Albeni Falls Operations Meeting 2015

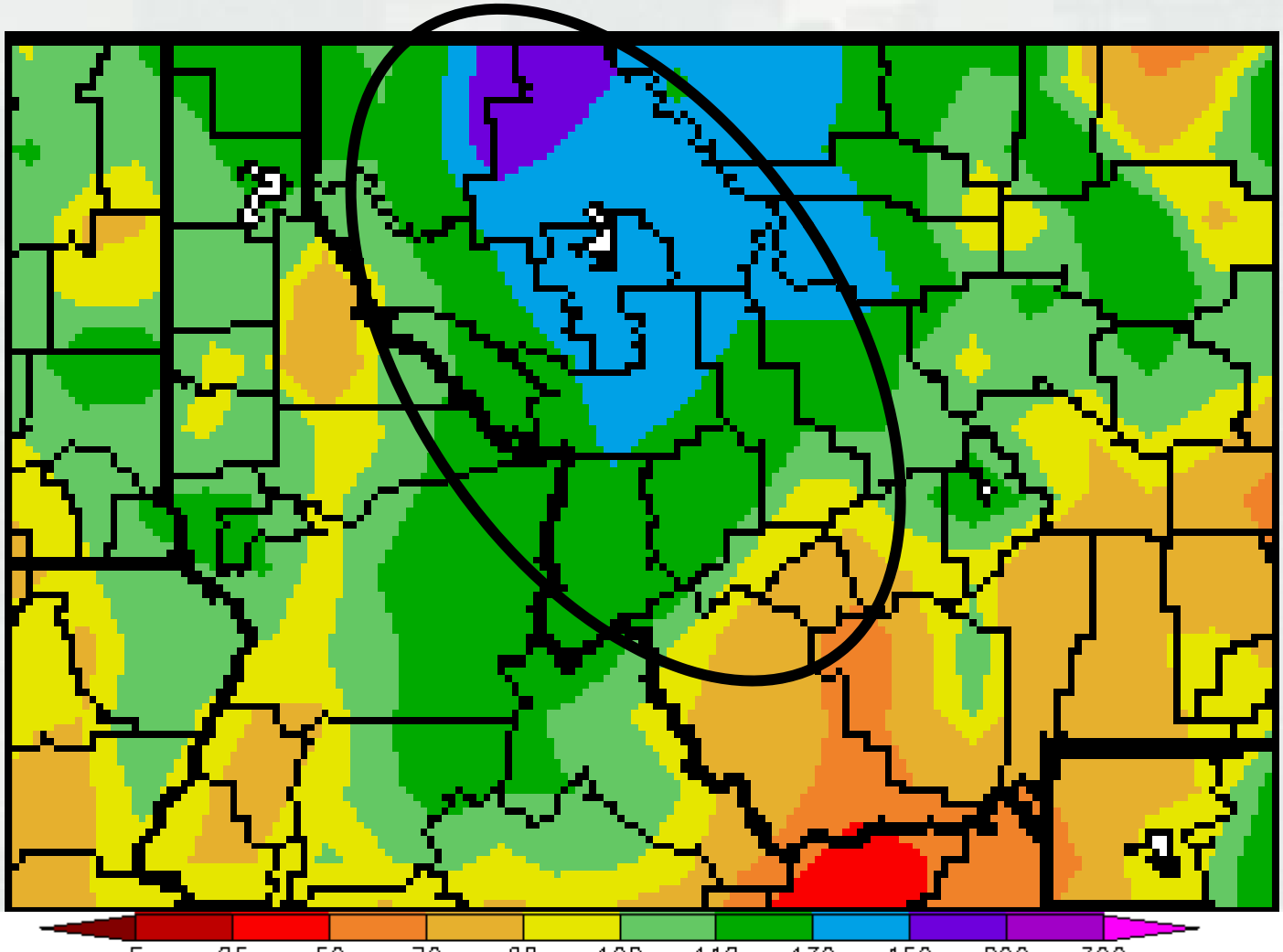
Katherine Rowden – NWS

Joel Fenolio – Corps of Engineers

Agenda

- Introductions
- Drought-Weather Conditions
- Free flow operations
- Review of Clarified Operations
- Albeni Falls Dam and Lake Pend Oreille Operations
- Questions and answers

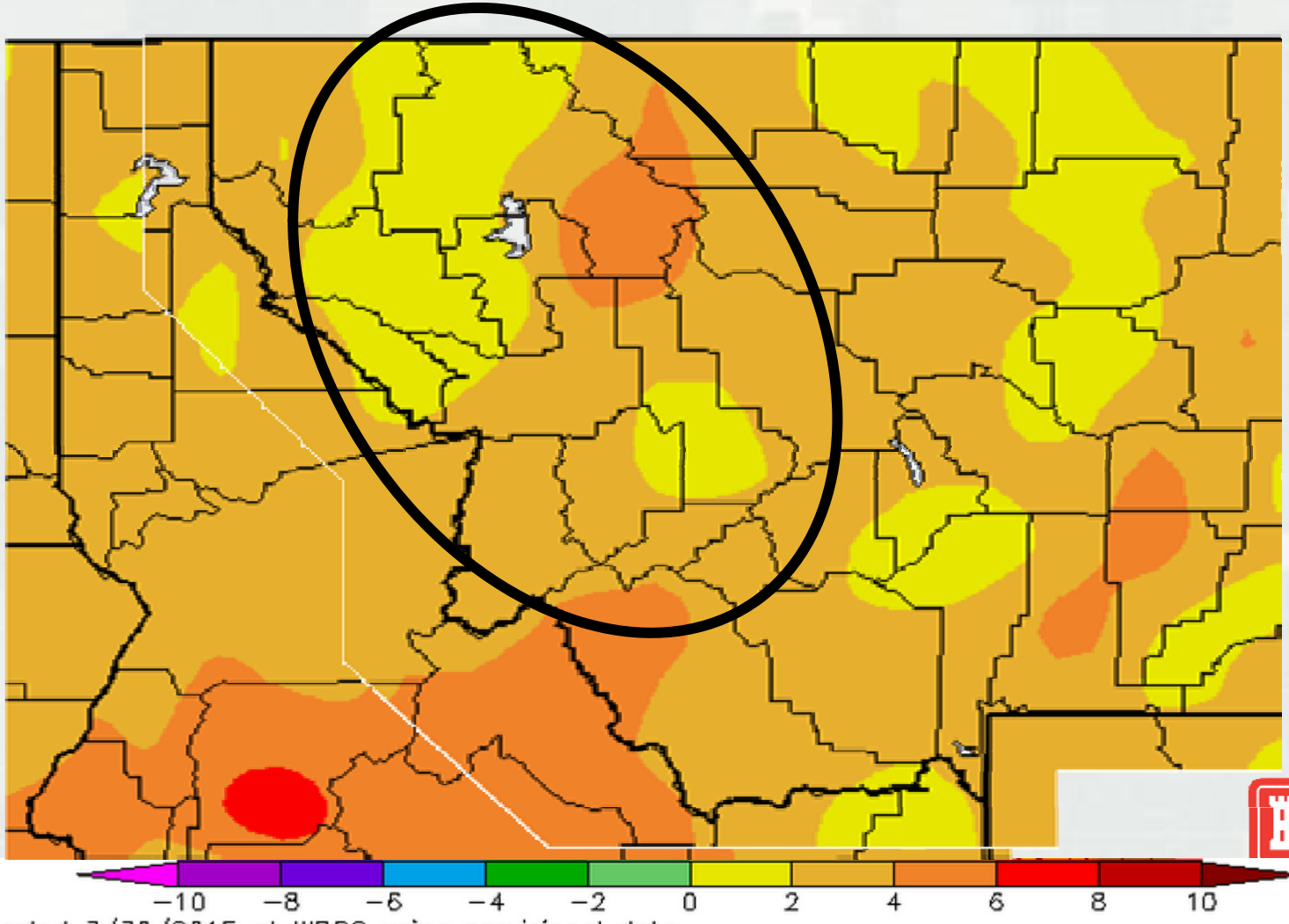
Percent of Average Precip
10/1/2014 – 4/22/2015



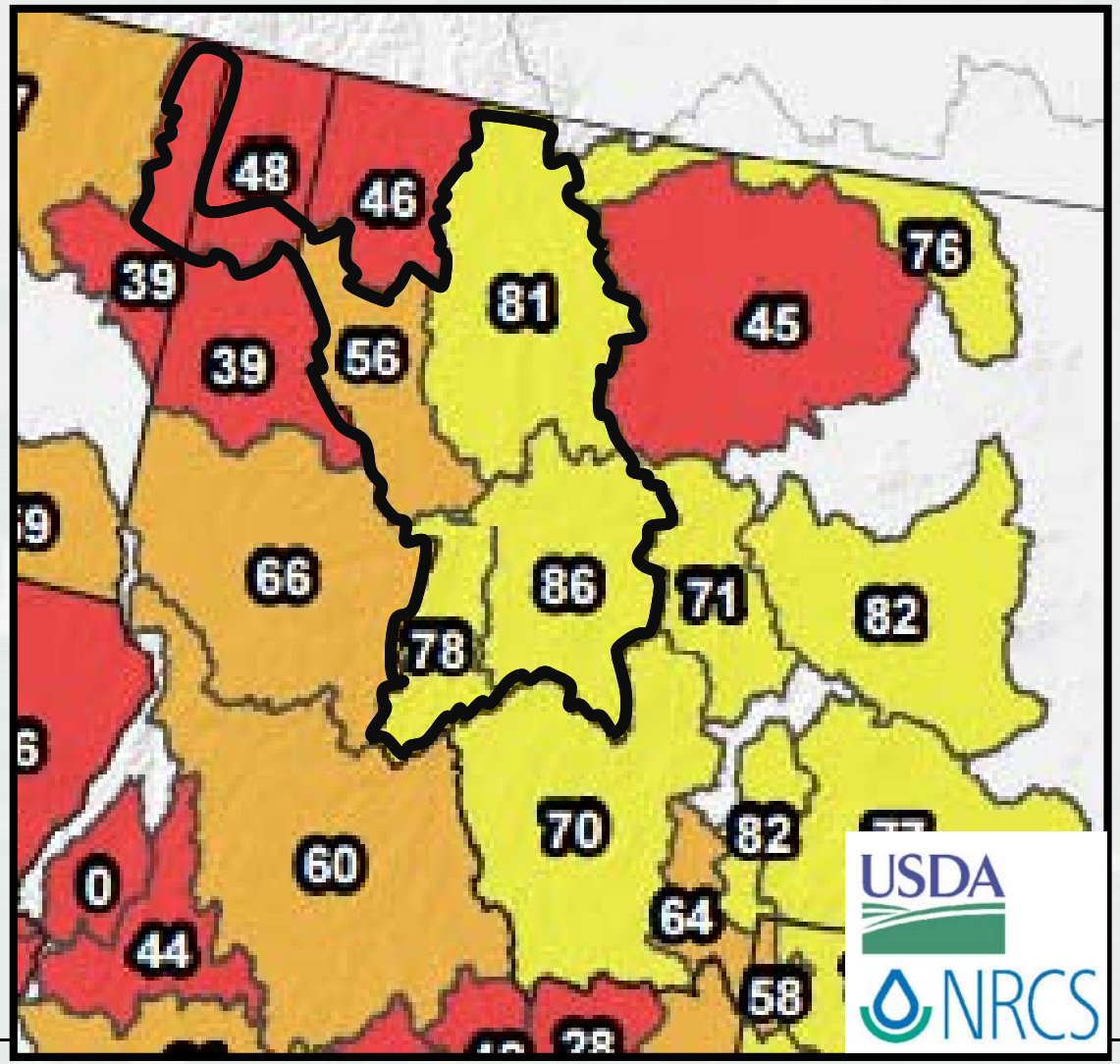
Generated 4/23/2015 at WRCC using provisional data.
NOAA Regional Climate Centers

RONG®

Departure from Ave Temp
10/1/2014 – 4/22/2015



% of Average Snowpack
April 1, 2015



Measured at SNOTELS in Mountains

USDA NRCS

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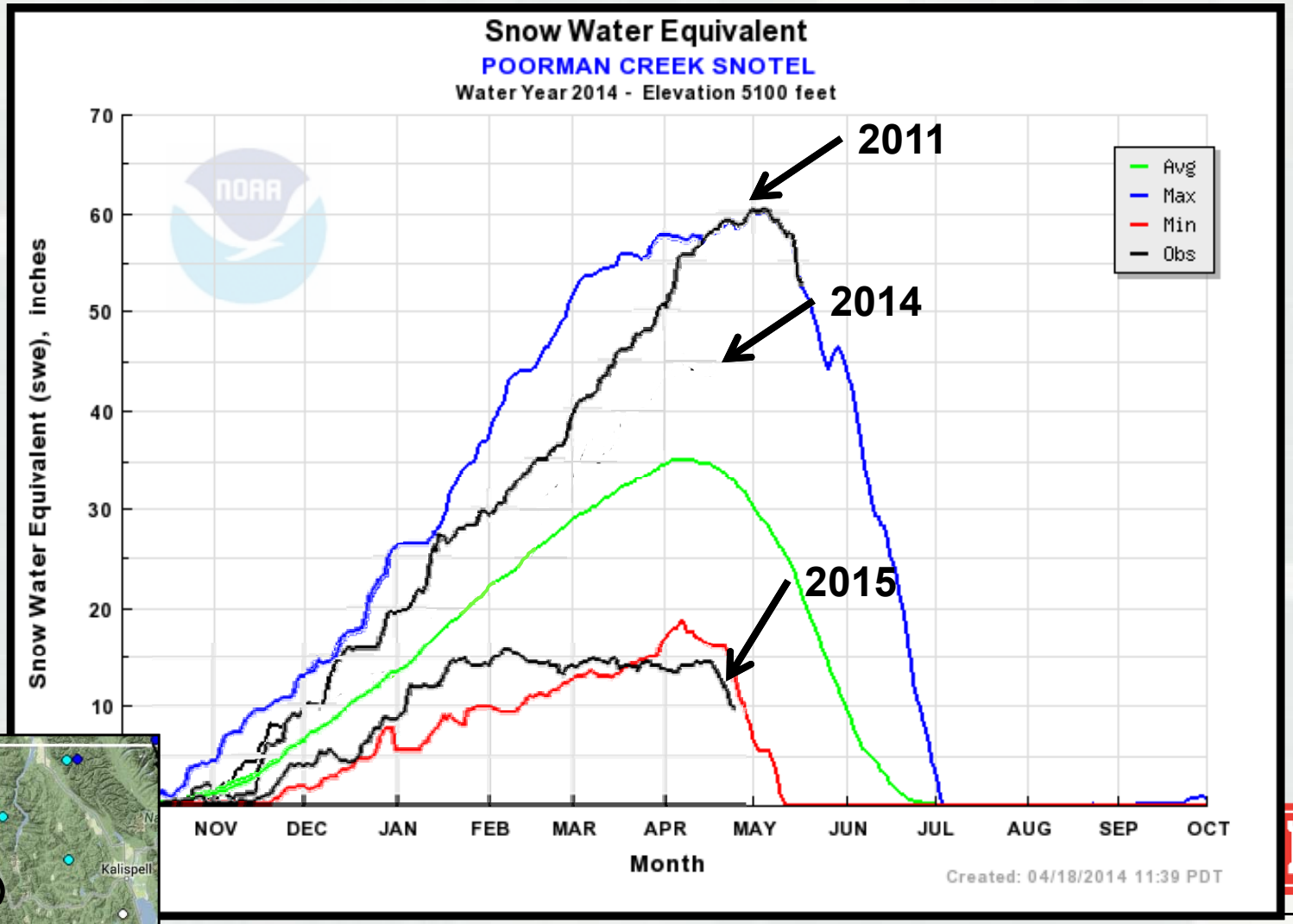
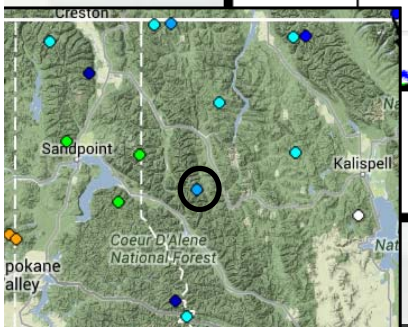
SNOTEL
Measured SWE





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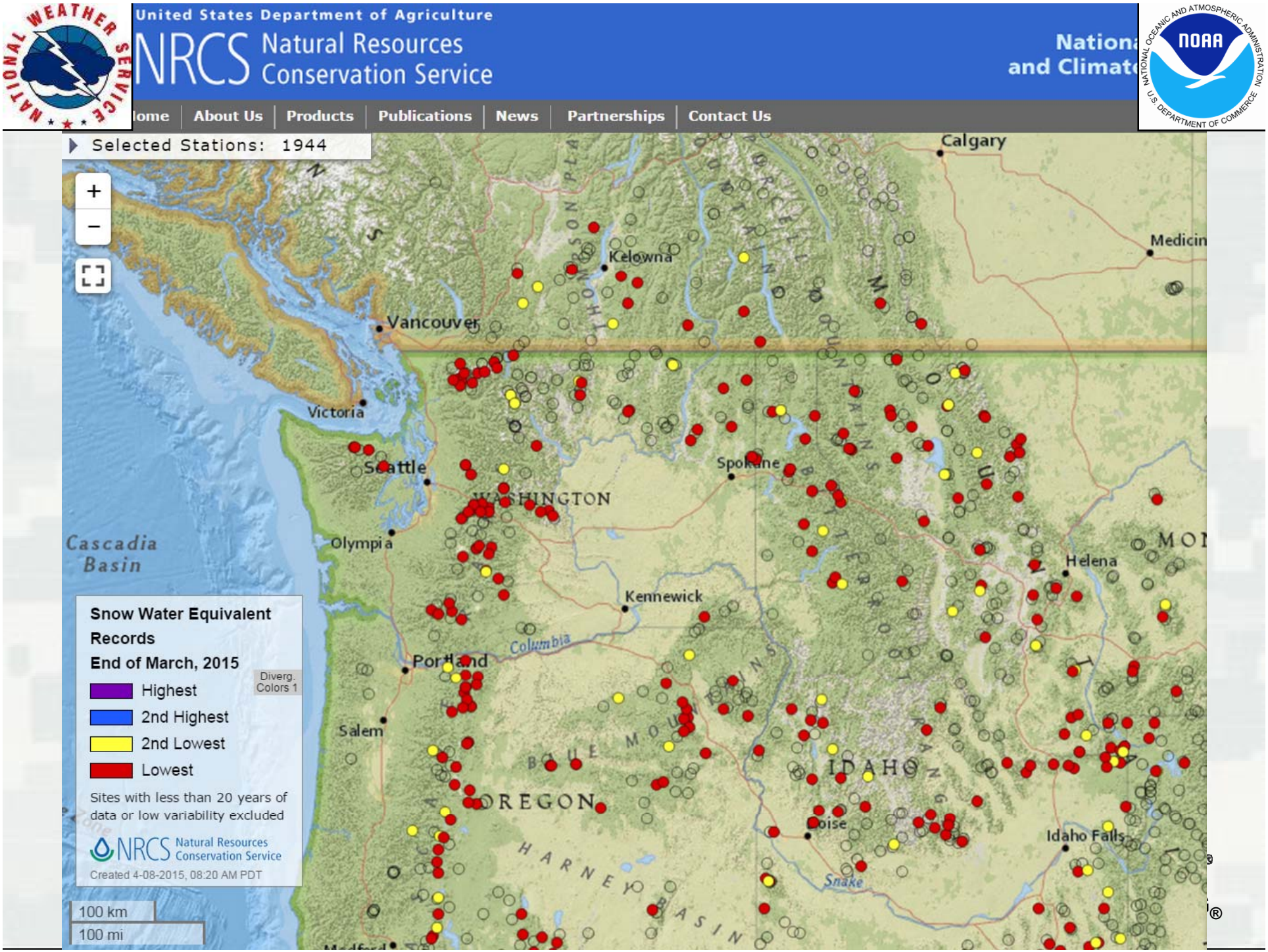

