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Spring / Summer Update to the 2005 Water Management Plan

FINAL 3 May 2005

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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 (WSF)

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

Forecast Point	Forecast Period	Forecast Date	Value (MAF)
Lower Granite	April – July	March Final	9.96
Lower Granite	April – July	April Final	11.1 ^A
The Dalles	April – August	March Final	57.2
The Dalles	April – August	April Final	60.8 ^A
Hungry Horse	April – August	February Final	1.60
Hungry Horse	April – August	March Final	1.289 ^{AB}
Libby	April – August	April Final	5.4
Libby	April - August	May or June (usual practice)	^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 final water supply forecast. The Priest Rapids spring flow objective is fixed (not dependent on the water supply forecast). Based on the April 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 (April Final) the summer flow objectives are shown below. The McNary summer flow objective is fixed (not dependent on the water supply forecast). Priest Rapids does not have a summer flow objective.

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 69 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 spring/summer flow objectives are shown in Appendix A for the QADJ run based on the April Final water supply forecast. For this update, the QADJ run is linked to the TMT agenda on the web, for the April 13, 2005 meeting. It is located at:

<http://www.nwd-wc.usace.army.mil/tmt/agendas/2005/0413.html>

4.0 Storage Project Operations

See Section 12 for latest QADJ model runs, Section 13 for latest ESP HYSSR model runs, Section 14 for volume charts for Libby, Dworshak and Hungry Horse and Section 15 for latest Dworshak ESP graphs.

Libby Dam

Sturgeon Pulse

The Corps' May Final WSF of 5.10 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 800 KAF and minimum bull trout flows of 7 kcfs in July.

USFWS will submit an SOR to TMT with specific flow and date recommendations prior to initiating a flow operation for sturgeon.

Hungry Horse Dam

Bull Trout Flows & Ramping Rates

The March final Bureau of Reclamation WSF for April – August was 1289 kaf. Minimum outflow from Hungry Horse and Columbia Falls are based on the March final forecast. This year they were set at 483 cfs and 3250 cfs, respectively. The April WSF for April – August was 1372 kaf.

Hungry Horse April 10 and refill objective

Due to minimum flow requirements and winter flood control elevations at Hungry Horse Dam the April 10 refill objective of 3556.7 feet was not be achieved. The project was at 3548.5 feet on that date. Based on the April final water supply forecast the Bureau of Reclamation expects to achieve the refill objective of 3560 feet about the first week in July.

Grand Coulee Dam

Grand Coulee April 10 and June 30 refill Objective

Based on the April Final WSF the April 10 refill objective is elevation 1283.3 feet. However, due to the maintenance required on the drum gates Grand Coulee will be held at a maximum elevation of 1255 feet for six weeks 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 April 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 (April Final) calls for a runoff volume of 60.8 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 that a volume of approximately 144 kaf will be available for flow augmentation in 2005.

6.0 Flood Control Operations

The April 15 and April 30 flood control elevations based on the April final forecast are shown in the following table. The January 31 – March 31 flood control elevations were based on previous forecasts.

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		1438.5		1438.5	1438.5
LIB	2420.9	2432.1	2441.135.9	2442.0		2442.3	2442.7
DCDB	1839.3	1812.5		1810.2		1810.6	1810.6
HGH	3546.8	3550.9		3555.6	3555.6	3555.6	3556.6
GCL	1290.0	1290.0		1283.3	1283.3	1283.3	1283.3
GCL-shifted	1290.0	1290.0		1281.9	1282.5	1282.8	
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		1587.5	1587.5	1587.5	1593.7
DWR-shifted*	1556.3	1571.2		1593.3		1600.0	

- *Note the DWR April 15 and April 30 flood control elevations are based on level 1 local flood control using estimated snow covered area of the basin. Snow covered area and flood control estimates are re-evaluated weekly.*

Dworshak/Grand Coulee flood control shift

A Dworshak/Grand Coulee flood control shift did not occur this year as Dworshak was below its end of March flood control elevation.

7.0 Minimum Operating Pool

The minimum operating pool (MOP) operation for the Lower Snake projects planning date was April 3rd. The Salmon Managers submitted SOR 2005-3 requesting the Snake and John Day drafts to MOP be delayed because of low numbers of juveniles at Lower Granite. They requested Ice Harbor, Lower Monumental, Little Goose and Lower Granite start MOP operations April 4, April 13, April 12 and April 11, respectively. These are the dates that were implemented. 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 MOP operations. The table below shows the agreed upon elevations that were implemented.

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 264.0 feet. The minimum level will be adjusted upward if needed to facilitate irrigation pumping. Actual John Day operations 262.5' – 264' range started April 15, 2005 at the request of the Salmon Managers in SOR 2005-3.

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 when the water over the eggs have accumulated 1000 (C degrees) thermal units after the initiation of spawning. This is expected to occur May 13 – 15 . See the 2005 Water Management Plan, Appendix 7 for the Hanford Reach Fall Chinook Protection Program Agreement. It is located at: <http://www.nwd-wc.usace.army.mil/tmt/documents/wmp/>

9.0 Spill for Juvenile Fish Passage

Spring Spill Operations – Snake River Dams

The current forecasted spring seasonal average flow for Lower Granite Dam, based on April Final 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. For planning purposes, 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. Actual operations at Ice Harbor were spill for RSW testing beginning April 4 and spill for fish passage starting at 1800 hours on April 7. The spill for fish passage start date was requested in SOR 2005-4 and discussed at the April 6 TMT.

Lower Granite Dam

Based on current projections of spring seasonal flow at Lower Granite, no spill for fish passage will occur in spring 2005. Spill may occur for short periods of time if it appears the fish facility and barge holding capacity will be exceeded.

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.

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

Ice Harbor Dam

Spill for fish passage is provided at Ice Harbor according to specifications in the 2004 UPA which includes starting about April 3 (planning date). Actual operations at Ice Harbor were spill for RSW testing beginning April 4 and spill for fish passage starting at 1800 hours on April 7. The spill for fish passage date was requested in SOR 2005-4 and discussed at the April 6 TMT meeting. In addition, the effect on juvenile fish of operating the new removable spillway weir (RSW) will be tested this spring and summer. Spill patterns and amounts will be varied in the test. See section 11 for further details. Spill during any non-test periods will be as specified in the UPA (spill limited to 45 kcfs during the day and spill to the gas cap at night).

Summer Spill Operations – Snake River Dams

As specified in the UPA, the summer spill planning dates are June 21 - August 31 for Ice Harbor Dam.

Lower Granite Dam, Little Goose Dam, Lower Monumental Dam

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

Ice Harbor Dam

The UPA specifies summer spill up to 45 kcfs from 0500 – 1800 hours and 120%/115% gas cap during 1800 – 0500 hours from June 21 – August 31.

Spring and Summer Spill Operations – Lower Columbia River Dams

McNary Dam

Spring spill will begin on or about April 10 (planning date) and will be conducted as specified in the UPA which calls for night spill (1800 – 0600 hours) to the gas cap. Spring spill will end when river conditions are no longer spring-like (flows <220 kcfs and water temperature reaches 62 degrees F.) and transport will be initiated. No summer spill with maximum transportation occurs at McNary Dam. Actual spill started April 10 as requested in SOR 2005-04 and discussed at the April 6 TMT meeting. Starting April 25,

voluntary spill started 24 hr/day for 21 days between April 25 and June 5. During this period 24 hr/day spill will be alternating with 12 hour/day spill for 2 – 4 days at a time. This additional spill is for fish passage research.

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. 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). Between April 10 and May 14, spill will be 12 hours nightly from 1800 to 0600 hours. Between May 15 and June 20, spill will occur from 1900 to 0600 hours (11 hours total). From June 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. Actual spill started April 10 as requested in SOR 2005-04 and discussed at the April 6 TMT meeting. Actual spill amount and hours are as specified in the UPA.

The Dalles Dam

Spill will be provided from April 10 through August 31 (planning dates) for spring and summer migrants as stated in the UPA. Per the UPA, spill will be 40% of total project outflow, not to exceed the 120% TDG cap. Actual spill started April 11 as requested in SOR 2005-04 and discussed at the April 6 TMT meeting. Actual spill amount and hours are as specified in the UPA. Spillbays 3-6 were raised and dogged off at 6 foot openings on April 27. Spill through bays 1 and 2 were adjusted with spill patterns provided by Portland District to provide spill as close to 40% of total outflow as possible. Spillbays 3-6 were dogged off at 8 foot openings on April 27 and will continue to be adjusted as flows increase or decrease over a consistent period of time.

Bonneville Dam

Spill will be provided from April 10 through August 31 (planning dates) for spring and summer migrants as stated in the UPA. Spill per UPA is to spill to the TDG cap at night and spill 50 to 75 kcfs (adult fallback limit) during the day. Actual spill started April 15 as requested in SOR 2005-05. The daytime spill level was set at 50 kcfs initially and then increased to the UPA level of 75 kcfs on April 19, also as requested in SOR 2005-5.

