Libby Dam Flood Risk and Spring Operations

Joel Fenolio, P.E.

Upper Columbia Senior Water Manager

Kevin Shaffer, EIT

Hydraulic Engineer

Seattle District

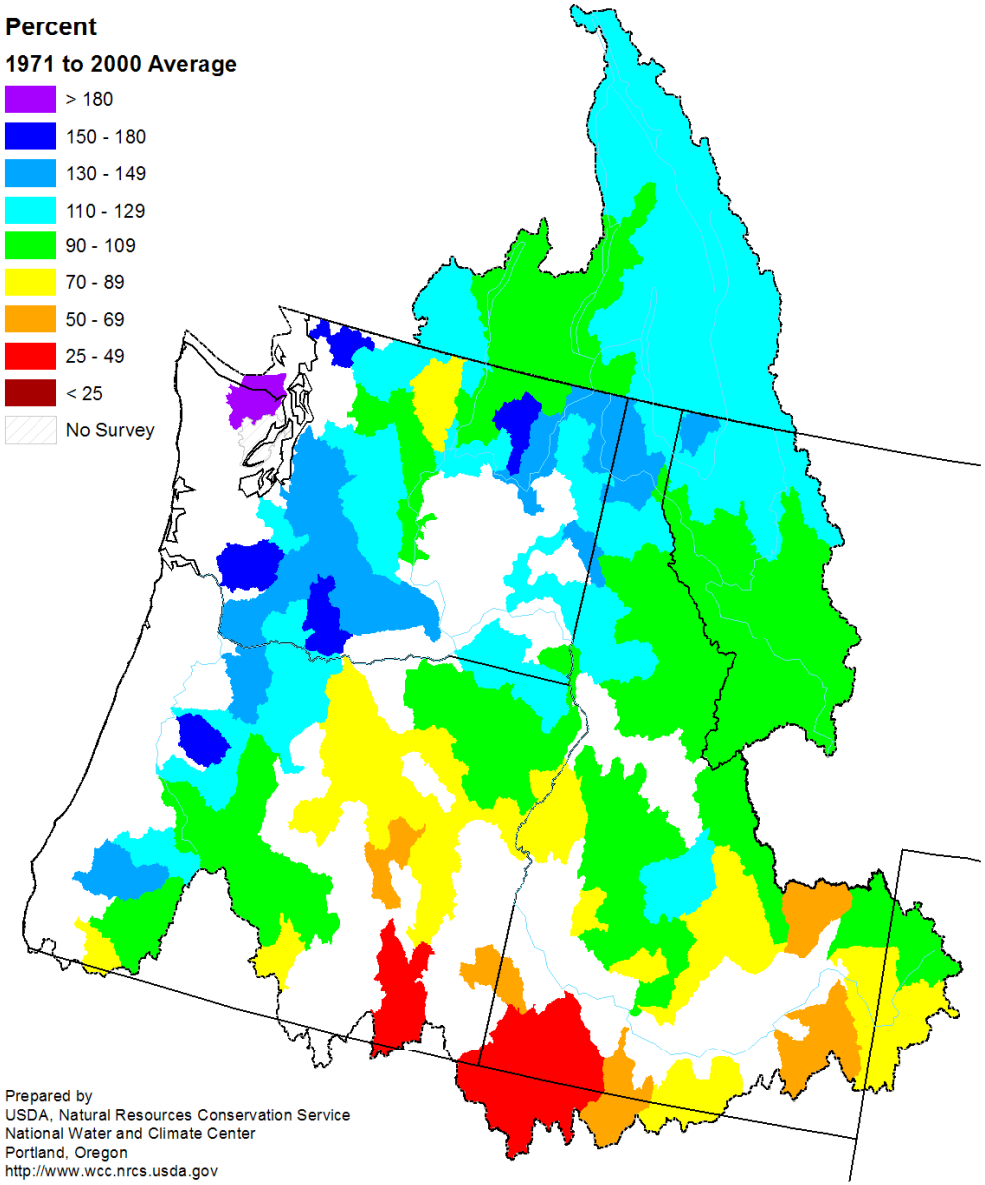
09 April 2011

US Army Corps of Engineers

BUILDING STRONG®

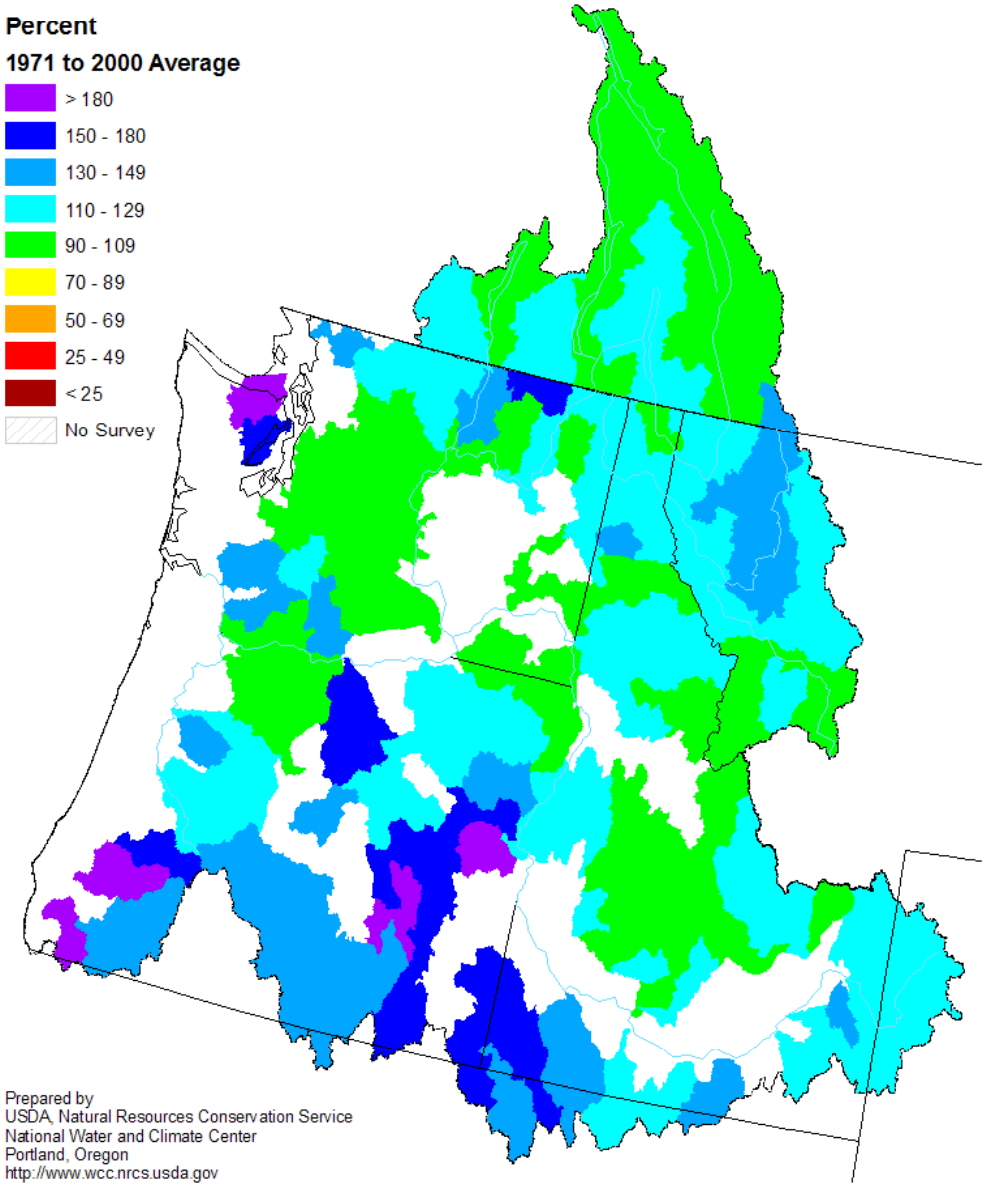
Snowpack and Flood Risk for 2012

Columbia River Mountain Snowpack as of April 1, 2012



