Water Supply Conditions Report

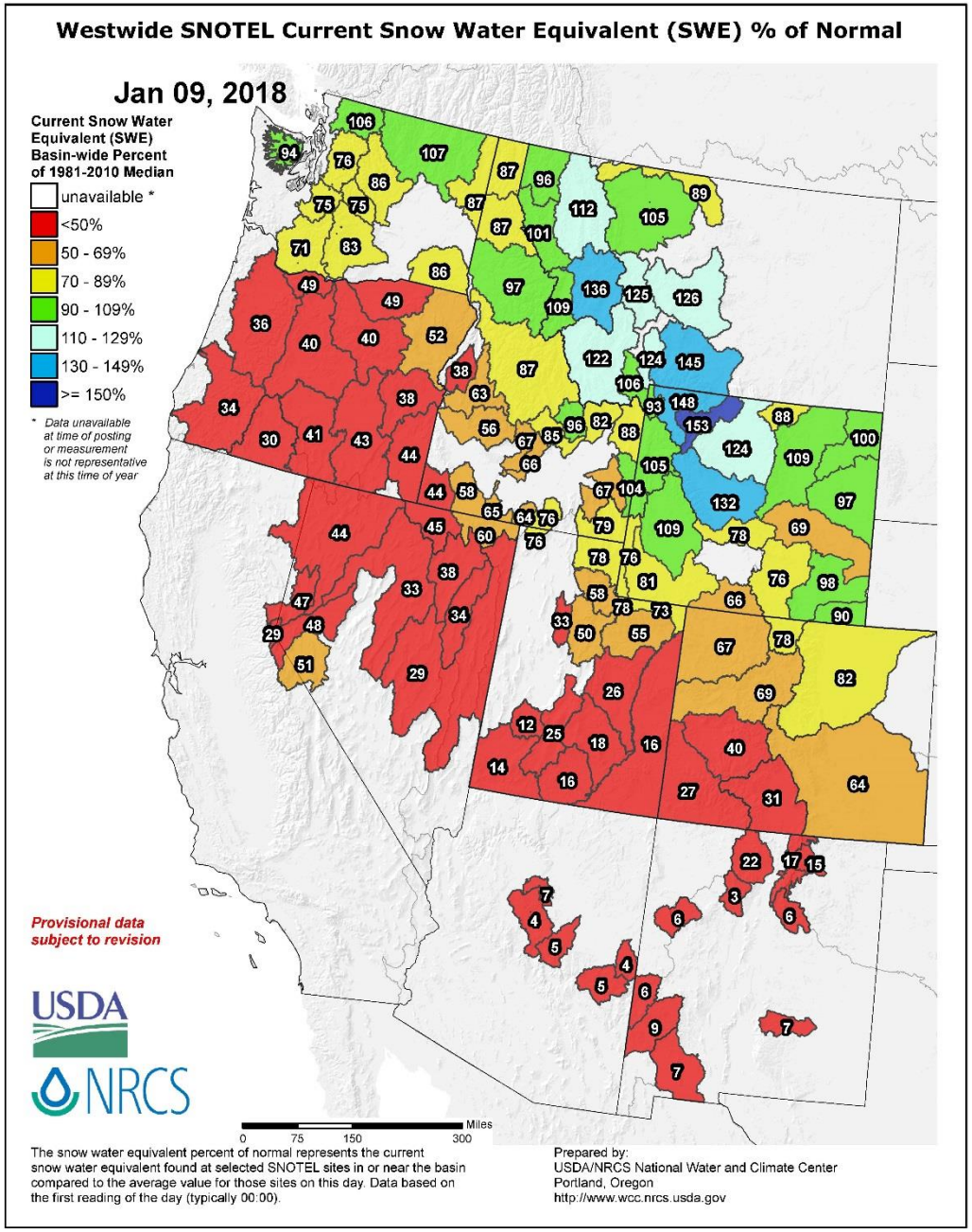
Drought Readiness Council

Ken Stahr
Oregon Water Resources Department
January 18, 2018

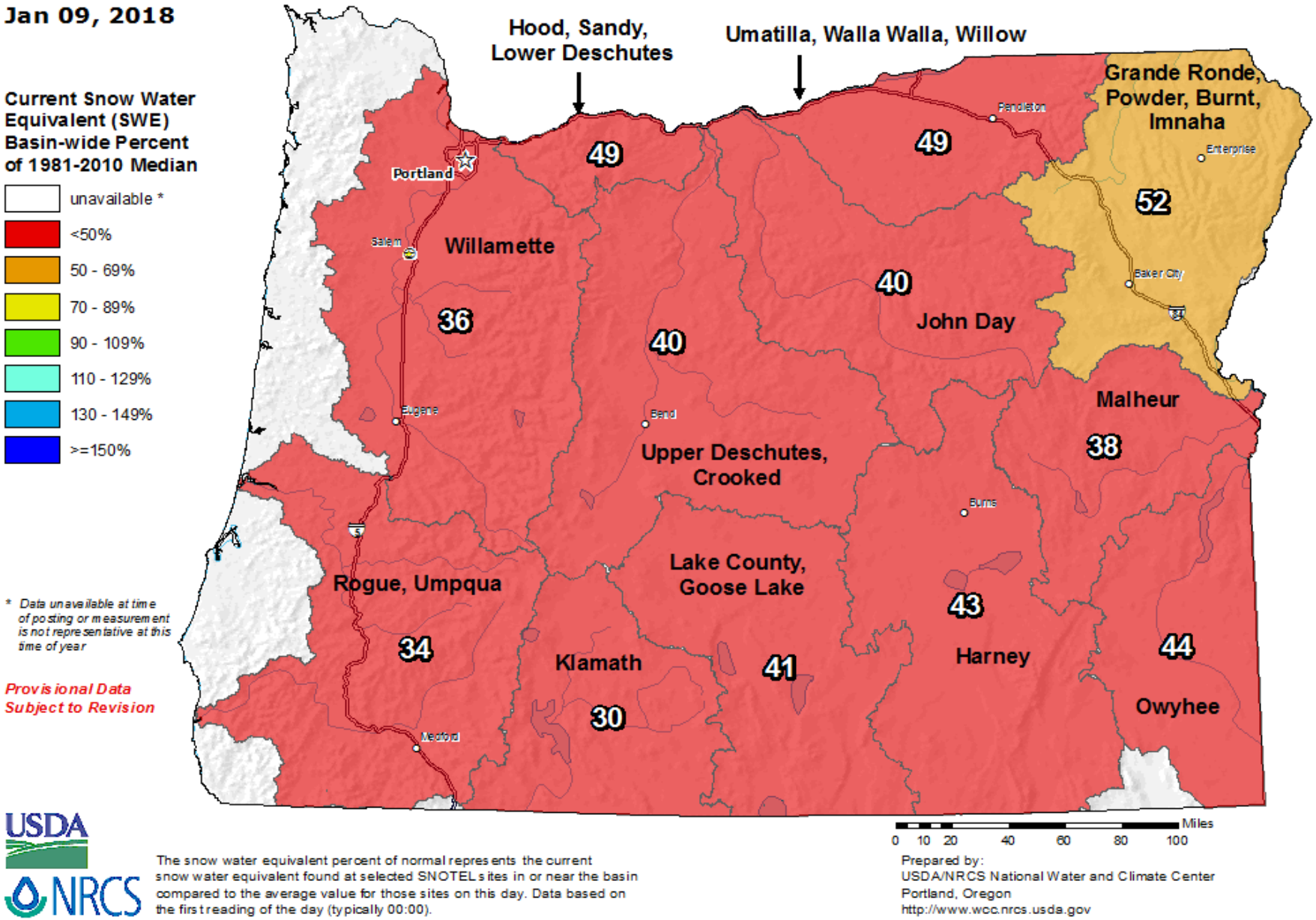
Not much snow to measure on January 1

Photo courtesy of Bill Goodman (Snow Surveyor, USFS Lakeview)