10. Water Quality – Spill Priority List

River operations are conducted to meet State total maximum daily load (TMDL) total dissolved gas standards under the Clean Water Act. 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 2005 involuntary spill will occur if needed in the order shown below. The priorities will be modified in-season as needed based on status of fish migration, spill/transport strategies, studies, and other factors.

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

2004 Gas Cap spill levels

The project spill discharge ranges shown below were the minimum and maximum levels requested in 2004 to meet daily total dissolved gas cap limits at individual projects.

	Min Kcfs	Max Kcfs
BON	75	180
TDA	70	130
JDA	70	155
MCN	130	185
IHR	70	92
LMN	25	44
LGS	38	43
LWG	20	47

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. 2005 Fish Passage Research

Summaries of 2005 fish passage research studies that have the potential to change project operation are described below. Descriptions will be provided in the spring/summer updates as they become available.

Lower Granite

Research this year at Lower Granite during the summer is meant to determine the effectiveness of summer RSW operations for fall Chinook approach, passage and survival. Radio-telemetry and hydroacoustics will be performed on a blocked study test of bulk spill versus RSW testing given that flows are anticipated to exceed 25kcfs throughout the course of the study. The following schedule is highly speculative:

2005 LGR Proposed Spill Research Schedule				
Date	Block #	Treatment	Volume	Training Spill
06/20/05	1	Bay 1 - RSW	6 - 8 kcfs	?
06/21/05	1	Bay 1 - RSW	6 - 8 kcfs	?
06/22/05	1	Bay 2 - Bulk	6 - 8 kcfs	?
06/23/05	1	Bay 2 - Bulk	6 - 8 kcfs	?
06/24/05	2	Bay 1 - RSW	6 - 8 kcfs	?
06/25/05	2	Bay 1 - RSW	6 - 8 kcfs	?
06/26/05	2	Bay 2 - Bulk	6 - 8 kcfs	?
06/27/05	2	Bay 2 - Bulk	6 - 8 kcfs	?
06/28/05	3	Bay 1 - RSW	6 - 8 kcfs	?
06/29/05	3	Bay 1 - RSW	6 - 8 kcfs	?
06/30/05	3	Bay 2 - Bulk	6 - 8 kcfs	?
07/01/05	3	Bay 2 - Bulk	6 - 8 kcfs	?
07/02/05	4	Bay 1 - RSW	6 - 8 kcfs	?
07/03/05	4	Bay 1 - RSW	6 - 8 kcfs	?
07/04/05	4	Bay 2 - Bulk	6 - 8 kcfs	?
07/05/05	4	Bay 2 - Bulk	6 - 8 kcfs	?
07/06/05	5	Bay 1 - 8kcfs	6 - 8 kcfs	?
07/07/05	5	Bay 1 - 8kcfs	6 - 8 kcfs	?
07/08/05	5	Bay 2 - Bulk	6 - 8 kcfs	?
07/09/05	5	Bay 2 - Bulk	6 - 8 kcfs	?
07/10/05	6	Bay 1 - 8kcfs	6 - 8 kcfs	?
07/11/05	6	Bay 1 - 8kcfs	6 - 8 kcfs	?
07/12/05	6	Bay 2 - Bulk	6 - 8 kcfs	?
07/13/05	6	Bay 2 - Bulk	6 - 8 kcfs	?

Little Goose

None

Lower Monumental

Determine survival in Bays 7 vs. 8 during the spring for RSW planning using a radiotelemetry study. Also, determine direct injury in Bays 7 vs. 8 during the late spring for RSW planning, using balloon tags.

2005 Lower Monumental Proposed Spill Research Schedule					
	Study	Hours of Spill	Bay 1	Bay 7	Bay 8
3-May to 27-May	Radiotelemetry	10:00 - 15:00	1 Stop	5 Stops	5 Stops
28-May to 6-Jun	Balloon Tag	10:00 - 15:00	1 Stop	5 Stops	5 Stops

Ice Harbor Dam

This tests for differences in distribution and survival of juveniles when spilling to the gas cap or spilling with RSW. The RSW condition will spill from 25% to 35% of total outflow.

IHR 05 Proposed Treatment Schedule

Date	Block #	Treatment
24-Apr		1 Gas Cap
25-Apr		1 Gas Cap
26-Apr		1 RSW
27-Apr		1 RSW
28-Apr		2 RSW
29-Apr		2 RSW
30-Apr		2 Gas Cap
1-May		2 Gas Cap
2-May		3 Gas Cap
3-May		3 Gas Cap
4-May		3 RSW
5-May		3 RSW
6-May		4 RSW
7-May		4 RSW
8-May		4 Gas Cap
9-May		4 Gas Cap
10-May		5 RSW
11-May		5 RSW
12-May		5 Gas Cap
13-May		5 Gas Cap
14-May		6 RSW
15-May		6 RSW
16-May		6 Gas Cap
17-May		6 Gas Cap
18-May		7 Gas Cap

19-May	7 Gas Cap
20-May	7 RSW
21-May	7 RSW
22-May	8 RSW
23-May	8 RSW
24-May	8 Gas Cap
25-May	8 Gas Cap
26-May	9 Gas Cap
27-May	9 Gas Cap
28-May	9 RSW
29-May	9 RSW

McNary Dam

This study is to better define spill operation for 12 vs. 24 hour and the affect of juvenile distribution and survival.

2005 MCN Proposed Spill Treatment Schedule

Date	Block #	Treatment	Date	Block #	Treatment
23-Apr	1	12-h spill	17-May	7	12-h spill
24-Apr	1	12-h spill	18-May	7	12-h spill
25-Apr	1	24-h spill	19-May	7	24-h spill
26-Apr	1	24-h spill	20-May	7	24-h spill
27-Apr	2	24-h spill	21-May	8	12-h spill
28-Apr	2	24-h spill	22-May	8	12-h spill
29-Apr	2	12-h spill	23-May	8	24-h spill
30-Apr	2	12-h spill	24-May	8	24-h spill
1-May	3	12-h spill	25-May	9	12-h spill
2-May	3	12-h spill	26-May	9	12-h spill
3-May	3	24-h spill	27-May	9	24-h spill
4-May	3	24-h spill	28-May	9	24-h spill
5-May	4	24-h spill	29-May	10	12-h spill
6-May	4	24-h spill	30-May	10	12-h spill
7-May	4	12-h spill	31-May	10	24-h spill
8-May	4	12-h spill	1-Jun	10	24-h spill
9-May	5	24-h spill	2-Jun	11	12-h spill
10-May	5	24-h spill	3-Jun	11	12-h spill
11-May	5	12-h spill	4-Jun	11	24-h spill
12-May	5	12-h spill	5-Jun	11	24-h spill
13-May	6	24-h spill			
14-May	6	24-h spill			
15-May	6	12-h spill			
16-May	6	12-h spill			

12-h spill - current BiOp spill (gas cap, 1800-0600 hours)

24-h spill - 85 kcfs spill 24-hours per day (treatment begins at 0600 hours)

This is McNary's turbine upgrade testing. This is a test of the vertical barrier screens in turbine #4 under two turbine loads to assess the effects of new VBS on juvenile injury and survival.

2005 MCN Proposed Turbine Operation Treatment Schedule

Spring				Summer			
Date	Block	Release day	Treatment	Date	Block	Release day	Treatment
26-Apr	1	x	60 MW	1-Jun	1	x	60 MW
27-Apr	1		60 MW	2-Jun	1		60 MW
28-Apr	1	x	80 MW	3-Jun	1	x	80 MW
29-Apr	1		80 MW	4-Jun	1		80 MW
30-Apr	2	x	60 MW	5-Jun	2	x	60 MW
1-May	2		60 MW	6-Jun	2		60 MW
2-May	2	x	80 MW	7-Jun	2	x	80 MW
3-May	2		80 MW	8-Jun	2		80 MW
4-May	3	x	60 MW	9-Jun	3	x	80 MW
5-May	3		60 MW	10-Jun	3		80 MW
6-May	3	x	80 MW	11-Jun	3	x	60 MW
7-May	3		80 MW	12-Jun	3		60 MW
8-May	4	x	80 MW	13-Jun	4	x	80 MW
9-May	4		80 MW	14-Jun	4		80 MW
10-May	4	x	60 MW	15-Jun	4	x	60 MW
11-May	4		60 MW	16-Jun	4		60 MW
12-May	5	x	80 MW	17-Jun	5	x	60 MW
13-May	5		80 MW	18-Jun	5		60 MW
14-May	5	x	60 MW	19-Jun	5	x	80 MW
15-May	5		60 MW	20-Jun	5		80 MW
16-May	6	x	80 MW	21-Jun	6	x	80 MW
17-May	6		80 MW	22-Jun	6		80 MW
18-May	6	x	60 MW	23-Jun	6	x	60 MW
19-May	6		60 MW	24-Jun	6		60 MW
20-May	7	x	80 MW	25-Jun	7	x	60 MW
21-May	7		80 MW	26-Jun	7		60 MW
22-May	7	x	60 MW	27-Jun	7	x	80 MW
23-May	7		60 MW	28-Jun	7		80 MW
24-May	8	x	60 MW	29-Jun	8	x	60 MW
25-May	8		60 MW	30-Jun	8		60 MW
26-May	8	x	80 MW	1-Jul	8	x	80 MW
27-May	8		80 MW	2-Jul	8		80 MW

The Dalles Dam

Spillwall Post Construction Evaluation.