BUILDING STRONG®

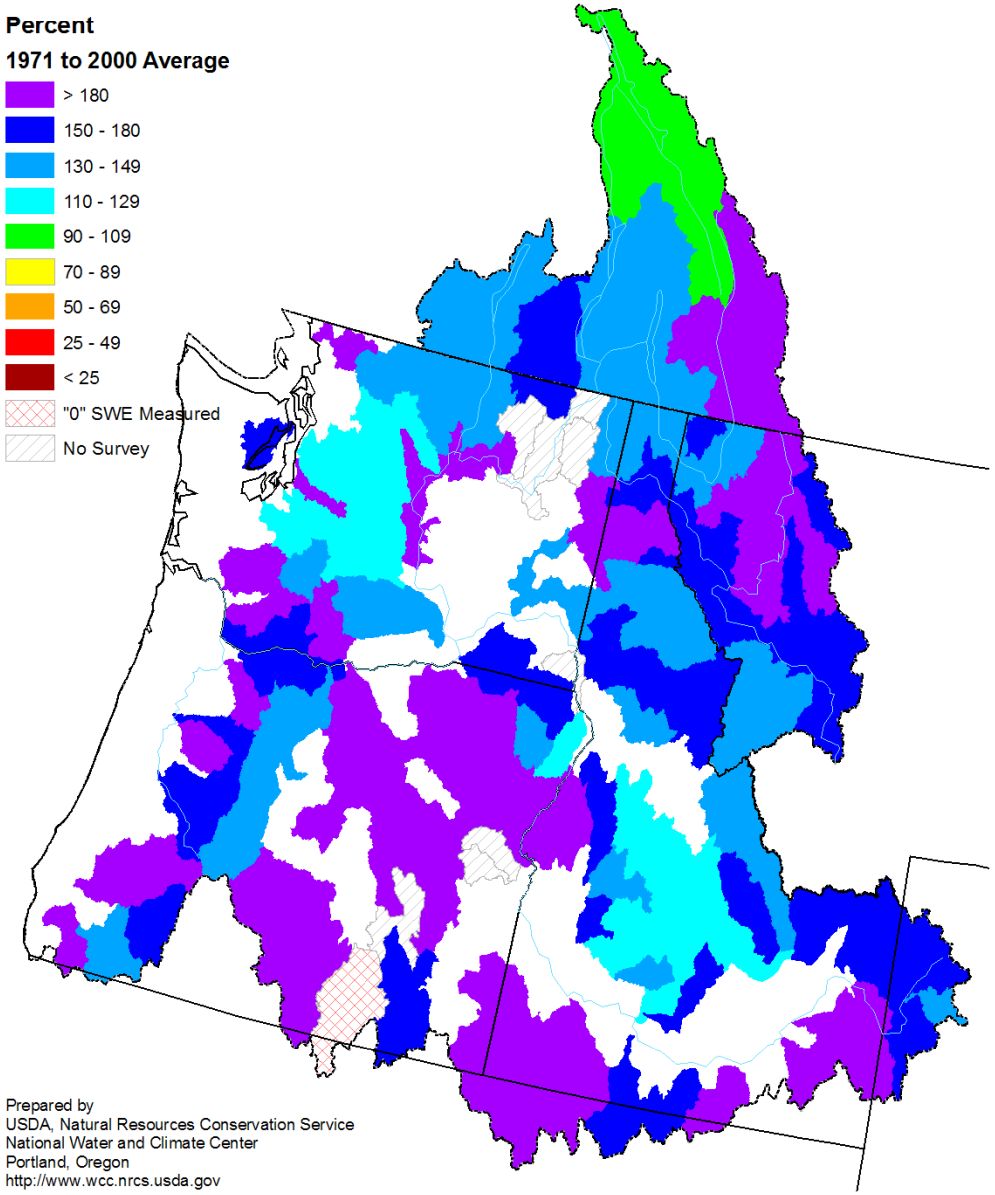
Columbia River Mountain Snowpack as of April 1, 2011



Prepared by
USDA, Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

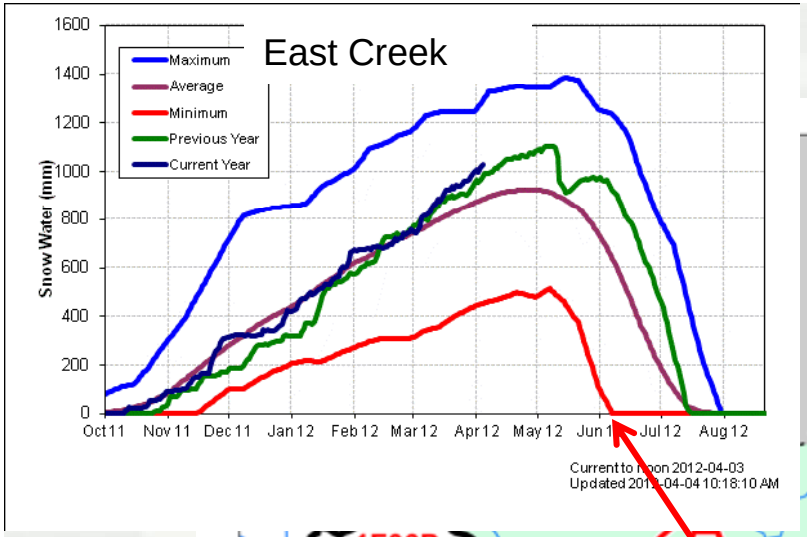
BUILDING STRONG®

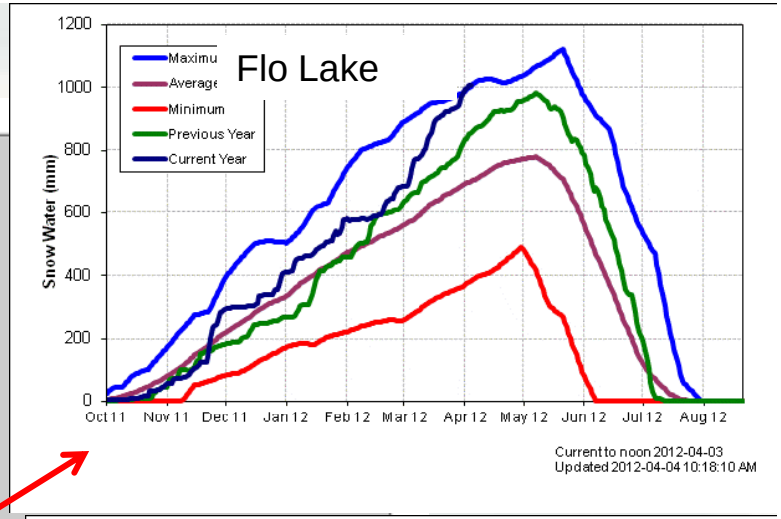
Columbia River Mountain Snowpack as of May 1, 2011

