2015 Water Management Plan
Seasonal Update
April 20, 2015

1. Introduction

The annual Water Management Plan (WMP) is developed prior to the implementation of Federal Columbia River Power System (FCRPS) operational measures identified in National Marine Fisheries Service (NMFS) 2008 FCRPS Biological Opinion (BiOp), NMFS 2010 Supplemental BiOp and NMFS 2014 Supplemental BiOp (collectively referred to as NMFS FCRPS BiOp), and the U.S. Fish and Wildlife Service (USFWS) 2000 and 2006 BiOps. The WMP is also developed prior to the receipt of any seasonal information that may determine how many of the operation measures are implemented. The Seasonal Update is intended to supplement the WMP with more detailed information on operations as the water year progresses. Each section of the Seasonal Update will be updated when information is available and finalized when no further information is available. The first update for the primary elements of Fall and Winter will be posted on November 1st of each year. The first update for the primary elements of Spring and Summer will be posted by March 1st of each year. The elements and operations included in the Seasonal Update are generally the same as have been previously presented in the Fall/Winter and Spring/Summer Updates to the WMP. The change to update in this manner is intended to present better continuity for tracking operations as they change throughout and across each season. The elements and operations described in the Seasonal Update and the approximate schedule for updates and finalization are as displayed in Table 1.

Table 1. Schedule for update and finalization of Seasonal Update elements and operations.

Section	Element	Begins	Finalized	Last Updated
	Current Conditions (e.g., WSF, Streamflows)	October	July	
	Seasonal Flow Objectives	April	August	April 3, 2015
	Flood Control	January	June	April 3, 2015
	Storage Project Operations	September	September	April 3, 2015
	Water Quality (Spill Priority Lists)	January	December	April 3, 2015
	Specific Operations	**Start Date**	**End Date**	**Last Updated**
	Chum Flows (Bonneville Dam)	November 1	April 10	April 3, 2015
	Spring Creek Hatchery Releases (Bonneville Dam)	April	May	April 3, 2015
	Burbot spawning temperature management (Libby Dam)	November	December 30	November 10, 2010
	Upper Snake Flow Augmentation	April 1	August 31	April 3, 2015
	Lake Pend Oreille Kokanee (Albeni Falls Dam)	September 1	December 30	March 25, 2014
	Transportation	May 1	September 30	April 3, 2015
	Spill Operations	April 3	August 31	April 3, 2015
	Fish Passage Research	March	October	April 3, 2015

	Snake River Zero Generation	December	February	April 3, 2015
	Hanford Reach Fall Chinook Protection	November	June	February, 2014

2. Seasonal Update Elements and Specific Operations

2.1. Current Conditions

Water Supply Forecasts – NWRFC

The final water supply forecast (WSF) is defined as the forecast posted on NOAA's Northwest River Forecast Center (NWRFC) website at 5:00 pm Pacific Standard Time on the 5th business day of the month (*April WSF is the 6th working day of the month to include most recent snow information and ESP forecast). NWRFC water supply forecasts are available on the following website: http://www.nwrfc.noaa.gov/ws/

Table 2. The Dalles Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2015		April-August 2015	
	Volume (maf)	% of 30-year Average (101.4 maf)	Volume (maf)	% of 30-year Average (87.5 maf)
January 8, 2015	102.6	101	87.3	100
February 6, 2015	103.8	102	83.1	95
March 6, 2015	91.7	90	71.8	82
April 8, 2015				
May 7, 2015				
June 5, 2015				
July 8, 2015				

Table 3. Grand Coulee Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2015		April-August 2015	
	Volume (maf)	% of 30-year Average (59.6 maf)	Volume (maf)	% of 30-year Average (56.8 maf)
January 8, 2015	60.1	101	56.5	100
February 6, 2015	61.5	103	55.8	98
March 6, 2015	56.5	95	49.4	87
April 8, 2015				
May 7, 2015				
June 5, 2015				
July 8, 2015				

Table 4. Lower Granite Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2015		April-August 2015	
	Volume (maf)	% of 30-year Average (27.4 maf)	Volume (maf)	% of 30-year Average (21.1 maf)
January 8, 2015	27.6	101	22.1	105
February 6, 2015	28.7	105	20.7	98
March 6, 2015	23.1	84	16.5	78
April 8, 2015				
May 7, 2015				
June 5, 2015				
July 8, 2015				

Water Supply Forecasts - Corps

Water supply forecasts for Libby and Dworshak dams are produced by the Corps' Seattle and Walla Walla Districts, respectively. Corps forecasts are available on the following website:

http://www.nwd.usace.army.mil/Missions/WaterManagement/ColumbiaRiverBasin/ColumbiaRiverFloodControl.aspx

Table 5. Libby Dam Water Final Supply Forecasts.

Forecast Issue Date	April-August 2015	
	Volume (kaf)	% of 78-year (1929-2008) Average (6,282 kaf)
December	6,903	110
January	6,297	100
February	5,523	94
March	5,683	97
April		
May		
June		

Table 6. Dworshak Dam Final Water Supply Forecasts.

Forecast Issue Date	April-July 2015	
	Volume (kaf)	% of 81-year (1929-2010) Average (2,663 kaf)
December	2,398	90
January	2,136	80
February	1,922	79
March	1,815	74
April		
May		
June		

Water Supply Forecasts – Bureau of Reclamation

Water supply forecasts for Hungry Horse Dam are produced by the Bureau of Reclamation.