Bonneville Dam

Unit Priorities for spring and summer.

3. Research Activities that will Impact Project Operations

Project	2005 Snake River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Lower Granite	Determine approach, passage and survival during a low flow year	Only in case of emergency, (i.e. high bypass system mortality or fish #s exceeding transport capabilities)	N/A
	Determine effectiveness of summer RSW operations for fall Chinook approach, passage and survival. Radio-telemetry and hydroacoustics	N/A	Spill to be provided through RSW 24 hours per day (6-8 kcfs) and some level of training spill between mid-June and late July running for 3 or 4 weeks. .
Little Goose	Determine approach, passage and survival during a low flow year	N/A	N/A
Lower Monumental	Determine survival in Bays 7 vs. 8 during the spring for RSW planning, Radiotelemetry	This study will operate high gate opening spill for 25-day duration from 10:00 AM until 3:00 PM each day beginning May 3. Spill volume roughly 18.7 kcfs. Stops will be: Spillbay 8 – 5 stops, Spillbay 7 – 5 stops, Spillbay 1 - 1 stop.	N/A
	Determine direct injury in Bays 7 vs. 8 during the late spring for RSW planning, Balloon tags	This study will examine fish injury in spillbays 7 and 8 with a gate opening of 5 stops. Study is scheduled to begin mid-May and the duration will be 12-14 days. Specific details are currently being finalized.	
Ice Harbor	Determine approach, survival, passage and egress	See attached Table	

	in a test of RSW versus bulk spill operations during spring and summer		
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Project	2005 Lower Columbia River Research Summary Table		
	Research Objectives	Spring Spill Plan	Summer Spill Plan
Bonneville	Route specific and spill survival	BiOp Spill	
The Dalles	Post-construction evaluation of spillway wall	Bays 3-6, 8 foot gate opening using suspending pennants, bays 1-2 will be variable, based on total river discharge	Bays 3-6, 4 foot gate opening using suspending pennants, bays 1-2 will be variable, based on total river discharge
John Day	N/A	N/A	N/A
McNary		N/A	N/A

12. Latest Q ADJ Model

Summary of May Early Bird 2005 QADJ Model Runs

3-May-05

Assumptions:

- * Streamflows were adjusted to the May Early Bird Water Supply Forecast for the period of May thru August of 51.2 MAF at The Dalles (65% of average) and shaped 69 different ways based on observed historical runoff.
- * Starting elevations are actual April 30, 2005 elevations.
- * Grand Coulee tries to meet 130,000 cfs in May while not drafting below 1240 ft. In June the project refills to 1285 ft in all years, and fills above 1285 ft if Priest Rapids flows are above 125,000 cfs. Summer lake targets are 1285.0 ft in July and 1278 ft in August (per the BiOp).
- * Hungry Horse operates in May for a controlled refill by 30 June and meets minimum flow of 3250 cfs at Columbia Falls. The project drafts to 3540 ft by 31 Aug.
- * Brownlee operates to flood control elevations, which is elevation 2077 ft (or full pool) and drafts some in July - August.
- * Dworshak targets full in June and drafts to 1534 ft by 31 Aug.
- * Libby targets full in June while maintaining a minimum flow in May of 10,800 cfs and 10,400 cfs out in June for sturgeon, based on a Tier 2 sturgeon pulse. Libby drafts to 2439 ft by 31 Aug, with a minimum bull trout flow of 7,000 cfs.

Results:

Priest Rapids Meets the Following Flow Objectives:

Month	Occurrences out of 69 Years	Average Flow for 69 Years (kcfs)	Flow Objective* (kcfs)
May	59	133	130
Jun	50	129	125

** Note: Flow objectives listed may be less than what is prescribed in the BiOp but were used for modeling.*

Lower Granite Meets the Following Flow Objectives:

Month	Occurrences out of 69 Years	Average Flow for 69 Years (kcfs)	Flow Objective* (kcfs)
May	0	61	85
Jun	1	54	73
Jul	0	31	50
Aug 15	0	24	50
Aug 31	0	22	50

McNary Meets the Following Flow Objectives:

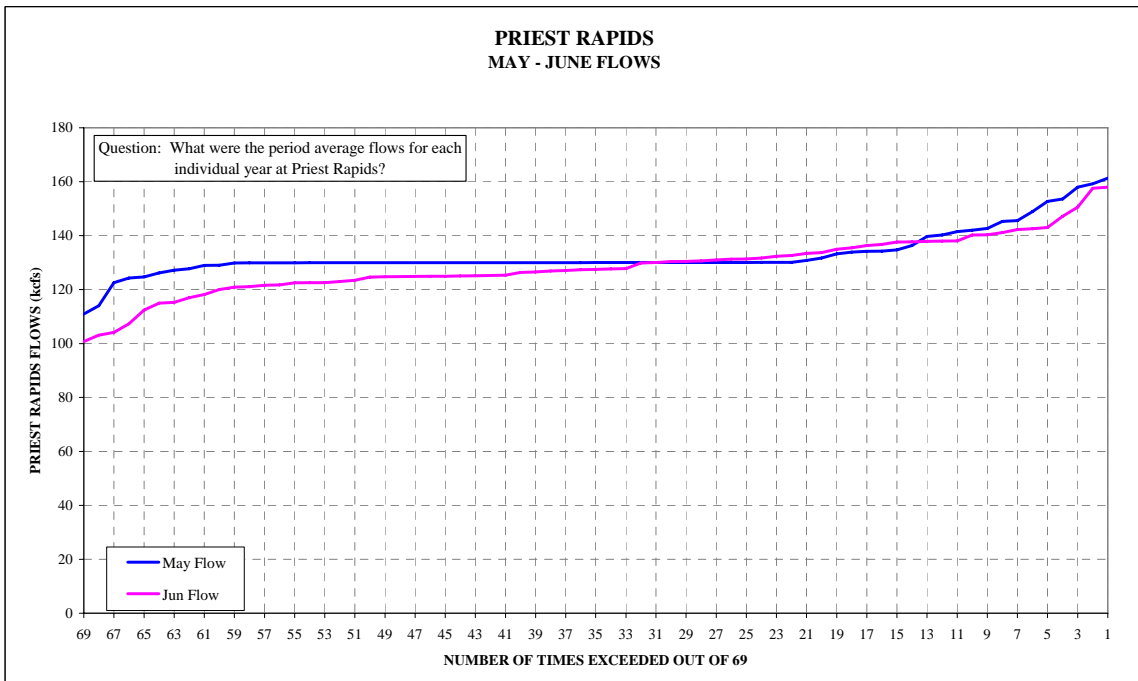
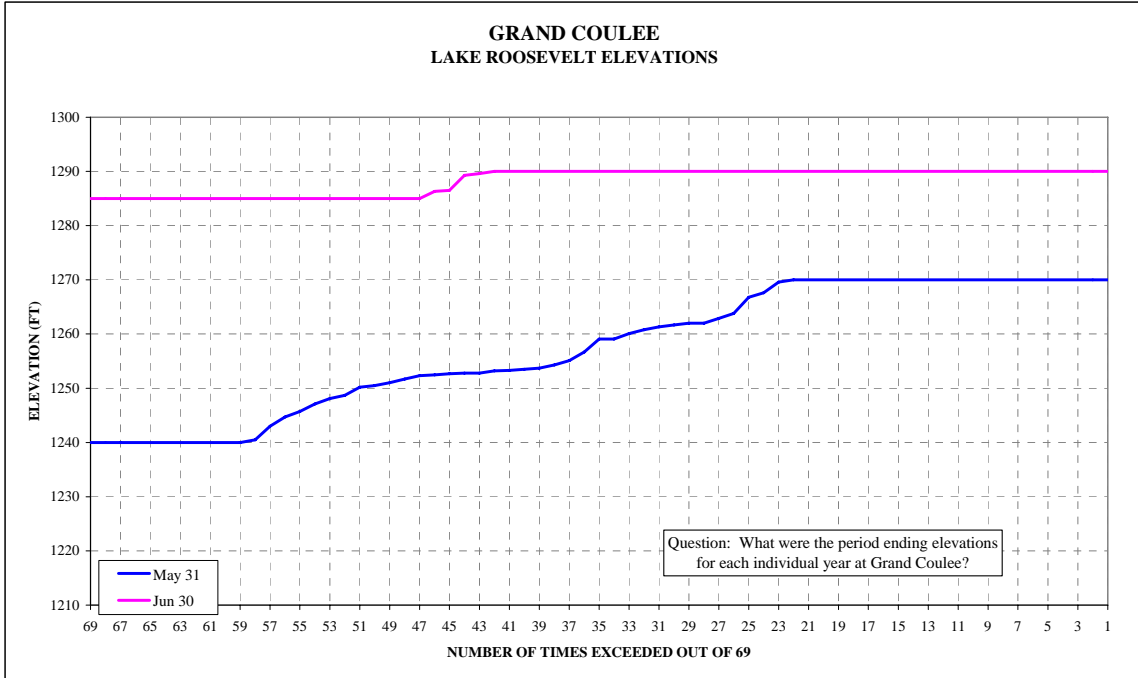
Month	Occurrences out of 69 Years	Average Flow for 69 Years (kcfs)	Flow Objective* (kcfs)
May	6	191	220
Jun	1	175	220
Jul	0	150	200
Aug 15	0	128	200
Aug 31	0	121	200

