March 2007

APPENDIX A

SPECIAL PROJECT OPERATIONS AND STUDIES

March 2007

March 2007

APPENDIX A: BONNEVILLE

March 2007

Bonneville Dam[1]

1. Special Project Operations.

RCC will coordinate needed changes with the projects and authorize operations in teletype regulations.

1.1. Spring Creek Hatchery Release. The first hatchery release is expected to occur in early March, followed by special operations for juvenile fish passage as coordinated with the fish agencies through TMT. Project operations for fish passage will be defined by RCC teletype prior to the release.

1.2. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

1.3. First Powerhouse Main Unit Rehabilitation. Work continues on the rehabilitation of main units 2, 10 and 8 at PH1 in 2007. Unit 2 is expected to return to service starting in mid December 2006. Unit 10 is expected to return to service in March of 2007. Special operations will be requested for main unit testing once the units are ready to start the initial start up test. Tests will require but are not limited to short term runs above and below the 1% turbine efficiency range, and turbine load rejection testing. Duration of these tests are generally short (less than 6 hours). Tests requiring the units to be outside the 1% operating ranges for longer than this 6 hour period during the fish passage season will be coordinated with the regional fish agency representatives prior to testing. Unit outages associated with line boring operations will need to be specially coordinated to minimize additional spill during the fish passage season. Efforts will be made to minimize outages that require taking units OOS during periods of high TDG levels below BON. The Corps rehabilitation fisheries representative (PM-E) along with Voith Hydro will create an advance schedule outlining line boring activities as to reduce the chances of TDG exceedences due to reduced powerhouse capacity. This schedule will be created prior to line boring activities for all remaining units.

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[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

2. Studies.

2.1. Spillway Survival Study. Acoustic telemetry will be used to estimate the survival of yearling and subyearling chinook salmon that pass through the spillway and dam. The purpose of this study is to evaluate the effect of spilling 100 kcfs 24-hours per day during the spring migration and 75 kcfs daytime, TDG cap night spill during the summer. In February, new spill patterns will be developed for this test and will be coordinated through FPOM and RCC upon their completion. Fish for this work will be collected at the Bonneville Dam smolt monitoring facility. BRZ access to install acoustic telemetry receiving nodes will be required prior to the spill season. Approximately every two weeks from May through July, battery changes will be necessary for hydrophones located in the BON forebay. This will require a BRZ permit for forebay access.

2.2. Lamprey Passage Evaluations. From early June to the end of August, 1000-2000 adult Lamprey will be captured and tagged with half-duplex PIT tags and released below the dam to evaluate overall passage, including use of the Lamprey Passage Systems (LPS). 400 of these fish will be radio-tagged for an evaluation of reduced fishway entrance flow at Powerhouse 2. On alternating nights from around June 1 to mid August the Washington shore ladder entrance head will be reduce to 0.5’ starting at 1000 and ramped back up to normal operations (1.5’) at 0400. A final day by day schedule will be supplied to the project to help guide the operators before the research begins. An additional prototype LPS will be installed in the WA ladder makeup water supply channel before lamprey passage season begins. LPS will be operational no later than the middle of May and run until at least October 1.

2.3. Adult Studies Evaluations. Hydroacoustics will be used to evaluate steelhead kelt passage at the B2CC, from 1 March 2007 to the juvenile passage season. South Fork Salmon River hatchery summer Chinook, PIT-tagged for future spawning success evaluations in previous years, will be separated by code at the AFF, morphometircally measured, and released.

2.4. Sea Lion Predation. Beginning when the first California sea lions return to Bonneville Dam until the last sea lion leaves, usually mid-February until June 1, exclusion gates will be installed at all downstream slots of all entrances and barriers will be installed at B2 FOGs. In addition, NMFS-approved sea lion harassment activities will occur from land during sea lion season. 350 to 400 spring Chinook will be radio-tagged and released during the spring run to see if there are any negative effects on fish passage from the efforts being taken to reduce predation by sea lions.

2.5. Bonneville Chum Salmon Fry Study. Starting prior to spill operations in mid-April 2007 Pacific Northwest National Laboratories (PNNL) personnel will be installing TDG monitoring stillwells (piezometers) in several gravel sights at both Ives Island and Multnomah Falls below BON Dam. Depending on river flows, special operations may be requested reducing BON outflows which will facilitate divers to safely install equipment. Any and all requests for flow reductions will be coordinated on a case by case basis with RCC.