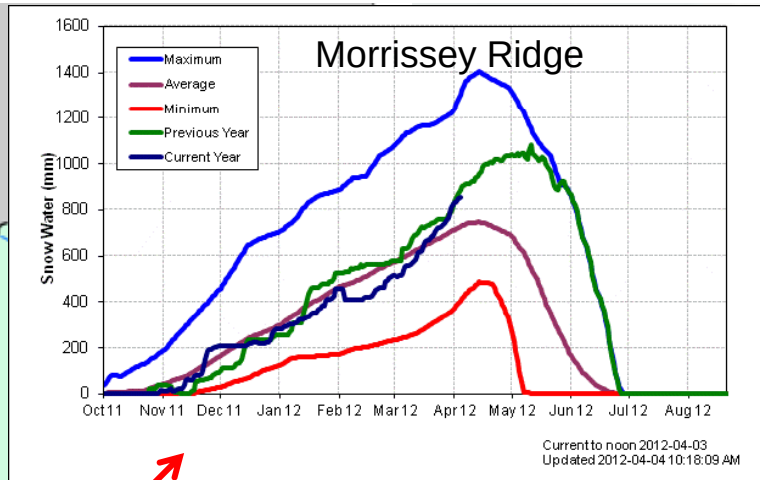


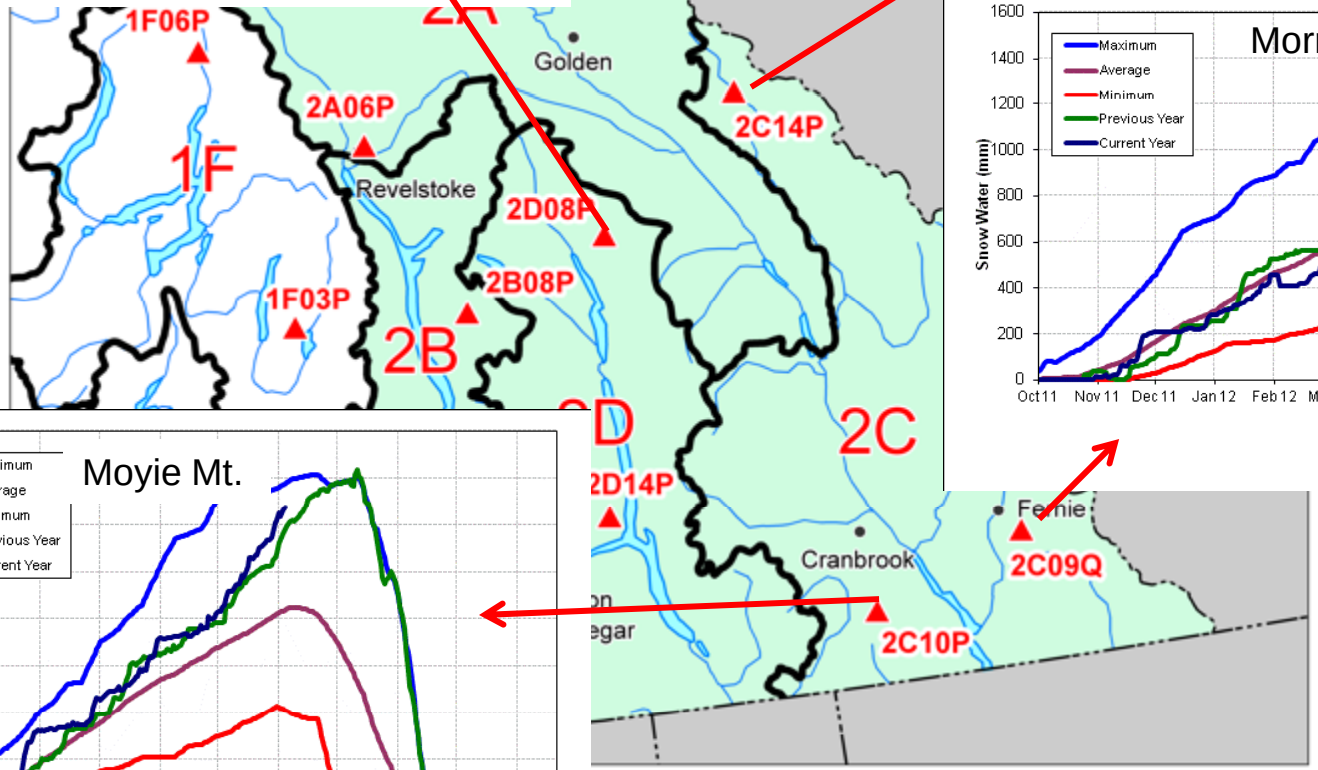
Prepared by
USDA, Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

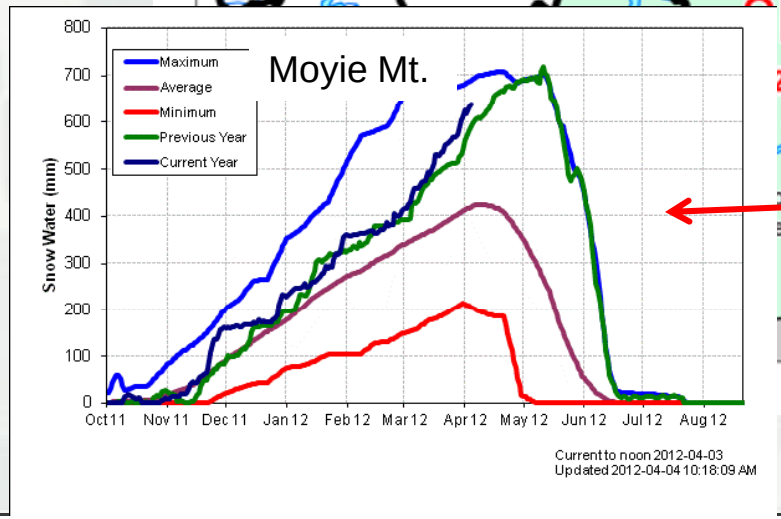
BUILDING STRONG®











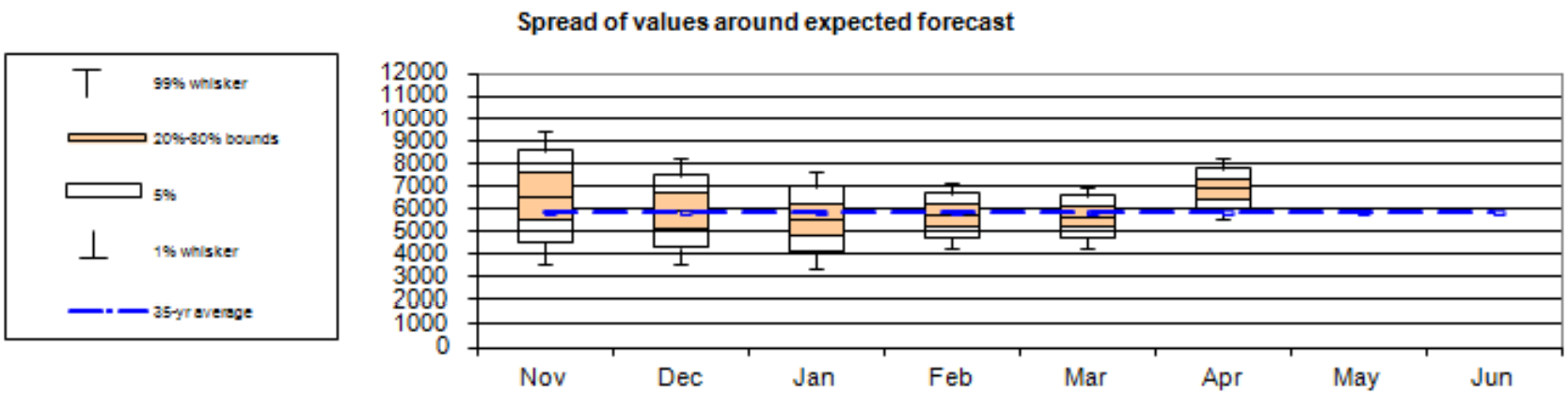
BUILDING STRONG®

Libby : April Runoff Forecast & Flood Control Calculation WY 2012

Runoff Forecast and Flood Control				1975-2009 Average	Percent of Average	1929-1999 Average	Percent of Average
Most Probable Runoff Volume:	Apr-Aug	6872	KAF	5865	117%	6337	108%
	Apr-Jul	6214	KAF	5303	117%	5771	108%
	May-Jul	5621	KAF	4797	117%	5247	107%
30-Apr Flood Control Space		3058	KAF				
30-Apr Flood Control Elevation		2377.3	ft				

