

Appendix A

Special Project Operations & Studies

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1. INTRODUCTION

1.1. Purpose

1.1.1. 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 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

1.2.1. 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.

1.2.2. 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).

1.2.3. The Action Agencies will coordinate all significant special operational requests and/or schedule changes with fisheries agencies and tribes through the appropriate regional forum to inform the final decision.

1.3. Spill for Juvenile Fish Passage

1.3.1. 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 Lower Snake River projects (IHR, LMN, LGS, LWG) and 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.

1.3.2. 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 in the tailrace.

1.4. Navigation Lock Maintenance

1.4.1. Annual lock outages are scheduled for routine maintenance and inspections, as well as some non-routine work such as gate structural repairs and machinery replacement.

1.4.2. In 2017, the annual outage at all Corps navigation locks on the Columbia and Snake rivers is extended to 14 weeks, December 12, 2016 – March 20, 2017, in order to perform extensive critical major repairs and non-routine repairs and maintenance, in addition to routine

maintenance and inspections. Additional information about the extended lock outages is available online at: <http://www.nww.usace.army.mil/Missions/Navigation/FY17LockOutage/>

1.5. Doble Testing

1.5.1. Doble testing of transformers at the Lower Snake River projects is required every three years and must be conducted during warm, dry conditions (July–August). Testing requires outage of the transformer and associated units and is performed during already scheduled outages to the extent possible and timed to avoid or minimize impacts to fish. For more information, refer to the project-specific sections below and FPP chapters. The Doble testing schedule for the current year is in **Table A-1** below.

Table A-1. Doble Testing Schedule in 2017.

Project	2017 Dates for Doble Testing	Outage (Transformer/Units)	Notes
BON	No specific outage for Doble tests. Testing is done during outages for maintenance.		
TDA	Oct 2-5 TBD	T4 T8 Replacement	
JDA	No specific outage for Doble tests. Testing is done during outages for maintenance.		
MCN	Jul 17-21 Jul 24-28	T1 (units 1-2) T2 (units 3-4)	
IHR	Jul 31-Aug 4	TW3, 4 (Units 3-4)	In conjunction w/ U3 annual maintenance and U4 6-yr overhaul.
LMN	Jul 29–Aug 5	T1 (Units 1–4)	All units OOS ≤ 4 hrs on first/last day for clearances. T2 (Units 5, 6) RTS at night 1800-0600.
LGS	Aug 7-11	T1 (Units 1-4)	Possibly testing Capacitive Coupling Potential Device (CCPD) as well
LWG	n/a	n/a	No Doble testing in 2017

2. BONNEVILLE DAM

2.1. Bonneville Dam Special Operations

2.1.1. See **Introduction section 1** above for special operations related to spill for juvenile fish passage and navigation lock outages for maintenance, and the schedule for Doble testing.

2.2. Bonneville Dam Studies

2.2.1. April 2017–July 2017: Post-Construction FGE Evaluation (Year 1 of 2). During the 2016/2017 winter maintenance period, the Corps completed gatewell modifications at all Bonneville Dam Powerhouse 2 (PH2) main units 11-18 with the intention to improve fish passage conditions (per BiOp RPA 18). This study will use hydroacoustic technology to

estimate post-construction fish passage metrics for spring and summer juvenile salmonids at all PH2 routes for two consecutive years (2017-2018).

2.2.1.a. There will be no special operations required for this study. All data will be collected during project operations in compliance with the 2017 FPP.

2.2.1.b. Equipment will be installed in February–March, including fixed-location split-beam transducers at each main unit and on a floating barge in front of the B2CC, and fixed-location and mobile sonar cameras at units 15 and 17. Data will be collected April 10–July 15, and will be related to project data for unit operating point (lower 1%, mid 1%, upper 1%), total outflow, and proportion of flow through each powerhouse and the spillway.

2.2.1.c. Objectives of the study include:

- a) estimate fish guidance efficiency (FGE) and fish passage efficiency (FPE);
- b) estimate seasonal and diel patterns by PH2 passage route for each unit and B2CC;
- c) evaluate FGE trends relative to project operations and environmental conditions (total outflow, proportion of outflow at PH1/PH2/spillway, PH2 unit operating point, forebay elevation, temperature, B2CC operation);
- d) estimate vertical distribution for smolt-size fish passing PH2 turbine intakes; and
- e) estimate gap loss using mobile acoustic underwater camera (spring) and fixed-location underwater cameras to compare against unit operating points.