2.6. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA.

March 2007

APPENDIX A: THE DALLES

March 2007

The Dalles Dam[1]

1. Special Project Operations

RCC will coordinate needed changes with the projects and authorize operations in teletype regulations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

2. Studies.

Research in 2007 will primarily focus on the effects of opening Bays 1-6 to 16’ gate openings. Gate openings of 16’ will occur for five days (from 07:00 to 15:00 hours each day) either: 1) prior to or during the first week of spill, or 2) during the period of peak river flow (e.g., from mid-April to late May).

2.1 Spillwall Evaluations. A direct survival and injury evaluation using balloon tags for yearling Chinook salmon released into Bays 4 and 6 will occur prior too or during the first week of spill or during peak flow conditions between late April and late May. The expected duration of the test is 5 days. The intent is to assess stilling basin conditions with 16’ gate openings. These large gate openings will provide 40% spill at total river flow of 360 Kcfs. Therefore, if total river flow during this test is less than 360 Kcfs, spill may exceed 40% for periods when fish are released and recaptured (approximately 0700 – 1700 hours for 5 days in April or May). A hard constraint of a minimum 75’ Bonneville Dam forebay elevation will be required from 0700-1700 hours during this five day period to ensure tailwater level at The Dalles Dam does not cause intermittent exposure of the baffle blocks. Access to the BRZ to track fish in the tailrace and release controls will be required. Fish for this work will be collected from a hatchery and transported to TDA for holding so some space may be required near a water source.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

2.2. Adult Lamprey Studies. Exit area half-duplex PIT antennas and receivers will be operational to monitor adult lamprey passage no later than mid-May.

2.3. Adult Salmon Studies. Researchers will add additional radio-telemetry antennae and receivers in the tailrace and ladder areas by 1 March to evaluate ladder use and passage of spring Chinook with the juvenile spill pattern.

2.4. Equipment Installation and Maintenance. Installation of balloon tag release equipment will begin in March 2007 at The Dalles Dam. Installation of release pipes in Bays 4 & 6 will require divers and access into the BRZ; however, no outages of turbine units will be required.

Geotechnical explorations of the foundation for the extension of the existing spillwall will be performed during the in-water work period in TDA tailrace starting in January and concluding prior to 28 February. This work will require a barge mounted drill rig for borings and BRZ tailrace access.

2.5 Sluiceway Studies: Possible research on the TDA ice and trash sluiceway in October and November may occur. This research may require having the sluicegates open over MU 1 and closed over other MU (18/5). It may require the operation may be limited to 12 hours to test for adults passing the project. This research will be coordinated through the regional forumns prior to implementation.

2.6. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, and equipment failures, etc. The seasonal timing (i.e., prior too, during the 1st week of spill, or during peak flow conditions) of the affects 16’ gate openings will be determined via the fisheries agencies through the regional forum. Some evaluations may not proceed. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC, TMT, and BPA.

March 2007

APPENDIX A: JOHN DAY

March 2007

John Day Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the spring and summer outmigration seasons in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. Planning dates for spill are from April 10 through August 31 for spring and summer migrants as required in the UPA. Between May 15 and June 20 (planning dates), spill will occur from 1900 to 0600 hours (11 hours total). Before that time period, spill will be for 12 hours nightly, from 1800 to 0600 hours. From April 10 to June 20 (planning dates), spill discharges will be 60% of instantaneous project flow at project flows up to 300,000 cfs. Above 300,000 cfs project flow, spill discharges will be 180,000 cfs (up to the hydraulic limit of the powerhouse). From June 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation conditions.

2. Studies.

2.1. Adult Lamprey Studies Exit area half-duplex PIT antennas and receivers will be operational no later than mid-May to monitor adult lamprey passage. JDA ladders will be evaluated this winter and spring for potential installation of LPS.

2.2. Adult Salmon Studies Researchers will be monitoring and downloading radio-telemetry systems to evaluate passage of spring Chinook tagged at Bonneville Dam.

