

2012 Water Management Plan Seasonal Update October 31, 2012

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	October 24, 2012
	Seasonal Flow Objectives	April	August	June 1, 2012
	Flood Control	January	June	June 1, 2012
	Storage Project Operations	September	September	October 24, 2012
	Water Quality (Spill Priority Lists)	April	August 31	October 24, 2012
	Specific Operations	Start Date	End Date	Last Updated
	Chum Flows (Bonneville Dam)	November 1	May 8	June 1, 2012
	Spring Creek Hatchery Releases (Bonneville Dam)	April 11	May 3	May 15, 2012
	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 24, 2012
	Transportation	May 1	September 30	October 24, 2012
	Spill Operations	April 3	August 31	October 24, 2012
	Fish Passage Research	March	April 3	June 8, 2012
	Snake River Zero Generation	December	February	February 14, 2012
	Hanford Reach Fall Chinook Protection	November	June	May 2, 2012

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 4th 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 2012		April-August 2012	
	Volume (maf)	% of 30-year Average (107.3 maf)	Volume (maf)	% of 30-year Average (93.1 maf)
January 6	86.0	80%	77.4	83%
February 6	91.9	86%	85.1	91%
March 6	98.8	92%	90.6	97%
April 5	112.9	105%	103.7	111%
May 4	120.0	112%	110.8	119%
June 4	117.8	110%	109.6	118%
July 3	128.4	120%	120.3	129%

Table 3. Grand Coulee Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2012		April-August 2012	
	Volume (maf)	% of 30-year Average (62.9 maf)	Volume (maf)	% of 30-year Average (60.3 maf)
January 6	51.6	82%	51.2	85%
February 6	56.2	89%	56.8	94%
March 6	59.7	95%	60.9	101%
April 5	68.0	108%	68.5	114%
May 4	72.5	115%	72.5	115%
June 4	71.6	114%	72.8	121%
July 3	80.0	127%	81.2	135%

Table 4. Lower Granite Dam Final Water Supply Forecasts.

Forecast Issue Date	January-July 2012		April-August 2012	
	Volume (maf)	% of 30-year Average (30.0 maf)	Volume (maf)	% of 30-year Average (22.9 maf)
January 6	23.4	80%	17.9	78%
February 6	24.8	82%	19.6	85%
March 6	26.0	87%	20.4	87%
April 5	29.7	99%	24.0	105%
May 4	30.3	101%	24.6	107%
June 4	28.5	95%	22.8	100%
July 3	30.1	100%	24.4	107%

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 2012	
	Volume (kaf)	% of 70-year Average (6,337 kaf)
November 7, 2011 (pre-season)	6,554	103%
December 7, 2011	5,876	93%
January 6, 2012	5,429	86%
February 6, 2012	5,713	97%
March 6, 2012	5,635	96%
April 5, 2012	6,872	117%
May 4, 2012	7,155	122%
June 4, 2012	7,379	118%

Table 6. Dworshak Dam Final Water Supply Forecasts.

Forecast Issue Date	April-July 2012	
	Volume (kaf)	% of 70-year Average (2,683 kaf)
December 8, 2011	2,724	102%
January 10, 2012	2,473	92%
February 7, 2012	2,504	93%
March 6, 2012	2,585	96%
April 5, 2012 (Non-Shifted)	2,966	111%
May 4, 2012	3,226	120%
June 4, 2012	3,083	117%

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 2012		January-July 2012		May-September 2012	
	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	1,908	92%	2,050	92%	1,691	92%
February 7	2,010	97%	2,143	96%	1,781	97%
March 6	1,962	95%	2,071	93%	1,739	95%
April 4	2,150	104%	2,261	102%	1,906	104%
May 3	2,209	107%	2,327	105%	1,680	92%
June 6	2,259	109%	2,378	107%	1,729	94%

Weekly Weather and Precipitation Retrospectives

Week	Weekly Weather / Precipitation Retrospective
October 24, 2011	The main rainfall story shifted into Canada, western Washington, and far northwestern Montana last week, where the vast majority of precipitation (on the order of 150 to 200% of normal) fell. Most of the rain fell this past weekend as cold front initially stalled over British Columbia before pressing southeast into the rest of the basin on Sunday. Snow levels were above 8000ft for much of the weekend, and with soils in Canada much wetter than this time last year, streamflows above Arrow remained rather high for mid October. Elsewhere, streamflows remained near or a bit above average, with near average temperatures and below average rainfall prevailing for a second week in a row.
October 31, 2011	The first real fall chill was felt over the basin last week, with load center temperatures 2 to 6°F below average. This brought on our first significant heat loads of the season. The cool and dry weather then gave way to a warmer but wetter weekend across the region, with 1-2 inches of rain falling in western Washington, the mountains of northwest Oregon, and parts of southern BC. Modest streamflow responses were underway this morning, mostly above Arrow and tributary streams feeding into the Snake River above Lower Granite.
November 7, 2011	A few cold fronts moved through the area, but as expected, they dropped only light snow in the mountains and near to below average rain in the valleys. November is the beginning of the snow accumulation period, and while it is still very early, amounts are below normal in all but a few locations in British Columbia. Minor streamflow responses occurred at the beginning of the week, but they have since fallen off to slightly elevated fall base flows.
November 14, 2011	It was rather mild last week as load center temperatures recovered from the previous week's chill. After a couple of mild and dry days, the weather turned to what we should normally see in November: wet. A decent storm system moved through the region this weekend which brought near average precipitation to the basin for the first time since late October, and brought the first significant mountain snows to the Cascades and mountains of Montana, and Idaho. Meanwhile in British Columbia, another dumping of snow pushed most snow-water equivalent observing sites above average.
November 21, 2011	It was a wet and cold across the basin last week. Parts of the Cascades, and mountains of Montana and British Columbia received up to 2 feet of snow last week. A somewhat drier but temporarily colder airmass spread across the region as the week ended. Modified Arctic air even clipped the BC portion of the basin and western Montana where some areas saw their first below zero (Fahrenheit) low temperatures of the season. Despite above average precipitation last week, cooler temperatures and falling snow levels reduced streamflows upstream from Lower Granite and Grand Coulee.
November 28, 2011	As expected, we had our stormiest week so far this winter across the basin last week. Several daily precipitation records fell across the region, with up to a foot of liquid precipitation in the Coast Range and Washington Cascades. Only southern Idaho missed out on the heaviest rains. Snow levels were also unusually high with a couple of record high temperatures recorded on Wednesday. Even with the higher snow levels, the snowpack is now above average over most of the basin, particularly in Canada where some of the highest mountains picked up over 4 feet of snow last week.
December 5, 2011	A cool but very dry weather pattern developed last week over the entire basin, with well below average precipitation as storm systems were deflected well to our north and south by a blocking upper level high pressure system off the West Coast. Temperatures started off near average, but drifted as much as 7 degrees below average over the weekend. It was much colder in the mountains of BC, Idaho and Montana where mountain valleys had lows below 0°F, which in turn began to freeze upper tributary streams. Between the colder temperatures and limited liquid precipitation, natural streamflows fell slowly or were nearly steady throughout the week, but were still a little above normal as base flows were held up by the wet fall and high soil moisture.

