2016 Water Management Plan
Seasonal Update
October 30, 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 the NOAA Fisheries 2008 FCRPS BiOp, as supplemented in 2010 and 2014 (collectively referred to as the 2014 NOAA Fisheries Supplemental BiOp), and the U.S. Fish and Wildlife Service (USFWS) 2000 FCRPS BiOp and 2006 Libby BiOp. 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	
	Flood Control	January	June	
	Storage Project Operations	September	September	October 30
	Water Quality (Spill Priority Lists)	January	December	
	Specific Operations	**Start Date**	**End Date**	**Last Updated**
	Chum Flows (Bonneville Dam)	November 1	April 10	October 30
	Spring Creek Hatchery Releases (Bonneville Dam)	April	May	
	Burbot spawning temperature management (Libby Dam)	November	December 30	November 10, 2010
	Upper Snake Flow Augmentation	April 1	August 31	
	Lake Pend Oreille Kokanee (Albeni Falls Dam)	September 1	December 30	
	Transportation	May 1	September 30	
	Spill Operations	April 3	August 31	
	Fish Passage Research	March	October	
	Snake River Zero Generation	December	February	

	Hanford Reach Fall Chinook Protection	November	June	October 30

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. 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 2016		April-August 2016	
	Volume (MAF)	% of 30-year Average (101.4 MAF)	Volume (MAF)	% of 30-year Average (87.5 MAF)
January 8, 2016				
February 5, 2016				
March 7, 2016				
April 7, 2016				
May 6, 2016				
June 7, 2016				
July 8, 2016				

Table 3. Grand Coulee Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2016		April-August 2016	
	Volume (MAF)	% of 30-year Average (59.6 MAF)	Volume (MAF)	% of 30-year Average (56.8 MAF)
January 8, 2016				
February 5, 2016				
March 7, 2016				
April 7, 2016				
May 6, 2016				
June 7, 2016				
July 8, 2016				

Table 4. Lower Granite Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2016		April-August 2016	
	Volume (MAF)	% of 30-year Average (27.4 MAF)	Volume (MAF)	% of 30-year Average (21.1 MAF)
January 8, 2016				
February 5, 2016				
March 7, 2016				
April 7, 2016				
May 6, 2016				
June 7, 2016				
July 8, 2016				

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 2016	
	Volume (KAF)	% of 78-year (1929-2008) Average (6,282 KAF)
November		
December		
January		
February		
March		
April		
May		
June		

Table 6. Dworshak Dam Final Water Supply Forecasts.

Forecast Issue Date	April-July 2016	
	Volume (KAF)	% of 81-year (1929-2010) Average (2,663 KAF)
December		
January		
February		
March		
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 2016		January-July 2016		May-September 2016	
	Volume (KAF)	% of 30-year Average (2,070 KAF)	Volume (KAF)	% of 30-year Average (2,224 KAF)	Volume (KAF)	% of 30-year Average (1,835 KAF)
January						
February						
March						
April						
May						
June						

Weekly Weather and Precipitation Retrospectives

Week	Weekly Weather / Precipitation Retrospective
October 5, 2015	
October 12, 2015	
October 19, 2015	
October 26, 2015	
November 2, 2015	
November 9, 2015	
November 16, 2015	
November 23, 2015	
November 30, 2015	
December 7, 2015	
December 14, 2015	
December 21, 2015	
December 28, 2015	
January 4, 2016	
January 11, 2016	
January 18, 2016	
January 25, 2016	
February 1, 2016	
February 8, 2016	
February 15, 2016	
February 22, 2016	
February 29, 2016	
March 7, 2016	
March 14, 2016	
March 21, 2016	
March 28, 2016	
April 4, 2016	

April 11, 2016
April 18, 2016
April 25, 2016
May 2, 2016
May 9, 2016
May 16, 2016
May 23, 2016
May 30, 2016
June 6, 2016
June 13, 2016
June 20, 2016
June 27, 2016
July 4, 2016
July 11, 2016
July 18, 2016
July 25, 2016
August 1, 2016
August 8, 2016
August 15, 2016
August 22, 2016
August 29, 2016
September 5, 2016
September 12, 2016
September 19, 2016
September 26, 2016

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

Project	Elevation Date Objective	Dec	Jan	Feb	Mar	Apr
Libby	Jan 31st					
	Feb 28th					
	March 31st					
	April 10th					
	April 15th					
	April 30th					
Hungry Horse	Jan 31st					
	Feb 28th					
	March 31st					
	April 10th					
	April 15th					
	April 30th					
Grand Coulee	Jan 31st					
	Feb 28th					
	March 31st					
	April 10th					
	April 15th					
	April 30th					
Brownlee	Jan 31st					
	Feb 28th					
	March 31st					
	April 15th					
	April 30th					
Dworshak	Jan 31st					
	Feb 28st					
	March 31st					
	April 10th					
	April 15th					
	April 30th					

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 34 of the Water Management Plan on the following website:

http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/2014/Final/20131231_WMP_Revised_20131230.pdf

April 10th and Refill Objectives: 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 October 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 31st. The final flow levels, for the remainder of the calendar year, are based on the March Final forecast.