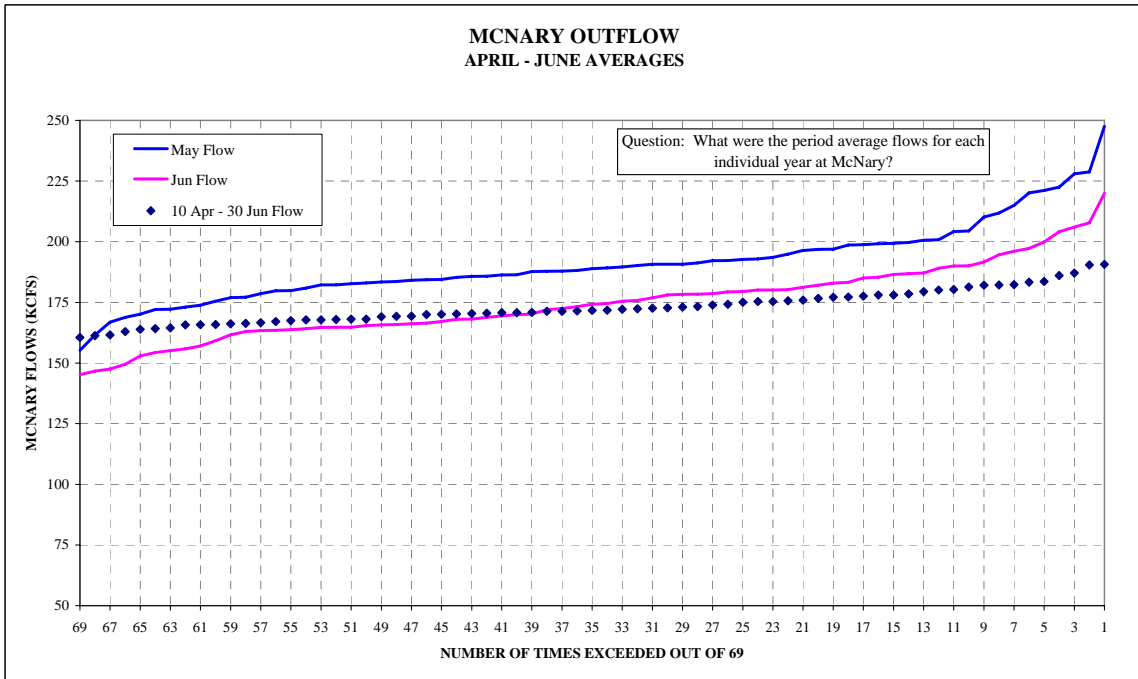
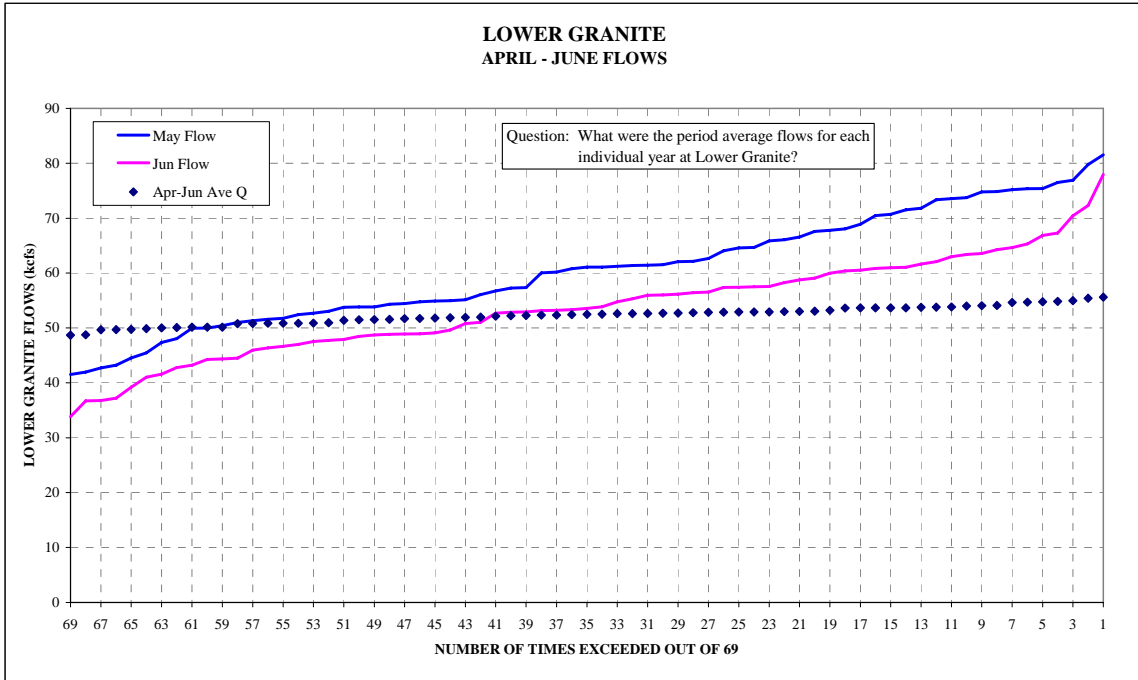
Projects Refill by 30 June:

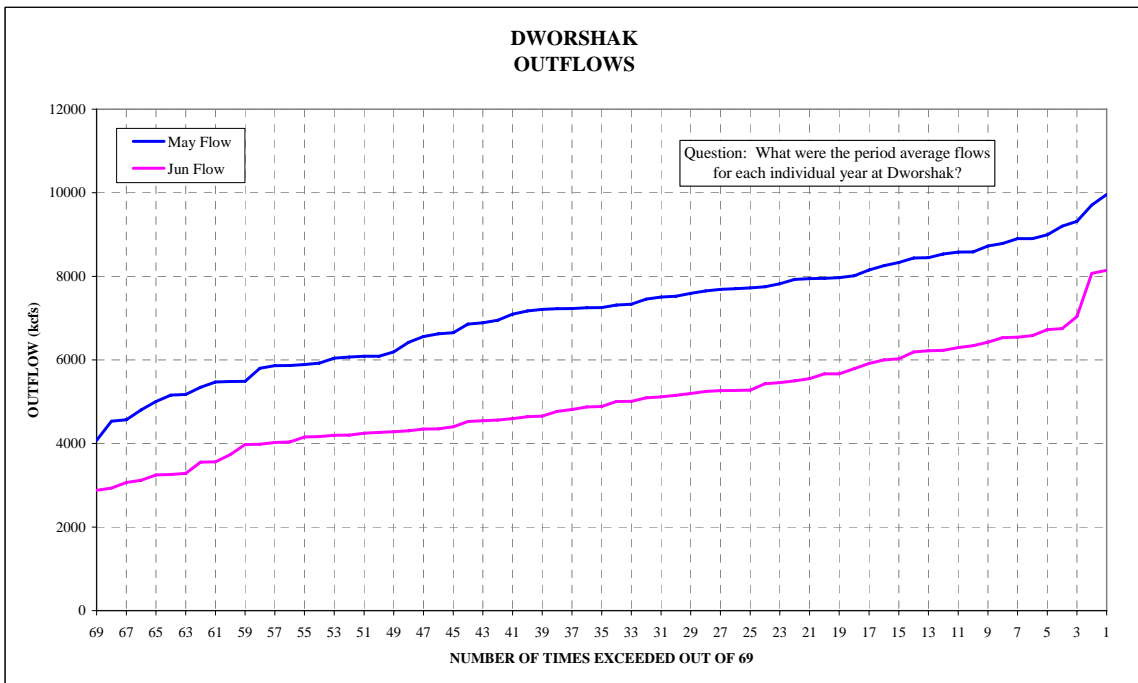
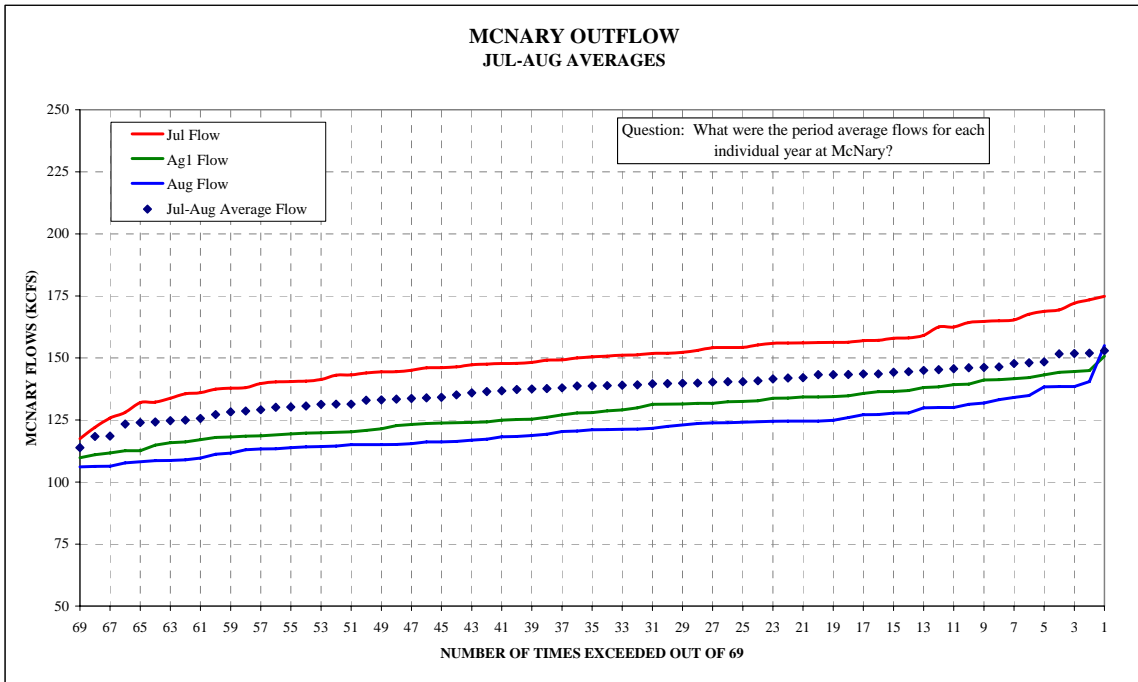
Month	Occurrences out of 69 Years	Average Elevation on 30 Jun for 69 Years
Libby	68	2459
Hungry Horse	69	3560
Grand Coulee	44	1288
Dworshak	69	1600