United States Department of Agriculture
NRCS Natural Resources Conservation Service
Home | About Us | Products | Publications | News | Partnerships | Contact Us
Selected Stations: 1944
Calgary
Kelowna
Vancouver
Victoria
Seattle
Spokane
WASHINGTON
Olympia
Cascadia Basin
Kennewick
Columbia
Portland
Salem
OREGON
IDAHO
Boise
Idaho Falls
Helena
Snake
HARNEY BASIN
Snow Water Equivalent Records
End of March, 2015
Diverg. Colors 1
Highest
2nd Highest
2nd Lowest
Lowest
Sites with less than 20 years of data or low variability excluded
NRCS Natural Resources Conservation Service
Created 4-08-2015, 08:20 AM PDT
100 km
100 mi

Observed Pend Oreille Runoff
October 2014 – March 2014
at Albeni Falls Dam

Oct – Mar runoff volume *this winter* = 7,285 kaf

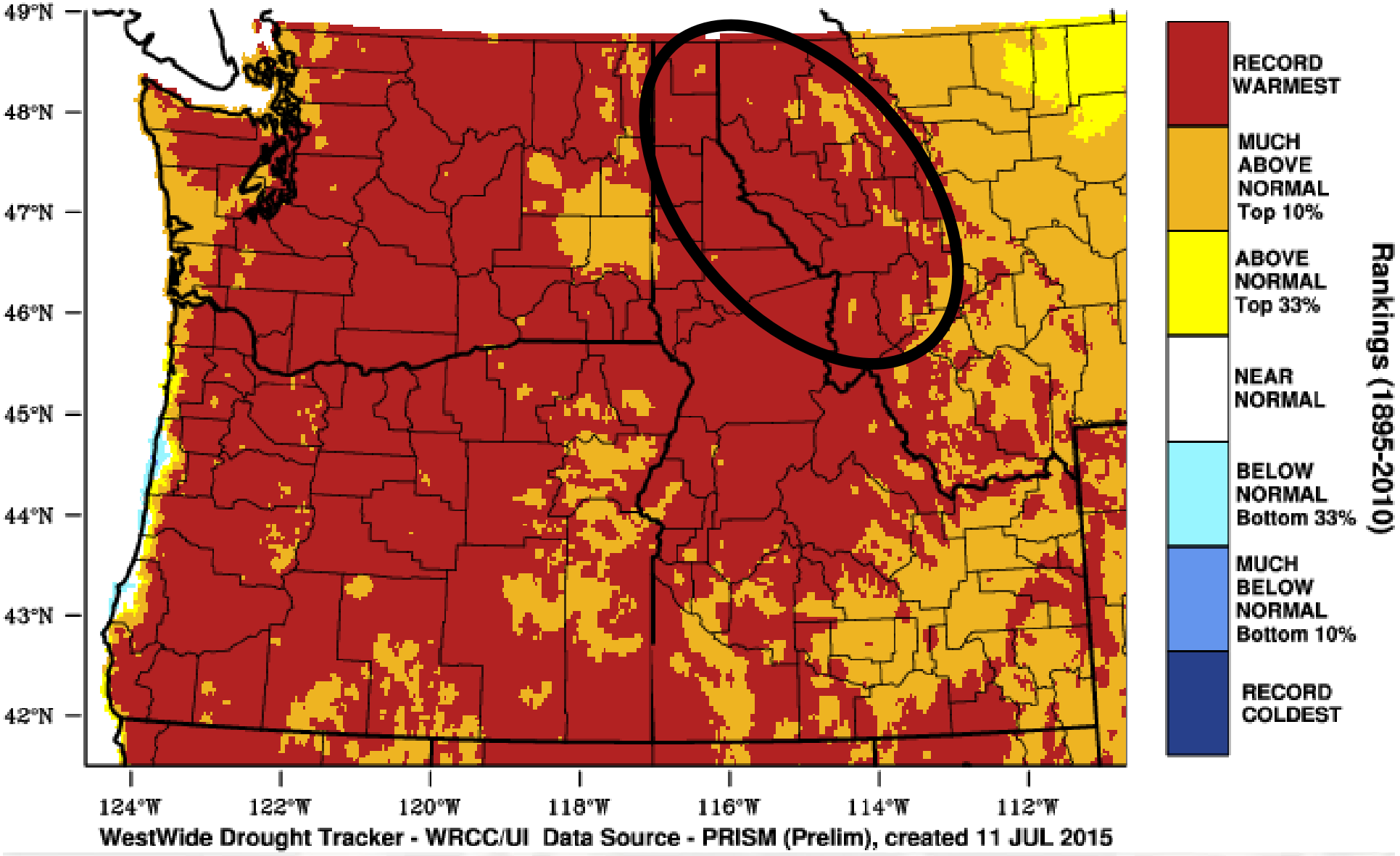
Oct – Mar *average* runoff volume = 4,508 kaf

61% more runoff this winter than average

Record Hot June

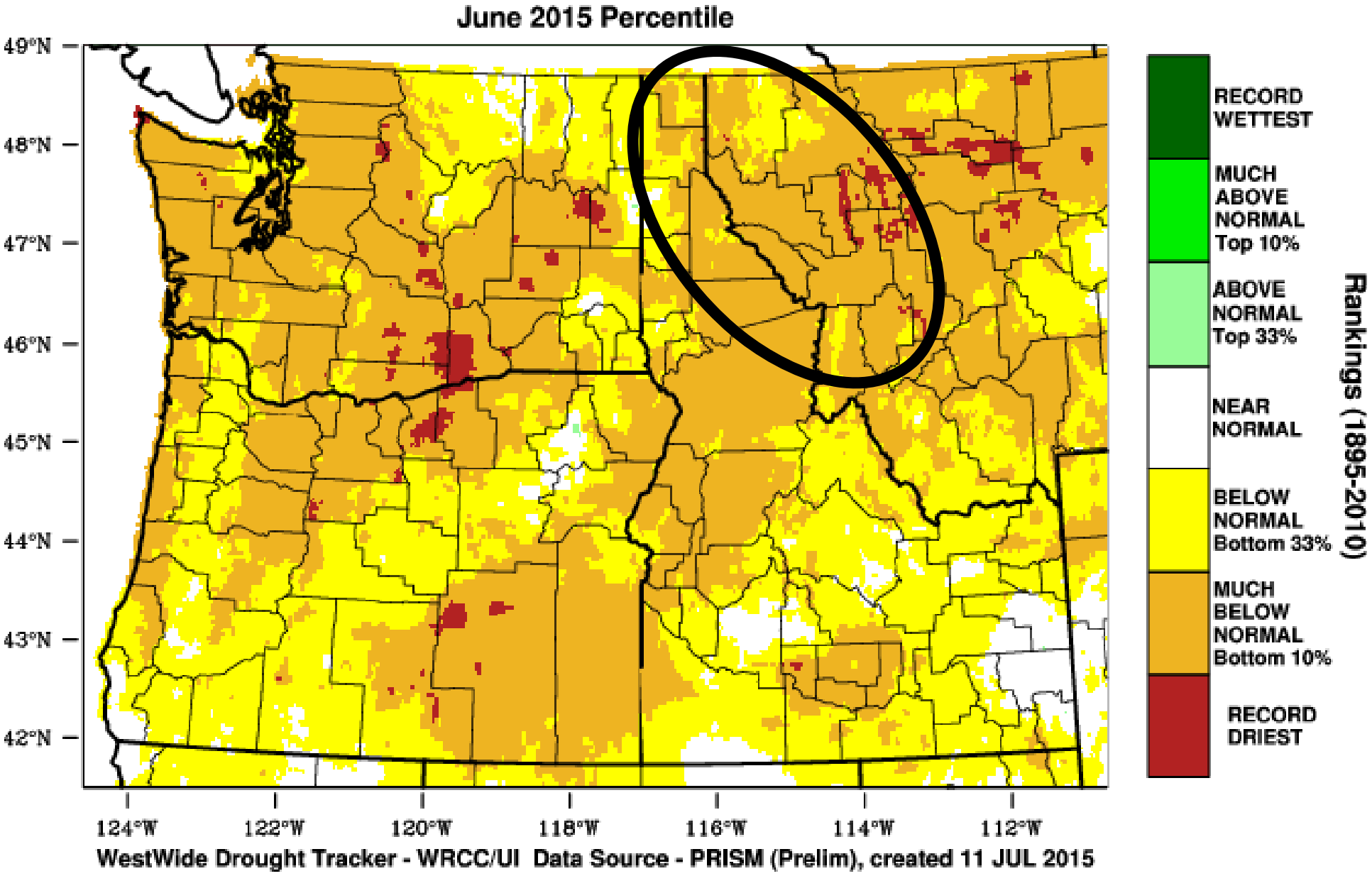
Pacific Northwest - Mean Temperature

June 2015 Percentile

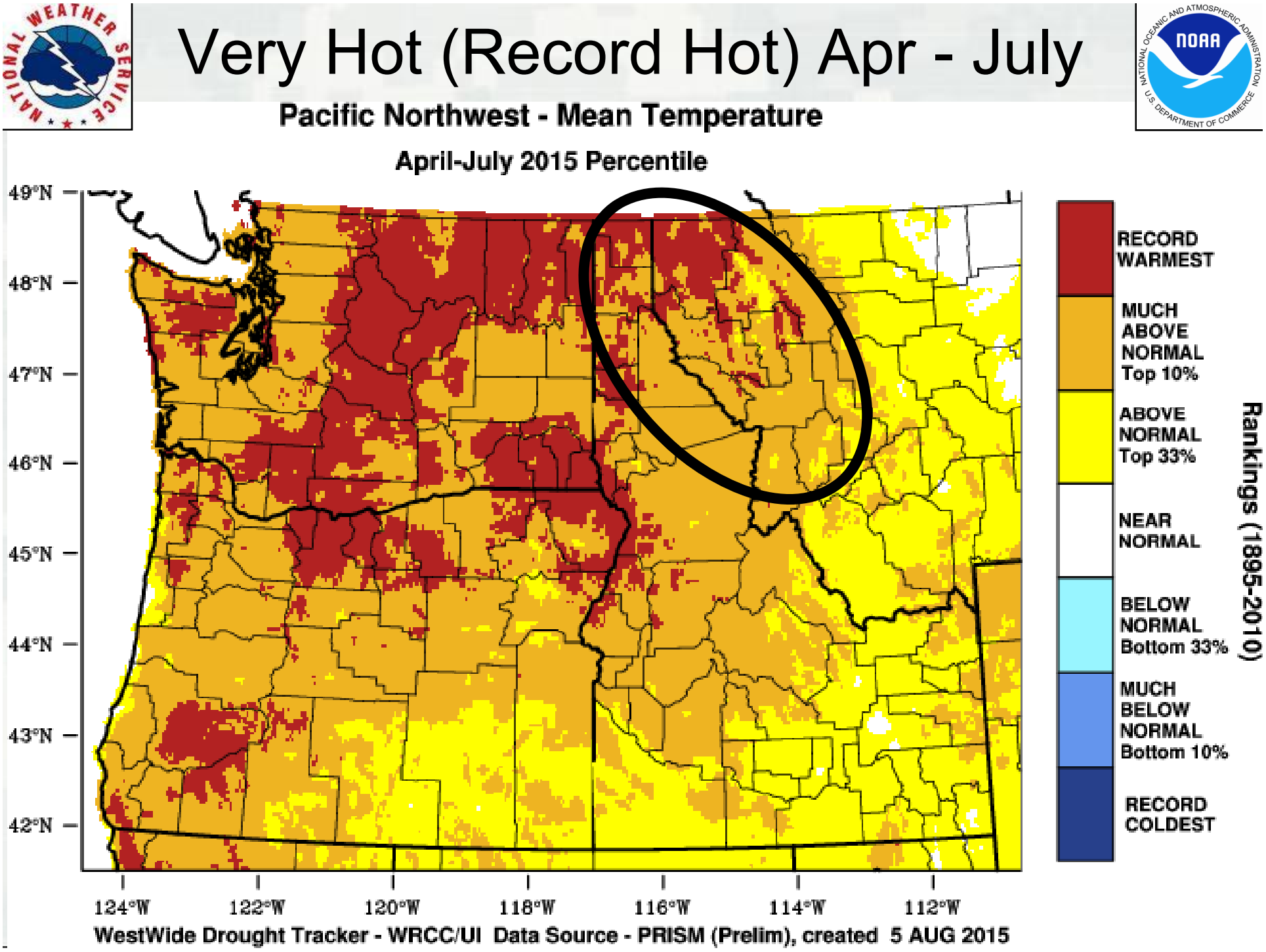


Very Dry (Record Dry) June

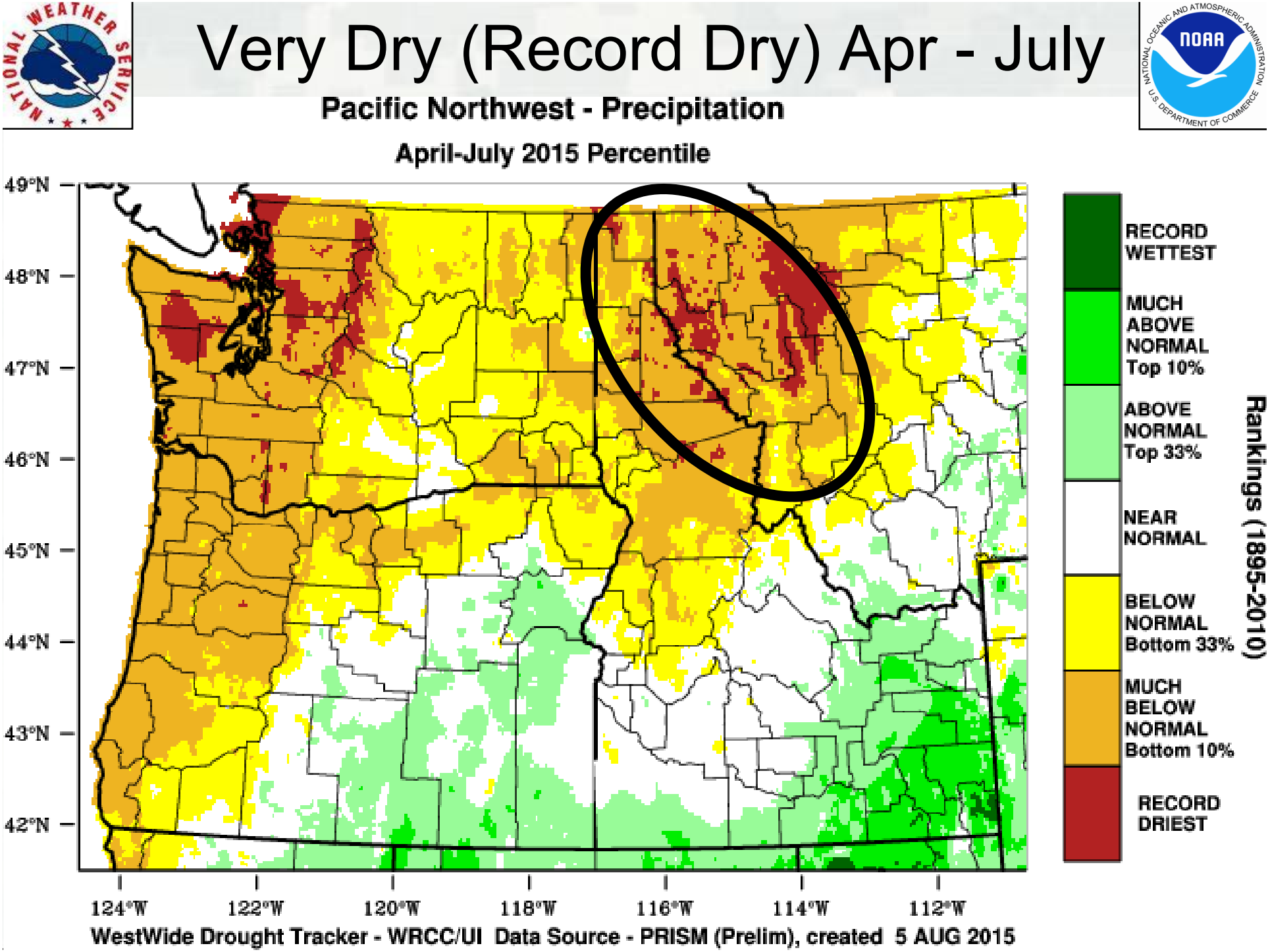
Pacific Northwest - Precipitation



Very Hot (Record Hot) Apr - July



Very Dry (Record Dry) Apr - July



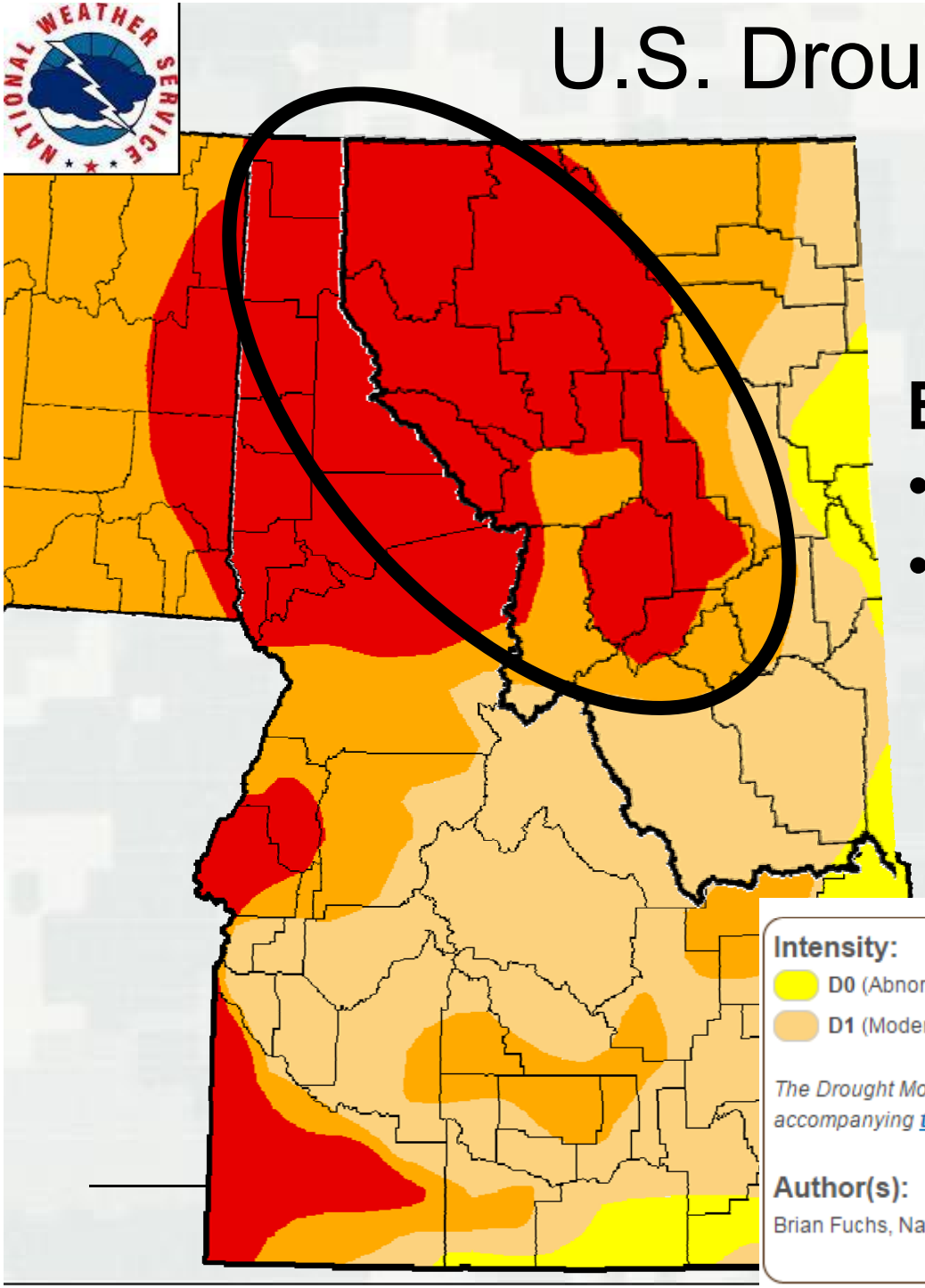
Summary

- Record Low Snowpack
- Record Early Snowmelt
- Record Hot June (and spring/summer)
- Very/Record Dry June (and spring/summer)
- Record amount of evaporation measure at Spokane