Week	Weekly Weather / Precipitation Retrospective
December 12, 2011	For the third week in a row, unusually dry conditions prevailed basin-wide. This drier pattern will begin to reverse this week as a series of storm systems begin to realign the jet stream to a more typical December pattern. Precipitation will again be below normal this week, but will trend closer to average (particularly in Canada), with some signs of near average precipitation returning just before Christmas. The lack of precipitation in what is normally our wettest time of year has put a dent into what had been rather high base flows to start December, and put a large dent in our longer range water supply forecasts for the spring. While it is still early, snowpack remains a bit above average across Canada, but is now below average over most of the US portion of the basin.
December 19, 2011	For the fourth week in a row, precipitation was well below average across the basin. Some light rain and mountain snow was observed in Canada and on the west side of the Cascades, but not enough to dent what is becoming a significant precipitation deficit across the region. As blocking high pressure remained just off the west coast, temperature inversions and occasional northerly flow from British Columbia kept temperatures several degrees below average. The continued lack of precipitation and cold temperature caused base flows to slow and headwater tributaries to freeze.
December 26, 2011	A major weather pattern change is underway this morning after nearly five weeks of well below average precipitation across the basin (in some cases on the west side of the Cascades, near record low precipitation).
January 2, 2012	Temperatures: Well above average basin-wide, falling to near average this weekend. Precipitation: Well above average basin-wide. Ended December well below average, though. Streamflows: Significant spikes on Willamette, Lower Columbia, Mid-C, Clearwater from heavy rain and 6000-9000ft snow levels. Modest rises in the Spokane and Clark Fork.
January 9, 2012	Temperatures: Above average, then fell to near average over the weekend Precipitation: Below average basin wide, especially US Basins. Streamflows: Flat or gradually receding basin-wide.
January 16, 2012	Temperatures: Slightly below average, then fell well below average this past weekend. Precipitation: Below average, but turned wetter over the weekend with low snow levels. Streamflows: Flat or gradually receding.
January 23, 2012	Temperatures: Below average, rising to near average over the weekend. Snow levels at sea level early in the week rose to 4000-8000ft, then fell to 1500ft this weekend. Precipitation: Near record precipitation US Basins (2 to 4 times 7-day normal); slightly below average in Canada. Significant snowpack gain in US basins. Major ice storm in Seattle: 300,000+ customers lost power; schools and many businesses closed for 3 days resulting in significantly reduced system load; State of Emergency declared due to the heavy snow, ice storm, and lost power. Streamflows: Minor flood stages reached on the mainstem Willamette (peak flow near 220KCFs at Portland on Saturday). State of emergency declared in western Oregon due to flooding, landslides, and wind damage. Significant flow increases in the lower river incrementals. Flows generally flat upstream from John Day where most of last week's precipitation fell as snow.
January 30, 2012	Temperatures: Above average first half. Below average second half. Precipitation: Well above average basin-wide, particularly in Canada where it fell mostly as snow. Streamflows: Minor rises from some rain on snowpack on the Willamette, Mid-Cs, Clearwater, Spokane, and Snake basins. Flows are now gradually receding.
February 6, 2012	Temperatures: Slightly above average. Warmer days offset by cold nights. Precipitation: Above average early in the week, then well below average. Streamflows: Flat or receding.
February 13, 2012	Temperatures: Near average. Snow levels generally near pass levels. Precipitation: Slightly below average, but wetter than the past three weeks. Streamflows: Slight bumps on the Willamettes/lower Columbia. Flat elsewhere.

Week	Weekly Weather / Precipitation Retrospective
February 20, 2012	<p>Temperatures: Near average. Precipitation: Near average. Streamflows: Slight rises on the Willamettes/lower Columbia incrementals. Flat elsewhere.</p>
February 27, 2012	<p>Temperatures: Above average early, then well below average over the weekend. Precipitation: Well above average. Parts of BC/WA/ID received 2-4 times normal snowfall. Streamflows: Significant but brief spikes on the lower Snake, Willamette and Clearwater. Minor rises on mid-Cs, Clark Fork, and upper Snake. Flat elsewhere.</p>
March 5, 2012	<p>Temperatures: Well below average, but moderated over the weekend. Precipitation: Above average. Parts of MT/ID/BC received 200% of normal Streamflows: Flat or receding due to much colder temperatures.</p>
March 12, 2012	<p>Temperatures: Well below average early, then above average late week. Precipitation: Above average BC and western MT. Below average elsewhere. Streamflows: Flat or receding.</p>
March 19, 2012	<p>Temperatures: Below average, except briefly above average in ID/MT middle of last week. Precipitation: Well above average basin-wide. A few daily rainfall records set. Streamflows: Significant rises this weekend on the Willamettes, lower Columbia, Snake, and Grand Coulee incrementals, but have turned over. Steady flows in Canada</p>
March 26, 2012	<p>Temperatures: Below average almost basin-wide, but slightly above average in ID. Precipitation: Well above average US. Slightly below average in Canada. Streamflows: Significant flow spikes on the Willamettes and lower Columbia late last week. More modest rises on the Snake, Clearwater/Spokane and Clark Fork, but all flows gradually fell over the weekend. Steady flows in Canada.</p>
April 2, 2012	<p>Temperatures: Slightly below average west. Slightly above average east, punctuated by record highs in southern Idaho on Friday/Saturday. Precipitation: Well above average US with numerous daily rainfall records broken late in the week. Some rain fell on mountain snowpack in the US basins. Near average precipitation in Canada, Streamflows: Significant flow spikes on virtually all US streams and mainstems. Steady flows in Canada.</p>
April 9, 2012	<p>Temperatures: Below average. Precipitation: Near average Canada. Slightly below average US. Streamflows: Flows generally receded throughout the week.</p>
April 16, 2012	<p>Temperatures: Above average initially, then fell to near average with cool morning lows. Precipitation: Below average. Streamflows: Smaller-than-expected increases Friday/Saturday due to mid elevation snowmelt and modest rainfall. Otherwise, steady flows but running a bit higher than usual.</p>
April 23, 2012	<p>Temperatures: Slightly below average initially, then rose well above average this past weekend with near record highs on Sunday. Precipitation: Above average basin-wide, particularly in US basins. Streamflows: Snowmelt cycling on most US tributaries with gradually increasing flows. Peak flows on Wednesday before a slight decrease Thursday/Friday. Snowpack reached critical melt density in US basins.</p>
April 30, 2012	<p>Temperatures: Record warmth Monday/Tuesday, then fell to slightly below average. Precipitation: Above average basin-wide, with majority falling as rain on the snowpack. Streamflows: Spring runoff began in the US and Canadian Kootenay Basins. Flows peaked Friday/Saturday. <i>Unregulated</i> flow at The Dalles rose above 500 kcfs Thursday, peaked near 630kcfs Saturday, but fell near or below 500 kcfs as remaining snowpack began to refreeze.</p>