Period Average Outflows (kcfs):

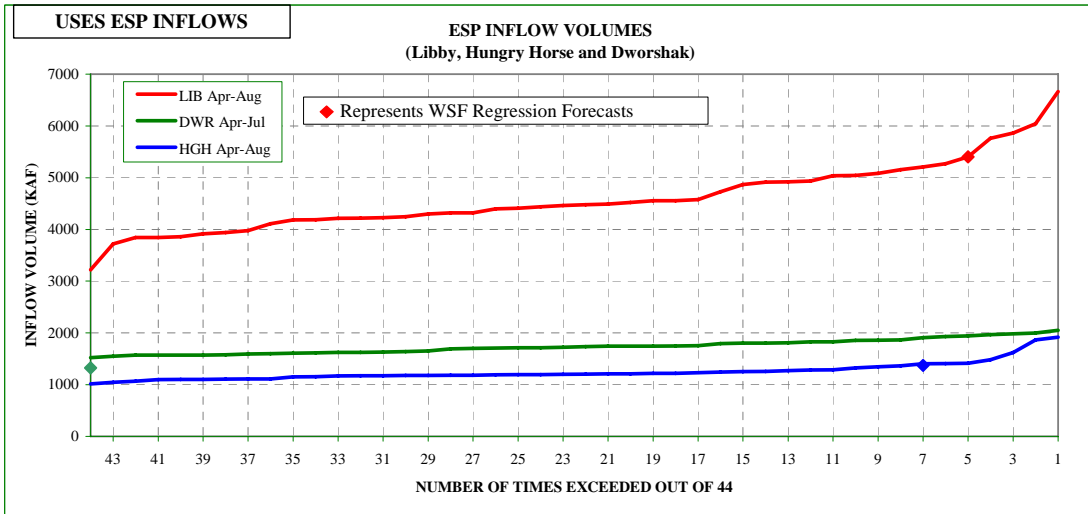
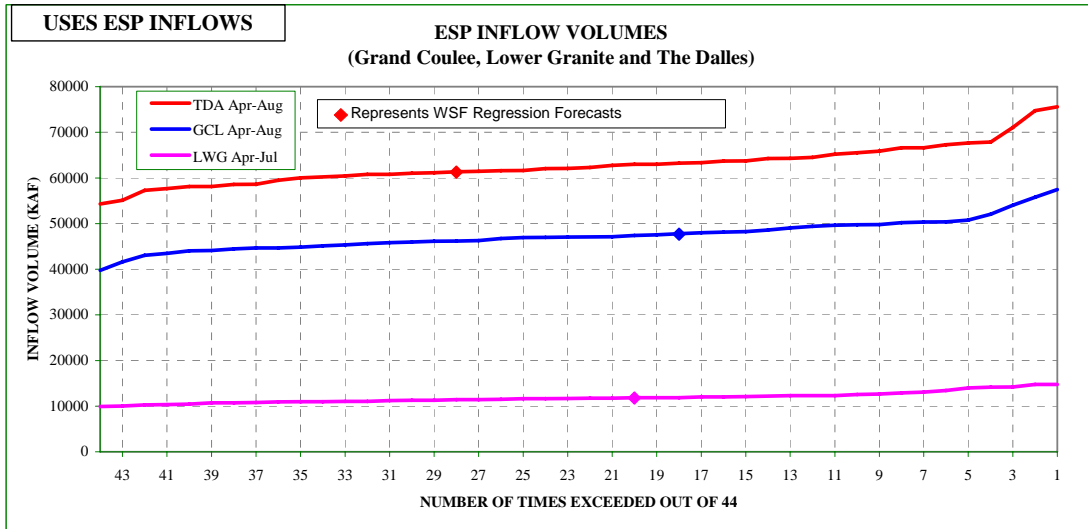
	Obs FEB 1-28	Obs MAR 1-28	Obs APR 1-15	Obs APR 16-30	MAY 1-31	JUN 1-30	JUL 1-31	AUG 1-15	AUG 16-31
LIB	4.0	4.0	4.0	4.0	11.2	17.5	21.5	19.6	16.5
HGH	1.0	0.9	2.1	7.2	5.3	5.4	5.8	5.4	4.2
GCL	101	91	76	82	116	108	117	102	98
PRD	111	100	85	95	133	129	126	107	101
DWR	1.6	1.6	3.6	5.4	7.1	5.0	10	10	9
BRN	10	11	13	12	13	11	8	9	9
LWG	21	22	39	45	61	54	31	24	22
MCN	134	123	132	147	191	175	150	128	121
TDA	140	125	136	143	191	168	146	127	121
BON	138	130	143	153	193	169	148	129	122







