

# **Spring/Summer Update to the 2010 Water Management Plan**

May 14, 2010

## ***Introduction***

This draft Spring/Summer Update (SSU) to the 2010 Water Management Plan (WMP) provides updated information regarding how the Action Agencies will operate Federal Columbia River Power System (FCRPS) reservoirs during the 2010 spring and summer seasons. The SSU does not repeat all of the information in the WMP, but instead provides additional updated information and specifies operations based on the current water supply forecasts, flow projections, and fish research. The SSU provides water supply forecasts for the spring and summer time period that were not available when the WMP was finalized. Operations in the SSU are based on the most current water supply forecasts; which are the best available forecasts of expected runoff water volume, and thus determine how the FCRPS can be operated in 2010. The SSU also outlines 2010 research operations planned for FCRPS projects. Fish research studies are routinely conducted to test the performance of current or new fish passage structures and/or operations and their effects on fish passage and survival. The Studies Review Work Group (SRWG) finalizes research study plans in the early spring prior to the beginning of the juvenile salmonid spring migration. This draft S/S Update summarizes project operations that support these research activities as best possible where the operations have been coordinated and finalized with regional entities.

## Water Supply Forecasts (WSF)

There are four water supply forecast (WSF) points used to determine BiOp operation of the FCRPS reservoirs; Lower Granite, The Dalles, Libby, and Dworshak. The determining forecasts are presented in Table 1.

Table 1.— Determining water supply forecasts for 2010 BiOp operations.

Forecast Point	Forecast Period	Forecast Date	Value (MAF)	Percent Normal <sup>E</sup>
Lower Granite	April – July	April Final	12.0 <sup>A</sup>	56
Lower Granite	April – Sept.	April Final	13.4	56
The Dalles	April – August	April Final	60.9 <sup>A</sup>	65
The Dalles	January – July	April Final	69.7	65
Hungry Horse	April - August	March Final	1.4 <sup>B</sup>	70
Hungry Horse	May - September	May Final	1.3	73
Libby	April - August	April Final	5.1 <sup>C</sup>	81
Libby	April - August	May Final	4.9 <sup>D</sup>	77
Dworshak	April – July	April Final	1.4 <sup>C</sup>	52
Dworshak	April – July	April Final	1.4 <sup>C</sup>	52

All forecasts are from the National Weather Service Northwest River Forecast Center (RFC) unless otherwise indicated:

A – RFC forecast (value used to set operations for spring flow objectives).

B – U.S. Bureau of Reclamation Forecast. The March Final forecast (April –August forecast period) determines the minimum Hungry Horse and Columbia Falls flows for the remainder of the calendar year (March-December).

C – Corps of Engineers Forecast.

D – Value used to set operations for Libby sturgeon pulse.

E - Percent of normal for RFC and BOR forecasts is based on 1971 – 2000 average. Percent of normal for Corps forecasts is based on 1929 – 1999 average.

## Seasonal Flow Objectives

### Spring

The spring seasonal flow objectives for Lower Granite are established using the Northwest River Forecast Center's (RFC) April Final WSF for the period of April-July. The spring seasonal flow objective for McNary is established using the RFC's April Final WSF for the period of April-August at The Dalles. The Priest Rapids spring seasonal flow objective is fixed and is not dependent on any water supply forecast. Based on the March Early Bird forecast, spring flow objectives are shown Table 2.

Table 2.— Spring seasonal flow objectives at Lower Granite, Priest Rapids and McNary dams.

Project	Spring Seasonal Flow Objective
Lower Granite	85 kcfs
Priest Rapids	135 kcfs
McNary	220 kcfs

### Summer

The summer seasonal flow objective for Lower Granite Dam is based on the RFC's June Final WSF for the period of April-July. Per the 2008 BiOp, the McNary summer seasonal flow objective is 200 kcfs and is not dependent on the water supply forecast. Based on the April WSF the summer seasonal flow objectives are shown in Table 3.