West-Wide Snowpack – January 9, 2018

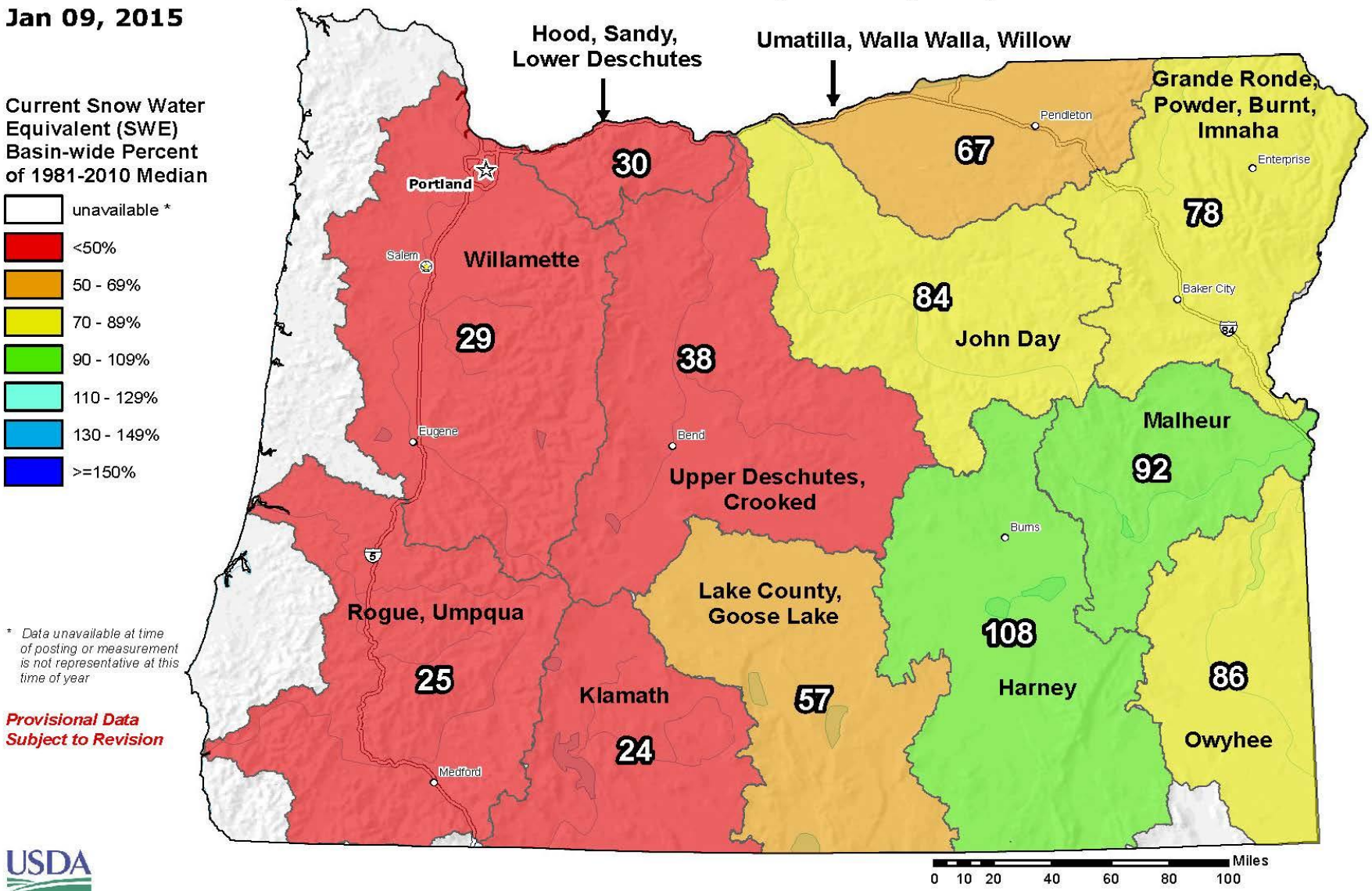


Statewide SNOTEL Snowpack is 39% of normal



Statewide SNOTEL Snowpack was 45% of normal

Jan 09, 2015



* *Data unavailable at time of posting or measurement is not representative at this time of year*

Provisional Data Subject to Revision

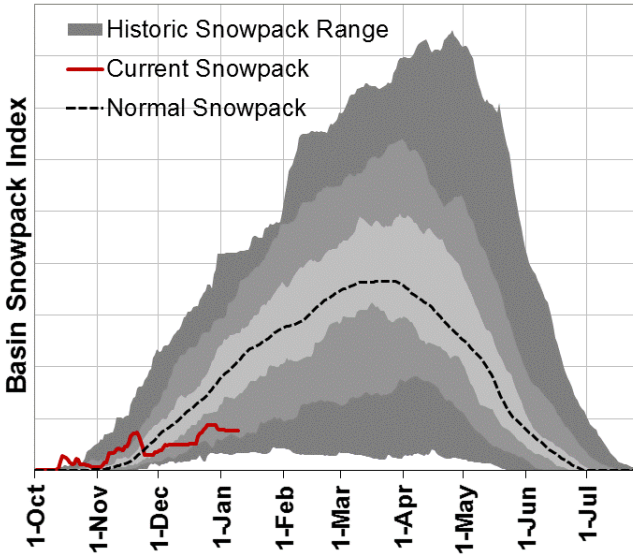
USDA NRCS

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

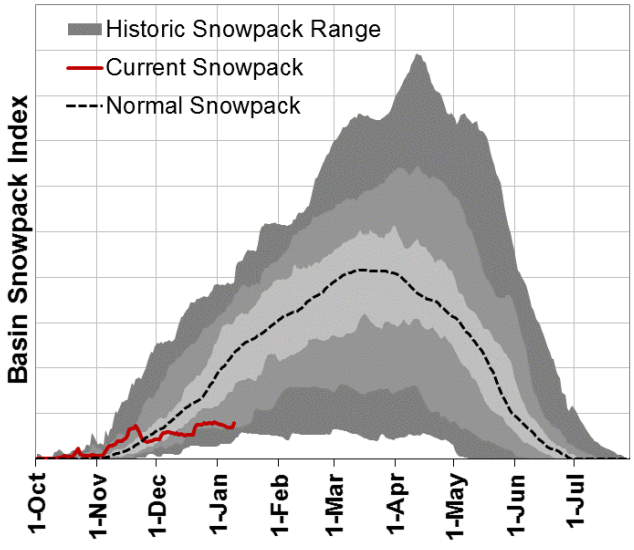
Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

