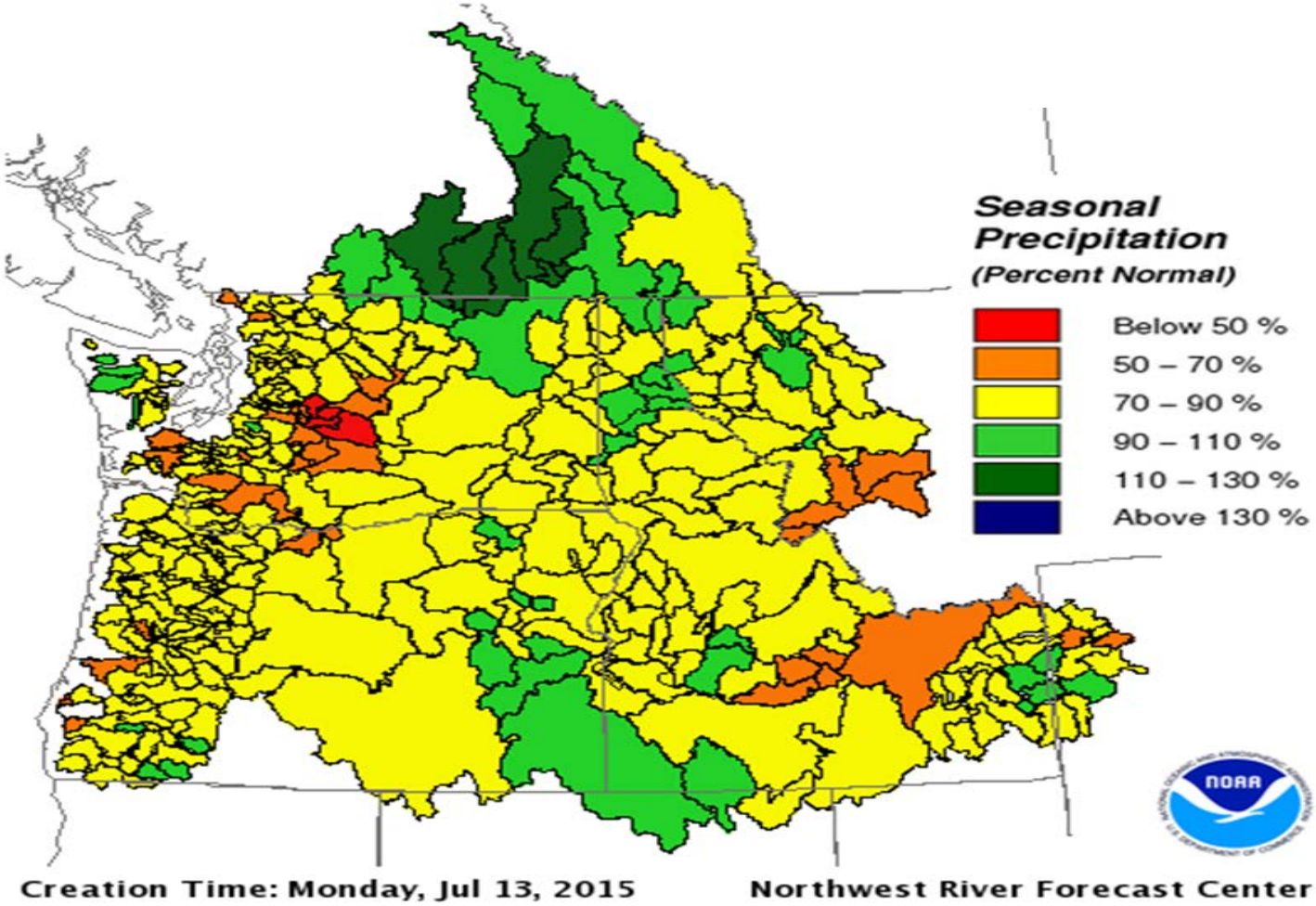
Columbia River Basin water supply and forecast conditions

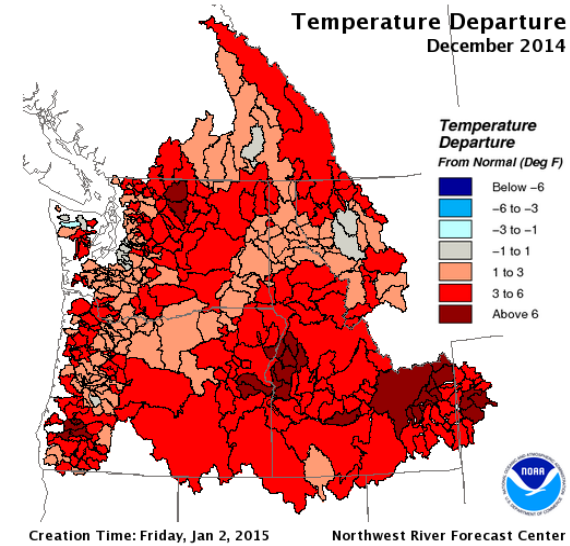
Kevin Berghoff
Senior Hydrologist
NOAA NW River Forecast Center

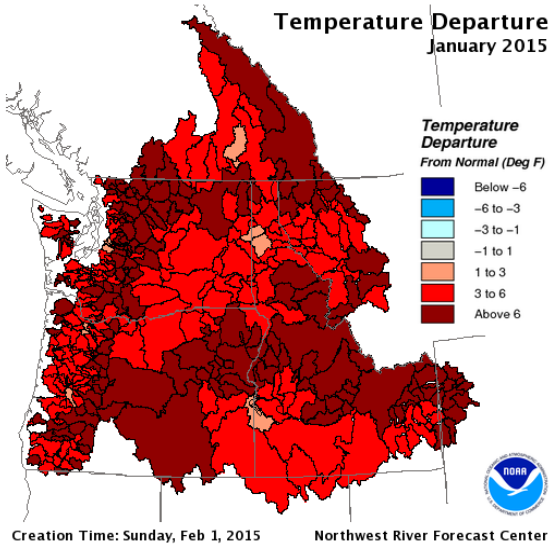
Cumulative Water Year Precipitation
Oct 1, 2014 – July 12, 2015

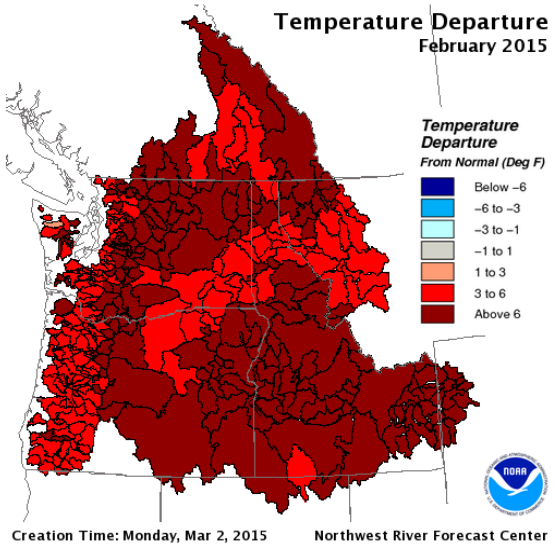


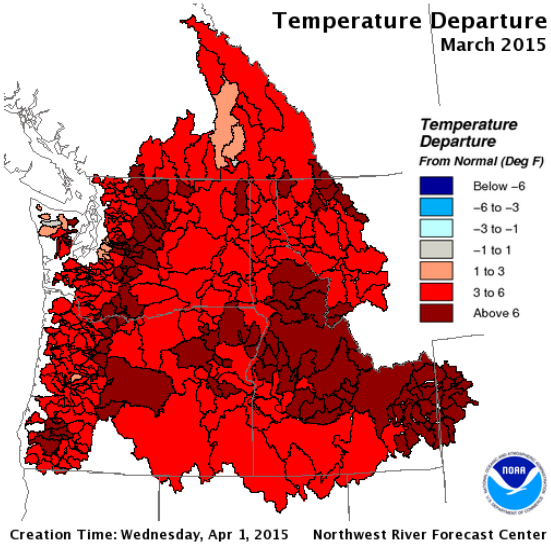
http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=2

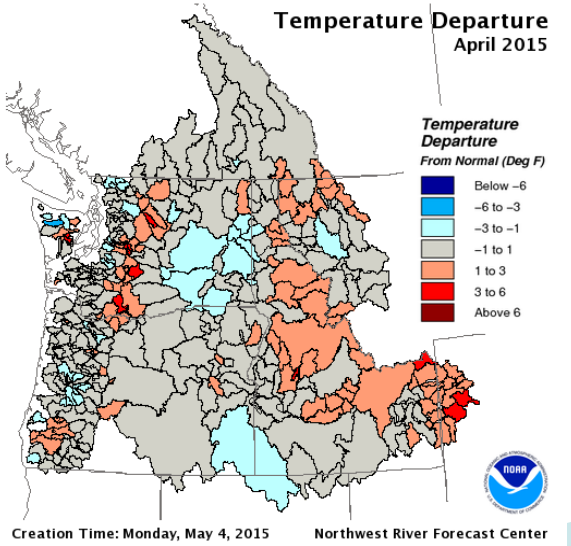
Monthly Temperature Departure from Normal

