

# 2013 Water Management Plan Seasonal Update October 28, 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 1<sup>st</sup> of each year. The first update for the primary elements of spring and summer will be posted by March 1<sup>st</sup> 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	September 5, 2013
	Seasonal Flow Objectives	April	August	September 5, 2013
	Flood Control	January	June	September 5, 2013
	Storage Project Operations	September	September	September 5, 2013
	Water Quality (Spill Priority Lists)	April	August 31	September 5, 2013
	<b>Specific Operations</b>	<b>Start Date</b>	<b>End Date</b>	<b>Last Updated</b>
	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	October 22, 2013
	Lower Granite	July 22	October 9	October 22, 2013
	Transportation	May 1	September 30	September 5, 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 5<sup>th</sup> 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	93.9	93	83.7	96
July 8	97.9	97	87.7	100

**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	60.5	101	58.4	103
July 8	63.9	107	61.6	109

**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	19.1	69	15.2	72
July 8	19.2	70	15.3	72

## 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	6454	103

**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	2158	80

## 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	2042	105	2214	106	1766	104

## Weekly Weather and Precipitation Retrospectives

Week	Weekly Weather / Precipitation Retrospective
October 8, 2012	<p><b>Temperatures:</b> Fell to near average.</p> <p><b>Rainfall:</b> Below average for the 13<sup>th</sup> week in a row. Scattered moderate rain in BC. First light snows of the season in BC on Tuesday and western MT on Wednesday.</p> <p><b>Streamflows:</b> Brief spikes in BC, otherwise flat and below average for early October.</p>
October 15, 2012	<p><b>Temperatures:</b> Slightly above average. Above average snow levels.</p> <p><b>Rainfall:</b> Well below average through Thursday, then well above average with the first widespread rains of the season.</p> <p><b>Streamflows:</b> Flat flows initially, but basinwide, minor rises have begun due to the weekend rain.</p>
October 22, 2012	<p><b>Temperatures:</b> Slightly above average, then fell below average.</p> <p><b>Rainfall:</b> Well above average northern 2/3<sup>rd</sup> of the basin, especially in BC. Below average southern 1/3<sup>rd</sup>.</p> <p><b>Streamflows:</b> Slight increase in flows basinwide, but most noticeably in Canada. Significant improvement in soil moisture content noted.</p>
October 29, 2012	<p><b>Temperatures:</b> Below average.</p> <p><b>Rainfall:</b> Above average basinwide. First significant mountain snows of the season early last week.</p> <p><b>Streamflows:</b> 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.</p>
November 5, 2012	<p><b>Temperatures:</b> Well above average initially, then well below average. Snow levels fell below pass levels.</p> <p><b>Precipitation:</b> Below average, but significant, basinwide precipitation over the weekend.</p> <p><b>Streamflows:</b> Widespread but relatively modest rises west of the Cascades over the weekend. More minor rises in Snake Basin. Flat or slowly receding flows elsewhere.</p>
November 12, 2012	<p><b>Temperatures:</b> Slightly above average. Snow levels near pass levels, but rising this morning.</p> <p><b>Precipitation:</b> Below average initially, then well above average over the weekend.</p> <p><b>Streamflows:</b> Flat or receding flows until the end of the week; significant rises have commenced on the west side.</p>
November 19, 2012	<p><b>Temperatures:</b> Above average.</p> <p><b>Precipitation:</b> Well above average US basins; slightly below average in BC.</p> <p><b>Streamflows:</b> High flows into the lower Columbia, Willamette and Mid-Cs for much of the week. Smaller rises on all other US subbasins, particularly the Spokane. Flat flows elsewhere.</p>
November 26, 2012	<p><b>Temperatures:</b> Above average.</p> <p><b>Precipitation:</b> Well above average US basins; slightly below average in BC.</p> <p><b>Streamflows:</b> High flows into the lower Columbia, Willamette and Mid-Cs, with crests early in the week, and another significant rise underway at the end of the period. Smaller rises in all other US subbasins. Generally flat flows in BC. Streamflows continue well above average as much November's precipitation fell as rain at unusually high elevations.</p>
December 3, 2012	<p><b>Temperatures:</b> Well above average initially, then gradually fell to near average.</p> <p><b>Precipitation:</b> Well above average US basins; near average in BC.</p> <p><b>Streamflows:</b> Unusually high flows for December virtually basin-wide. Crests observed Thursday and Friday, followed by slow recessions due to colder and drier weather.</p>
December 10, 2012	<p><b>Temperatures:</b> Slightly above average.</p> <p><b>Precipitation:</b> Well above US basins and below average in BC.</p> <p><b>Streamflows:</b> Gradually receding flows due to lower, and more typical snow levels.</p>