SNOWPACK GRAPHS – January 9, 2018

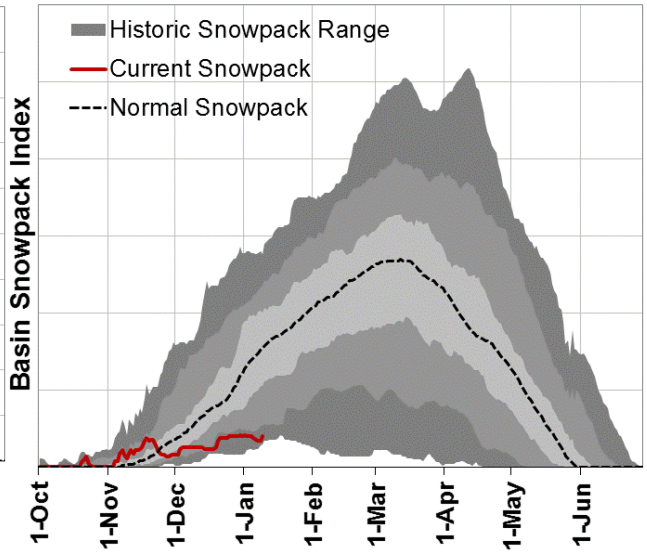
Willamette



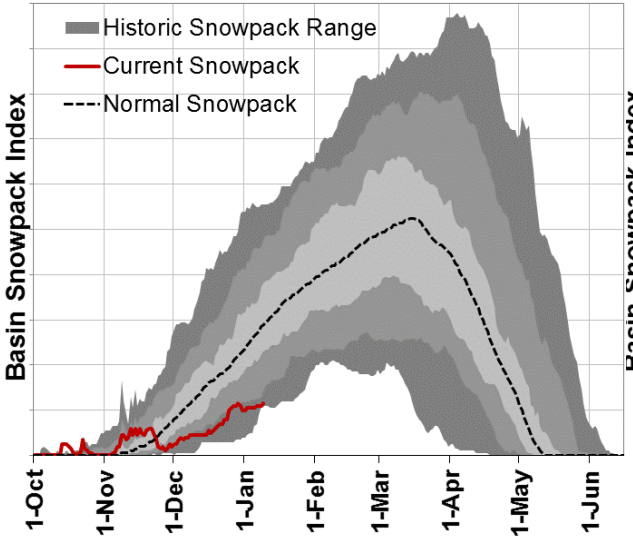
Rogue/Umpqua



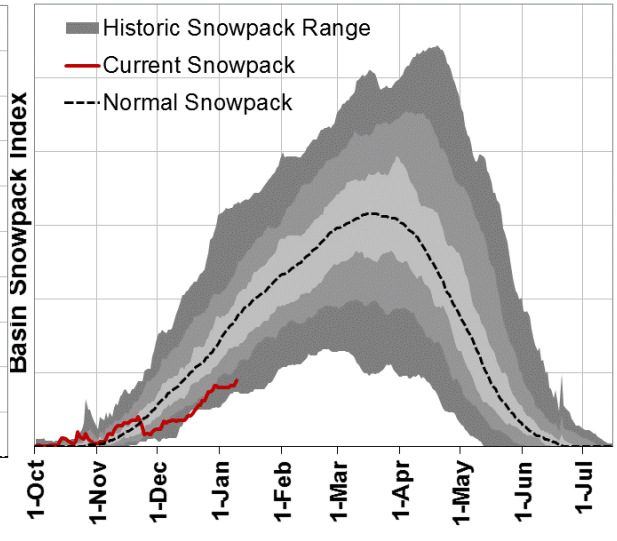
Klamath



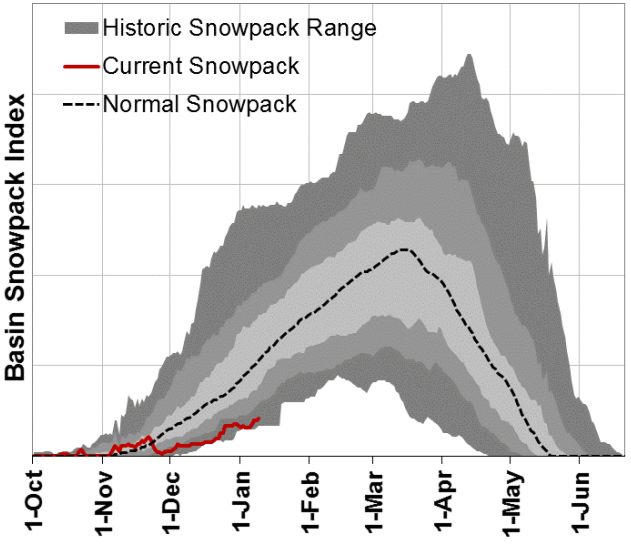
John Day



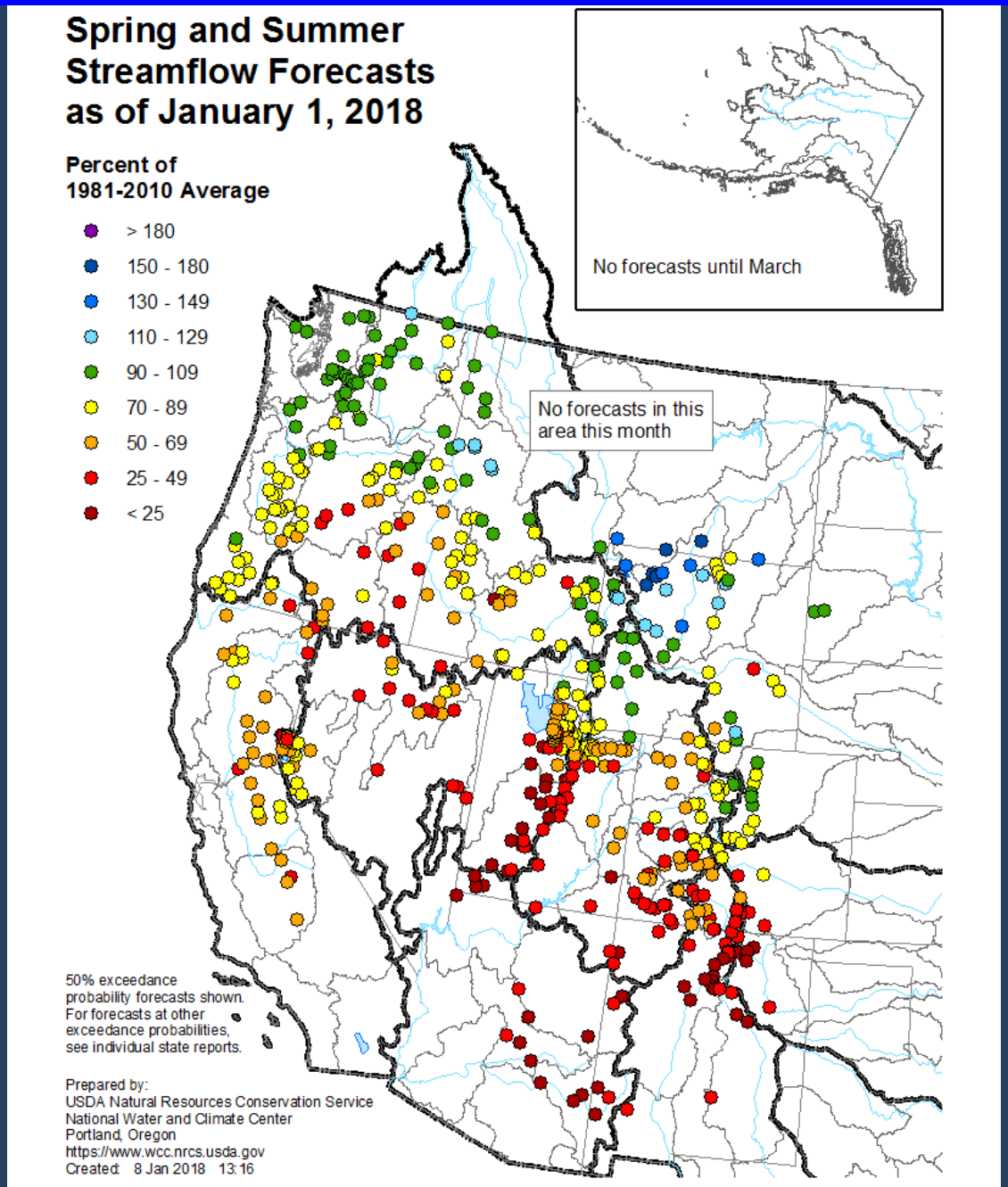
Grande Ronde/Powder/Burnt



Owyhee/Malheur

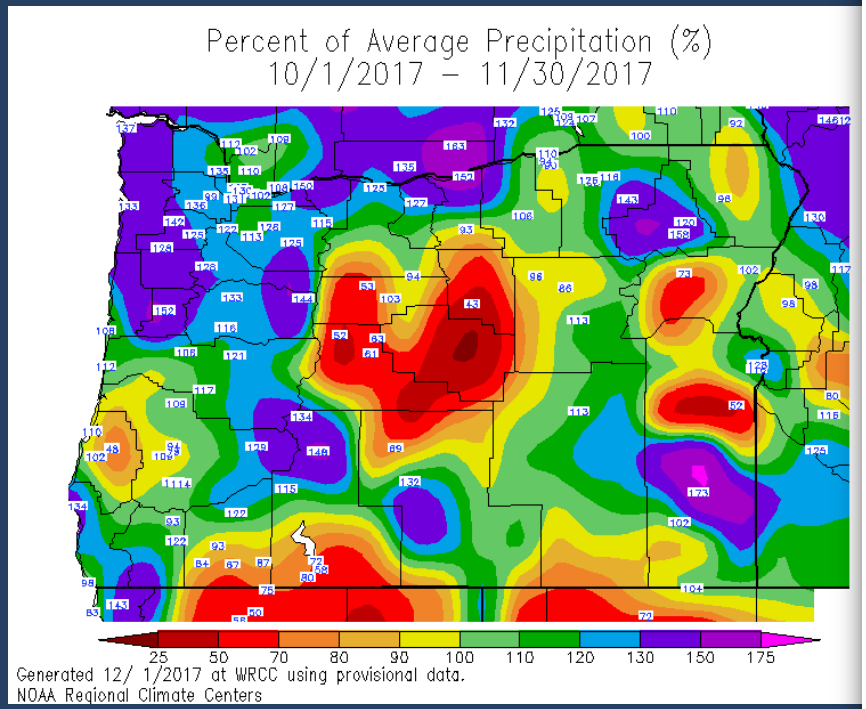


West-Wide Streamflow Volume Forecasts 50% Exceedance Probability – January 2018



WY2018 Precipitation thus far

Thru Nov 30 2017



Thru Jan 7 2017

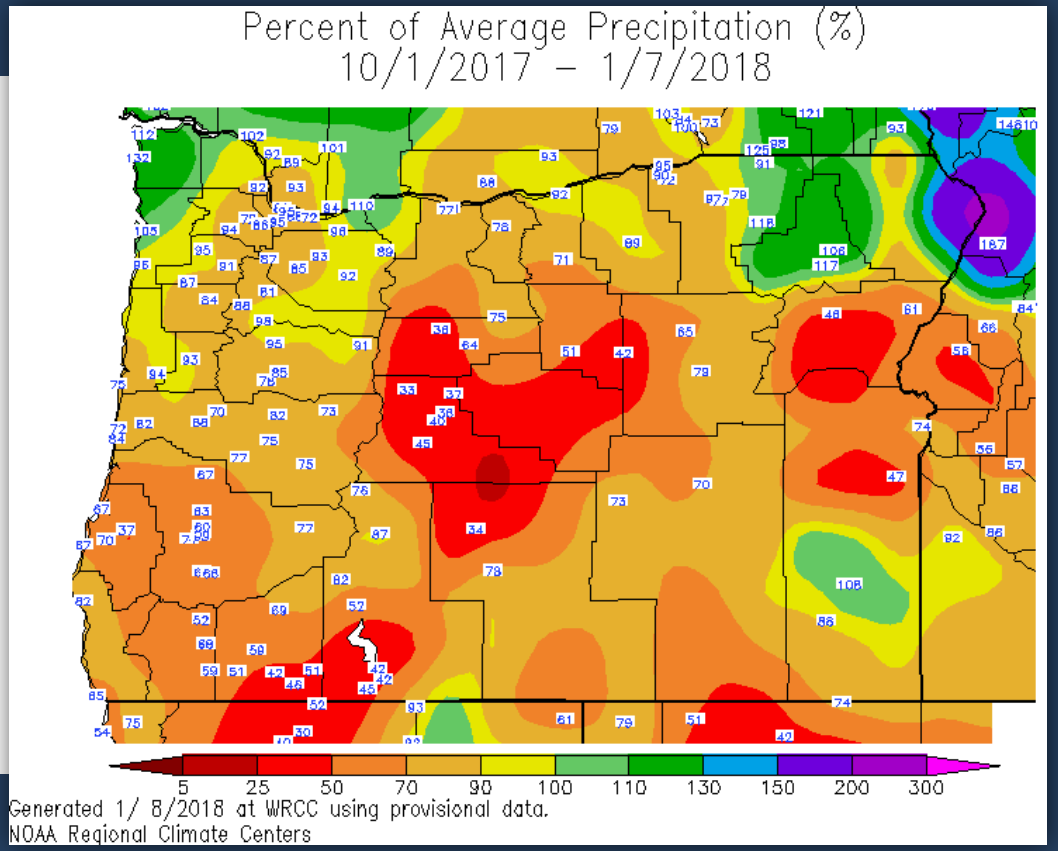
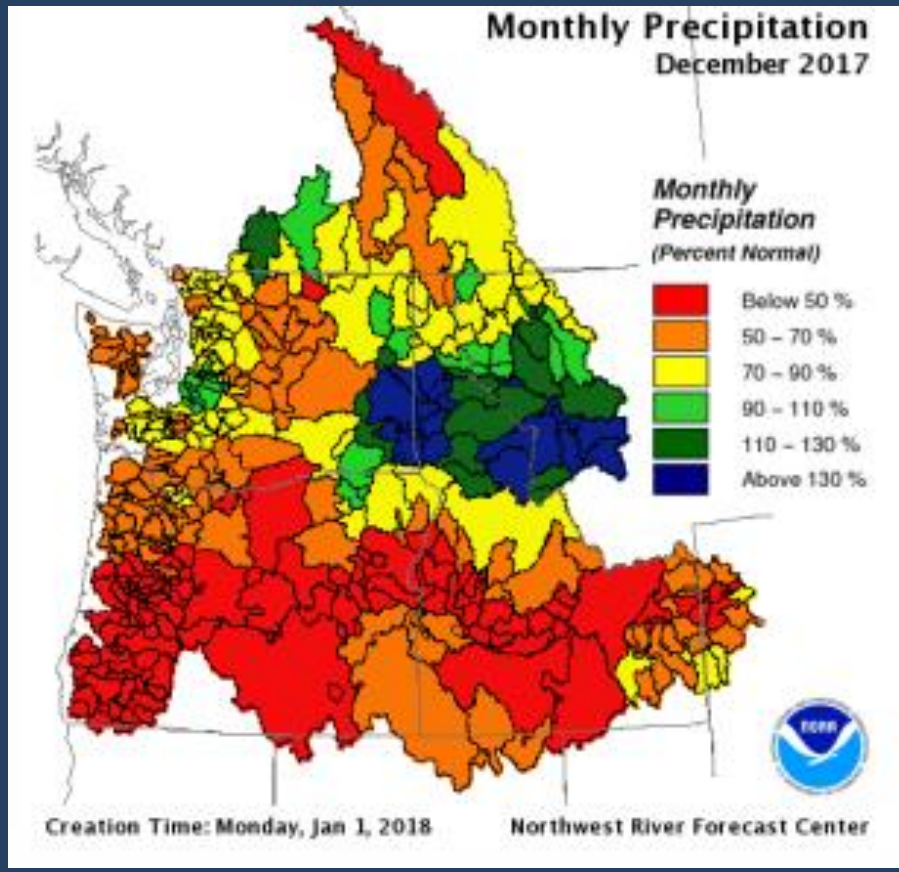