2.3. All dates shown are approximate and could be advanced or delayed by a week or so depending on various factors such as river flows, contractor schedules, equipment failures, etc. Some evaluations may not proceed. Therefore, a final description of studies and outages being conducted will be coordinated with the region through AFEP (FFDRWG and SRWG), prior to April 1. All special operation requests or schedule changes will be coordinated with the fisheries agencies and tribes through the AFEP and with RCC and BPA.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

March 2007

APPENDIX A: MCNARY

March 2007

McNary Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of McNary reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Doble Tests. One transformer bank, T4, and the respective turbine units will be taken out of service for Doble testing in 2007. Turbine units 7 and 8 will be unavailable for generation during the testing. The outage is tentatively scheduled for 6-9 August 2007

1.3 Rehabilitation of Spillway Gates. Contract 06-C-0029 was awarded on 19 Sep 2006 for the rehabilitation of three spillway gates. Two gates are scheduled for refurbishment during a 150 calendar day period commencing on 6 Oct 2006. The third gate is scheduled for rehabilitation during a 45 calendar day period commencing on or about 1 Sep 2007. The work involves resurfacing wheels, installing low-friction seals, and painting. One gate would be rehabbed at a time, over about a four-week period. A gate would be removed from its slot for rehab and a spare gate set in the upstream slot while the gate is being rehabbed. Handling gates for rehab would require a four to six hour outage in one spillway bay at a time, about one swap per month. Twenty-one of the 22 spillway bays would be operable during the period of time that each spillway gate is being rehabbed.

1.4 Headgate Repair. Repairing main unit headgates by adding new roller chain, seals, anodes, etc. This is a long term program to return the headgates to a safe operating condition. The plan will require short unit outages throughout the year while transporting gates from units to the repair pit and other handling needs to facilitate the repairs.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

1.5 Transformer Installation. The transformers have reached the end of life and are scheduled to be replaced during planned outages. T6 Transformers, units 11 and 12 and T7, units 13 and 14 will be replaced starting in July, 2007 and finishing by the end of October, 2007. Unit outages will start with units 12 and 13 for the T6 installation then followed by units 13 and 14 for the T7 installation.

1.6 New Turbine Unit Oil Coolers. The existing turbine unit thrust bearing oil coolers are failing and are in need of replacement. The project has been replacing the internal oil coolers with external coolers as they fail. The plan is to replace the remaining oil coolers during planned outages rather than through forced outages. This work will start in July, 2007 and will continue into 2008. Cooler replacements will take place in conjunction with annual overhauls of turbine units 4, 5, and 11 and in conjunction with 9 year overhauls inspections scheduled for turbine units 1 and 3.

2. Studies.

2.1. Evaluation of Juvenile Salmonid Passage and Survival. A passage and survival study to evaluate the performance of one or more top-spill weirs (TSW) will be conducted during the spring and summer of 2007. Both spring and summer evaluations will consist of two project spill operations yet to be determined. Equipment setup and installation requiring diving and considerable boat activity in the forebay BRZ will begin in February and continue through mid-April. The spring evaluation will begin in April and continue into early June. The summer evaluation will begin later in June and continue until August. During the evaluations, juvenile salmonids will be collected at the juvenile fish facility for tagging with acoustic tags. The facility will alternate between days of primary bypass and secondary bypass in the spring (April 1 to approximately June 20). Within this time period (approximately April 17 to June 9) during days of primary bypass, the facility will switch to secondary bypass for up to a few hours each day to collect additional fish for tagging if necessary. Tagged fish will be released upstream of the project and monitored as they enter the forebay and pass the project. Also during the evaluation, daily boat access to the forebay BRZ will be required for equipment maintenance. Regional coordination will be necessary to determine appropriate spill levels and patterns for spring and summer evaluations. Treatment schedules and test spill patterns will be developed through SRWG and FFDRWG prior to the study.

2.2. Examination of Ice Harbor Passage and Survival Study Fish. Fish tagged with radio transmitters and PIT-tags at Ice Harbor Dam for Ice Harbor RSW evaluation will be collected at McNary Dam using the sort by code PIT-tag diversion system. Necropsies will be performed on these fish at McNary to determine effect of route passage history at Ice Harbor Dam on fish condition. No special operations are anticipated for the activity.

2.3. TSW Direct Injury and 48-hour Survival Evaluation. A direct injury and 48-hour evaluation of Hi-Z balloon-tagged fish passing a temporary spillway weir (TSW) and a conventional spillbay will be conducted in late March prior to regular TSW operations during the fish passage season. Evaluation will require spill through conventional and TSW bays (~7-8 kcfs per bay) prior to the spill season. A treatment schedule will be developed through SRWG and FFDRWG prior to the evaluation.