Table 7. Hungry Horse Dam Final Water Supply Forecasts.

Forecast Issue Date	April-August 2015		January-July 2015		May-September 2015	
	Volume (kaf)	% of 30-year Average (1,936 kaf)	Volume (kaf)	% of 30-year Average (2,098 kaf)	Volume (kaf)	% of 30-year Average (1,693 kaf)
January	2,265	117%	2,450	117%	1,980	117%
February	2,207	114%	2,427	116%	1,930	114%
March	1,916	99%	2,275	108%	1,676	99%
April	1,704	88%	2,337	111%	1,490	88%
May						
June						

Notable Water Supply Triggers for low WY operations

Project	WSF Trigger	Operation Triggered
Libby	The Dalles May Final Apr-Aug 72.2 maf	Draft 20' from full by September 30. (Caveat this year is that the draft will be 20' from full by August 31 to provide lower flows in September for sturgeon habitat work near Bonners Ferry)
Hungry Horse	The Dalles May Final Apr-Aug 72.2 maf	Draft 20' from full by September 30. (instead of 10')
Non Treaty Storage (NTS)	The Dalles May Final Apr-Aug 72.2 maf	Firm release of up to 0.5 maf of dry year NTS storage (May –June or other such period agreed to by both parties). The volume released will be shaped flat during the release period unless negotiated differently with BCH. If used this year, we will not have the right to it next year.
Grand Coulee	The Dalles July Final Apr-Aug 92.0 maf	Summer Draft limit is lowered 2 feet to elevation 1278 feet by August 31. (minus the incremental storage adjustment of .3 feet for 2015 resulting an end of August objective of elevation 1277.7 feet)
Libby	May Final Libby Apr-Aug WSF less than 4.8 maf	Tiered volumes of sturgeon pulse begin at WSF > 4.8 maf. If below there is no sturgeon pulse.

Weekly Weather and Precipitation Retrospectives

Week	Weekly Weather / Precipitation Retrospective
October 6, 2014	**Temperatures:** Well above average. Several record highs Monday-Wednesday. **Precipitation:** Dry through Friday, then increasing rainfall in BC and west of the Cascades as a major weather pattern change commenced. **Streamflows:** Somewhat elevated baseflows in BC due to September rainfall; otherwise flat and typical early fall baseflows across the basin.
October 13,2014	**Temperatures:** Well above average. **Precipitation:** Above average northwest half; below average southeast half. **Streamflows:** Very minor, localized rises Upper Columbia, lower Columbia and Willamette basins. Most rainfall went into moistening soils.
October 20, 2014	**Temperatures:** Above average, but not as warm as previous weeks. **Precipitation: Well above average (300-600% of normal),** except below average in the upper Snake. Several daily rainfall records Wed-Thu. Wind gusts 45-70mph west of Cascades Sat, which caused more damage than usual due to leaves still on the trees. First significant mountain snows this past weekend. **Streamflows:** Modest rises in BC, Western MT, Mid-Cs, lower Columbia and Willamette basins. Most rainfall went into moistening soils.
October 27, 2014	**Temperatures:** Above average, but cooled closer to average this weekend. **Warmest October on record in Portland and Seattle; 3rd warmest on record in Boise; tied for 4th warmest on record Spokane**. **Precipitation:** Well above average, especially northwest half. Snowpack gains in BC/western MT/central ID. **Streamflows:** Modest rises in much of the basin late last week, except in the Snake where weekend rain went into moistening soils.
November 3, 2014	**Temperatures:** Above average, then fell to near average this weekend. **Precipitation:** Well above average western WA, BC, much of ID and western MT (200-400% of average). Below average elsewhere. Much drier developed over the weekend. Some snowpack gains in BC. **Streamflows:** Significant, brief rises in BC and western MT, modest rises in ID. Flows generally diminished over the weekend.
November 10, 2014	**Temperatures:** For the first time since April, Well below average basinwide. Moderate early season cold snap Wed to Sun (load center temperatures 10-12 degrees below average). Record, below zero low temperatures east of the Cascades this weekend. **Precipitation:** Above average southern OR/southern ID; below average elsewhere. Damaging east winds Columbia Gorge, western OR/Western WA Tue-Wed, followed unusually early low-elevation snow and ice storm OR and southern ID Thu-Fri. **Streamflows:** Brief flow spike on the Willamette this weekend. Slowly receding flows elsewhere, although baseflows remained above normal.
November 17, 2014	**Temperatures:** Slowly recovered to near average after the previous week's cold snap. **Precipitation:** Increased to well above average US basins; below average in BC. **Streamflows:** Modest rises on the Willamettes and lower Columbia this weekend; flat elsewhere with some ice movement noted on high elevation streams.
November 24, 2014	**Temperatures:** Near record warmth through Friday, then plunged well below average this weekend. Load Center average temps dropped for 15° above average Thursday to 12° below average Sunday. **Precipitation:** Well above average basinwide (200-500% of normal), with significant snowpack gains. **Streamflows:** Modest rises on many US streams, especially the Snakes, mid-Cs, Lower Columbia, and Willamette, as snow levels rose well above pass levels. Rapid recessions this weekend, though, due to much colder temperatures.
December 1, 2014	**Temperatures:** Rose from well below average to well above average. **Precipitation:** Increased to above average US basins; below average in BC. **Streamflows:** Mostly flat.