Image sources: wrcc.dri.edu

December Precipitation & Temperatures



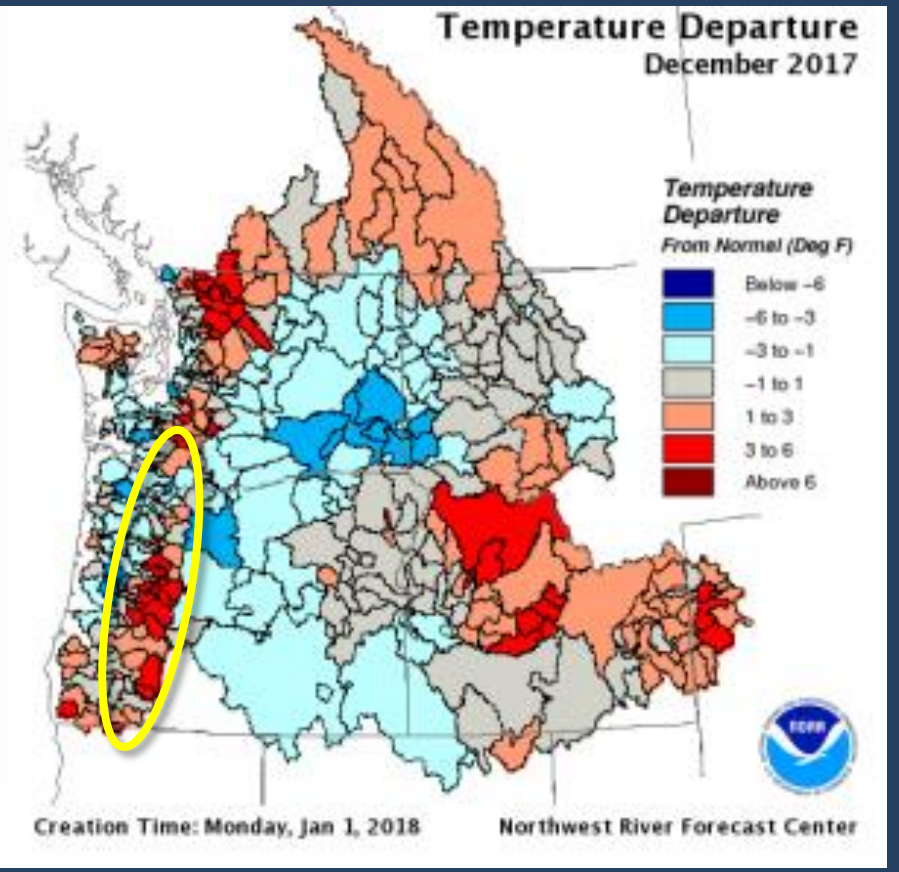
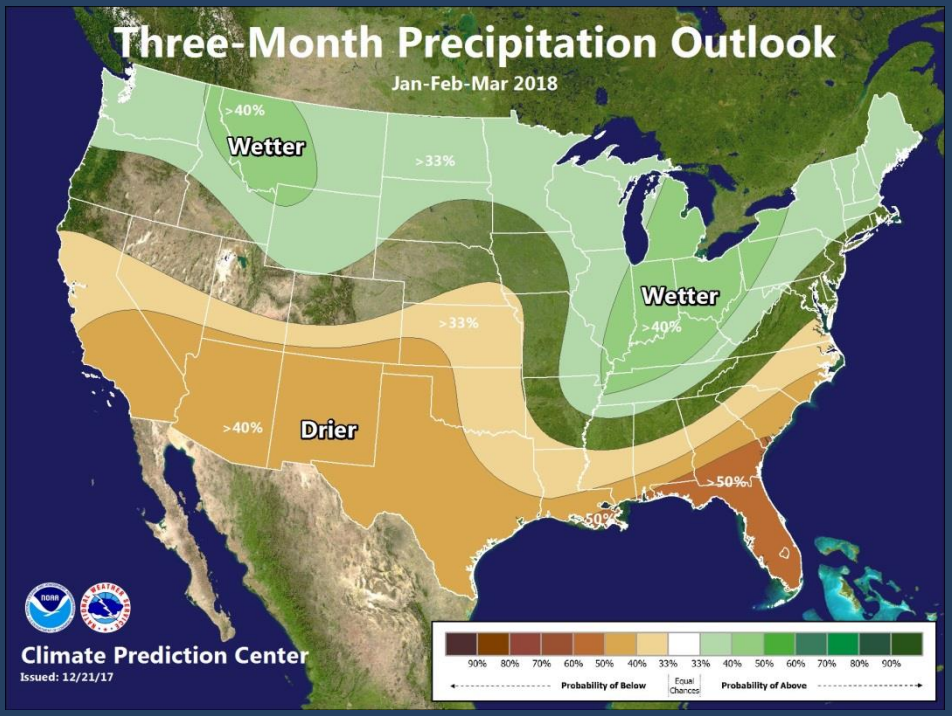