2.4. Estimate of hydrosystem latent mortality associated with barge and in-river life-history strategies of Snake River spring/summer Chinook salmon. The study will require access to fish collection facilities at Lower Granite, McNary, and Bonneville Dams and access to barges and coordination with barge operations. The study will monitor pathogen prevalence and disease incidence in the barge holds and hydropower bypass facilities along the Snake and Columbia River migration corridor and characterize the impact of transport operations on disease transmission. The study will also asses the impact of loading density and water volume exchange rates on disease dynamics and estimate the incidence of latent mortality associated with the type and severity of infectious disease.

2.5. Smolt Responses to Hydrodynamic and Physical Characteristics of Forebay Flow Nets Upstream of Surface Flow Outlets. This study by Battelle will examine fish movement and hydraulic variables upstream of the removable spillway weir (a “surface flow outlet” similar to the corner collector at Bonneville Dam and sluiceway at The Dalles Dam). DIDSON and ADCP equipment will be installed on a barge for data collection. The barge will be anchored to one of the piers adjacent to the TSW. Installation activities will be coordinated with dam operations. Barge access by researchers after installation will only occur if electronic problems need to be fixed and will be coordinated with project staff. The barge can be accessed via a man basket picked from a crane. A trailer will be placed on the spillway to control and operate equipment. Deployment of the barge and equipment would need to occur during February and March 2007. Data collection will focus on determining a water velocity threshold that causes rejection at surface flow entrances and providing hydraulic guidelines for future designs. This study

was previously planned to take place at Ice Harbor Dam. A similar study scheduled for the 2007 season at Lower Granite Dam was cancelled.

March 2007

APPENDIX A: ICE HARBOR

March 2007

Ice Harbor Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. Also see paragraph 2.1 below for scheduled testing of the new removable spillway weir.

1.2 Harbor Boat Barrier Installation. A boat barrier will be installed in the forebay approximately 800 feet upstream of the RSW, powerhouse and spillways. The barrier will be installed either before or after the spill season. The structure will be a cable/buoy system that stretches approx 1600 feet in length.

1.3 Replacement of Turbine Unit Fire Protection System. This work involves replacing the high pressure CO2 fire protection system on each of the turbine units. The existing systems are configured in banks, turbine units 1-3 on one bank and turbine units 4-6 on the other. This work requires approximately each turbine unit to be out of service for the installation. However because of the way the existing system is configured turbine units 1-3 would all have to be out of service at the same time. Likewise turbine units 4-6 would have to be out of service at the same time. Turbine units 4-6 are to be taken out of service for approximately 4 weeks in September, 2007, followed by a similar outage for turbine 1-3 in October, 2007.

1.4 Turbine Unit 2 Welding Blades. The blades in turbine unit 2 are to be welded in a fixed position. This turbine unit will be OOS for this work starting in August, 2007 and will end in November, 2007.

1.5 Turbine Units 1-6 Protective Relays. The protective relays are being replaced on each of the turbine units. Each turbine unit will be OOS for approximately 2 weeks. Turbine unit outages will start at the end of November, 2006. All work is currently scheduled to be completed by the end of March, 2007. Due to the complexity of this work, completion may be delayed until early May, 2007. Extended outages past April 1 will be coordinated with TMT.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

2. Studies.

2.1. Removable Spillway Weir (RSW) Passage and Survival Evaluation. The RSW will again be evaluated through a radio-telemetry study in 2007. The tainter gate at spillbay 2, when operated, will be either fully open or fully closed. The flow over the RSW will be regulated by the project forebay elevation and not by the tainter gate. Projected flow through the RSW at the anticipated forebay elevation of MOP will be around 8,000 cfs. Project operations (spill levels and possibly patterns) will change according to a randomized block schedule. Details of the schedule and operations are not available at this time, but will be developed through the SRWG and FFDRWG. Spill operation may involve two operations including the RSW and varying levels of “training” spill. Specifics will be coordinated with the fishery agencies and others as needed.

