

**Spring / Summer Update to the 2005
Water Management Plan**

DRAFT 16 March 2005

TABLE OF CONTENTS

1.	Introduction.....	3
2.0	Role of Water Supply Forecasts	4
3.0	Flow Objectives	4
	<u>Spring</u>	4
	<u>Summer</u>	4
	<u>Prospects For Meeting Flow Objectives</u>	6
4.0	Storage Project Operations	6
	<u>Libby Dam</u>	6
	Sturgeon Pulse	6
	<u>Hungry Horse Dam</u>	6
	Bull Trout Flows & Ramping Rates	6
	<u>Grand Coulee Dam</u>	7
5.0	Upper Snake River Flow Augmentation.....	8
6.0	Flood Control Operations	8
	<u>Dworshak/Grand Coulee flood control shift</u>	8
7.0	Minimum Operating Pool	9
8.0	Hanford Reach	9
9.0	Spill for Juvenile Fish Passage	9
	<u>Spring Spill Operations – Snake River Dams</u>	9
	Lower Granite Dam	11
	Little Goose Dam.....	11
	Lower Monumental Dam.....	11
	Ice Harbor Dam.....	12
	<u>Summer Spill Operations – Snake River Dams</u>	12
	Lower Granite Dam, Little Goose Dam, Lower Monumental Dam.....	12
	Ice Harbor Dam.....	12
	<u>Spring and Summer Spill Operations – Lower Columbia River</u>	
	<u>Dams</u>	12
	McNary Dam	12
	John Day Dam.....	12
	The Dalles Dam	13
	Bonneville Dam	13
10.	Water Quality – Spill Priority List.....	14
	<u>2004 GAS Cap levels</u>	15
	<u>Other Spill Operations</u>	15
11.	2005 Fish Passage Research	16
	Lower Granite Dam	16

<u>Lower Monumental Dam</u>	16
<u>Ice Harbor Dam.....</u>	16
<u>McNary Dam</u>	16
<u>The Dalles Dam</u>	16
<u>Bonneville Dam</u>	16

Draft Spring / Summer Update to the 2005 Water Management Plan

1. Introduction

The 2005 Spring / Summer update to the Water Management Plan (WMP) updates information on how the Action Agencies plan to operate the Federal Columbia River Power System (FCRPS) reservoirs during the spring and summer seasons.

The *Spring / Summer WMP Update* (S/S Update) is needed because water supply forecasts for the spring and summer time period are not available at the time the water management plan is written. Planned operations in the *S/S Update* 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 how the FCRPS will be operated in 2005. The “April Final” water supply forecast is the most current forecast available when the final version of the *S/S Update* is completed.

The *S/S Update* also reports 2005 research operations planned for the FCRPS projects. Research studies are routinely conducted to test the performance of current or new fish passage operations and the effects on a wide range of conditions, including spill survival, tailrace egress, transport benefits and the performance of new passage devices like the Bonneville second powerhouse corner collector. The Studies Review Work Group establishes the research study plan in the spring just prior to the commencement of the spring migration. The *S/S Update* summarizes the project operations that support these research activities.

The *S/S Update* does not repeat all of the information in the WMP, but does provide additional detail and specifies operations based on the current water supply forecast or changes that need to be made in operations because of the availability of current water supply forecasts, flow projections, and other new information.

2.0 Role of Water Supply Forecasts

There are four forecast points that are used to determine BiOp operation of the FCRPS reservoirs. The latest forecasts (~~March February May~~ Final) are given below.

Forecast Point	Forecast Period	Forecast Date	Value (MAF)
Lower Granite	April – July	March February January Final	9.9612.714.9
Lower Granite	April – July	April Final	A
The Dalles	April – August	March February January Final	57.269.274.3
The Dalles	April – August	April Final	A
Hungry Horse	April _ August	February January Final	1.601.86
Hungry Horse	April – August	March Final	1.289 ^{AB}
Libby	April – August	March February January Final	5.37635.8
Libby	April - August	May <u>or June (usual practice)</u>	C

All forecasts are from the National Weather Service unless otherwise indicated

A – Value that is used to set operations

B – USBR Forecast C – COE Forecast

3.0 Flow Objectives

Spring

The spring flow objectives for Lower Granite and McNary are established by the ~~April January~~ final water supply forecast. The Priest Rapids spring flow objective is fixed (not dependent on the water supply forecast). Based on the ~~April March February~~ final forecast the spring flow objectives are shown below.