13. Latest ESP HYSSR Model Runs

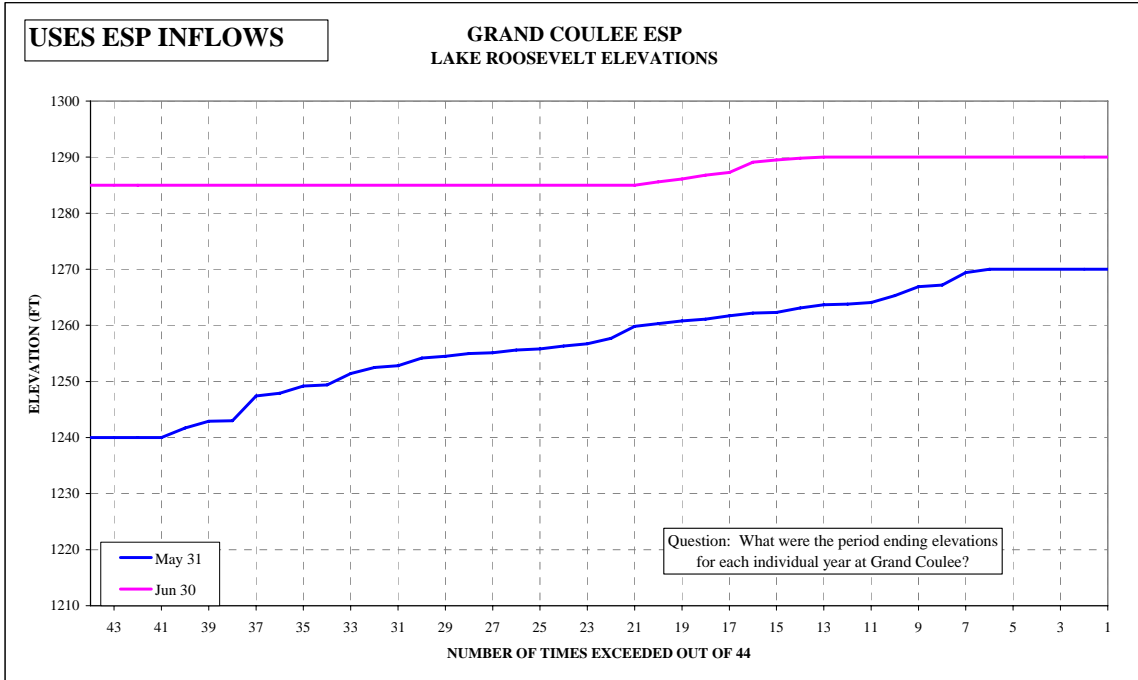


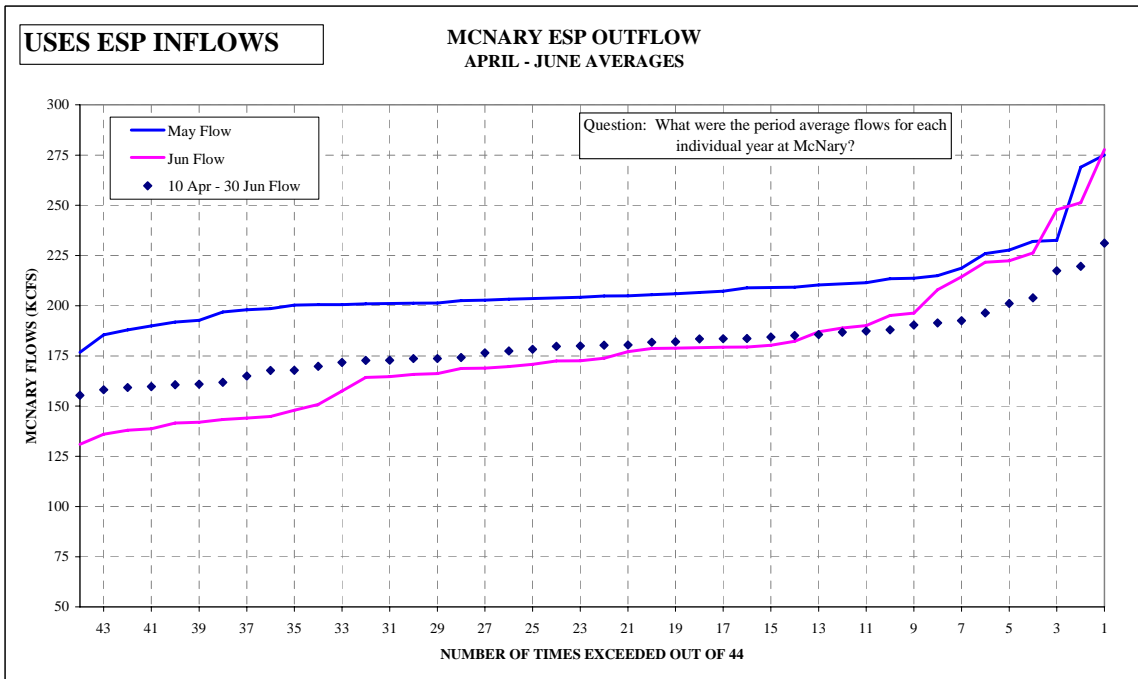
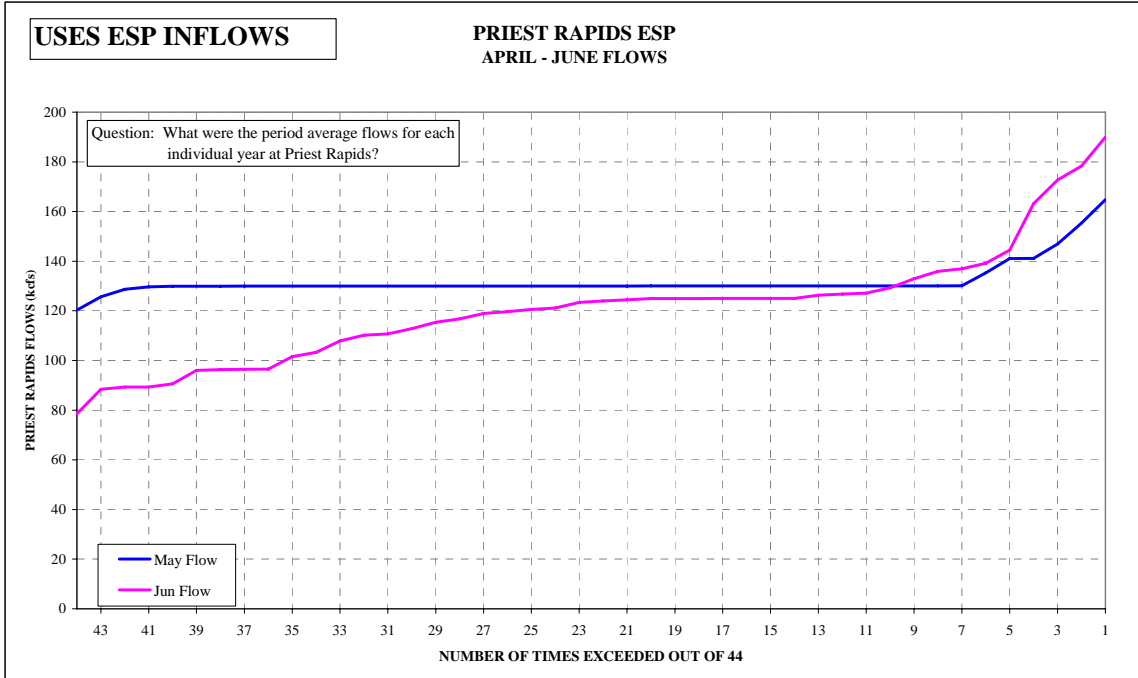
Volume Comparison Table (ESP versus Regression (May Early Bird)):

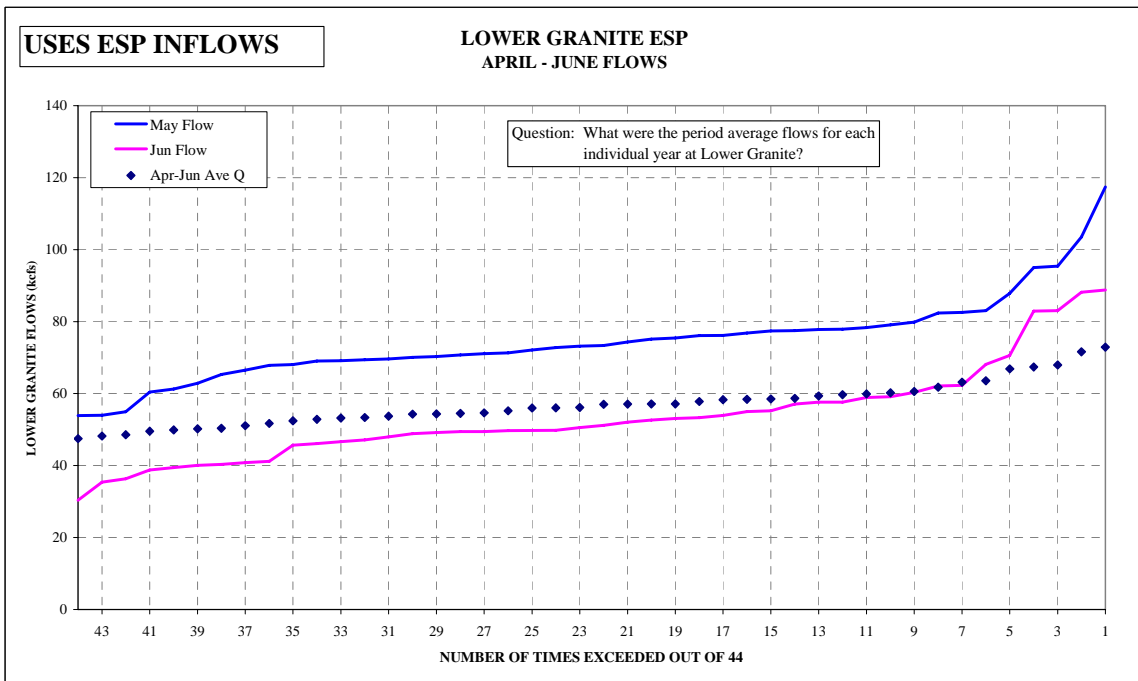
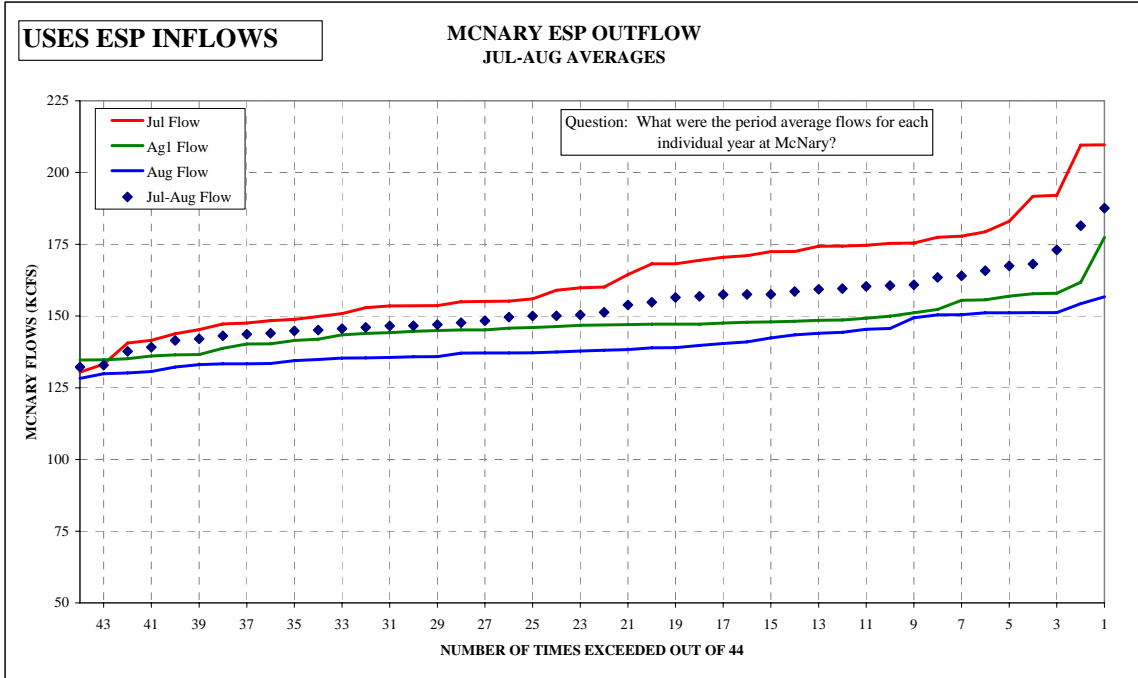
Forecast Period	Official WSF (Regression)			ESP Volumes					
	Volume (kaf)	Percent of Average	30 year Average (kaf)	10% Exceedance Probability	30% Exceedance Probability	50% Exceedance Probability	70% Exceedance Probability	90% Exceedance Probability	
Grand Coulee	Apr-Aug	47700	79%	60290	50600	48600	47000	45800	44000
Lower Granite	Apr-Jul	11800	55%	21550	13800	12200	11700	11200	10500
The Dalles	Apr-Aug	61300	66%	93090	67500	64300	62200	60800	58100
Hungry Horse *	Apr-Aug	1372	66%	2070	1410	1260	1200	1170	1100
Libby **	Apr-Aug	5401	86%	6248	5260	4880	4460	4220	3870
Dworshak **	Apr-Jul	1325	50%	2645	1920	1800	1720	1630	1570