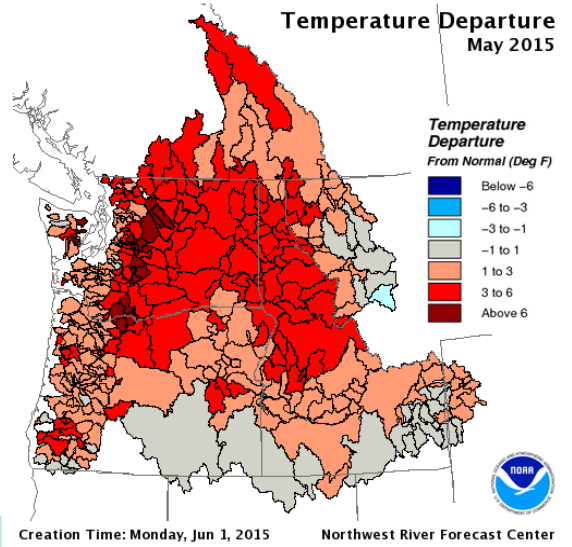








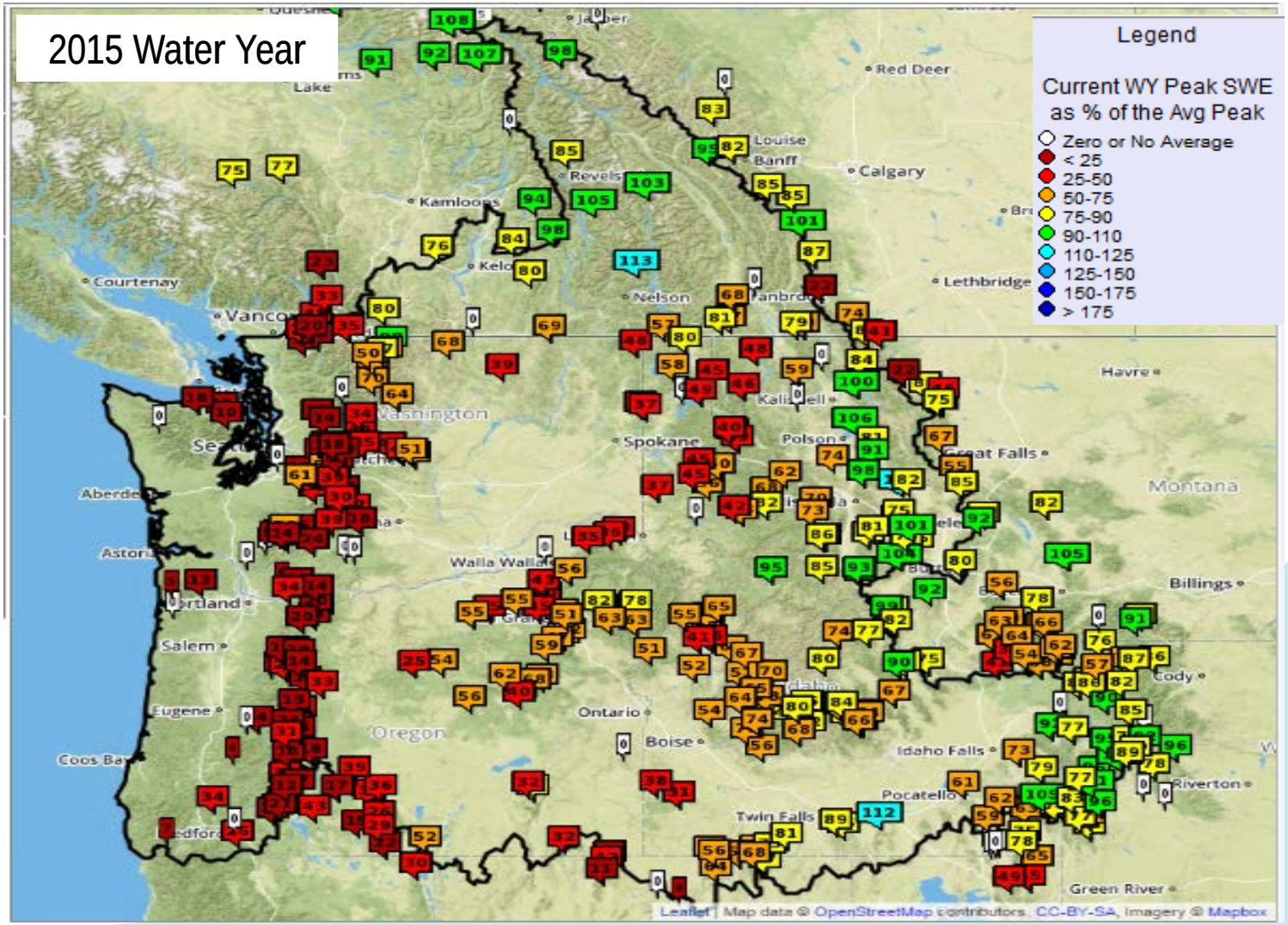




http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php?tab=2

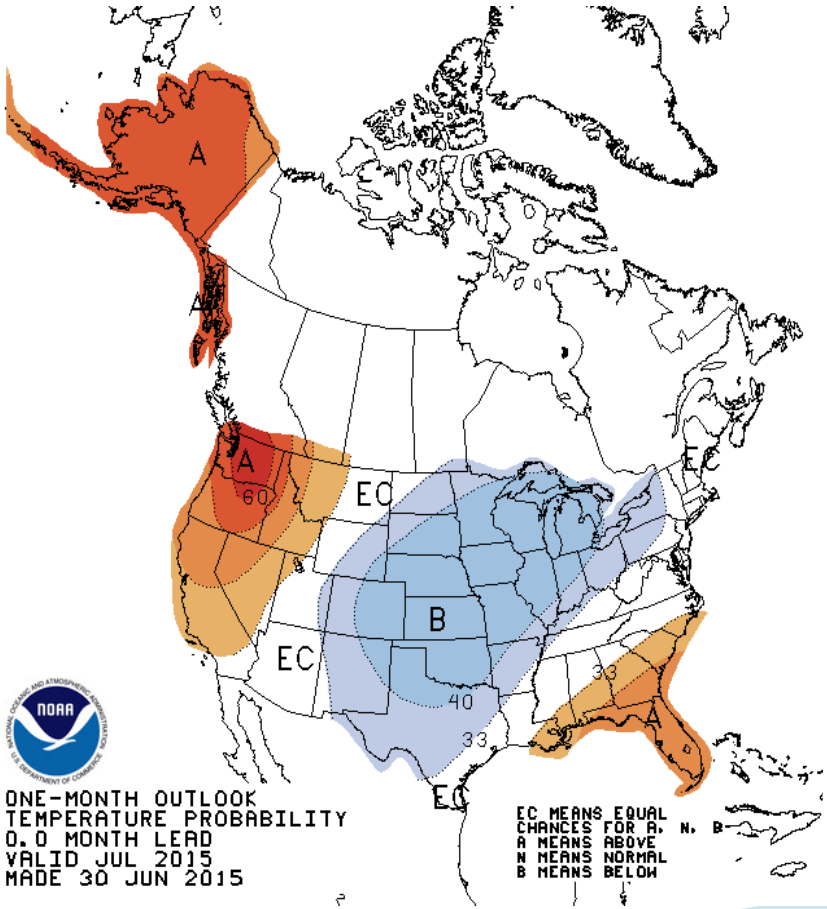
Maximum Observed Snow Water Equivalent

Displayed as Percent of Normal Peak

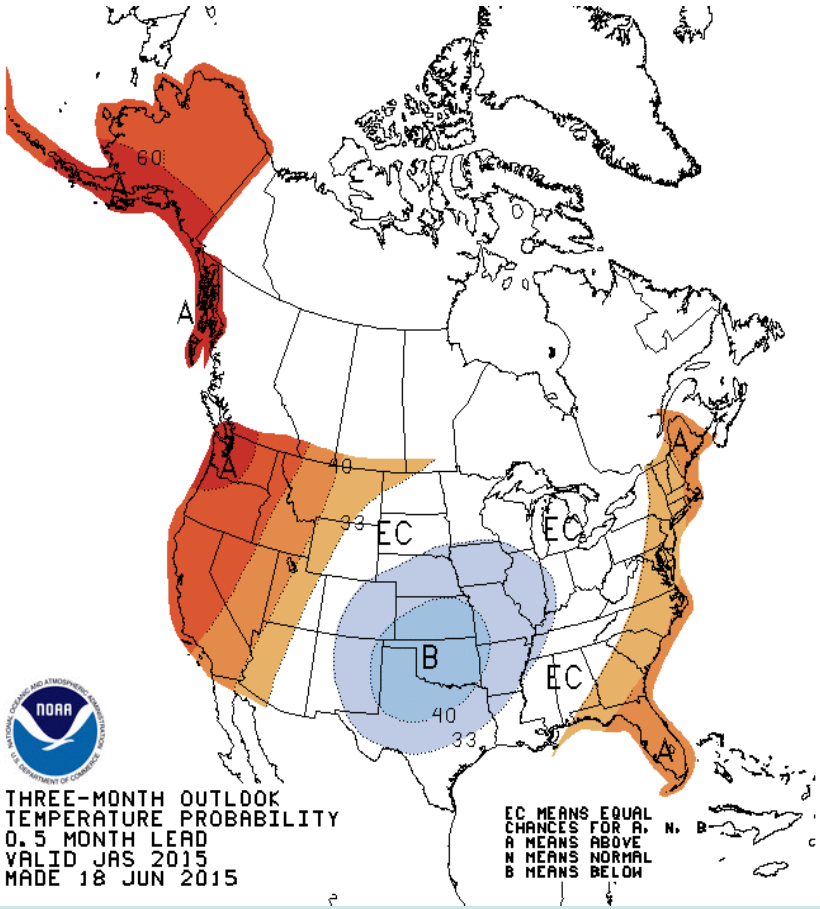


NWS Climate Prediction Center
30 and 90 Day Outlooks

July Temperature Outlook



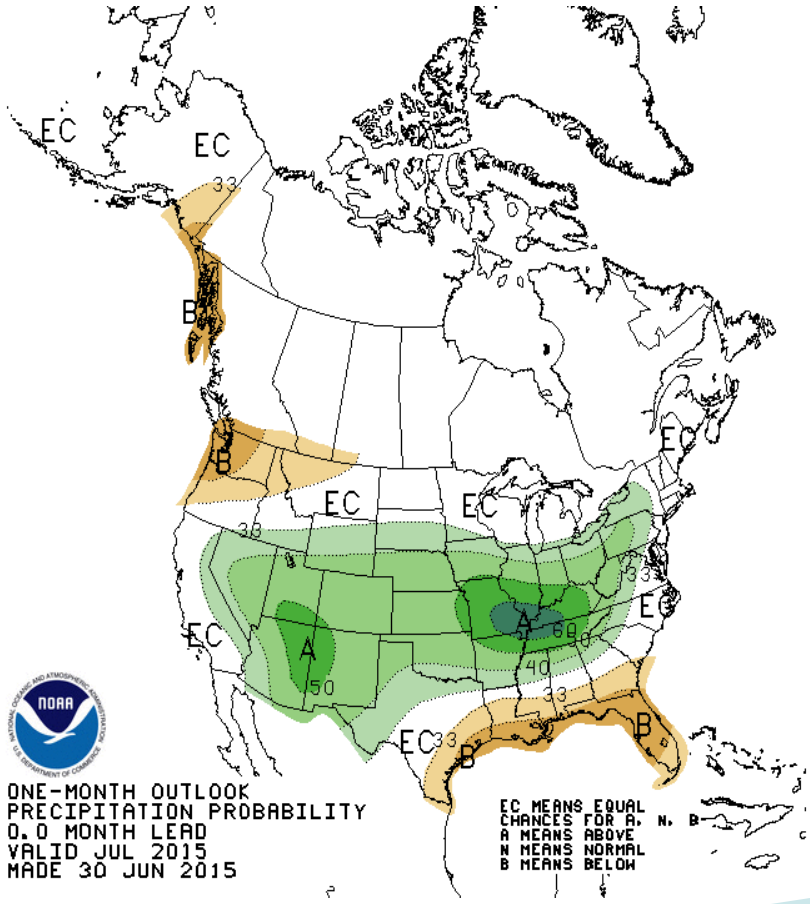
Jul-Aug-Sept Temperature Outlook



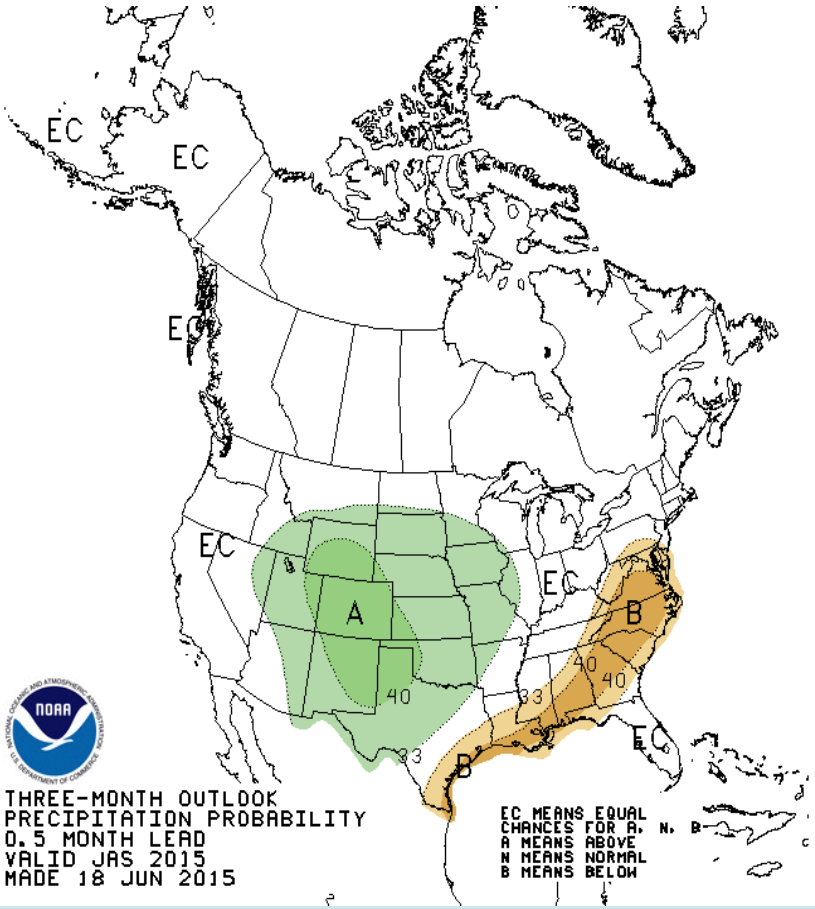
http://www.cpc.ncep.noaa.gov/

NWS Climate Prediction Center
30 and 90 Day Outlooks

July Precipitation Outlook



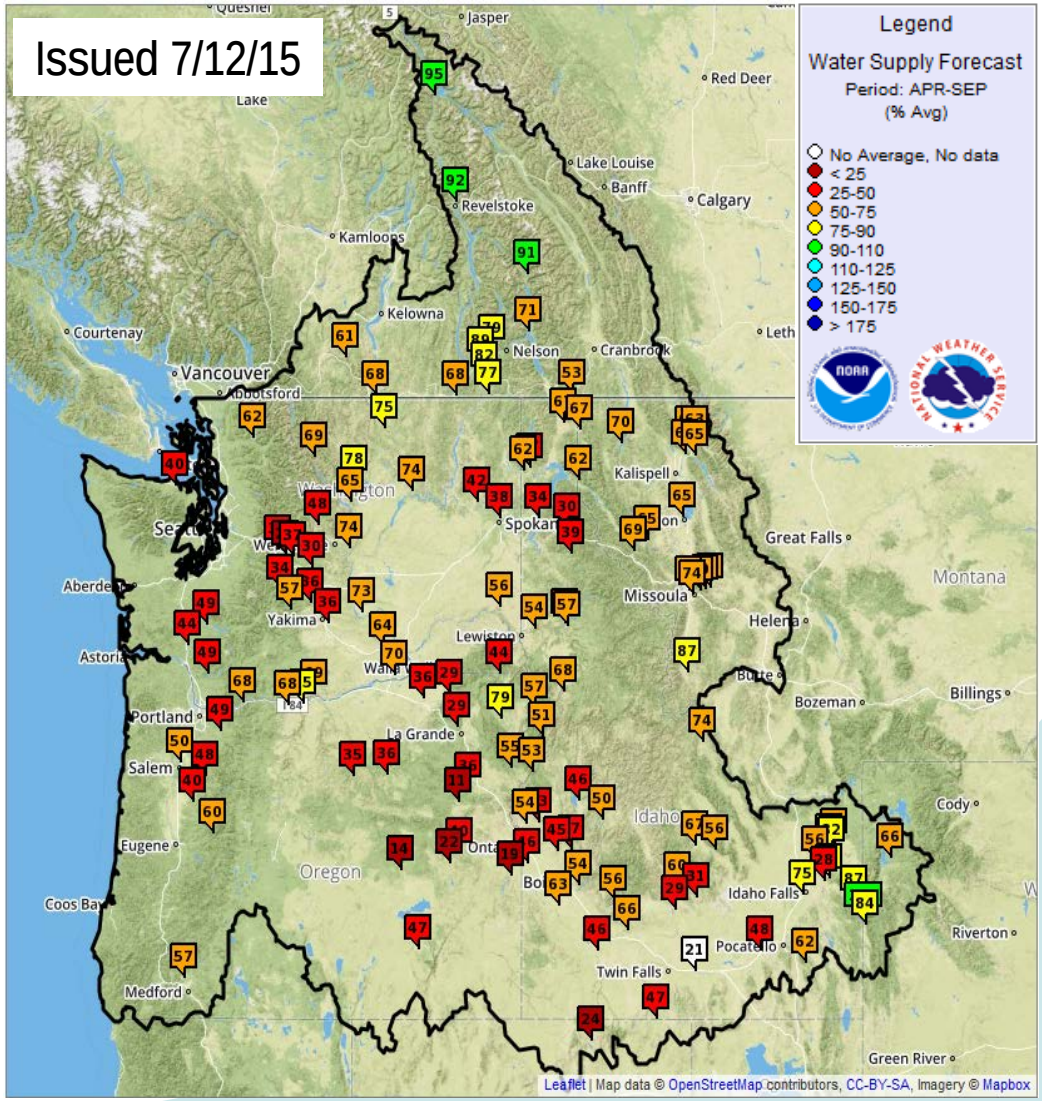
Jul-Aug-Sept Precipitation Outlook



http://www.cpc.ncep.noaa.gov/

Seasonal Water Supply Forecasts

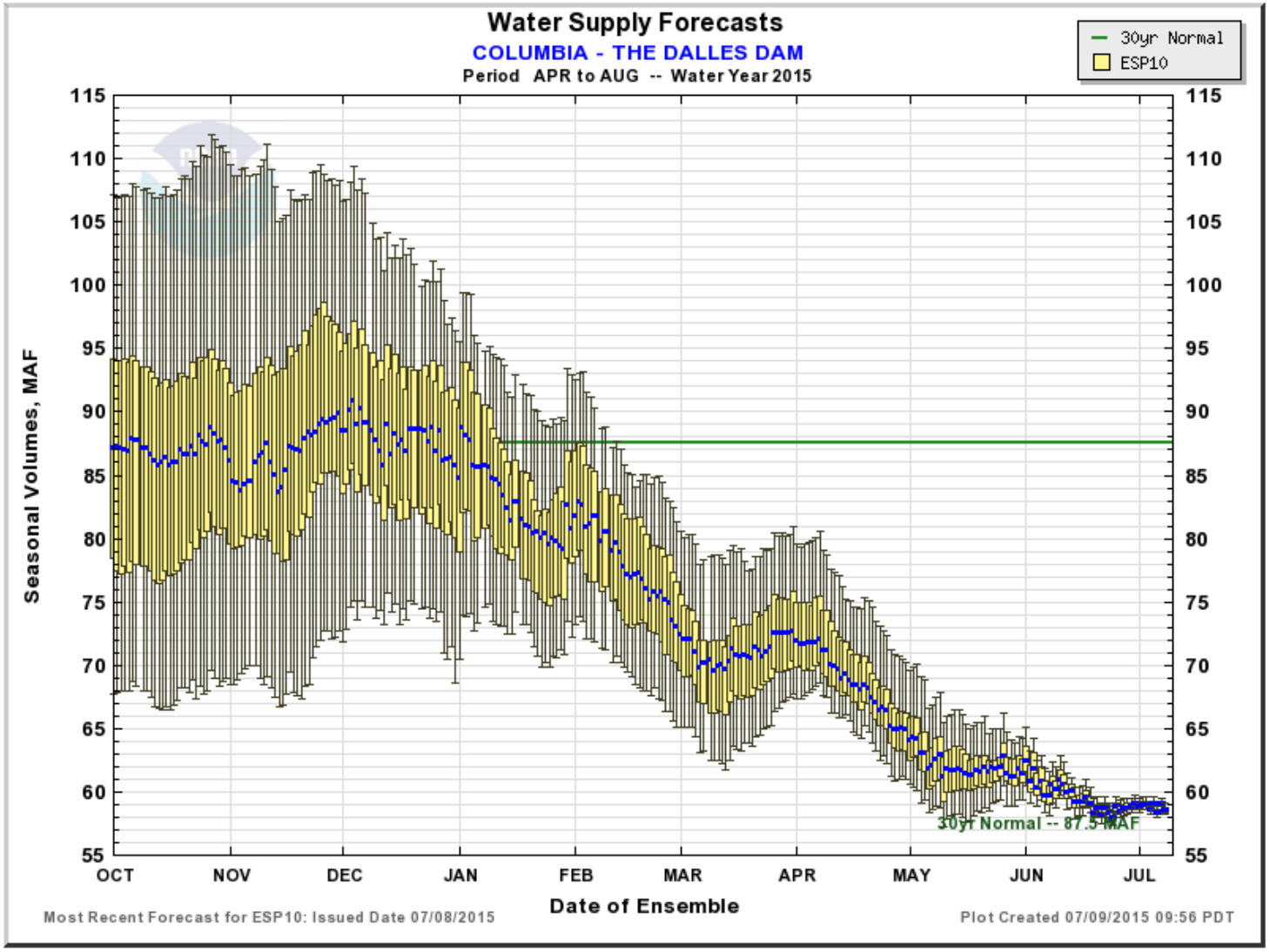
Location	% AVE	Rank
Columbia River at Grand Coulee (Apr-Aug Volume)	74%	3/55
Snake River at Lower Granite Dam (Apr-Jul Volume)	53%	4/55
Columbia River at the Dalles (Apr-Aug Volume)	67%	3/55



http://www.nwrfc.noaa.gov/ws/

Columbia River at the Dalles

Apr-Aug Water Supply Forecast issued 7/12/2015: 58.8 MAF (67% of Normal)



http://www.nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=TDAO3

Science, Service, Stewardship

Fish Passage: 2015 Migration Year

July 13, 2015 Congressional Briefing

Ritchie Graves
NMFS, West Coast Region
Interior Columbia Basin Office

Photo courtesy of Morgan Bond, NWFSC

Spring & Summer Flow Objectives

BiOp Flow objectives during the juvenile migration.