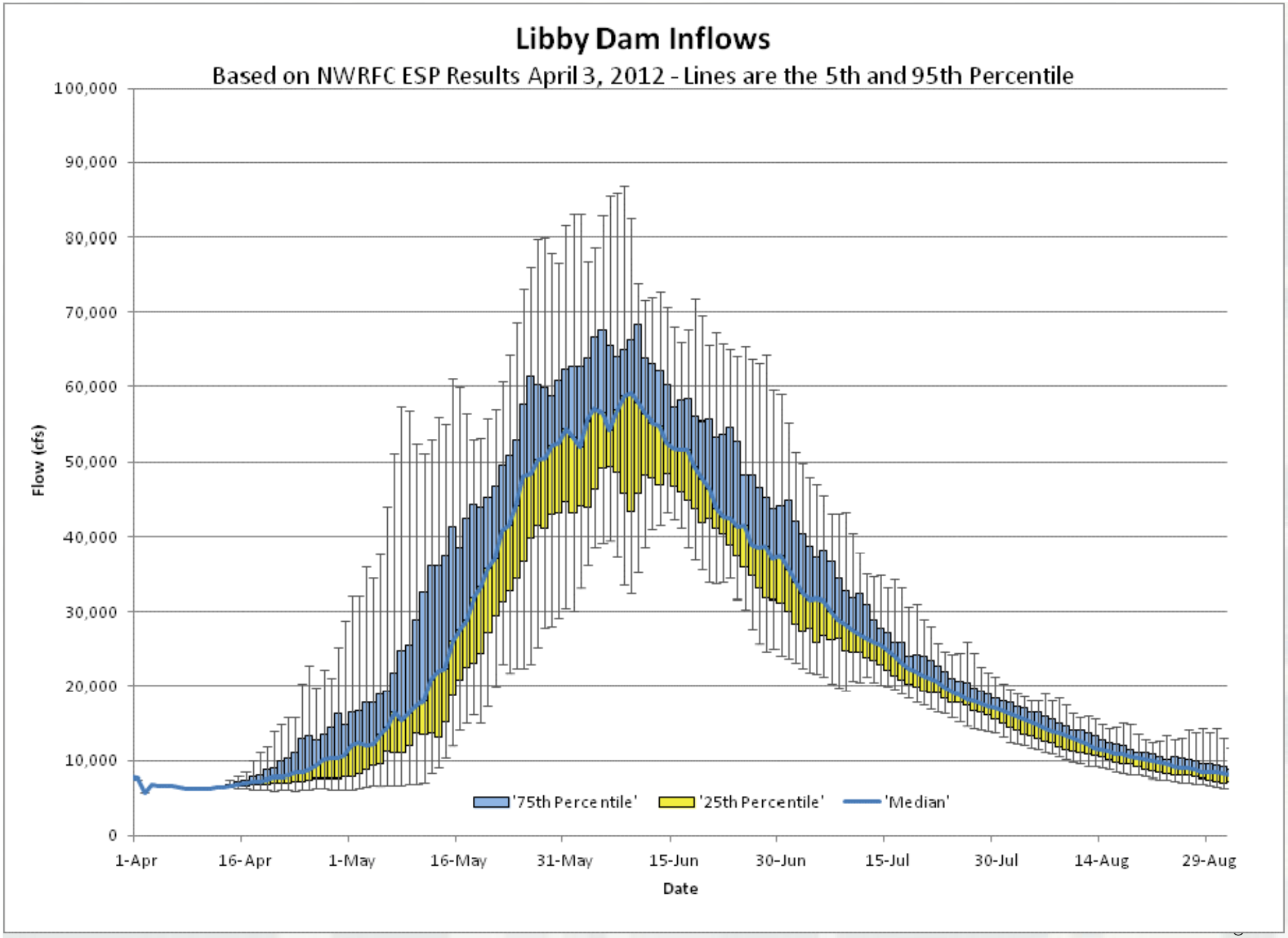
Seasonal Flood Control VARQ Flood Control Implemented

Forecast Date >>	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Apr-Aug Runoff Forecast	6532	5876	5524	5714	5635	6872		
First-of-Month Elev	2448.3	2435.6	2412.5	2410.3	2407.9	2402.3		
Date >>	30-Nov	31-Dec	31-Jan	28-Feb	15-Mar	31-Mar	15-Apr	30-Apr
Flood Control Space	500	1965	1419	1300	1030	1030	3058	3058
Flood Control Elevation	2448.0	2412.0	2426.2	2429.2	2435.7	2435.7	2377.3	2377.3



Current Operations at Libby Dam

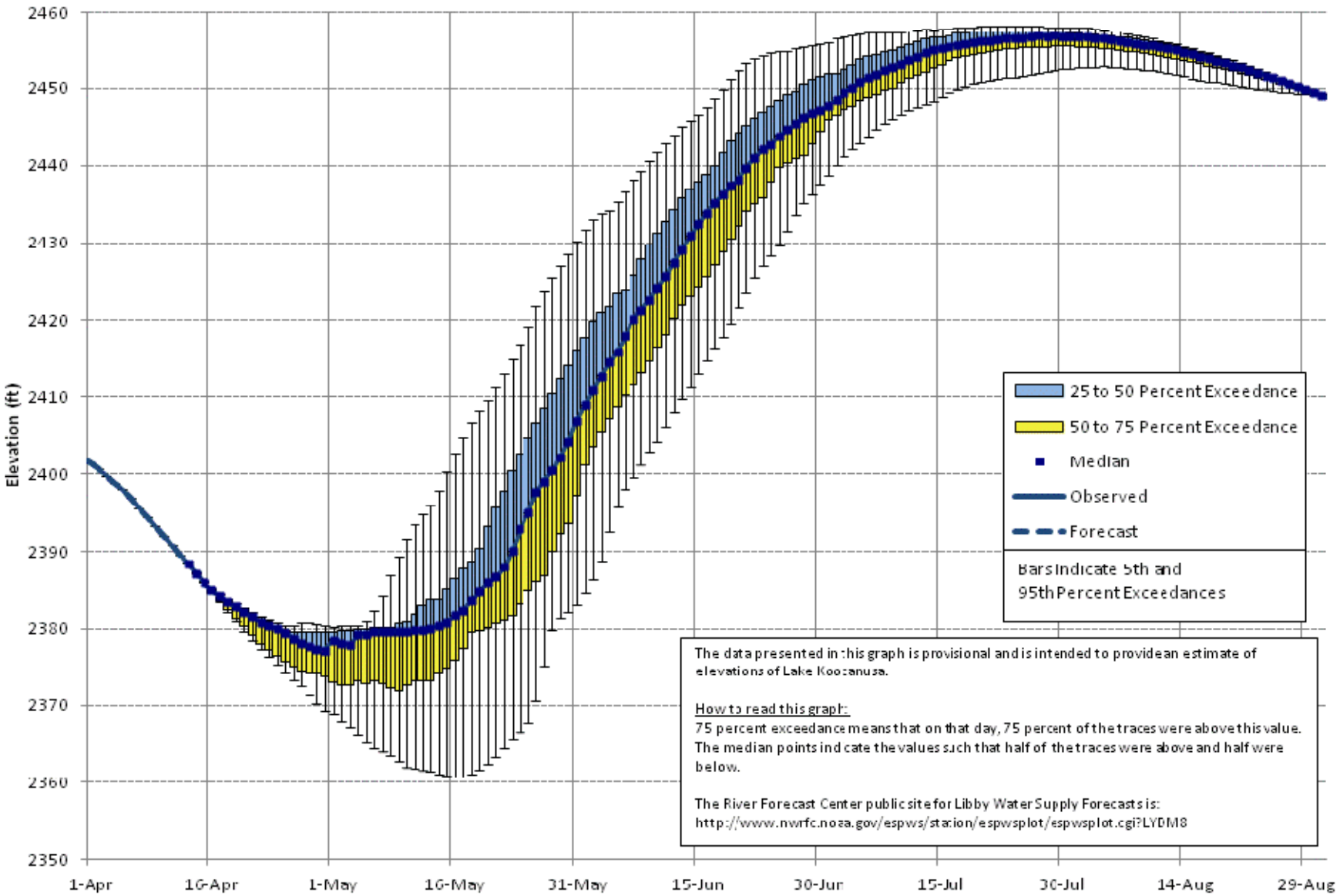
- Releases are at Full Powerhouse 25 kcfs
- April 5th Elevation 2395 ft
- Targeting the higher of the Flood Control Elevation of 2377 ft or the Refill Curve ~2380 ft on April 15th
- April 15th is the next major decision point to keep drafting or cut back releases