Image sources: water.weather.gov/precip/index.php

Outlook for January-February-March



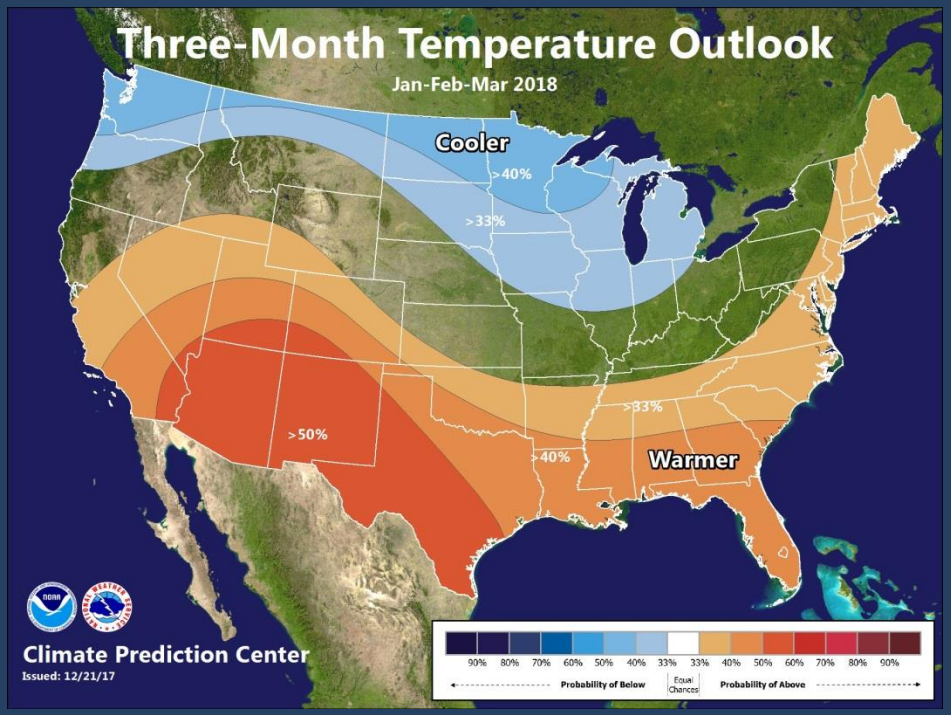
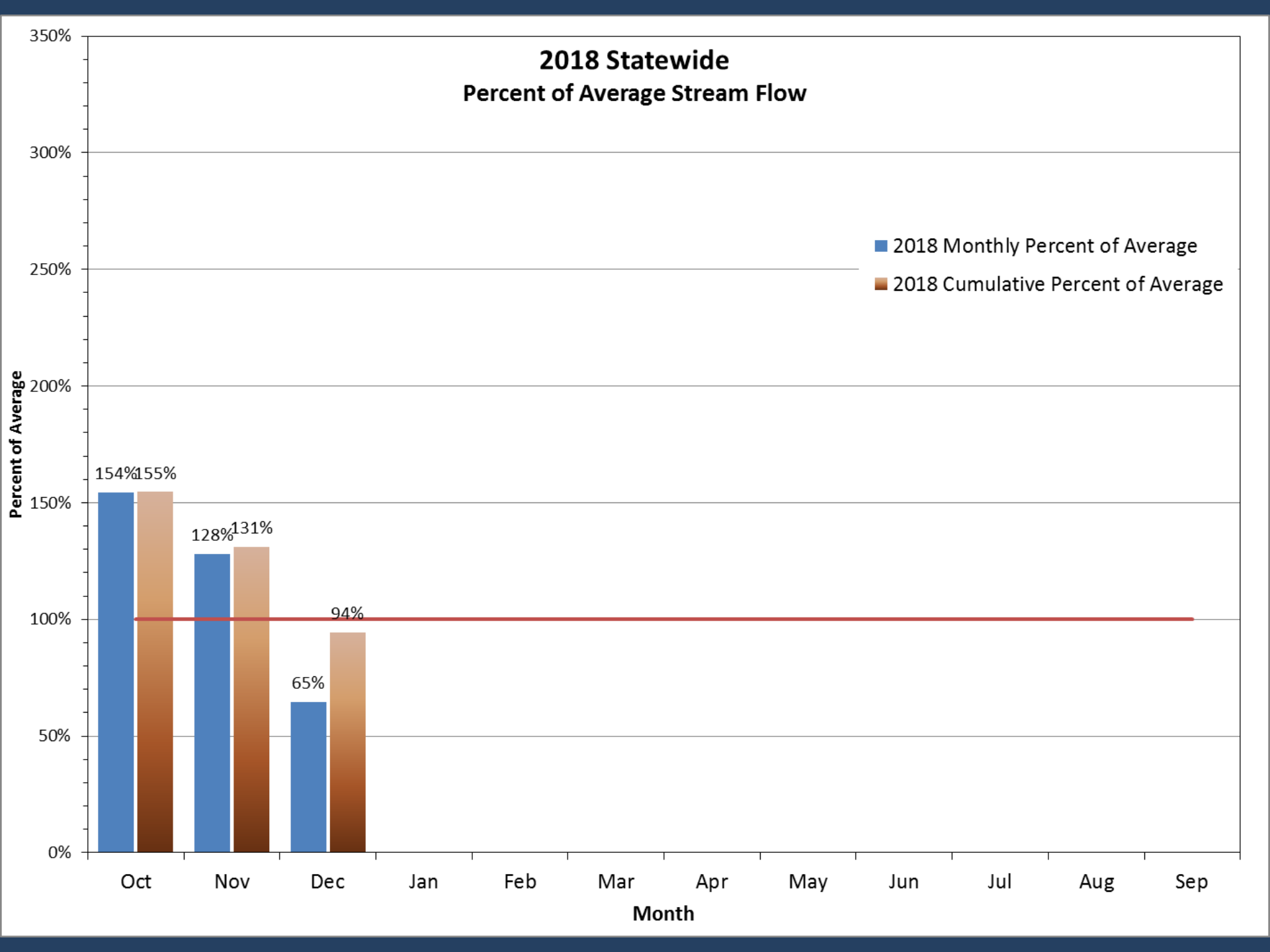
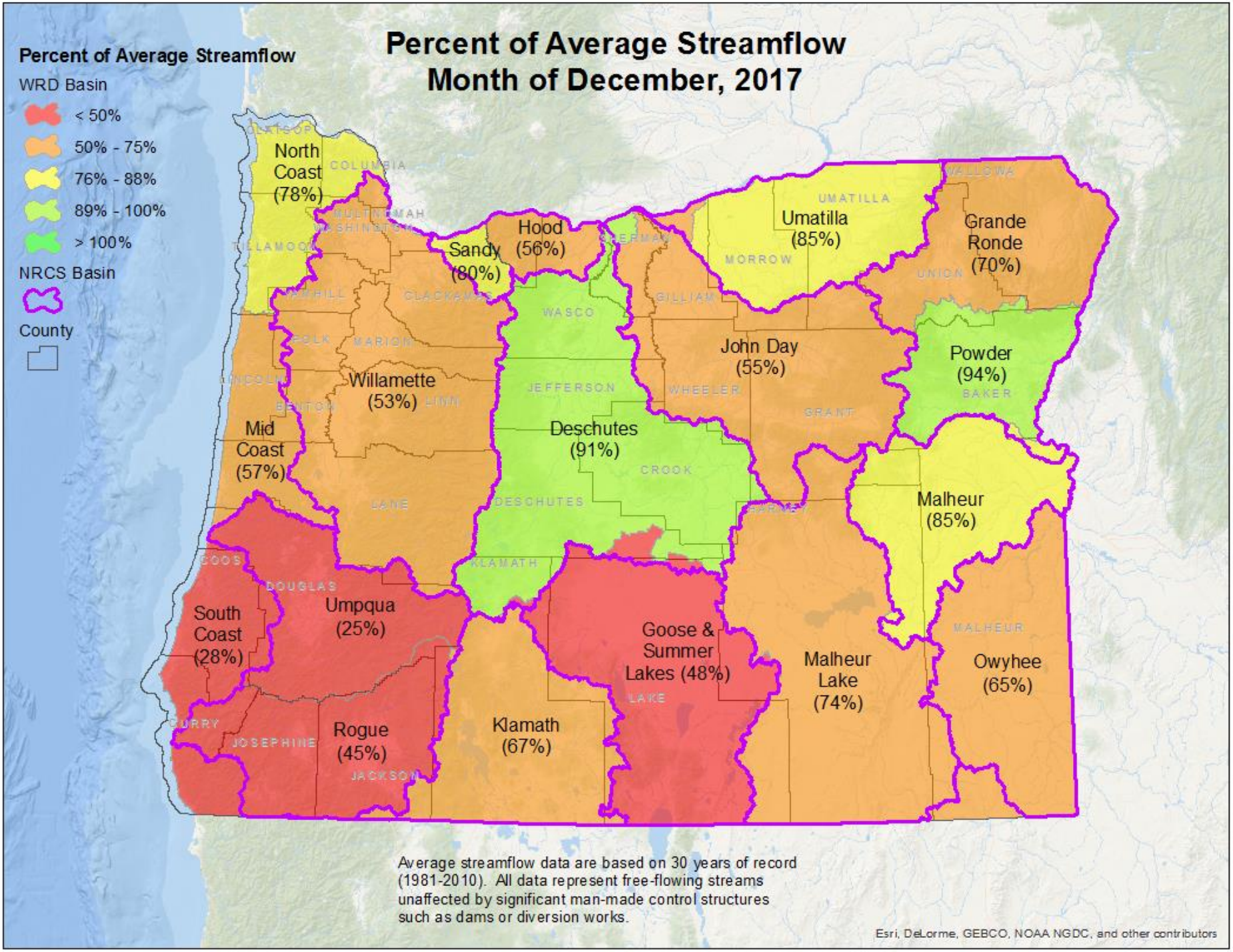