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

Summer

The summer flow objective for Lower Granite Dam is based on the June Final water supply forecast. Based on the latest water supply forecast (~~March February January~~ Final) the summer flow objectives are shown below. The McNary summer flow objective is fixed (not dependent on the water supply forecast).

Project	Summer Flow Objective
Lower Granite	50 KCFS
McNary	200 KCFS

Prospects For Meeting Flow Objectives

An analysis of the likelihood of meeting the flow objectives was conducted by using the Corps' QADJ runs of the HYSSR model. This model uses the volume of the current water supply forecast and applies the ~~6959~~ runoff shapes observed in the historical record to this forecast volume. The likelihood of meeting the flow objectives and refilling the reservoirs by the targeted dates is a function of both the runoff volume and the timeframe in which the snowmelt and stream flows occur. The likelihood of meeting the 2005~~4~~ spring/summer flow objectives are shown in listed below.

~~See~~ Appendix A for the latest QADJ run. (Based on the ~~March February Final May Early~~ water supply forecast) For this draft update, the QADJ run is linked to the TMT agenda on the web, for the February 16, 2005 meeting. It is located at: <http://www.nwd-wc.usace.army.mil/tmt/agendas/2005/0216.html>

4.0 Storage Project Operations

See Appendix B for Volume Charts for Libby, Dworshak and Hungry Horse. These charts will be added to the update when they become available.

Libby Dam

Sturgeon Pulse

The current water supply forecast -of 5.~~37637~~ MAF for Libby (April – August) puts Libby operations in the 2nd tier of operations for sturgeon called for in the USFWS 2000 Biological Opinion. The 2nd tier sturgeon operation calls for a sturgeon flow volume of ~~80077 KAF.98 MAF~~ and minimum bull trout flows of 7 kcfs in July.

An SOR with specific flow and date recommendations will be submitted to TMT prior to initiating a flow operation for sturgeon.

Hungry Horse Dam

Bull Trout Flows & Ramping Rates

Based on the Bureau of Reclamation ~~February March January~~ forecast for April – August of ~~160012891859~~ kaf, the minimum outflow from Hungry Horse will be ~~742483900~~ cfs and the minimum flow for Columbia Falls will be ~~3,4053250 3,53600~~ cfs.

Hungry Horse April 10 and June 30 refill objective

Due to minimum flow requirements and winter flood control elevations at Hungry Horse Dam the April 10 refill objective will not likely be achieved. Based on the March final water supply forecast the Bureau of Reclamation expects to achieve the June 30 refill objective of 3560 feet.

Grand Coulee Dam

Grand Coulee April 10 and June 30 refill Objective

Based on the ~~February-March~~ Final WSF the April 10 refill objective is elevation 1283.3 feet. However, due to the maintenance required on the drumgates Grand Coulee will be held at a maximum elevation of 1255 feet for six weekends starting April 1. After completion of the required work Grand Coulee is not expected to refill to elevation 1290 feet by the first week of July.

Grand Coulee Summer Draft Limit

Based on the ~~FebruaryMarchMay~~ final forecast of April – August runoff volume at the Dalles, the summer draft limit for Grand Coulee is expected to be 1278 feet. The draft limit for this project officially changes from 1280 to 1278 feet when the July final April-to-August runoff volume forecast for The Dalles is less than 92 Maf. The current forecast (~~FebruaryMarchMay~~ final) calls for a runoff volume of ~~69.274.3~~ X MAF during this period.

Dworshak Dam

Summer Draft for Temperature Control

A key operation at Dworshak Dam is to draft cold water from the Dworshak reservoir in July, August, and September to cool water temperatures 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 the making the decisions of when and how to draft Dworshak for water temperature control.

5.0 Upper Snake River Flow Augmentation

The Bureau of Reclamation currently estimates ~~up to 487~~ that a volume between 175 kaf and ~~225300~~ kaf will be available for flow augmentation in 200~~5~~4.

6.0 Flood Control Operations

The flood control elevations based on the ~~March February~~ April final forecast are shown in the following table.