Table 3.— Summer seasonal flow objectives at Lower Granite and McNary dams.

<b>Project</b>	<b>Summer Seasonal Flow Objective</b>
Lower Granite	50 kcfs
McNary	200 kcfs

## **Storage Project Operations**

### **Libby Dam - Bull Trout Flows**

Bull trout minimum flows are specified in the 2006 Libby Sturgeon Biological Opinion (USFWS BiOp). Per the BiOp, the project will initiate bull trout flows of 6 kcfs on May 15 and maintain the minimum flow criteria through June or until the sturgeon pulse begins. After the sturgeon pulse, and/or July through August, the bull trout minimum will be 7.0 kcfs per Table 7 of the WMP and the Corps May Final WSF for April-August of 4.9 MAF. For the month of September, the bull trout minimum flow will return to 6 kcfs.

### **Libby Dam - Sturgeon Pulse**

Per the 2006 Libby Sturgeon Biological Opinion, the sturgeon pulse volume is determined from a tiered flow structure based upon the Corps' May Final WSF for the period of April-August. The sturgeon pulse volume for 2010 will be 800 KAF. Measurement of sturgeon volumes excludes the 4 kcfs minimum flow releases from the dam. A request with specific flow level and date recommendations will be submitted to TMT prior to initiating an operation for sturgeon.

In accordance with the 2006 USFWS BiOp, as clarified, up to 10 kcfs will be spilled in various years to improve sturgeon habitat. The Corps will have a better estimate of sturgeon flow start date, reservoir elevation, and the recommended flow pattern given the sturgeon volume in late May.

### **Libby Dam - April 10 and Refill Objectives**

Libby's April 10 objective was projected to be 2,441.4 ft based upon the Corps' Feb Final WSF of 5,478 KAF (<http://www.nwd-wc.usace.army.mil/report/libf/201002.pdf>). Inflows have been less than the instantaneous minimum of 4,000 cfs and Libby's elevation on April 10 was 2403.0 ft (38.4 ft below the objective). The project has been on minimum flows of 4,000 cfs since January 1, 2010 and is projected to release minimum flows through May 19, 2010. The project is remaining on minimum flows in lieu of discharging VARQ flows consistent with the Phase II storage operation agreed to by TMT on April 28, 2010. The Phase II storage operation allows Libby to store up to 260 KAF prior to the sturgeon pulse, with the stored water fully released by June 30, to increase the chance of attaining forebay elevations that will facilitate the spill operation described in the preceding section.

The elevation at Libby as of May 12, 2010 was 2,409.9 ft. Since the project must provide sturgeon flows and is usually requested by SOR to maintain a flat flow (after the sturgeon flows) to reach 2,449 ft by the end of September (or 2439 ft in the lowest 20% of years, determined by the Dalles May forecast), the project is often not able to refill to 2,459 ft. Any volume in excess of the bull trout minimum flow requirement that drafts this project to the end of September draft target is salmon flow augmentation water.

### **Libby Dam – Summer draft Limit**

Experimental draft to 10 feet from full by the end of September, except in the lowest 20th percentile of water years (currently less than 71.8 MAF), as measured at The Dalles, when draft will increase to 20 feet from full by end of September. The RFC's May Final forecast for April-August is used to set the official draft limit. The RFC's May Final April-August forecast for The Dalles is 62.2 MAF, therefore the draft limit for 2010 is 20 ft draft from full.

If the project fails to refill 20 feet from full, the project will release inflows or operate to meet minimum flows through the summer months, subject to the bull trout minimums described above.

### ***Hungry Horse Dam***

#### **Water Supply Forecast and Minimum Flows**

The minimum flow, measured below Hungry Horse Dam, 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 level, for the remainder of the calendar year, is based on the March Final forecast. The Bureau of Reclamation's March Final WSF for April-August was 1449 kaf (70% of average). Minimum flow requirements from Hungry Horse and Columbia Falls are currently set at 616 cfs and 3,330 cfs, respectively. The March final forecast sets the minimum flow requirements from March through December.