Image source: www.cpc.ncep.noaa.gov

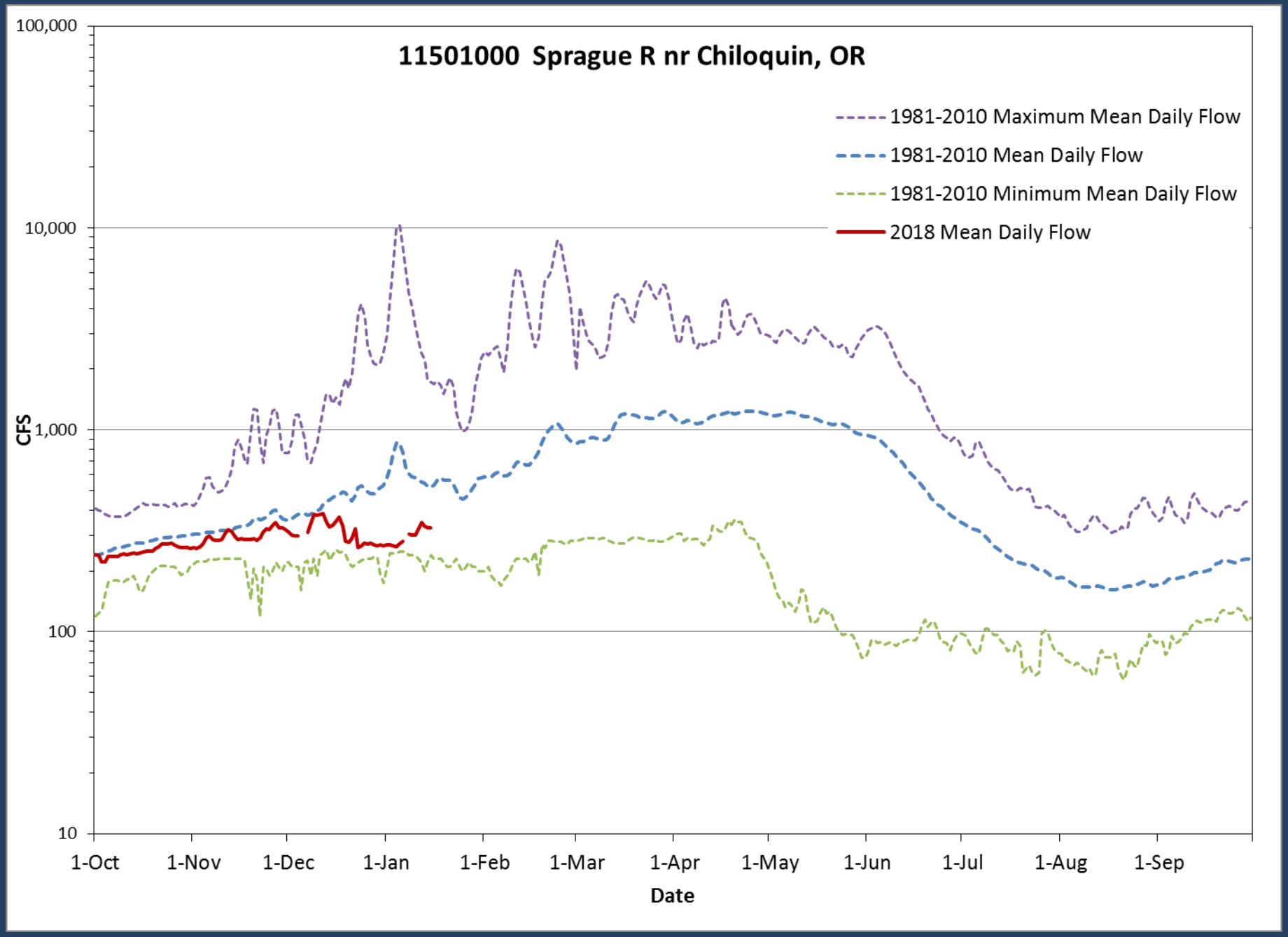

2018 Statewide
Percent of Average Stream Flow
2018 Monthly Percent of Average
2018 Cumulative Percent of Average
Percent of Average
350%
300%
250%
200%
150%
100%
50%
0%
154%
155%
128%
131%
65%
94%
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Month

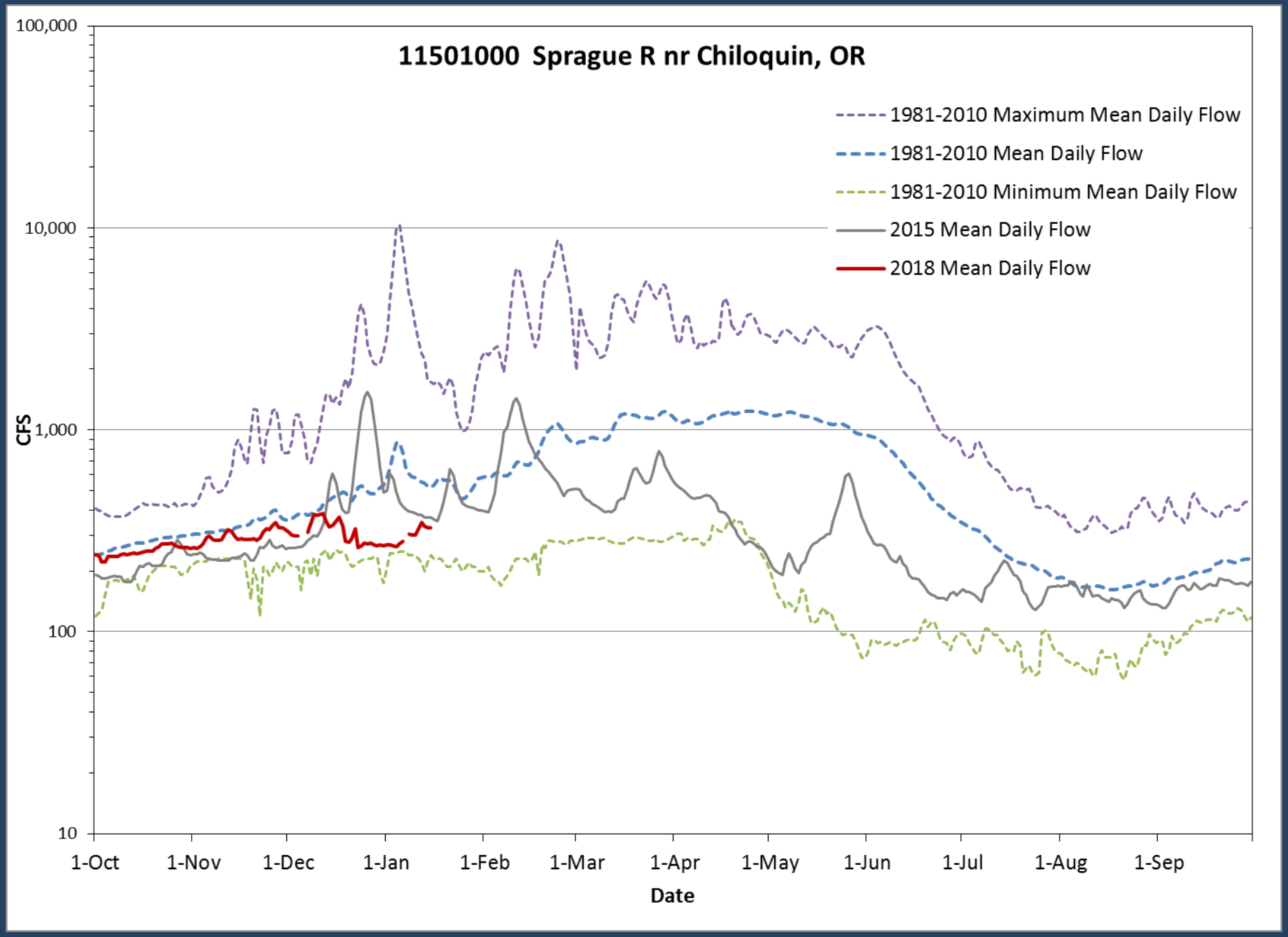
Percent of Average Streamflow
Month of December, 2017