2.2. Turbine Direct Injury and 48-hour Survival Evaluation. A direct injury and 48-hour evaluation of fish passing a turbine (unit 1 or 3) under three operating discharges will be completed in March prior to the spill season. This evaluation will require operating a unit (1 or 3) at the lower end of 1%, peak efficiency, and the unit’s best operating geometry (outside of 1% range) throughout the test. Test fish fitted with Hi-Z balloon tags will be released into the unit under the three operating discharges via a release pipe installed on a STS screen and then recovered in the tailrace. A treatment schedule will be developed through SRWG and FFDRWG prior to the evaluation.

2.3. Evaluate the Impacts of Avian Predation on Salmonid Smolts from the Columbia and Snake Rivers. This is a pilot study to determine how various biotic and abiotic factors are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study request PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams April-July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. A sample of 500 fish per week is desired.

2.4. Approach patterns of juvenile salmonids at Snake River projects. This study is primarily concerned with the survival of fish passing McNary Dam; one factor being examined during the 2007 season is whether prior passage history influences smolt survival rates at McNary Dam. Yearling Chinook, subyearling Chinook are to be captured, tagged with both acoustic and PIT tags, and released above Lower Granite Dam. Downstream migration will be tracked by hydrophones placed in the forebays and upstream faces of Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams. These hydrophones are to be installed in February and March 2007, prior to the spring spill season and will be removed after study completion. Tagging, release and data collection will take place from April to July 2007.

March 2007

APPENDIX A: LOWER MONUMENTAL

March 2007

Lower Monumental Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of Lower Monumental reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Doble Tests. Transformer bank T1 is scheduled to be Doble tested 17-21 September 2007. This will require all six turbine units to be out of service for several hours to disconnect T1. A similar power outage will be needed to reconnect T1 after tests are concluded. Only turbine units 5 and 6 will be available for service during the Doble tests. During powerhouse outages, turbine unit five will be operated in “speed - no load” mode to provide station service.

1.3. Lower Monumental RSW Installation. An RSW is scheduled to be installed in the spring of 2007. Installation is scheduled to be completed by April 13. This will require changes to spill patterns for early April. If the RSW cannot be installed prior to April 13 as scheduled, then summer installation may be necessary, most likely after 31 August 2007. Should RSW installation be delayed, commission tests would be conducted in the fall. A few weeks of stow/deploy efforts may take place prior to commission tests. Turbine unit 6 and several spillbays will need to be taken out of service for this work as diving operations are required. Installation and revised spill patterns will be coordinated with TMT and the region.

1.4 Replacement of Turbine Unit Fire Protection System. This work involves replacing the high pressure CO2 fire protection system on each of the turbine units. The existing systems are configured in banks, turbine units 1-4 on one bank and turbine units 5-6 on the other. This work requires approximately each turbine unit to be out of service for the installation for approximately 1 week. However because of the way the existing system is configured turbine units 1-4 would all have to be out

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of service at the same time. Likewise turbine units 5 and 6 would have to be out of service at the same time. Individual turbine units are expected to be taken out of service starting in the middle of September, 2007 with completion expected at the end of December, 2007. Bank outages are scheduled between September and December 2007.

1.5 Turbine Unit Breaker Installation. This project involves the replacement of the main breakers on each of the turbine units. This work requires 2 adjacent units to be out of service at the same time (i.e.: turbine units 1 and 2, 3 and 4, 5 and 6 are paired). Main breakers in turbine units 3 through 6 were replaced in November and December 2006. Breaker replacements in turbine units 1 and 2 are currently scheduled to take place in July and August 2007.

1.6 Turbine Units 2 and 5 Protective Relays. The protective relays are being replaced on each of the turbine units. Protective relays have already been replaced in turbines 1, 3, 4 and 6. This work has not been completed in turbine units 2 and 5. No separate outages will be required as turbine unit 5 work will be performed concurrently with previously scheduled annual maintenance outage in July, 2007. Protective relay replacements in turbine unit 2 will take place concurrently with Doble Tests in September, 2007 (see item 1.2 above).

2. Studies.

2.1. Lower Monumental Survival Study. A radio telemetry survival study will be conducted with yearling Chinook through Lower Monumental Dam during the spring of 2007. Radio telemetry equipment setup will begin in February and continue until the end of March, 2007. Smolts will be radio tagged, released upstream of the project, and monitored as they pass the project beginning in mid-April. Spill using a high-gate opening alternate bay configuration will be evaluated to confirm acceptable spillway survival under the operation.