December 8, 2014	**Temperatures:** Consistently above average. **Precipitation:** Most precipitation was west-side and into BC **Streamflows:** Small rises over the weekend.
December 15, 2014	**Temperatures:** Rose to well above average, with unusually high snow levels. **Precipitation:** Well above average US basins (200-300% of average). Below average in BC. **Streamflows:** Significant rises throughout the southern half of the basin, especially the Willamettes, lower Columbia, Clearwater and Snake basins.
December 22, 2014	**Temperatures:** Fell to near average with more seasonable snow levels. Arctic air spreading rapidly southward this morning. **Precipitation:** Well above average US basins with significant snowpack gains; near average in BC. **Streamflows:** Crests on many US streams Monday, followed by slow recessions. Flat flows in BC.
December 29, 2014	**Temperatures:** Moderate cold snap Tuesday-Thursday (temps ~10°F below average), then moderated closer to average by the weekend. **Precipitation:** Below average. **Streamflows:** Flat or receding.
January 5, 2015	**Temperatures:** Above average. **Precipitation:** Below average south half; near average north half. **Streamflows:** Minor flow increases Clearwater, Spokane, lower Columbia, which crested last Wed-Thu. Slowly receding flows since then. Flat flows in BC and western MT.
January 12, 2015	**Temperatures:** Above average. **Precipitation:** Dry initially, then above average, especially US basins. **Streamflows:** Modest flow increases on the Willamette, lower Columbia, Snakes, mid-Cs and Spokane, which crested on Monday. Mostly flat flows elsewhere.
January 19, 2015	**Temperatures:** Near average initially, then rose well above average (10-15 degrees above average). Near record highs this weekend, especially in the mountains. **Precipitation:** Well below average, except above average in western WA and BC this past weekend. **Streamflows:** Flat or receding through Friday, then minor rises on the Spokane, Clark Fork, Clearwater and Yakima Basins this weekend as very warm mountain temperatures melted some mid-elevation snow.
January 26, 2015	**Temperatures:** Above average. **Precipitation:** Well below average. **Streamflows:** Flat in BC and in higher elevations. Slowly receding in lower elevation streams but baseflows remained above average for late January.
February 2, 2015	**Temperatures:** Well above average with unusually high snow levels. Record warmth Thursday-Saturday. **Precipitation:** Well above average (200-400% of average) from prolonged Pineapple Express. Some snow stripped off below 6000ft, but 4-6ft of snow (4-5" water equivalent) fell on many BC snow pillows. Redfish Creek, BC, which is a high elevation snow pillow, received about 9ft (9" of water equivalent). **Streamflows:** Large rises on most low elevation streams this weekend from heavy rain and some snowmelt. Largest increases on the lower Snake, Spokane, Pend Oreille and Kootenai Basins.
February 9, 2015	**Temperatures:** Well above average, with a few record highs. **Precipitation:** Fell to well below average. **Streamflows:** Crests from previous heavy rains Tue-Wed (unregulated peak near 320kcfs at The Dalles), followed by slow recessions.
February 16, 2015	**Temperatures:** Well above average, with a few record highs. **Precipitation:** Heavy precipitation ended last Tuesday; well below average since then. **Streamflows:** Crests from previous heavy rains Tue-Wed (unregulated peak near 320kcfs at The Dalles), followed by slow recessions.
February 23, 2015	**Temperatures:** Fell to near average.

	Precipitation: Below average. **Streamflows:** Slowly receding, but still above normal for late February.
March 2, 2015	**Temperatures:** Rose to above average. Near record highs this weekend somewhat cancelled out by chilly nights. **Precipitation:** Well below average. **Streamflows:** Flat or slowly receding. Flows still above normal for early March.
March 9, 2015	**Temperatures:** Well above average with numerous records broken. Unusually high snow levels. **Precipitation:** Dry through Friday, followed by Pineapple Express event this weekend. Several daily rainfall records broken US basins. Strong winds and isolated wind damage western OR/WA on Sunday. **Streamflows:** Flat or slowly receding, followed by rapid rises on many US basin headwaters from weekend rain and snowmelt.
March 16, 2015	**Temperatures:** Above average, but not as warm as previous weeks. **Precipitation:** Above average, especially in BC with 3-5ft of mountain snow detected on most snow pillows. **Streamflows:** Crested last Wed, followed by slow recessions due to cooler temps. Unregulated flows at The Dalles peaked near 280kcfs but remained near 250kcfs this weekend.
March 23, 2015	**Temperatures:** Above average, ending much above average. **Precipitation:** Well above average through Wed, then well below average for the rest of the week **Streamflows:** Varied from mostly flat to showing slow recessions from rises over previous weekend. Unregulated flows at The Dalles remained consistently about 250 kcfs.
March 30, 2015	**Temperatures:** Starting much above average and cooling to just below average by mid-week**.** **Precipitation:** Below average for most of the week. **Streamflows:** Varied from mostly flat to slow recessions from rises over previous weekend. Unregulated flows at The Dalles remained consistently about 250 kcfs.
April 6, 2015	
April 13, 2015	
April 20, 2015	
April 27, 2015	
May 4, 2015	
May 11, 2015	
May 18, 2015	
May 25, 2015	
June 1, 2015	
June 8, 2015	
June 15, 2015	
June 22, 2015	
June 29, 2015	
July 6, 2015	
July 13, 2015	
July 20, 2015	
July 27, 2015	
August 3, 2015	
August 10, 2015	
August 17, 2015	
August 24, 2015	
September 7, 2015	
September 14, 2015	
September 21, 2015	
September 28, 2015	