3. THE DALLES DAM

3.1. The Dalles Dam Special Operations

3.1.1. See **Introduction section 1** above for special operations related to spill for juvenile fish passage and navigation lock outages for maintenance, and the schedule for Doble testing.

3.2. The Dalles Dam Studies

3.2.1. There are no studies scheduled for The Dalles Dam in 2017.

4. JOHN DAY DAM

4.1. John Day Dam Special Operations

4.1.1. See **Introduction section 1** above for special operations related to spill for juvenile fish passage and navigation lock outages for maintenance, and the schedule for Doble testing.

4.2. John Day Dam Studies

4.2.1. There are no studies scheduled for John Day Dam in 2017.

5. McNARY DAM

5.1. McNary Dam Special Operations

5.1.1. See **Introduction section 1** above for special operations related to spill for juvenile fish passage, navigation lock outages for maintenance, and the schedule for Doble testing.

5.1.2. Bi-Monthly (Long-Term): 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.

5.1.3. Monthly (Long-Term): Fish Ladder Exit, Entrance, Regulating/Tilting Weir Maintenance. The Oil Accountability Program identified oil leaks in the WA/OR fish ladders and made repairs a priority. Maintenance efforts revealed that the original seals and gaskets failed due to not being actively operated to prevent drying out and tearing. Now that seals and bushings have been replaced, the project needs 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 back shifts or periods of inactivity to exercise seals. The manual greasing of Zerk fittings requires a mechanic during normal working hours. McNary will work with Project Biologists to perform this maintenance during low impact periods as appropriate.

5.1.4. February 2017–August 2017: NERC/WECC Main Unit Reactive Limit Tests. The purpose is to ensure that accurate information on generator gross and net Real and Reactive Power capability is available for planning models used to assess Bulk Electric System (BES) reliability. This testing is a new requirement communicated to McNary in December 2016. Testing will require all Main Unit Generators to operate outside of the 1% range requirements for at least 1 hour (NERC/WECC changed duration requirement from 30 minutes to 60 minutes). McNary Dam will try to complete testing in February 2017; however, operational restrictions may require some units to be tested later in the year during fish passage season. At a minimum, Unit 13 is being repaired Dec 2016–Mar 2017 and will require testing after its return to service. Testing dates are not currently scheduled and will be coordinated with BPA and NWW NERC/WECC Engineers.

5.1.5. April–July (Annually): Waterfowl Nesting. Since 1982, McNary pool has been 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 337.0'–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.

5.1.6. July 2017: Doble Testing. As defined in **Table A-1** above, Doble testing in 2017 is scheduled for July 17–21 at Transformer Bank 1 (T1) and July 24–28 at T2. Testing will require outages of the transformer and their respective units for up to 5 days for 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 testing. Turbine unit 1% efficiency operations and priority orders will continue to follow FPP requirements. See the FPP project-specific chapters, **Turbine Maintenance** section for more information.

5.1.7. August 2017–December 2017: Unit 3 and Unit 5 Overhaul. Unit 3 is scheduled for overhaul 8/7/2017–10/6/2017. Unit 5 is scheduled for overhaul 10/9/2017–12/8/2017.

5.1.8. December 2017: Unit 13 EAL Equipment Removal and Testing.

5.2. McNary Dam Studies

5.2.1. Ongoing: Evaluation of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at McNary Dam. This study will use half-duplex (HD) PIT-tag systems to evaluate passage success of adult Pacific lamprey at McNary Dam, the four Lower Snake River projects and associated river segments. Adult Lamprey were captured and tagged at John Day Dam in 2014 and 2015, and tags remain active. This study will continue to require electrical power for electronics and access to maintain and download data from the PIT-tag detection equipment. Maintenance of equipment will occur during the winter maintenance period when adult fishways are dewatered.

6. ICE HARBOR DAM

6.1. Ice Harbor Dam Special Operations

6.1.1. See **Introduction section 1** for special operations related to spill for juvenile fish passage, navigation lock outages for maintenance, and the schedule for Doble testing.

6.1.2. Ongoing through October 2017: Unit 2 Turbine Replacement. Starting in March 2016 and currently scheduled through January 2018, the turbine runner on Unit 2 will be replaced. Prior to disassembling the unit, pre-commission testing will be performed with STSs installed. When the unit returns to service, the same testing will be accomplished with STSs in place while the unit is operating for the duration of the tests. Testing is projected to take several days. Following Unit 2 completion, Unit 3 will require pre-commissioning testing which will also take several days. This testing will be performed with STSs installed.