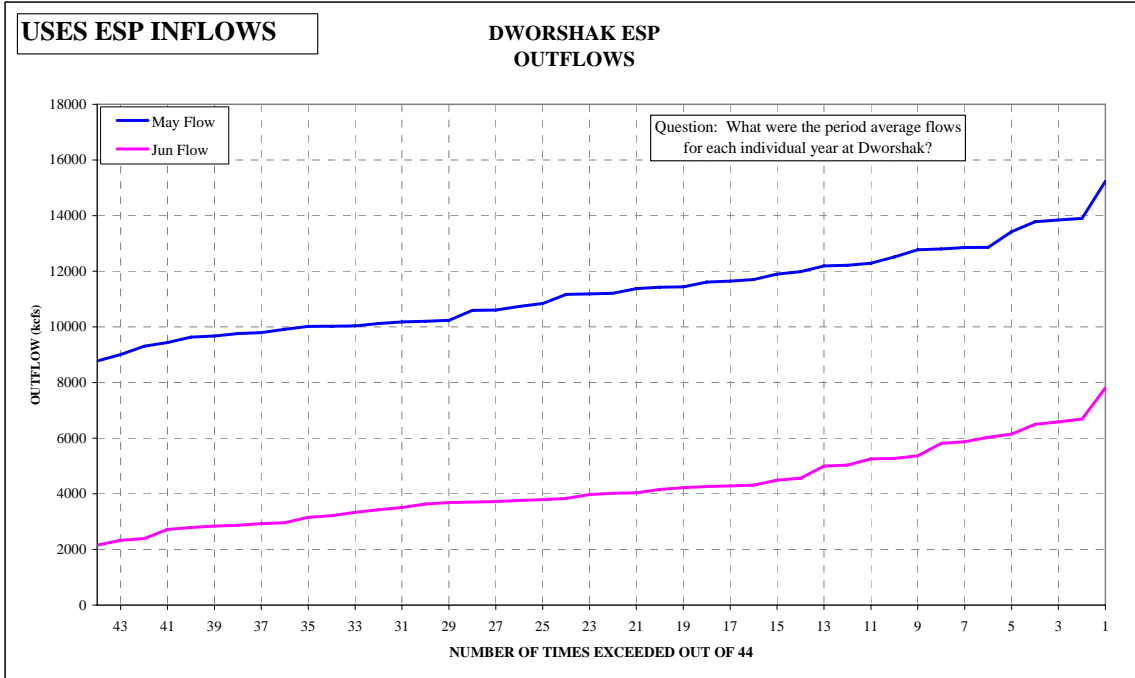
* USBR Official Forecast (April Final)