St Joe River at Calder example

- Currently flowing at 350 cubic feet per second (CFS)
- Average lowest flow of the year is 400 cfs which typically occurs at the end of September
- Expect streamflows to continue to decline until fall rains pick up
- It is possible that all-time record low flows may be seen on some streams this year

U.S. Drought Monitor



Extreme Drought

- All of Bonner County
- most of the Pend Oreille watershed

Intensity:

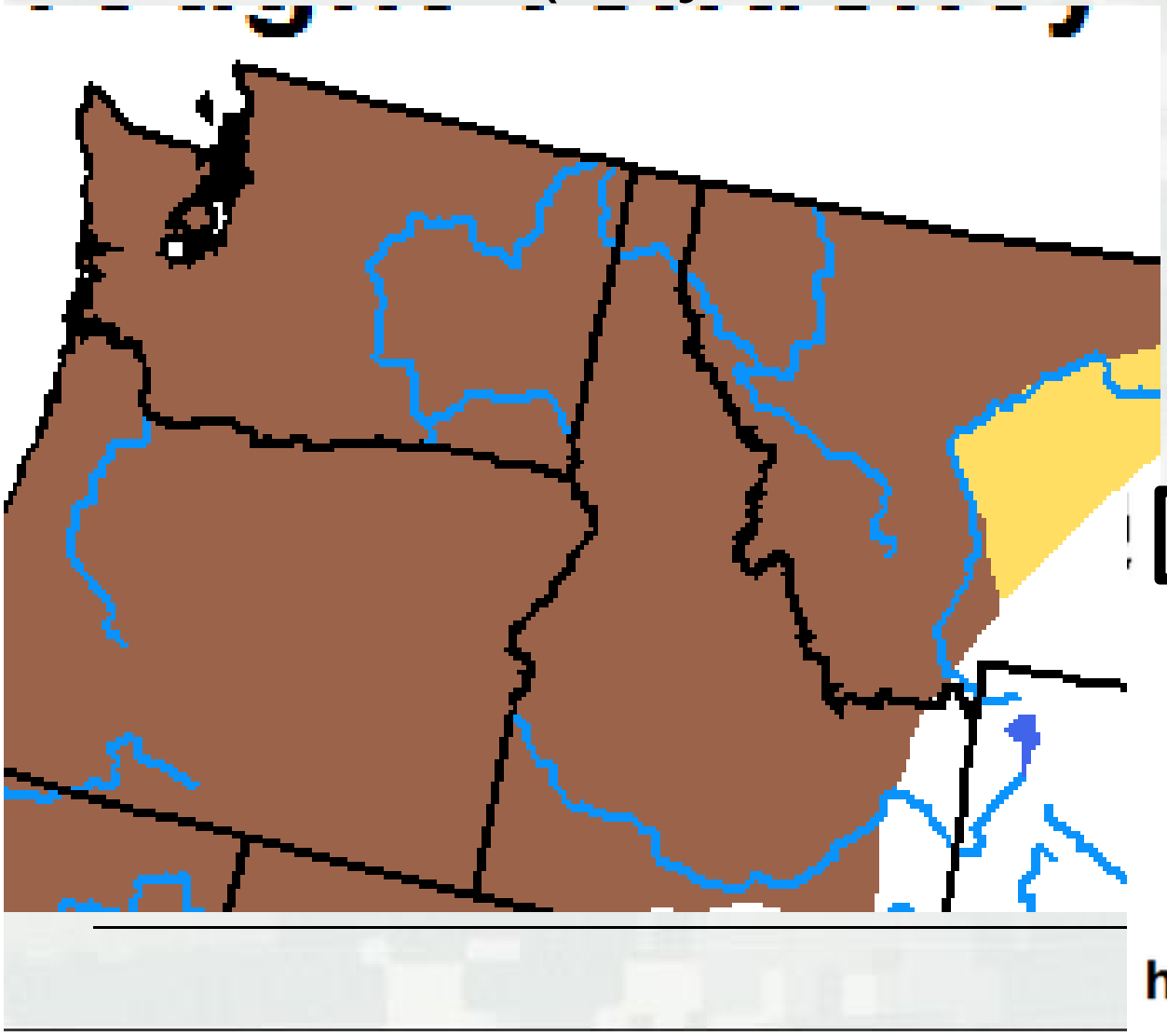
D0 (Abnormally Dry)
D1 (Moderate Drought)
D2 (Severe Drought)
D3 (Extreme Drought)
D4 (Exceptional Drought)

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying **text summary** for forecast statements.*

Author(s):

Brian Fuchs, National Drought Mitigation Center

Seasonal Drought Outlook
Drought Tendency
(July 16 – Oct 31)



Drought persists/intensifies

Drought remains but improves

Drought removal likely

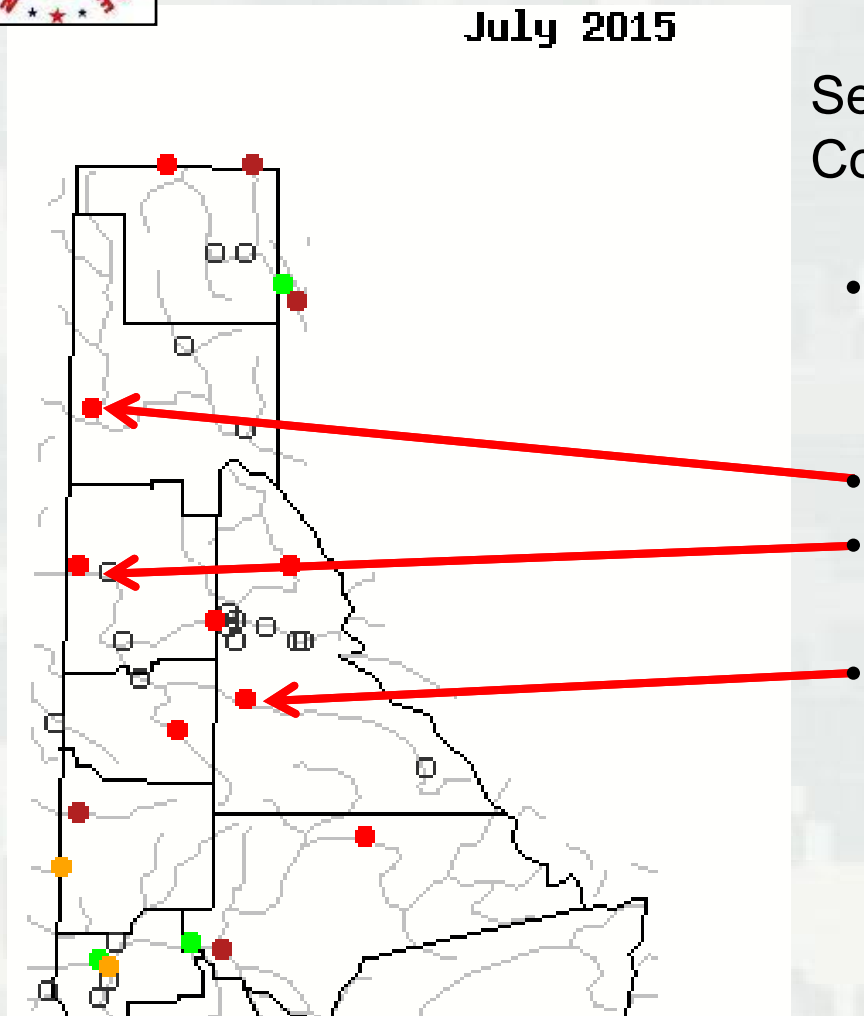
Drought development likely

http://go.usa.gov/hHTe

Drought Impacts?

- **Municipal water supply**
- **Crop stress / crop loss**
- **Forest / Tree Health**
- **Increased fire danger**
- **Irrigation & Livestock ponds**
- **Private wells**
- **Fish**
- **Recreation / Economic**
- **Other…**

Signs of Drought



Setting Low Streamflow Records since May
Compared to same time period in record

- Bright red dots indicate record low average monthly flow for July

- Priest River has 65 years of data
- Spokane River at Post Falls has 102 years of data
- St Joe River at Calder has 96 years of data

Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

USGS

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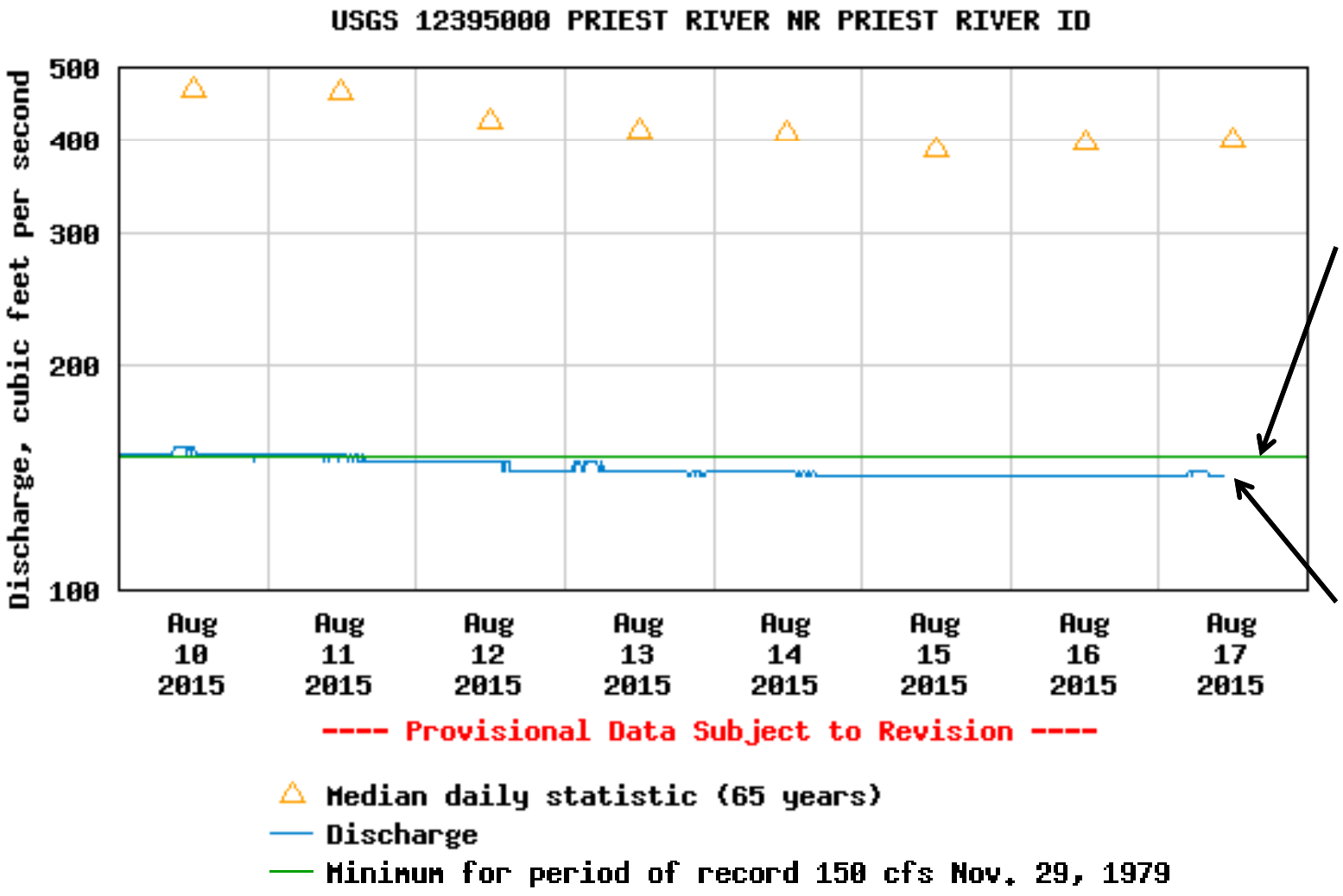
Signs of Drought



Minimum Recorded Flow (11/29/1979)

Current Flow

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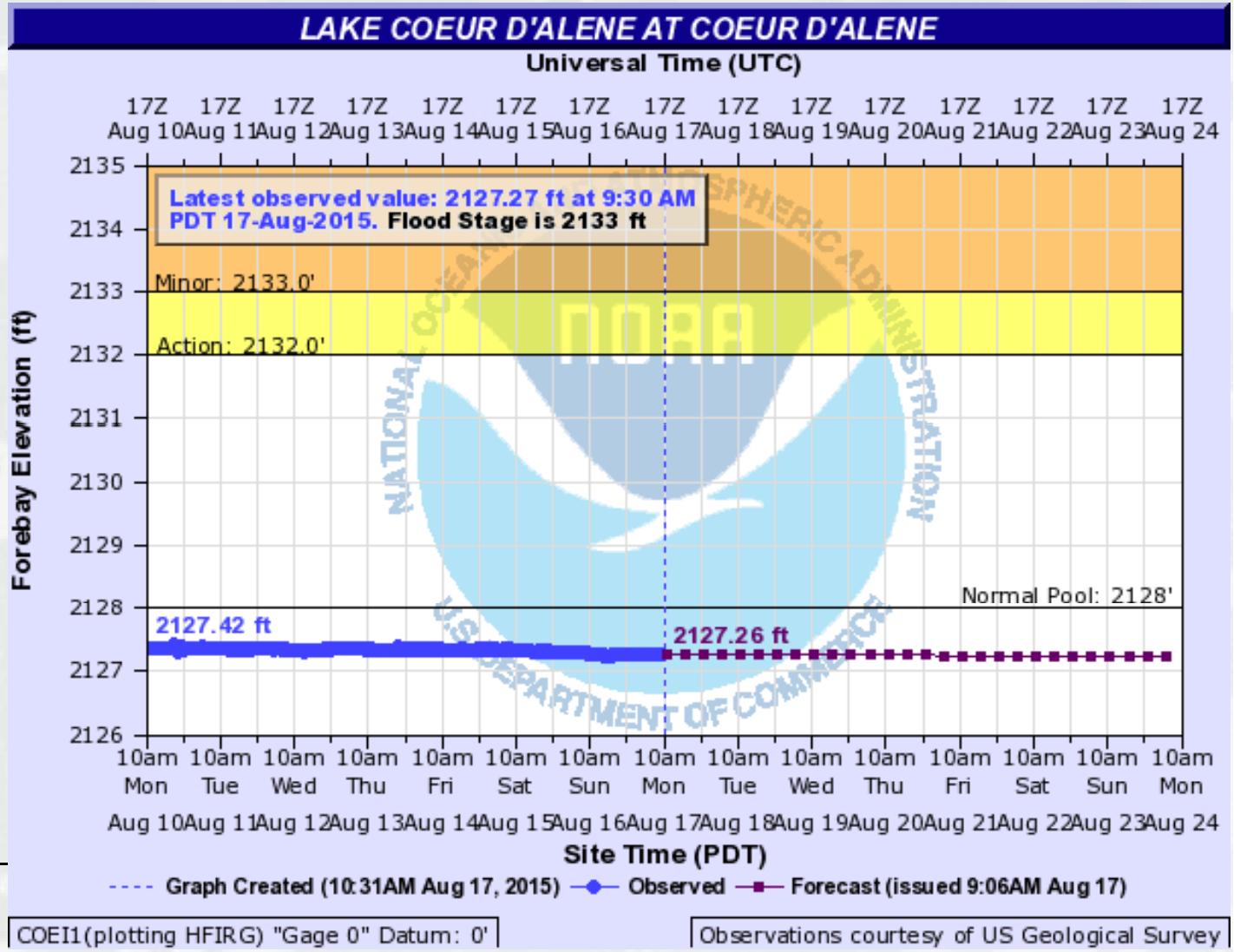
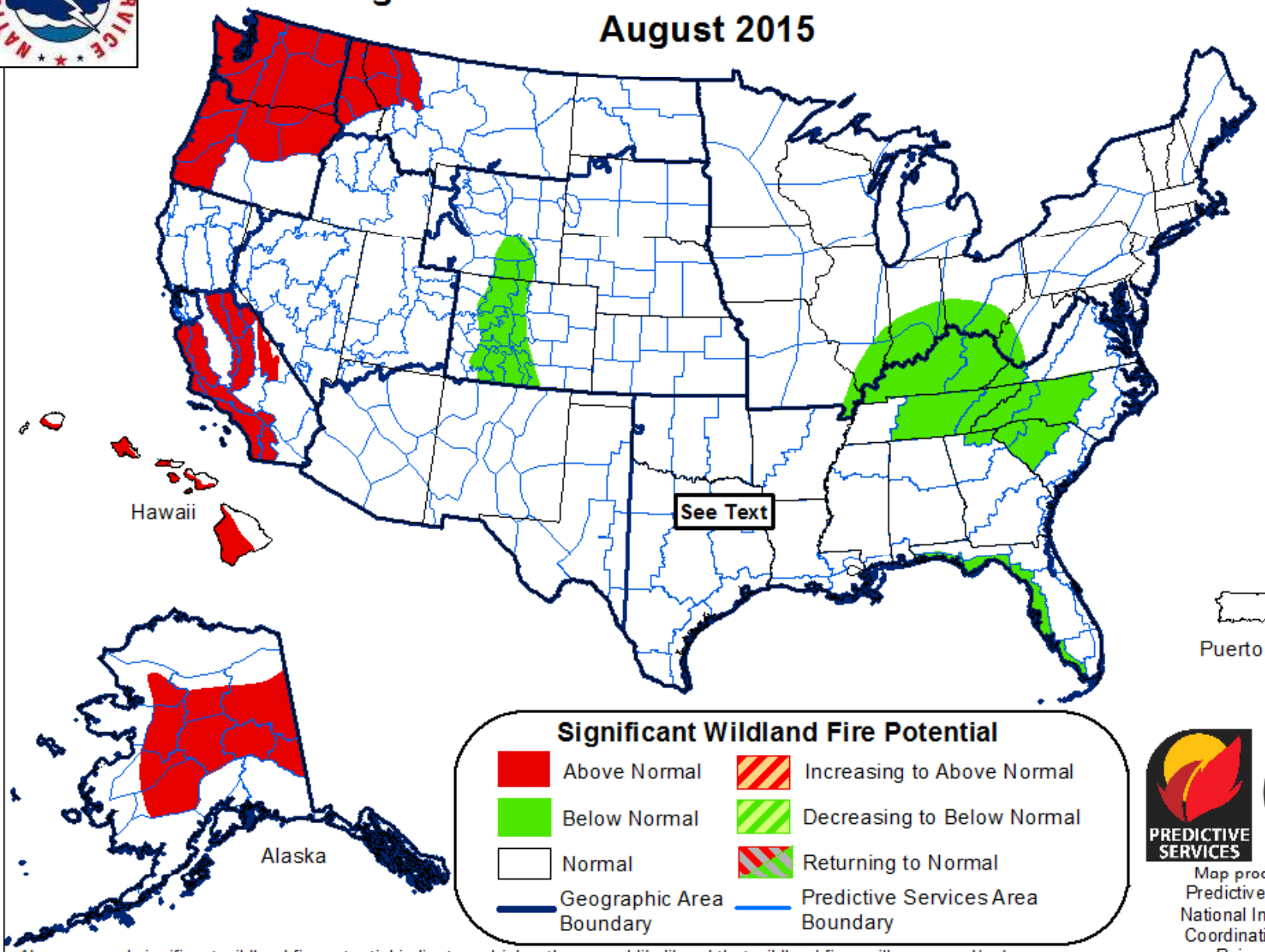
Signs of Drought