Columbia River

Spring: 220 – 260 kcfs sliding scale based on runoff volume of 80,000 to 92,000 kaf

Snake River

Spring: 85 – 100 kcfs sliding scale based on runoff volume of 16,000 to 20,000 kaf

Flow Management decisions made through the Regional Forum (Technical Management Team)

Emphasis placed on spring juvenile migrants – 6 ESUs, while taking some risk to flow in summer – 1 ESU.

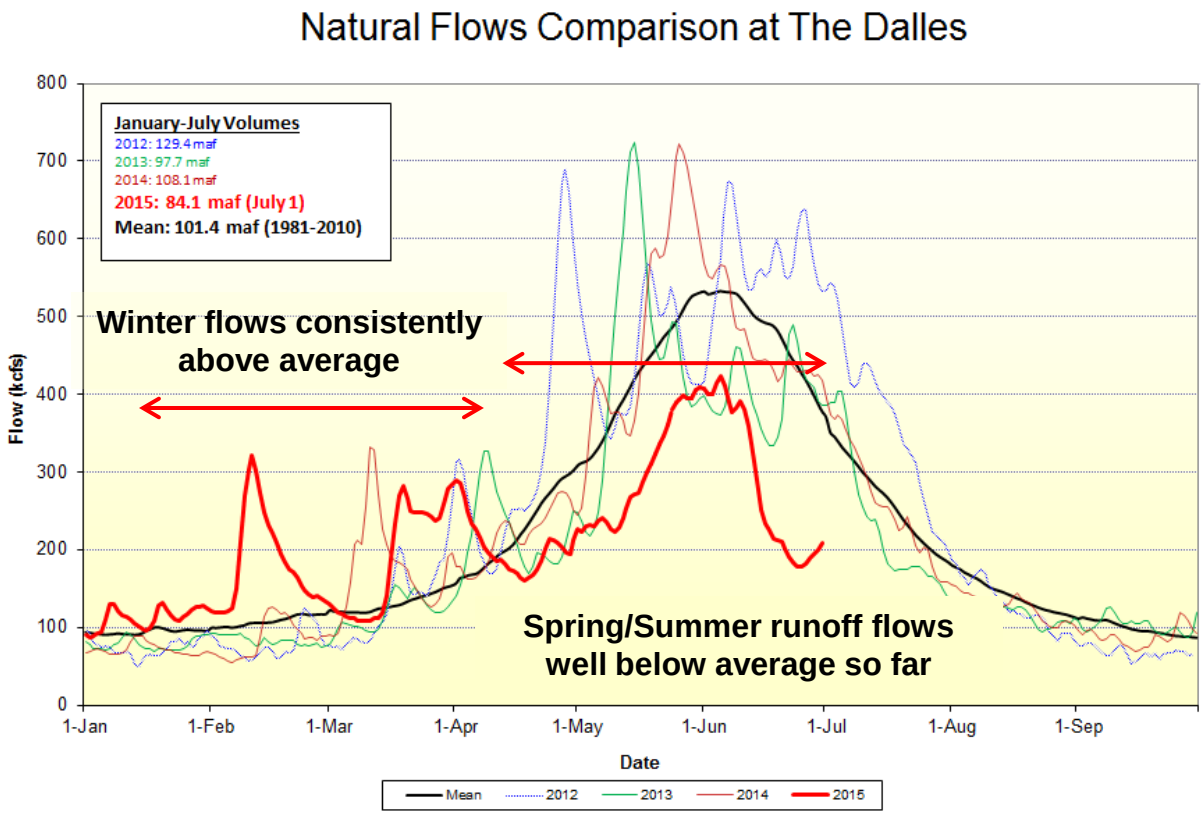
FCRPS BiOp RPA 14 – Dry Water Operations helped to guide decision processes

- 500 kaf of Canadian non-Treaty storage released
- 1,000 kaf of Canadian Treaty storage released
- Corps approved two flood control deviation requests to shift flows into April/May to benefit spring fish.

FCRPS Dry Year Operations

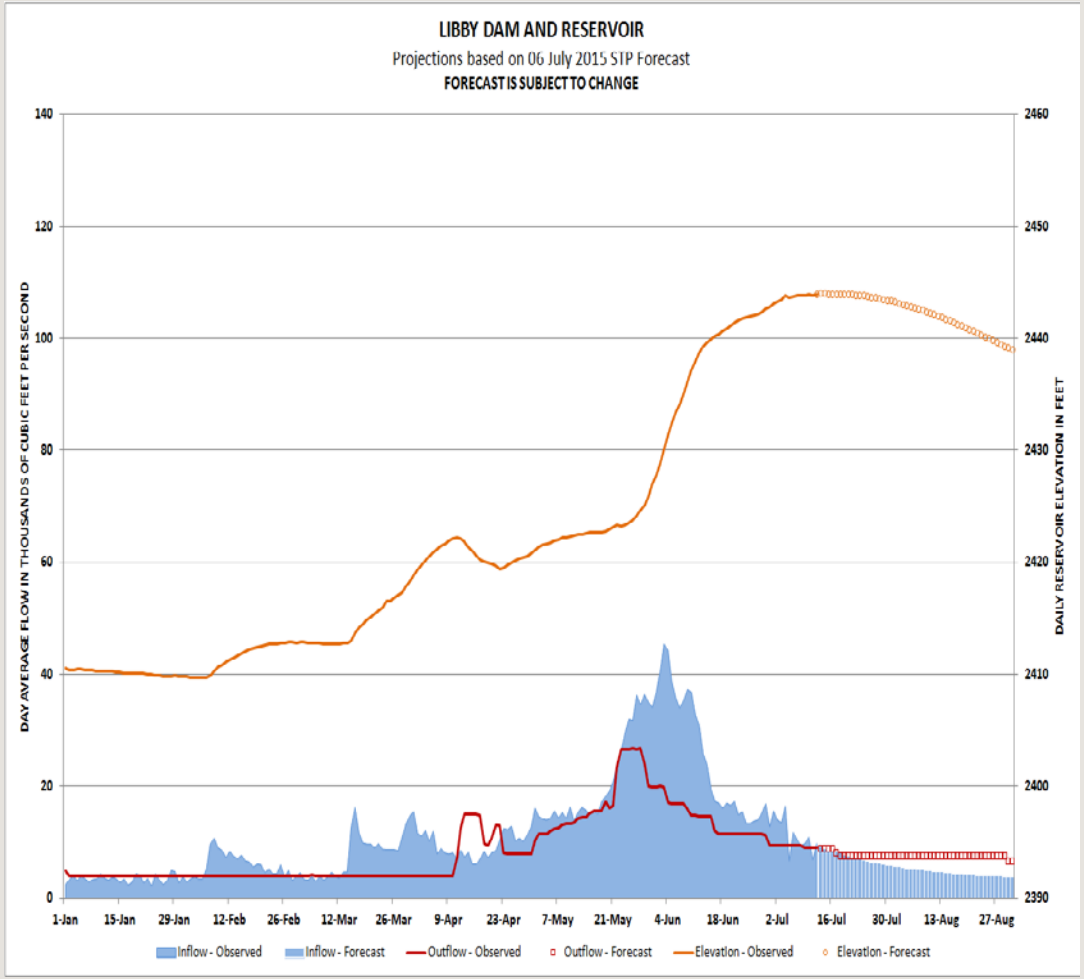
PRESENTED BY
Tony Norris, BPA
John Roache, Reclamation
Steve Barton, Corps of Engineers

Natural Flows at The Dalles – 2015



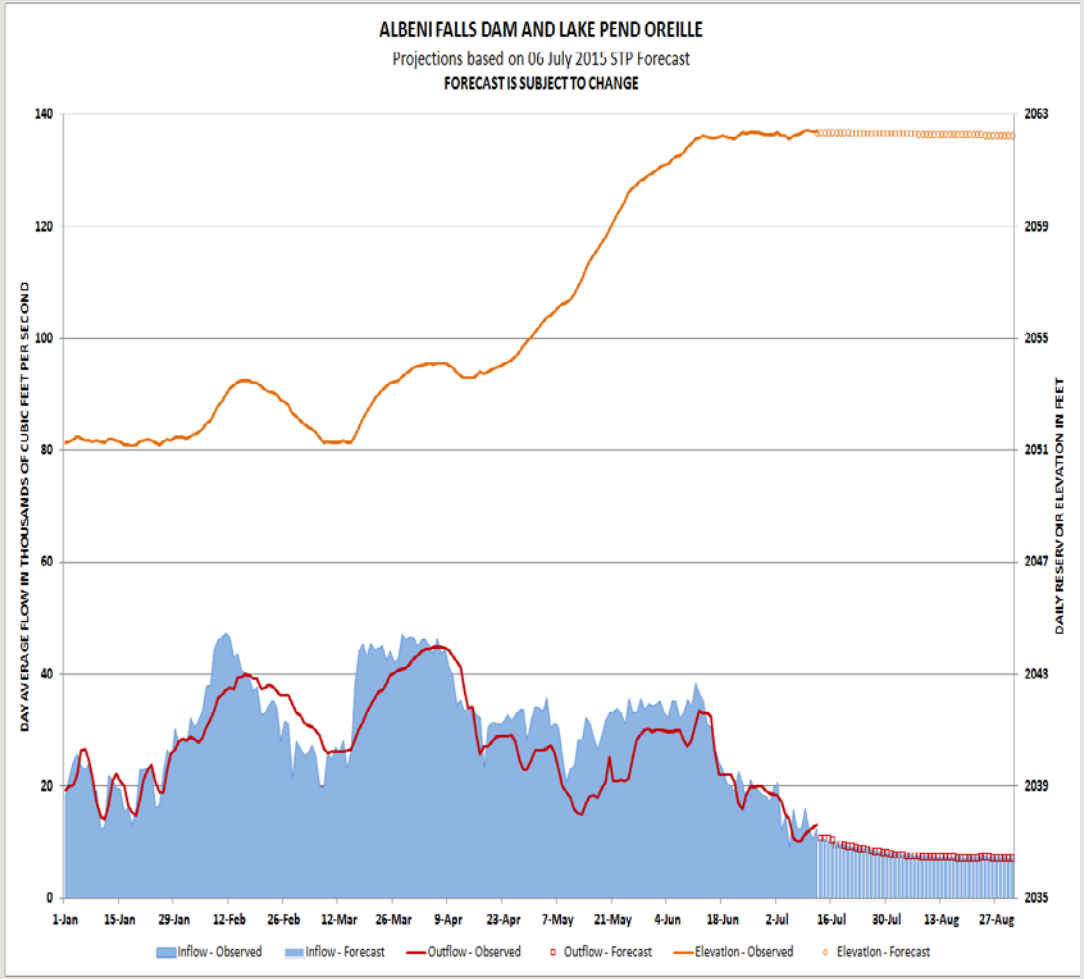
BiOp Dry Year Operations

PROJECT	WSF TRIGGER	OPERATION TRIGGERED
Libby	The Dalles May Final Apr-Aug 72.2 maf	Draft 20' from full by September 30.
Hungry Horse	The Dalles May Final Apr-Aug 72.2 maf	Draft 20' from full by September 30.
Non Treaty Storage (NTS)	The Dalles May Final Apr-Aug 72.2 maf	Firm release of up to 0.5 maf of dry year NTS storage
Grand Coulee	The Dalles July Final Apr-Aug 92.0 maf	Summer Draft limit is lowered 2 feet to elevation 1278 feet by August 31.
Libby	May Final Libby Apr-Aug WSF less than 4.8 maf	If below 4.8 maf there is no sturgeon pulse.