December 17, 2012	<p><b>Temperatures:</b> Near average US basins; below average in BC.</p> <p><b>Precipitation:</b> Well above average US basins, slightly below average in BC. Significant snowpack gains at low/mid elevations.</p> <p><b>Streamflows:</b> Unusually high flows in the lower Columbia and Willamette due to low elevation heavy rain this week. Diminishing flows elsewhere due to cold weather.</p>
December 24, 2012	<p><b>Temperatures:</b> Near average, but then fell below average over the weekend.</p> <p><b>Precipitation:</b> Well below average.</p> <p><b>Streamflows:</b> Flat or slowly receding. Ice formation noted on several headwater tributaries.</p>
December 31, 2012	<p><b>Temperatures:</b> Below average.</p> <p><b>Precipitation:</b> Well below average.</p> <p><b>Streamflows:</b> Flat or slowly receding. Ice formation noted on several headwater tributaries.</p>
January 7, 2013	<p><b>Temperatures:</b> Well above average initially, then fell sharply to well below average.</p> <p><b>Precipitation:</b> Near average in BC and west of the Cascades; well below average elsewhere.</p> <p><b>Streamflows:</b> Modest streamflow increases in some US tributaries Wednesday-Friday, but they returned to winter baseflows over the weekend.</p>
January 14, 2013	<p><b>Temperatures:</b> Below average, except well above average in the mountains of WA/OR/ID due to a strong temperature inversion (much warmer aloft than at the surface)</p> <p><b>Precipitation:</b> Virtually none, which is very unusual for mid January.</p> <p><b>Streamflows:</b> Flat baseflows, with some minor ice jamming in headwater areas.</p>
January 21, 2013	<p><b>Temperatures:</b> Well below average initially (close to cold snap criteria), but recovered to near average by late in the week.</p> <p><b>Precipitation:</b> Near average east; below average west. However, basinwide precipitation ended an unusual two week January dry spell.</p> <p><b>Streamflows:</b> Flat baseflows.</p>
January 28, 2013	<p><b>Temperatures:</b> Above average. January 2013 was the coldest January since 1993.</p> <p><b>Precipitation:</b> Above average WA through central ID, otherwise near or slightly below average.</p> <p><b>Streamflows:</b> Very small rises in the Clearwater, Mid-Cs and Willamettes. Flat flows elsewhere.</p>
February 4, 2013	<p><b>Temperatures:</b> Above average initially, then fell slightly below average.</p> <p><b>Precipitation:</b> Near average initially, then fell below average.</p> <p><b>Streamflows:</b> Flat.</p>
February 11, 2013	<p><b>Temperatures:</b> Above average initially, then fell slightly below average.</p> <p><b>Precipitation:</b> Below average. This was the 7<sup>th</sup> week in a row of below average precipitation.</p> <p><b>Streamflows:</b> Flat.</p>
February 18, 2013	<p><b>Temperatures:</b> Slightly below average.</p> <p><b>Precipitation:</b> Below average initially, then above average. First significant winter storm in almost 8 weeks swept through the region Friday/Saturday.</p> <p><b>Streamflows:</b> Minor rises on the lower river and Willamettes. Otherwise flows were flat.</p>
March 4, 2013	<p><b>Temperatures:</b> Slightly below average; mild days but cold nights.</p> <p><b>Precipitation:</b> Near average northern ½ of the basin; below average elsewhere.</p> <p><b>Streamflows:</b> Flat or slowly receding.</p>
March 11, 2013	<p><b>Temperatures:</b> Well above average, but turned much cooler over the weekend.</p> <p><b>Precipitation:</b> Well above average in BC and WA; below average elsewhere.</p> <p><b>Streamflows:</b> Basinwide, modest, slow rises underway on many tributaries due to snowmelt and precip. BC/MT headwater flows peaked over the weekend and are working downstream today.</p>
March 18, 2013	<p><b>Temperatures:</b> Below average, except briefly above average last Wednesday.</p> <p><b>Precipitation:</b> Well above average Monday-Thursday, then well below average.</p> <p><b>Streamflows:</b> Minor streamflow peaks on most US and southern BC tributaries Monday and again Wednesday-Thursday, then receded due to much colder and drier weather.</p>

March 25, 2013	<p><b>Temperatures:</b> Rose to well above average.</p> <p><b>Precipitation:</b> Below average. Little precipitation in BC.</p> <p><b>Streamflows:</b> Minor snowmelt cycling/rises on lower elevation tributaries in the US, mostly over this past weekend. Otherwise flat.</p>
April 1, 2013	<p><b>Temperatures:</b> Well above average, but cooled to slightly below average over the weekend.</p> <p><b>Precipitation:</b> Above average US basins with some rain on snowpack; near average in BC.</p> <p><b>Streamflows:</b> Significant inflow increases in US basins from rain and snowmelt. Most streams are peaking now, or peaked over the weekend. Minor inflow increases noted above Arrow as well.</p>
April 8, 2013	<p><b>Temperatures:</b> Slightly below average.</p> <p><b>Precipitation:</b> Above average basinwide, with significant snowpack gains above 5000ft.</p> <p><b>Streamflows:</b> Slowly receding flows due to colder temps, but snowmelt cycling continued on many low elevation streams.</p>
April 15, 2013	<p><b>Temperatures:</b> Below average.</p> <p><b>Precipitation:</b> Near average north half of the basin; below average south half.</p> <p><b>Streamflows:</b> Slowly receding through Friday, then small rises resumed due to rain and snowmelt.</p>
April 22, 2013	<p><b>Temperatures:</b> Rose to above average, but nights remained cold in the mountains.</p> <p><b>Precipitation:</b> Above average in BC; below average US basins with little precip in the Snake basin.</p> <p><b>Streamflows:</b> Small snowmelt rises resumed this weekend, but were held in check by subfreezing overnight lows.</p>
April 29, 2013	<p><b>Temperatures:</b> Slight below average initially, then well above average. A few record highs west of the Cascades this weekend.</p> <p><b>Precipitation:</b> Well below average.</p> <p><b>Streamflows:</b> Initially fell due to cooler temps, followed by slowly increasing snowmelt flows.</p>
May 6, 2013	<p><b>Temperatures:</b> Well above average.</p> <p><b>Precipitation:</b> Near average Western WA and above Revelstoke, BC, otherwise well below average.</p> <p><b>Streamflows:</b> Spring snowmelt runoff underway. Large basinwide increases, particularly US tributaries.</p>
May 13, 2013	<p><b>Temperatures:</b> Slightly below average.</p> <p><b>Precipitation:</b> Above average in BC/Western WA, below average elsewhere, but not nearly as dry as the first half of May.</p> <p><b>Streamflows:</b> Flows on all rivers crested Wednesday/Thursday, and are slowly receding.</p>
May 20, 2013	<p><b>Temperatures:</b> Well below average, with unusually low snow levels.</p> <p><b>Precipitation:</b> Well above average, especially in BC/Western MT (200-250% of average).</p> <p><b>Streamflows:</b> Receded due to colder temperatures, but a new rise is beginning this morning on most headwater streams across the basin.</p>
May 27, 2013	<p><b>Temperatures:</b> Rose to slightly above average, with rising snow levels</p> <p><b>Precipitation:</b> Above average initially, then fell to below average.</p> <p><b>Streamflows:</b> Slowly diminishing, despite rain and snowmelt. Unregulated flows fell below 400 kcfs, which was faster than previously expected.</p>
June 3, 2013	<p><b>Temperatures:</b> Well above average.</p> <p><b>Precipitation:</b> Slightly below average in BC; little to no rainfall elsewhere.</p> <p><b>Streamflows:</b> Steady flows remain propped up by ongoing snowmelt. A few high elevation headwaters in the Snake and above Grand Coulee had slightly increased snowmelt cycling over the weekend. Unregulated flows at The Dalles are about 80-100kcfs lower than they should be for early June.</p>