6.1.3. June 2017–August 2017: Units 4, 5, 6 Turbine Oil Replacement. Tentatively scheduled to begin June 19, 2017, Units 4, 5, 6 will be out of service for approximately 3 weeks each to replace the turbine oil. These outages will overlap 1 week to facilitate preparation for the next unit while the contractor replaces the turbine oil on the previous unit. Tentative schedule is Unit 6 June 19–July 7, Unit 5 July 3–22, and Unit 4 July 17–August 4.

6.1.4. July/August 2017: Doble Testing. The schedule for the current year is in **Table A-1** above. Doble testing is conducted in conjunction with scheduled unit maintenance. Since Ice Harbor has multiple transformer banks, transmission lines, and redundant switching capability, the remaining units will be available for operation during testing and will operate in accordance with FPP priority order within the 1% range. For more information on Doble testing, see the FPP project-specific chapters, **Turbine Maintenance** section.

6.1.5. (Tentative) October 2016–February 2018: Transformer Deluge System Replacement. Large Capital work to replace transformer deluge fire protection system pumps and piping will require bus section outages and 2 units out of service at a time to accommodate work around the transformers. Duration of the outages is scheduled for 3 weeks per bus section. Oct–Nov 2017: Bus section 3 (units 5, 6); Nov–Dec 2017: Bus section 2 (units 3, 4); Dec 2017–Jan 2018: Bus section 1 (units 1, 2).

6.2. Ice Harbor Dam Studies

6.2.1. Ongoing: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. This study will use half-duplex (HD) PIT-tag systems to evaluate passage success of adult Pacific lamprey at McNary Dam, the four Lower Snake River projects and associated river segments. Adult Lamprey were captured and tagged at John Day Dam in 2014 and 2015, and tags remain active. This study will continue to require electrical power for electronics and access to maintain and download data from the PIT-tag detection equipment. Maintenance of equipment will occur during the winter maintenance period when adult fishways are dewatered.

7. LOWER MONUMENTAL DAM

7.1. Lower Monumental Dam Special Operations

7.1.1. See **Introduction section 1** for special operations related to spill for juvenile fish passage, navigation lock outages for maintenance, and the schedule for Doble testing.

7.1.2. Ongoing through 2018: Lower Monumental Head Gate Rehab: Under the BPA Large Cap Program, parts and materials have been acquired to rehabilitate the head gates at Lower Monumental Dam. 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. Deviation from unit priority will be necessary to swap head gates from the unit to the pit. The duration of the outages is expected to be one day. The work started in December of 2012 and will continue in to 2018.

7.1.3. Ongoing through July 2017: Unit 1 Rehab to Kaplan. Work started in January 2016 and is currently scheduled to July 2017. 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.

7.1.4. Ongoing through July 2017: Powerhouse Monolith Water-stop Replacement. Under the BPA Large Cap Program, Powerhouse Monolith Water-stops will be replaced during the timeframe of July 2016 through July 2017. This will require installation of drilling rigs on the intake deck and insertion of hydrophilic polyurethane membranes to replace failed water-stops.

7.1.5. Ongoing through August 2017: Adult Fish Collection Channel Bulkhead Maintenance. Work began in June 2016 to rehabilitate Adult Fish Collection Channel Bulkheads along the powerhouse to support Diffuser Grating replacement during the FY18 in-water work period. This work will require short duration (≤ 5 hours) Fish Pump outages and adjustment of the NPE and SPEs to minimize the pressure differential to facilitate removal and replacement of bulkheads. The bulkheads will be rehabilitated on the tailrace deck, then returned to service. The work is expected to continue into the second half of 2017.

7.1.6. April 2017–March 2018: Turbine Unit Digital Governor Installation. This contract is to replace the aging mechanical governors with new digital governors on all six turbine units. The new governors will make the units more reliable and efficient, with less required maintenance.

7.1.7. July 2017: Doble Testing. The schedule for the current year is in **Table A-1** above. On the first and last day of testing, clearance procedures will require a total powerhouse outage for up to 4 hours and all project outflow will be spilled (except approximately 5 kcfs for station service). Available turbine units will be operated in accordance with FPP priority order and within the 1% range during this work. For more information on Doble testing, see the FPP project-specific chapters, **Turbine Maintenance** section.

7.1.8. July 2017–August 2017: A-B-C Phase Ground Switch Repair and MOD Inspections. BPA employees will be working on the faulty “A, B, C” Phase Grounding Switch and Motor Operated Disconnects (MOD) servicing the powerhouse to the BPA Substation transmission line. The work will take approximately 3 days to complete and requires Unit 5 to be first priority or run at speed no load for station service power.