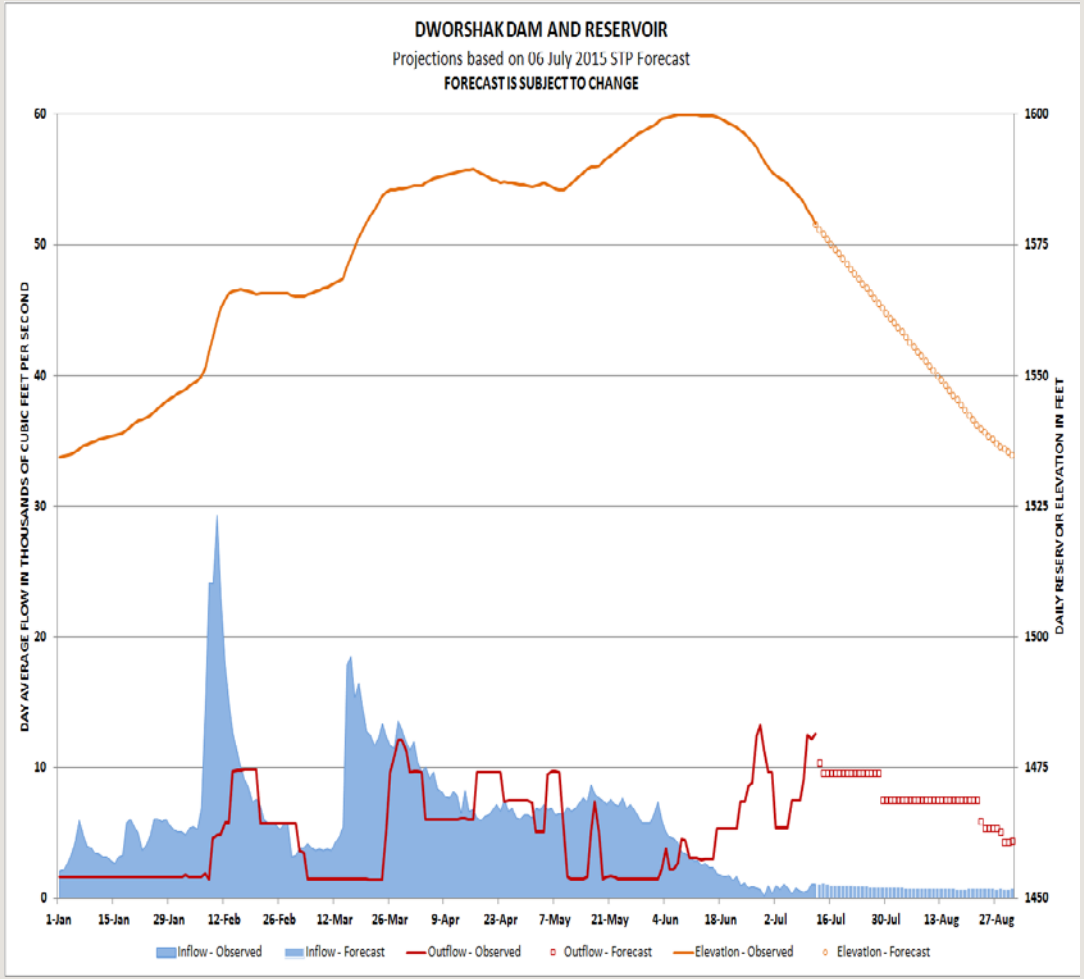
Libby Dam

- April-August Water Supply Forecast dropped from 6.3 MAF in January to 5.1 MAF in June (86% of average).
- Sturgeon flow augmentation volume was 0.8 MAF (Tier2)
  - Releases began May 22 at full powerhouse for 7 days, ramping down to stable summer flows.
- Estimated flows planned to be steady through August, drafting to 2439 ft by August 31.



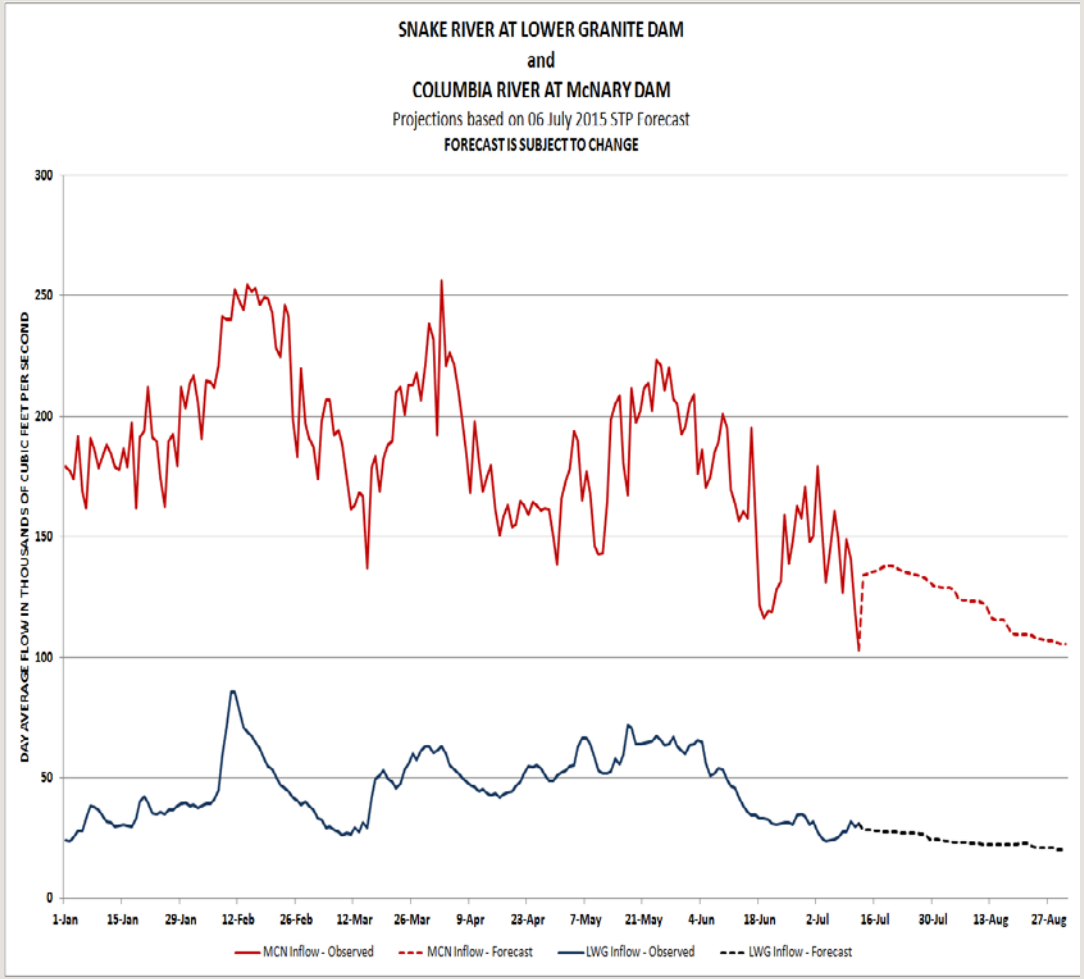
Albeni Falls Dam

- High inflows over the winter and spring caused some fill into the lake due to channel restriction.
- Refilled the lake to within top half-foot on June 11.
- Maintain Lake Pend Oreille 2062.0-2062.5 ft into September.



Dworshak Dam

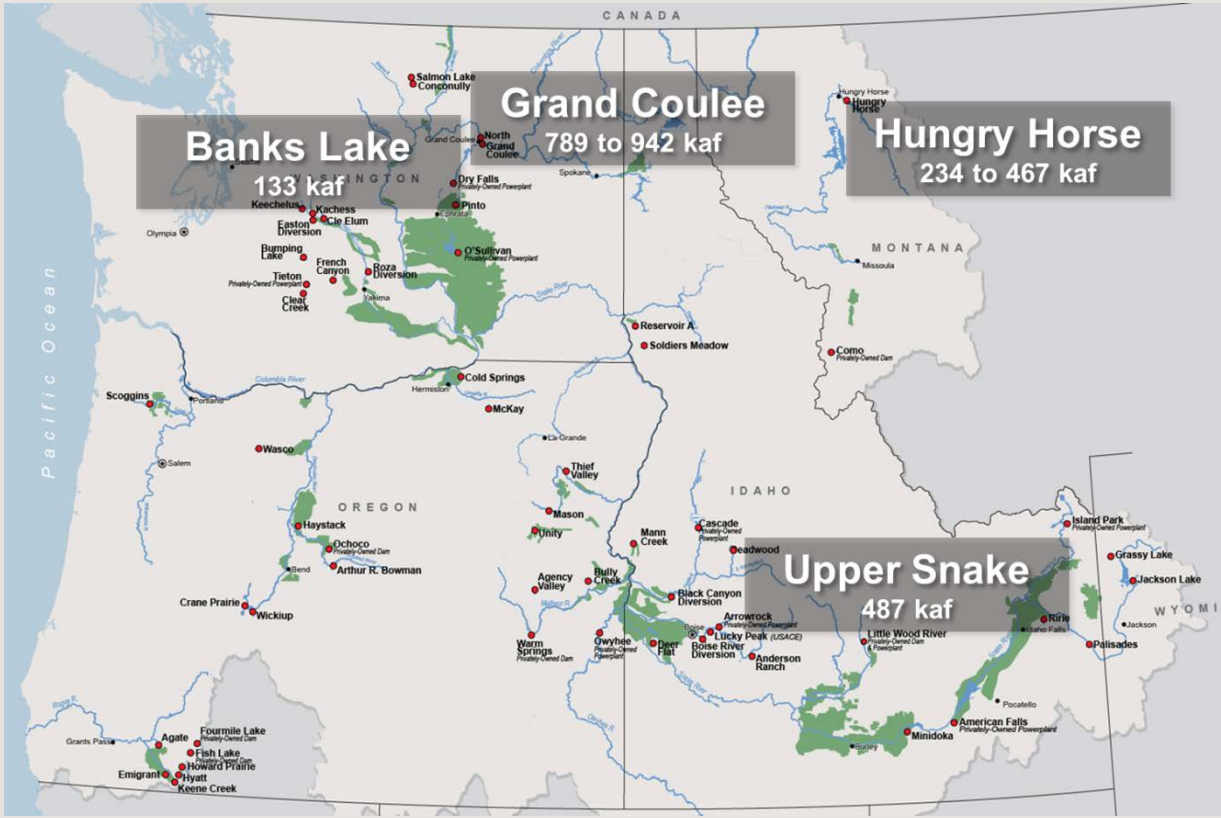
- April-July Water Supply Forecast dropped from 2.1 MAF in January to 1.1 MAF in May (42% of average).
- Project augmented spring flows on three occasions to assist spring juveniles.
- Reservoir refilled the first week of June.
- Reservoir releases for flow augmentation and temperature control began June 17, targeting 1535 ft by August 31.



Lower Snake and Lower Columbia Rivers

- Flows in these reaches are elevated due to upstream flow operations.
- Water temperature is warmer than normal
- No new known navigation hazards other than seasonal accretion.
- Low flows may make special operations difficult to implement in late summer.

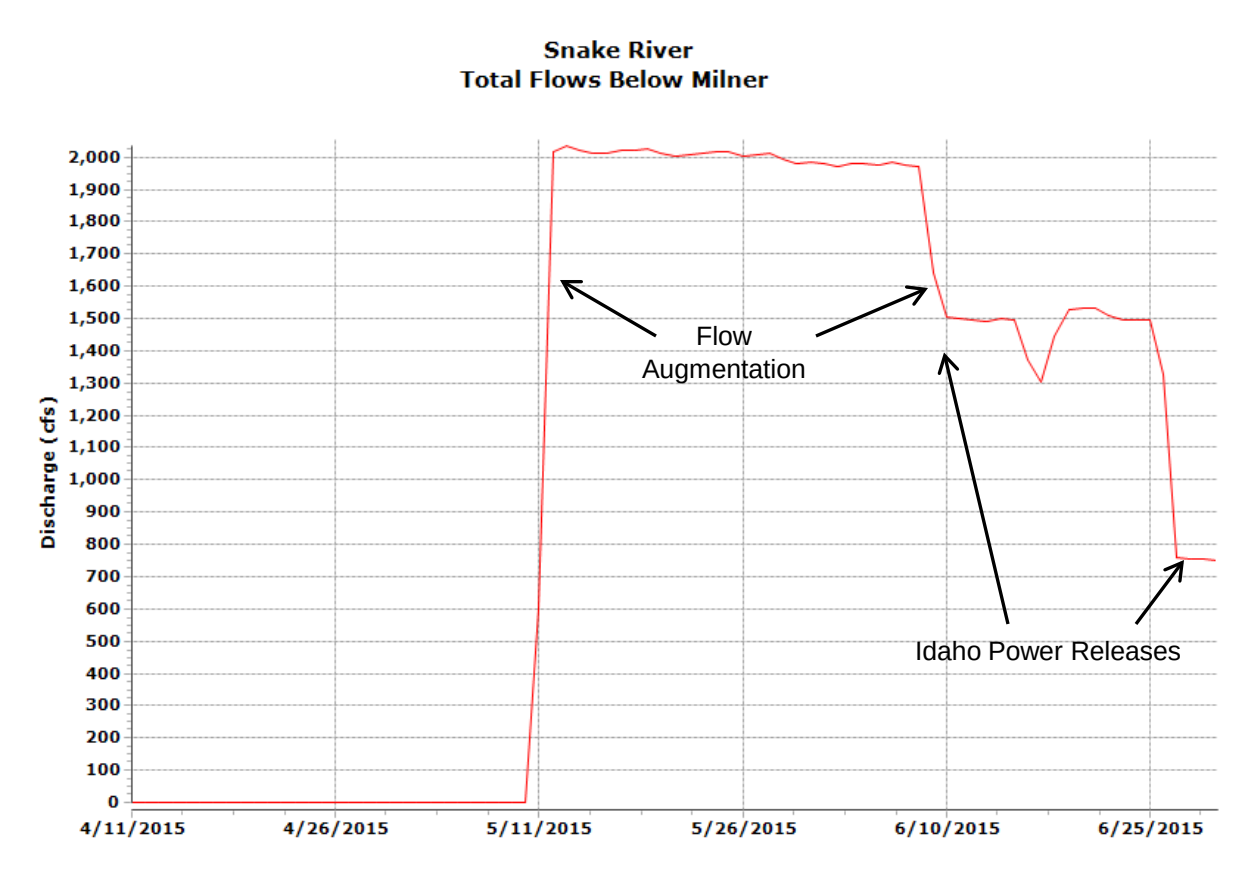
Reclamation Flow Augmentation Goals



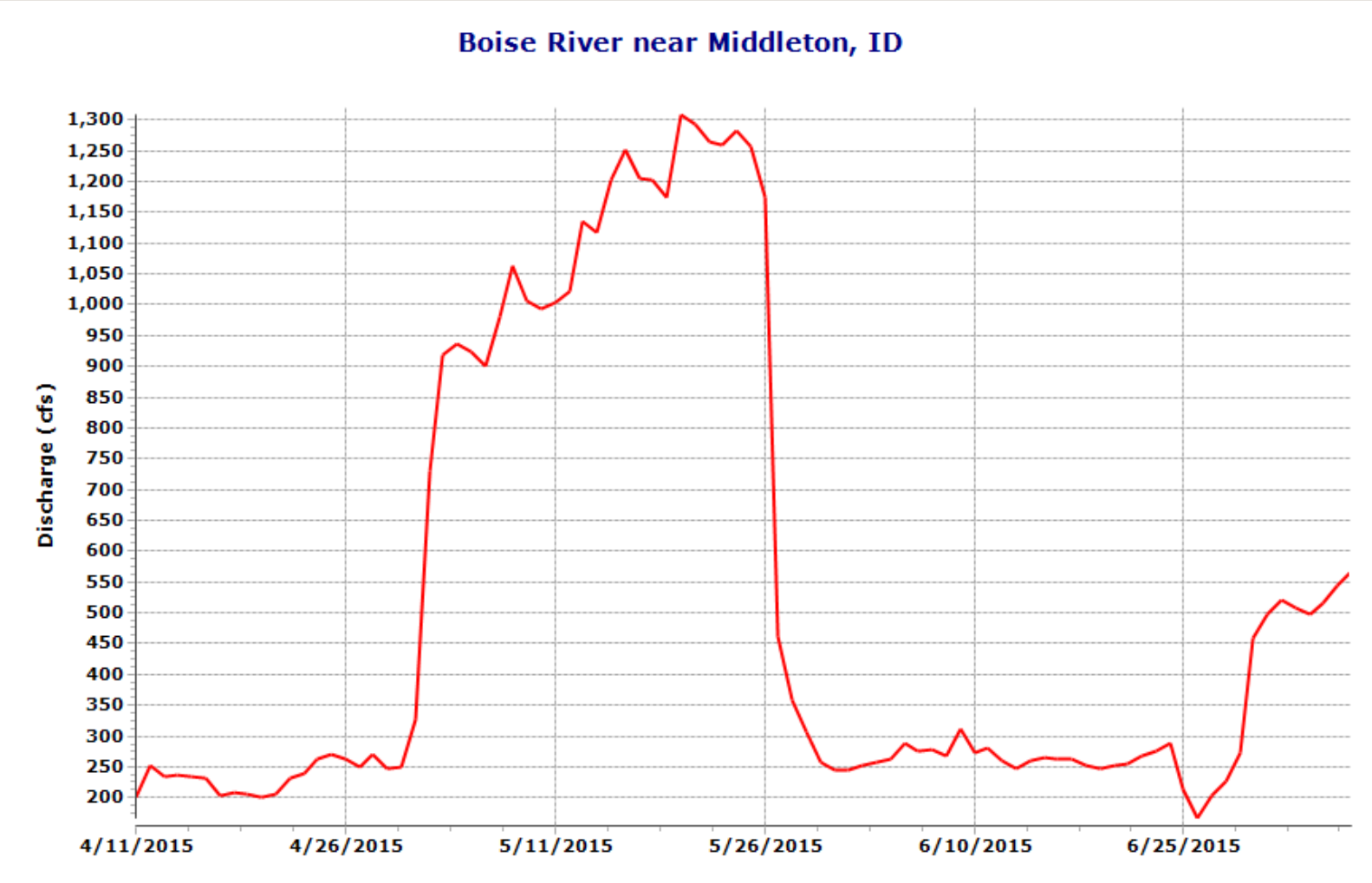
2015 Upper Snake Flow Augmentation

Source	Volume (Acre-feet)	Timing
Upper Snake	122,362	May-June
Boise	62,982	May -July
Payette	164,007	May-August
Natural Flows (Idaho and Skyline)	77,649	spring/summer