2.2. Seasonal Flow Objectives

Project	Planning Dates	BiOp Season Average Flow Objective – (kcfs)	Season Average Flow to date (kcfs)
Priest Rapids	Spring 4/10–6/30	135 kcfs	
McNary	Spring 4/10–6/30	220-260 kcfs[i]	
	Summer 7/1–8/31	200 kcfs	
Lower Granite	Spring 4/3–6/20	85-100 kcfs[i]	
	Summer 6/21–8/31	50-55 kcfs[ii]	

i. Varies according to NWRFC April forecast.
ii. Varies according to NWRFC June forecast.

2.3. Flood Control

Flood Control Elevations and April 10 Objective Elevations per each forecast period are listed in the table below. Forecasted flood control elevations will be calculated beginning in December after the Libby and Dworshak water supply forecasts are available. Subsequent forecasted flood controls will be updated after the final water supply forecasts are available January-April.

Grand Coulee and all Canadian projects will be operated for standard flood control. Hungry Horse and Libby will be operated for Variable Q (VARQ) Flood Control. Beginning in January, the Corps calculates Upper Rule Curve elevations based on the monthly official final forecasts. Projects are operated using these elevations as an upper limit, with the objective of reaching their spring refill elevations. Detailed flood control operations are available at the following website: http://www.nwd-wc.usace.army.mil/report/colsum.

The April 10 elevations shown in the table below are calculated by linear interpolation between the March 31 and April 15 forecasted flood control elevations.

Project	Elevation Date Objective	Dec	Jan	Feb	Mar	Apr
Libby	**Jan 31**	2410.6	2410.0			
	Feb 28		2407.8	2435.7		
	March 31		2406.7	2440.2	2433.8	
	April 10		2406.7	2440.2	2433.8	
	April 15		2406.7	2440.2	2433.8	
	April 30		2406.7	2440.2	2433.8	
Hungry Horse	**Jan 31**		3541.3			
	Feb 28		3533.8	3535.5		
	March 31		3525.2	3527.8	3540.4	
	April 10		3522.4	3525.3	3539.5	
	April 15		3521.0	3524.1	3539.0	
	April 30		3516.6	3520.2	3537.4	
Grand Coulee	**Jan 31**		1290.0			
	Feb 28		1290.0	1290.0		
	March 31		1276.7	1282.7	1283.3	

Project	Elevation Date Objective	Dec	Jan	Feb	Mar	Apr
	April 10		1265.4	1272.1	1253 (drumgate)	
	April 15		1259.8	1266.8	1283.3	
	April 30		1243.1	1249.5	1282.9	
Brownlee	**Jan 31**		2077.0			
	Feb 28		2049.9	2051.8		
	March 31		2046.1	2051.1	2071.8	
	April 15		2046.2	2053.1	2074.4	
	April 30		2045.8	2054.5	2077.0	
Dworshak	**Jan 31**		1550.6			
	Feb 28		1549.9	1560.0		
	March 31		1563.3	1574.1	1586.7	
	April 10		1570.8	1581.3	1584.8	
	April 15		1574.5	1584.9	1583.9	
	April 30		-	-	-	

2.4. Storage Project Operations

Libby Dam

Bull Trout Flows: Bull trout minimum flows are specified in the 2006 Libby Sturgeon Biological Opinion (2006 BiOp) and may be found in Table 9 on page 32 of the Final Water Management Plan on the following website:

http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/2015/

April 10 and Refill Objectives: According to the Corps' Libby February Runoff Forecast the most probable runoff volume for April – August was 5,523 kaf (94% of average from 1981-2010). This forecasted runoff volume resulted in an April 10 elevation objective of 2440.2 feet. This section will be updated throughout the season as new forecast information becomes available.

Sturgeon Pulse: This section will be updated throughout the season as new forecast information becomes available.

Summer Draft Limit: From August through November in 2015-2017, the AAs will be operating Libby Dam in coordination with the Kootenai Tribe of Idaho in order to provide conditions for
construction of a suite of Kootenai River Habitat Restoration Projects (KRHRP). In order to accommodate this operation, the AAs will coordinate with TMT on the actual operation to reach the NMFS FCRPS BiOp September 30 elevation of either 2439 or 2449 feet.

Hungry Horse Dam

Water Supply Forecast and Minimum Flows: The minimum flow requirements are measured at two locations the South Fork Flathead River below Hungry Horse Dam and the Flathead River at Columbia Falls. The minimum flows will be determined monthly, beginning in January, with the Bureau of Reclamation's WSF forecast for Hungry Horse Reservoir for the period of April 1

to August 31. The final flow levels, for the remainder of the calendar year, are based on the March Final forecast.

April 10 and June 30 Refill Objectives: The Bureau of Reclamation computes Hungry Horse's final April 10 elevation objective by linear interpolation between the March 31 and April 15 forecasted flood control elevations based on the March Final WSF. The Bureau of Reclamation's March 2015 Final WSF for April–August was 1,916 kaf (99% of average) which set the minimum flow requirements below Hungry Horse and at Columbia Falls at 900 cfs and 3,500 cfs, respectively. The minimum flow requirements are set for the rest of the calendar year and will be updated following the January 2016 Final forecast.