June 10, 2013	<p><b>Temperatures:</b> Slightly below average.</p> <p><b>Precipitation:</b> Slightly above average in BC and northern Cascades; below average elsewhere.</p> <p><b>Streamflows:</b> Slowly receding overall, although localized inflow spikes occurred above Arrow and Libby due to rain on snowpack.</p>
June 17, 2013	<p><b>Temperatures:</b> Below average through Friday, then rose to near average.</p> <p><b>Precipitation:</b> Well above average in most of the basin, especially in BC where rainfall was 300-500% of average for mid-June; below average in southern Idaho.</p> <p><b>Streamflows:</b> Large streamflow spikes in the Kootenay and Clark Fork basins Thursday and Friday, with more modest rises in the Clearwater/Salmon, Spokane, and Upper Columbia above Arrow. Flows are receding across most of the basin this morning, except for very small rises in the Willamettes and lower Columbia incrementals.</p>
June 24, 2013	<p><b>Temperatures:</b> Climbed to well above average. Heat wave conditions starting Friday (load center temperature +10°F or higher).</p> <p><b>Precipitation:</b> Above average northwest half through Thursday, otherwise below average elsewhere.</p> <p><b>Streamflows:</b> High and steady above Arrow due to snowmelt and some rain. Slowly receding flows elsewhere.</p>
July 1, 2013	<p><b>Temperatures:</b> Basinwide five day heat wave began to ease on Wednesday, and ended by Thursday. Load center temps peaked at +14.7F on July 1.</p> <p><b>Precipitation:</b> Below average. Scattered thunderstorms above Brownlee.</p> <p><b>Streamflows:</b> Steady and stubbornly high above Arrow and Libby due to ongoing snowmelt. Slowly receding flows elsewhere.</p>
July 8, 2013	<p><b>Temperatures:</b> Slightly below normal for the week.</p> <p><b>Precipitation:</b> Below average.</p> <p><b>Streamflows:</b> Slowly receding flows.</p>
July 15, 2013	<p><b>Temperatures:</b> Near average west of the Cascades; above average east.</p> <p><b>Rainfall:</b> Scattered showers in BC. Little rainfall elsewhere.</p> <p><b>Streamflows:</b> Slowly receding and below average for mid July. Unregulated flows at The Dalles fell below 200kcf on July 14, which is about 2 weeks earlier than usual.</p>
July 22, 2013	<p><b>Temperatures:</b> Slightly below average.</p> <p><b>Rainfall:</b> Slightly above average northeast half, but the rainfall will be highly variable due to hit-and-miss showers and thunderstorms.</p> <p><b>Streamflows:</b> Slowly receding, although very localized spikes are possible from scattered thunderstorms.</p>
July 29, 2013	<p><b>Temperatures:</b> Below average.</p> <p><b>Rainfall:</b> Above average northeast half; below average elsewhere</p> <p><b>Streamflows:</b> Localized streamflow increases above Grand Coulee and in the Salmon/Clearwater basins from last week's thunderstorms. Otherwise, flat and below average flows continue.</p>
August 5, 2013	<p><b>Temperatures:</b> Slightly above average.</p> <p><b>Rainfall:</b> Below average overall, but scattered, mainly mountain thunderstorms produced localized heavy rain and hail in OR/ID/WA this weekend.</p> <p><b>Streamflows:</b> Flat overall.</p>
August 12, 2013	<p><b>Temperatures:</b> Above average, with higher than average humidity.</p> <p><b>Rainfall:</b> Below average overall, except above average in western Washington and near average above Mica, BC.</p> <p><b>Streamflows:</b> Flat overall.</p>