#### **Hungry Horse 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 WSF, the April 10 objective was elevation 3554.4 feet. Low winter stream flows coupled with required minimum discharges for Columbia Falls drafted Hungry Horse below the April 10 elevation objective. Hungry Horse was at elevation 3521.35 on April 10, 2010. 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.

#### **Hungry Horse 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 <71.8 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 RFC's May Final April-August forecast for The Dalles is 62.2 maf, thus indicating a draft limit elevation of 3540 feet by September 30

## **Grand Coulee Dam**

### **Grand Coulee 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 WSF, the April 10 objective was elevation 1283.3 ft. (Due to low inflows at Dworshak, no shift of flood control storage with GCL will be possible.). Because of low water supply forecasts and low inflows, it became apparent that it would be highly unlikely that Grand Coulee could support the chum operation below Bonneville Dam until April 10 without Grand Coulee coming in below the April 10 elevation objective. In order to protect chum redds for as long as practicable and also conserve water in Grand Coulee for spring migrants, it was decided through TMT to continue the minimum chum protection level below Bonneville Dam of 11.3 feet tailwater elevation until March 17. The minimum protection level was then gradually stepped down until March 22 at which time Grand Coulee discharges were decreased to just meet the Hanford Reach protection flow of 60 kcfs. Grand Coulee continued to support the Hanford Reach protection flow through April 10 resulting in an April 10 elevation of 1275.2 feet. Grand Coulee is expected to refill to 1,290.0 ft by approximately June 30.

### **Grand Coulee 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 April Final WSF at The Dalles, the summer draft limit for Grand Coulee is expected to be 1,278 ft. This draft limit will most likely be modified to implement the Lake Roosevelt drawdown component of Washington's Columbia River Water Management Program (CRWMP) WMP Section 6.5.6

### **Washington State's Columbia River Water Management Program (CRWMP)**

The Lake Roosevelt Incremental Draft portion of Washington State's Columbia River Water Management Plan (CRWMP) results in additional water withdrawals from Lake Roosevelt for both beneficial use and instream flows. The Incremental draft results in a release of 82,500 acre-feet or about a foot of draft at Lake Roosevelt in most years. For every 2 acre-feet of water put to beneficial use, 1 acre-foot of water will go to instream flows.

30,000 acre-feet to Odessa – Water to be pumped to Banks Lake and delivered through the Columbia Basin Project

25,000 acre-feet M&I – water to be released from Grand Coulee dam and withdrawn from the Columbia River at Various sites downstream

27,500 acre-feet releases for instream flow (“fish”) – for every 2 acre-feet of water released for beneficial use, one acre-foot of water is released to instream flow.

The only way to demonstrate that the water came from Lake Roosevelt and not stream flows during the juvenile fish migration period is to draft Lake Roosevelt. Based on RPA 4 in the 2008 FCRPS BiOp, there are two elevation objectives during the juvenile fish migration period (1) end of June (early July) refill, and (2) August 31 draft which is forecast based. If water were release

in the spring, from the Lake Roosevelt incremental draft water account, then Lake Roosevelt would need to miss refill by that amount. Lake Roosevelt would draft below the end of August draft limit by the amount released in both the spring and summer flow augmentation periods. The Fish Flow Releases Advisory Group, which is made up of members from Colville Confederated Tribes (CCT), Columbia River Intertribal Fish Comision (CRITFC), Washington Department of Fish and Wildlife (DFW), Washington Department of Ecology (DOE), NOAA Fisheries, USFWS and Reclamation, developed a release pattern for water year 2010.

2010 Operations

Before the state of Washington can issue contracts for the M&I water, the water needs to be put to beneficial use (perfect the water right) and put into the state water trust. Reclamation needs to have water contracts before it can release water from Lake Roosevelt.

The March final April – September Water supply Forecast for The Dalles in 2010 was 65.8 MAF which makes 2010 a dry year. This would result in 82,500 acre-feet of water being delivered. Water cannot be delivered to the Odessa area at this time so a maximum of 52,500 acre-feet of water could be released in 2010. Reclamation is seeking a one-year contract to release the 25,000 acre-feet M&I water and the 27,500 acre-feet instream flow water (instream flow water associated with both the M&I and the Odessa component of the Lake Roosevelt Incremental Draft). Depending on when the contracts are completed, the full amount may not be released in 2010. This year will be a one-time operation. Table 4 shows the maximum volume of water and elevation draft from Lake Roosevelt in 2010. These numbers and elevations will need to be adjusted when the contracts are complete.

Table 4 – Lake Roosevelt operations with CRWMP for 2010

Water Year Scenario	Purpose of Release	Releases by volume by accounting point (acre-feet)		
		April-June	July-August	September
“Dry”	Odessa	0	0	0
	M&I	18,250	6,750	0
	Fish	27,500	0	0
	Total	45,750	6,750	0
Lake Roosevelt (feet)				
Additional draft		0.5	0.7	
End of Period elevation		1289.4 <sup>1</sup>	1277.3 <sup>2</sup>	

<sup>1</sup> Additional draft at Lake Roosevelt in feet. Water surface elevation can only be measured to the nearest 10<sup>th</sup>.

<sup>2</sup>To demonstrate that the water comes from Lake Roosevelt the end of August draft includes both spring and summer releases.

In the future, water will need to be contracted before the corresponding instream flow water can be released. For example if there is no Odessa water released next year and the state only has contracts for 10,000 acre-feet of the M&I water then only 5,000 acre-feet of water will be released for instream flow for a total of 15,000 acre-feet of water.

## **Drum Gate Maintenance**

Due to low forecasted water supply and high forecasted flood control elevations at Grand Coulee, regularly scheduled maintenance on the drum gates is being deferred in 2010 unless a critical maintenance issue arises. In order to accomplish drum gate maintenance, Lake Roosevelt must be at or below elevation 1255 feet for 6-8 weeks. Drum gate maintenance must occur at a minimum one time in a 3-year period, two times in a 5-year period, and three times in a 7-year period. Due to high flood control elevations, maintenance was also deferred in 2009. Because maintenance was deferred in 2009 and 2010, drum gate maintenance will have to be performed in the spring of 2011 regardless of water supply conditions.

## ***Dworshak Dam***

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

As of May 12, Dworshak Dam was releasing minimum outflow and at elevation 1,561.8 feet (full is 1,600.0 feet). The official Corps May Final WSF for April–July is 1.5 MAF, or 57% of average. Due to very low snow volumes, refill at the project is uncertain at this time.

A key operation at Dworshak Dam is to draft cold water from the Dworshak reservoir in July, August, and September to cool water temperatures and provide flow augmentation in the Lower Snake River for the benefit of migrating salmon and steelhead. In-season modeling will be done to provide information to aid in making the decisions of when and how to draft Dworshak. The summer reservoir draft limit is 1,535 ft by the end of August. This limit determines the maximum draft available for summer flow (July and August) augmentation from Dworshak. In years when Lower Snake River conditions are anomalous (e.g. high temperatures, etc.), modification of the target elevation of 1535 ft by August 31 may occur in accordance with the annual Dworshak Operational Plan, as formulated by the Dworshak Operations Board. The Action Agencies will draft Dworshak to approximately 1,520 ft in September. The extension of the draft limit from August 31 into September reflects requirements for about 200 kaf to be held for release as defined per the Snake River Basin Adjudication Agreement.

### ***Upper Snake River Flow Augmentation***

Even though the April Final WSFs are low throughout the Snake River Basin, the Bureau of Reclamation is still hopeful that 427 kaf of Upper Snake River flow augmentation will be provided in 2010.

## **Flood Control Operations**

Table 5.— Flood control elevations as of April 25, 2010.

Project	Date						
	Jan 31	Feb 28	Mar 15	Mar 31	Apr 10	Apr 15	Apr 30
MCDB	2460.7	2451.3		2470.9		2471.1	2471.1
ARDB	1432.1	1434.0		1438.5		1438.5	1438.5
LIB	2423.0	2436.4	2441.1	2444.0	2445.7	2445.7	2447.5
DCDB	1839.3	1814.8	1811.1	1811.1		1822.8	1822.8
HGH	3546.6	3550.6		3553.9	3554.4	3554.4	3555.1
GCL	1290.0	1290.0		1283.3	1283.3	1283.3	1283.3
BRN	2077.0	2076.7		2077.0		2077.0	2077.0
DWR	1550.1	1567.6		1587.5	1587.5	1597.4	1597.4

### **Dworshak/Grand Coulee flood control shift**

At the end of February Dworshak was approximately 50 feet below required flood control due to a very dry fall and winter resulting in abnormally low reservoir inflows. Dworshak has been on minimum discharge since late September 2009. Due to the low reservoir elevation, the primary concern is refilling the reservoir for summer temperature and flow augmentation. It is unlikely Dworshak reservoir will fill enough to catch up with flood control by the end of April, which means that Dworshak will not be able to shift flood control space to Grand Coulee. If inflows to Dworshak change dramatically and the reservoir fills to the required flood control elevation before the end of March, the COE will consider shifting flood control space to Grand Coulee.

### **Minimum Operating Pool (MOP)**

All four Lower Snake River projects are scheduled to reach MOP elevations by April 3 (Table 5). The MOP elevation ranges will be adjusted as needed to meet authorized project purposes including navigation. New gages have been installed in the Lock approach at Lower Granite Dam which will provide more accurate measurements of the water depth over the navlock entrance sill, a critical element of the navigation system. In the past, there have been times during low total river flows (less than 50 kcfs) when the combination of spill and mandatory unit cycling (to operate within MOP to MOP+1 ft.) have led to conditions in which the minimum clearance over the entrance sill was not maintained. In 2009 the COE worked with BPA to increase awareness about the issue and prevented the violations of MOP from occurring, however in the event that the conditions can not be avoided, at

Table 5.— Snake River MOP elevations.

<b>Project</b>	<b>Operation</b>	<b>Lower Range Elevation (ft)</b>	<b>Upper Range Elevation (ft)</b>
Ice Harbor	MOP	437.0	438.0
Lower Monumental	MOP	537.0	538.0
Little Goose <sup>A</sup>	MOP	633.0	634.0
Lower Granite	MOP	733.0	734.0

A – To be adjusted as necessary to provide adequate depth over entrance sill at Lower Granite navlock.



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

### ***Hanford Reach***

The Vernita Bar protection level flow was set at a level of 60.0 kcfs based on the 2009 redd count. This year's Vernita Bar protection operation end date will be determined in coming months.

### ***Operation Considerations***

To be determined.

### ***Water Quality - Spill Priority List***

River operations are conducted to meet State Clean Water Act total maximum daily load (TMDL) dissolved gas standards. Also, research operations at a particular dam can be impacted by involuntary spill. Thus spill at research projects is given lower priority in the hope that involuntary spill can be eliminated during research. The spill priority list as of May 10, 2010 is shown below. Involuntary spill will occur in the order shown. The priorities may be modified in 2010 by TMT as needed based on spill operations, status of fish migration, spill/transport strategies, and research studies.

Table 6 – Latest Spill Priority List

**Spill Priority List**

May 10, 2010

Project	TDG%	TDG%	TDG%	TDG%	TDG%	TDG%
	110	115	120	125	130	135
LWG	20	30	41	90	125	200
LGS	10	15	32	80	150	250
LMN	10	15	35	95	180	250
IHR	30	45	95	125	180	240
WEL	10	15	25	45	130	
RRH	5	10	20	30	150	
RIS	5	10	20	30	150	
WAN	10	15	20	50	100	
PRD	20	30	40	40	40	
MCN	40	80	145	230	290	450
JDA	20	60	120	240	450	600
TDA	20	60	125	250	360	600
BON	50	65	75	150	225	270
CHJ	20	50	100	130	165	200
GCL(a)	0	5	10	20	35	50
GCL(b)	0	15	30	75	120	130
DWR	37%	42%	50%	60%	70%	

When Grand Coulee Forebay elevation is less than 1266 ft, use GCL(a) spill cap associated with outlet tubes. When Grand Coulee forebay elevation is greater than 1265.5 ft, use GCL(B) spill caps associated with the drumgates.