This section will be updated throughout the season as new forecast information becomes available.

Summer Draft Limit: The summer reservoir draft limit at Hungry Horse is 3550 feet (10 feet from full) by September 30, except in the lowest 20th percentile of water years (The Dalles April-August <72.2 maf) when the draft limit is elevation 3540 feet (20 feet from full) by September 30. The RFC's May Final April-August forecast is used to set the official draft limit.

Grand Coulee Dam

April 10 and June 30 refill Objective: For 2015 the official April 10 elevation objective is 1253.0 feet. This is a result of the required drum gate maintenance which requires the forebay to be no higher than elevation 1255.0 feet. Drum gate maintenance will be completed in Mid-May and Grand Coulee can begin refilling immediately after.

This section will be updated throughout the season as new forecast information becomes available.

The Lake Roosevelt Incremental Storage Release Program: This section will be updated throughout the season as new information becomes available.

Table 8. Lake Roosevelt releases requested for 2015.

"Bucket"	2015 Releases (acre-feet)	Total Lake Roosevelt Incremental Storage Releases Program (acre-feet)
Odessa		
M&I		
Instream Flow		

Summer Draft Limit: The Grand Coulee summer draft limit is set by the magnitude of the RFC's July Final April–August WSF at The Dalles Dam.

This section will be updated as information becomes available.

Drum Gate Maintenance: A full 8-week period for drum gate maintenance is being implemented in 2015. The maintenance requires Lake Roosevelt to be below elevation 1255 feet

is occurring. The maintenance period began on March 15 and is expected to be completed on May 9, 2015.

Banks Lake: This section will be updated as information becomes available.

2.5. Dworshak Dam

The Corp will update in June or as soon as information becomes available.

2.6. Water Quality

Spill priority lists coordinated with the TMT may be found on the following website:

http://www.nwd-wc.usace.army.mil/tmt/documents/ops/spill/priority/

2.7. Burbot Temperature management (Libby Dam)

Under the terms of a Memorandum of Understanding (MOU) prepared in 2005 by the Kootenai Valley Resource Initiative (KVRI) and signed by the Corps, the selective withdrawal gate system at Libby Dam has been set to release cool water in November and December, before temperature stratification limits the temperature control capability. The purpose of this operation is to provide cooler river temperatures downstream of Libby Dam (closer to normative thermal conditions). This operation will likely result in November and December temperatures being slightly cooler than the existing selective withdrawal temperature rule curve. Corps staff at Libby Dam removed selective withdrawal gates incrementally during late October to assure that daily temperature change remains within 2°F per day; gates were removed systematically to slowly lower river temperature by early November (a span of about 8°F). Temperature will not be minimized this fall until isothermal conditions develop due to constraints and precautions that will be observed related to selective withdrawal crane rehabilitation that will occur over the winter, necessitating a more conservative gate removal pattern. Rather than removing all gates (resulting in withdrawal elevation of 2222 feet), the Corps removed all but 3 rows of gates (resulting in withdrawal elevation of 2253 feet).

2.8. Spring Creek Hatchery Release (Bonneville Dam)

This section will be updated throughout the season as new information becomes available.

2.9. Lake Pend Oreille Kokanee Spawning Flows (Albeni Falls Dam)

For the 2014-2015 Lake Pend Oreille operations the AAs are planning on implementing a MCE of 2051 ft. (operating range of 2051-2052 ft. with no flexible winter power operation) to facilitate IDFG habitat restoration work on the Clark Fork River Delta, near Clark Fork, Idaho.

2.10. Upper Snake Flow Augmentation

This section will be updated throughout the season as new information becomes available.

2.11. Chum Operation

Date	TMT Discussion/Chum Operation
October 29, 2014	TMT Meeting - The TMT coordinated the following chum operation that would start on November 1. 1. Operate Bonneville tailwater within a 1ft. range of 11.5 - 12.5 ft. elevation during all hours. 2. If necessary to pass additional flows, operate Bonneville tailwater up to 13.0 ft. elevation during all hours, returning to 11.5 - 12.5 ft. whenever possible. 3. If necessary to pass additional flows, operate Bonneville tailwater up to 16.5 ft. elevation during nighttime hours (5 pm-6 am) with the highest tailwater elevations around midnight. 4. If necessary, operate Bonneville tailwater up to 18.5 ft. elevation during nighttime hours (5 pm - 6 am) with the highest tailwater elevations around midnight. 5. If necessary, operate Bonneville tailwater at a range of 13.0 - 16.5 ft. elevation during daytime hours (6 am - 5 pm) with no upper limit during nighttime hours and the highest tailwater elevations around midnight. At this point, the Action Agencies would notify TMT and coordinate further operations if necessary. WDFW reported that chum were present in the Grays River and chum have been observed passing Bonneville Dam.
November 5, 2014	TMT Meeting - The chum operation began at 0600 hours on November 1, at which point the tailwater elevation at Bonneville was 11.6ft, with an outflow of 114kcfs. On November 5, at 0800 hours tailwater elevation was 11.9ft with total outflow of 112.9kcfs. NOAA indicated chum are in the area, with 4 fish, as well as a red observed within the Multnomah Falls/ Horsetail Falls area and 12 chum have gone above Bonneville. WA added there were 7 live chum and 1 redd observed in the Ives/Pierce Complex area and additionally, 71 live, 5 dead fall chinook were observed and 7 redds.
November 19, 2014	TMT Meeting - Bonneville Dam has been operating lower than 13 ft. tailwater. Yesterday's (11/18) minimum was 11.8 ft. and maximum was 12.8 ft. WA noted that due to weather conditions they were not able to survey for chum last week, however, so far 40 chum have been counted in the I-205 area and 60 in the Ives area.