Note that April 10th flood control elevations are interpolated, as there is no official method of determining April 10th flood control elevations

Project	Date						
	31-Jan	28-Feb	15-Mar	31-Mar	10-Apr	15-Apr	30-Apr
ARDB	1433.2	1433.4		1433.50.6		1438.50.6	1438.50.6
LIB	2420.9	2432.1	2441.135.9	2442.035.9		2442.64	2443.2
DCDB	1839.3	1812.5		1810.207.7		1810.207.7	1810.207.7
HGH	3546.8	3550.9		3555.61.8	3552.1	3556.72.2	3557.752.6
GCL	1290.0	1290.0		1283.3	1283.3	1283.3	1283.3
GCL-shifted	1290.0	1290.0		1281.93.3	1283.3	1282.83.3	
BRN	2077.0	2077.0		2077.0		2077.0	2077.0
BRN-shifted	2077.0	2077.0		2077.0		2077.0	
DWR	1557.4	1571.2		1588.55.6	1591.7	1597.44.8	1597.4
DWR-shifted	1556.3	1571.2		1593.385.7	1591.8	1599.54.8	

Dworshak/Grand Coulee flood control shift

Dworshak/Grand Coulee flood control shift will occur this year, if conditions are favorable.

7.0 Minimum Operating Pool

The minimum operating pool (MOP) operation for the Lower Snake projects is scheduled to start April 3rd. The table below shows planned operations in 2005~~4~~. It was agreed at the March 17, 2004 TMT meeting that because of human health and safety issues associated with navigation concerns Ice Harbor, Little Goose, and Lower Granite would be operated at MOP+1 to MOP+2. TMT may address, on an in-season management basis, navigation or other concerns that may result in adjustments in BiOp MOP operations.

Project	Lower Range		Upper Range	
	Operation	Elevation	Operation	Elevation
Ice Harbor	MOP+1	438	MOP + 2	439
Lower Monumental	MOP	537	MOP + 1	538
Little Goose	MOP+1	634	MOP + 2	635
Lower Granite	MOP +1	734	MOP + 2	735

At John Day the forebay will be operated within a 1.5-foot range of the minimum level that provides irrigation pumping from April 10th to September 30th. The initial range will be 262.5 and 264.0feet. The minimum level will be adjusted upward if needed to facilitate irrigation pumping.

8.0 Hanford Reach

The Vernita Bar protection level flow was set at a level of 65 kcfs based on the November 21 and 28, 2004 redd counts. This year's Vernita Bar protection operation is scheduled to end May 11. See Appendix C for the Hanford Reach Agreement. The ability to meet the protection level of 65 kcfs from April 1 through the first week of July will be dependent on the inflow into Grand Coulee.

9.0 Spill for Juvenile Fish Passage

~~Note: At this time the spill operations for the 2005~~4~~ spill season have not been finalized yet. Information below is the best of our knowledge and subject to change.~~

Spring Spill Operations – Snake River Dams

~~The current forecasted spring seasonal average inflow for Lower Granite Dam, based on February water supply forecasts, is less than 70 kcfs. This is below the UPA's 70 kcfs trigger level for spill at the lower Snake River collector projects, Lower Monumental, Little Goose, and Lower Granite. If forecasts increase and spill occurs, it will begin on or~~

about April 3, with TMT recommending an actual date for spill to start. Spill will end April 20 if the flow projection is between 70 and 85 kcfs, and will continue until the end of the spring season if the flow projection exceeds 85 kcfs. Ice Harbor will provide spill for fish passage according to specifications in the 2004 UPA and the 2005 WMP, starting April 3 or as recommended by TMT. ~~significantly lower than the 85 kcfs trigger level, at which the 2004 UPA NMFS BiOp calls for maximizing juvenile fish transport. After discussions in the regional Technical Management Team and Implementation Team forums and no consensus being reached, the Corps of Engineers issued the following statement on this issue.~~

Corps of Engineers Decision **2004 Spring Spill at Lower Snake River Projects**

~~The 2004 Final Updated Proposed Action for the FCRPS biological Opinion Remand (UPA) has provisions for spill when seasonal average Snake River flows are projected to be above 85,000 cfs (RPA 40). February final runoff volume forecast is for seasonal average Snake River flows to be about ????? cfs, well below the threshold for spill. As a result, the UPA calls for maximizing fish collection and transportation in the Snake River. Recent transport research results have raised questions about the benefits of transporting yearling Chinook salmon in April (as opposed to leaving them to migrate inriver). As a result, one~~

;