August 19, 2013	<p><b>Temperatures:</b> Above average.</p> <p><b>Rainfall:</b> Above average southern OR/ID from hit-and-miss thunderstorms. Below average elsewhere, although some rainfall was also noted in BC and west of the Cascades.</p> <p><b>Streamflows:</b> Flat or receding overall, but very localized streamflow spikes were noted from scattered weekend thunderstorms. Unregulated flows at The Dalles fell below 100 kcfs on Thursday, which is about 3 weeks earlier than usual.</p>
August 26, 2013	<p><b>Temperatures:</b> Above average, mostly due to warm and humid nights.</p> <p><b>Rainfall:</b> Above average, with a few late-August rainfall records broken in Western WA.</p> <p><b>Streamflows:</b> Localized streamflow spikes in the mid-Cs and BC headwaters, otherwise flat. Unregulated flows at The Dalles recovered slightly to just over 100 kcfs.</p>
September 2, 2013	<p><b>Temperatures:</b> Well above average, mostly due to warm and humid nights.</p> <p><b>Rainfall:</b> Well above average, with the heaviest and most widespread rains since late June. Over two dozen daily rainfall records broken Thursday and Friday.</p> <p><b>Streamflows:</b> Numerous, but brief streamflow spike, and isolated flash floods across most of the basin. Only slight increases noted on mainstem rivers. Unregulated flows fell below 100 kcfs early in the week at The Dales, but then recovered on Friday.</p>
September 9, 2013	<p><b>Temperatures:</b> Well above average, but cooled closer to average yesterday. Record high temperatures Wednesday and Thursday.</p> <p><b>Rainfall:</b> Below average, but with scattered thunderstorms in the Snake basin late last week, and over BC, eastern WA and eastern OR yesterday.</p> <p><b>Streamflows:</b> Generally flat or receding.</p>
September 16, 2016	<p><b>Temperatures:</b> Near to slightly above average.</p> <p><b>Rainfall:</b> Above average northwest two-thirds; below average southeast third. First flight snows of the seasons on some of the Canadian Rockies mountaintops.</p> <p><b>Streamflows:</b> Flat in the US basins; significant inflow decreases in BC due to cooler temperatures.</p>
September 23, 2016	<p><b>Temperatures:</b> Below average.</p> <p><b>Rainfall:</b> Well above average, including a subtropical storm this past weekend northwest two-thirds. <b>Numerous daily and all-time September rainfall records broken this weekend across the northwest half.</b></p> <p><b>Streamflows:</b> Initially flat or receded due to cool temps, but numerous streamflow spikes and rises underway this morning due to heavy rain and mild mountain temperatures.</p>
September 30, 2016	<p><b>Temperatures:</b> Below average.</p> <p><b>Precipitation:</b> Well above average on Monday, then fell below average.</p> <p><b>Streamflows:</b> Crests from last week's record rainfall worked their way downstream through Wednesday, with unregulated flows at The Dalles peaking near 140kcfs (highest level since July). Flows then receded for the rest of the week and this weekend.</p>

## 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	187.4
McNary	Spring 4/10–6/30	220-260 kcfs <sup>i</sup>	261.9
	Summer 7/1–8/31	200 kcfs	171.9
Lower Granite	Spring 4/3–6/20	85-100 kcfs <sup>i</sup>	67.9
	Summer 6/21–8/31	50-55 kcfs <sup>ii</sup>	27.4

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	2409.5	2375.9	2402.3	2405.8	
	April 15	2409.5	2375.9	2402.3	2405.8	2411.8
	April 30	2409.5	2375.9	2402.3	2405.8	2411.8
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	1518.3	1534.3	1567.3	1571.2	
	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:** According to the Corps' Libby February Runoff Forecast the most probable runoff volume for April–August was 6,384 kaf (109% of average from 1975 – 2009). This forecasted runoff volume resulted in an April 10 elevation objective of 2,402.3 ft. This section will be updated throughout the season as new forecast information becomes available.

**Sturgeon Pulse:** Per the 2006 BiOp, the sturgeon pulse volume is determined from a tiered flow structure based upon the Corps' May Final WSF for the period of April-August. On May 8, 2013 the Action Agencies (AAs) received System Operational Request (SOR) FWS#1. The SOR identified the following specifications.

Based on the U.S. Fish and Wildlife Service's (Service) February 2006 Biological Opinion (2006 BiOp) on operations of Libby Dam, and the May final April-August volume runoff forecast of 6.535 million acre-feet, we are within a Tier 3 operations year for Kootenai River white sturgeon. The minimum recommended release volume for sturgeon conservation in a Tier 3 year is 1.14 million acre-feet and we recommend the following procedures for discharge of at least this minimum volume from Libby Dam:

The precise means that will be utilized to meet these objectives are largely dependent on real-time conditions and in-season management. It is not possible to develop a single definitive recommendation for a sturgeon operation at this time due to the uncertainties in the forecast, and shape and volume of inflow. Given these uncertainties, the Service has developed the following guidelines for sturgeon operations in 2013:

- The 2013 sturgeon operations at Libby Dam will consist of two periods of peak flows.
- Begin sturgeon augmentation flow for the first peak when the Regional Team of Biologists determines that local tributary run-off downstream of Libby Dam is peaking.
- Increase discharge (according to ramping rates in 2006 BO) from Libby Dam up to full powerhouse capacity, depending on local conditions, e.g. river stage at Bonners Ferry.
- Maintain peak discharge (20,000-25,000 cubic feet per second (cfs)) for a period of 5-7 days.
- Selective withdrawal gates at Libby Dam above elevation 2,326 mean sea level will remain uninstalled during this peak, allowing for conservation of warmer surface water that will be targeted for release during the descending limb of the second peak, described below.
- After 5-7 days of peak discharge, decrease discharge at Libby Dam (according to ramping rates in 2006 BO) to a discharge that is sufficient to maintain a flow of at least 18,000 cfs at Bonners Ferry until commencement of the second peak.
- Increase discharge (according to ramping rates in 2006 BO) from Libby Dam up to full

powerhouse capacity when the Regional Team of Biologists determines that the high-elevation run-off in the Kootenai Basin has begun. Actual peak discharge during this second peak will depend on local conditions (i.e. river stage at Bonners Ferry).