Date	TMT Discussion/Chum Operation
December 17, 2014	TMT Meeting - The operation has been implemented as planned and as of this morning (0800 hours) the tailwater was at 12.7 ft. with a total outflow of 125.1kcfs. NOAA noted this was a challenging year due to a lack of continuous data from field crews. It appears that Chum spawning is nearing the end, however, there are still fish spawning. This year, redds were observed further up the channel than previous years, as a result a higher protection level to be set for incubation and emergence. NOAA continued to report that water levels at Bonneville are rising and the project may not be able to hold 13 ft. for much longer, however, expects to be able to hold it until next week. As of yesterday, FPAC members were okay with maintaining a 13 foot daytime threshold until more information is available from surveys on 12/23. FPAC has made a request for specific details from the survey and is hoping that it will inform as to what a reasonable protection level will look like going forward. USFWS noted that hopefully the surveys will provide depth information and a map of the elevation and location of the redds. The trap at Duncan Creek will be removed on December 23rd which will require a 11.5-12.5 ft. elevation from 0800 to 1400 hours. The Corps will continue the current operation, holding the daytime elevation between 11.5-13.0 ft., until 0800 on December 23rd. As of 0800 hours on the 23rd, the elevation will be kept between 11.5-12.5 ft. for the Duncan Creek trap removal. At 1500 hours, the operation will shift to the chum incubation operation, which calls for a minimum tailwater elevation of 13.0 ft. during all hours. Additional information will be gathered during surveys on the 23rd and TMT will check in on and adjust the operation if needed at the January 7th TMT meeting.
January 7, 2015	TMT Meeting - The Corps noted the operation has not changed since December 19th at 1500 hours when the project began operating to a minimum tailwater of 13ft. Operation parameters are available on the TMT website. NOAA, noted that hopefully there will be additional information from spawning surveys by the next TMT meeting on January 21st, at which point TMT can discuss options moving forward with the operation.
January 21, 2015	TMT Meeting - NOAA, discussed the chum spawning operation, noting the operation will continue to maintain a minimum tailwater elevation of 13ft., pending additional information. WA, added that the operation will be reexamined once data is reviewed and discussed internally and with FPAC; WA suggested revisiting this topic at the next TMT meeting. The Corps provided additional information on the Bonneville Dam forecast, stating that tailwater is operating within the 17-19 ft. range, well above the 13 ft. minimum and according to the NWRFC Bonneville Dam inflows will be between 185-195 kcfs over the next 10 day period.

Date	TMT Discussion/Chum Operation
February 4, 2015	TMT Meeting - NOAA, discussed the chum spawning operation, noting that WDFW has been the lead on the ground on this project and they requested maintaining a 13 ft. tailwater elevation when possible. WA, agreed with Paul, noting that WA requests the operation continue to meet a 13 ft. tailwater elevation while there is water to support it. BPA, asked WA to elaborate on what information was used to determine the 13 ft. threshold, as this differs from the final survey recommendations regarding the protection of Ives Island. WA noted that based on the information provided to the staff, there was adequate coverage on the given day of the survey but there was concern over the preciseness of the data long-term. WA stated that if water is available WA will request a minimum 13 ft. tailwater elevation. BPA asked what the minimum elevation recommendation would be if water is not available. WA speculated (but was not sure) that elevation recommendations would be a gradual ramp down to 12.5 ft. and 12 ft. The Corps provided additional information on the Bonneville Dam forecast, stating that the tailwater is operating at 18.2 ft. and noted that the 10 day forecast indicates inflow will gradually increase from 197 kcfs to 292 kcfs by February 9th and then back down to 268 kcfs by February 13th. Based on this information the Corps plans to continue implementing the current chum spawning operation (13 ft. minimum tailwater). Per the recommendation to continue the project with a minimum tailwater elevation of 13ft., while water is available, the Corps will implement the operation as requested. TMT will revisit this issue at their next scheduled meeting, on February 18th.
February 18, 2015	TMT Meeting - WA, noted there is nothing to report on the current chum spawning operation. NOAA, added that an update on forecasted chum emergence will be provided at the next TMT meeting; however, it is likely that emergence will be earlier than normal this year. NOAA noted that forecasted emergence for the Hanford reach is February 28th, which is earlier than usual and it is reasonable to expect this to hold true for other reaches as well. NOAA will provide an update on the chum emergence forecast at the March 4th TMT meeting.
March 4, 2015	TMT Meeting - NOAA, reported that the chum incubation period and temperature units are continuing to be tracked. The incubation and pending emergence will continue to be tracked. There is no new information to report regarding redd locations. An update will be provided at the next TMT meeting.
March 18, 2015	TMT Meeting - NOAA, reported on the chum operation, noting that they have continued to track temperature units and emergence is expected to be within the normal range. BPA, asked if the operation was on track for a complete emergence by the end of March. NOAA noted that the temperature monitoring is tracked with the floating gauge and is not representative of all of the redds, thus is it difficult to say when emergence will be complete. NOAA noted that stream flows over the next 10 days look sufficient to continue the operation, however, emergence can continue past March. The need to balance flows for the chum operation and summer flow augmentation was noted, and it was recognized that there are step down options that could be implemented if necessary.
March 25, 2015	TMT Meeting - NOAA, reported on the chum spawning operation. NOAA summarized last week's discussion centering on balancing chum tailwater elevation below Bonneville and upstream elevation and spring/summer flow augmentation needs. At this point, the balance greatly depends on stream flows, which due to the recent series of rain events are adequate to continue the 13ft. tailwater elevation. NOAA noted that stream flows are up and NOAA's 10 day forecast shows adequate water in the lower river. NOAA also noted that Chum are well into the estimated emergence period. The data provided from the December 5th red survey is not inclusive of all fish and the recommendation is to continue with protection efforts by maintaining 13 ft.

