. Deviation from unit priority will be necessary to swap headgates from the unit to the pit. The duration of the outages is expected to be one day. The work is expected to start in December of 2012 and continue in to 2018.

7.2. Lower Monumental Dam Studies.

7.2.1. Ongoing through Spring 2016: Radio-Telemetry Monitoring of Adult Salmon and Lamprey. Radio-telemetry equipment previously installed for FY14 studies (adult salmon and lamprey) will be used to continue monitoring for tagged adult salmon and lamprey through spring 2015. Additional lamprey will be tagged in summer 2015 and monitored for passage evaluations through spring 2016. Access to antennas and receivers for downloading and maintenance will be needed through the winter maintenance period.

7.2.2. March 2015–December 2015: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. A study of Snake River adult lamprey passage is planned for the 2015 adult passage season, June to October. The primary goals of the research are to determine fish ladder entrance preferences, migration timing through the ladders, turn-around points in the ladders, fallback rates, and conversion rates between the Lower Snake River dams. Lamprey will be captured and tagged with radio tags and half-duplex (HD) PIT-tags at John Day Dam, transported for release below Ice Harbor Dam, and monitored at the four Lower Snake River projects. Radio-telemetry equipment is used for both adult lamprey and salmonid studies and equipment was installed in previous years. Although equipment installation has occurred, periodic maintenance and downloading of radio-telemetry equipment is required throughout the year. Maintenance of HD-PIT antennas will occur during the winter maintenance period when adult fishways are dewatered.

8. LITTLE GOOSE DAM

8.1. Little Goose Dam Special Operations.

8.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at Little Goose Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

8.1.2. July 2015-2016: Digital Governor Replacement. Governor replacement will take place at Little Goose beginning July 2015, but may extend into 2016. This work will require performance testing and model validation testing. Thus running units out of FPP priority and outside 1%. See model validation testing paragraph. This contract work is subject to normal contracting and construction delays or issues.

8.1.3. August 2015: Doble Testing. Tentatively scheduled August 3–7, 2015, two transformers, T-2 and turbine units 5, 6 will be out-of-service for Doble testing**.** Since Little Goose Dam has multiple transformer banks, the remaining units will be available for operation during these tests and will operate within the 1% range in accordance with FPP priority order.

8.1.4. September 2015–March 2016: Steady State Model Validation Testing. 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 will be tested on a 1-2 year cycle. Tests will require running the unit out of FPP priority sequence and outside the 1% range. Testing can occur any time from September 1–March 31 and will not occur during fish passage season (April 1–August 31). Tests will preferably be conducted just after unit annual maintenance, but may happen at other times. Tests will last for a standard of 30 minutes at maximum load with additional time to run the unit along the maximum real/reactive power curve to the minimum settings. Total test time is anticipated to be 90 minutes or less. Test durations will be minimized to the extent possible and will only be run for the purpose of completing the required model validation testing.

8.2. Little Goose Dam Studies.

8.2.1. Ongoing through Spring 2016: Radio-Telemetry Monitoring of Adult Salmon and Lamprey. Radio-telemetry equipment previously installed for FY14 studies (adult salmon and lamprey) will be used to continue monitoring for tagged adult salmon and lamprey through spring 2015. Additional lamprey will be tagged in summer 2015 and monitored for passage evaluations through spring 2016. Access to antennas and receivers for downloading and maintenance will be needed through the winter maintenance period.

8.2.2. March 2015–December 2015: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. A study of Snake River adult lamprey passage is planned for the 2015 adult passage season, June to October. The primary goals of the research are to determine fish ladder entrance preferences, migration timing through the ladders, turn-around points in the ladders, fallback rates, and conversion rates between the Lower Snake River dams. Lamprey will be captured and tagged with radio tags and half-duplex (HD) PIT-tags at John Day Dam, transported for release below Ice Harbor Dam, and monitored at the four Lower Snake River projects. Radio-telemetry equipment is used for both adult lamprey and salmonid studies and equipment was installed in previous years. Although

equipment installation has occurred, periodic maintenance and downloading of radio-telemetry equipment is required throughout the year. Maintenance of HD-PIT antennas will occur during the winter maintenance period when adult fishways are dewatered.