2015 Flow Augmentation – expect to deliver 427 kaf, basin values are likely to be adjusted as augmentation releases continue



Upper Snake (above Milner) releases were completed by June 10th
releases after that were flows for Idaho Power

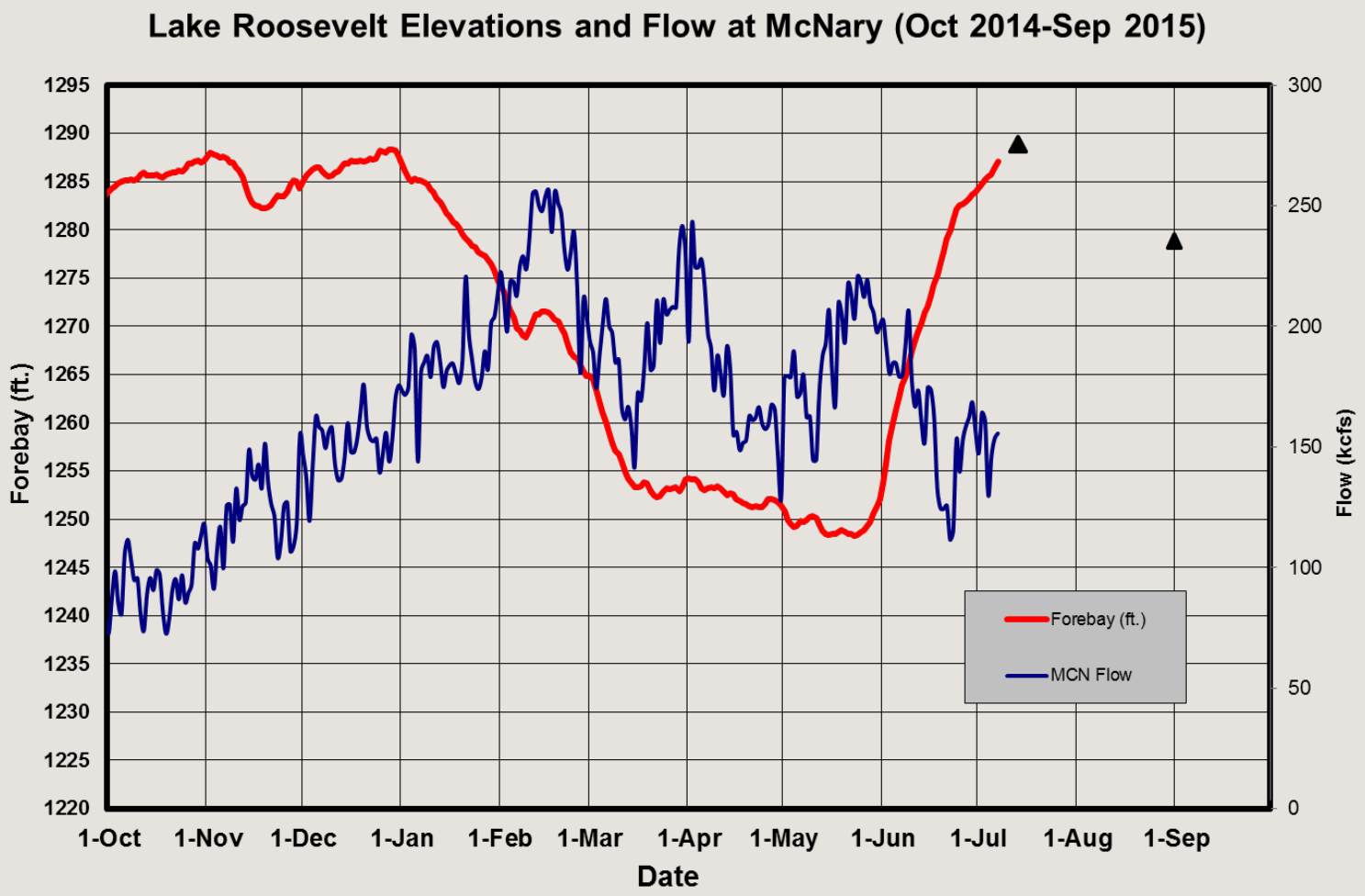

Boise River near Middleton, ID
Discharge (cfs)
1,300
1,250
1,200
1,150
1,100
1,050
1,000
950
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
4/11/2015
4/26/2015
5/11/2015
5/26/2015
6/10/2015
6/25/2015

Grand Coulee Operations

- Reservoir Drafted to 1255 feet or lower for Drum Gate Maintenance from March 15 – May 11.
- After May 11 delayed refill of Grand Coulee to maintain 185 kcfs at McNary through May 21.
- May 22 – maintained average flows at McNary at 200 kcfs through end of month.

Grand Coulee (cont.)

- Began refilling on June 1.
- Elevation was in 1285-1286 foot range for July 4th weekend for recreation interests.
- Plan to fill to 1289.7 feet by July 19.
- After filling, draft 12 feet by end of August for flow augmentation.


Lake Roosevelt Elevations and Flow at McNary (Oct 2014-Sep 2015)
Forebay (ft.)
1295
1290
1285
1280
1275
1270
1265
1260
1255
1250
1245
1240
1235
1230
1225
1220
Flow (kcfs)
300
250
200
150
100
50
0
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
Date
Forebay (ft.)
MCN Flow

Hungry Horse Operations

- Volume inflow forecast on February 1 was above average (114%).

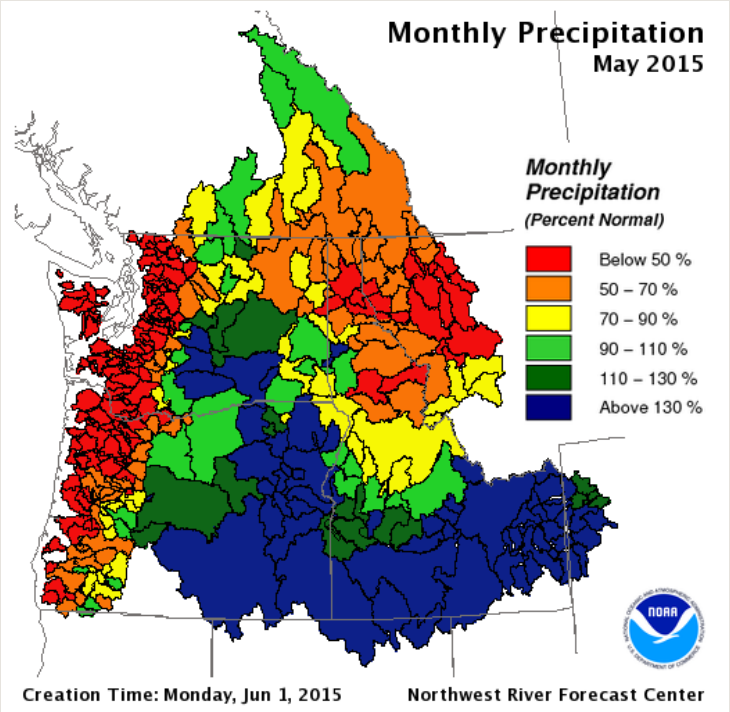
- Volume that ran off in March was the highest in last 45 years in the Flathead basin and depleted low and mid elevation snow.

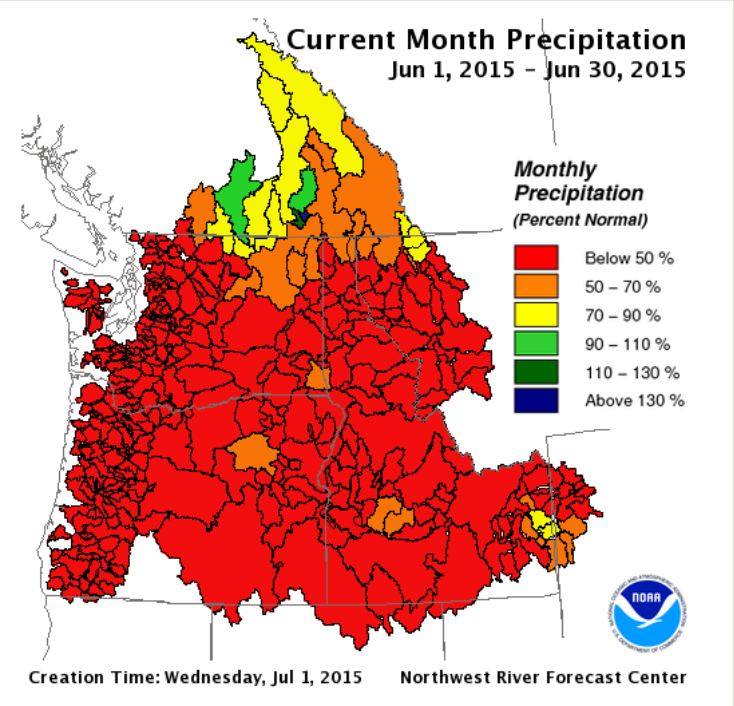
Hungry Horse (cont.)

- Precipitation in April and May were much below average resulting in significant decrease in volume inflow forecast in May and June.

- June (May – Sep) inflow volume forecast was 64 percent of average.