Libby Dam Inflows
Based on NWRFC ESP Results April 3, 2012 - Lines are the 5th and 95th Percentile
Flow (cfs)
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1-Apr
16-Apr
1-May
16-May
31-May
15-Jun
30-Jun
15-Jul
30-Jul
14-Aug
29-Aug
Date
'75th Percentile'
'25th Percentile'
'Median'

Libby Dam Reservoir Elevations

Corps of Engineers Projections Based on the 53 Ensemble Streamflow Prediction Traces
Issued on 3-April by the Northwest River Forecast Center, National Weather Service

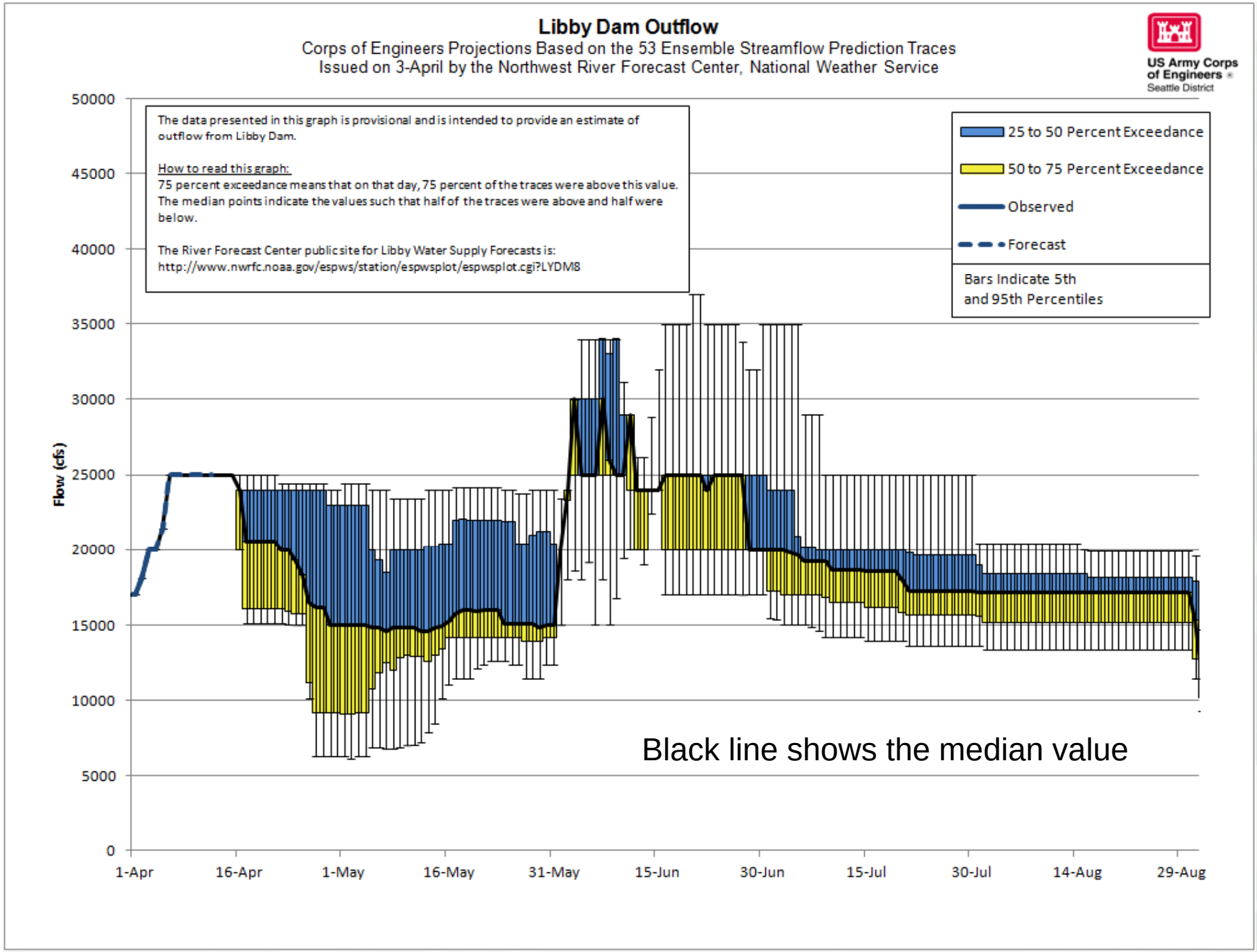
US Army Corps of Engineers
Seattle District



The data presented in this graph is provisional and is intended to provide an estimate of elevations of Lake Koocanusa.

How to read this graph:
75 percent exceedance means that on that day, 75 percent of the traces were above this value. The median points indicate the values such that half of the traces were above and half were below.

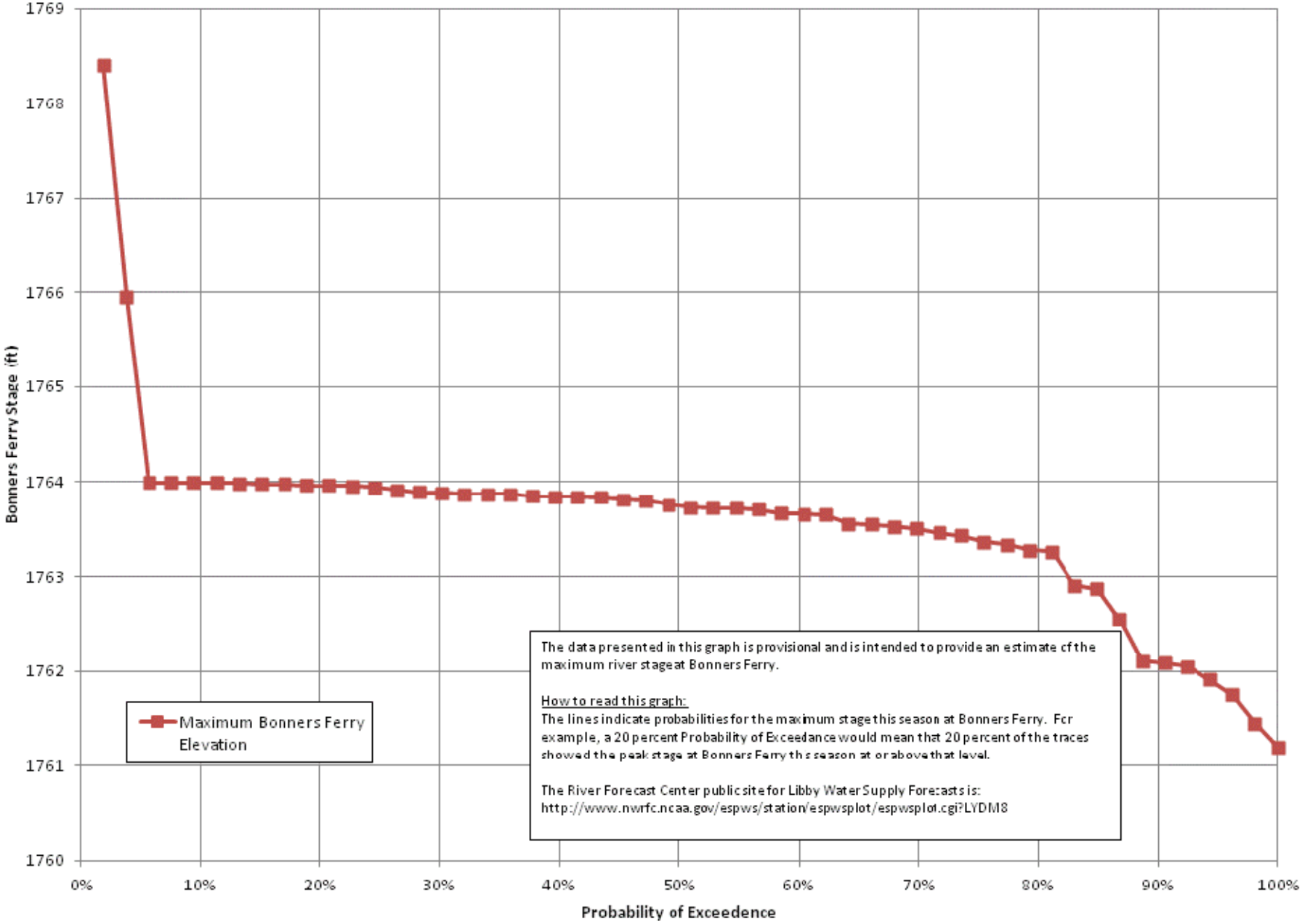
The River Forecast Center public site for Libby Water Supply Forecasts is:
http://www.nwrfc.noaa.gov/espws/station/espwsplot/espwsplot.cgi?LYDM8