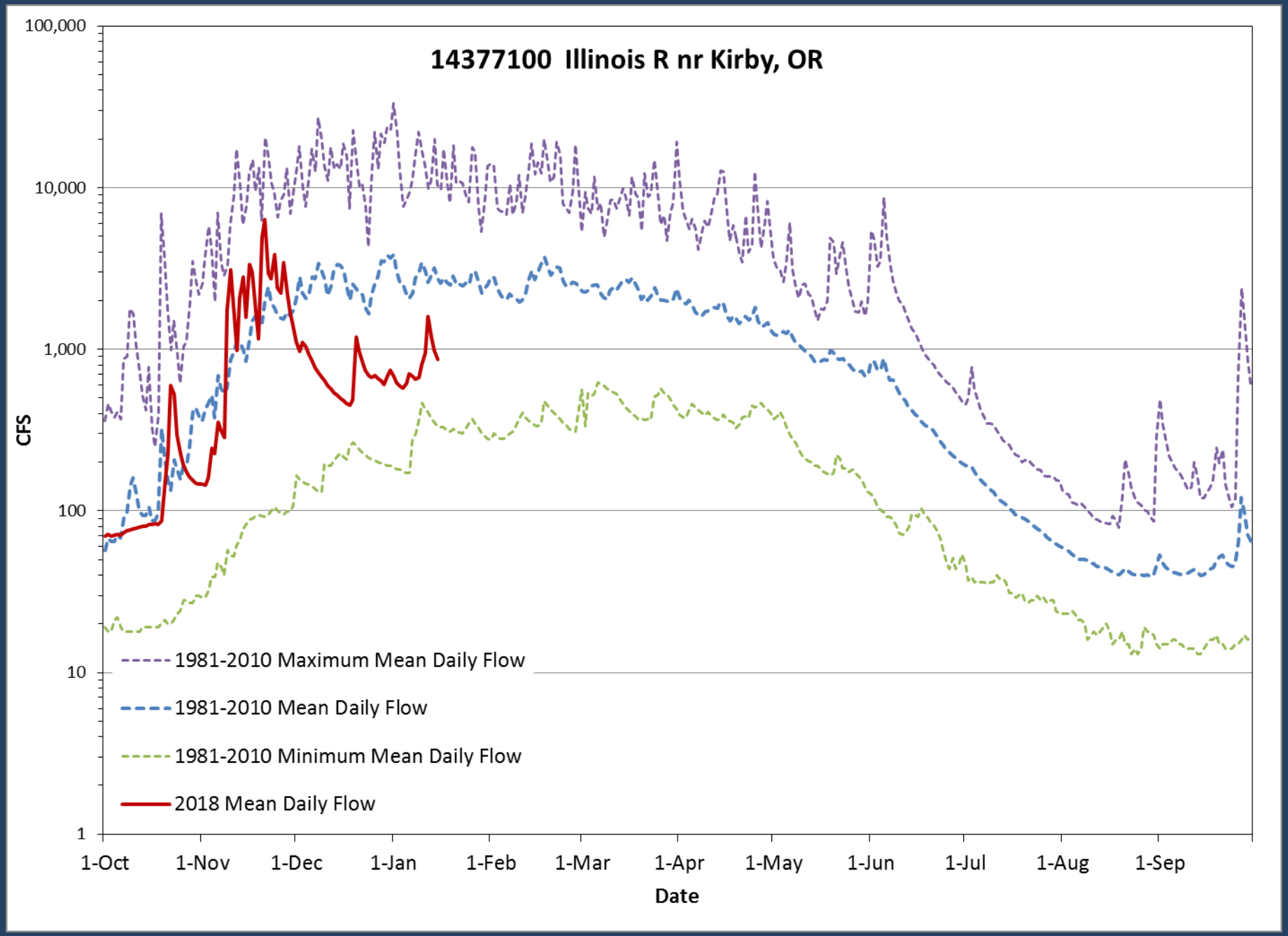


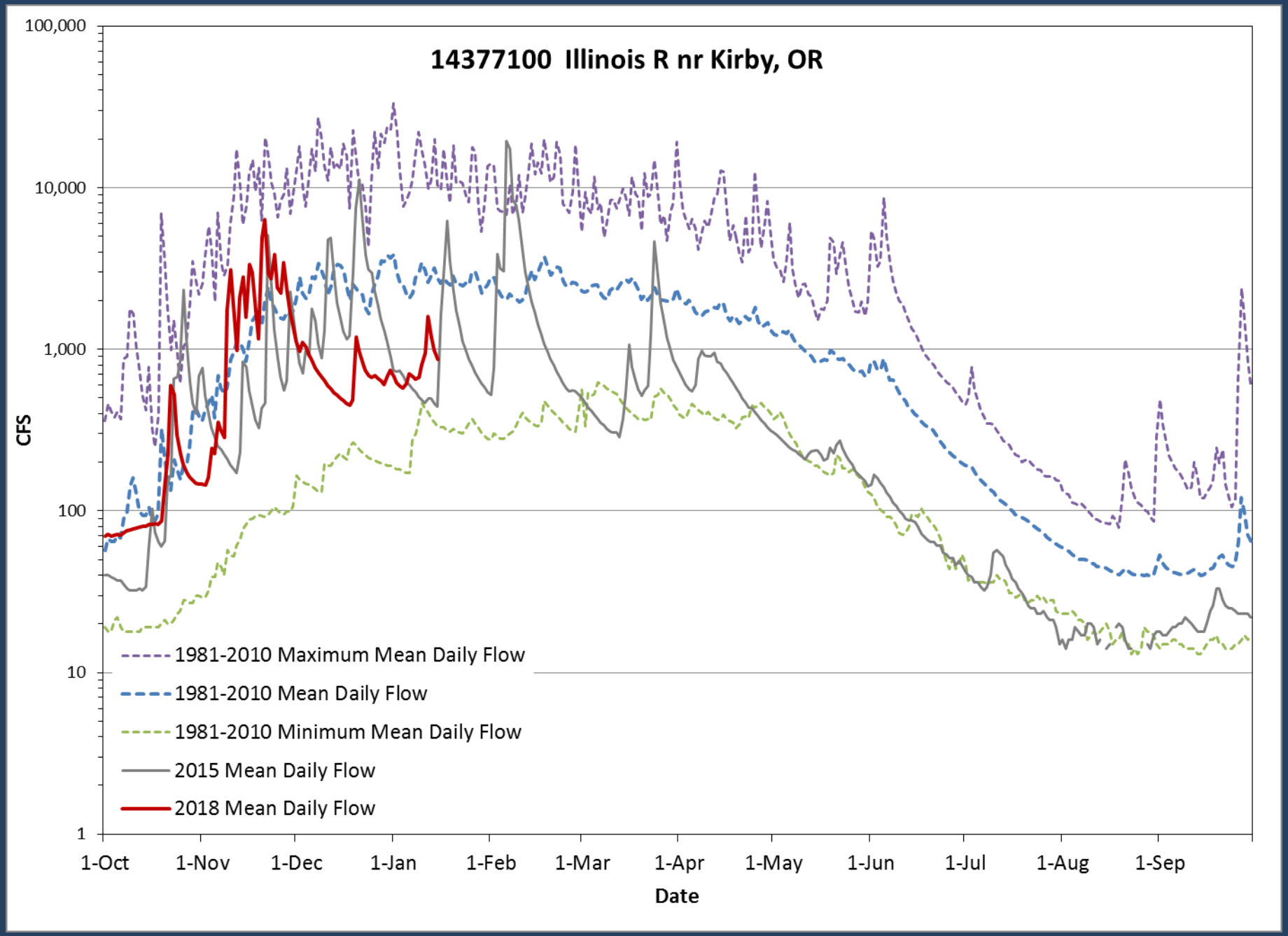
Average streamflow data are based on 30 years of record (1981-2010). All data represent free-flowing streams unaffected by significant man-made control structures such as dams or diversion works.

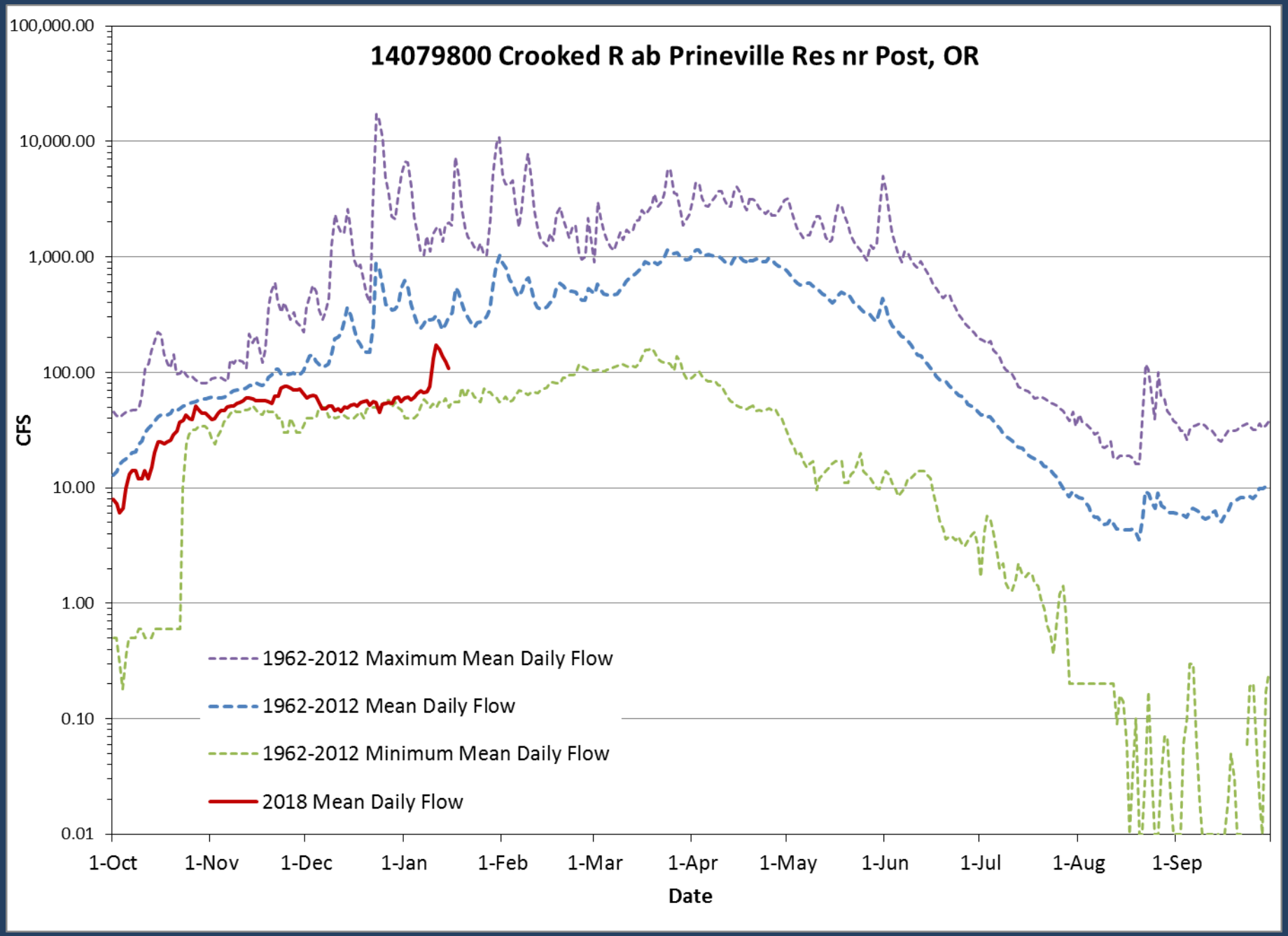
Basin	Water Year % of average through December, 2017	% of average for December	% of average for 01/05/2018
North Coast	123%	78%	61%
Willamette	99%	53%	48%
Sandy	119%	80%	63%
Hood	108%	64%	67%
Deschutes	107%	88%	82%
John Day	81%	56%	46%
Umatilla	94%	85%	74%
Grande Ronde	114%	86%	102%
Powder	104%	94%	66%
Malheur	102%	84%	85%
Owyhee	90%	65%	35%
Malheur Lake	86%	74%	61%
Goose & Summer Lakes	83%	44%	70%
Klamath	81%	67%	47%
Rogue	80%	45%	46%
Umpqua	68%	25%	27%
South Coast	74%	28%	39%
Mid Coast	91%	57%	31%
West Side	**93%**	**52%**	**45%**
East Side	**96%**	**73%**	**67%**
State	**95%**	**65%**	**58%**