Chum survey data gathered at the Ives/Pierce Island Complex will be summarized in the table below. Data from all Chum survey areas, including the Ives/Pierce Island Complex, are provided by the Fish Passage Center and available on the following website:

http://www.fpc.org/spawning/spawning_surveys.html

Table 9. Chum Data from Surveys of the Ives/Pierce Island Complex

Date	Lives	Dead[i]	Redds[ii]	Visibility (feet)
25- Sept-14	0	0	0	10
2-Oct-14	0	0	0	10
10-Oct-14	0	0	0	12.5
17-Oct-14	0	0	0	10
24-Oct-14	0	0	0	8
31-Oct-14	0	0	0	12
4-Nov-14	3	0	1	6
6-Nov-14	NC	0	NC	Carcass count only
10-Nov-14	29	2	8	10 ft. vis.
12-Nov-14	-	-	-	No survey wind gusts 60-80 mph
14-Nov-14	13	5	NC	10
18-Nov-14	39	5	9	3
25-Nov-14	170	17	33	6
2-Dec-14	-	-	-	No survey wind gusts 60 mph
5-Dec-14	122	35	31	2
9-Dec-14	75	5	35	2
12-Dec-14	0	6	0	12
16-Dec-14	35	2	20	12
23-Dec-14	0	0	0	0.5
29-Dec-14	0	0	0	0.5
6-Jan-15	0	1	0	4

i. Dead are newly samply fish only.
ii. Redds are an instantaneous count for the day, not cumulative.

2.12. Vernita Bar/Hanford Reach Fall Chinook Protection Program Operations (Non-BiOp Action)

Date	Summary
	• This section will be updated throughout the season as new information becomes available.
	•
	•

2.13. Snake River Zero Generation (Non-BiOp Action)

According to the Lower Snake projects' operating manuals, from December 1 through February 28, "zero" minimum project discharge is permitted on a limited basis. Under an agreement between the Corps of Engineers and the fishery agencies, zero river flow is allowed for water storage during low power demand periods (at night and on weekends) when there are few, if any, actively migrating anadromous fish present in the Snake River. Water stored under zero river flow conditions may maximize power production from the Columbia River Basin system, but zero river flow operations are not recommended at Lower Snake projects when fish are actively migrating in the Snake River."

Salmon Managers submitted System Operations Request (SOR) 2005-22 Snake River Zero Nightime and Weekend Flow, to the Action Agencies (AA) on December 6, 2005. The SOR may be found on the following website:

http://www.nwd-wc.usace.army.mil/tmt/sor/2005/2005-22.pdf

In the SOR the Salmon Managers provided the AAs with the following table to clarify the criteria of "… few, if any …" prior to the implementation of the Zero Generation Operation.

The few migrating adult criterion trigger will be defined on a sliding scale outlined in the following table. The table applies to both "wild" and "total" categories of returning adult steelhead.

Run to date>#	**Run to date≤ #**	**Few criteria< #**
0	30,000	10
30,000	60,000	20
60,000	100,000	35
100,000	150,000	50
150,000	200,000	65
200,000	250,000	80
250,000		100

TMT Meeting (November 19, 2014) - BPA, requested the 2014 criteria for zero generation on the Snake River Dams. NOAA, noted that the 2014 criteria will be a rolling 3 day average count of 65 total steelhead and/or 20 wild steelhead at Lower Granite Dam based on a rolling 3 day average. The criteria are based on a sliding scale outlined in the attachment posted on the TMT agenda. NOAA indicated that there are currently 100's of steelhead passing Lower Granite daily; however, numbers may be dropping. The recent cold weather may be influencing the recent decrease in passage. NOAA will continue to track steelhead passage and will contact the Action Agencies when the trigger is hit. An update will be provided at the December 17th TMT meeting.

TMT Meeting (**December 17, 2014**) - BPA noted the trigger has yet to be hit and water temperatures have crept up from 5 to 6.5 degrees Celsius. However, there is still potential the trigger will be hit by the end of the month and the operation will be implemented as coordinated.

NOAA is fine with the AAs tracking and implementing the operation if the triggers are hit, and it is not necessary for them to wait for word from NOAA. The Corps noted the criteria include a rolling 3-day average count of less than or equal to 65 total steelhead and 20 wild steelhead at Lower Granite. If these criteria are not met by the end of December then the AAs will implement the operation on January 1st, 2015 when the Lower Granite Dam fish ladder goes out of service.