- Post Falls dam must release a minimum of 500 cfs during summer
- Can no longer maintain full pool
- Will continue steady decline through rest of summer
- Already 8” below summer pool



Significant Wildland Fire Potential Outlook
August 2015



Significant Wildland Fire Potential

- Above Normal
- Below Normal
- Normal
- Geographic Area Boundary
- Increasing to Above Normal
- Decreasing to Below Normal
- Returning to Normal
- Predictive Services Area Boundary

Above normal significant wildland fire potential indicates a higher than usual likelihood that wildland fires will occur and/or become significant events. Wildland fires are still expected to occur during forecasted normal conditions as would usually be expected during the outlook period. Significant wildland fires are still possible but less likely than usual during forecasted below normal periods.

Map produced by
Predictive Services,
National Interagency
Coordination Center
Boise, Idaho
Issued August 1, 2015
Next issuance September 1, 2015

Signs of Drought

Floods Follow Fires

Severely burned areas with little to no canopy or ground cover left

Steep Slopes

Intense rain in thunderstorms

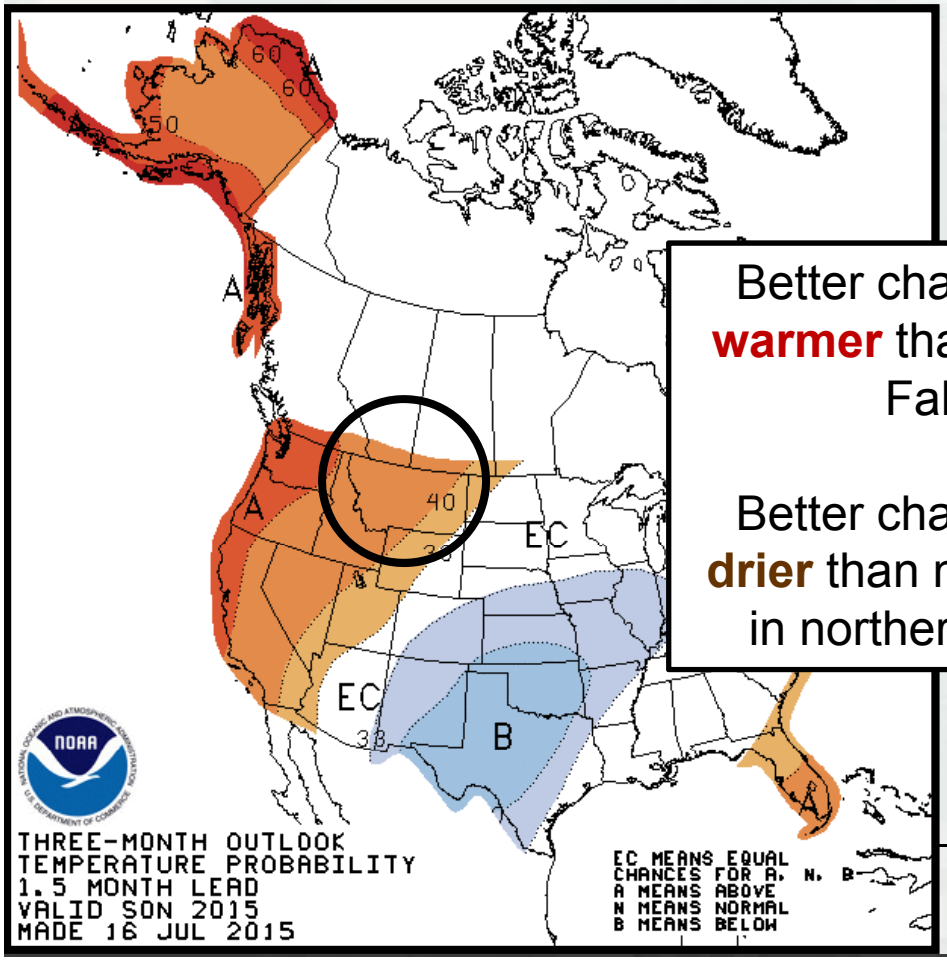
Increase in spring snowmelt runoff

Risk remains for 2 to 5 years after the fire

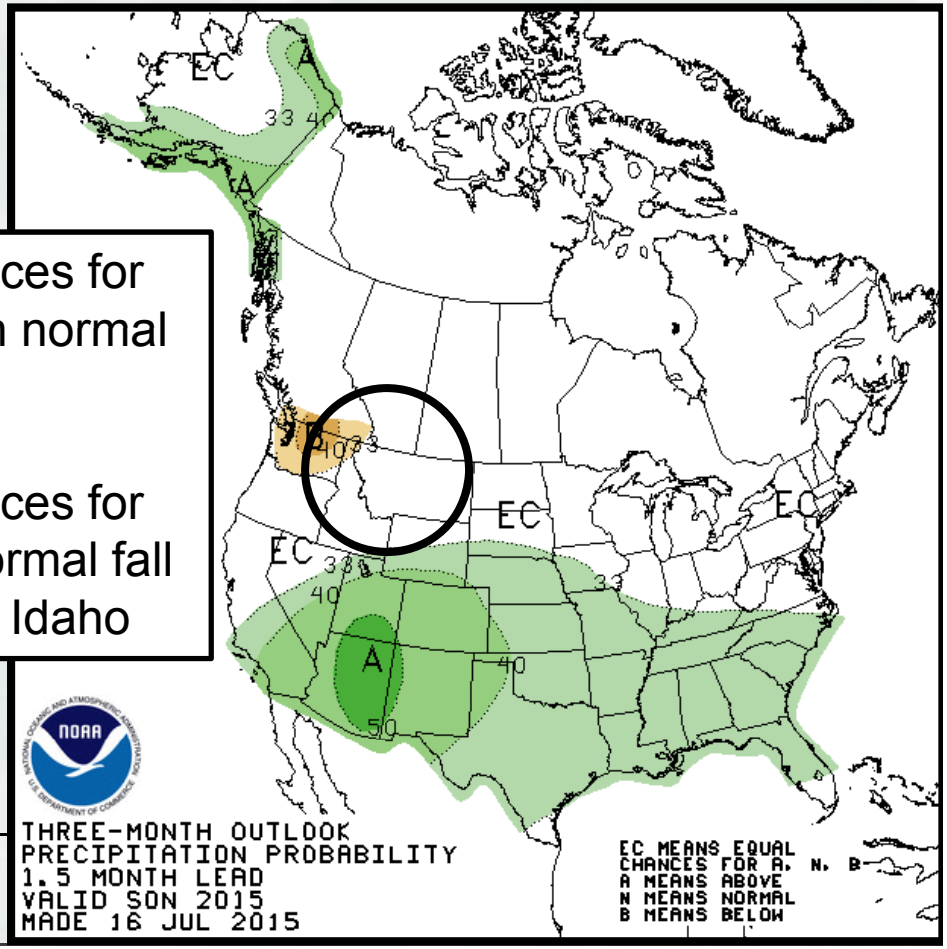
Various resources available to assess individual risk

Sept / Oct / Nov Outlooks

Temperature



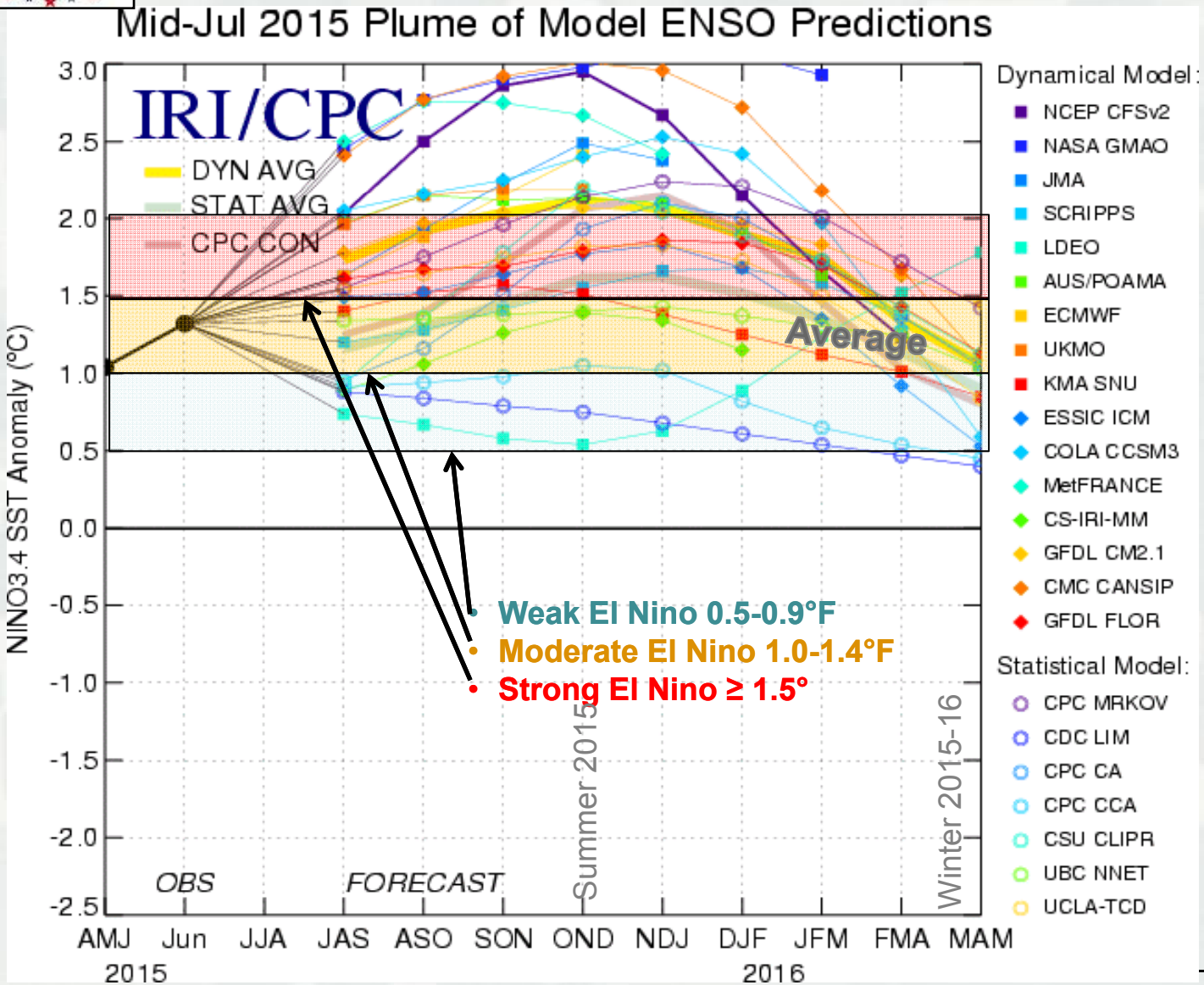
Precipitation



Better chances for **warmer** than normal Fall.

Better chances for **drier** than normal fall in northern Idaho

El Niño Forecast



85% chance El Niño will continue through the 2015-2016 winter

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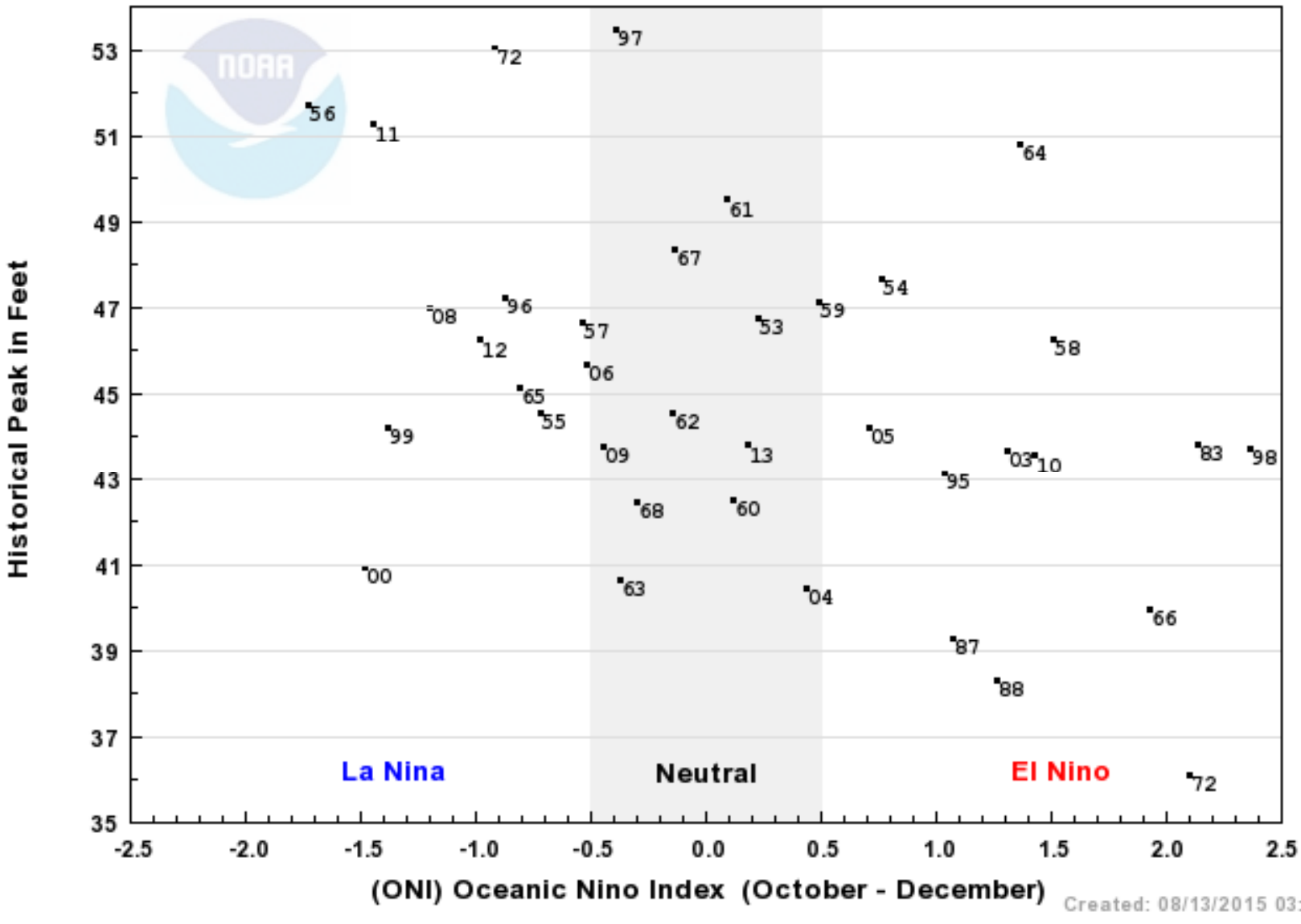
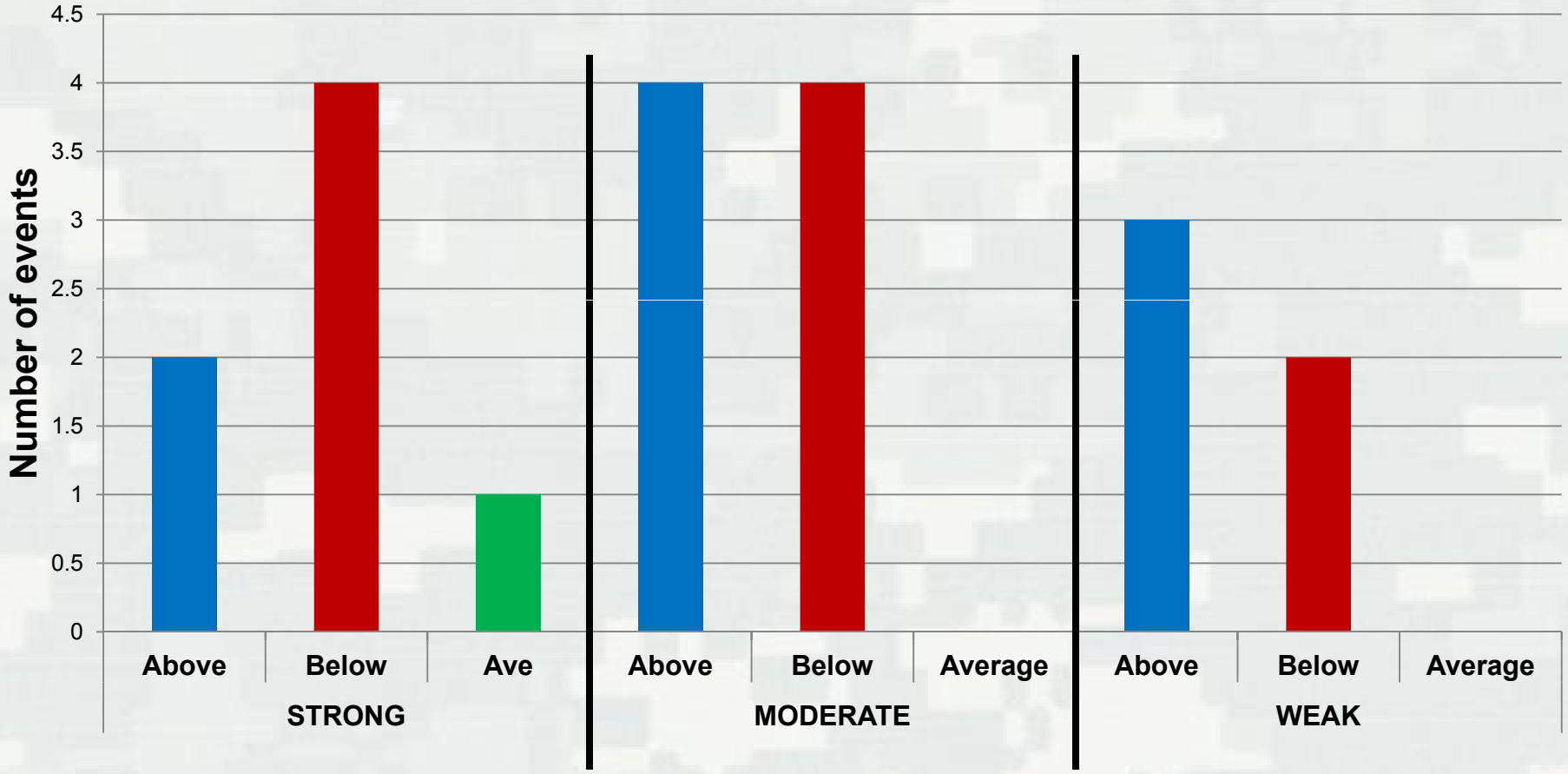
Comparison of Historical Peaks to (ONI) Oceanic Nino Index