Libby Dam Outflow
Corps of Engineers Projections Based on the 53 Ensemble Streamflow Prediction Traces
Issued on 3-April by the Northwest River Forecast Center, National Weather Service
US Army Corps of Engineers
Seattle District
The data presented in this graph is provisional and is intended to provide an estimate of outflow from Libby Dam.
How to read this graph:
75 percent exceedance means that on that day, 75 percent of the traces were above this value. The median points indicate the values such that half of the traces were above and half were below.
The River Forecast Center public site for Libby Water Supply Forecasts is:
http://www.nwrfc.noaa.gov/espws/station/espwsplot/espwsplot.cgi?LYDM8
25 to 50 Percent Exceedance
50 to 75 Percent Exceedance
Observed
Forecast
Bars Indicate 5th and 95th Percentiles
Flow (cfs)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
1-Apr
16-Apr
1-May
16-May
31-May
15-Jun
30-Jun
15-Jul
30-Jul
14-Aug
29-Aug
Black line shows the median value

Maximum Bonners Ferry Stage - Probability Chart

Corps of Engineers Projections Based on the 53 Ensemble Streamflow Prediction Traces
Issued on 3-April by the Northwest River Forecast Center, National Weather Service

US Army Corps of Engineers
Seattle District



The data presented in this graph is provisional and is intended to provide an estimate of the maximum river stage at Bonners Ferry.

How to read this graph:
The lines indicate probabilities for the maximum stage this season at Bonners Ferry. For example, a 20 percent Probability of Exceedance would mean that 20 percent of the traces showed the peak stage at Bonners Ferry this season at or above that level.

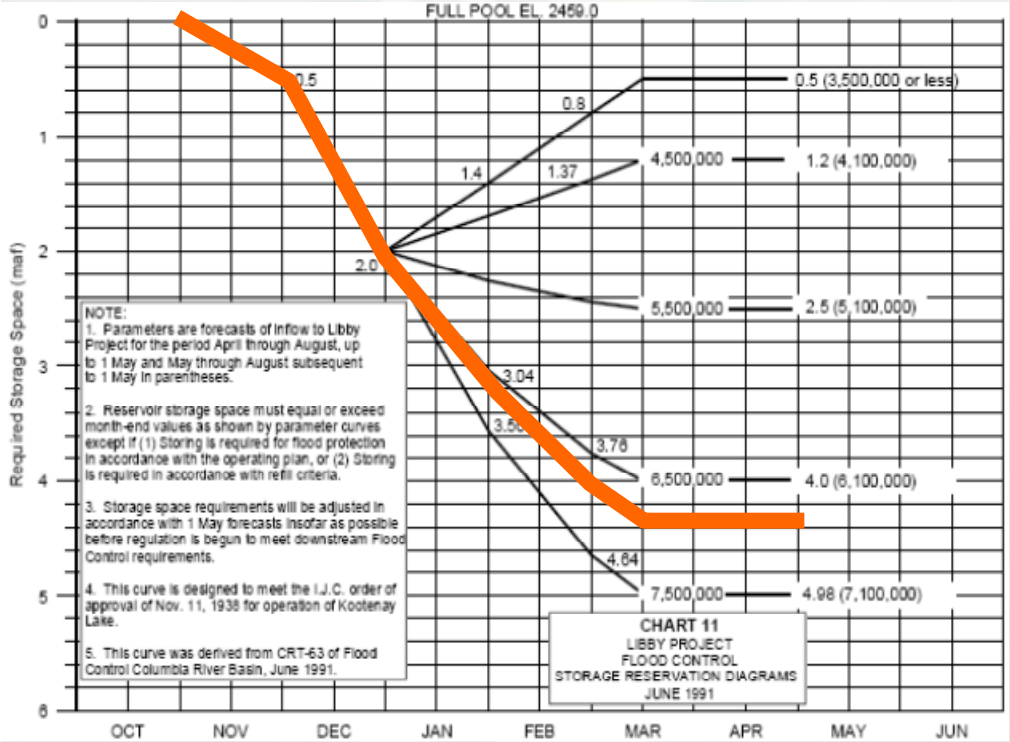
The River Forecast Center public site for Libby Water Supply Forecasts is:
http://www.nwrfc.noaa.gov/espws/station/espwsplot/espwsplot.cgi?LYDM8

