2013 Water Management Plan
Seasonal Update
May 7, 2013

1. Introduction

The annual Water Management Plan (WMP) is developed prior to the implementation of operational measures identified in the 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	April 19, 2013
	Seasonal Flow Objectives	April	August	
	Flood Control	January	June	April 19, 2013
	Storage Project Operations	September	September	April 19, 2013
	Water Quality (Spill Priority Lists)	April	August 31	April 19, 2013
	Specific Operations	**Start Date**	**End Date**	**Last Updated**
	Chum Flows (Bonneville Dam)	November 1	May 8	April 19, 2013
	Spring Creek Hatchery Releases (Bonneville Dam)	April 11	May 3	April 19, 2013
	Burbot Flows (Libby Dam)	November	December 30	November 1, 2010
	Upper Snake Flow Augmentation	April	August 31	June 8, 2012
	Lake Pend Oreille Kokanee (Albeni Falls Dam)	September	December 30	April 19, 2013
	Transportation	May 1	September 30	April 19, 2013
	Spill Operations	April 3	August 31	April 19, 2013
	Fish Passage Research	March	April 3	April 19, 2013
	Snake River Zero Generation	December	February	April 19, 2013
	Hanford Reach Fall Chinook Protection	November	June	April 19, 2013

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 (except June and July, which are taken on June 4 and July 3, as per the official WSF calendar). 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 2013		April-August 2013	
	Volume (maf)	% of 30-year Average (101.4 maf)	Volume (maf)	% of 30-year Average (87.5 maf)
January 8	102.5	101	92.0	105
February 7	92.0	91	81.9	94
March 7	89.7	89	80.4	92
April 5	91.1	90	81.8	93
May 7	92.4	91	82.5	94
June 6				
July 8				

Table 3. Grand Coulee Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2013		April-August 2013	
	Volume (maf)	% of 30-year Average (59.6 maf)	Volume (maf)	% of 30-year Average (56.8 maf)
January 8	59.8	100	58.2	103
February 7	55.9	94	54.5	96
March 7	54.6	92	54.0	95
April 5	57.5	96	55.9	98
May 7	59.3	100	57.4	101
June 6				
July 8				

Table 4. Lower Granite Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2013		April-August 2013	
	Volume (maf)	% of 30-year Average (27.4 maf)	Volume (maf)	% of 30-year Average (21.1 maf)
January 8	20.8	100	22.2	105
February 7	24.1	88	19.6	93
March 7	22.5	82	18.6	88
April 5	21.0	77	17.2	82
May 7	19.5	71	15.7	74
June 6				
July 8				

Water Supply Forecasts - Corps

Water supply forecasts for Libby and Dworshak dams are produced by the Corps' Seattle and Portland Districts, respectively. Corps forecasts are available on the following website: http://www.nwd-wc.usace.army.mil/report/colriverflood.htm

Table 5. Libby Dam Water Final Supply Forecasts.

Forecast Issue Date	April-August 2013	
	Volume (kaf)	% of 70-year Average (6,337 kaf)
November 7, 2011 (pre-season)	7,194	114
December 7, 2011	6,238	98
January 6, 2012	6,898	109
February 6, 2012	6,384	101
March 6, 2012	6,315	100
April 5, 2012	6,189	98
May 4, 2012	6,535	103
June 4, 2012		

Table 6. Dworshak Dam Final Water Supply Forecasts.

Forecast Issue Date	April-July 2013	
	Volume (kaf)	% of 70-year Average (2,683 kaf)
December 8, 2011	2,727	102
January 10, 2012	2,587	96
February 7, 2012	2,202	82
March 6, 2012	2,128	79
April 5, 2012 (Non-Shifted)	2,036	76
May 4, 2012	2,296	86
June 4, 2012		

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 2013		January-July 2013		May-September 2013	
	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 9						
February 7	2,147	111	2,327	111	1,877	111
March 7	1,994	103	2,154	103	1,743	103
April 3	2,002	103	2,164	103	1,750	103
May 3	2,054	106	2,214	106	1,789	106
June 6						

Weekly Weather and Precipitation Retrospectives

Week	Weekly Weather / Precipitation Retrospective
October 8, 2012	**Temperatures:** Fell to near average. **Rainfall:** Below average for the 13th week in a row. Scattered moderate rain in BC. First light snows of the season in BC on Tuesday and western MT on Wednesday. **Streamflows:** Brief spikes in BC, otherwise flat and below average for early October.
October 15, 2012	**Temperatures:** Slightly above average. Above average snow levels. **Rainfall:** Well below average through Thursday, then well above average with the first widespread rains of the season. **Streamflows:** Flat flows initially, but basinwide, minor rises have begun due to the weekend rain.
October 22, 2012	**Temperatures:** Slightly above average, then fell below average. **Rainfall:** Well above average northern 2/3rd of the basin, especially in BC. Below average southern 1/3rd. **Streamflows:** Slight increase in flows basinwide, but most noticeably in Canada. Significant improvement in soil moisture content noted.
October 29, 2012	**Temperatures:** Below average. **Rainfall:** Above average basinwide. First significant mountain snows of the season early last week. **Streamflows:** Slightly increased flows basinwide, except west of the Cascades where more substantial increases were noted this weekend. Much of the initial rains soaked into soils rather than run off into streams.
November 5, 2012	
November 12, 2012	
November 19, 2012	
November 26, 2012	
December 3, 2012	
December 10, 2012	
December 17, 2012	
December 24, 2012	
December 31, 2012	
January 7, 2013	
January 14, 2013	
January 21, 2013	
January 28, 2013	
February 4, 2013	
February 18, 2013	
February 11, 2013	
February 25, 2013	
March 4, 2013	
March 11, 2013	
March 18, 2013	
March 25, 2013	
April 1, 2013	
April 8, 2013	
April 15, 2013	
April 22, 2013	
April 29, 2013	
May 6, 2013	
May 13, 2013	
May 20, 2013	
May 27, 2013	