(ALFW1) PEND OREILLE-ALBENI FALLS DAM



- Earliest meltoff & lowest snowpack on record
- Surpassed average annual low flow in mid July
- Closing in on record low flows
- ~30% of Avg runoff for May - Jul
- Record evaporation since 1980 (started measuring in Spokane)
- Hottest June on record;
- Near record dry spring
- Continued above average temps expected
- Above avg fire behavior, burn bans (Since June) now Industrial partial shutdown
- Needed Spring precip – got the opposite
- Climatologically, should start cooling after this week
- No sign of precip on the horizon
- Super El Nino on the way

Historical El Niño Precip in Northern Idaho



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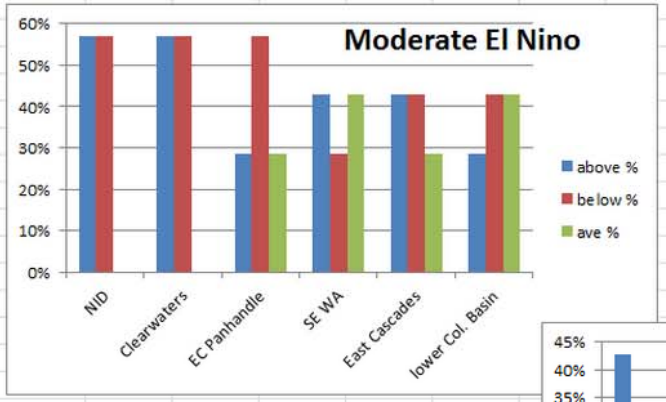
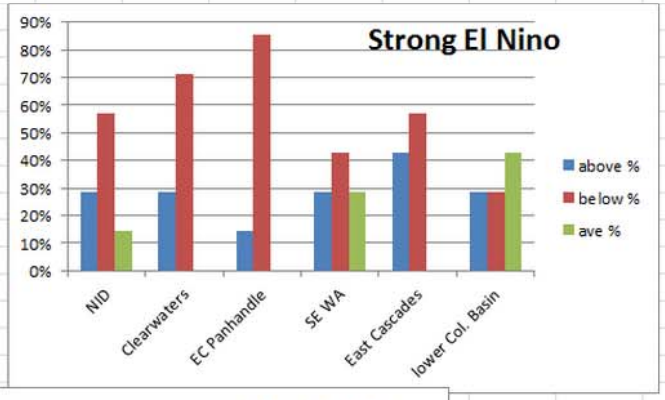
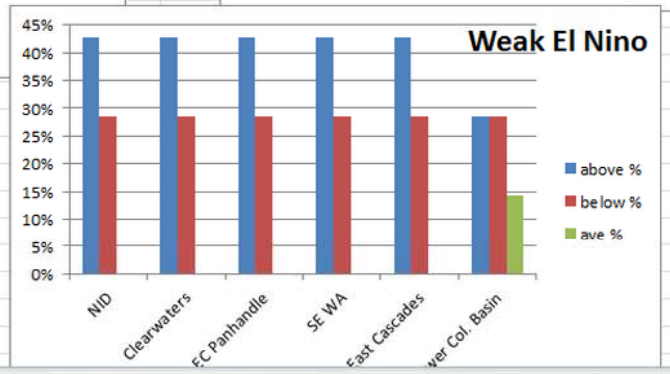
	7						8						5					
	Strong						Moderate						Weak					
	Above	above %	below	below %	ave	ave %	Above	above %	below	below %	ave	ave %	Above	above %	below	below %	ave	ave %
NID	2	29%	4	57%	1	14%	4	57%	4	57%	0	0%	3	43%	2	29%	0	0%
Clearwaters	2	29%	5	71%	0	0%	4	57%	4	57%	0	0%	3	43%	2	29%	0	0%
EC Panhandle	1	14%	6	86%	0	0%	2	29%	4	57%	2	29%	3	43%	2	29%	0	0%
SE WA	2	29%	3	43%	2	29%	3	43%	2	29%	3	43%	3	43%	2	29%	0	0%
East Cascades	3	43%	4	57%	0	0%	3	43%	3	43%	2	29%	3	43%	2	29%	0	0%
lower Col. Basin	2	29%	2	29%	3	43%	2	29%	3	43%	3	43%	2	29%	2	29%	1	14%







Dickensheet Gage

94000 PRIEST RIVER NR COOLIN ID

VISIONAL DATA SUBJECT TO REVISION

Available data for this site | Time-series: Daily data | GO

Click to hide station-specific text

LOCATION.--Lat 48° 27'07", long 116° 53'58" (NAD27), in SE1/4 SW1/4 NE1/4 sec.19, T.59 N., R.4 W., Bonner County, Outlet Bay quad., Hydrologic Unit 17010215, in Dickensheet campground, on left bank 190 ft downstream from Dickensheet Bridge, 2.5 mi downstream from Binarch Creek, 3 mi southwest of Coolin, 5.2 mi downstream from outlet of Priest Lake, and at mile 38.8.

DRAINAGE AREA.--611 mi^2.

PERIOD OF RECORD.--October 1948 to September 2006 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 2,338.24 ft above NGVD of 1929. Prior to Feb. 23, 1949, nonrecording gage at same site and datum.

REMARKS.--No diversion above station. Flow partly regulated by Priest Lake (sta 12393000) 5.2 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,280 ft^3/s June 3, 1997, gage height, 8.02 ft; maximum gage height, 8.44 ft, June 18, 1974; minimum observed discharge, 26 ft^3/s Sept. 25, 1958, gage height, 1.16 ft, but may have been less Sept. 11, 1953 and Sept. 24, 1958, when stage was below intake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 29, 1948, reached a stage of 8.40 ft, present site and datum, discharge, 8,670 ft^3/s.

12395000 PRIEST RIVER NEAR PRIEST RIVER, ID

LOCATION - Lat 48°13'11", long 116°54'51" referenced to North American Datum of 1983, in NW 1/4 SW 1/4 NW 1/4 sec.12, T.56 N., R.5 W., Bonner County, ID, Hydrologic Unit 17010215, Priest River quad., on right bank, 500 ft downstream from Saddler Creek, 0.4 mi downstream from Lower West Branch, 2.7 mi north of Priest River, and at mile 3.8.

DRAINAGE AREA - 902 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD - June 1903 to April 1905, November 1910 to April 1911, May to December 1923, February 1929 to current year. Prior to October 1930, published as "at Priest River."

REVISED RECORDS - WSP 572: 1903-5.

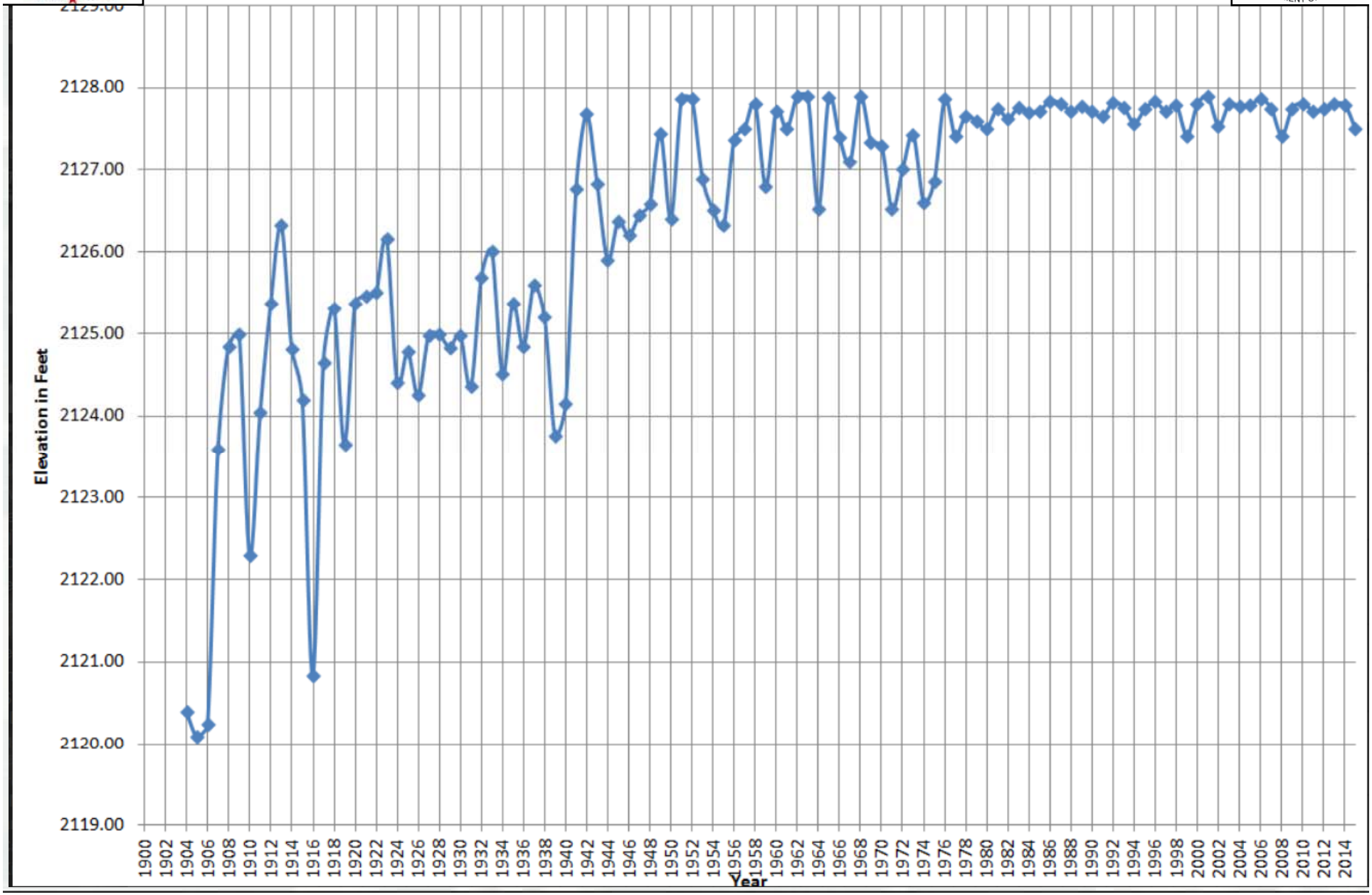
GAGE - Water-stage recorder. Elevation of gage datum is arbitrary. Prior to May 15, 1929, and Sept. 18, 1929 to Apr. 28, 1930, non recording gages at site 3 mi downstream at datum of about 40 ft lower. June 4 to Sept. 17, 1929, and Apr. 29 to Sept. 11, 1930, non recording gages at or near present site at present datum.

REMARKS - Some regulation on tributaries and, since Aug. 9, 1950, flow partly regulated by Priest Lake (see station 12393000).

- Water year 2014: Records good except for periods Oct. 17 to May 27, records fair. Dec. 4 to 15, Jan. 5 to 7, and Jan. 31 to March 7, records poor.

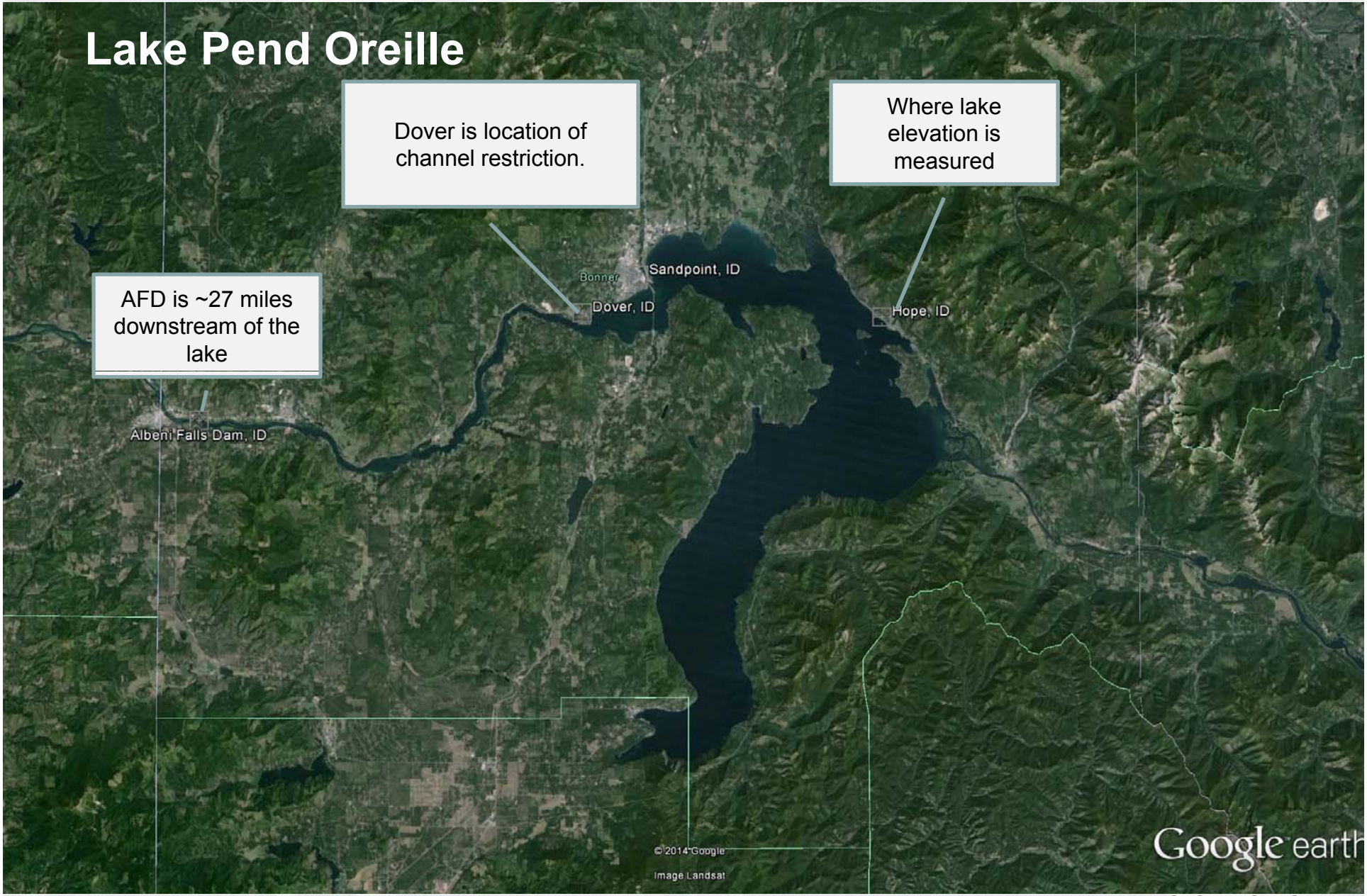
EXTREMES FOR PERIOD OF RECORD - UNREGULATED PERIOD (1913-49): Maximum discharge prior to regulation by Priest Lake, 10,500 ft^3/s May 29-30, 1948; maximum gage height, 8.97 ft, May 29, 1948; minimum daily discharge, 191 ft^3/s Jan. 7, 1937. REGULATED PERIOD (1950 to current year): Maximum discharge since regulation began, 10,800 ft^3/s May 18, 1997, gage height, 9.13 ft; minimum, 150 ft^3/s Nov. 29, 1979, gage height, 0.38 ft.