** Corps Official Forecast (April Final)



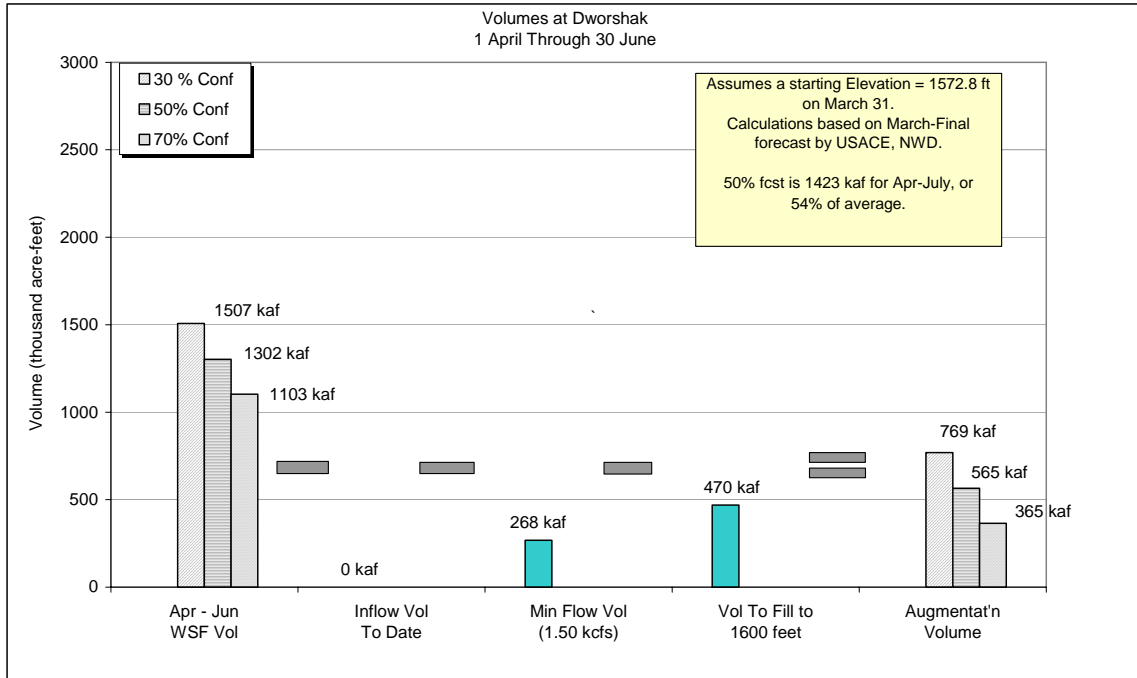




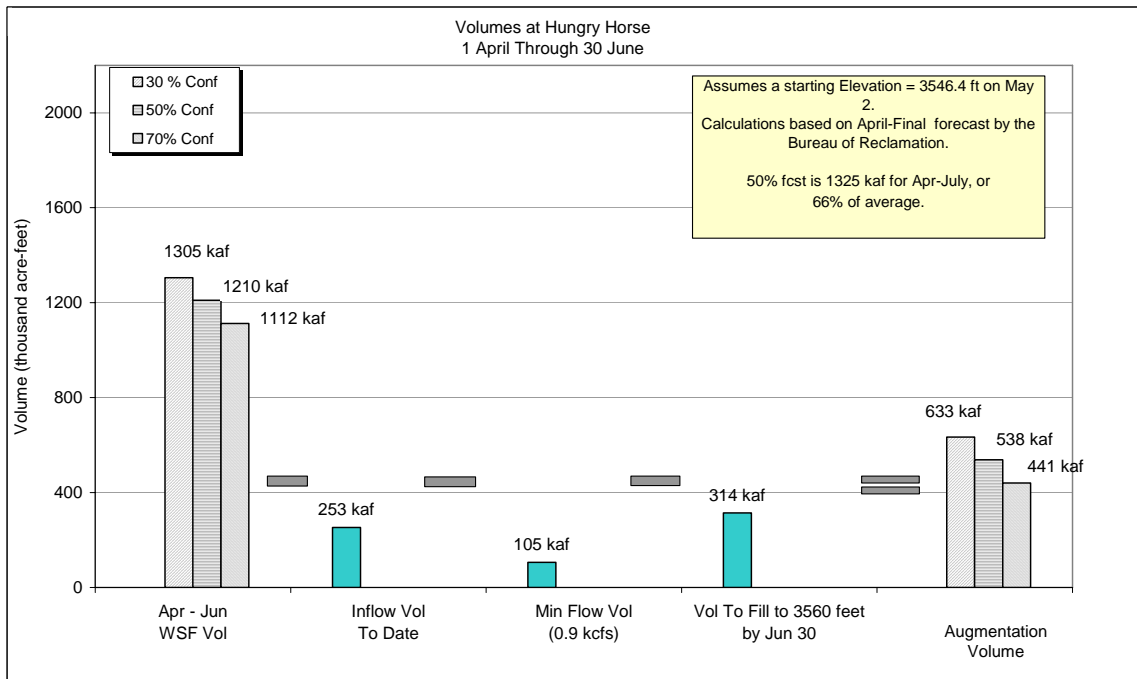


14. Latest Flow Augmentation Graphs

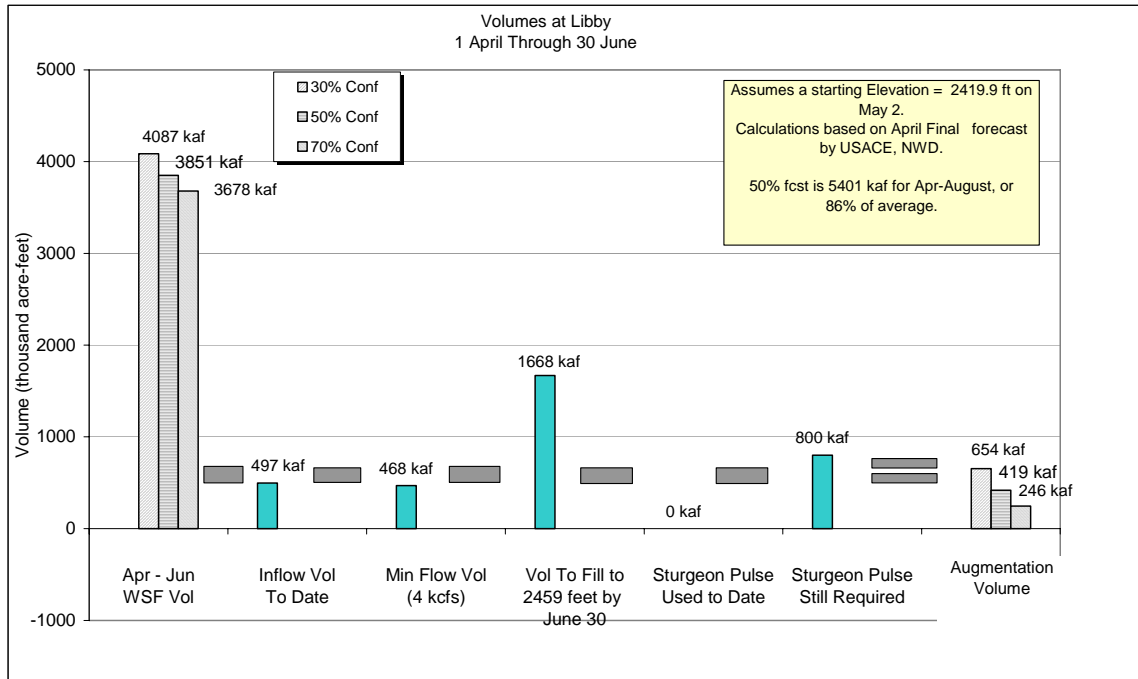
Dworshak



Hungry Horse

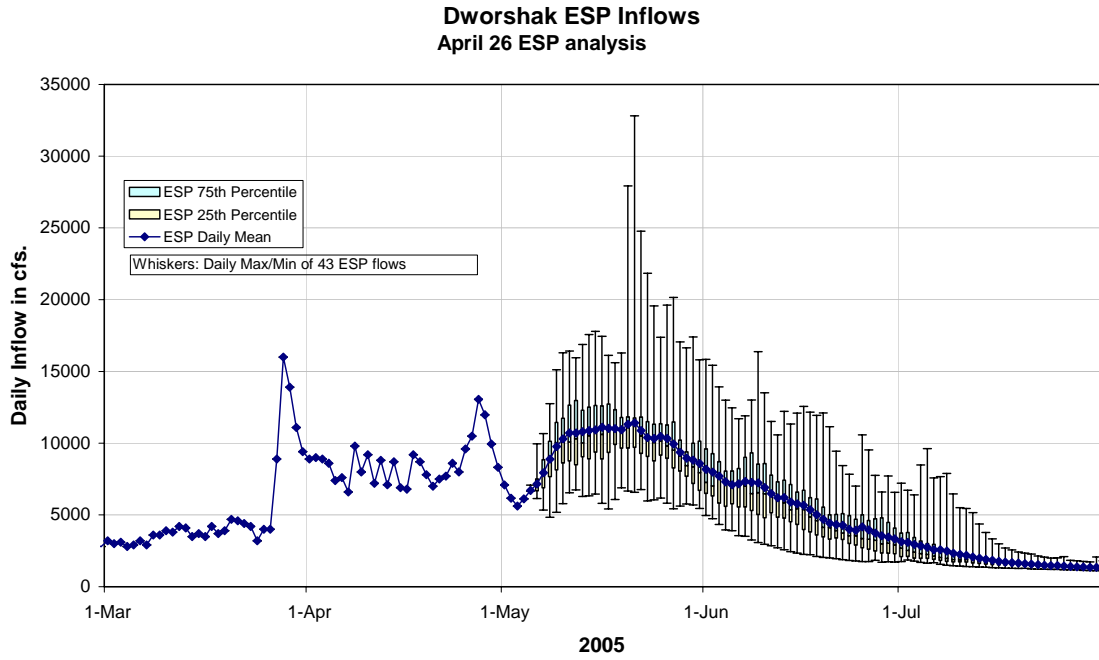


Libby

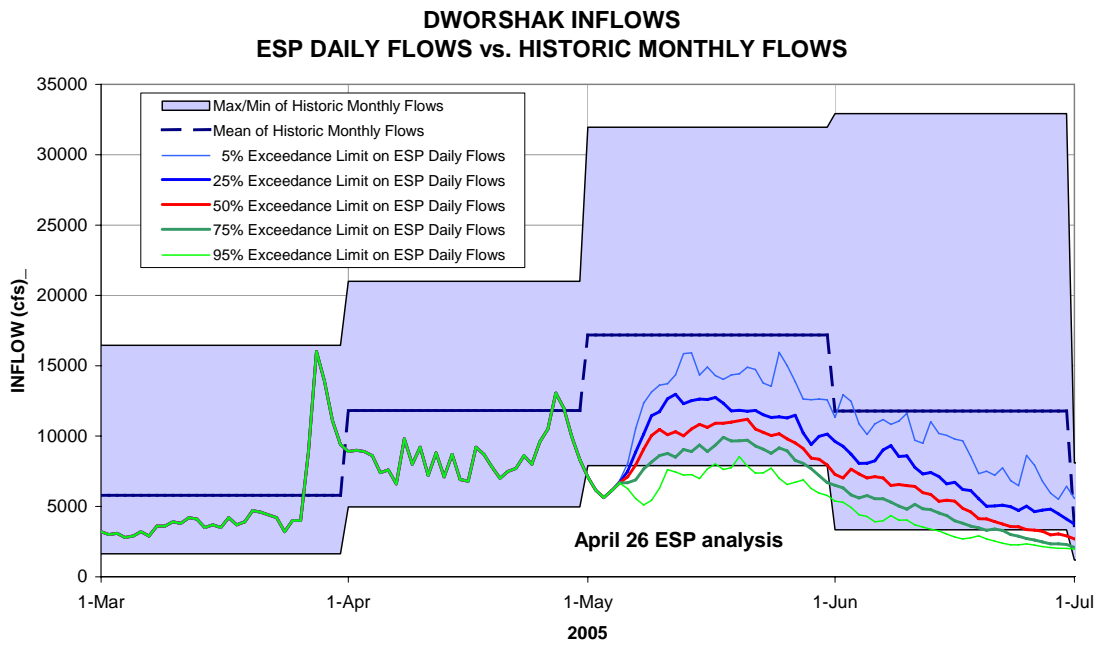


15. Latest DWR ESP Graphs

ESP Inflow



ESP Inflow - Exceedance



ESP Augmentation Volumes

Dworshak Augmentation Volumes
ESP inflows and 1April Water Supply Forecast