June 3, 2013
June 10, 2013
June 17, 2013
June 24, 2013
July 1, 2013
July 8, 2013
July 15, 2013
July 22, 2013
July 29, 2013
August 5, 2013
August 12, 2013
August 19, 2013
August 26, 2013

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	170.2
McNary	Spring 4/10–6/30	220-260 kcfs[i]	237.5
	Summer 7/1–8/31	200 kcfs	
Lower Granite	Spring 4/3–6/20	85-100 kcfs[i]	57.2
	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**	2411.3	2395.2			
	Feb 28	2410.1	2381.5	2404.3		
	March 31	2409.5	2375.9	2402.3	2405.8	
	April 10					
	April 15	2409.5	2375.9	2402.3	2405.8	2411.8
	April 30	2409.5	2375.9	2402.3	2405.8	2411.8

Project	Elevation Date Objective	Dec	Jan	Feb	Mar	Apr
Hungry Horse	Jan 31	3543.6	3541.4			
	Feb 28	3538.5	3534.1	3537.1		
	March 31	3532.5	3525.7	3530.4	3537.2	
	April 10		3522.9	3528.2	3535.9	
	April 15	3529.6	3521.5	3527.1	3535.2	3534.7
	April 30	3526.7	3517.2	3523.8	3533.1	3532.6
Grand Coulee	Jan 31	1290.0	1290.0			
	Feb 28	1290.0	1290.0	1290.0		
	March 31	1260.6	1266.4	1282.3	1282.6	
	April 10		1252.8	1276.7	1279.9	
	April 15	1241.0	1246.0	1273.9	1278.5	1275.1
	April 30	1231.5	1235.7	1260.8	1265.1	1258.5
Brownlee	Jan 31	2077.0	2077.0			
	Feb 28	2048.4	2050.7	2055.1		
	March 31	2043.1	2047.8	2057.1	2064.7	
	April 15	2040.7	2047.2	2060.6	2068.1	2069.4
	April 30	2038.4	2046.1	2062.2	2069.9	2071.2
Dworshak	Jan 31	1535.8	1539.3			
	Feb 28	1522.3	1528.9	1546.7		
	March 31	1524.7	1534.0	1559.8	1563.7	
	April 10					
	April 15	1515.1	1534.5	1571.0	1574.9	1568.5
	April 30	1514.4	1522.4	1554.5	1560.9	1568.5

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 presented in Table 7 of the WMP.

April 10 and Refill Objectives: Discussion of Libby April 10 elevation objective will be included pending completion of the Corps February Runoff Forecast the most probable runoff volume for April – August. This section will be updated throughout the season as new forecast information becomes available.

Summer Draft Limit: OnApril 3, 2013, the AAs received SOR 2013-01 from the Kootenai Tribe of Idaho to provide Libby target outflows of 8,000 cfs or less in the month of September and October. The objective of implementing the request was to provide decreased Libby outflows during the months of September and October in order to facilitate sturgeon habitat restoration actions being implemented by the Tribe in the Kootenai River. Based on information provided in the SOR it is likely the Kootenai Tribe will request a similar type of operation in 2014.

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. The Bureau of Reclamation's March Final WSF for April–August was 1,994 kaf (103 % of average). Minimum flow requirements from Hungry Horse and Columbia Falls are currently set 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 2014 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. Based on the March final forecast and forecasted flood control elevations, the April 10 elevation objective was 3535.9 ft. Hungry Horse actual elevation on April 10 was 3536.4 ft. Hungry Horse Reservoir is expected to refill by approximately June 30. A late snowmelt runoff may delay refill to sometime after June 30 in order to avoid excessive spill at the project.

Summer Draft Limit: The experimental summer reservoir draft limit at Hungry Horse is 3,550 ft. (10 ft. 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 3,540 ft. (20 ft. 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: The Bureau of Reclamation computes Grand Coulee'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 for The Dalles. Based on the March final forecast and forecasted flood control elevations, the April 10 elevation objective was 1279.9 ft. Grand Coulee passed through elevation 1279.9 ft during the early morning hours of April 10 as the project was drafting towards the April 15 and April 30 flood control targets of 1275.1 ft and 1258.5 ft, respectively.