Lower Granite Dam

~~Based on current projections of spring seasonal flow at Lower Granite, no spill for fish passage will occur in spring 2005. If spill for fish passage occurs, the RSW will be operated plus training spill of approximately 12 kcfs for 24 hours per day. Spill will be provided according to the pattern given in the 2005 Fish Passage Plan Table LWG-9. Spill at Lower Granite will start April 3. The default spill operation was spill using the RSW plus training spill of approximately 12 kcfs. There will several times that spilling to the 120% gas at night was used to offset times when daytime spill was not available because of equipment installation. Spill will end April 23.~~

Little Goose Dam

~~Based on current projections of spring seasonal flow at Lower Granite, no spill for fish passage will occur at Little Goose in spring 2005. If spill for fish passage occurs, the schedule specified in the UPA will be followed, which is spill 12 hours per day, 1800 hours – 0600 hours, to the TDG cap. Spill at Little Goose will start April 7. Spring spill passage at Little Goose Dam was as specified in the BiOp. Spill nights to gas cap (1800–0600). Spill ended April 23.~~

Lower Monumental Dam

~~Based on current projections of spring seasonal flow at Lower Granite, no spill for fish passage will occur at Lower Monumental in spring 2005. If spill for fish passage occurs, the schedule specified in the UPA will be followed, which is spill 24 hours per day. The amount to be spilled will be a percentage of the project outflow with the spill percentage being 50% when total project outflow is less than 75 kcfs or greater than 100 kcfs. The spill percentage will be 45% when the total project outflow is between 75 and 100 kcfs. Because of the low water supply this year spill at Lower Monumental will be limited.~~

Ice Harbor Dam

~~Spill for fish passage will be provided at Ice Harbor according to specifications in the 2004 UPA. In addition, A test of the effect the effect on juvenile fish of operating the new removable spillway weir (RSW) on juvenile fish of two different spill patterns will be tested this spring and summer. Spill patterns and amounts will be varied in the test. The dates of this test will be from April 15th to July 15th. Spill operation will involve two distinct operations including one “bulk” spill pattern and one small gate opening pattern. Specifics will be coordinated with the fishery agencies and others as needed. The “bulk” spill pattern will consist of spilling up to the gas cap 24 hours a days and spilling the small gate pattern will consist of spilling 45 kcfs 24 hours a day. (See section 11 for further details). Spill during any the non-test periods will be as specified in the UPABiOp (spill limited to 45 kcfs during the day and spill to the gas cap at night). Spill started at Ice Harbor April 13.~~

Summer Spill Operations – Snake River Dams

The summer spill planning ~~dates are period is~~ June 21-August 31 for the Lower Snake projects.

Lower Granite Dam, Little Goose Dam, Lower Monumental Dam

As ~~specified in the UPA recommended in the BiOp~~, no spill and full transport will be conducted at the Snake River transport dams.

Ice Harbor Dam

See spring spill section for details.

Spring and Summer Spill Operations – Lower Columbia River Dams

McNary Dam

Spring spill will begin on or about April 10 and will be conducted as specified in the UPA which calls for night spill (1800 – 0600 hours) to the gas cap. Spring spill will be suspended when river conditions are no longer spring-like (flows <200 kcfs and water temperature reaches →62-degrees F) and transport will be initiated. No summer spill with maximum transportation occurs at McNary Dam.

John Day Dam

Spill will be provided from April 10 through August 31 (planning dates) for spring and summer migrants as stated in the UPA. Between May 15 and June 20, spill will occur from 1900 to 0600 hours (11 hours total). Before that time period, spill will be for 12 hours nightly, from 1800 to 0600 hours. From April 10 to June 20, spill discharges will be 60% of instantaneous project flow at project flows up to 300,000 cfs. Above 300,000 cfs project flow, spill discharges will be 180,000 cfs (up to the hydraulic limit of the

powerhouse). From ~~June~~^{July} 21 through August 31, spill will be 30% of instantaneous project flow 24-hours per day. Spill will be provided in a manner consistent with TDG management to avoid excessive gas supersaturation.

The Dalles Dam

Spill will be 40% of total project outflow. ~~out spill~~ not to exceed the 120% TDG cap.

Bonneville Dam

-Spill will be as specified in the UPA, spill to the TDG cap at night and spill 50 to 75 kcfs (~~adult~~ fallback limit) during the day.

10. 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. Starting out in 2005⁴ involuntary spill will occur in the following order shown below. The priorities will be modified as needed based on status of fish migration, spill/transport strategies, and studies, and other factors.