9. LOWER GRANITE DAM

9.1. Lower Granite Dam Special Operations.

9.1.1. See **Introduction** sections **1.2** and **1.3** above for special operations at Lower Granite Dam regarding spill for juvenile fish passage and navigation lock outages for maintenance.

9.1.2. May 2015 and November 2015: Unit 3 Partial Discharge Analysis (PDA). The PDA measures the health of the generator stator. The two most recent PDA results for Unit 3 indicate extremely poor condition; therefore the unit needs to be analyzed every 6 months. To analyze the unit, it has to be running at or near the 1% upper limit for approximately 4 hours. It takes about 15 minutes to connect the computer to the test points and gather the PDA data. All PDA data will be taken during spring runoff (May 1–31) when running all the units will be in accordance with FPP unit priority. In November, Unit 3 needs to be tested and run, possibly out of the FPP unit priority order for about 4.5 hours.

9.1.3. August 2015: T2 Doble Test: Lower Granite transformer T2 bank will be Doble tested this year. A full line outage will be taken daily. Unit 5 will be run at speed-no-load (approximately 5 kcfs) daily to supply station service power. At night T1 (Units 1-4) will be returned to service. T2 (Units 5 and 6) will remain OOS for the duration of the Doble test. The Doble test is scheduled for 5 days starting at 0600 August 10, 2015. T2 is scheduled to return to service August 14, 2015 at 1800.

9.1.4. Long-Term (Bi-Monthly): Headgate Repair. This is a long-term program to return the headgates 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 vice versa. Each swap will take 4–6 hours to complete and occur approximately every 2 months. Headgate movements are expected to take place concurrently with other outages as they occur, and no special operations outside the FPP are anticipated, but as the program progresses, with fewer headgates needing repair, it may cause an occasional outage on a priority unit.

9.1.5. Long-Term (Bi-Monthly): ESBS Repair. This is a long-term program to return the 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 vice versa. Each swap will take 4–6 hours to complete and occur approximately every 2 months. ESBS movements are expected to take place concurrently with other outages as they occur, and no special operations outside the FPP are anticipated, but as the program progresses, with fewer screens needing repair, it may cause an occasional outage on a priority unit.

9.2. Lower Granite Dam Studies.

9.2.1. Ongoing through Spring 2016: Radio-Telemetry Monitoring of Adult Salmon and Lamprey. Radio-telemetry equipment previously installed for FY14 studies (adult salmon and lamprey) will be used to continue monitoring for tagged adult salmon and lamprey through spring 2015. Additional lamprey will be tagged in summer 2015 and monitored for passage

evaluations through spring 2016. Access to antennas and receivers for downloading and maintenance will be needed through the winter maintenance period.

9.2.2. March 2015–June 2015: Kelt Collection, Transport to Reconditioning, and In-River Survival. From March 25 through June 15, 2015, provide assistance to Nez Perce Tribe for collection of post-spawn steelhead (kelt) off the Lower Granite separator for their reconditioning program. Depending on flow conditions, separator technicians will collect a similar number of A-run and B-run kelt for transfer to CRITFC/NPT researchers at Dworshak Dam reconditioning facilities (about 400 kelt) with remaining kelt PIT-tagged for direct release into the tailwater (about 1,200-1,400 kelt) and limited release into gatewell 5A as part of the evaluation of prototype overflow weirs and enlarged 14" orifice.