- Selective withdrawal gates at Libby Dam above elevation 2,326 mean sea level will be placed to within 30' of the surface of the reservoir prior to the end of the second peak, described above, allowing for release of warmer surface water as the receding limb of the hydrograph commences. Release of warmer water from Libby Dam, in combination with lower volume of release, will allow the Kootenai River temperature to increase to appropriate spawning temperatures at Bonners Ferry (8-10°C) during the receding limb of the hydrograph.
- Maintain peak discharge for a period of 7-9 days.
- After 7-9 days of peak discharge, and until the sturgeon volume is exhausted, decrease discharge at Libby Dam towards stable summer flows, to no less than bull trout minimum flows (8,000 cfs in Tier 3).
- Total number of days at peak discharge will depend on real time conditions and the shape of the inflow hydrographs.

5/8 TMT Meeting - USFWS, presented the SOR which was coordinated through the Kootenai Recovery Team and would provide operations during two periods of peak flows during the spring migration, one coinciding with low elevation runoff. Telemetry data for spawning Kootenai sturgeon females from 2010-2012 indicate that the spill tests did not facilitate a change in Kootenai sturgeon spawning and migration behaviors. Given the results from 2008-2012 sturgeon operations at Libby Dam, the team felt a different approach to managing the sturgeon volume is warranted. TMT members either supported or did not object to the operations associated with implementation of the SOR. Based on the feedback from TMT the AAs committed to implementing the SOR and providing updates to the TMT during subsequent meetings.

**Summer Draft Limit:** On April 3, 2013, the AAs received SOR 2013-01 from the Kootenai Tribe of Idaho to release 8,000 cfs or less from Libby Dam during 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 and 2015.

4/3 TMT Meeting – The Kootenai Tribe of Idaho presented the SOR and the AAs coordinated the following operation in order to implement the SOR: 1) Target 2449 feet by end September, 2) to achieve that goal, the operation would target an elevation band of 2449-2451.6 feet by the end of August, and 3) Libby would then release no greater than 8 kcfs through September 30 or until elevation 2449 is attained, whichever comes first. TMT members either supported or did not object to this operation. The Corps committed to providing the TMT with updates on this operation in future meetings.

6/19 TMT Meeting - The Corps provided the following update on current Libby Dam operations: 1) Flood risk is moderate, 2) no spill for the sturgeon pulse, and 3) refill was expected in mid

August. The Corps is still planning on implementing the operation coordinated during the 4/3 meeting in order to implement the SOR.

7/10 TMT Meeting - The Corps provided the following update on current Libby Dam operations: 1) Extreme rainfall in late June filled space held in reserve, 2) peak elevation in early July (2457.8'), 3) unit outage beginning July 22 will reduce powerhouse capacity to ~14 kcfs, 4) once unit outage is underway and until 31 Aug hold 14 kcfs until elevation at Libby Dam reaches 2450.0', then adjust release to target 2449 ft on 31 Aug, 5) maintain previous S.O.R.: anticipate the 31 Aug target range is 2449 ft to 2451.6 ft and then release 8 kcfs in September until the reservoir elevation reaches 2449 ft, then ramp down to 6 kcfs.

8/21 TMT Meeting - The Corps provided the following update on current Libby Dam operations: 1) The pool elevation will pass below 2450' on Friday, so flows at Libby will need to be reduced in order to meet a target elevation of 2449' at the end of the month, 2) starting tomorrow (Thursday 8/22), a ramp down of 1 kcfs/day will be implemented to reach 10 kcfs outflows by Monday, 3) on Monday, additional adjustment will be made if necessary to set a flow for the remainder of the month that will result in an elevation as close as possible to 2449, and 4) September discharges are expected to hold around 6 kcfs to support the Kootenai Tribe habitat work.

## **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. In 2013 Hungry Horse filled to elevation 3559.4 ft on July 10

**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.

The May Final April – August forecast at The Dalles was 82.5 maf which set the September 30 draft limit at 3550 ft. Hungry Horse drafted to elevation 3550.4 ft on September 30, 2013.