2.2. Effects of Stratification in the Lower Monumental Pool on Behavior of Subyearling Chinook During Summer. An acoustic tag study to look for correlation between subyearling Chinook movement and water circulation patterns is planned for the summer of 2007. Fish marked for the tag effects study and released at Lower Granite will be detected by autonomous nodes throughout the pool between Little Goose and Lower Monumental. Acoustic telemetry equipment will be set up during March for detection of fish movement within the forebay and areas upstream. These nodes

will be installed early in order to collect data on spring smolts to complement the tag effects study.

2.3. Evaluate the Impacts of Avian Predation on Salmonid Smolts from the Columbia and Snake Rivers. This is a pilot study to determine how various biotic and abiotic factors are associated with differences in steelhead smolt vulnerability to predation by Crescent Island terns and Foundation Island cormorants. The study request PIT tagging both hatchery and wild steelhead collected in the smolt monitoring sample at Lower Monumental and Ice Harbor dams April-July. The recorded condition of a fish will be attached to a specific tag code and vulnerability to avian predation will be evaluated using PIT tag recovery data collected from the avian bird colonies. A sample of 500 fish per week is desired.

2.4. Approach patterns of juvenile salmonids at Snake River projects. This study is primarily concerned with the survival of fish passing McNary Dam; one factor being examined during the 2007 season is whether prior passage history influences smolt survival rates at McNary Dam. Yearling Chinook, subyearling Chinook are to be captured, tagged with both acoustic and PIT tags, and released above Lower Granite Dam. Downstream migration will be tracked by hydrophones placed in the forebays and upstream faces of Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams. These hydrophones are to be installed in February and March 2007, prior to the spring spill season and will be removed after study completion. Tagging, release and data collection will take place from April to July 2007.

APPENDIX A: LITTLE GOOSE

March 2007

Little Goose Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM.

1.2. Doble Tests. Transformer bank T1 is scheduled to be Doble tested 13-19 August 2007. This will require all six turbine units to be out of service for several hours to disconnect T1. A similar power outage will be needed to reconnect T1 after tests are concluded. Only turbine units 5 and 6 will be available for service during the Doble tests. During powerhouse outages, turbine unit five will be operated in “speed - no load” mode to provide station service.

1.3 Replacement of Turbine Unit Fire Protection System. This work involves replacing the high pressure CO2 fire protection system on each of the turbine units. The existing systems are configured in banks, turbine units 1-4 on one bank and turbine units 5-6 on the other. This work requires approximately each turbine unit to be out of service for approximately 1 week. However because of the way the existing system is configured turbine units 1-4 would all have to be out of service at the same time. Likewise turbine units 5 and 6 would have to be out of service at the same time. Single turbine unit outages are expected to take place from the end of March 2007 to the end of May 2007. This is to be followed by 2 separate bank outages in July and August 2007.

1.4 Turbine Unit Breaker Installation. This work involves replacing the main unit breakers on each of the turbine units. This work requires two turbine units to be out of service at a time, with each outage lasting 3 weeks. The current schedule is to start breaker replacements at Little Goose with turbine units 1 and 2 from 16 February to 13 March 2007, followed by turbine units 3 and 4 from 13 March to 6 April 2007, then by turbine units 5 and 6 from 3 July to 23 July 2007.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

1.5. Underwater Dive Inspection. An underwater diving inspection will be conducted in the roller bucket and downstream channel areas below the spillway. The training wall between the powerhouse and the spillway will also be inspected. Minimum Operating Pool (MOP) operations and powerhouse operations directing flow towards the left (South) bank will be requested to reduce diving hazards. Although the inspection date is uncertain at this time, efforts will be made to coordinate dive operations with the schedule navigation lock outage in March 2007.

2. Studies.

2.1 A Study to Determine Migration Behavior and Survival of Juvenile Salmonids. Using fish tagged and released at Lower Granite Dam, the goals of this study include: (1) Determine the timing and route of passage for yearling Chinook salmon, sub-yearling Chinook salmon and juvenile steelhead relative to spill and powerhouse operations; (2) Estimate route-specific survival of hatchery yearling and sub-yearling Chinook salmon and hatchery juvenile steelhead; (3) Determine the effects of dam operations (e.g. varying flows, pool levels, and spill volumes) on smolt approach paths in the forebay of Little Goose Dam. This includes passage and survival estimates during two treatments of dam operations.