9.2.3. April 2015–June 2015: Study to compare seasonal SARs of early in-river migrating Snake River yearling anadromous salmonids versus transported. A study will be conducted to determine seasonal effects of transporting fish from the Snake River to optimize a transportation strategy. At Lower Granite, fish will be collected for this study starting on approximately April 6, with marking beginning on April 7, 2015. Depending on the number of fish available, fish will be collected 1-2 days with tagging occurring on the day following collection. A barge will leave each Thursday morning with all fish collected during the previous 1-3 days. By barging all fish (minus the in-river group) during 1 to 3 days of collection, barge densities will be maintained at a level similar to what would occur under normal transport operations that time of year. This pattern will occur in the weeks preceding general transportation and will be incorporated into general transportation once that operation begins. The desired transported sample size is 6,000 wild Chinook and 4,000-6,000 wild steelhead weekly for approximately 8 weeks.

9.2.4. April 2015–October 2015: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. A study of Snake River adult lamprey passage is planned for the 2015 adult passage season, June to October. The primary goals of the research are to determine fish ladder entrance preferences, migration timing through the ladders, turn-around points in the ladders, fallback rates, and conversion rates between the Lower Snake River dams. Lamprey will be captured and tagged with radio tags and half-duplex PIT-tags at John Day Dam, transported for release below Ice Harbor Dam, and monitored at the four Lower Snake River projects. Radio-telemetry equipment is in place from the adult salmon passage studies and some additional arrays will be installed in the adult fish ladders in the vicinity of transition or turn pools. Installation of equipment occurred in 2014, but will require and maintenance and balancing of radio-telemetry equipment in the spring (April-June) prior to the adult lamprey migration season. Access to antennas and receivers for downloading and maintenance will be needed from April through October.

9.2.5. August 2015–December 2015: Study to compare SARs of Snake River fall Chinook salmon under alternative transportation and dam operational strategies. A sample of subyearling Chinook salmon will be collected at Lower Granite juvenile fish facility using the PIT-tag sort-by-code system. Fish will be measured and compared to fish captured at Bonneville Dam to determine growth for in-river migrants. Sort-by-code will also be used to collect holdover fall Chinook juveniles in the spring. Scales will be collected from a subsample of returning adults in the fall for age at ocean entry and overall age analysis.

9.2.6. Long-Term (through March 2017): Juvenile Fish Bypass System Upgrade Construction. See FPOM MOC **15-LWG-01** (12-Feb-2015). Construction activities associated with the Lower Granite Dam fish bypass system upgrade began in 2014 and are expected to continue throughout 2015, with completion expected in March 2017.

Construction activities in 2015 are anticipated to include the plugging of the fish screen slots (FSS) including the Wagner Horns; mining of the transportation channel through the south non-overflow section of the powerhouse; erection of the new primary and secondary dewatering structures and transportation flume; and associated components, potentially including work within the forebay associated with construction activities. The construction of FSS plugs are expected to occur during scheduled turbine unit outages for annual maintenance and/or in association with non-priority units while they are offline. Following placement of the FSS plugs, the slots will be dipped to remove all fish prior to the placement of Tremie concrete. Fish removed from the slots will be transported below the dam and released. Fish salvage operations will be coordinated with Project Fisheries.

During the 2015/16 winter work period, the juvenile collection channel may be widened to the final 9.5' channel width in the vicinity of turbine units 5 and 6 (upstream end of collection channel). Crossover activities involving permanent modifications to the existing juvenile bypass system (JBS) are not anticipated to begin prior to August 2016.

Activities for the FSS that require special project operations other than as described above will be coordinated through FPOM and/or FFDRWG as appropriate. All fish salvage operations will follow standard dewatering procedures and will be coordinated through Lower Granite's fisheries staff in accordance with standard operation procedures. Any deviations from FPP operations will be coordinated through FPOM and/or FFDRWG as appropriate.

Update 5-Feb-2015: The construction of the FSS and Wagner Horn plugs was completed at Unit 1 in early February 2015. Construction at Unit 3 began in January 2015 with an anticipated completion by mid- February 2015. Currently, Unit 2 is on the schedule for completion March 25, 2015. The completion of Units 1 and 3 would allow either unit to be run as priority units during the Unit 2 outage. Units 5, 6 and 4 are scheduled to be completed during their next annual maintenance period starting July 7, 2015 through October 5, 2015.