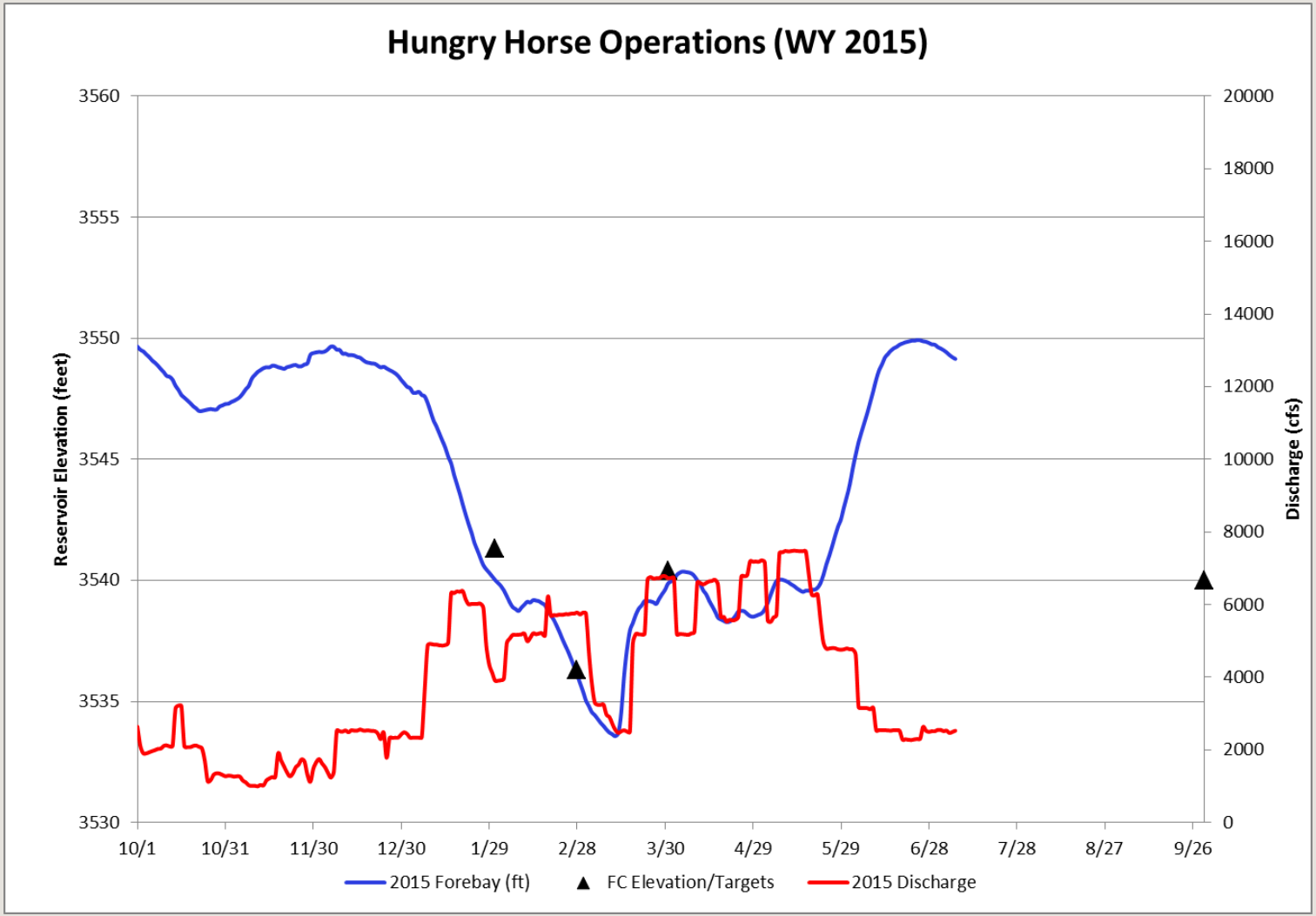
May/June Precipitation

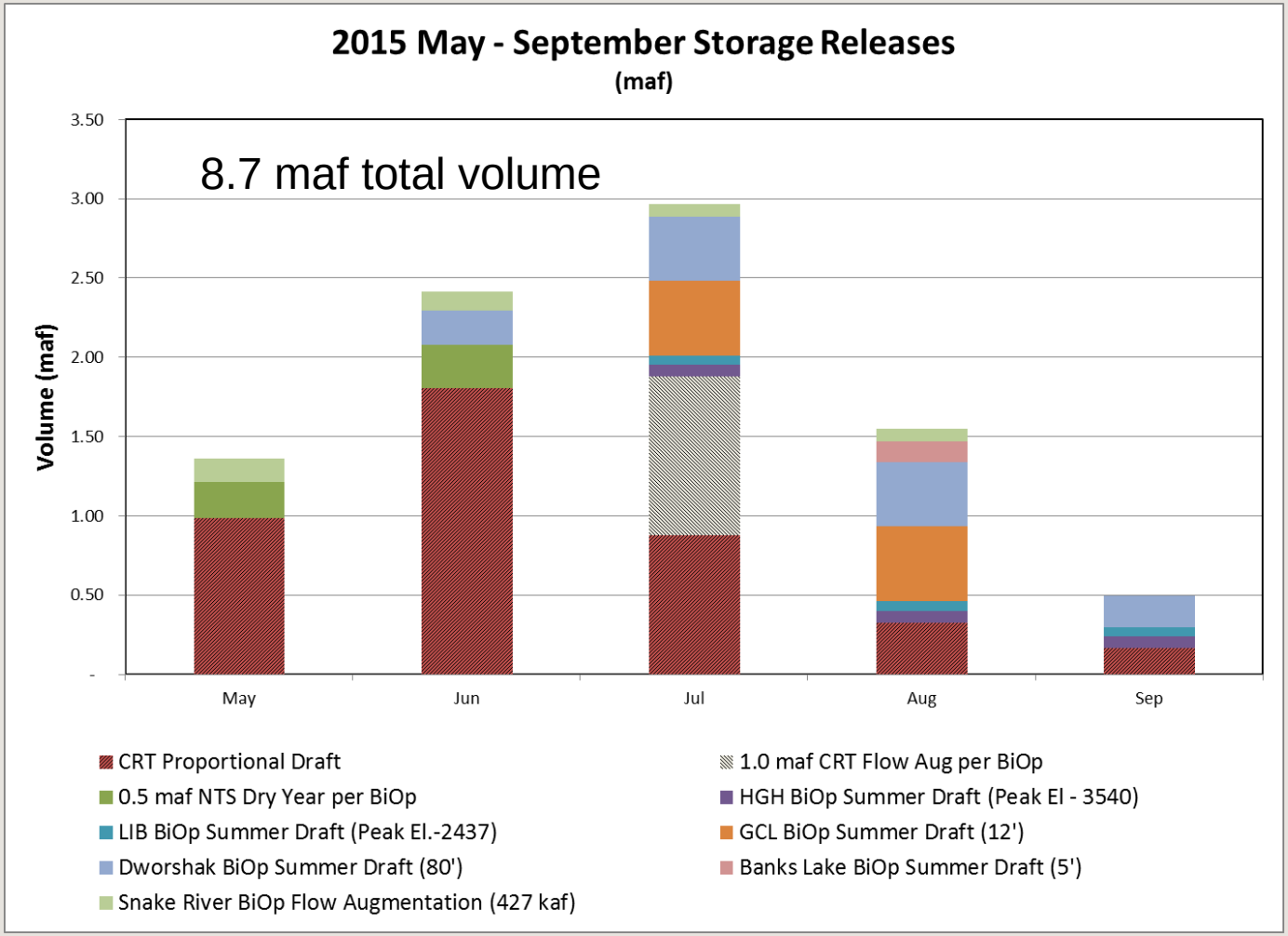




Hungry Horse (cont.)

- Hungry Horse filled to 10 below full elevation.
- On July 1st Hungry Horse began to draft 20 feet from full elevation by the end of September for flow augmentation in the lower Columbia river.
- Approximately 6 kaf of the summer draft was shaped into early July from August and September to help maintain elevation and flows at Flathead Lake.


Hungry Horse Operations (WY 2015)
Reservoir Elevation (feet)
Discharge (cfs)
3560
3555
3550
3545
3540
3535
3530
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
10/1
10/31
11/30
12/30
1/29
2/28
3/30
4/29
5/29
6/28
7/28
8/27
9/26
2015 Forebay (ft)
FC Elevation/Targets
2015 Discharge



Volumes and distribution of releases are estimated

2015 Augmentation Summary

	Total (maf)	Flow Contribution (kcfs)
May	1.4	22.1
Jun	2.4	39.3
Jul	3.0	48.3
Aug	1.5	25.1
Sep	0.5	8.0
Total	**8.7 maf**	**28.5 kcfs**

Science, Service, Stewardship

Fish Passage: 2015 Migration Year

July 13, 2015 Congressional Briefing

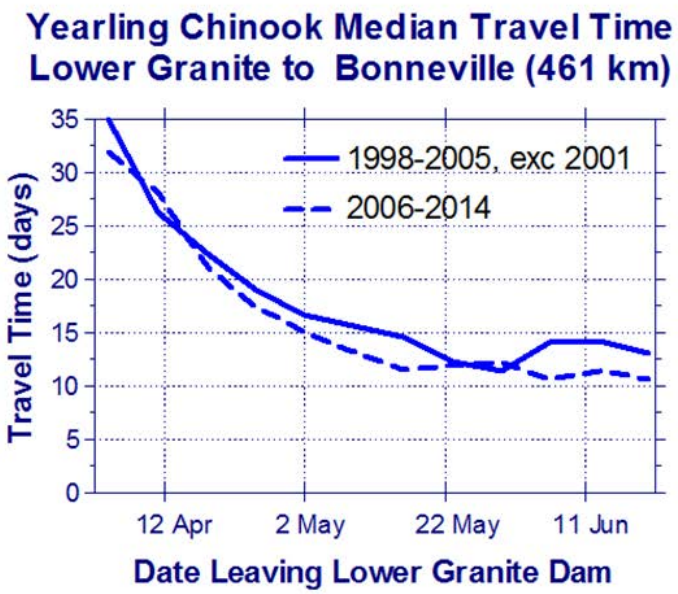
Ritchie Graves
NMFS, West Coast Region
Interior Columbia Basin Office

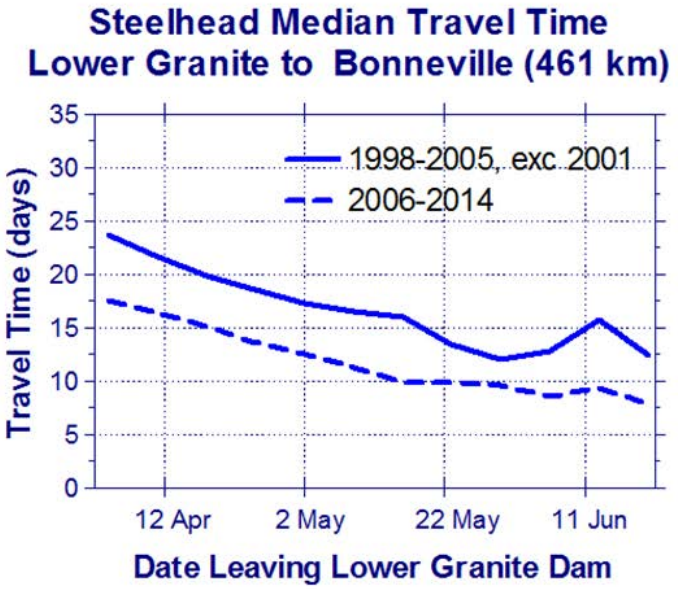
Photo courtesy of Morgan Bond, NWFSC

Science, Service, Stewardship

Changes in Median Travel Times Since 2005

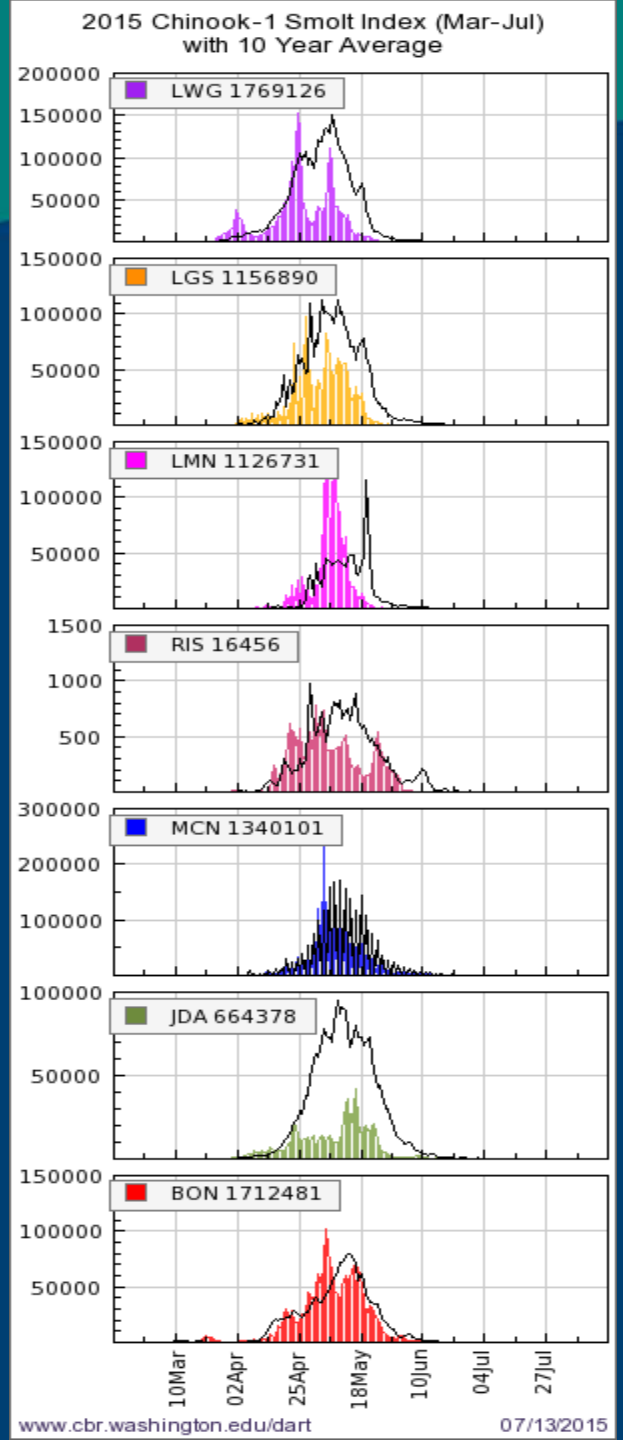
2006-2014 vs 1998-2005

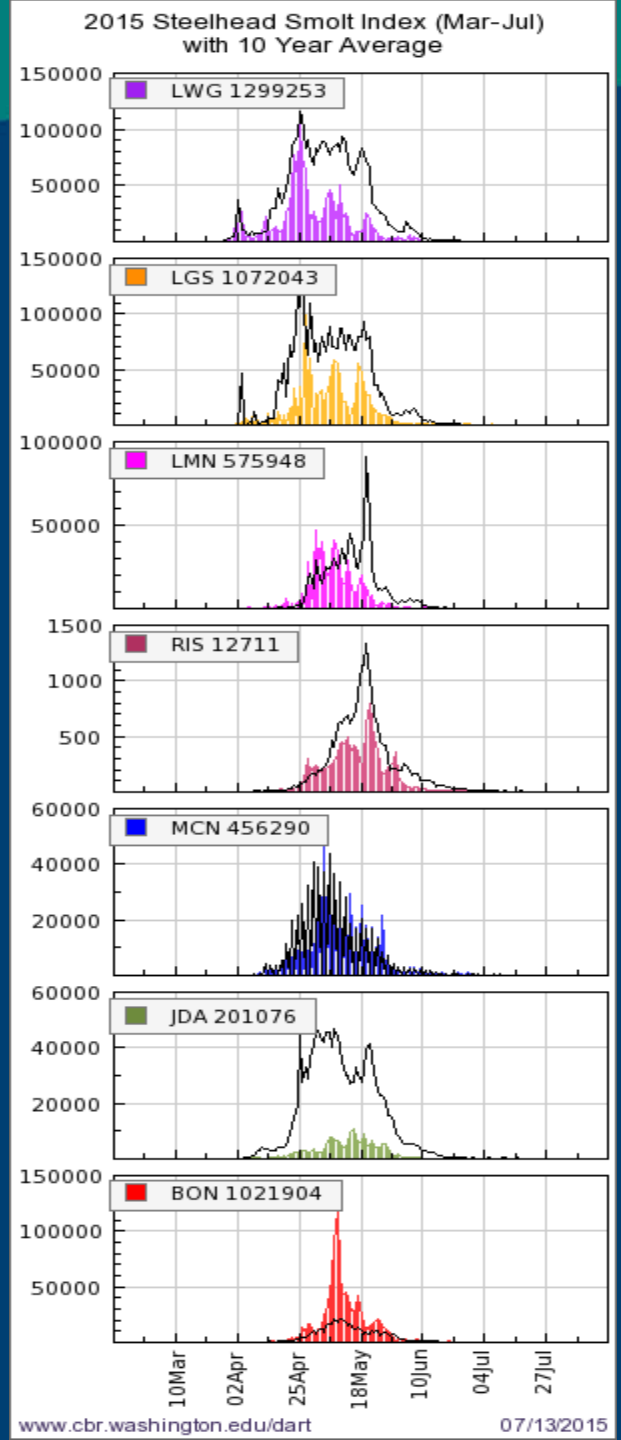




Science, Service, Stewardship

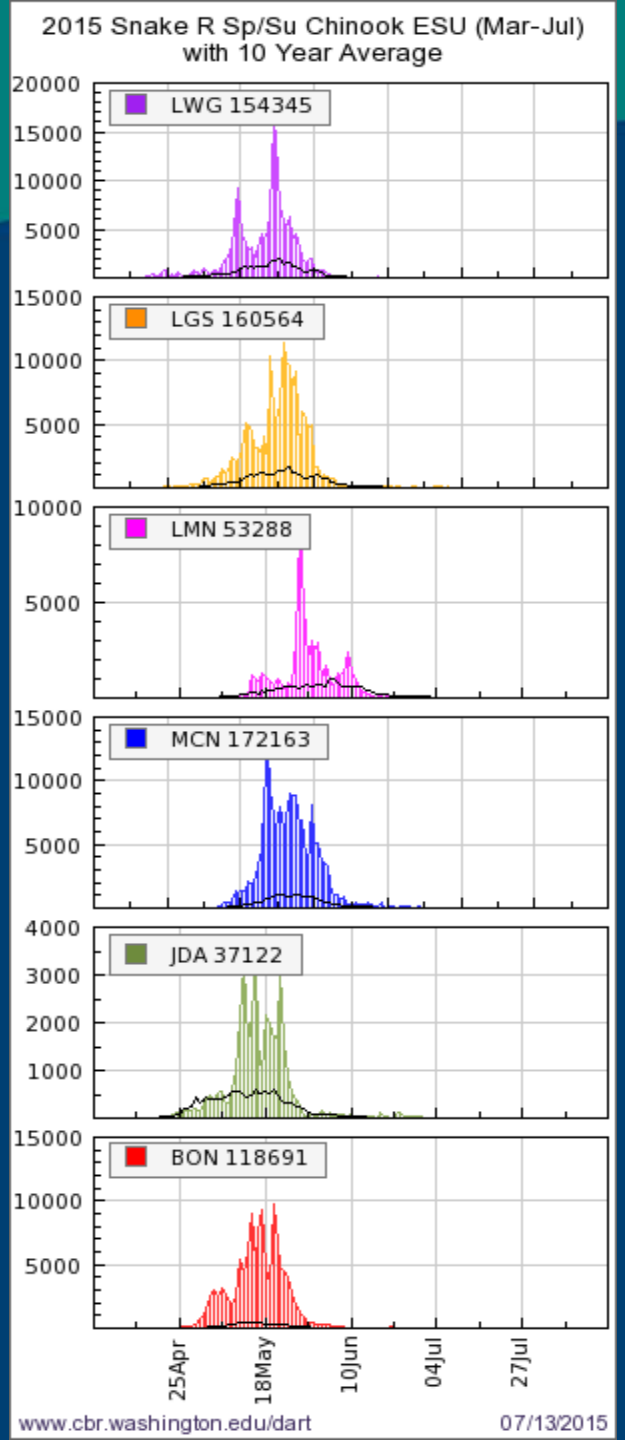
Yearling Chinook and steelhead smolt passage indices.