Grand Coulee will operate to refill around June 30 to provide summer flow augmentation. In order to demonstrate that water was released from Grand Coulee during the spring under the Lake Roosevelt Incremental Storage Release Program, Grand Coulee will target a refill elevation following a recommendation from the Fish Flow Releases Advisory Group (FFRAG).

The Lake Roosevelt Incremental Storage Release Program

The total amount of water to be released from Grand Coulee in 2013 under the Lake Roosevelt Incremental Storage Release Program will be 25,500 acre-ft and will be distributed as shown in Table 8.

Table 8. Lake Roosevelt releases requested for 2013.

"Bucket"	2013 Releases (acre-feet)	Total Lake Roosevelt Incremental Storage Releases Program (acre-feet)
Odessa	0	30,000
M&I	17,000	25,000
Instream Flow	8,500	27,500

A total of 13,260 acre-ft will be released in the spring (April, May, June) and 12,240 acre-ft will be released in the summer (July, August). In order to demonstrate that the water was released in the specified time periods, Lake Roosevelt will attempt to fill to elevation 1289.8 ft or 0.2 ft from full around June 30. The summer draft limit will be modified an additional 0.3 ft and will have a draft limit of elevation 1279.7 ft or 1277.7 ft depending on the July final forecast for The Dalles.
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.

Drum Gate Maintenance: Drum gate maintenance will not be performed in 2013. Lake Roosevelt will not be drafted deep enough and/or long enough to allow drum gate maintenance to be completed. Lake Roosevelt must be at or below elevation 1,255 ft for up to 8 weeks to allow drum gate maintenance to be performed.
Banks Lake: Banks Lake will draft to elevation 1565 ft. byAugust 31 to provide more water for summer flow augmentation. Pumping to Banks Lake will be reduced and irrigation for the Columbia Basin Project will be met be drafting the reservoir up to 5 ft. from full (elevation 1565 ft.) by August 31

Dworshak Dam

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

2.5. Water Quality

The AAs have coordinated the following spill priority lists with the TMT to date:

- **September 22, 2012 – December 4, 2012:** The wintertime spill priority list was coordinated during the August 29, 2012, TMT meeting that may be found on the following website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/

- **December 4, 2012 – March 31, 2013**: The wintertime spill priority list coordinated during the December 4, 2012; February 13, 2013, and; March 13, 2013; TMT meetings that may be found on the following website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/

- **April 1 – May 15**: Spring spill priority list coordinated during the March 13, TMT meeting that may be found on the following website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/

2.6. Spring Creek Hatchery Releases (Bonneville Dam)

The USFWS coordinated the Bonneville Dam Powerhouse Two (PH2) special operation for the Spring Creek Hatchery release during the April 3 and 10 TMT meetings. The USFWS released approximately 8.2 million juvenile tule fall chinook on April 11 from the Spring Creek and Little White Salmon National Fish Hatcheries. The special operation included special operation of targeting PH2 units at the mid range which is expedited to improve passage conditions through the gatewells of PH2 from April 12 to 22. Specifically, in coordination with the TMT the Action Agencies (AA) implemented the following operation:

1) Operate PH2 within a flow range of 13 to 15 kcfs targeting 14 kcfs.
2) To pass additional inflow operate PH1 within the 1% of peak efficiency operating range.
3) To pass additional inflow operate PH1 at the Best Operating Point.
4) To pass additional flow increase PH2 units to utilize the full range of the 1% of peak efficiency.

Additional information regarding these discussions may be found in the April 3 and 10 TMT meeting notes on the following website:

http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/

2.7. Burbot Spawning Flows (Libby Dam)

Under the terms of an 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 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 2,222 ft.), the Corps removed all but 3 rows of gates (resulting in withdrawal elevation of 2,253 ft.).

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

This section will be updated pending an SOR for this operation expected to occur in September of 2013.

2.9. Upper Snake Flow Augmentation

Reclamation currently estimates that 427 Kaf of Upper Snake River flow augmentation will be provided in 2013. Below average water supply conditions in the Snake River Basin will most likely result in the use of some reservoir power head space in order to provide the 427 Kaf of flow augmentation.