TMT Meeting (**January 7, 2015**) **-** BPA, reported that the zero nighttime generation operation has been implemented; however, the trigger was not hit. Regardless of the trigger, the ladder was scheduled to be taken out of service on January 1st with the initiation of the zero nighttime generation operation. TMT members present were uncertain as to if and when the ladder was taken out of service, however, it was believed to have been done on 5th or 6th of January.

2.14. Minimum Operating Pool (MOP)

In accordance with Reasonal Prudent Alternative 5 in the NOAA Fisheries 2014 Supplemental BiOp the Action Agencies operate the Lower Snake River projects (Ice Harbor, Lower Monumental, Little Goose and Lower Granite) at MOP (unless adjusted to meet authorized project purposes, primary navigation) from April 3 through August 31 as specified in the 2015 Fish Operations Plan (FOP). MOP ranges at Lower Snake River Projects are found in Table 9 below.

Table 9. MOP Elevation Ranges for Lower Snake River Projects

Project	Minimum Operating Pool Elevation (feet)	Upper Limit of 1-foot Operating Range (feet)
Ice Harbor	437.0	438.0
Lower Monumental	537.0	538.0
Little Goose	633.0	634.0
Lower Granite	733.0	734.0

Additional information regarding MOP operations are described in the FOP on the following website.

http://www.nwd-wc.usace.army.mil/tmt/agendas/2015/2015_Fish_Operations_Plan_(030315).pdf

At John Day Dam from April 10 to September 30, the forebay is operated within a 1.5 foot range (262.5 to 264.0 feet) of the minimum elevation that provides irrigation pumping. The initial range is 262.5 to 264.0 feet. The minimum elevation will be adjusted upward as necessary to facilitate irrigation pumping.

2.15. Spill and Transportation in 2015

Spring spill will begin on April 3 at Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams. Spring spill operations will continue through June 20. Spring spill will begin

April 10 at McNary, John Day, The Dalles, and Bonneville dams. Spring spill operations will continue through June 15. Spring spill operations are shown below in Table 10.

Table 10. Summary of 2015 spring spill levels at lower Snake and Columbia River projects

Project	Planned 2015 Spring Spill Operations (Day/Night)
Lower Granite	20 kcfs/20 kcfs
Little Goose	30%/30%
Lower Monumental	Gas Cap/Gas Cap (approximate Gas Cap range: 20-29 kcfs)
Ice Harbor	**April 3-April 28:** 45 kcfs/Gas Cap **April 28-June 20:** 30%/30% vs. 45 kcfs/Gas Cap (approximate Gas Cap range: 75-95 kcfs)
McNary	40%/40%
John Day	**April 10-April 28:** 30%/30% **April 28-June 15:** 30%/30% and 40%/40%
The Dalles	40%/40%
Bonneville	100 kcfs/100 kcfs

Summer spill will begin on June 21 at Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams and continue through August 31 at all four Snake River projects. Summer spill will begin June 16 at McNary, John Day, The Dalles, and Bonneville dams and continue through August 31 at all four Columbia River projects. Summer spill levels are shown below in Table 11.

Table 11. Summary of 2015 summer spill levels at lower Snake and Columbia River projects

Project	Planned 2015 Spring Spill Operations (Day/Night)
Lower Granite	18 kcfs/18 kcfs
Little Goose	30%/30%
Lower Monumental	17 kcfs/17 kcfs
Ice Harbor	**June 21-July 13:** 30%/30% vs. 45 kcfs/Gas Cap **July 13-August 31:** 45 kcfs/Gas Cap (approximate Gas Cap range: 75-95 kcfs)
McNary	50%/50%
John Day	**June 16-July 20:** 30%/30% and 40%/40% **July 20-August 31:** 30%/30%
The Dalles	40%/40%
Bonneville	85 kcfs/121 kcfs and 95 kcfs/95 kcfs

Additional information regarding spill may be found in the FOP on the following website.

http://www.nwd-wc.usace.army.mil/tmt/agendas/2015/2015_Fish_Operations_Plan_(030315).pdf

To achieve the 2014 Supplemental BiOp goal of transporting about 50% of juvenile steelhead, transportation will be initiated at Lower Granite, Little Goose, and Lower Monumental dams on May 1, as coordinated with the TMT in 2014.

The collection of fish at lower Snake River projects for transportation will commence at 0700 hours on May 1. Barging of fish will begin the following day and collected juvenile fish will be transported from each facility on a daily or every-other-day basis (depending on the number of fish) throughout the migration season. Transportation operations will be carried out at each project in accordance with all relevant FPP operating criteria.

2.16. Fish Passage Research in 2015

The following information is included in the 2015 Fish Passage Plan Appendix A that may be found on the following website.

http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2015/final/FPP15_AppA.pdf

- **Bonneville Dam Studies.**

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.

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).

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.

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.

- **The Dalles Dam Studies.**

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

- **John Day Dam Studies.**

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

- **McNary Dam Studies.**

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.

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.

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.

- **Ice Harbor Dam Studies.**

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.

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.

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.

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.

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.

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.

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.

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.

- **Lower Monumental Dam Studies.**

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.

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.

- **Little Goose Dam Studies.**

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.

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.

- **Lower Granite Dam Studies.**

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.

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.

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.

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.

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.

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.