Lake Coeur d'Alene Minimum Elevations During July and August



Albeni Falls Dam/Lake Pend Oreille Basics

Lake Pend Oreille

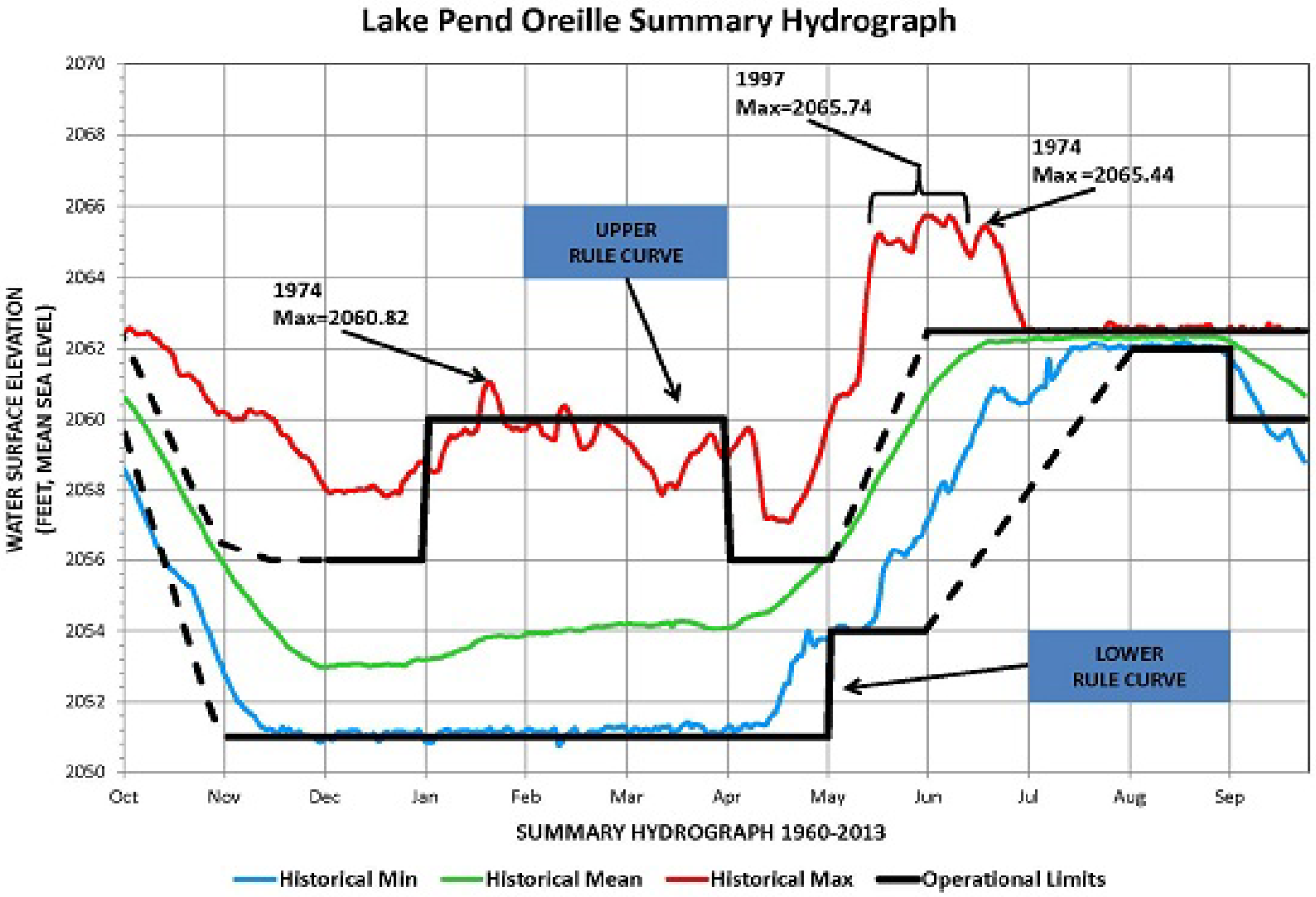


Albeni Falls Dam/Lake Pend Oreille Basics

- Corps operates 11.5 feet of the Lake between elevation 2,051 and 2,062.5 feet
- Summer Operating Range 2,062 to 2,062.5 feet
- Downstream flood flow is 95 kcfs but control point is at Sandpoint as measured at the Hope Gage at 2,063.5 feet
- Downstream mitigation for flood risk can occur in the winter
- Year round minimum flow is 4 kcfs for Albeni Falls Dam and Cabinet Gorge Dam's is 5 kcfs

Albeni Falls Dam/Lake Pend Oreille 101

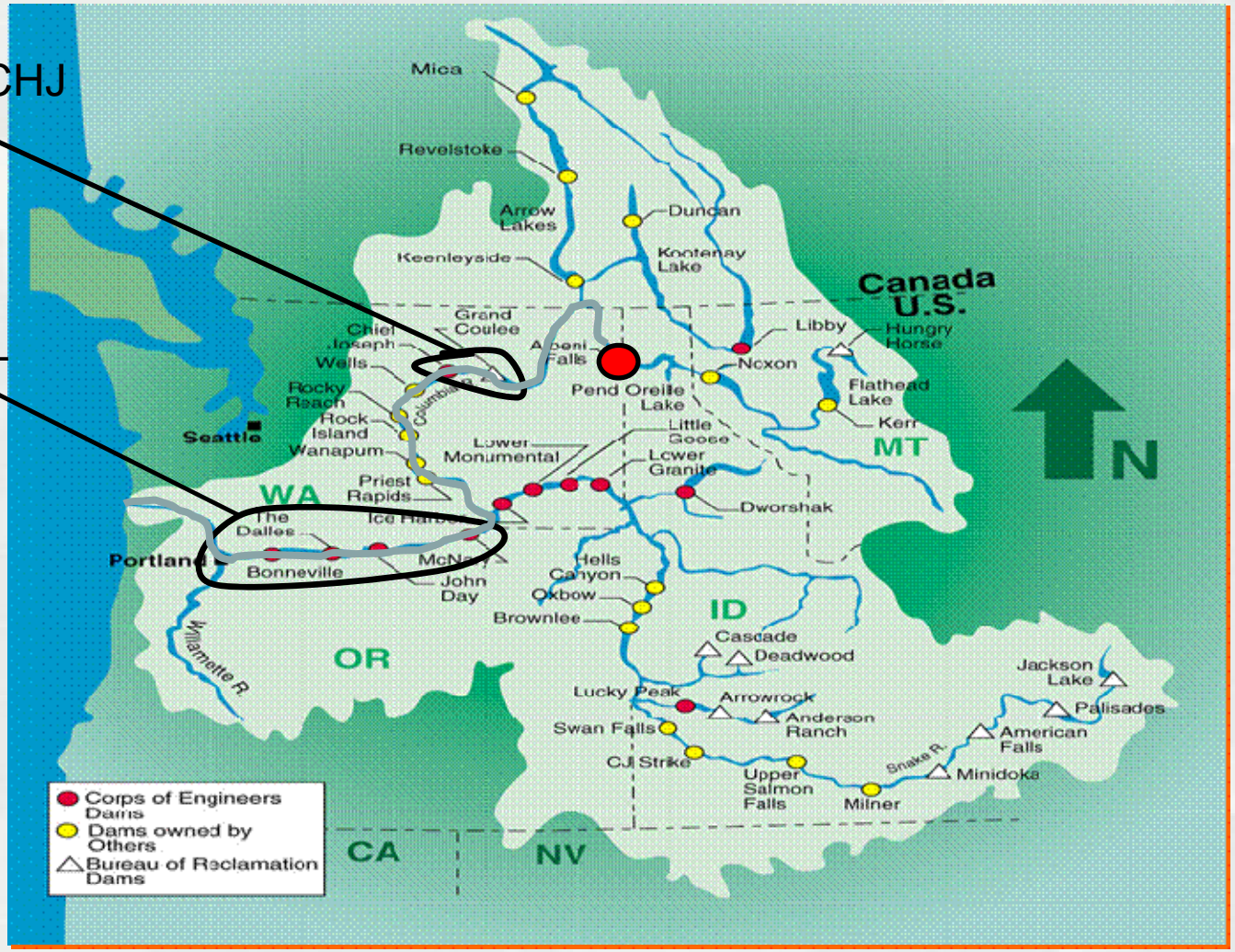
- Winter Operating Range
  - 2,051 to 2,056 feet for power
  - Up to 2,060 feet for Flood Risk Management
- Freeflow is when the gates are pulled and the channel restriction controls flow and lake level


Lake Pend Oreille Summary Hydrograph
1997
Max=2065.74
1974
Max =2065.44
UPPER
RULE CURVE
1974
Max=2060.82
LOWER
RULE CURVE
WATER SURFACE ELEVATION
(FEET, MEAN SEA LEVEL)
2070
2068
2066
2064
2062
2060
2058
2056
2054
2052
2050
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
SUMMARY HYDROGRAPH 1960-2013
Historical Min
Historical Mean
Historical Max
Operational Limits

FCRPS Projects

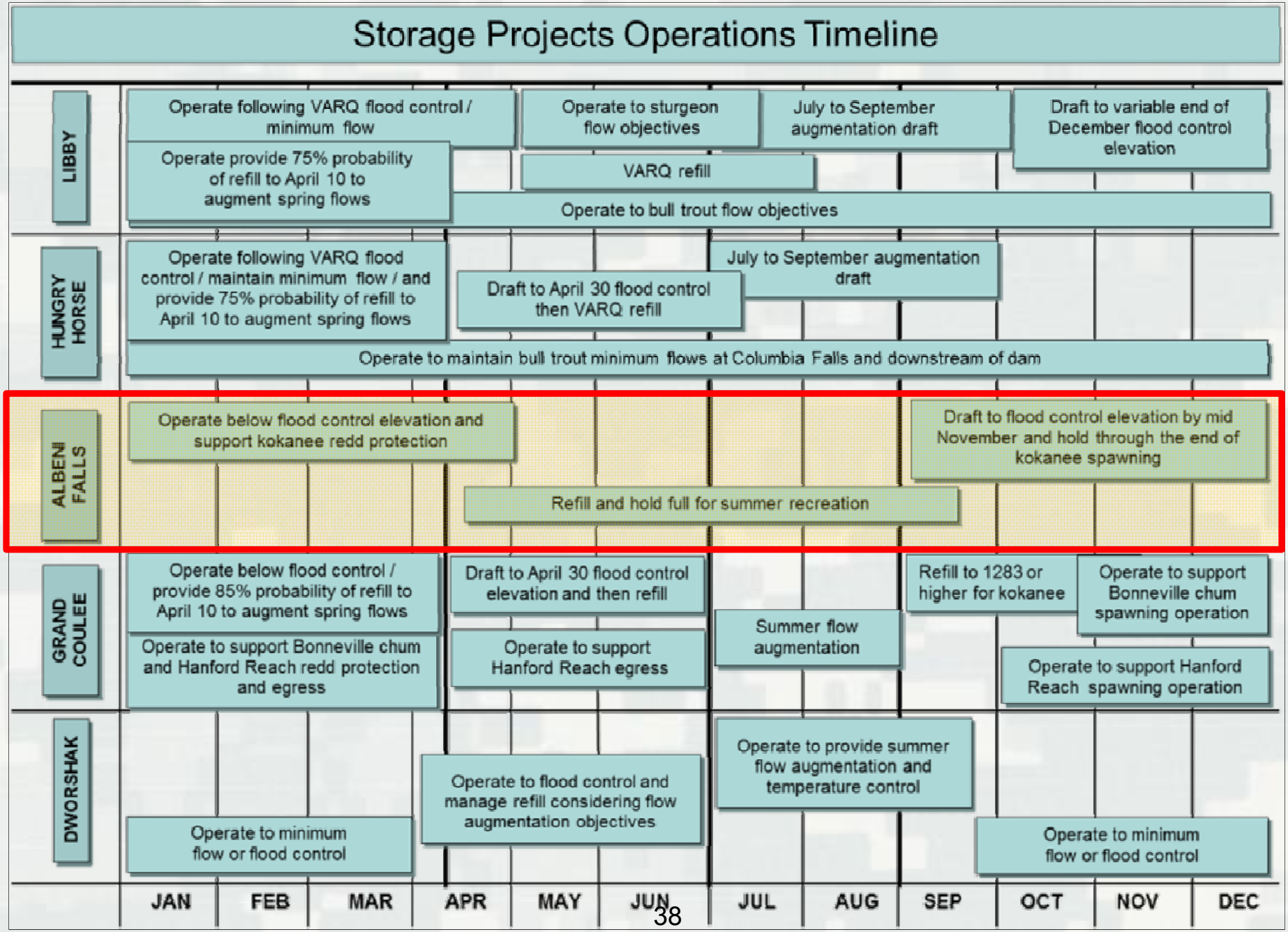
GCL/CHJ

LCOL

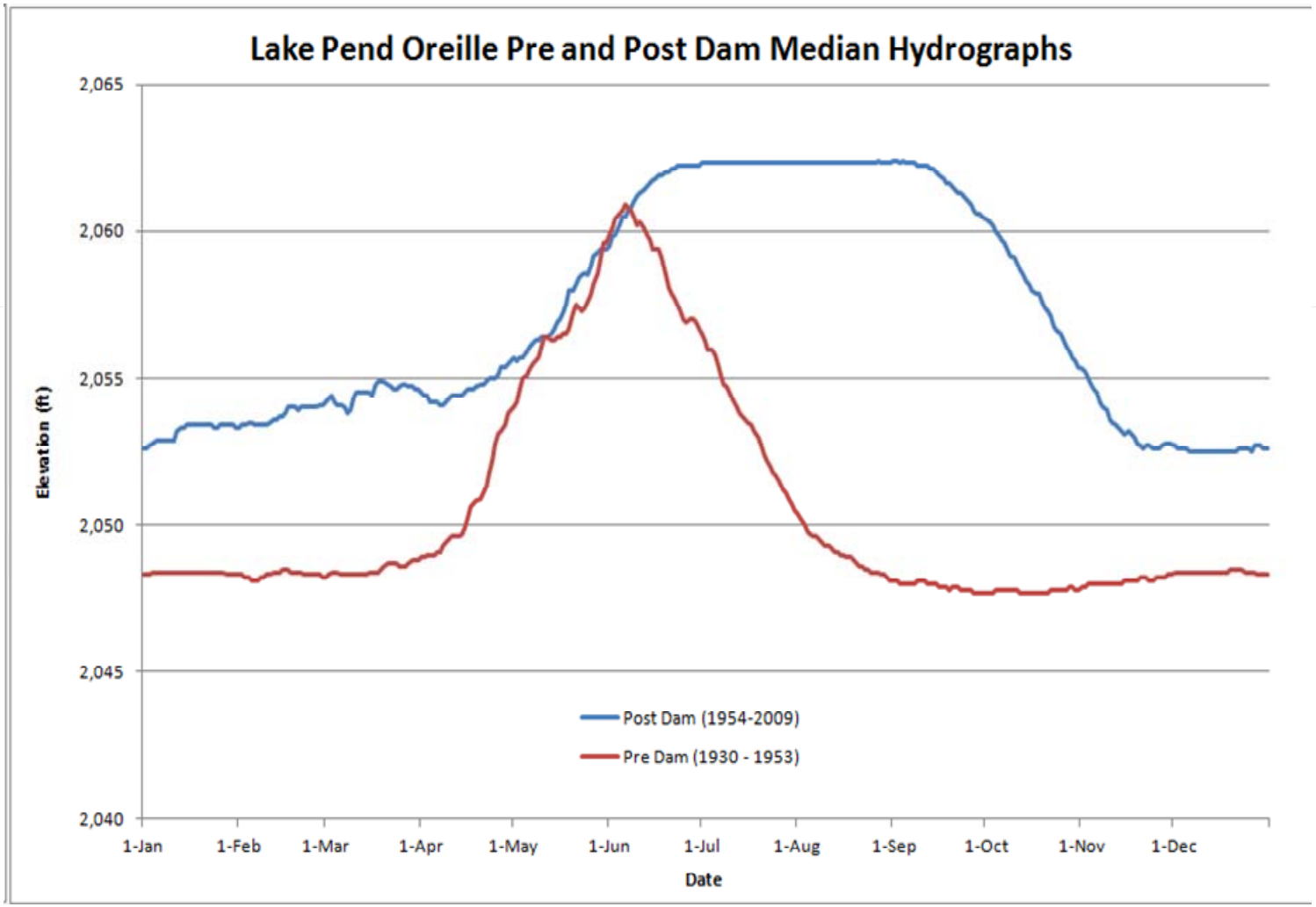


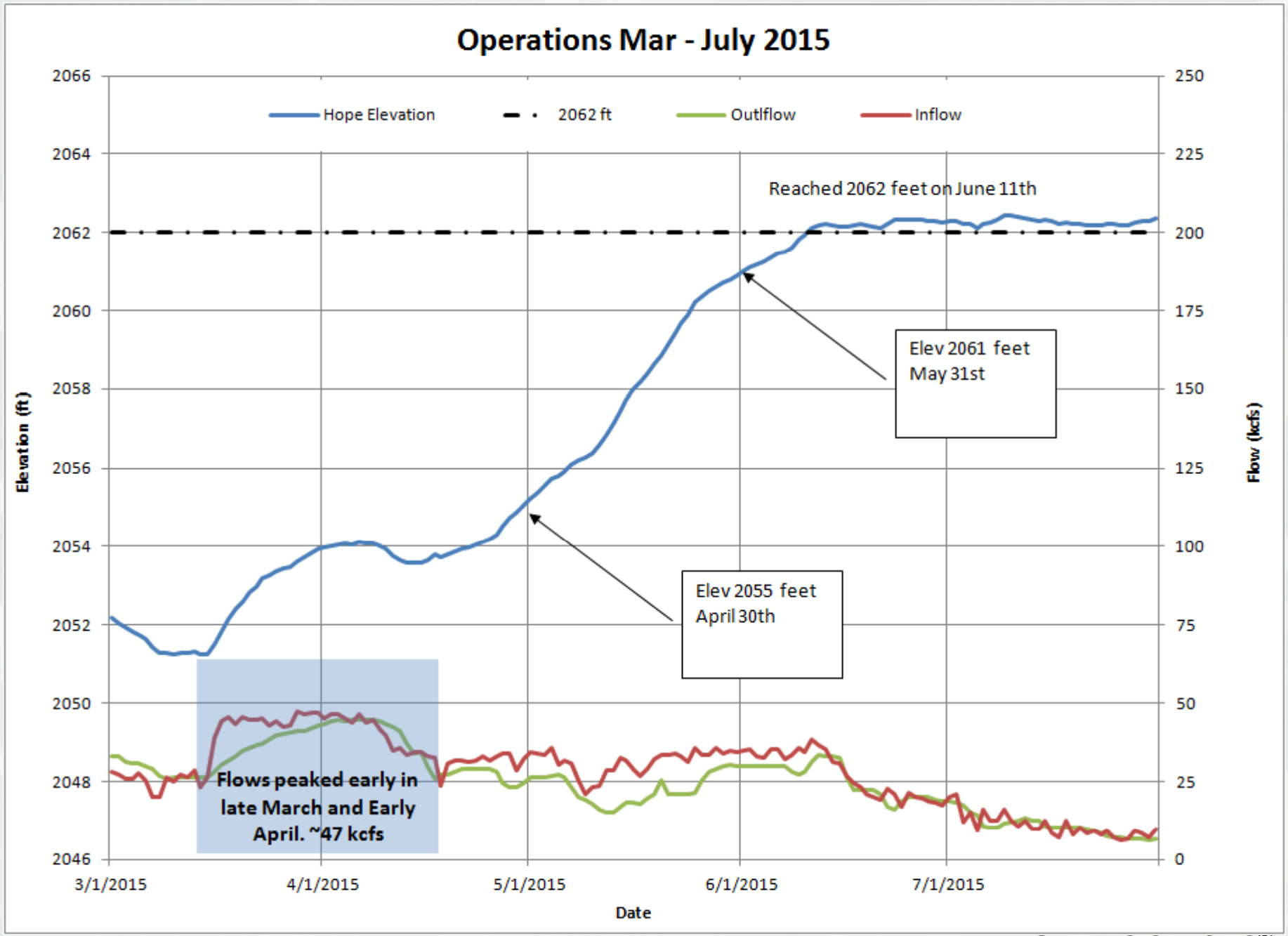
Albeni Falls Dam

- 20-25% of GCL average inflow
- 1' of forebay = 1' of forebay at GCL
- 1 unit of water produces 2 MW at site
- 1 unit of water produces up to 60 MW for D/S Fed projects