2.10. Chum Spawning and Incubation Flows (Bonneville Dam)

Date	TMT Discussion/Chum Operation
October 31, 2012	TMT Meeting - Chum had been observed in the Grays River, captured in gill nets and also observed in the fish ladders at Bonneville, with a total of 11 passing Bonneville by last count. Salmon Managers recommended the Action Agencies (AAs) initiate the following chum operation today: 1) a range of 11.3-11.7ft., targeting 11.5 ft. during day-time hours, and 2) up to 18.5 ft. during night-time hours. The AAs informed the Salmon Managers this operation was initiated yesterday prior to TMT due to high Bonneville Dam inflows.
November 14, 2012	TMT Meeting - The Salmon Managers reported that the last chum count, on 11/6, found 34 live and 1 dead chum in the Ives Island area. The AAs were continuing to provide an operation to meet the requests of the salmon managers, targeting an 11.5 foot tailwater elevation during the day and releasing excess water up to 18.5 ft. at night.
November 20, 2012	TMT Email Notification – Current and forecasted Bonneville Dam inflows continued to increase therefore Salmon Managers requested the AAs initiate the following chum operation today: 1) a range of 12.2 to 12.8 ft., targeting 12.5 ft., during daytime hours and 2) up to 18.5 ft. during nighttime hours. The AA's implemented the request on November 20 and notified the TMT via email of this change in the chum operation. The meeting on November 21 was cancelled since the AAs implemented the requested operation.
November 27, 2012	TMT Email Notification - The AA's increased the Bonneville Dam tailwater for the chum operation to 14.0 ft. (operating range of 13.5 - 14.5 ft.) today. The previous operation targeted a 12.5 ft. tailwater operation (operating range of 12.2-12.8 ft.). It is no longer possible to maintain the 12.5 ft. tailwater operation due to high inflows as well as current NWRFC forecast information indicating high Bonneville Dam inflow.
November 28, 2012	TMT Meeting – The TMT discussed the current chum operation targeting 14.0 ft. (operating range of 13.5 - 14.5 ft.). The AAs increased the tailwater elevation on November 27, given the high flows and forecasted increase in Bonneville Dam inflows. The TMT discussed current operation and impacts on Grand Coulee April 10. The AA's will continue this operation until further notice.
November 30, 2012	TMT Meeting – Effective today the AAs will target a Bonneville Dam tailwater of 14 feet with an 13.5 – 15.5 ft operational range based on today's TMT meeting. It may become increasingly difficult to maintain a chum protection level of greater than 13.5 while not compromising the April 10 forebay elevation at Grand Coulee.

Date	TMT Discussion/Chum Operation
December 4, 2012	TMT Meeting – Effective today the AA's implemented the following operation: 1) Continue to maintain the 13.5 minimum tailwater during all hours; 2) make best efforts to continue to maintain the daytime 13.5 to 15.5 tailwater targeting to 14.0 foot tailwater. 3) if unable to maintain #2 above then pass up to a maximum of 18.5 feet during the nighttime; 4) if unable to maintain #3 above then pass up to a maximum of 18.5 feet during the daytime, and; 5) if unable to maintain #4 above then operate to full powerhouse plus operation of the B2CC. The goal of this is to avoiding spilling that would delay the spillway repair work that is currently underway. The revised operation was based on continued discussions regarding increasing inflows requiring more operating flexibility for the AAs to manage the system. Furthermore, ongoing repair work on the Bonneville spillway has been coordinated with the region and is a high priority project, so the AA's are trying to avoid spill at the project which would force the crews to be pulled and delay the repair work.
December 12, 2012	TMT Meeting – The TMT will continue implementing the chum operation discussed during the December 4 TMT meeting.
December 18, 2012	TMT Meeting – The TMT discussed transitioning to a 13.5 foot minimum tailwater elevation for the chum incubation operation on December 21. The AA's committed to implementing the new operation on December 21. The AAs reported the tests will be conducted tomorrow in order to prepare for the installation of the PH2 Lamprey Passage Structure. Additionally, the AA will lower the tailwater to 11.7 feet tomorrow or on 12/26 so WDFW may remove the Duncan Creek Fish Trap. WDFW indicated it should take no more than 3 hours to pull the trap.
January 9, 2013	TMT Meeting - NOAA, shared that the last field report indicated zero chum spawning. The salmon managers were comfortable with the current operation maintaining a minimum tailwater elevation of 13.5 feet at Bonneville to protect incubating chum. The AAs indicated this operation would be maintained until further notice. TMT will revisit this operation in the spring as conditions change.
February 13, 2013	TMT Meeting - No changes to the current operation were proposed today. The current operation for chum is to meet a 13.5 foot minimum tailwater elevation at Bonneville, and this has been met with success while other work is underway at the project. The dredging operation at PH2 which was successfully completed. Spillway repair work is ongoing and expected to be complete by 2/23 with no issues or delays to report. The Lamprey Passage Structure (LPS) installation is also going well. Spill has been implemented to meet the various needs at Bonneville and has stayed within TDG requirements (FPOM coordinated an agreement 'not to exceed 106% day average). Off ramp contingencies are in place should extra runoff in March pose challenges to meeting all the demands, but before a change is made, this would be coordinated with the region – including TMT if alternative operations were options to be explored. Grand Coulee is currently operating to meet the chum flows at Bonneville and is still on target to meet the April 10 elevation for spring migrants (with no draft to date). That being said, the latest decrease in water supply forecast might require a draft at Grand Coulee in the near future and Reclamation suggested that the AAs would be watching this closely.