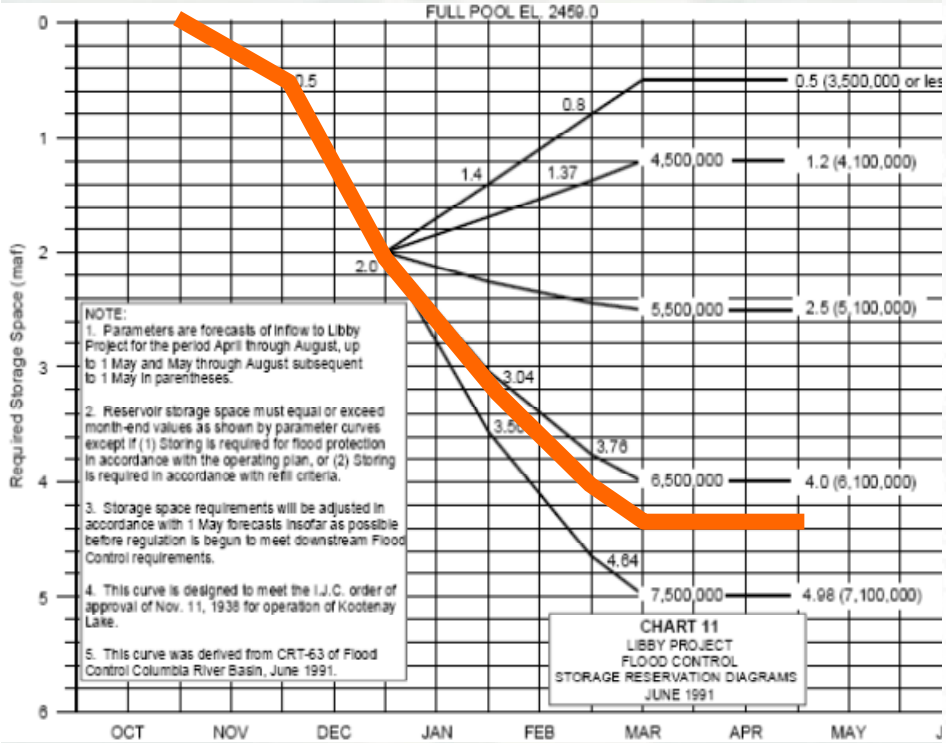
Conclusion from ESP Traces

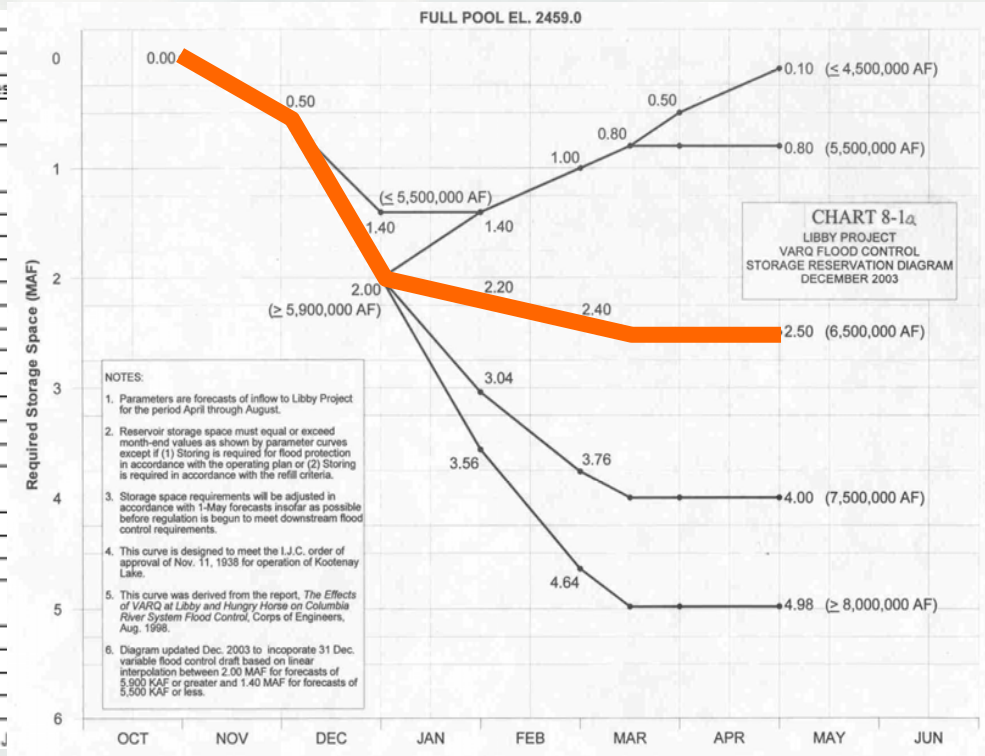
- This is going to be a big year in the Kootenai River but the current plan looks to put Libby Dam in good position to handle the upcoming freshet.

Questions

Additional Slides as needed

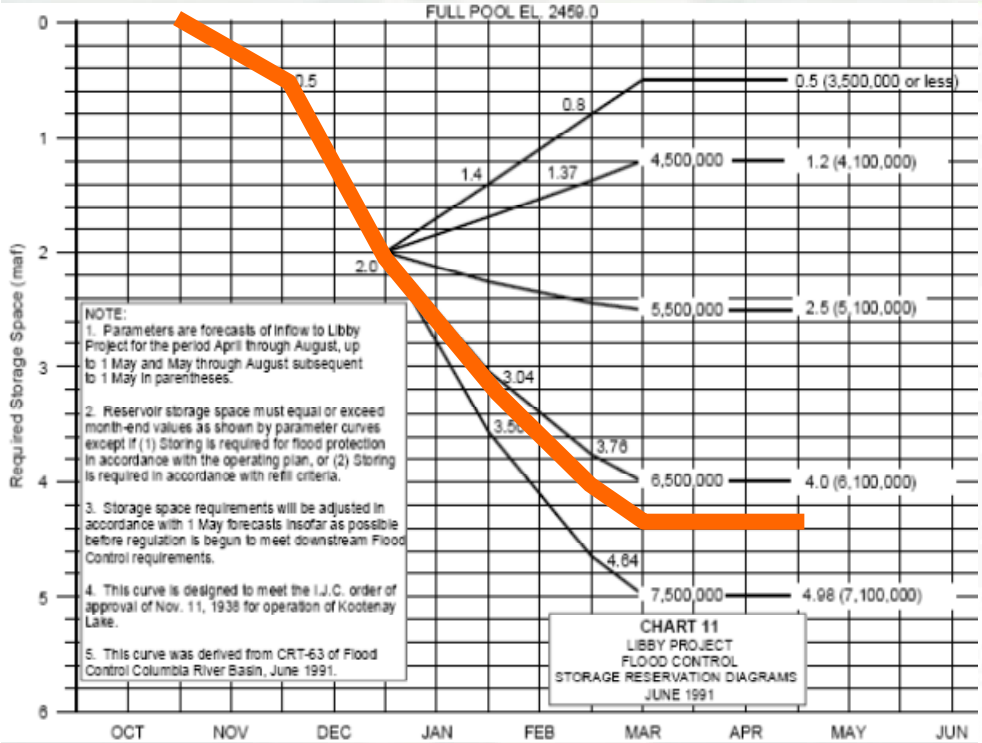

FULL POOL EL. 2459.0
Required Storage Space (maf)
0
1
2
3
4
5
6
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
0.5
0.8
1.4
1.37
2.0
3.04
3.56
3.76
4.64
0.5 (3,500,000 or less)
4,500,000
1.2 (4,100,000)
5,500,000
2.5 (5,100,000)
6,500,000
4.0 (6,100,000)
7,500,000
4.98 (7,100,000)
NOTE:
1. Parameters are forecasts of inflow to Libby Project for the period April through August, up to 1 May and May through August subsequent to 1 May in parentheses.
2. Reservoir storage space must equal or exceed month-end values as shown by parameter curves except if (1) Storing is required for flood protection in accordance with the operating plan, or (2) Storing is required in accordance with refill criteria.
3. Storage space requirements will be adjusted in accordance with 1 May forecasts insofar as possible before regulation is begun to meet downstream Flood Control requirements.
4. This curve is designed to meet the I.J.C. order of approval of Nov. 11, 1938 for operation of Kootenay Lake.
5. This curve was derived from CRT-63 of Flood Control Columbia River Basin, June 1991.
CHART 11
LIBBY PROJECT
FLOOD CONTROL
STORAGE RESERVATION DIAGRAMS
JUNE 1991