Storage Projects Operations Timeline
LIBBY
Operate following VARQ flood control / minimum flow
Operate to sturgeon flow objectives
July to September augmentation draft
Draft to variable end of December flood control elevation
Operate provide 75% probability of refill to April 10 to augment spring flows
VARQ refill
Operate to bull trout flow objectives
HUNGRY HORSE
Operate following VARQ flood control / maintain minimum flow / and provide 75% probability of refill to April 10 to augment spring flows
Draft to April 30 flood control then VARQ refill
July to September augmentation draft
Operate to maintain bull trout minimum flows at Columbia Falls and downstream of dam
ALBENI FALLS
Operate below flood control elevation and support kokanee redd protection
Draft to flood control elevation by mid November and hold through the end of kokanee spawning
Refill and hold full for summer recreation
GRAND COULEE
Operate below flood control / provide 85% probability of refill to April 10 to augment spring flows
Draft to April 30 flood control elevation and then refill
Refill to 1283 or higher for kokanee
Operate to support Bonneville chum spawning operation
Operate to support Bonneville chum and Hanford Reach redd protection and egress
Operate to support Hanford Reach egress
Summer flow augmentation
Operate to support Hanford Reach spawning operation
DWORSHAK
Operate to provide summer flow augmentation and temperature control
Operate to flood control and manage refill considering flow augmentation objectives
Operate to minimum flow or flood control
Operate to minimum flow or flood control
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

Lake Pend Oreille Pre and Post Dam

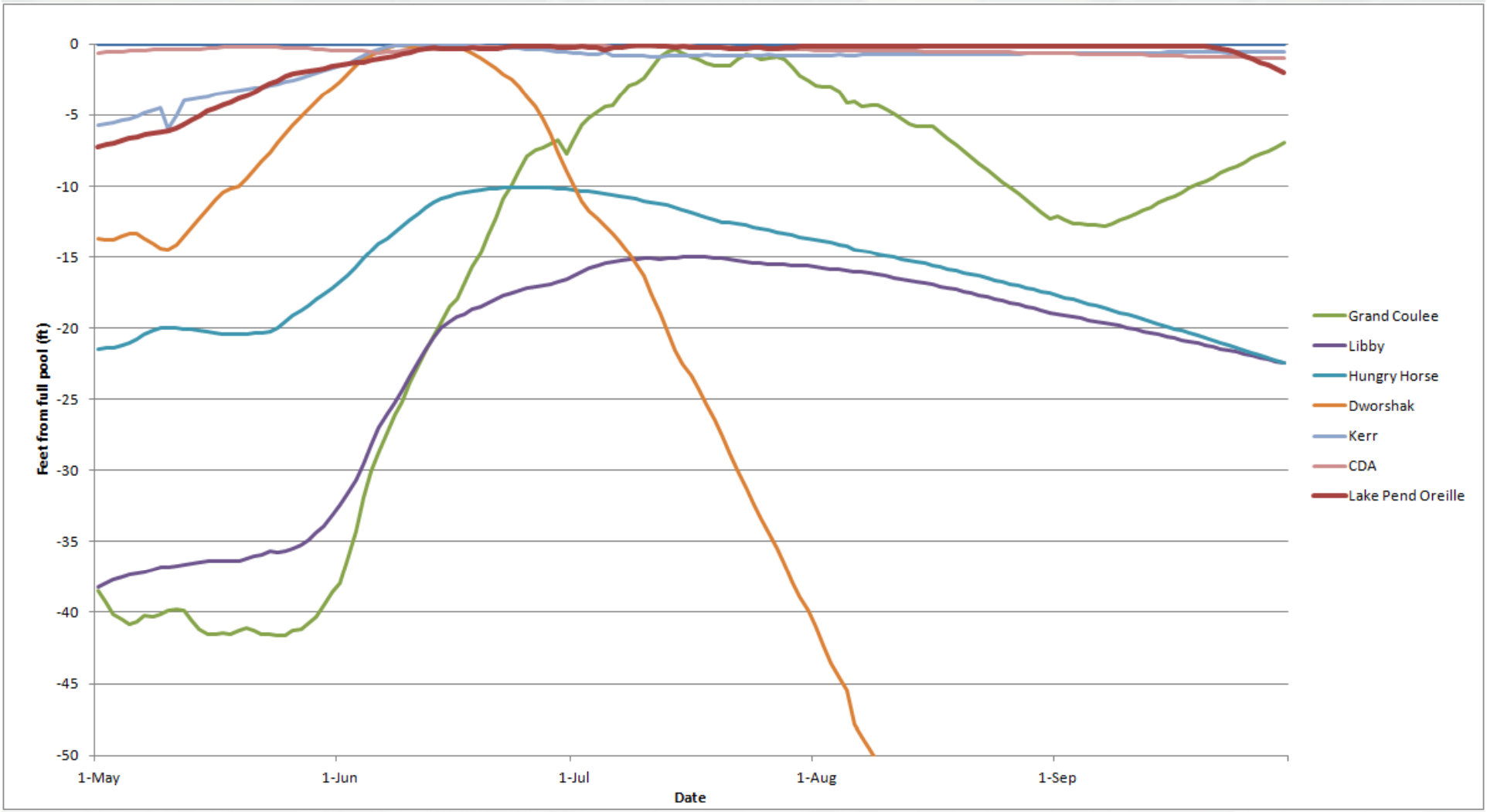



Operations Mar - July 2015
Hope Elevation
2062 ft
Outlflow
Inflow
Reached 2062 feet on June 11th
Elev 2061 feet
May 31st
Elev 2055 feet
April 30th
Flows peaked early in late March and Early April. ~47 kcfs
Elevation (ft)
Flow (kcfs)
Date
2066
2064
2062
2060
2058
2056
2054
2052
2050
2048
2046
250
225
200
175
150
125
100
75
50
25
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015

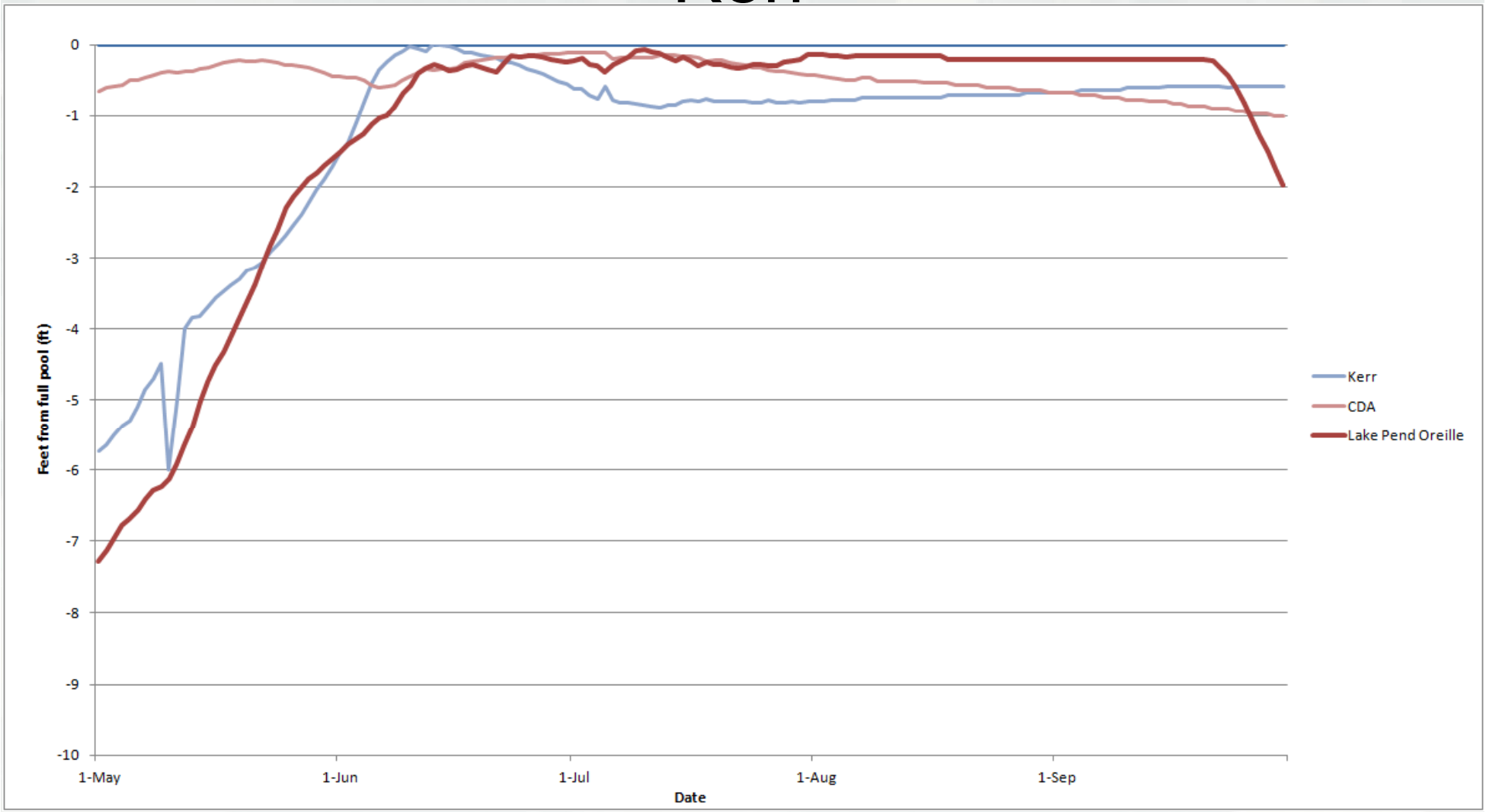
Spring Operations Review

- End of April and May elevations were a balance between Lake Pend Oreille refill and downstream needs.
  - ▶ Grand Coulee drum gate maintenance.
  - ▶ Providing flows for Chum reds in the middle Columbia River
- Refilled Lake Pend Oreille to 2,062 feet earlier than recent years June 11th.

Below Full Pool for FCRPS Projects



Below Full Pool for LPO, CDO, and Kerr



Coordination and Clarified Operations

- Eliminated pre- or post-Labor Day temperature operations that could have drafted the Lake earlier than in the past
- Worked with Idaho Governor's Office and Pend Oreille Basin Commission
- Defines operations and coordination post kokanee experiment
- Gives additional certainty to Sept/Oct drawdown
- Continue to hold 2 public meetings in April and August

Coordination and Clarified Operations September Drawdown

- Hold the summer pool (2,062 to 2,062.5 feet) through the third Sunday of Sept, or Sept 18, whichever is later
- Make effort to be above 2,061 feet the forth weekend of Sept, or Sept 25, whichever is later
- No lower than 2,060 feet on Sept 30
- There may be times when elevations are lower than those specified above

Coordination and Clarified Operations Oct/Nov Drawdown

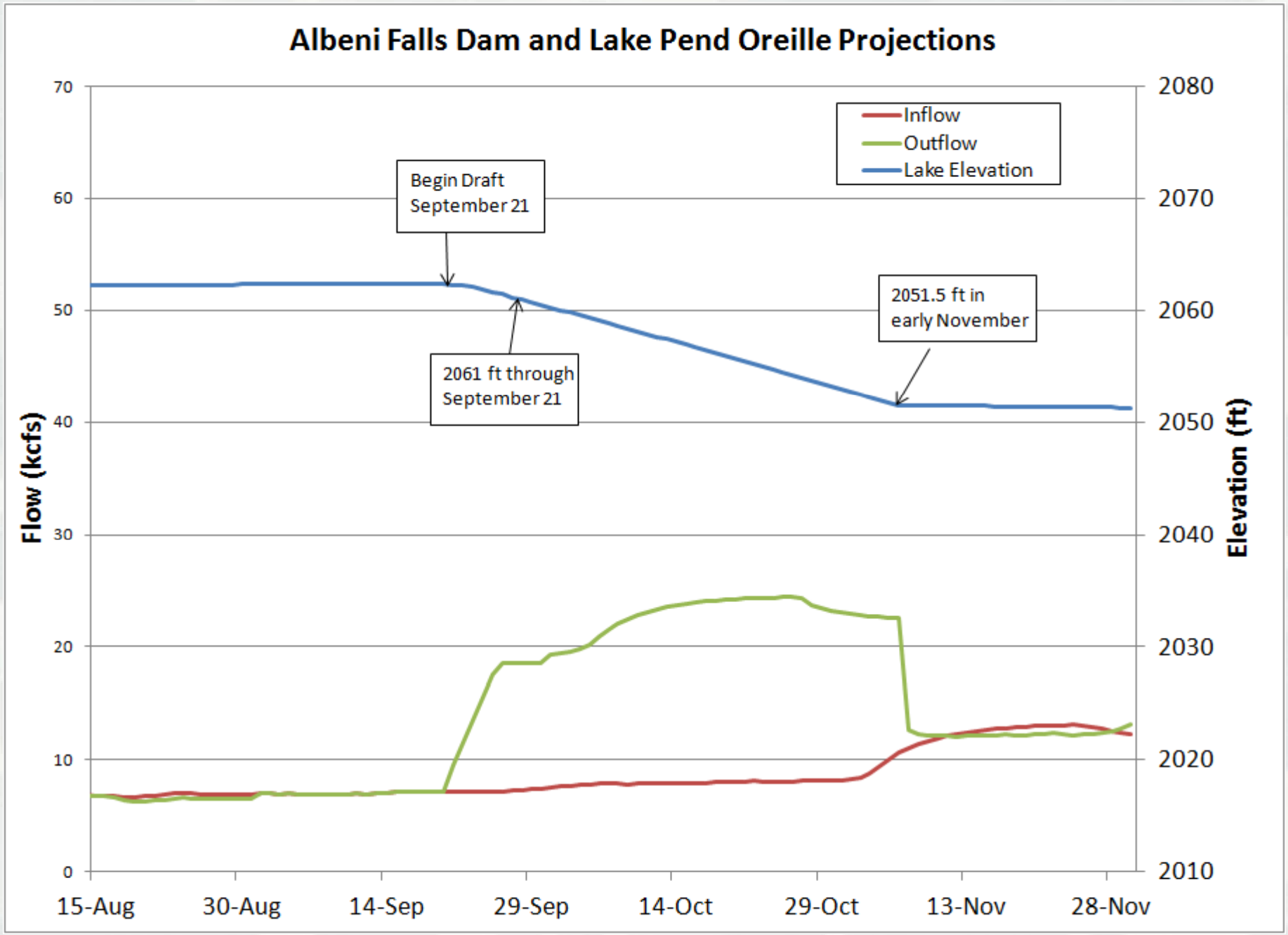
- Winter minimum elevation will be 2,051 feet
- October through 1st week of November, target being at 2,051 feet no later than Nov. 15
- In November the lake will be drafted no lower than 2,051 feet or elevation at the time of kokanee spawning
- Targeting 2,051 feet gives greater flexibility to:
  - ► Flood risk management in the winter and spring
  - ► Power operations in the winter both at Albeni Falls Dam and in the Columbia River

Fall Targets 2015

- Between 2,062 to 2,062.5 feet through Sept 20
- Above 2,061 feet through Sept 27
- Target being between 2,060.5 and 2,061 feet on Sept 30
- Winter Minimum Control Elevation is 2,051 feet.
  - ► Target being within a half foot by Nov.15