Date	TMT Discussion/Chum Operation
February 20, 2013	TMT Meeting - A conference call was convened today to look at current conditions and determine an operation for chum moving forward. Reclamation reported that currently the AAs are operating to meet a 13.5 foot tailwater elevation below Bonneville, using storage out of Grand Coulee. The Dalles water supply forecast continues to drop, now 5 more MAF below the February final forecast. NOAA, shared the salmon managers' priority to meet the April 10 upper rule curve at Grand Coulee for the spring migration. The 13.5 foot tailwater elevation this year was a product of excess November precipitation, and now maintaining for the benefit of redds at that higher level. NOAA concluded that, given all the uncertainty with fish numbers, emergence timing and weather forecasts, the salmon managers were ok with a phased step down to a lower tailwater elevation and proposed a specific operation for the next week: Lower the tailwater elevation to 13 feet today; lower to 12.5 feet on 2/22; to 12 feet on 2/24; and on 2/26 step down to 11.8 feet. In addition, bring the tailwater elevation back up to 13.5 feet for 1-2 hours during each day as an interim measure over this next week. NOAA reiterated that the overriding objective is to meet the upper rule curve on April 10 at Grand Coulee, and given the drier forecasts, the salmon managers recognize the need to make a change to the chum operation. The action agencies agreed that the salmon managers' proposed step down and re-wetting approach is reasonable for the next week.
February 27, 2013	TMT Meeting - A conference call was convened today to look at current conditions and determine an operation for chum moving forward. The Corps reported that the operation set up during last week's TMT call had been achieved, with a gradual step down to a minimum 11.8 foot tailwater at Bonneville as of yesterday – with daily one-hour increments of bringing the tailwater back up to 13.5 feet to re-wet any redds that had been spawned at that higher elevation. Currently, the tailwater was 11.9 feet and Bonneville was releasing 132 kcfs. Reclamation, added that since the operation had been implemented, Grand Coulee was no longer being drafted to meet the chum flows. Salmon Managers had discussed and agreed to continue the operation for another week. The AAs agreed to continue with the current operation, maintaining a minimum 11.8 foot tailwater at Bonneville, with a 1-hour re-wetting period between 2100 and 2400 hours.
March 6, 2013	TMT Meeting - NOAA, said the salmon managers had discussed and agreed to continue the operation for another week – at an 11.8 foot minimum tailwater with 1-hour increments per day up to 13.5 feet for re-wetting. NOAA said Battelle had provided temperature accrual data at various red locations; of those they had data on, 39 of 40 who had spawned prior to 11/14 had accrued enough temperatures to reach emergence. Of those remaining between 11/14-11/26, on average they need about 76 more TUs to get to emergence (so are on their way but not there yet) – which was reason to continue with the rewetting. The AAs agreed to continue with the current operation, maintaining a minimum 11.8 foot tailwater at Bonneville with a 1-hour re-wetting period occurring within a 24-hour period each day.
March 13, 2013	TMT Meeting - NOAA, reported that chum emergence is close in terms of temperature units, but evidence suggests that some chum may linger in the area and so the salmon managers recommended continuing the current operation for another week. They acknowledged some risk to meeting the Grand Coulee 4/10 elevation objective and will want to watch this closely. Reclamation responded that the current elevation at Grand Coulee is 1276 feet, and based on the latest forecast 1279.9 feet is the April 10 elevation objective. So far, there has been no filling or drafting of Grand Coulee. The Corps will continue to implement the current operation, a minimum 11.8 foot tailwater at Bonneville with 1 hour per day increments of rewetting up to 13.5 feet.

Date	TMT Discussion/Chum Operation
March 27, 2013	TMT Meeting - NOAA, requested on behalf of the salmon managers an extension of the current Bonneville operation to protect any remaining emerging chum. A field trip out to the area confirmed that the re-wetting operation was indeed aiding in keeping the higher, 13.5 foot, elevation wetted, and that this water was also providing additional velocity to move the fish out. Because of the uncertainty about whether end of emergence had occurred (this point was reiterated by Washington, who reported that numbers observed at the Bonneville Juvenile Fish Facility (SMP) had picked up about a week ago but since then there had been no sightings, adding to the uncertainty), the AAs agreed to continue the operation for one additional week. BPA, stated the agency's preference for a determined end date for this operation which would allow for some operating flexibility. BPA is looking for an operation that supports the chum and is cost-effective. BPA agreed to continue operation for another week based on the uncertainty conveyed by the salmon managers today. The Corps will continue to implement the current operation, a minimum 11.8 foot tailwater at Bonneville with 1 hour per day increments of rewetting of 13.5 feet.
April 3, 2013	TMT Meeting - NOAA, indicated Hamilton Springs chum are nearing the peak of the migration. As such, the salmon managers requested a continuation of the 11.8 feet minimum tailwater elevation at Bonneville until the start of spring spill on the Columbia on 4/10 – there is no longer a need for re-wetting at the project. The Corps will continue to implement the minimum 11.8 foot tailwater at Bonneville but the chum operation will officially end on 4/9 at 2400 hours.