### **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 refill target elevation in 2013 is 1289.8 ft which is 0.2 ft below the full pool elevation. Grand Coulee refilled to elevation 1289.8 ft on July 12, 2013

### **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.**

<b>“Bucket”</b>	<b>2013 Releases (acre-feet)</b>	<b>Total Lake Roosevelt Incremental Storage Releases Program (acre-feet)</b>
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 and will have a draft limit elevation of 1277.7 ft or an additional 0.3 ft by August 31

**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. The July Final April–August WSF at The Dalles was 87.7 maf which set the draft limit to 1278 ft. The draft limit will be modified an additional 0.3 ft or to elevation 1277.7 ft to implement the Lake Roosevelt Incremental Storage Release Program. Grand Coulee drafted to elevation 1277.4 ft on August 31, 2013

**Drum Gate Maintenance:** Drum gate maintenance was not performed in 2013. Lake Roosevelt was not 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. by August 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 by drafting the reservoir up to 5 ft. from full (elevation 1565 ft.) by August 31. Banks Lake drafted to elevation 1564.9 ft on August 31, 2013

## **Dworshak Dam**

### **Summer Draft for Temperature Control and Flow Augmentation:**

The AAs coordinated the Dworshak summer draft during the following TMT meetings in efforts to keep Lower Granite Dam tailwater temperatures below 68° F.

6/19 TMT Meeting – The Corps gave a slideshow linked to today’s agenda. The Dworshak basin is entering a period of higher precipitation over the next few days with cooler temperatures and increased flows. Current Dworshak outflow temperature is 42-43 degrees F. Thanks to this cooling trend, temperatures at Lower Granite tailwater are expected to drop to the 60 degrees F range. The latest model shows temperatures dropping to 59 degrees and coming back up to 60 degrees by June 29. That means flow augmentation from Dworshak is not needed at this time.

7/10 TMT Meeting - Since TMT last met on June 19, the Corps sent TMT members several emails to coordinate Dworshak operations. The information is shown in several attachments to this item on today’s agenda. Amending the spill priority list to move Lower Granite lower helped to reduce temperatures in the Lower Granite tailwater. The Corps continues to maintain water temperatures at or below the water quality standard of 68 degrees in Lower Granite tailwater in accordance with the BiOp.

7/24 TMT Meeting – The Corps shared the District’s temperature model run from 7/15 and reported that Dworshak is discharging 11 kcfs (full powerhouse plus 1.3 kcfs spill) and will continue to do so today to manage the continuing warm trend. The model is tracking well, however, last night’s model did not track with actual temperatures; the inputs may have to be adjusted to account for changes resulting from Lower Granite operations.

8/14 TMT Meeting – The Corps, reported that according to the latest models, the average discharge from Dworshak is expected to be 8 kcfs from now through the end of August in order to reach the targeted 1535 foot elevation. As such, and given cooling conditions, the project backed off from full powerhouse to 8 kcfs on 8/13. As of the time of the conference call, the Lower Granite Dam tailwater temperature was 66°F; if temperatures approach 68°F the Dworshak operation will increase back to full powerhouse, however, this may cause less flow available towards the end of August. There have been some inconsistencies with the model due to the recent special operations at Lower Granite, however, they are monitoring conditions closely and will adjust the operation if needed to keep temperatures below 68 °F. It was noted that the operation has gone very well this year.

8/21 TMT Meeting – The Corps reported that despite some divergence in the model, they are still capturing temperature trends at Dworshak. The flexibility for decreasing discharge is limited in August as compared to July, however, the project has been able to maintain temperatures at Lower Granite. Beginning August 22<sup>nd</sup> a 7.3kcfs discharge will be implemented and held through the end of the month. Dworshak Board members have convened and coordinated the following operation for the use of the Nez Perce Tribe's 200 kaf in Dworshak Reservoir: 1) On or about August 31 Dworshak will be drafted to approximately elevation 1535 feet and discharge is expected to be about 7.0 kcfs, 2) maintain discharge at approximately 7.0 kcfs for approximately 10 days (September 10<sup>th</sup>), 3) on about September 11<sup>th</sup> reduce discharge to 5.9 kcfs, 4) on about September 14<sup>th</sup> reduce discharge to 4.8 kcfs, 5) on about September 18<sup>th</sup> reduce discharge to 2.4 kcfs, and 6) reduce to minimum outflow (about 1.5 kcfs) when the reservoir pool drafts to elevation 1520 (forecasted to be about September 22<sup>nd</sup>). This operation is similar to operations in previous years, although flows are lower this year. It is expected that warm air temperatures will continue through September, however, solar radiation will decrease as we move into fall. Walla Walla District will continue to provide operation updates at future TMT meetings and share temperature modeling as long as it is still being run.

## ***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/>
- **May 15 – June 20:** Spring spill priority list coordinated during the May 1, TMT meeting that may be found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **May 15 – June 20:** Spring spill priority list coordinated during the May 15, TMT meeting that may be found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **May 15 – June 20:** Spring spill priority list coordinated during the May 17, TMT meeting may be found on the May 15 TMT agenda on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **June 1 – June 15:** Spring spill priority list coordinated during the May 22, TMT meeting may be found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>

- **June 19 – August 31:** Summer spill priority list coordinated during the June 19, TMT meeting may be found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **July 12 – August 31:** Summer spill priority list coordinated during the July 3, TMT meeting may be found on the July 10 TMT agenda found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **July 12 – August 31:** Summer spill priority list coordinated during the July 10, TMT meeting may be found on the following website:  
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>
- **September 1 – December 31, 2013:** Winter spill priority list coordinated during the August 21, TMT meeting 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 AAs 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)***

During the September 19, 2012 TMT meeting, IDFG presented, “SOR USFWS/IDFG 2012-1 Request to implement a 2012-2013 winter minimum control elevation (MCE) of 2055’ for Lake Pend Oreille, Idaho” (Dated September 17, 2012). On September 27, 2011, IDFG and USFWS submitted a systems operations request (SOR) to the TMT for 2011-2012 and 2012-2013 winter operations (USFWS/IDFG-1). The SOR requested an MCE of 2051’ in 2011-2012 and 2055’ in 2012-2013. TMT members voiced no objections to the SOR, with the caveat that 2012-2013 request be revisited the following year. The justification for this SOR remains the same as the 2011-2012, including the determination to deviate from the decision tree. During the September 19, 2012, TMT meeting members supported or did not object to implementation of the SOR, therefore the AA’s implemented the SOR for a MCE of 2055’ in 2012-13.