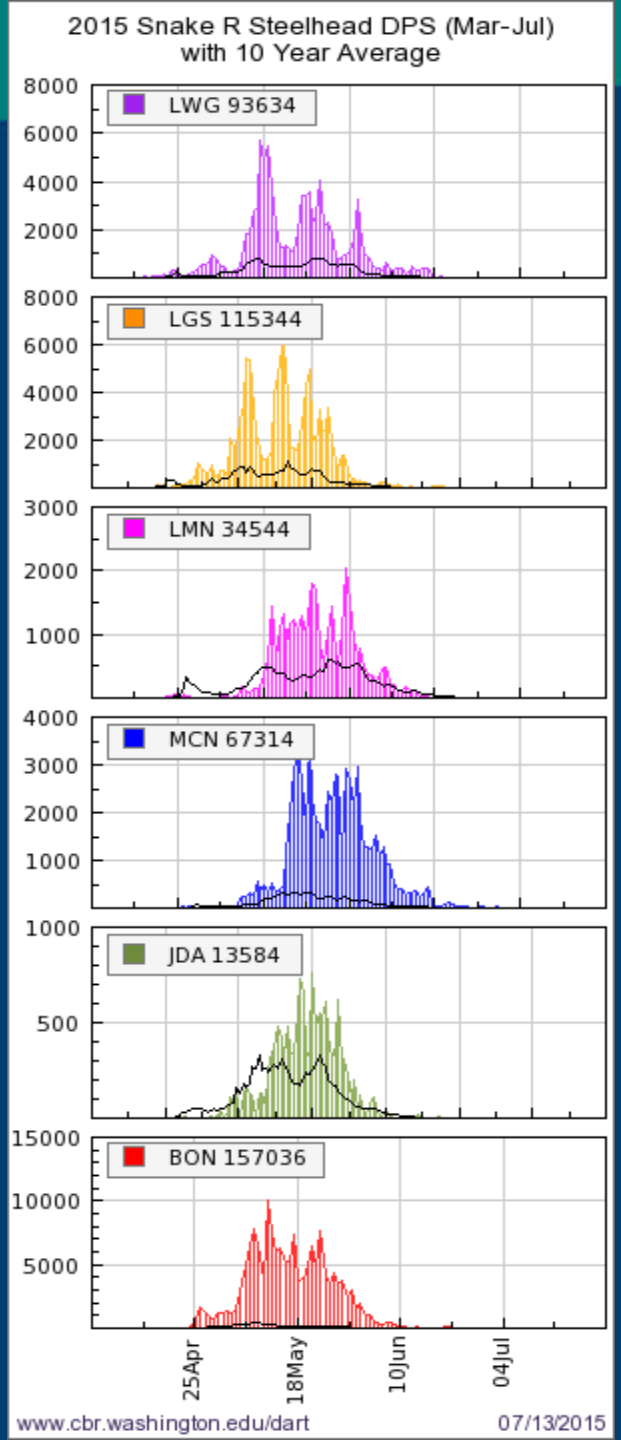


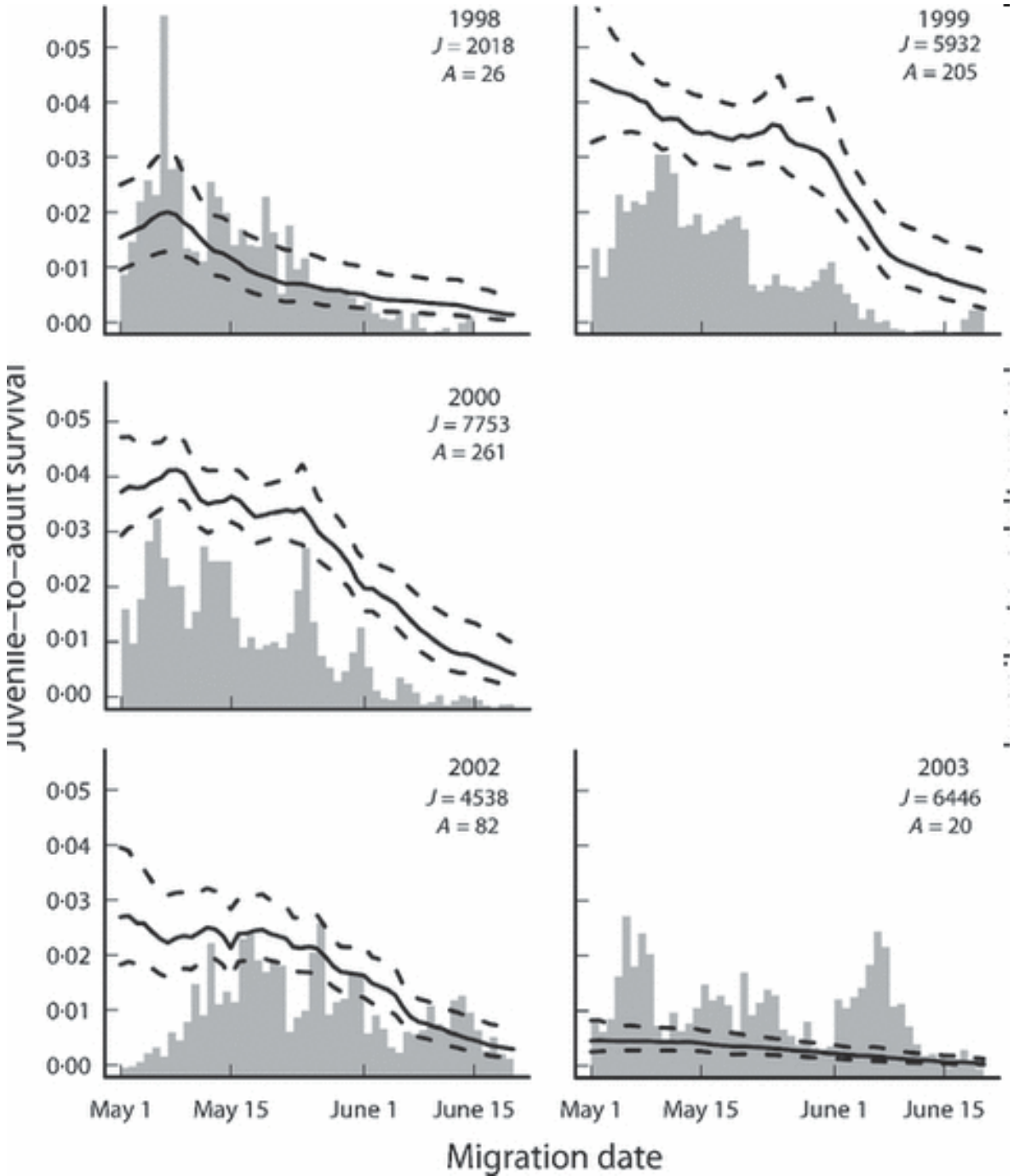


Science, Service, Stewardship

Snake River Spring Chinook and Steelhead passage timing from PIT tags







Why We Care

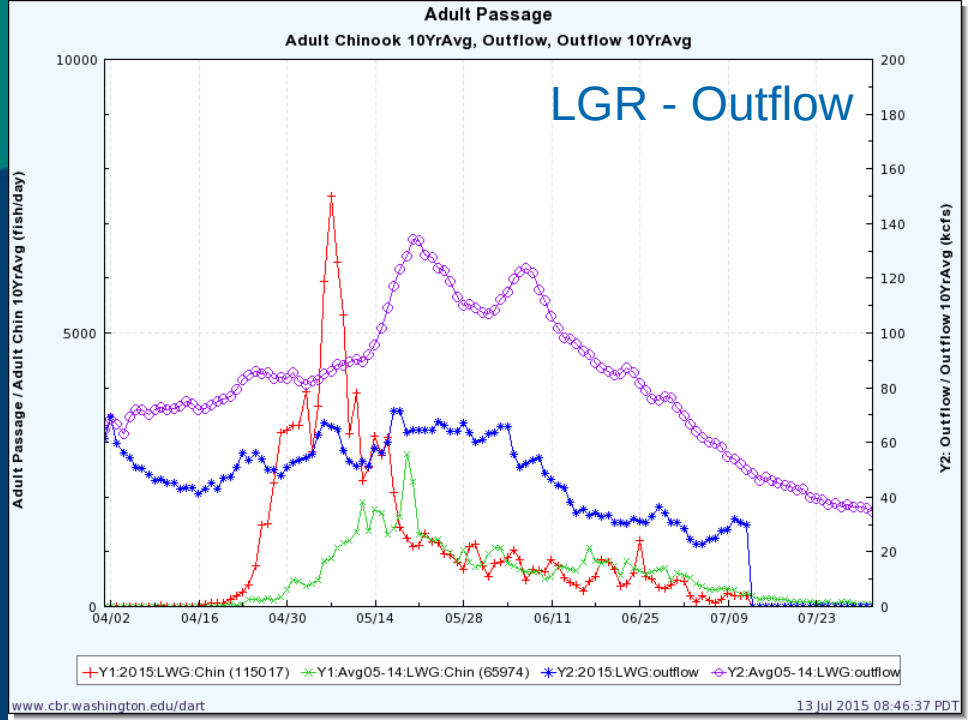
Time of ocean entry important because…

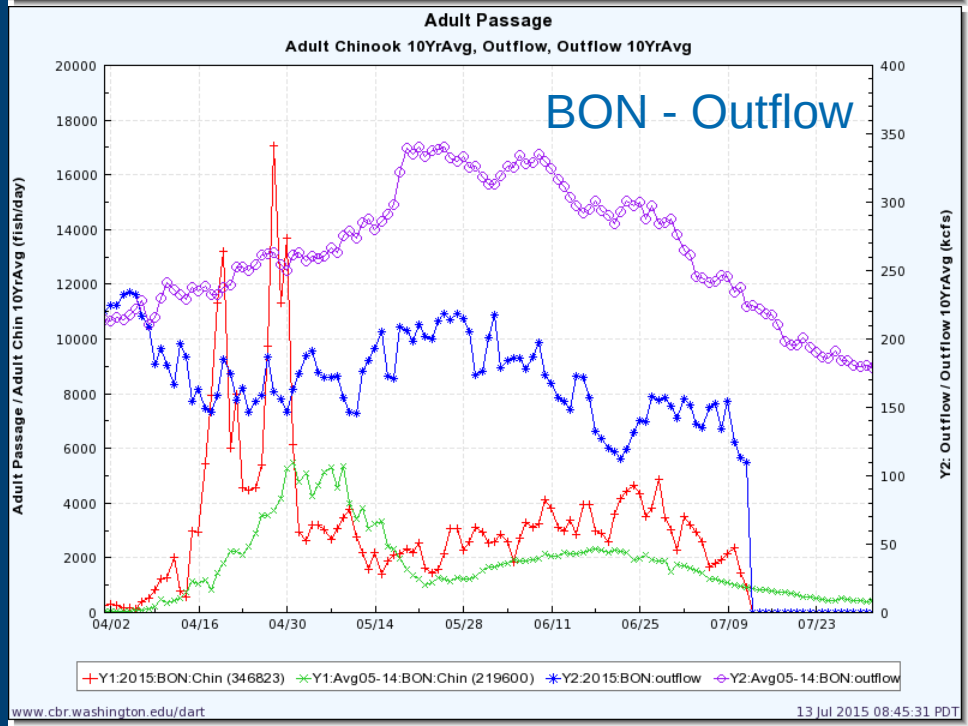
Later migrants generally have lower SARs

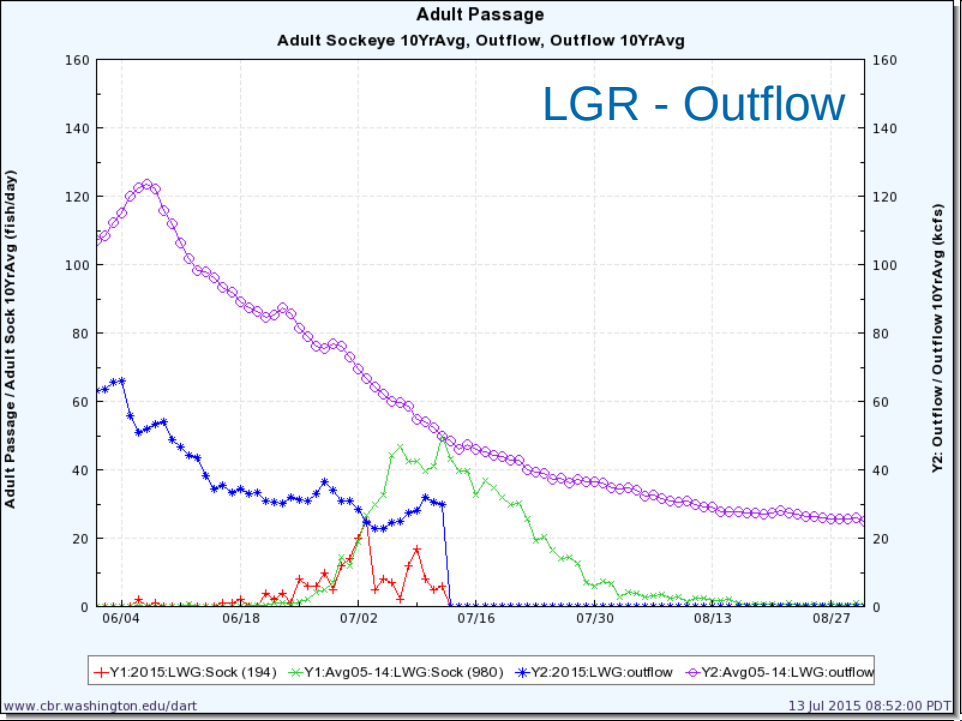
Source: Scheuerell et al. 2009, Journal of Applied Ecology