7.1.9. August 2017–December 2017: Unit 2 Liner Replacement. Under the BPA Large Cap Program, Unit 2 is currently scheduled to receive a liner replacement starting in August 2017 and continuing to December 2017. This work will follow completion of the Unit 1 Rehab. During this time, Unit 2 will be out-of-service. Testing following the repairs will follow FPP paragraph 4.3.5 (6-year Overhaul).

7.1.10. September 2017: Turbine Unit 5 XJ Breaker Maintenance. Turbine Unit 5 is the station service unit for Lower Monumental. This breaker needs to be serviced at a separate time from the Unit Annual due to station service considerations.

7.1.11. December 2017–June 2018: Drainage and Unwatering Pump Replacement. Lower Monumental will be replacing the existing drainage and unwatering pumps with modern pumps and motors. The new pumps and controllers allow better control of the drainage and unwatering systems.

7.2. Lower Monumental Dam Studies

7.2.1. Ongoing: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. This study will use half-duplex (HD) PIT-tag systems to evaluate passage success of adult Pacific lamprey at McNary Dam, the four Lower Snake River projects and associated river segments. Adult Lamprey were captured and tagged at John Day Dam in 2014 and 2015, and tags remain active. This study will continue to require electrical power for electronics and access to maintain and download data from the PIT-tag detection equipment. Maintenance of equipment 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 section 1** above for special operations related to spill for juvenile fish passage, navigation lock outages for maintenance, and the schedule for Doble testing.

8.1.2. July 2017–October 2017: Replacement of Station Service Transformers T01, T02.

Transformer T01 install July 17–August 15, 2017, could require two separate daily line outages July 17 and August 15 in order to safely isolate the system for install and reconfiguration before the restoring to normal operation. During the outage, all units (1-6) will be out of service from 0600-1700. Transformer T02 install is scheduled to begin September 11, 2017, at 0600, and requires unit 5 to be out of service for six weeks through October 20. Unit 5 will be the last unit of priority in 2017 and is already scheduled to be out of service for repair sometime in September (FPP Change Form 17LGS002). This outage will likely have zero impact on unit priority or fish passage.

8.1.3. August 2017: Doble Testing. The schedule for the current year is in **Table A-1** above. Doble testing is conducted in conjunction with scheduled unit maintenance. For more information on Doble testing, see the FPP project-specific chapters, **Turbine Maintenance** section.

8.1.4. September 2017–January 2018: Installation of Adjustable Spillway Weir (ASW). The Little Goose Dam TSW will be replaced with a new ASW from late 2017 through early 2018 as coordinated with FPOM via MOC 16LGS02. Spillway 1 will be tagged out of service from September 1, 2017, to January 31, 2018. Turbine units 5 and 6 may be tagged out of service intermittently throughout the project in support of dive operations to facilitate removal of the TSW and installation of the new ASW. Activities for the project will be coordinated with the Little Goose Project and RCC (Reservoir Control Center) as needed to facilitate construction activities. At this time, we do not anticipate any significant in water demolition, repairs or installation efforts.

8.1.5. Late Fall/Early Winter 2017. Trash Sheer Boom Installation. The install will require a generic two units at a time outage. These outages are planned to occur in October 2017, but will be refined as the construction schedule is solidified.

8.2. Little Goose Dam Studies

8.2.1. Ongoing: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. This study will use half-duplex (HD) PIT-tag systems to evaluate passage success of adult Pacific lamprey at McNary Dam, the four Lower Snake River projects and associated river segments. Adult Lamprey were captured and tagged at John Day Dam in 2014 and 2015, and tags remain active. This study will continue to require electrical power for electronics and access to maintain and download data from the PIT-tag detection equipment. Maintenance of equipment 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 section 1** above for special operations related to spill for juvenile fish passage, navigation lock outages for maintenance, and the schedule for Doble testing.

9.1.2. Bi-Monthly (Long-Term): Headgate Repair. This is a long-term program to return 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 back. 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, and no special operations outside FPP criteria are anticipated, but as the program progresses and fewer headgates need repair, it may require an occasional outage on a priority unit.

9.1.3. Bi-Monthly (Long-Term): ESBS Repair. 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. ESBS movements are expected to take place concurrently with other outages and no special operations outside FPP criteria are anticipated, but as the program progresses and fewer screens need repair, it may require an occasional outage on a priority unit.

9.1.4. Ongoing through March 2018: Juvenile Fish Bypass System Upgrade. Construction activities associated with the Lower Granite Dam juvenile bypass system (JBS) upgrade began in 2014 and are expected to continue through March 2018, with project commissioning expected to occur in February/March 2018 (FPOM MOC: 16LWG10).

9.1.4.a. Construction activities in 2017 are anticipated to include Construction activities in 2016 are anticipated to include mining of the existing juvenile collection channel during 2016/17 winter maintenance period (MOC: 16LWG10) and during the extended Juvenile Bypass System (JBS) outage (August 1, 2017 to March 24, 2018) to widen the collection channel (MOCs: 13LWG17, 16LWG10); completion 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; installation of

new primary and emergency bypass outfall structures in the tailrace and associated components. Work during 2017 will include work in-water work in the forebay associated with collection and transportation channel improvements and within the tailrace for outfall construction activities.

9.1.4.b. During the 2016/17 winter work period, the juvenile collection channel is being widened to the final 9.5' channel width in the vicinity of turbine units 3 and 4 with tie-in to the upstream portion of the collection channel that was widened during the 2015/16 winter maintenance window. The collection channel will be widened within the vicinity of Turbine Units 1-2 and down-well area during the extended winter maintenance period 1 August 2017 to 24 March 2018. Crossover activities involving permanent modifications to the existing juvenile bypass system (JBS) are anticipated to occur during the extended JBS outage starting August 2017.

9.1.4.c. Lower Granite Dam RSW operations will be extended through 15 December 2017 as part of the extended JBS shutdown described in MOC 16LWG10. As discussed with NWW FFDRWG and FPOM, it may be necessary for the Corps to adaptively manage RSW operations during the September 1, 2017 to December 16, 2017 period to improve fish passage conditions and facilitate in-water outfall construction activities.

9.1.4.d. Activities that require special project operations other than as described above or in current MOCs 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.

9.1.5. Ongoing through May 2017: Unit 1 Rehab to Kaplan.

9.1.6. Fall 2017–March 2018: Lower Granite Spillbay 1 PIT-Tag Detector Installation.

Construction activities associated with PIT-tag detection system installation at Lower Granite Dam will begin in fall 2017 and are expected to continue through winter 2018, with project completion expected in March 2018. Construction activities will primarily be in, or near, spillbay 1 and will include reshaping of the ogee, installation of a new spillway flow deflector, and installation of a PIT-tag detection system installation. To facilitate these construction activities, including concrete removal and installation of new equipment, the Corps anticipates needing to request an extended in-water work window of November 15, 2017, to February 28, 2018. The type of work and level of effort is expected to be similar to what was needed for the reshaping of the ogee and new flow deflector for the Ice Harbor Dam spillbay 2 during the winter of 2015/16. An MOC will be distributed to FPOM once sufficient project details are available.

9.2. Lower Granite Dam Studies

9.2.1. Ongoing: Evaluation of Adult Pacific Lamprey Migration Behavior and Passage Success in the Lower Snake River. This study will use half-duplex (HD) PIT-tag systems to evaluate passage success of adult Pacific lamprey at McNary Dam, the four Lower Snake River projects and associated river segments. Adult Lamprey were captured and tagged at John Day

Dam in 2014 and 2015, and tags remain active. This study will continue to require electrical power for electronics and access to maintain and download data from the PIT-tag detection equipment. Maintenance of equipment will occur during the winter maintenance period when adult fishways are dewatered.

9.2.2. March 2017–June 2017: Kelt Collection, Transport to Reconditioning, and In-River Survival. From March 25 through June 15, 2017, 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 holding tanks for CRITFC/NPT researchers to process for either trucking to Dworshak Dam reconditioning facilities (about 400 kelt) or PIT-tagged for direct release into the tailwater (about 1,200-1,400 kelt).

9.2.3. June 2017-September 2017: Year-2 Post-Construction Evaluation of Water Temperature Cooling Chimney and Spray Bar Installation (2016) for Adult Sockeye and Summer/Fall Chinook Ladder Exit Success. ARIS camera will be re-installed in the northern trolley pipe alongside the adult ladder exit at 60 feet deep to collect proportion of successful exits from the ladder and sort trajectories into probable upriver migration, fallback direction, or ladder re-entry. Ladder passage times will be estimated using the PIT-tag detection arrays, including a new pass-through antenna array installed downstream of the adult trap exit gate.