Week	Weekly Weather / Precipitation Retrospective
May 7, 2012	<p>Temperatures: Below average. Unusually low snow levels with subfreezing nighttime lows in the mountains.</p> <p>Precipitation: Above average basin-wide.</p> <p>Streamflows: Slowly receding flows as spring runoff slowed. Unregulated flows at The Dalles remained above 400 kcfs all week.</p>
May 14, 2012	<p>Temperatures: Above average Mon-Tue; well below average Wed-Thu; near record highs Sat-Sun.</p> <p>Rainfall: Virtually no rain. Spotty showers in BC of little consequence.</p> <p>Streamflows: Steady flows as spring runoff temporarily slowed. Unregulated flows at The Dalles hovered near 330-370 kcfs.</p>
May 21, 2012	<p>Temperatures: Near record highs Monday, then cooled to slightly below average.</p> <p>Rainfall: Below average overall. Scattered thunderstorms with spotty rainfall in BC, MT and northern ID; widespread but light rain spread into the western basin on Sunday.</p> <p>Streamflows: Basin-wide flows steadily climbed due to snowmelt. Unregulated flows peaked near 530 kcfs on Friday, and held near 500 kcfs all weekend.</p>
May 28, 2012	<p>Temperatures: Below average.</p> <p>Rainfall: Above average, including some late season, high elevation snow in BC/MT/ID</p> <p>Streamflows: Slightly above average spring flows continued. Unregulated flows at The Dalles did not climb as high as expected, but remained near 500 kcfs all week.</p>
June 4, 2012	<p>Temperatures: Slightly below average Mon-Tue, otherwise above average.</p> <p>Rainfall: Above average WA and BC; below average elsewhere. Widespread rain moving into the basin this morning.</p> <p>Streamflows: Unregulated flows at The Dalles fell to 410 kcfs on Wednesday (below late May average) but rose back toward 500 kcfs this weekend. Rapidly rising headwaters this morning.</p>
June 11, 2012	<p>Temperatures: Well above average Monday, then fell below average.</p> <p>Rainfall: Near record rainfall northern half. Widespread 3-5" rains in Canada, and 1-3" Western OR/WA, Northern ID and Western MT. Well below average in southern OR/ID.</p> <p>Streamflows: Unregulated flows into Grand Coulee rose to 531 kcfs and 690 kcfs at The Dalles. Only a modest snowmelt spike on the Snake. Flows gradually receded over the weekend.</p>
June 18, 2012	<p>Temperatures: Below average, then rose to near average.</p> <p>Rainfall: Above average BC, northern ID/NW Montana. Below average elsewhere. Dry in southern OR/southern ID</p> <p>Streamflows: Flows above Arrow briefly dropped due to cooler temperatures, but increased again over the weekend due to rain and snowmelt. Flows elsewhere gradually receded, but remained at typically high June levels. Unregulated flows at The Dalles remain above 500 kcfs.</p>
June 25, 2012	<p>Temperatures: Above average Thu/Fri last week, otherwise below average.</p> <p>Rainfall: Well above average northwest ½ of basin; well below average southeast ½.</p> <p>Streamflows: Flows continued to increase above Arrow. Smaller rises elsewhere from scattered thunderstorms. Unregulated flows at The Dalles remained about 540 kcfs all week.</p>
July 2, 2012	<p>Temperatures: Below average, then rose to near average late in the week.</p> <p>Rainfall: Well above average northwest ½ (200-400% of normal, 2-6" of rain in Arrow/Kootenay basins); well below average southeast ½.</p> <p>Streamflows: Very high flows continued above Grand Coulee, and especially in BC. Flows gradually receding elsewhere. Unregulated flows at The Dalles peaked again near 630kcfs on Tuesday, but slowly fell throughout the week.</p>

Week	Weekly Weather / Precipitation Retrospective
July 9, 2012	<p>Temperatures: Below average initially, then rose well above average this weekend.</p> <p>Rainfall: An extended dry spell began last week. Well below average basin-wide, except above average early in the week above Arrow.</p> <p>Streamflows: Very high flows continued above Arrow, but finally began to recede on Wednesday. Flows gradually receding elsewhere. Unregulated flows at The Dalles fell below 500 kcfs on Friday.</p>
July 16, 2012	<p>Temperatures: Well above average, particularly east of the Cascades.</p> <p>Rainfall: Below average overall, but isolated heavy rain/thunderstorms over Idaho, western MT, BC, and eastern WA.</p> <p>Streamflows: Very high flows and minor flooding continued in BC and the Kootenay/Libby basin. Significant snowmelt rises above Mica. Flows flat or gradually receding elsewhere.</p>
July 23, 2012	<p>Temperatures: Above average east of the Cascades; slightly below average west.</p> <p>Rainfall: Above average rainfall in Canada. Below average elsewhere, but isolated heavy rain/thunderstorms over Idaho, western MT, and eastern WA.</p> <p>Streamflows: Very high flows and minor flooding continued in BC and the Kootenay/Libby basin. Snowmelt rises above Arrow remain high but are slowing gradually, however, locally heavy thunderstorms caused significant rises on indicator streams briefly over the weekend. Flows flat or gradually receding elsewhere.</p>
July 30, 2012	<p>Temperatures: Well below average initially, then near average</p> <p>Rainfall: Above average above Mica. Below average elsewhere.</p> <p>Streamflows: Gradually receding basin-wide. Canadian snowmelt runoff slowed considerably last week.</p>
August 6, 2012	<p>Temperatures: Below average initially, then rose well above average.</p> <p>Rainfall: Little rainfall, except for scattered thunderstorms above Mica and in western MT today and Tuesday.</p> <p>Streamflows: Rapidly receding mainstem and Canadian tributary flows. Slowly diminishing flows elsewhere.</p>
August 13, 2012	<p>Temperatures: Well above average initially, then fell to near average. Several record highs 8/4-5. First significant heat wave of the summer in California.</p> <p>Rainfall: Little rainfall, except for scattered thunderstorms above Arrow.</p> <p>Streamflows: Slowly diminishing flows, although some remaining snowmelt rises were observed above Mica and Duncan. Flows in the lower river fell below the long-term average.</p>
August 20, 2012	<p>Temperatures: Well above average until Saturday, when significant cooling commenced stronger and earlier than expected. Load center temps peaked near 9°F above average on Friday.</p> <p>Rainfall: Little rainfall, except for isolated thunderstorms over the weekend.</p> <p>Streamflows: Gradually receding, and below normal for mid August.</p>
August 27, 2012	<p>Temperatures: Below average.</p> <p>Rainfall: Near average in BC from scattered thunderstorms. No rainfall elsewhere.</p> <p>Streamflows: Small rises in BC early in the week from snowmelt and thunderstorm, otherwise flat or gradually receding flows across the basin.</p>
September 4, 2012	<p>Temperatures: Below average.</p> <p>Rainfall: Near average in BC from scattered thunderstorms. Little or no rainfall elsewhere.</p> <p>Streamflows: Flat or slowly receding. Brief spikes in BC from midweek thunderstorms.</p>
September 10, 2012	<p>Temperatures: Rose to well above average, then cooled on Sunday. Two days of 90°F+ in Portland.</p> <p>Rainfall: Below average. A few showers and thunderstorms in BC and western MT early in the week, and WA/OR this weekend and early this morning. Little or no rain elsewhere.</p> <p>Streamflows: Flat or slowly receding.</p>
September 17, 2012	<p>Temperatures: Started well below average, then rose to above average. First freeze of</p>

Week	Weekly Weather / Precipitation Retrospective
	the season in many locations east of the Cascades Tuesday/Wednesday morning. Rainfall: Moderate rain in BC and western WA early in the week, but below average overall. Little or no rain elsewhere. Streamflows: Flat or slowly receding.
September 24, 2012	Temperatures: Started well below average, then rose to above average. First freeze of the season in many locations east of the Cascades Tuesday/Wednesday morning. Rainfall: Moderate rain in BC and western WA early in the week, but below average overall. Little or no rain elsewhere. Streamflows: Flat or slowly receding.
October 1, 2012	Temperatures: Well above average basin-wide. Rainfall: Well below average. It was the 11 th week in a row with below average precipitation. Streamflows: Flat and below average for late September.

2.2. Seasonal Flow Objectives

Project	Planning Dates	BiOp Season Average Flow Objective – (kcfs)	Observed Season Average Flow (kcfs)
Priest Rapids	Spring 4/10–6/30	135 kcfs	232
McNary	Spring 4/10–6/30	220-260 kcfs ⁱ	342
	Summer 7/1–8/31	200 kcfs	265.2
Lower Granite	Spring 4/3–6/20	85-100 kcfs ⁱ	107.9
	Summer 6/21–8/31	50-55 kcfs ⁱⁱ	42.3

- 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	2419.0	2426.7			
	Feb 28	2423.5	2436.4	2429.2		
	March 31	2425.7	2441.6	2432.6	2435.7	
	April 10	2425.7	2441.8	2432.6	2435.7	
	April 15	2425.7	2442.0	2432.6	2435.7	2377.3
	April 30	2425.7	2442.3	2432.6	2435.7	2377.3

Project	Elevation Date Objective	Dec	Jan	Feb	Mar	Apr
Hungry Horse	Jan 31	3543.6	3546.0			
	Feb 28	3538.5	3543.1	3540.2		
	March 31	3532.5	3539.8	3535.3	3537.4	
	April 10	3531.1	3539.0	3533.7	3536.1	
	April 15	3529.6	3538.2	3532.9	3535.4	3525.4
	April 30	3526.7	3536.6	3530.5	3533.3	3521.7
Grand Coulee	Jan 31	1290.0	1290.0			
	Feb 28	1289.9	1290.0	1290.0		
	March 31	1260.3	1281.5	1281.5	1270.1	
	April 10	1250.5	1279.7	1270.9	1258.3	
	April 15	1240.7	1278.5	1265.6	1252.4	1232.2
	April 30	1231.2	1276.2	1253.9	1237.0	1220.2
Brownlee	Jan 31	2077.0	2077.0			
	Feb 28	2048.4	2054.2	2049.5		
	March 31	2043.1	2059.9	2045.6	2042.9	
	April 15	2040.7	2063.3	2046.0	2040.8	2024.8
	April 30	2038.4	2068.5	2046.5	2039.1	2014.3
Dworshak	Jan 31	1535.9	1542.1			
	Feb 28	1522.5	1534.3	1532.9		
	March 31	1524.9	1541.9	1539.8	1531.8	
	April 10	1520.2	1548.4	1546.3		
	April 15	1515.4	1551.7	1549.5	1512.3	1461.0
	April 30	1516.2	1528.7	1527.0	1522.5	1499.6

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 5,713 kaf (97% of average from 1975 – 2009). This forecasted runoff volume resulted in an April 10 elevation objective of 2,435.5 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 14, 2012 the Action Agencies (AA) received System Operational Request (SOR) FWS#1. The SOR identified the following specifications.

Based on the Fish and Wildlife Service's February 2006 Biological Opinion (2006 BO) on operations of Libby Dam, and the May final April-August volume runoff forecast of 7.155 million acre-feet, we are within a Tier 4 operations year for Kootenai River white sturgeon. The minimum recommended release volume for sturgeon conservation in a Tier 4 year is 1.18 million

acre-feet and we recommend the following procedures for discharge of at least this minimum volume from Libby Dam:

Begin releases of sturgeon volume from Libby Dam once the following conditions are met: Kootenai River temperatures at Bonners Ferry reach 8° C, and Koocanusa Reservoir elevation reaches at least 2,415' MSL; at least one tagged F4 sturgeon is positioned at Ambush Rock; and the forebay of Koocanusa Reservoir warms such that 20-35,000 cubic feet per second (cfs) can be released in unison through the turbines and over the spillway without decreasing Libby Dam release temperatures by more than 2° C.

Ascending Limb: When these conditions are met, increase discharge from Libby Dam (according to ramping rates in the 2006 BO) to 15,000 cfs for 3 days, followed by discharge of 20,000 cfs for 3 days, discharge of full powerhouse capacity (PHC) for 3 days, and maintain peak discharge of PHC plus spill of up to 10,000 cfs for 7 days.

Alternatively, if discharges from Libby Dam are higher than 15,000 cfs prior to commencement of sturgeon operations, once the conditions described above are met, increase discharge from Libby Dam (according to ramping rates in the 2006 BO) to 20,000 cfs for 4 days, followed by discharge of PHC for 5 days, and maintain peak discharge of PHC plus spill of up to 10,000 cfs for 7 days.

Descending Limb: At approximately 6:00 AM, following peak outflow, reduce discharge from Libby Dam to PHC for 4 days. After four days at PHC, reduce discharge to 20,000 cfs for at least 3 days. This discharge period may be extended if necessary to reduce the rate of reservoir refill.

5/23 TMT Meeting - The USFWS/IDFG coordinated the implementation of SOR 2012-FWS#1 during the May 23, 2012 TMT and the AAs committed to implementing the SOR during the meeting. The AA's provided an additional update on the operation during the June 20, TMT meeting.

Summer Draft Limit: On March 28, 2012, the AAs received SOR 2012-01 from the Kootenai Tribe of Idaho to provide Libby target outflows of 6,000 cfs in the month of September and 4,000 cfs in the month of 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.

3/28 TMT Meeting - In coordination with the region at the Technical Management Team (TMT) meeting on March 28, 2012, the AAs coordinated an operation to draft Libby Dam to 2,449 ft by August 31. Drafting Libby Dam to 2,449 ft by August 31 would provide the Kootenai Tribe with greater certainty that the AAs would be able to achieve the requested Libby outflows as identified in the SOR. The operation to achieve the target elevation by August 31 will be managed through in-season coordination with TMT as forecasts and observed conditions develop.

7/11 TMT Meeting - The Corps provided an update on observed inflows at Libby Dam, which were 166% of average for the month of June. Due to the extreme above-average precipitation conditions, the TMT discussed operational adjustments that would still allow for the implementation of the SOR. The Corps proposed an alternative operating plan that ramps flows down based on inflow triggers, and results in an end of August elevation >2449'. The TMT provided input on the alternative, which the Corps considered in developing a third alternative for discussion at the next TMT meeting.

7/18 TMT Meeting - The Corps provided an updated alternative (Alternative 3) based on discussions and recommendations from the 7/11 TMT meeting. All TMT members present concurred with Alternative 3 as the preferred operation to achieve multiple objectives, including the SOR, in light of the record-breaking high flows in the Kootenai River. Details of the Alternative 3 operation may be found on the following website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0718_Libby-Dam-Summer-Ops.pdf

7/25 TMT Meeting - The Corps provided an update on planned Libby operations as defined in Alternative 3, based on the latest observed and forecast data. Forecasts have remained stable and there is very little change from the previous discussion on 7/18. The Corps clarified that any water stored above 2449' on August 31 will be released sometime from mid-November through December to achieve the end of December flood control target elevation. The timing of this water release may provide a benefit to the chum operation.

8/8 TMT Meeting - The Corps provided an update that they had received a request from MT to modify the Libby operation to provide a higher September outflow of 8 kcfs for the benefit of the river's biological productivity. The Corps provided an Alternative 4 operation that incorporated MT's request, using the same inflow triggers in August but a more gradual ramp down to a higher September outflow. Details of the Alternative 4 operation may be found on the following website: http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0808_Libby_Dam_Summer_Ops_Aug8.pdf.

Based on information provided in the SOR it is likely the Kootenai Tribe will request a similar type of operation in 2013.

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 1962 kaf (95 % 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 2013 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 3536.1 ft. Hungry Horse actual elevation on April 10 was 3526.4 ft. Due to an increasing water supply forecast through March and expected lower April 30 flood control elevations, Hungry Horse ramped up discharges in late March in order to target a lower April 30 flood control elevation. The average Hungry Horse discharge from April 10-April 30 was 9600 cfs. 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 2012 Hungry Horse refilled to elevation 3560 ft on June 25.

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 <72.4 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 110.8 maf which set the September 30 draft limit at 3550 ft. Hungry Horse drafted to elevation 3549.2 ft. on September 30, 2012.

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 1258.3 ft. Grand Coulee actual elevation on April 10 was 1246.0 ft. Due to an increasing water supply forecast through March and expected significantly lower April 30 flood control elevations, Grand Coulee ramped up discharges in late March in order to achieve a lower April 30 flood control elevation. Grand Coulee drafted from elevation 1257.4 ft on March 31 to elevation 1228 ft. by April 23. The ICF date was declared on April 24 and Grand Coulee decreased discharges and began a controlled refill for system flood control.

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 2012 is 1289.8 ft which is 0.2 ft below the full pool elevation. Grand Coulee refilled to elevation 1289.8 ft. on July 8, 2012.

The Lake Roosevelt Incremental Storage Release Program

The total amount of water to be released from Grand Coulee in 2012 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 2012.

“Bucket”	2012 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 fill to elevation 1289.8 ft or 0.2 ft from full around June 30 and will have a draft limit of elevation 1279.7 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. Based on the June Final WSF at The Dalles, the summer draft limit for Grand Coulee is expected to be 1280 ft. The draft limit will be modified an additional 0.3 ft or to elevation 1279.7 ft to implement the Lake Roosevelt Incremental Storage Release Program. Grand Coulee drafted to elevation 1279.6 ft on August 31, 2012.

Drum Gate Maintenance: Drum gate maintenance was performed in 2012

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 1565.1 ft. on August 31, 2012

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°.

7/11 TMT Meeting - The AAs reported on final refill operations and the transition to temperature operations at Dworshak Dam. The project touched full on June 30 and began a gradual draft on July 1. On July 9, the AAs began to increase drafts for temperature and flow augmentation. The TMT discussed the AAs proposed course of action to counter high temperatures predicted in the area in the foreseeable future. The AAs would be monitoring temperatures daily, would cut back sooner on the drafts if the temperatures moderate sooner than later, and, now that the project is in temperature augmentation ops, will stop fluctuations to focus on temperature needs. This plan was met with praise from all TMT members.

7/18 TMT Meeting - The current operation has successfully kept temperatures at Lower Granite below 68°. Temperatures have cooled since the last TMT meeting on 7/11 and are projected not to increase again until next week, so the AA's plan forward is to reduce discharges at Dworshak to 9.5 kcfs today, at a temperature of 45°, and monitor conditions closely with a plan to increase

discharges as necessary to address temperature increases at Lower Granite – likely a week out per current forecasts.

7/25 TMT Meeting - The AAs has made all efforts to keep temperatures below 68 degrees at Lower Granite but at one point Lower Granite hovered just above 68 degrees, but the 12-hour average remains below 68 degrees. The slight incursion above 68 degrees was caused by unusually high winds mixing warmer water, as well as by higher releases from the Hells Canyon complex due to system load demands. Current operations at Dworshak are 13.3 kcfs outflows, with 3.6 kcfs spill. The increased discharges are in response to an unexpected heat wave and resultant warmer water temperatures. As a response, the project increased discharges and managed outflows up to the 110% TDG standard. The project will decrease discharges at such time that temperatures and flows decrease sufficiently.

8/8 TMT Meeting - The Corps reported that the recent warm spell is forecasted to continue for the next few days, with temperatures continuing in the upper 90s in the Clearwater and Snake basins. For this reason, the Corps has decided not to cut back Dworshak releases for temperature augmentation as previously planned. The current Dworshak releases of 12.5 kcfs will continue most likely through the end of this week. The 10-day outlook calls for cooler temperatures beginning next week. However, one of the transformers at Dworshak is out of service, which results in an approximate loss of 1-1.5 kcfs generation through the powerhouse. This means more water has to be spilled which hurts operational flexibility. So far the project has spilled within its downstream TDG criteria. TMT will revisit Dworshak operations on August 15 with an update from the AAs.

2.5. Water Quality

The AAs coordinated with TMT to prioritize spill at projects in consideration of current conditions (fish passage numbers, special operations, etc.), and implemented spill priority lists for the following timeframes:

- **Jan 1–March 31:** Wintertime spill priority list coordinated at TMT meeting on 12/21/11. Available online at:
http://www.nwd-wc.usace.army.mil/tmt/agendas/2011/1221_010112_Wintertime%20spill%20priority%20list.pdf
- **April 1–April 22:** Spring spill season prior to initiation of performance standard testing, coordinated at TMT meetings on 3/21, 3/28 and 3/29. Available online at:
http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0328_Spill_Order%20List_040112_revised_0323_tmt.pdf
- **April 11–18:** USFWS Spring Creek Hatchery Release operation coordinated at TMT meetings on April 11 and 18. Moved BON to the top of the priority order beginning at Level 3.
- **April 23–June 19:** Spring spill season during performance standard testing, coordinated at TMT meetings on March 28 and April 11. Available online at:
http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0411_Spill_Order%20List_042312_62012.pdf
- **June 20–July 20:** Summer spill season during performance standard testing coordinated at the June 20 TMT meeting. Available online at:
<http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/>
- **July 23–August 31:** Summer spill season during performance standard testing coordinated at July 18 TMT meetings. Available online at:

http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0718_Agenda.html

- **September 1 – December 31:** Wintertime spill priority list coordinated during the August 29 TMT meeting. Available online at:
http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/0829_Agenda.html

2.6. Spring Creek Hatchery Releases (Bonneville Dam)

In April of 2012, the USFWS conducted hatchery releases of approximately 12 million juvenile tule fall Chinook salmon from the Spring Creek and Little White Salmon National Fish Hatcheries on April 11 and on April 30. On April 11, the USFWS released approximately 1 million fish, but then temporarily suspended the operation until the Corps removed a log that was blocking passage through the Bonneville Dam (BON) powerhouse one (PH1) ice and trash sluiceway (ITS), a surface passage route for juveniles. The USFWS completed the release on April 13. This operation was coordinated during the March 28, April 11, and April 13 TMT meetings. NOAA Fisheries submitted a SOR on April 13 to improve passage conditions through powerhouse two (PH2) gatewells for the hatchery smolts. In order to implement the SOR, the AAs implemented the following flow-neutral operation from April 13-17 to improve passage conditions for juveniles through PH2:

1. BON PH2 units operated up to 25% of the 1% of best efficiency operating range.
2. To pass additional flows, operate PH1 units up to 100% (upper limit) of the 1% operating range.
3. To pass additional flows after PH1 is operating at the upper limit of the 1% range, increase PH2 units one at a time in the order of priority within 25-50% of the 1% operating range.
4. To pass additional flow after PH1 is fully loaded and all available PH2 units are operating at 50% (mid-point) of the 1% range, increase operation of PH1 units up to best geometry.
5. To pass additional flow after all available PH1 units are operating at best geometry, increase PH2 units one at a time in the order of priority within 50-75% of the 1% operating range.
6. To pass additional flow after all available PH2 units are operating at 75%, decrease PH1 unit operation to 100% of the 1% operating range and increase PH2 units one at a time in the order of priority within 75-100% of the 1% operating range.

The operation reduced mortality of juveniles that passed the project through the PH2 juvenile bypass system.

For the second USFWS hatchery release on April 30, the AAs implemented the following flow-neutral operation from April 30 until May 3 to improve PH2 passage conditions:

1. Operate Powerhouse 1 at best geometry.
2. Limit Powerhouse 2 units to 14 kcfs discharge, which from the salmon managers' estimate would maintain a flow-neutral operation.

3. Hold the forebay elevation not to exceed 73 feet as a soft constraint.

This operation reduced mortality and descaling of juveniles that passed through the PH2 gatewells. This operation was coordinated during the April 25, 27, and May 2 TMT meetings. Additional information regarding the Spring Creek Hatchery release operations may be found in the TMT meeting notes found on the following TMT website:

<http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/>

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)

IDFG presented SOR USFWS/IDFG2012-1 during the September 19, 2012, TMT meeting that included the following specifications.

IDFG and USFWS request that the Corps draw Lake Pend Oreille down to a winter minimum control elevation (MCE) no lower than 2055' during the winter of 2012-2013. Conduct drawdowns while minimizing or eliminating the need to spill at Albeni Falls Dam. We request that the drawdown be completed by November 8 if reasonably possible. During the past five years, kokanee spawning has commenced around November 8 (earlier than years prior). If this is not possible, the MCE should be reached as soon as possible after November 8 and no later than November 15, and should not be dropped below this elevation for the duration of the winter. IDFG will monitor arrival time of kokanee at shoreline spawning areas and provide timely reports to the federal agencies. These proposed operations are not anticipated to cause exceedance of the state maximum total dissolved gas standards at downstream projects barring unforeseen circumstances. Lake Pend Oreille will then be held within 0.5' above the MCE to the end of kokanee spawning (monitored by IDFG) or December 31, whichever comes first. During the September 19 TMT meeting the AAs committed to implement the SOR as requested.

2.9. Upper Snake Flow Augmentation

487 kaf of flow augmentation was provided from the Upper Snake in 2012.

2.10. Chum Spawning and Incubation Flows (Bonneville Dam)

Date	TMT Discussion/Chum Operation
October 26, 2011	TMT discussion – 2 chum observed to date. AAs will plan to begin chum ops (11.3-11.7ft.) with a target of 11.5 ft. on November 1, 2011.
November 2, 2011	TMT discussion – 12 chum observed in Ives Island Area. Due to work at Bonneville Dam, the chum operation range upper limit was expanded to 11.3-12.0 feet.
November 9, 2011	TMT discussion – NOAA Fisheries presented SOR 2011-5 Bonneville Chum Operation. The objective of the SOR was to allow chum to spawn in the Ives Island area at elevations higher than the 11.5 ft. elevation if fish numbers and hydrologic conditions were favorable. The SOR was a framework recommended for consideration while moving through the chum season, rather than a specific operation recommendation. It was intended to be implemented if flows support it, to allow access to additional spawning habitat areas, and to provide more natural flow conditions rather than big fluctuations between day and night time hours. The chum operation will continue to target an 11.5 feet (11.3-12.0' feet) tailwater elevation at Bonneville. Weekly field observations conducted by WDFW will inform FPAC and TMT discussions. TMT will revisit the issue on a weekly basis to discuss operations moving forward.
November 23, 2011	TMT Discussion – NOAA Fisheries provided an update that 37 chum had been observed in the Ives Island area and that officially 133 chum had been observed in the recently reconstructed off channel area. Given the chum counts and current and forecasted precipitation in to the system (with nighttime flows reaching over 200 kcfs last night), the salmon managers, per an FPAC call on 11/22, recommended taking the next step described in SOR 2011-5 to adjust the tailwater elevation range to 11.7-12.5 feet. Reclamation suggested that given the water in the system, the recommended operation fits well as a way to meet the system conditions. BPA added that a precipitation event underway had already required a change to the tailwater elevation, so was not opposed to the recommendation. As requested the AAs implemented a Bonneville tailwater elevation range of 11.7-12.5 feet.
November 30, 2011	TMT Discussion – NOAA Fisheries indicated the live chum count on 11/22 was 38 and that while there was not much activity in the Ives channel, the new channel was proving to be a 'hot spot' with 500 active spawners observed on 11/23. Given this, the salmon managers recommended no change to the current operation of 11.7-12.5 foot tailwater elevation range at Bonneville. Based on this information the AAs did not change the operation and continued the 11.7 to 12.5 ft. Bonneville Dam tailwater operation.
December 14, 2012	TMT Discussion – NOAA Fisheries indicated the live chum count as of 12/5 was 226 in the Ives area, with 24 'mass redds' observed. Spawning was now past its peak according to observations. NOAA Fisheries indicated the abundance and distribution of chum and redds this year was good therefore the salmon managers recommended continuing the current operation of maintaining a Bonneville tailwater elevation range of 11.7-12.5 ft. during the day time. AAs committed to continuing the current Bonneville Dam tailwater operation of 11.7 – 12.5ft.