1. Lower Granite
2. Little Goose
3. Lower Monumental
4. Ice Harbor
5. McNary
6. The Dalles
7. John Day
8. Bonneville
9. Wanapum
10. Wells
11. Rocky Reach
12. Rock Island
13. Priest Rapids
14. Chief Joseph
15. Grand Coulee

On May 7 the order changed to:

- ~~1. Ice Harbor~~
- ~~2. McNary~~
- ~~3. The Dalles~~
- ~~4. John Day~~
- ~~5. Bonneville~~
- ~~6. Lower Monumental~~
- ~~7. Little Goose~~
- ~~8. Lower Granite~~
- ~~9. Wanapum~~
- ~~10. Wells~~
- ~~11. Rocky Reach~~
- ~~12. Rock Island~~
- ~~13. Priest Rapids~~
- ~~14. Chief Joseph~~
- ~~15. Grand Coulee~~

~~This change was made to help maximize juvenile fish transport at the collector dam on the Lower Snake River.~~

200~~4~~3 GAS Cap levels

The range of gas caps during 200~~4~~3 at the projects is shown below. The flow ranges listed below maintained the gas cap limits at the individual projects during the year.

	Min Kcfs	Max Kcfs
BON	<u>75400</u>	<u>180470</u>
TDA	<u>7085</u>	<u>130435</u>
JDA	<u>7095</u>	<u>155465</u>
MCN	<u>130400</u>	<u>185460</u>
IHR	<u>7054</u>	<u>92440</u>
LMN	<u>2545</u>	44
LGS	<u>3827</u>	43
LWG	<u>2036</u>	<u>4743</u>

Other Spill Operations

Based on a study conducted by a subgroup of the Regional Forum Water Quality Team, it was determined that joint operations of Chief Joseph and Grand Coulee Dam for power and total dissolved gas production could result in an overall reduction in TDG levels both upstream and downstream of Chief Joseph dam by taking advantage of the larger generation flow capacity of Grand Coulee and the lower average TDG loading below the Chief Joseph spillways (absent deflectors). As a result of this study, and coordination with the Bureau of Reclamation and the Colville Tribe, the joint operation of Grand Coulee and Chief Joseph will be conducted during the 2004 spill season. Operationally, this will be as follows,

- When Lake Roosevelt is below 1260' elevation, spill from the Grand Coulee outlet tubes be avoided by shifting all spill to Chief Joseph for spill discharges up to 70 kcfs. If river conditions require spill releases above 70 kcfs at Chief Joseph, the additional spill should be distributed between Chief Joseph and Grand Coulee in a 2.5 to 1 ratio.
- When Lake Roosevelt TDG is elevated and at or above 1260' elevation, spill over the drum gates at Grand Coulee may be beneficial to the system due to potential degassing. The continuation of monitoring practices and additional investigations of these operational measures on TDG exchange are recommended to further establish efficient and effective joint operations at Grand Coulee and Chief Joseph.

11. 200⁵⁴ Fish Passage Research

Summaries of 200⁵⁴ fish passage research studies that have the potential to change project operation are described below. Descriptions will be provided in future draft WMP updates as they become available.

Lower Granite Dam

Lower Monumental Dam

Ice Harbor Dam

McNary Dam

The Dalles Dam

Spillwall Post Construction Evaluation.

Bonneville Dam

Unit Priorities for spring and summer.

12. Research Activities that will Impact Project Operations (to be updated in later draft)

Project	200 5 4 Snake River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Lower Granite			
Little Goose		N/A	N/A
Ice Harbor	Spillway survival	4/15—7/15: 24 hrs Bulk spill vs. FPP 2-day block design.	

Project	200 5 4 Lower Columbia River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Bonneville	Route specific and spill survival	6/20—7/31 50kefs/24 hrs vs. Day: 75kefs Night: Gas cap	
The Dalles	Post-construction evaluation of spillway wall	4/13—5/1: Daytime only balloon tag releases. 12-18kefs vs. 21kefs Late April—7/20: Radio tag mortality estimates	
	Sluice operations evaluation	4/19—6/30: 24 hrs 2-day block design 3-gates vs. 6-gates	7/1—7/17: 24 hrs 2-day block design 3-gates vs. 6-gates
John Day		N/A	N/A
McNary		N/A	N/A

Appendix A Qadj Runs.

(to be included in later draft)

**Appendix B Volume Charts for Libby, Dworshak and
Hungry Horse.**

(to be included in later draft)

~~**Appendix C Hanford Reach Agreement.**~~