### ***2.9. Upper Snake Flow Augmentation***

427 Kaf of Upper Snake River flow augmentation was provided in 2013. Below average water supply conditions in the Snake River Basin resulted 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 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.

Date	TMT Discussion/Chum 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.
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.

Date	TMT Discussion/Chum Operation
February 13, 2013	<p>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.</p>
February 20, 2013	<p>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 AAs agreed that the Salmon Managers' proposed step down and re-wetting approach is reasonable for the next week.</p>
February 27, 2013	<p>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.</p>

Date	TMT Discussion/Chum Operation
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.
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 foot 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](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 <sup>i</sup>	Redds <sup>ii</sup>	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.
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 samplly 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	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• The next redd count will occur on October 28, 2012 and will require USGS gauging station flows of 38 kcfs.</li> </ul>

Date	Summary
October 28, 2012	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>
November 4, 2012	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Initiation of Spawning has been set to be October 31 for the flow elevation zone above the 50 kcfs.</li> <li>• 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.</li> </ul>
November 18, 2012	<ul style="list-style-type: none"> <li>• On Sunday, November 18, 2012 the fourth Vernita Bar ground redd count was conducted to determine the 2012-2013 Hanford Reach Critical Flow Elevation.</li> <li>• the 2012-2013 Critical Flow Elevation is set at the 65 kcfs elevation</li> <li>• 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.</li> <li>• No additional ground redd counts are planned for this year.</li> </ul>

## ***2.12. Lower Granite Dam***

Beginning in mid-July 2013, daily and year-to-date counts of adult sockeye passage at Lower Granite Dam (LWG) were significantly lower than at the three downstream Snake River dams, indicating a potential passage delay at the project. Adult sockeye were first detected in the Snake River on June 4 at Ice Harbor Dam and daily counts peaked at all projects in mid-July. By July 19, the year-to-date total of adult sockeye passage was 883 at Little Goose Dam and 559 at LWG, equating to a differential of 351 fish that were potentially delayed in their upstream migration.

Water temperature differentials between the LWG tailrace, fish ladder and forebay increased beginning in late June/early July 2013, indicating adult sockeye may be delayed by a “thermal block” at the project. The differential increased as temperatures warmed significantly in the top 10 feet of the forebay which provides water to the upper portion of the fishway. The tailrace was relatively cool, maintained below 68°F by flow augmentation from Dworshak Dam which settles to the bottom of the reservoir and passes through the deeper turbine intakes. In late June and early July 2013, the forebay became increasingly stratified and there was little to no mixing between the deeper, cooler water and the warming surface layer. From July 1-19, the adult ladder exit was warmer than the tailrace by an average of 3-7°F, with hourly differentials up to 9°F during the hottest times of the day.

From July 22 through October 9, the Action Agencies implemented adaptive management operations to address adult passage delay and warm ladder temperatures at LWG, as coordinated with Regional Salmon Managers at TMT (July 22, 23, 24, 26, 29, 31; August 2, 5, 14, 21; September 4, 18; October 2), and at FPOM (August 8 and September 9). Additional information may be found in the meeting notes on the following website: <http://www.nwd-wc.usace.army.mil/tmt/agendas/2013/>.

### **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 AAs 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.

<b>Run to date&gt;#</b>	<b>Run to date&lt; #</b>	<b>Few criteria&lt; #</b>
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.

## 2.14. 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.

## 2.15. 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.<sup>6</sup>

<b>Project</b>	<b>Planned 2013 Spring Spill Operations (Day/Night)</b>	<b>Comments</b>
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	<b>April 3-April 28:</b> 45 kcfs/Gas Cap <b>April 28-June 20:</b> 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	<b>Pre-test:</b> 30%/30% <b>Testing:</b> 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.<sup>7</sup>

<b>Project</b>	<b>Planned 2013 Summer Spill Operations (Day/Night)</b>	<b>Comments</b>
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	<b>June 21-July 13:</b> 30%/30% vs. 45 kcfs/Gas Cap <b>July 13-August 31:</b> 45 kcfs/Gas Cap (approximate Gas Cap range: 75-95 kcfs)	Same as 2012
McNary	50%/50%	Same as 2012
John Day	<b>July 1-July 20:</b> 30%/30% and 40%/40% <b>July 20-August 31:</b> 30%/30%	Same as 2012
The Dalles	40%/40%	Same as 2012
Bonneville	<b>June 16-July 20:</b> 85 kcfs/121 kcfs and 95 kcfs/95 kcfs <b>July 21-August 31:</b> 75 kcfs/Gas Cap	Same as 2012

Juvenile transportation operations were coordinated during the following TMT meetings.

4/24 TMT Meeting - NOAA, presented the McNary Transportation SOR, saying it was very similar to the request made last year for no transportation at McNary during the summer season. The Salmon Managers put the proposal together based on the FOP guidance that this issue should be addressed through FPOM and at TMT. They wanted to get the request in early to avoid any potential contract issues. NOAA said the main driver for this request was that there have been structural changes to the system, with a new bypass constructed last year at the project, which should benefit in river fish. Washington, added that last year saw 94.6% survival out of the bypass. In addition to the signatories to the SOR (NOAA, USFWS, Oregon, Washington, Idaho, Nez Perce, and CRITFC/Umatilla), Montana expressed no objection to the request today. The AAs acknowledged receipt of the request and said they needed some time to review it from a policy standpoint, and will get back to TMT with a response either next week during the 5/1 TMT conference call, or the following 5/15 TMT meeting.

5/1 TMT Meeting – The Corps, updated TMT that, per discussions and agreement at TMT, the Corps began barging fish from Lower Granite on 4/28; will begin collection at Little Goose on 5/2 and transportation on 5/3; and will begin collection at Lower Monumental on 5/7 and transportation on 5/8.

5/15 TMT Meeting – The Corps, shared the AA’s response to a SOR submitted on 4/23 and discussed at the 4/24 TMT meeting re: summer transportation operations at McNary. The Corps will implement the request for 2013.

8/14 TMT Meeting - NOAA, reported that high levels of Columnaris have been detected in the juveniles sampled at Lower Monumental; Columnaris is common in juveniles at this time of year due to warm water temperatures. NOAA explained that past operations have implemented every day trucking to get the fish past Bonneville quickly, however, due to low fish counts the Salmon Managers suggest this year to keep fish in the river and allow for full bypass with condition sampling every third day. The AAs agreed with the proposed plan, and the Corps said this operation would commence today at 3:00 pm and is expected to continue for the next two weeks, unless there is a significant increase in collection numbers. The Corps reported that the conditions appear to be improving; yesterday's sample revealed no signs of Columnaris and there were no mortalities. The Corps also inquired as to if they should hold the secondary bypass open for longer than normal in order to divert a large enough sample size for the condition sampling. NOAA agreed that the secondary bypass could be open for a longer duration and that he would defer the decision to the project; Idaho, requested that the Fish Passage Center be a part of conversations regarding the sample duration.

8/21 TMT Meeting – The Corps updated the group on recent recommendations and proposed operation changes for juvenile transportation from Lower Monumental Dam. Due to fish conditions (Columnaris outbreak, low abundance, and high mortality), the region agreed at the August 14 TMT to stop transport and go to full-flow bypass with condition sampling every third day. Conditions have since improved and FPAC now recommends resuming normal transport operations. The Corps indicated that the project can resume collecting for transport as early as today and begin every other day trucking tomorrow 8/22. There was inquiry as to if a study has been done to assess survival rates associated with transporting and bypass. NOAA, assured that there is data, however, a formal report has not been released. Although data has been collected since 2004, there are still uncertainties around mortality rates of fish that were bypassed and overwinter in the hydrosystem. A method to account for this is needed to make a fair comparison between transport and bypass. Project managers will resume juvenile collection as soon as possible and begin every other day trucking of juvenile fish.

8/30 TMT Email Coordination - As coordinated with TMT at the August 21 meeting, Lower Monumental resumed every-other-day truck transport beginning on August 22 and continuing through this morning, August 30. Signs of columnaris disease in sampled fish began increasing on August 25, and mortality rates have exceeded 6% for the past three consecutive days. Consistent with criteria in the Fish Passage Plan Appendix B, the Corps has consulted with NOAA Fisheries to determine appropriate fish protection measures in light of the situation. Effective today, Lower Monumental has suspended every-other-day truck transport and will operate in primary bypass mode to route all bypassed fish back to the river. The facility will continue condition sampling every 3 days, next scheduled to occur on Monday, Sept. 2. Information from the condition sampling, along with any other relevant data, will be provided to TMT to inform discussions at the meeting on September 4.

9/4 TMT Meeting – The Corps noted that as stated in the August 30<sup>th</sup> TMT email notification, the juvenile transportation operation shifted on August 30<sup>th</sup>, suspending every-other-day truck transport and operating in primary bypass mode to route all bypassed fish back to the river. The facility continued condition sampling every 3 days and found signs of Columnaris in 2 of the 15

fish sampled during a 4 hour sampling on September 2<sup>nd</sup>. As a result of the data gathered on the 2<sup>nd</sup>, FPAC recommended and the Corps agreed to implement a modified every-other-day truck transport operation that alternates between 24 hours of collection for truck transport and 24 hours of full bypass. FPAC expressed that this approach limits risks across options. The Corps will implement the modified every-other-day truck transport operation and begin collecting fish this morning for truck transport tomorrow, September 5th, then switching to primary bypass for the following 24-hour period. This operation will continue for 2 weeks and will be revisited at the September 18<sup>th</sup> TMT meeting.

9/18 TMT Meeting – The Corps noted that since the last TMT meeting on 9/4, a special operation has been implemented to transport juveniles from Lower Monumental Dam that alternates between 24 hours of collection for every-other-day truck transport and 24 hours of full bypass to return fish to the river. Recent data from condition sampling shows little to no mortality and no signs of Columnaris, thus the Corps proposes to resume normal transport operations of collecting all fish for every-other-day truck transport. The Salmon Managers agreed that at this point it would be acceptable to return to normal transport operations. The Corps discontinued the special operation and resume normal every-other-day transport. The project is collecting fish today, 9/18, for truck transport tomorrow, 9/19, and will continue collecting all fish for every-other day transport through the end of September.

## ***2.16. 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](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 CORPS-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.