April 10th and June 30th Refill Objectives: The Bureau of Reclamation computes Hungry Horse's final April 10th elevation objective by linear interpolation between the March 31st and April 15th forecasted flood control elevations based on the March Final WSF.

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 30th, 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 30th. The RFC's May Final April-August forecast is used to set the official draft limit.

Grand Coulee Dam

April 10th and June 30th refill Objective: The Bureau of Reclamation computes Grand Coulee's final April 10th elevation objective by linear interpolation between the March 31st and April 15th forecasted flood control elevations based on the March Final WSF for The Dalles.

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 2016.

"Bucket"	2016 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: This section will be updated as information becomes available.

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

The AAs have coordinated the following spill priority lists with the TMT to date, and they may be found on the following website:

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

2.7. Burbot Spawning Flows (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)

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

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 21, 2015	At this time the tentative plan for chum operation will be the same operation coordinated last year. The operation would begin with a tailwater elevation of 11.5 to 13.0 feet beginning on November 7. TMT will revisit the chum operation at the November 4th TMT meeting, unless there is significant rainfall and then an interim meeting will be scheduled.

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)
October 8, 2015	0	0	0	5
October 15	0	0	0	5

Date	Lives	Dead[i]	Redds[ii]	Visibility (feet)

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)

The Hanford Reach Fall Cinook Protection Agreement (Agreement) ebstablishes the obligations of the Parties with respect to the protection of fall Chinook in the Hanford Reach of the Columbia River. The Parties agree that during the term of the Agreement these flow regimes address all issues in the Hanford Reacth with respect to fall Chinoook protection and the impact of operation of the seven dams operatin under Mid'Columbia Hourly Coordination, including the obligations of Grant, Chelan, and Douglas under any new licenses issued by the Federal Energy Regulatory Commission (FERC).

Beginning in mid - October, under the terms of the Hanford Reach Fall Chinook Protection Program Agreement, river flows are reduced every Sunday morning (day of lowest power demand) to the Priest Rapids Dam minimum operating discharge of 36,000 cubic feet per second (ft3/s) [1,000 cubic meters per second (m3/s)]. This allows the Agency and Utility Party Monitoring Team to manually survey for redd distribution at Vernita Bar just downstream of Priest Rapids Dam. These drawdowns occur every Sunday morning until the initiation of fall Chinook spawning has been set both above and below the 50,000 ft3/s (1,416 m3/s) flow elevations. A final drawdown is conducted on the Sunday prior to Thanksgiving to establish the minimum critical flow needed to protect pre - emergent fall Chinook. Given the previously described limitations, this weekly reduction in river flow affords the best viewing conditions for aerial flights. Aerial flights are therefore scheduled to be conducted concurrent with the Sunday morning drawdowns, when possible.

Date	Summary
October 8, 2015	Operations to support the Hanford Reach Fall Chinook Protection Program will begin on October 15, 2015. Reverse Load Factoring will begin at 000 hours on Thursday the 15th and continue through the end of the Spawning Period. The Spawning Period is scheduled to end on November 22, 2015 (last Sunday prior to Thanksgiving), but may be extended if spawning activity is observed during the redd survey on that day. During Reverse Load Factor, Priest Rapids Outflows (as measured at the USGS gauge) must remain between 55 and 70 kcfs during daylight hours. Reduced daytime flows (38 kcfs) below Priest Rapids Dam on Sundays during the Spawning Period will be required to support redd counts on Vernita Bar. The first redd count will be conducted on Sunday, October 18. Specific details for operational support during Vernita Bar redd counts will be updated throughout the season and be provided in individual flow requests.
October 18	On Sunday, October 18, 2015 representatives from Grant PUD and Washington Department of Fish & Wildlife conducted the first 2015 Vernita Bar spawning ground survey. One redd was observed in the 36 – 50 kcfs elevation zone (Table 1). Five redds are required for the Initiation of Spawning, therefore the date for the Initiation of Spawning has not been set. A second spawning ground survey will be conducted next Sunday, October 25.
October 25	On Sunday, October 25, 2015 representatives from Grant PUD and Washington Department of Fish & Wildlife conducted the second 2015 Vernita Bar spawning ground survey. Fifty-one redds were observed in the 36 – 50 kcfs elevation zone and 16 redds were observed in the above 50 kcfs elevation zone (Table 1). Five redds are required for the Initiation of Spawning, therefore spawning has initiated in both the below and above the 50 kcfs zone. The date for the Initiation of Spawning has been set as October 21, 2015. The next spawning ground survey will be used to determine the Critical Elevation and will be conducted on Sunday November 22.

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 Nighttime 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

The AAs will implement the Snake River Zero Nightime Generation Operation on the Lower Snake River during winter of 2015/2016 in coordination with the TMT.

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 2016

This section will be updated once the 2016 Fish Operations Plan is available by April of 2016.

2.16. Fish Passage Research in 2016

This section will be updated once the Fish Passage Plan is complete in April 2016.