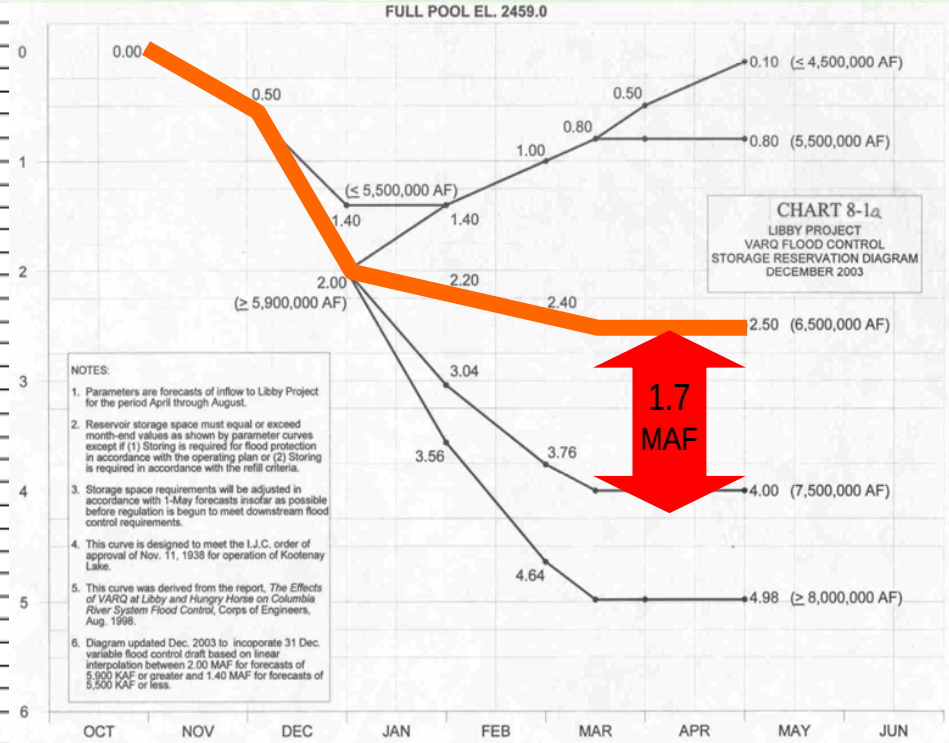




Standard SRD

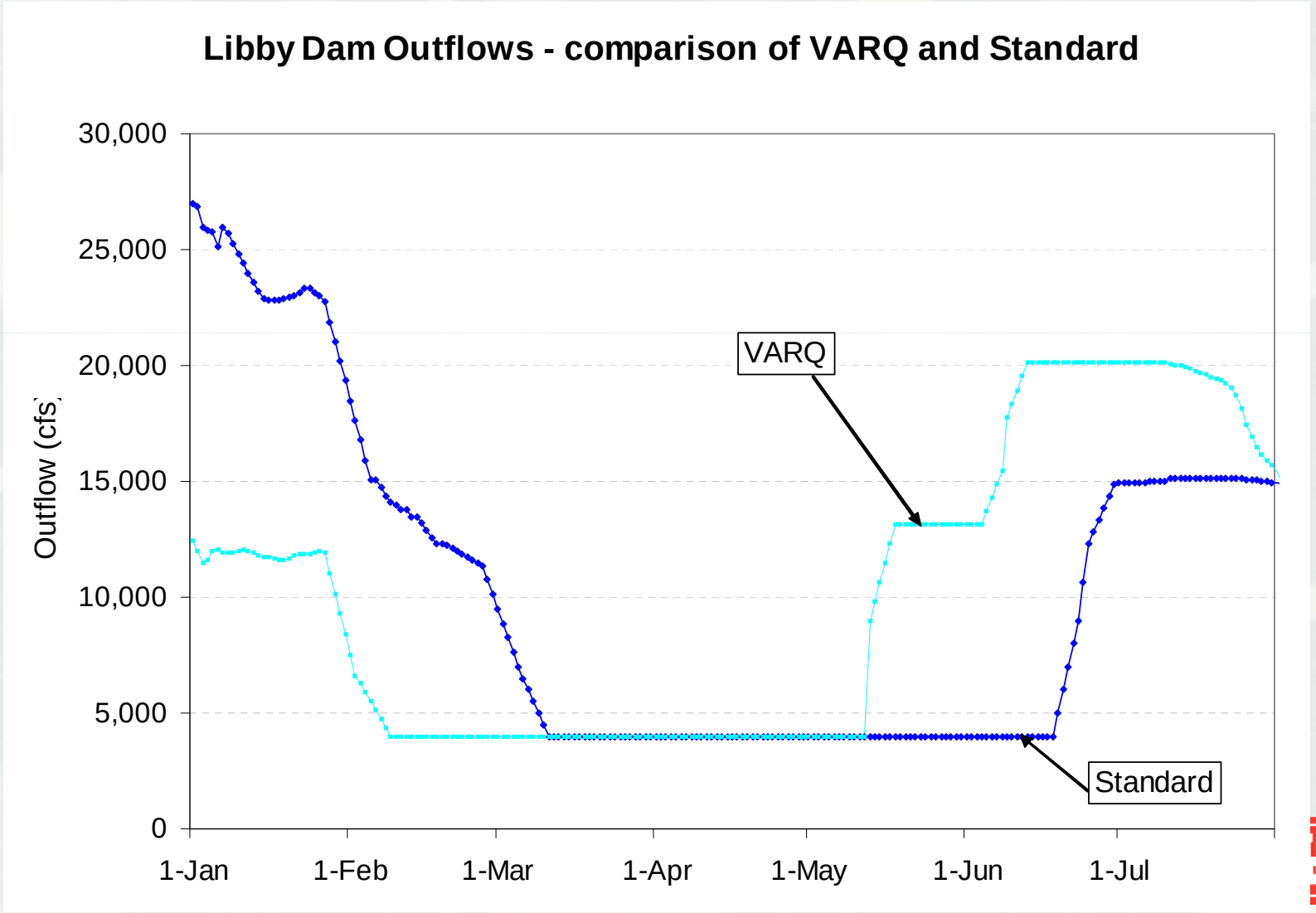
VARQ SRD

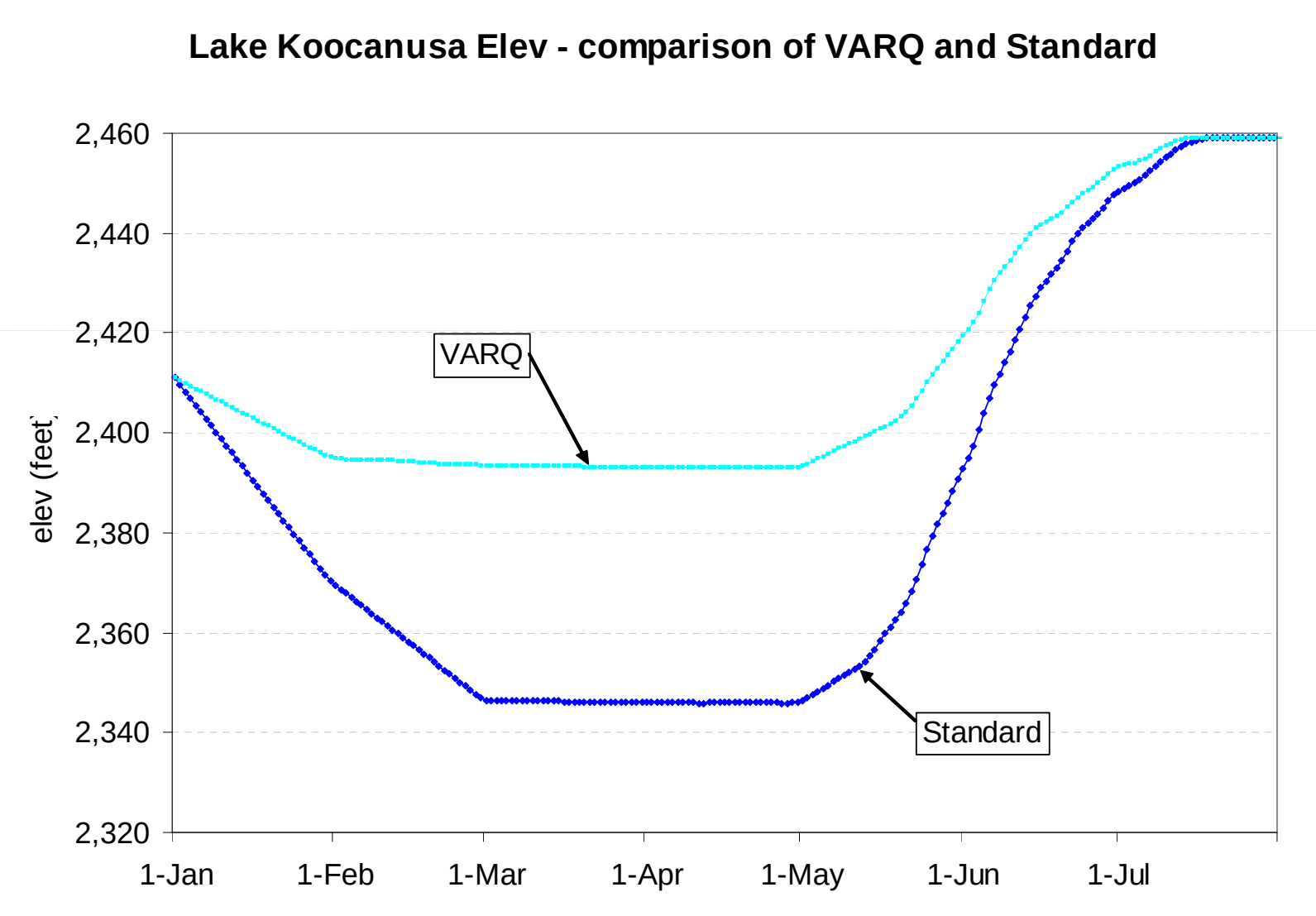




Standard SRD **VARQ SRD**

Higher outflows are needed during the refill period since there is 1.7 MAF more water in the reservoir at the end of the draft period.


Libby Dam Outflows - comparison of VARQ and Standard
30,000
25,000
20,000
15,000
10,000
5,000
0
Outflow (cfs)
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
VARQ
Standard


Lake Koocanusa Elev - comparison of VARQ and Standard
2,460
2,440
2,420
2,400
2,380
2,360
2,340
2,320
elev (feet)
VARQ
Standard
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul