

Draft Spring/Summer Update to the 2010 Water Management Plan

March 1, 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 yet available when the WMP itself was finalized. Operations contained in the SSU are based on the most current water supply forecast; which is considered to be the best available forecast of the expected runoff water volume, and thus determines 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 latest forecasts are presented in Table 1.

Table 1.— Latest water supply forecasts available as of April , 2010.

Forecast Point	Forecast Period	Forecast Date	Value (MAF)	Percent Normal ^E
Lower Granite	April – July	April Mid-Month	11.7 ^A	54
-Lower Granite	April – Sept.	April Mid-Month	13.1	54
The Dalles	April – August	April Mid-Month	59.9 ^A	64
The Dalles	January – July	April Mid-Month	68.8	64
Hungry Horse	April - August	March Final	1.4 ^B	70
Hungry Horse	May - September	April Final	1.3	71
Libby	April - August	April Final	5.1 ^C	81
Libby	April - August	May Final	^D	
Dworshak	April – July	April Final	1.4 ^C	52
Dworshak	April – July	May Final		

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

A – RFC forecast (March 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.

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Seasonal Flow Objectives

Spring

The spring seasonal flow objectives for Lower Granite are established using the Northwest River Forecast Center's (RFC) April ~~final~~ Final Water Supply Forecast for the period of April-July.

The spring seasonal flow objective for McNary is established using the Northwest River Forecast Center's RFC's April ~~final~~ 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 Northwest River Forecast Center's RFC's June ~~final~~ Final water supply forecast WSF for the period of April-July. ~~The McNary summer seasonal flow objective is always 200 kcfs and is not dependent on the water supply forecast.~~ Based on the ~~April WSF latest water supply forecast (March Early Bird), preliminary~~ the summer seasonal flow objectives are shown in Table 3. ~~The McNary summer seasonal flow objective is always 200 kcfs and is not dependent on the water supply forecast.~~

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

Project	Summer Seasonal Flow Objective
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 the tiered minimum (6-9 kcfs) based upon the COE May Final WSF for the April-August period. 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 not be set until May. 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 Clarified USFWS BiOp, up to 10 kcfs will be spilled in various years to improve sturgeon habitat. This year's sturgeon volume will be determined by the Corps' May Final April–August ~~water supply forecast~~ (WSF). At that time, the Corps will be able to determine the sturgeon volume and have a better estimate of sturgeon flow start date, reservoir elevation, and the recommended flow pattern given the sturgeon volume. If the May WSF is less than 4800 KAF, there is no designated sturgeon volume and no spill will be provided.

Libby Dam - April 10 and Refill Objectives

Libby's April 10 objective is 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>). The project has been on minimum flows of 4,000 cfs since January 1, 2010 and is projected to be releasing minimum flows through April 30, 2010. The current elevation at Libby is 2,406.6 ft as of February 22, 2010. Inflows have been less than the instantaneous minimum of 4,000 cfs and Libby's elevation is not projected to be at the April 10 objective. Since the project must provide sturgeon flows and is usually requested by SOR to maintain a flat flow (after the sturgeon flows) to reach 2,439 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. The volume to reach the end of September draft target is salmon flow augmentation water.

Libby Dam – Summer draft Limit

~~Experimental~~ The Libby summer draft is 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 April Final TDA April-August forecast is 64.3 MAF, which indicates that the 20 ft draft will likely be triggered.

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. ~~Meet~~ The minimum flow requirements for bull trout from May 15 to September 30 ~~as~~ is 6,000 cubic feet per second (cfs), as described in the USFWS 2006 Libby Biological Opinion, and 4,000 ~~cubic feet per second (cfs) in~~ October through May 14 ~~for resident fish.~~

~~The Dalles trigger for drafting to 20 ft from full is if TDA Apr Aug inflow volume is less than 71.8 MAF. The 01 April Dalles forecast is 64.3 MAF which indicates that the 20 ft draft will be triggered but the 01 May forecast will set the final Summer Draft Limit for Libby Dam.~~

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~~ 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~~Final WSF. Based on the March ~~final~~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 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 April ~~Final~~Final forecast from the RFC for The Dalles (April-August) was 60.9 maf, thus indicating a draft to elevation 3540 feet by September 30 will likely occur. ~~The May final forecast is the official determination of the draft limit.~~

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~~Final WSF for The Dalles. Based on the March ~~final~~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 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 a 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~~Final April –August WSF at The Dalles Dam. Based on the April ~~final~~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).

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 low 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 April 26 Dworshak dam was releasing minimum outflow and at elevation 1543.5 feet (full is 1600.0 feet). The official [Corps April Final Corps water supply forecast WSF](#) for April–July is 1.4 MAF or 52% of average. Due to lack of snow, especially at lower elevations, the project has a significant chance of not completely filling. Recent models have been inconsistent by how much, if any, Dworshak may miss refill with the key uncertainty being magnitude of spring rain events. The Climate Prediction Center 15 April outlook calls for equal chances for having above normal and below normal precipitation through mid May.

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. This limit determines the maximum draft available for summer flow ([July and August](#)) augmentation from Dworshak. [However, 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~~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 4.— Flood control elevations as of April , 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	1597.4	1597.46	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

(Concerns over LWG nav lock entrance remain. Steve notes he will comment to allow for possible need.)

Table 5.— Snake River MOP elevations.

Project	Operation	Lower Range Elevation (ft)	Upper Range Elevation (ft)
Ice Harbor	MOP	437.0	438.0
Lower Monumental	MOP	537.0	538.0
Little Goose ^A	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 proposed spill priority list for March 17, 2010 is shown below. Involuntary spill will occur in the order shown. The priorities may be modified in 2010 ~~prior to the spill season by TMT~~ as needed based on spill operations, status of fish migration, spill/transport strategies, and research studies.

Spill Priority List
March 17, 2010 proposed spill priority list.

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	27	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	160	160	160
BON	50	65	100	150	225	270
CHJ	40	70	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

To be determined. The COE moved forward with a split strategy of spring spill and transportation for 2010 in the Snake River, which was consistent with the ISAB recommendation. 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. Summer spill at all projects will follow the 2010 FOP, unless changed through the TMT process.

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

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