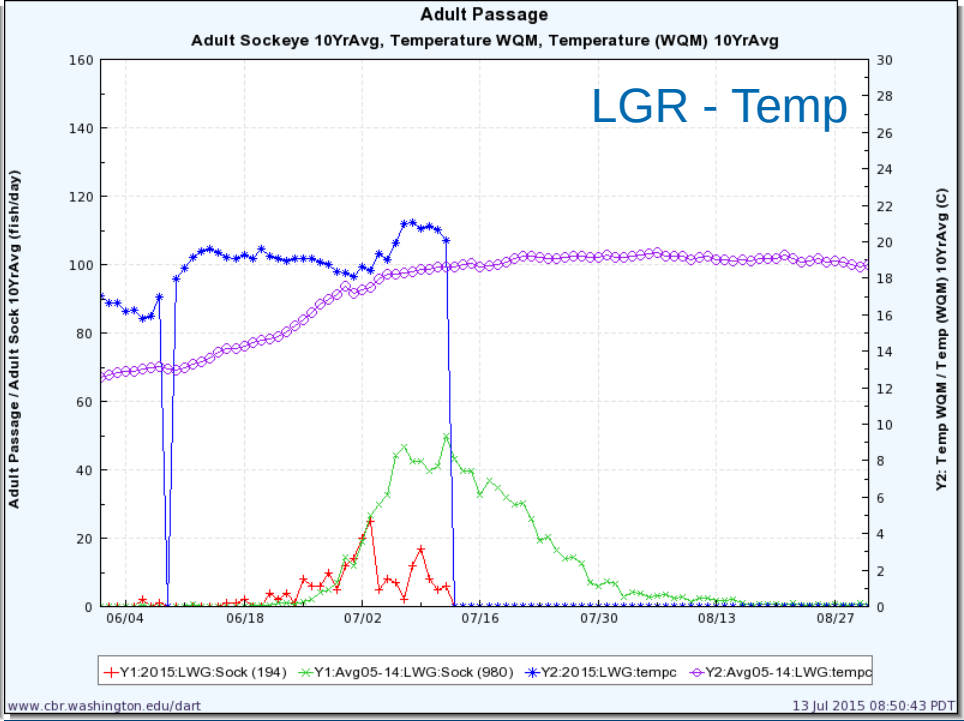
Science, Service, Stewardship

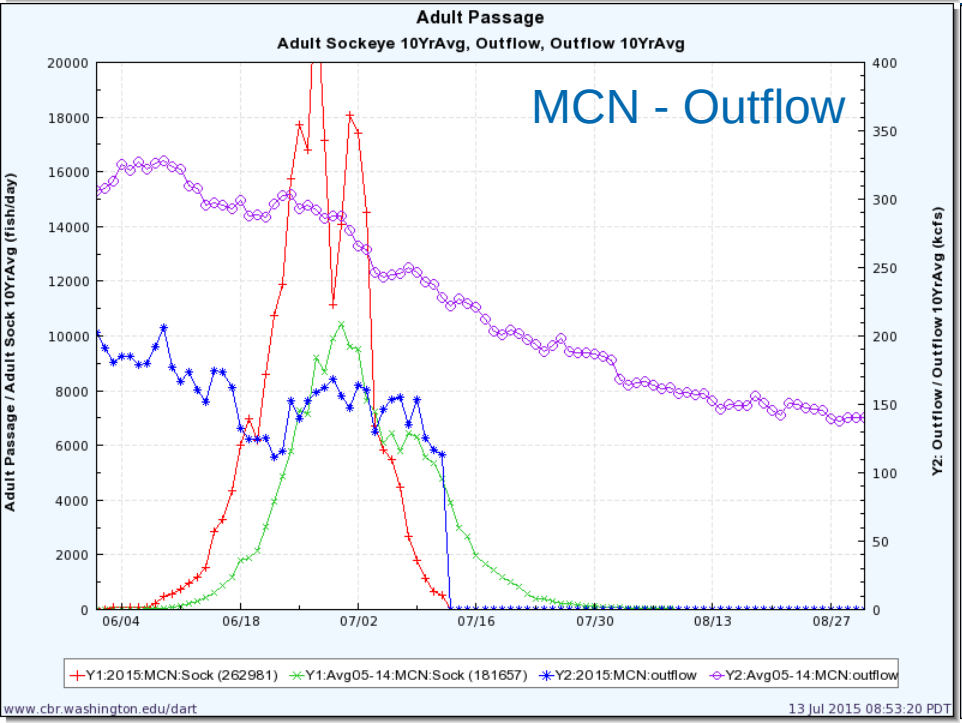
Chinook Salmon Adult Passage

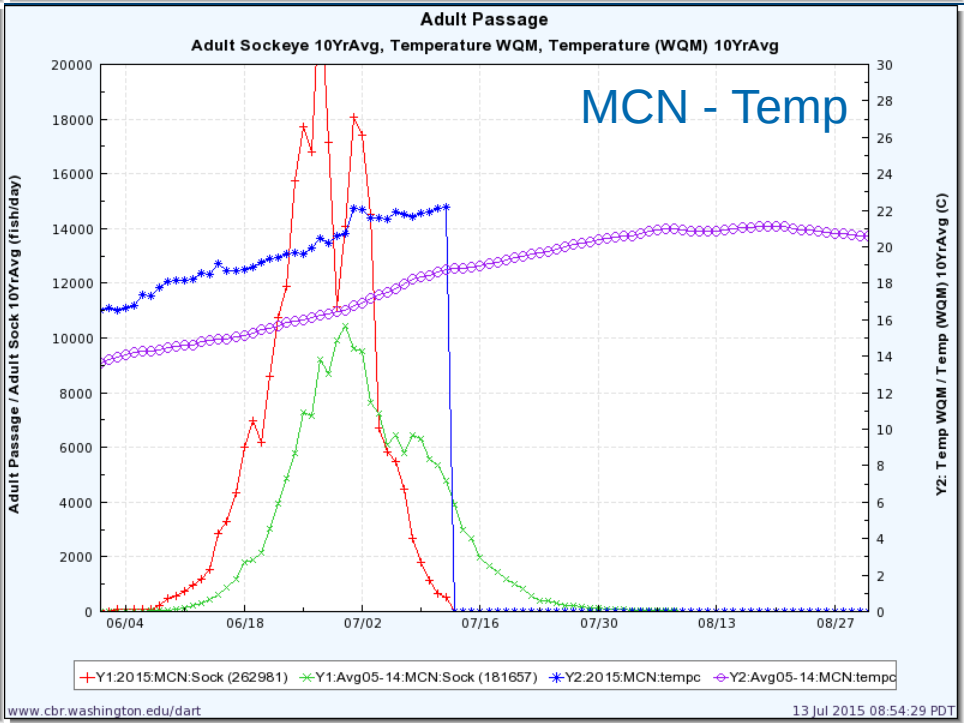





Adult Passage
Adult Sockeye 10YrAvg, Outflow, Outflow 10YrAvg
LGR - Outflow
Adult Passage / Adult Sock 10YrAvg (fish/day)
Y2: Outflow / Outflow 10YrAvg (kcfs)
06/04
06/18
07/02
07/16
07/30
08/13
08/27
Y1:2015:LWG:Sock (194)
Y1:Avg05-14:LWG:Sock (980)
Y2:2015:LWG:outflow
Y2:Avg05-14:LWG:outflow
www.cbr.washington.edu/dart
13 Jul 2015 08:52:00 PDT


Adult Passage
Adult Sockeye 10YrAvg, Temperature WQM, Temperature (WQM) 10YrAvg
LGR - Temp
Adult Passage / Adult Sock 10YrAvg (fish/day)
Y2: Temp WQM / Temp (WQM) 10YrAvg (C)
06/04
06/18
07/02
07/16
07/30
08/13
08/27
Y1:2015:LWG:Sock (194)
Y1:Avg05-14:LWG:Sock (980)
Y2:2015:LWG:tempc
Y2:Avg05-14:LWG:tempc
www.cbr.washington.edu/dart
13 Jul 2015 08:50:43 PDT


Adult Passage
Adult Sockeye 10YrAvg, Outflow, Outflow 10YrAvg
MCN - Outflow
Adult Passage / Adult Sock 10YrAvg (fish/day)
Y2: Outflow / Outflow 10YrAvg (kcfs)
06/04
06/18
07/02
07/16
07/30
08/13
08/27
Y1:2015:MCN:Sock (262981)
Y1:Avg05-14:MCN:Sock (181657)
Y2:2015:MCN:outflow
Y2:Avg05-14:MCN:outflow
www.cbr.washington.edu/dart
13 Jul 2015 08:53:20 PDT


Adult Passage
Adult Sockeye 10YrAvg, Temperature WQM, Temperature (WQM) 10YrAvg
MCN - Temp
Adult Passage / Adult Sock 10YrAvg (fish/day)
Y2: Temp WQM / Temp (WQM) 10YrAvg (C)
06/04
06/18
07/02
07/16
07/30
08/13
08/27
Y1:2015:MCN:Sock (262981)
Y1:Avg05-14:MCN:Sock (181657)
Y2:2015:MCN:tempc
Y2:Avg05-14:MCN:tempc
www.cbr.washington.edu/dart
13 Jul 2015 08:54:29 PDT

Science, Service, Stewardship

Dworshak Operations and Lower Granite Ladder Work/Sockeye Trapping

Doug Baus
U.S. Army Corps of Engineers

Science, Service, Stewardship

US Army Corps of Engineers
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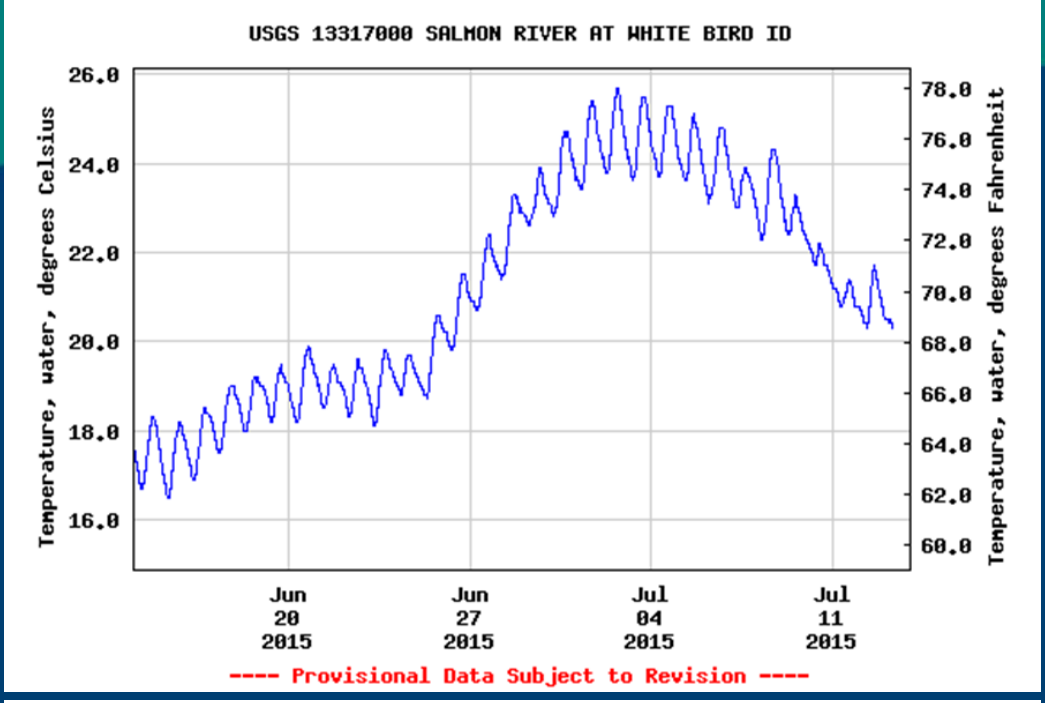
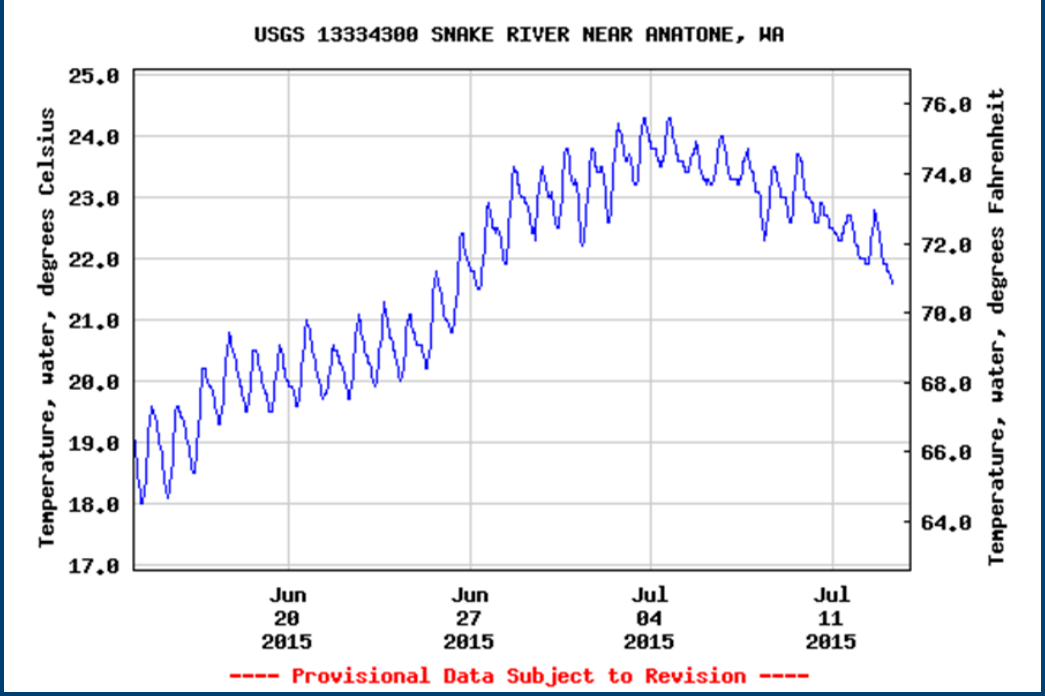
Temperatures Upstream of the FCRPS Mainstem Dams





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Questions?

Speakers and Points of Contact

Speakers

- Kevin Berghoff, Senior Hydrologist, NW River Forecast Center
- Ritchie Graves, Columbia Hydropower Branch Chief, NOAA Fisheries
- Steve Barton, Chief, Columbia Basin Water Management Division, U.S. Army Corps of Engineers
- John Roache, River and Reservoir Operations Manager, Bureau of Reclamation Pacific Northwest Region
- Tony Norris, Bonneville Power Administration
- Doug Baus, Fisheries Biologist, Columbia Basin Water Management Division, U.S. Army Corps of Engineers

Points of Contacts for Speakers

- Christina Durham, Congressional Relations Specialist, National Marine Fisheries Service, Christina.Durham@noaa.gov, 206-526-6613
- Michael Milstein, Public Affairs Officer, NOAA Fisheries, Michael.Milstein@noaa.gov, 503-231-6268
- Venetia Gempler, Chief Public Affairs Officer, Bureau of Reclamation, Pacific Northwest Region, vmgempler@usbr.gov, 208-378-5020
- Joel Scruggs, Public Affairs Specialist, Bonneville Power Administration, Jlscruggs@bpa.gov, 503-230-5511
- Michael Coffey, Chief Public Affairs Officer, Northwestern Division, U.S. Army Corps of Engineers, Michael.A.Coffey@usace.army.mil, 503-808-3722