Date	TMT Discussion/Chum Operation
December 21, 2012	TMT Discussion – NOAA Fisheries and WDFW indicated the spawning numbers were declining but still going at Ives and the lower sites will be checked by the field crew on Friday, 12/23. Some redds were observed exposed during low tide, which was expected. Given where the redds have been spawned, the field crew and salmon managers recommended holding the Bonneville tailwater elevation around 12.0 ft. during this protection ‘maintenance’ period. TMT members discussed this operation, and agreed that the commitments to protect the chum redds and meet Grand Coulee April 10 refill targets would continue. The AAs committed to continuing the current operation of 11.7 to 12.5 ft Bonneville tailwater but the AAs would put a greater emphasis on attempting to operate to a Bonneville tailwater of 12.0 ft.
December 28, 2012	TMT Discussion – WDFW indicated field surveys from 12/23 and 12/27 suggested chum spawning was near completion. TMT members discussed ending the Bonneville tailwater spawning operation (11.7 to 12.5 ft with a target of 12.0 ft.) and initiating an incubation operation (12.0 ft. minimum tailwater). Based on this discussion the AAs discontinued the spawning operation and initiated the 12.0ft. tailwater operation for incubation.
January 11, 2012	TMT Discussion – TMT members did not recommend changing the current operation therefore the AAs committed to the continuation of the current 12.0 ft. minimum Bonneville tailwater operation.
January 25, 2012	TMT Discussion – NOAA Fisheries reported that the salmon managers discussed the possibility of lowering the tailwater elevation to 11.7 feet but recent data collection revealed a potential risk to dewatering redds if the tailwater is dropped below the 12.0 ft. Salmon managers recommended AAs maintain the current 12.0 ft. tailwater elevation while there is adequate water supply. WDFW will provide GPS information to TMT on redd location that may be used to inform future decisions on changes to the Bonneville tailwater operation. The AAs committed to the continuation of the current 12.0 ft. minimum Bonneville tailwater operation.
February 8, 2012	TMT Discussion – NOAA Fisheries shared mapping of chum redds. Based on these data and the current short and long-term forecasts showing increased precipitation in the region, the Salmon Managers requested that the Corps continue with the current operation of a minimum tailwater elevation of 12.0 ft. during all hours to provide a higher level of certainty that redds will remain watered. The AAs planned to maintain a 12.0 ft minimum tailwater elevation at Bonneville, and revisit the operation with TMT next week.
February 15, 2012	TMT Discussion – NOAA Fisheries reported on behalf of the salmon managers a preference to continue with a minimum 12 foot tailwater elevation at Bonneville to support chum. BOR would support this operation given there would be no impact to Grand Coulee April refill. TMT members agreed it will be important to continue to monitor conditions and be ready to make changes if forecasts indicate a significant change in water supply. The Corps would continue to implement the current operation of minimum 12 foot tailwater elevation at Bonneville.
March 7, 2012	WDFW provided a map depicting chum redd locations and temperature gauges, a second graph comparing 2006-2007 data (to show the wide range of variability in emergence timing) and a third page containing data for the current year. Chum emergence is expected to be 50% complete by March 21-28, about a week earlier than last year which, it was noted, was a cool year. NOAA added that the pre-season forecast assumed ‘normal’ conditions and indicated the peak of chum emergence to be around April 3. The Corps said the operation at Bonneville would continue at 12’ tailwater minimum until TMT revisits during their next meeting.
March 28, 2012	NOAA Fisheries indicated the chum operation ended on March 28

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 available on the

Fish Passage Center website at:

http://www.fpc.org/spawning/spawning_surveys/ODFW_reports/2011spawning.htm

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

Date	Lives	Dead ⁱ	Redds ⁱⁱ	Visibility (ft)
21-Oct	2	0	0	
24-Oct	0	0	0	
28-Oct	12	0	0	1 ft.
1-Nov	19	0	0	2.5 ft.
8-Nov	2	1	0	3 ft.
15-Nov	37	1	12	3 ft.
22-Nov	38	2	6	3 ft.
29-Nov	151	24	mass redds	5 ft.
6-Dec	226	23	mass redds	5 ft.
14-Dec	29	8	mass redds	12 ft.
20-Dec	13	25	NC	5 ft.
27-Dec	11	13	NC	12 ft.
3-Jan	0	2	NC	4 ft.
10-Jan	0	5	NC	10 ft.
17-Jan	0	0	NC	3 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 23, 2011	<ul style="list-style-type: none"> • On Sunday, October 23, 2011 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. The Monitoring Team consisted of Paul Hoffarth (WDFW) and Chris Carlson (GCPUD). Observing the redd count was Shawna Meehan (WDFW). Flows from Priest Rapids Dam at Vernita Bar were about 38 kcfs. Results of this survey are provided in the table below. • 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. During this time last year (2010), there were 3 redds counted within the 36-50 kcfs flow elevation. • The next redd count will occur on October 30, 2011 and will require USGS gauging station flows of 38 kcfs.

Date	Summary
October 30, 2011	<ul style="list-style-type: none"> • On Sunday, October 30, 2011 the third Vernita Bar ground redd count was conducted to determine the Initiation of Spawning for the zones below and above the 50 kcfs elevation. The Monitoring Team consisted of Paul Hoffarth (WDFW) and Chris Carlson (GCPUD). Observing the redd count was Demischelle Hoffarth. Flows from Priest Rapids Dam at Vernita Bar were about 39 kcfs. Results of this survey are provided in the table below. • Based on the above survey count and the Hanford Reach Fall Chinook Protection Program Agreement, the Initiation of Spawning has been set for the 36 kcfs – 50 kcfs zone and the zone above 50 kcfs as October 26 (the Wednesday before the weekend on which the Monitoring Team identifies five or more redds with the zone). • Last year’s redd count on October 31 identified 12 redds within the 36-50 kcfs flow and none above the 50 kcfs elevation. • The next redd count will occur on November 20, 2011 and will require USGS gauging station flows of 50 kcfs. This redd count will likely be used to set the 2011 – 2012 Critical Flow Elevation.
November 5, 2011	<ul style="list-style-type: none"> • The third 2011 fall Chinook redd count aerial survey was conducted on Saturday November 5. The surveyor was Paul Wagner (EAS) and the pilot was Dave McCurry (Bergstrom Aircraft). The area surveyed was the Columbia River from just upstream of the I-182 bridge in Richland to just downstream of Priest Rapids Dam. Wind was light, and viewing conditions were excellent. Hourly discharge from Priest Rapids Dam ranged from 56.8 kcfs to 57.2 kcfs during the flight. • A total of 8,534 redds were counted during this survey. Two thousand four hundred and forty of these redds were observed in areas of known contaminated groundwater upwelling. • Total redd counts for this survey (8,534) approached the maximum redd counts for 2010 (8,817). Viewing conditions were excellent, and historical spawning areas appeared largely filled with redds out to maximum depths viewable. Minimal superimposition was observed.
November 20, 2011	<ul style="list-style-type: none"> • The fourth and final 2011 fall Chinook redd count aerial survey was conducted on Sunday November 20. The surveyor was Paul Wagner (EAS) and the pilot was Don Clayhold (Bergstrom Aircraft). • The area surveyed was the Columbia River from just upstream of the I-182 bridge in Richland to just downstream of Priest Rapids Dam. Wind was light, and viewing conditions were only fair due to heavy cloud cover. Hourly discharge from Priest Rapids Dam ranged from 50.8 kcfs to 60.1 kcfs during the flight. • A total of 8,472 redds were counted during this survey, down slightly from the third survey conducted two weeks ago owing to the reduced visibility. Two thousand one hundred and sixty eight of these redds were observed in areas of known contaminated groundwater upwelling.
February 15, 2012	<p>TMT Discussion - Grant County PUD (GCPUD) shared information about Hanford Reach operations. Operations were on track and GCPUD expects rearing period protection to begin on March 8. GCPUD reported there were currently 922 accumulated temperature units.</p>
March 7, 2012	<p>TMT Discussion – GCPUD indicated the Hanford Reach emergence protection operation was scheduled to begin on March 8. GCPUD showed graphs depicting temperature unit accumulations, and also said a report from 2011 had been submitted by Grant PUD and was available for review.</p>
March 28, 2012	<p>TMT Discussion - Protection flows began on March 8 and are expected to end on June 19 (this date might change). The specific operation at Priest Rapids was 107.1 kcfs discharge, with a 41.3 kcfs daily delta and 54.3 kcfs daily delta constraint. There have been no exceedances to date.</p>

Date	Summary
April 18, 2012	TMT Discussion – GCPUD indicated protection flows are still scheduled to begin the weekend of April 28 and there have been no exceedances to date. Temperatures are tracking well with normal temperatures for this time of year.
May 2, 2012	TMT Discussion – GCPUD indicated operation were still on track with June 19 as the estimated completion date. Average outflows have been 203 kcfs with 67 kcfs as the mean daily delta. Priest Rapids has operated at a minimum 150 kcfs (159.5 kcfs on the weekends) and there have been no exceedances. Fish numbers are expected to pick up soon.