Chum survey data gathered at the Ives/Pierce Island Complex are 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/ODFW_reports/2012spawning.htm

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

Date	Lives	Dead[i]	Redds[ii]	Visibility (ft)
18-Sep	0	0	0	12 ft.
26-Sep	0	0	0	12 ft.
3-Oct	0	0	0	10 ft.
8-Oct	0	0	0	12 ft.
12-Oct	0	0	0	12 ft.
15-Oct	0	0	0	12 ft.
19-Oct	0	0	0	1 ft.
22-Oct	5	0	0	8 ft.
24-Oct	6	0	1	10 ft.
29-Oct	1	0	0	5 ft.
31-Oct	2	0	0	2 ft.
6-Nov	34	1	14	6 ft.
13-Nov	74	2	29	12 ft.
15-Nov	NC	4	NC	6 ft.

Date	Lives	Dead[i]	Redds[ii]	Visibility (ft)
19-Nov	NC	14	NC	2 ft.
27-Nov	22	8	0	4 ft.
29-Nov	NC	15	NC	4 ft.
4-Dec	0	11	0	2 ft.
6-Dec	NC	2	NC	3 ft.
11-Dec	0	4	0	3 ft.
13-Dec	NC	0	NC	5 ft.
18-Dec	0	2	0	6 ft.

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

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

Date	Summary
October 21, 2012	• On Sunday, October 21, 2012, the first Vernita Bar ground redd count was conducted to determine the Initiation of Spawning for the zones below and above the 50 kcfs elevation. • Flows from Priest Rapids Dam at Vernita Bar were about 37 kcfs. Based on the above survey count and the Hanford Reach Fall Chinook Protection Program Agreement, the Initiation of Spawning has not occurred for either zone below or above the 50 kcfs elevation. • The next redd count will occur on October 28, 2012 and will require USGS gauging station flows of 38 kcfs.
October 28, 2012	• On Sunday, October 28, 2012 the second Vernita Bar ground redd count was conducted to determine the Initiation of Spawning for the zones below and above the 50 kcfs elevation. • Initiation of Spawning has been set to be October 24 for the flow elevation zone between 36 – 50 kcfs. The Agreement identifies that Initiation of Spawning occurs the Wednesday before the weekend on which the Monitoring Team first identifies five (5) or more redds within the flow zone of 36-50 kcfs and the zone above 50 kcfs.
November 4, 2012	• On Sunday, November 4, 2012 the third Vernita Bar ground redd count was conducted to determine the Initiation of Spawning for the zone above the 50 kcfs elevation. • Initiation of Spawning has been set to be October 31 for the flow elevation zone above the 50 kcfs. • The next redd count will occur on November 18, 2012 and used to determine the 2012-2013 Critical Flow Elevation. USGS gauging flows of 50 kcfs will be required.

Date	Summary
November 18, 2012	• On Sunday, November 18, 2012 the fourth Vernita Bar ground redd count was conducted to determine the 2012-2013 Hanford Reach Critical Flow Elevation. • the 2012-2013 Critical Flow Elevation is set at the 65 kcfs elevation • The Monitoring Team agreed that the fish spawning season had ended and that November 18, 2012 be identified as the End of Spawning date. The November 25 supplemental ground redd count will not be required. • No additional ground redd counts are planed for this year.

2.12. 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 Nighttime Generation Operation on the Lower Snake River between December 18 and February 28, 2013 based on discussions with the TMT during the November 14, November 30, December 4, and December 12 TMT meetings.

2.13. Minimum Operating Pool (MOP)

Surveys conducted in 2011 demonstrated impairment of the federal navigation channel in the Lower Granite pool. In accordance with the RPA, until maintenance activities are conducted to provide adequate channel depths for safe navigation, the Corps supports adopting the variable minimum operation pool (MOP) operation used during the 2011/ 2012 season (Table 9) and coordinated this operation with TMT in 2011/2012. Snake River MOP ranges (Table 10) as well as the variable MOP operation inflow dependent ranges are included below.

Table 9. Variable MOP Ranges for Lower Granite Dam

Lower Granite Inflows	Operation	Minimum Operating Pool Elevation (ft)	Upper Limit of 1-foot Operating Range (ft)
≥ 120 kcfs	MOP	733.0	734.0
80 kcfs - 119 kcfs	MOP +1	734.0	735.0
50 kcfs - 79 kcfs	MOP +1.5	734.5	735.5
≤ 49 kcfs	MOP +2	735.0	736.0

Table 10. MOP Elevation Ranges for Lower Snake River Projects

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

*See table above for LWG variable MOP operation

At John Day Dam from April 10 to September 30, the forebay is operated within a 1.5 ft range 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.

2.14. Spill and Transportation in 2013

Spring and summer spill operations are summarized in the tables below.
Additional information regarding spill operations may be found in the 2013 Fish Operations Plan which is Appendix E of the Fish Passage Plan that may be found on the following website:

http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2013/index.html

Table 2.— Summary of 2013 spring spill levels at lower Snake and Columbia River projects.[6]

Project	Planned 2013 Spring Spill Operations (Day/Night)	Comments
Lower Granite	20 kcfs/20 kcfs	Same as 2012
Little Goose	30%/30%	Same as 2012
Lower Monumental	Gas Cap/Gas Cap (approximate Gas Cap range: 20-29 kcfs)	Same as 2012
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)	Same as 2012
McNary	40%/40%	Same as 2012
John Day	**Pre-test:** 30%/30% **Testing:** 30%/30% and 40%/40%	Same as 2012
The Dalles	40%/40%	Same as 2012
Bonneville	100 kcfs/100 kcfs	Same as 2012

Table 3.— Summary of 2013 summer spill levels at lower Snake and Columbia River projects.[7]

Project	Planned 2013 Summer Spill Operations (Day/Night)	Comments
Lower Granite	18 kcfs/18 kcfs	Same as 2012
Little Goose	30%/30%	Same as 2012
Lower Monumental	17 kcfs/17 kcfs	Same as 2012
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)	Same as 2012
McNary	50%/50%	Same as 2012
John Day	**July 1-July 20:** 30%/30% and 40%/40% **July 20-August 31:** 30%/30%	Same as 2012
The Dalles	40%/40%	Same as 2012
Bonneville	**June 16-July 20:** 85 kcfs/121 kcfs and 95 kcfs/95 kcfs **July 21-August 31:** 75 kcfs/Gas Cap	Same as 2012

Information regarding fish transportation will be posted as soon as it becomes available.

2.15. Fish Passage Research in 2013

A brief summary of 2013 fish passage research is summarized below. More information may be found in Appendix A of the 2013 Fish Passage Plan that may be found on the following website:

http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2013/final/FPP13_AppA.pdf

Bonneville Dam

- **Powerhouse Two (PH2) Fish Guidance Efficiency (FGE) Program Research.** From March through July, 2013, the COE-funded study "*Validation of the Computational Fluid Dynamics Analysis and Evaluation of Fish Condition and Gatewell Residence Time for Juvenile Salmonids in a Modified Gatewell at the Bonneville Dam Second Powerhouse*" is scheduled to occur.
- **Adult Salmon Studies.** From late March to early October, up to 600 adult and 400 jack spring-summer Chinook salmon, 400 sockeye salmon, and up to 800 steelhead will be captured and radio-tagged and/or PIT-tagged at the Bonneville Dam Adult Fish Facility (AFF) and released below the dam to evaluate passage and migration behavior.
- **Lamprey Passage Evaluations.** From early June to the end of August, up to 900 adult Pacific lamprey will be captured and tagged at the Adult Fish Facility, tagged with half-

duplex PIT-tags and released below the dam to evaluate efficacy of fishway modifications and overall migration through the FCRPS.

- **Sea Lion Predation.** From early January through May 31, 2013, the Fisheries Field Unit (FFU) will monitor sea lion predation and evaluate sea lion deterrent efforts from the powerhouse decks and the spillway public parking lot.

The Dalles Dam

- **Adult Lamprey Studies.** Half-duplex PIT-tag systems will be operational to monitor adult lamprey passage no later than mid-May, 2013.
- **Adult Salmon Studies.** Passage of salmon and steelhead collected, tagged with radio-telemetry transmitters and/or PIT-tags, and released below Bonneville Dam will be monitored at The Dalles Dam from late March through October, 2013.

John Day

- **Adult Lamprey Studies.** Half-duplex PIT-tag systems will be operational to monitor adult lamprey passage no later than mid-May, 2013.
- **Adult Salmon Studies.** Passage of salmon and steelhead collected, tagged with radio-telemetry transmitters and/or PIT-tags, and released below Bonneville Dam will be monitored at John Day Dam from late March through October, 2013.

McNary

- **Adult Salmon Studies.** Both a lower Columbia River and a Snake River adult salmon passage study are planned for the 2013 adult passage season.
- **Evaluation of Adult Pacific Lamprey Passage Success at McNary Dam.** This study will evaluate passage success for adult Pacific lamprey at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using half-duplex (HD) PIT-tag systems.
- **Fish Guidance Efficiency (FGE) and Fish Condition Study** relative to partially raised operating gate (PROG) and stored operating gate (SOG) position will occur at McNary Dam during the 2013 fish passage season.
- **Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at McNary Dam.** The purpose of this study is to use underwater video, acoustic imaging, and/or other non-invasive technologies to count and observe adult salmonids and Pacific lamprey in the fish ladders at McNary Dam.
- **Oregon Shore Ladder Intake Screen Monitoring.** The purpose of this monitoring study is to ensure that the current Oregon shore adult ladder fish screens are not impinging ESA-listed juvenile fish, Pacific lamprey or bull trout.

Ice Harbor Dam

- **Adult Salmon Studies.** Both a lower Columbia River and a Snake River adult salmon passage study are planned for the 2013 adult passage season.
- **Evaluation of Adult Pacific Lamprey Passage Success at Ice Harbor Dam.** This study will evaluate passage success for adult Pacific lamprey *Entosphenus tridentatus* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using half-duplex (HD) PIT-tag systems.

- **Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at Ice Harbor Dam.** The purpose of this study is to use underwater video, acoustic imaging, and/or other non-invasive technologies to count and observe adult salmonids and Pacific lampreys, *Entosphenus tridentatus*, in the fish ladders at Ice Harbor Dam.
- **Evaluation of Fish Counting Accuracy Issues at FCRPS Dams, Ice Harbor and Lower Monumental Dams.** This study is to determine if counting slot lighting modifications, video camera location and upgrades, and video monitor placement can improve fish counting accuracy at Ice Harbor and Lower Monumental dams.

Lower Monumental Dam

- **Evaluation of Fish Counting Accuracy Issues at FCRPS Dams, at Ice Harbor and Lower Monumental Dams.** This study is to determine if counting slot lighting modifications, video camera location and upgrades, and video monitor placement can improve fish counting accuracy at Ice Harbor and Lower Monumental dams.
- **BiOp Kelt Passage and Survival Monitoring.** In 2013, a contractor will conduct the second year of a two year study to assess dam route passage efficiency and survival for downriver migrating steelhead kelt utilizing the existing acoustic telemetry receiver system installed by PNNL for the BiOp Juvenile Summer-run Salmon Performance Standard.
- **Adult Salmon Studies.** Both a lower Columbia River and a Snake River adult salmon passage study are planned for the 2013 adult passage season.
- **BiOp Performance Standard Compliance Test at Lower Monumental Dam.** In 2013, Battelle will conduct the second year of a two year study to assess compliance with the BiOp Juvenile Salmon Performance Standard.
- **Evaluation of Adult Pacific Lamprey Passage Success at Lower Monumental Dam.** This study will evaluate passage success for adult Pacific lamprey *Entosphenus tridentatus* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using half-duplex (HD) PIT-tag systems.

Little Goose Dam

- **BiOp Performance Standard Compliance Test at Little Goose Dam.** In 2013, Battelle will conduct the second year of a two year study to assess compliance with the BiOp Juvenile Salmon Performance Standard.
- **BiOp Kelt Passage and Survival Monitoring.** In 2013, researchers will conduct the second year of a 2-year study to assess dam route passage efficiency and survival for downriver migrating steelhead kelt utilizing the existing acoustic telemetry receiver system installed by Battelle for the BiOp Juvenile Summer-run Salmon Performance Standard.
- **Adult Salmon Studies.** Both a lower Columbia River and a Snake River adult salmon passage study are planned for the 2013 adult passage season.
- **Evaluation of Adult Pacific Lamprey Passage Success at Little Goose Dam.** This study will evaluate passage success for adult Pacific lamprey *Entosphenus tridentatus* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using half-duplex (HD) PIT-tag systems.

- **Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at Little Goose Dam.** The purpose of this study is to use underwater video, acoustic imaging, and/or other non-invasive technologies to count and observe adult salmonids and Pacific lampreys, *Entosphenus tridentatus*, in the fish ladders at Little Goose Dam.

Lower Granite Dam

- **Evaluation of Prototype Overflow Weir and 14-inch Orifice for the Lower Granite Juvenile Bypass System Upgrade.** A prototype overflow weir and enlarged 14" orifice are being installed into intake gatewell 5A during the winter of 2012/13 for biological testing during the 2013 fish passage season from April 15–June 30, 2013.
- **Kelt Reconditioning / Transportation / In-river Survival**. Provide assistance to Nez Perce Tribe for collection and tagging of post-spawn steelhead (kelt) off the Lower Granite separator for reconditioning study, temporary rearing and feed, and JSATS route survival determination in order to determine the feasibility and success of these alternatives for increased steelhead population growth.
- **BiOp Kelt Passage and Survival Monitoring.** In 2013, a contractor will conduct the second year of a two year study to assess dam route passage efficiency and survival for downriver migrating steelhead kelt utilizing the existing acoustic telemetry receiver system installed by Battelle for the BiOp Juvenile Summer-run Salmon Performance Standard at Little Goose and Lower Monumental dams.
- **Adult Salmon Studies.** Both a lower Columbia River and a Snake River adult salmon passage study are planned for the 2013 adult passage season.
- **Evaluation of Adult Pacific Lamprey Passage Success at Lower Granite Dam.** This study will evaluate passage success for adult Pacific lamprey *Entosphenus tridentatus* at McNary Dam, Ice Harbor Dam, and the remaining lower Snake River dams and associated river segments using half duplex passive integrated transponder (HD PIT) systems.
- **Lower Granite Winter / Spring 2013 Tailrace Field Data Collection.** A physical general tailrace model (1:55 scale) and 2-D Computational Fluid Dynamics (CFD) model are currently being developed for the Lower Granite tailrace area.
- **Lower Granite Outfall Geotechnical Explorations.** In order to collect necessary data for construction of a new Lower Granite Juvenile Bypass System (JBS), it will be necessary to conduct geotechnical explorations at Lower Granite both on-shore (upland) and in the water.
- **Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at Lower Granite Dam.** The purpose of this study is to use underwater video, acoustic imaging, and/or other non-invasive technologies to count and observe adult salmonids and Pacific lampreys, *Entosphenus tridentatus*, in the fish ladders at Lower Granite Dam.