**2010 Spill and Transportation Operations**

Based on recommendations from the ISAB, the COE moved forward with a split strategy of spring spill and transportation for 2010 in the Snake River, meaning spill and transport would be concurrent. The RIOG and FPAC approved this strategy. Transportation at Lower Granite Dam began on April 24 this year, then 8 days later (May 2) at Little Goose Dam, and 3 days after that (April 5) at Lower Monumental Dam. Spring spill at the remaining projects will follow the 2010 FOP (see Table 7), unless changed through the TMT process.

Table 7 – Summary of 2010 spring spill levels at lower Snake and Columbia River projects.

<b>Project</b>	<b>Planned 2010 Spring Spill Operations (Day/Night)</b>	<b>Comments</b>
Lower Granite	20 kcfs/20 kcfs	Same as 2009
Little Goose	30%/30%	Same as 2009
Lower Monumental	Gas Cap/Gas Cap (approximate Gas Cap range: 20-29 kcfs)	Same as 2009
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 2009
McNary	40%/40%	Same as 2009
John Day	<b>Pre-test:</b> 30%/30% <b>Testing:</b> 30%/30% vs. 40%/40%	Same as 2009
The Dalles	40%/40%	Same as 2009
Bonneville	100 kcfs/100 kcfs	Same as 2009

## ***2010 Fish Passage Research***

More details regarding the 2010 fish passage research found below can be found in Appendix A of the Fish Passage Plan.

### Bonneville

- Second Powerhouse Behavioral Guidance Structure (BGS) Biological Evaluation/Project Survival
- Lamprey Passage Evaluations
- Adult Salmon Studies Evaluations
- Sea Lion Predation.

### The Dalles Dam

- Adult Lamprey Studies
- Adult Salmon Studies
- Steelhead Ice Trash Sluiceway Passage Study
- Lower Columbia River Survival Study

### John Day Dam

- Adult Lamprey Studies
- Adult Salmon Studies
- Evaluation of Top Spillway Weirs (TSW)
- Post Construction Balloon Tag Tests of New Spillbay Deflector at Bay 20
- Out of Criteria Operations Related to Research

### McNary Dam

- Developing a separator for Juvenile Lamprey
- Evaluation of Adult Pacific Lamprey Passage Success at McNary and Lower Snake River Dams
- Video Monitoring of Adult Fish Ladder Modifications to Improve Pacific Lamprey Passage at the McNary Dam Oregon Shore Fishway, 2010
- Evaluation of Juvenile Salmonid Condition (descaling) Under Different Turbine Operating Conditions at McNary Dam
- Evaluation of Juvenile Salmonid Gatewell Egress Using Updated Orifice Lighting Treatments at McNary Dam

### Ice Harbor Dam

- Evaluation of Adult Pacific Lamprey Passage Success at McNary and Lower Snake River Dams

### Lower Monumental Dam

- Bull Trout PIT Tag Study
- Developing a separator for Juvenile Lamprey

### Little Goose Dam

- Bull Trout PIT Tag Study

### Lower Granite Dam

- A study to compare seasonal SARs of early in-river migrating versus transported Snake River yearling anadromous salmonids
- Bull Trout PIT Tag Study
- A study to compare SARs of Snake River fall Chinook salmon under alternative transportation and dam operational strategies
- Kelt reconditioning / transportation
- A Study to Evaluate Hydropower System-related Latent Mortality Associated with Passage of Yearling Chinook Salmon Smolts through Snake River Dams