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

According to the Lower Snake projects’ operating manuals, from December through February, "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.”

In 2005, the Salmon Managers developed guidance criteria (3-day running average of less than 65 total run (hatchery and wild) adult steelhead and less than 20 wild adult steelhead passing Lower Granite per day) for dropping to zero generation. The status of the actively migrating fish in the Snake River will be evaluated in November and December to determine when the criteria have been met.

On December 9, 2011, steelhead passage at Lower Granite Dam met the criteria required in order to operate to zero generation on the Snake River projects. The AAs implemented a Snake River Zero Generation operation as needed from December 9, 2011 through February 29, 2012.

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 season (Table 9) and coordinated this operation with TMT in 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 2012

The following is a summary of 2012 spring spill levels at lower Snake and Columbia River projects.

Project	Planned 2012 Spring Spill Operations (Day/Night)	Comments
Lower Granite	20 kcfs/20 kcfs	Same as 2011
Little Goose	30%/30%	Same as 2011
Lower Monumental	Gas Cap/Gas Cap (approximate Gas Cap range: 20-29 kcfs)	Same as 2011
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 2011
McNary	40%/40%	Same as 2011
John Day	Pre-test: 30%/30% Testing: 30%/30% and 40%/40%	Same as 2011
The Dalles	40%/40%	Same as 2011
Bonneville	100 kcfs/100 kcfs	Same as 2011

The following is a summary of 2012 summer spill levels at lower Snake and Columbia River projects

Project	Planned 2012 Summer Spill Operations (Day/Night)	Comments
Lower Granite	18 kcfs/18 kcfs	Same as 2011
Little Goose	30%/30%	Same as 2011
Lower Monumental	17 kcfs/17 kcfs	Same as 2011
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 2011
McNary	50%/50%	Same as 2011
John Day	July 1-July 20: 30%/30% and 40%/40% July 20-August 31: 30%/30%	Same as 2011
The Dalles	40%/40%	Same as 2011
Bonneville	June 16-July 20: 85 kcfs/121 kcfs and 95 kcfs/95 kcfs July 21-August 31: 75 kcfs/Gas Cap	Same as 2011

More information on 2012 spring/summer spill operations may be found in the 2012 Fish Operations Plan found on the following website:

<http://www.nwd-wc.usace.army.mil/tmt/agendas/2012/>

Lower Granite (LWG) fish facility began collecting fish for transport on May 1 and fish barging at LWG began on May 2. Little Goose (LGS) fish facility began collection on May 3 and the first barge departure occurred on May 4. Lower Monumental (LMN) collection began on May 5 with the first barge departure on May 6. This operation was coordinated with the TMT during the May 25 meeting. Juvenile fish transportation ended at LWG, LGS, and LMN Dams by November 1.

The 2012 FOP states transportation will be initiated at McNary Dam between July 15 and 30. Fish will be transported from McNary Dam by barge through August 16, then transported by truck every other day.

During the July 18 TMT meeting the AA's received SOR 2012-3 - Do not initiate barge transport operations at McNary Dam, from the Fish Passage Advisory Committee (FPAC). The SOR requested the Corps not initiate transport from McNary Dam until truck transport begins on August 17. The Corps implemented the SOR 2012-3 as coordinated during the July 18 TMT meeting.

The AA's received SOR 2012-4 - Truck Transport from McNary Dam, on August 15, from the FPAC, and the SOR was discussed during the August 15 TMT meeting. The specification identified in the SOR was to delay the start of truck transport at McNary Dam until further notice. There was a lack of consensus amongst the TMT regarding the implementation of the SOR therefore the Corps did not implement the SOR. The Corps initiated truck transportation on August 18. Juveniles were transported from McNary through September 30.

2.15. Fish Passage Research in 2012

A brief summary of 2012 fish passage research is included below. More details regarding 2012 fish passage research may be found in Appendix A of the 2012 Fish Passage Plan available on the following website: <http://www.nwd-wc.usace.army.mil/tmt/documents/fpp/2012/>

Bonneville Dam

- BiOp Performance Standard Compliance Test
- Adult Kelt Passage
- Lamprey Passage Evaluations
- Sea Lion Predation

The Dalles

- Adult Lamprey Studies
- BiOp Performance Standard Testing
- Steelhead Kelt Downstream Passage Study

John Day

- Adult Lamprey Studies
- BiOp Performance Standard Compliance Test

McNary

- Adult steelhead fallback study
- BiOp Performance Standard Compliance Test
- Evaluation of Adult Pacific Lamprey Passage Success at McNary
- Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at McNary Dam
- Identify potential for adverse impact of aquatic invertebrates growing within the juvenile collection and bypass systems at McNary, 2012
- Oregon shore ladder intake screen monitoring
- Determining the feasibility of detecting JSAT Transmitters in the Tailrace Environment at McNary Dam
- Steelhead straying study
- BiOp Kelt Passage and Survival Monitoring

Ice Harbor

- Evaluation of Fish Counting Accuracy Issues at FCRPS Dams, at Ice Harbor and Lower Monumental Dams
- Evaluation of Adult Pacific Lamprey Passage Success at Ice Harbor Dam
- Underwater Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at Ice Harbor Dam

Lower Monumental

- BiOp Performance Standard Compliance Test

- Evaluation of Fish Counting Accuracy Issues at FCRPS Dams, at Ice Harbor and Lower Monumental Dams
- Evaluation of Adult Pacific Lamprey Passage Success at Lower Monumental Dam
- BiOp Kelt Passage and Survival Monitoring

Little Goose

- BiOp Performance Standard Compliance Test
- Evaluation of Adult Pacific Lamprey Passage Success at Little Goose Dam
- BiOp Kelt Passage and Survival Monitoring

Lower Granite

- Study to compare seasonal SARs of early in-river migrating versus transported Snake River yearling anadromous salmonids
- Study to compare SARs of Snake River fall Chinook salmon under alternative transportation and dam operational strategies
- Kelt Reconditioning / Transportation
- Study to Evaluate Hydropower System-related Latent Mortality Associated with Passage of Yearling Chinook Salmon Smolts through Snake River Dams
- Study to evaluate straying behavior in steelhead
- Study to identify overwintering behavior of Fall Chinook salmon
- Evaluation of Adult Pacific Lamprey Passage Success at Lower Granite Dam
- Developing Half-Duplex PIT-tag Antennas at Fishway Entrances and Exits at Lower Granite Dam
- BiOp Kelt Passage and Survival Monitoring