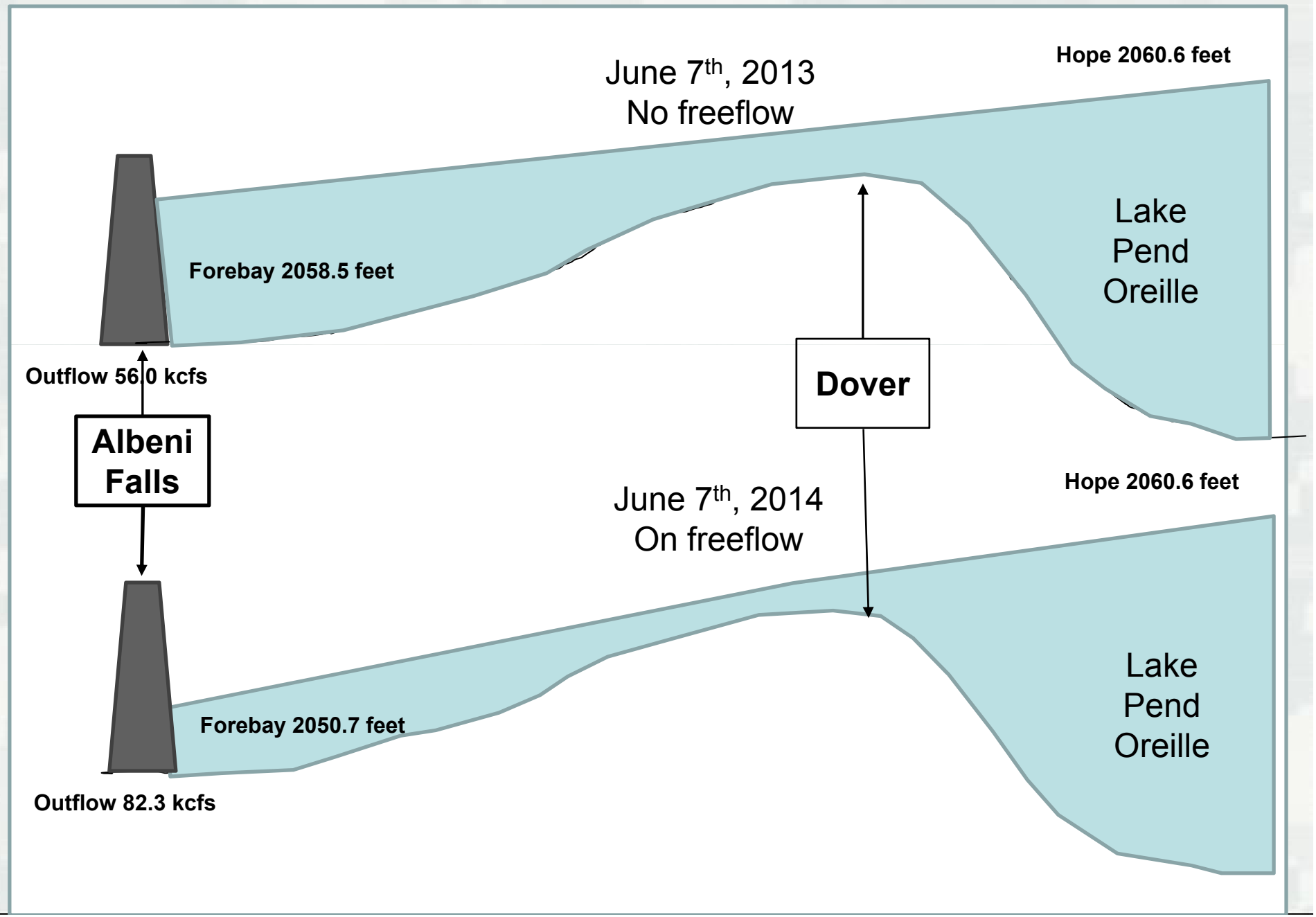
Winter Operations

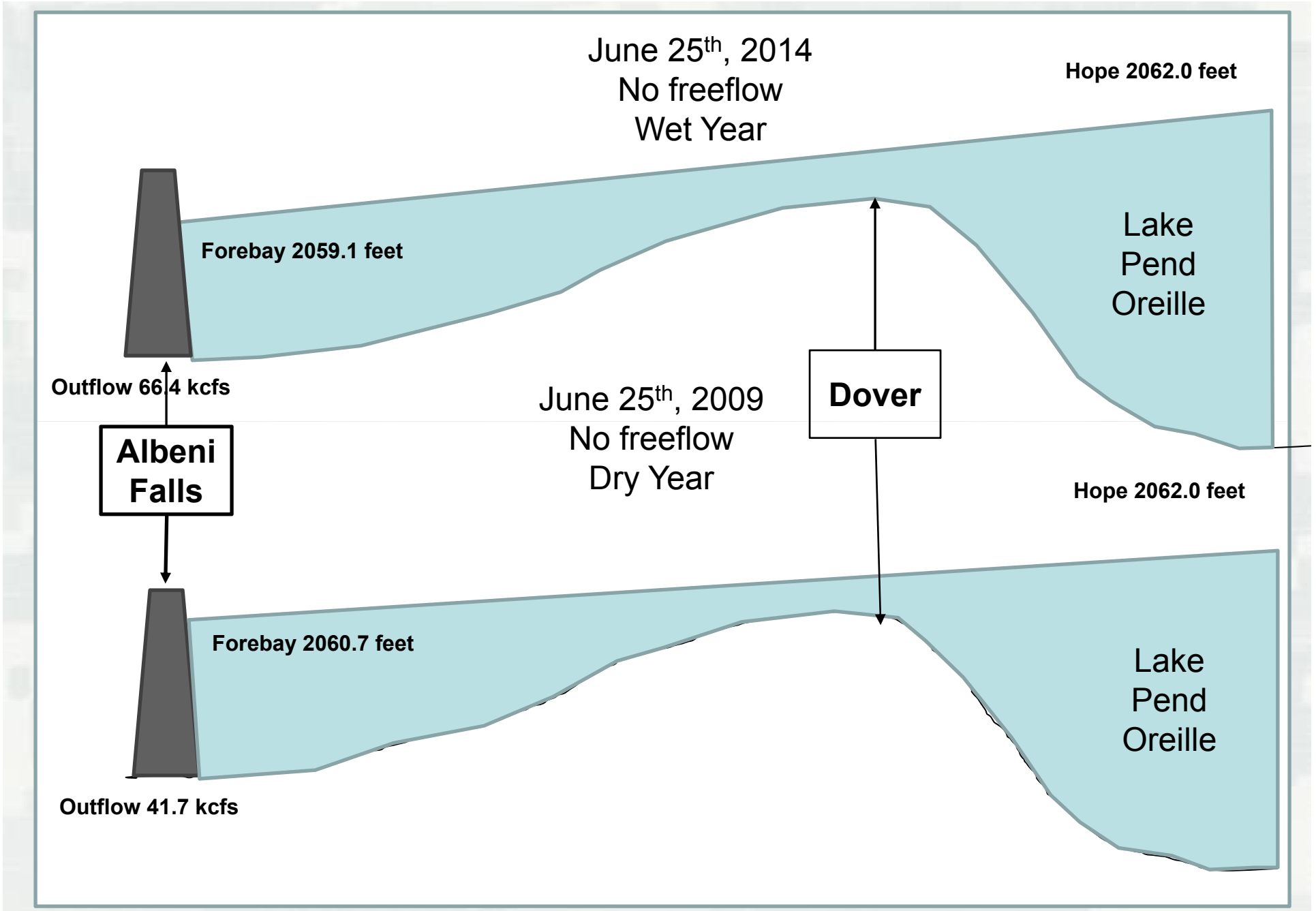
- Hold between 2,051 and 2,051.5 feet until kokanee are done spawning or Dec 31
- January to March:
  - Flexible Winter Power Operations permitted
  - Jan to Feb cultural work could limit pool elevations to 2,055 feet
  - Potential gate fix at Grand Coulee could effect the spring operations


Albeni Falls Dam and Lake Pend Oreille Projections
Flow (kcfs)
Elevation (ft)
Inflow
Outflow
Lake Elevation
Begin Draft
September 21
2061 ft through
September 21
2051.5 ft in
early November
70
60
50
40
30
20
10
0
2080
2070
2060
2050
2040
2030
2020
2010
15-Aug
30-Aug
14-Sep
29-Sep
14-Oct
29-Oct
13-Nov
28-Nov

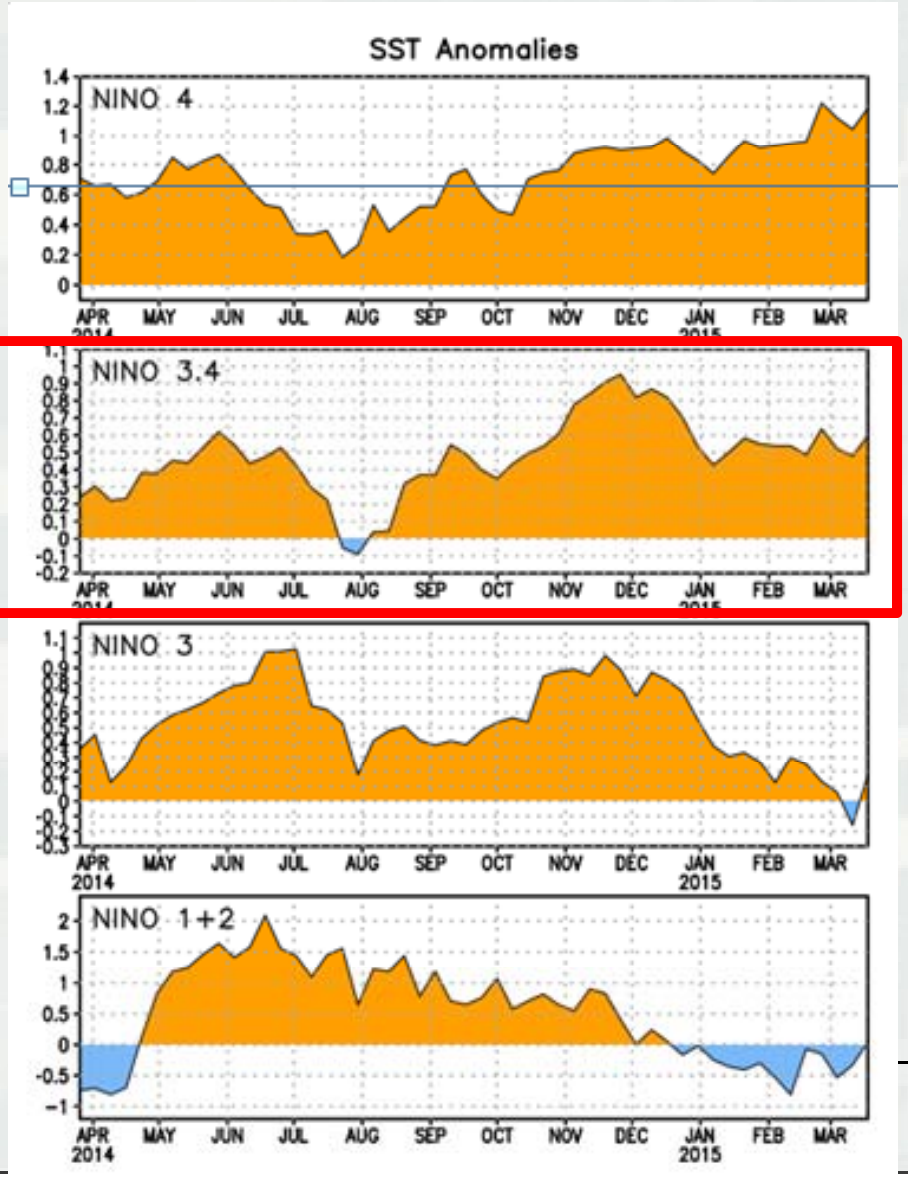
Questions?

Freeflow vs Controlled Flow



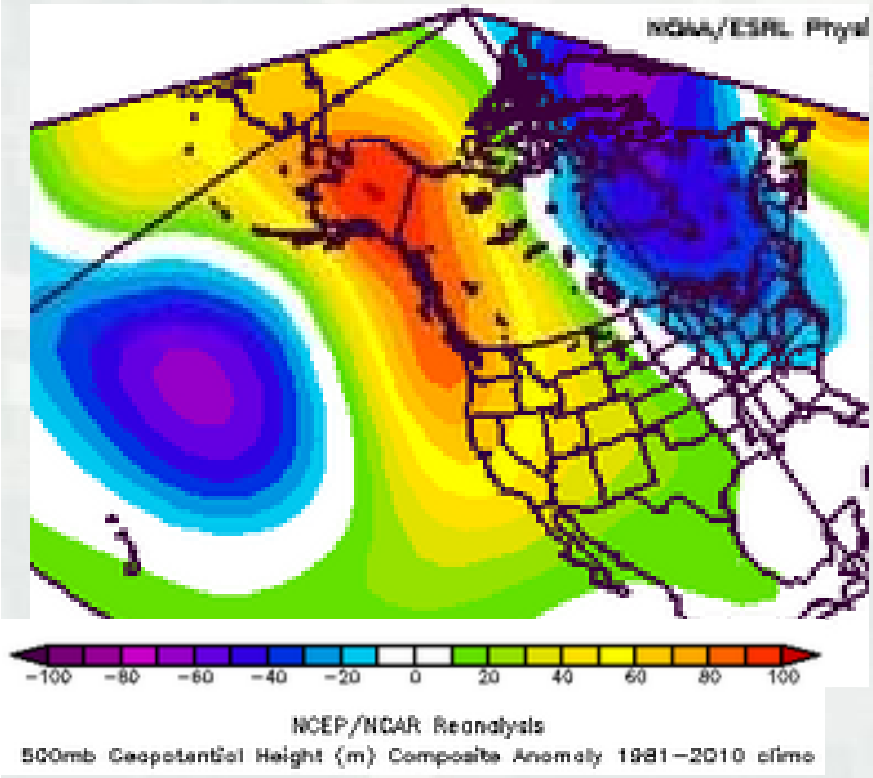

June 25th, 2014
No freeflow
Wet Year
Hope 2062.0 feet
Forebay 2059.1 feet
Lake
Pend
Oreille
Outflow 66.4 kcfs
Albeni
Falls
June 25th, 2009
No freeflow
Dry Year
Dover
Hope 2062.0 feet
Forebay 2060.7 feet
Lake
Pend
Oreille
Outflow 41.7 kcfs

IS EL NINO TO BLAME?

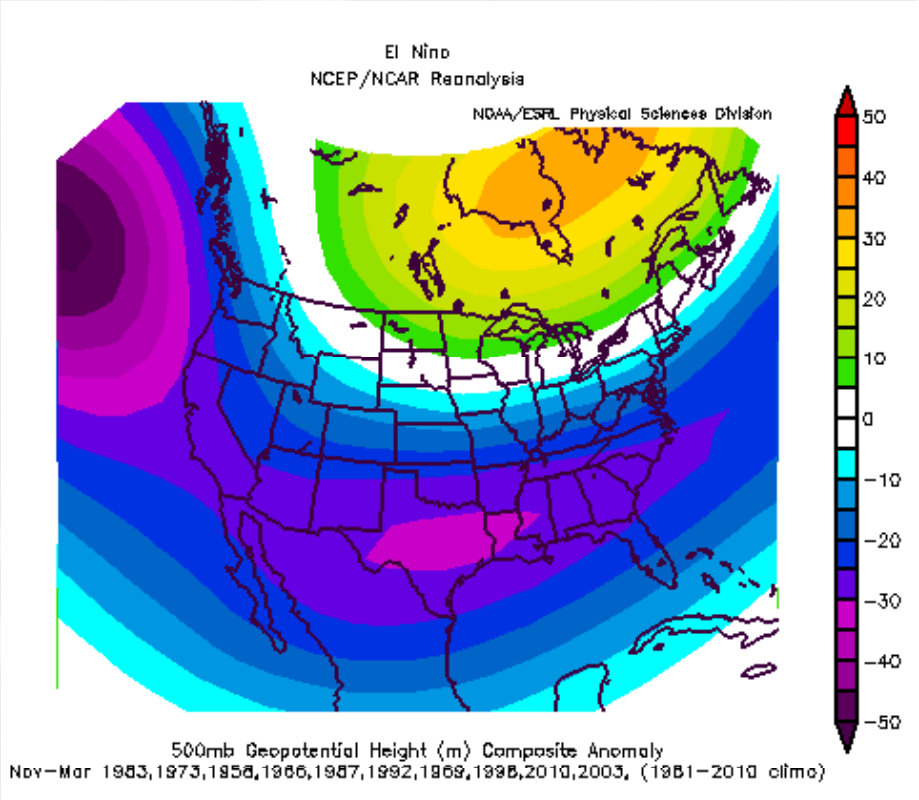


Since October, a weak El Nino has been present

Nov 2014 – Feb 2015
500mb height anomaly

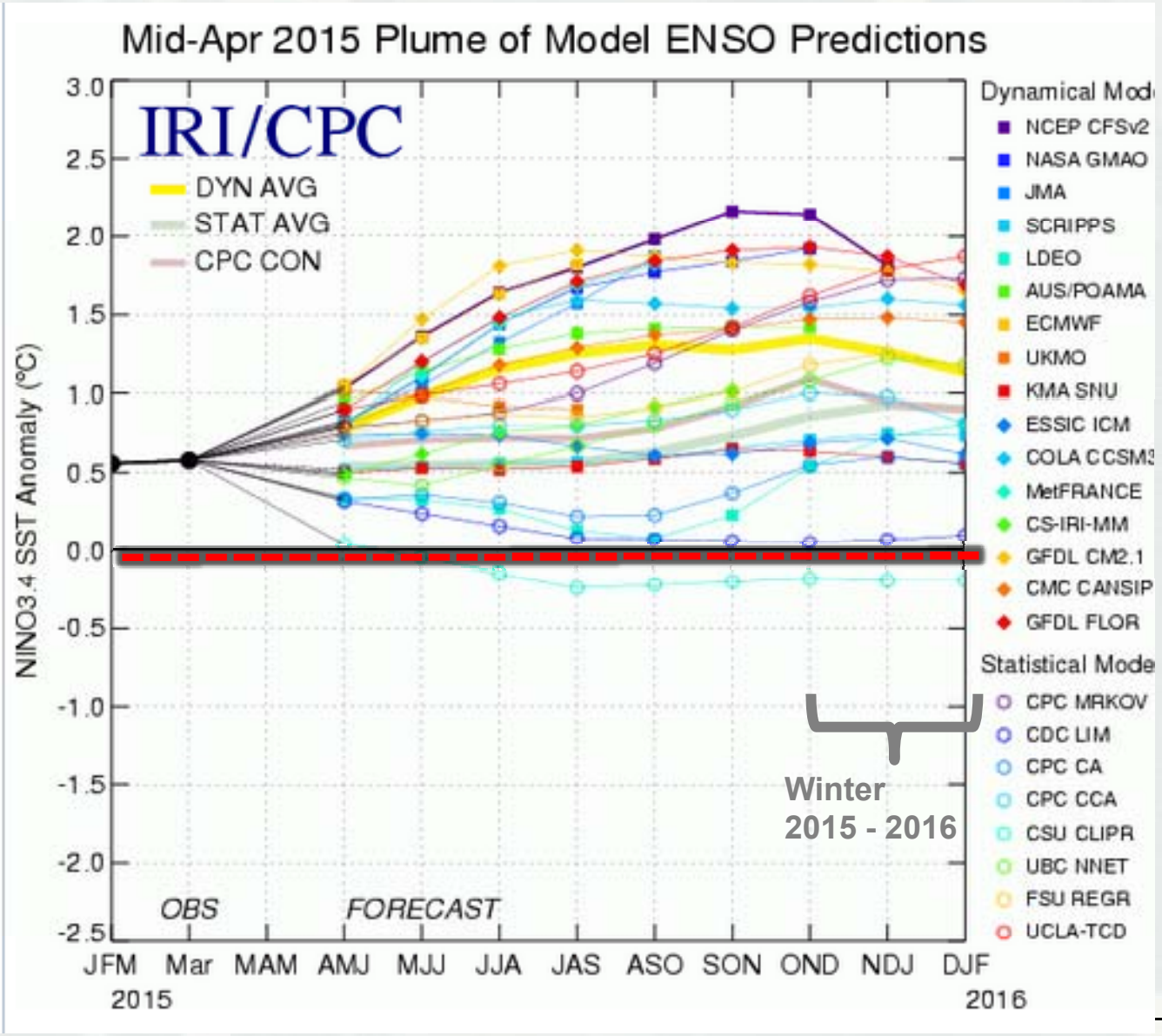


- Upper ridge the dominant factor – much more so than El Nino
- Natural atmospheric variability is the likely cause of this ridge



El Nino composite
500mb height anomaly

Possible El Niño in 2015-2016?



Flexible Winter Power Operations

- Purpose: Increase flexibility for FCRPS operations to optimize power generation and protect against unplanned events
  - 1' of water from ALF is slightly more than a 1' of water at GCL (worth ~2700 MW for total downstream Federal Projects)\
  - Helps protect against costly cold snaps or power system emergencies
  - Could be used for fishery needs
  - The Environmental Assessment (EA) presented the full range of potential FWPO operations
  - It is highly unlikely that hydrologic and power system conditions would warrant utilizing FWPO with back-to-back significant fill and draft events as presented in the EA.

- Schedule: mid-December through March
  - Dependent on many in-season variables: power prices, streamflows, weather, regional temperatures, water supply, downstream constraints and status of downstream reservoirs.
  - Fill during low power demand and/or higher inflows; draft for above purposes
  - Constraints would limit amount and rate of fill/draft

- Constraints: In addition to normal operating constraints
  - Max discharge: 45 kcfs
  - Max El: 2056'
  - Min El: MCE
  - Best Management Practice produced to minimize ice-related damages downstream of ALF
  - Minimum fluctuation SOP to reduce risk of damage to overwater structures