Radio tag antennas will be placed on the dam in order to cover all passage routes, as well as in the forebay and tailrace of Little Goose Dam. Dive work (and associated turbine and spill outages) may be necessary to install spillway antennas. In addition antenna repair and installation may be necessary on ESBSs and VBSs. The research biologists may also need access to the BRZ for radio-tracking antenna placement if barges are necessary to obtain the passage information needed.

2.2. Evaluation of Spillbays for Direct Injury Using Balloon Tagged Juvenile Salmonids. In support of proposed RSW construction at Little Goose Dam, Hi-Z balloon tag and sensor fish tests will be used compare direct injury rates between a flow deflector equipped spill bay versus a non-flow deflector equipped spillbay. This work will be undertaken during spring at a time when it does not interfere with radio tag survival study fish. Spill operations for this study will be discontinuous, as spill stoppage is needed to recover research fish in the tailrace. Set-up and test preparations will take place approximately one week before the testing begins, likely in March 2007.

2.3. Approach Patterns of Juvenile Salmonids at Snake River Projects. This study is primarily concerned with the survival of fish passing McNary Dam; one factor being examined during the 2007 season is whether prior passage history influences smolt survival rates at McNary Dam. Yearling Chinook, subyearling Chinook are to be captured, tagged with both acoustic and PIT tags, and released above Lower Granite Dam. Downstream migration will be tracked by hydrophones placed in the forebays and upstream faces of Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams. These hydrophones are to be installed in February and March 2007, prior to the spring spill season and will be removed after study completion. Tagging, release and data collection will take place from April to July 2007.

March 2007

APPENDIX A: LOWER GRANITE

March 2007

Lower Granite Dam[1]

1. Special Project Operations.

1.1. Spill. Spill for fish passage will be provided during the outmigration season in accordance with spill specifications in Appendix E and as coordinated through TMT. Alternative spill patterns to control dissolved gas levels or change fish passage conditions will be coordinated through the FPOM. During periods of high river flow, spill volumes and the elevation of Lower Granite reservoir may need to be manipulated on a daily or every-other-day basis to provide safe conditions for loading the fish barge at the juvenile fish facility below the dam.

1.2. Doble Tests. Transformer bank T1 is scheduled to be Doble tested 10-14 September 2007. This will require all six turbine units to be out of service for several hours to disconnect T1. A similar power outage will be needed to reconnect T1 after tests are concluded. Only turbine units 5 and 6 will be available for service during the Doble tests. During powerhouse outages, turbine unit five will be operated in “speed - no load” mode to provide station service.

1.3 Turbine Unit 2 Repair. Turbine unit 2 is currently undergoing rewind and turbine repair and is scheduled to be returned to service by mid June 2007. Two weeks of operational tests are needed after the completion of repairs to verify turbine and generator controls, start-up & shut-down sequence operations, relay action, alarms, and other associated components. Operation outside of normal priority may be necessary.

1.4. Turbine Unit 3 Rewind. Turbine unit 3 is scheduled to be taken out of service for rewind work following the completion of turbine unit 2 repairs. Turbine unit 3 is scheduled to undergo rewind and cavitation repair from mid-June 2007 through 31 March 2008.

1.5. Behavior Guidance Structure Removal. The Behavior Guidance Structure or BGS is slated to be removed by 23 March 2007. This work will require turbine units 4, 5, and 6 to be taken out of service for approximately 1 week between January and March 2007. The trash/shear boom will be modified, repaired and repositioned simultaneously with BGS removal.

[1] The purpose of this section is to notify regional interests of planned activities that will or may affect fish passage. Further coordination may occur as needed.

1.6. Main Unit Breaker Replacement. All main turbine unit breakers are to be replaced from mid-August to mid-November 2007. During this period, two turbine units will be out of service at a time, starting with turbine units 1 and 2, then turbine units 3 and 4, then turbine units 5 and 6. Either T-1 or T-2 will simultaneously be out of service, depending on which breakers are being replaced. Turbine units 1 through 4 normally feed into T-1, and turbine units 5 and 6 normally feed into T-2. The 500 KV line will be out of service one day each time turbine units are taken out of or returned to service.

1.7. Lewiston Levee Inspection. The Corps will inspect the Lewiston Levee System on April 18 and 19. These inspections will require the Lower Granite forebay lowered to MOP elevations to permit access to concrete structures and riprap embankments in the Lewiston area.

2. Studies.

2.1. Removable Spillway Weir Operation. The Removable Spillway Weir (RSW) was installed in the summer of 2001. It underwent extensive biological testing in spring 2002 and 2003. During February and March 2004, the Behavioral Guidance Structure was moved to the north two units and the depth decreased along part of its length. The 2006 biological test was designed to test the effectiveness of the BGS in influencing fish distribution in the forebay and subsequent passage and survival. A summer test of the RSW is scheduled to take place in 2007. This would occur sometime between mid-June and late July and would most likely run for 3 or 4 weeks. Radio-telemetry would again be used to assess RSW performance. Project operations would most likely include the RSW (between 6,000 and 7,700 cfs) and some level of training spill, 24 hours per day. No spring evaluation is currently planned (November 2006), but if operations are substantially different than what has been done in the past, biological monitoring may take place, most likely radio-telemetry.

2.2. Alternate Barge Release Strategies. In 2007, NOAA Fisheries will PIT tag yearling Chinook salmon and steelhead to evaluate if an alternate release site for barged fish improves survival. In addition, Battelle will acoustically tag 2,000 fish. The study will require one 2000 series barge for transporting the smolts downriver to near Astoria Bridge for release, and a separate towboat will be contracted to move this barge downriver for the release. Six separate alternate site releases on an ebb tide are planned and tagging will occur five days prior to each release. The control group will be transported in a normal barge trip with

all other collected fish for release at Skamania. Arrangements have been made to use the NOAA PIT tagging buildings and personnel for the PIT marking. Acoustic marking and BKD sampling will need to take place either in the wet lab or the shed used for gas bubble monitoring. This study may require an increase in the normal facility sampling rate in order to get the required number of fish on marking days. The study will require coordination with other onsite researchers and the project biological staff and this effort has already been initiated.

2.3. Comparative Performance of Acoustic-tagged and PIT-tagged Juvenile Salmonids. This study will examine performance differences between fish tagged with only a PIT tag against fish tagged with both a microacoustic tag and PIT tag. A modification to the existing PIT tag diversion for the east raceway flume is planned to occur during February 2007. This will change the existing drop gate into a PIT diversion slide gate capable of rapid response. The modification will be done by NOAA Fisheries, and the PIT tag equipment operation and maintenance will be the responsibility of PSMFC. All facility modifications and testing are planned to occur prior to the fish passage season.

2.4. A study to compare seasonal SARs of early in-river migrating versus transported Snake River yearling anadromous salmonids. At Lower Granite, this study will ask for fish to be collected starting April 1 and transported every-other-day (approximately 2-3 times) a week until transportation operations begin. The desired transported sample size is 6,000 wild Chinook and 6,000 wild steelhead per week for five to six weeks beginning approximately April 1. Currently, the tagging level for the inriver migrating group is 2000 fish per week using NOAA Fisheries Survival Study tagging levels. The study will request an increase in the inriver migrating sample size for comparison. An estimated sample size for the in-river migrating group to estimate weekly SARs with 95% confidence interval is being developed.

2.5. Estimate of hydrosystem latent mortality associated with barge and in-river life-history strategies of Snake River spring/summer Chinook salmon. The study will require access to fish collection facilities at Lower Granite, McNary, and Bonneville Dams and access to barges and coordination with barge operations. The study will monitor pathogen prevalence and disease incidence in the barge holds and hydropower bypass facilities along the Snake and Columbia River migration corridor and characterize the impact of transport operations on disease transmission. The study will also asses the impact of loading density and water volume exchange rates on disease dynamics and

estimate the incidence of latent mortality associated with the type and severity of infectious disease.

2.6. Approach patterns of juvenile salmonids at Snake River projects. This study is primarily concerned with the survival of fish passing McNary Dam; one factor being examined during the 2007 season is whether prior passage history influences smolt survival rates at McNary Dam. Yearling Chinook, subyearling Chinook are to be captured, tagged with both acoustic and PIT tags, and released above Lower Granite Dam. Downstream migration will be tracked by hydrophones placed in the forebays and upstream faces of Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams. These hydrophones are to be installed in February and March 2007, prior to the spring spill season and will be removed after study completion. Tagging, release and data collection will take place from April to July 2007.