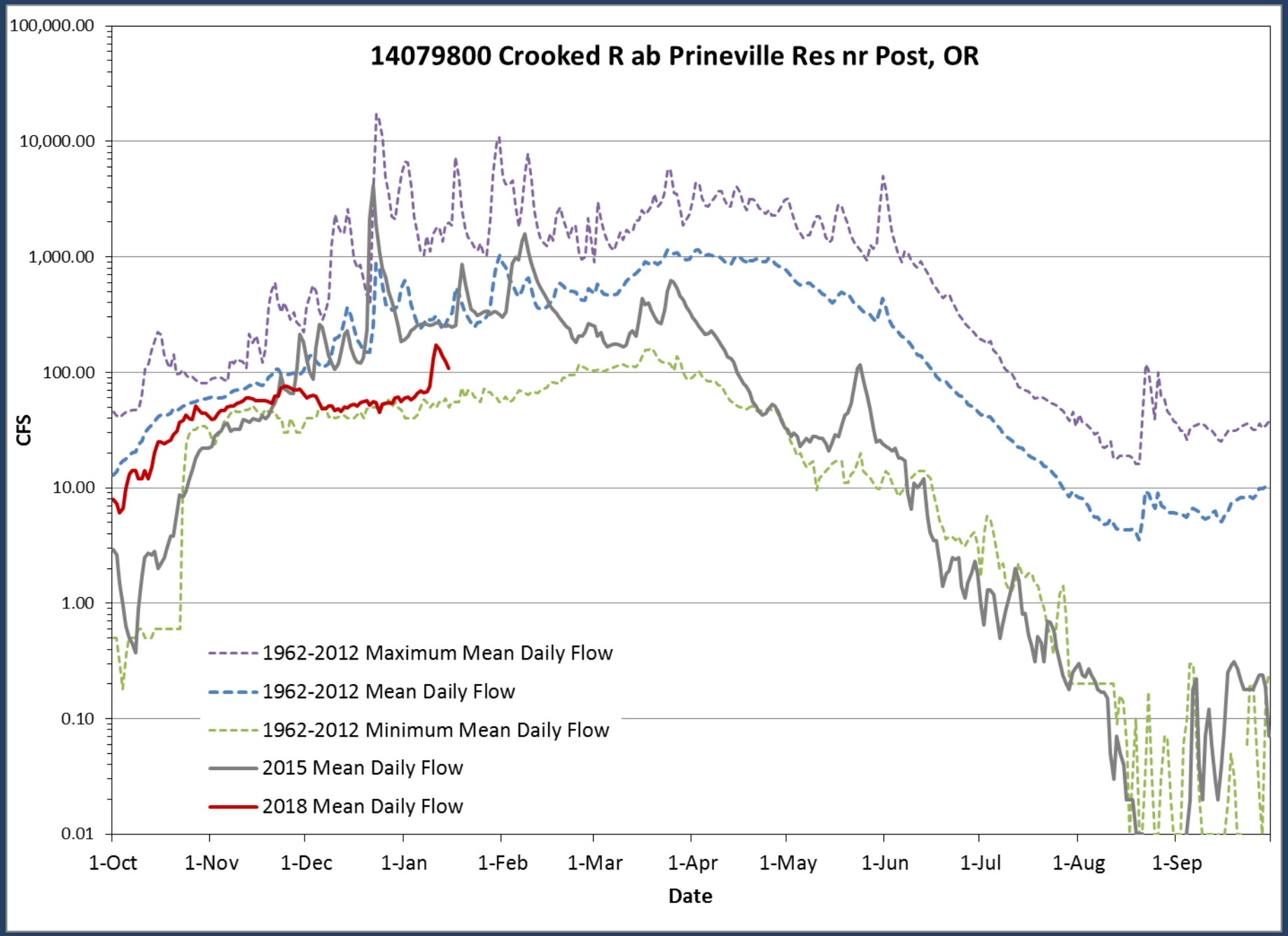

11501000 Sprague R nr Chiloquin, OR
1981-2010 Maximum Mean Daily Flow
1981-2010 Mean Daily Flow
1981-2010 Minimum Mean Daily Flow
2018 Mean Daily Flow
100,000
10,000
1,000
100
10
CFS
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
Date

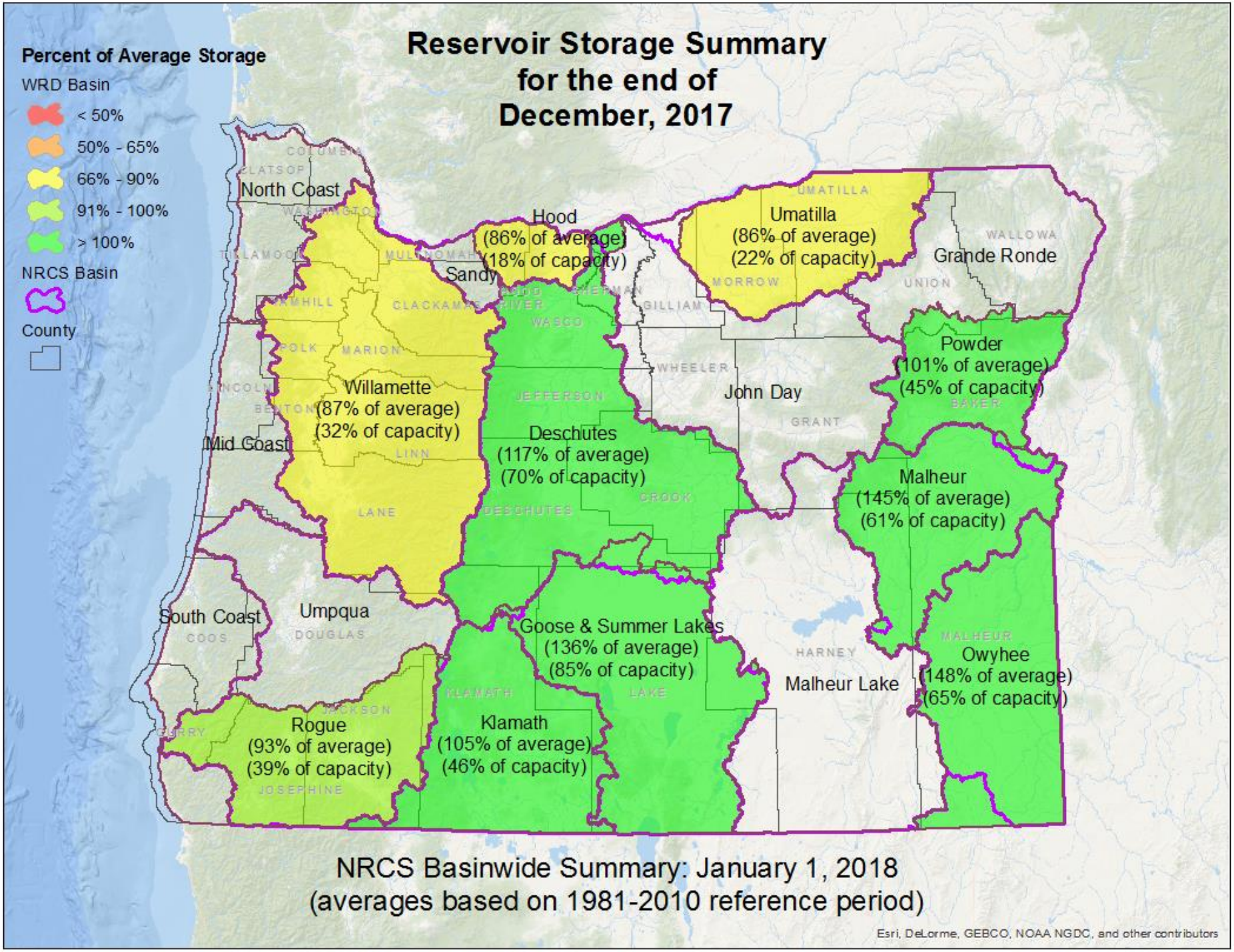

11501000 Sprague R nr Chiloquin, OR
1981-2010 Maximum Mean Daily Flow
1981-2010 Mean Daily Flow
1981-2010 Minimum Mean Daily Flow
2015 Mean Daily Flow
2018 Mean Daily Flow
100,000
10,000
1,000
100
10
CFS
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
Date


14377100 Illinois R nr Kirby, OR
100,000
10,000
1,000
100
10
1
CFS
1981-2010 Maximum Mean Daily Flow
1981-2010 Mean Daily Flow
1981-2010 Minimum Mean Daily Flow
2018 Mean Daily Flow
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


14377100 Illinois R nr Kirby, OR
100,000
10,000
1,000
100
10
1
CFS
1981-2010 Maximum Mean Daily Flow
1981-2010 Mean Daily Flow
1981-2010 Minimum Mean Daily Flow
2015 Mean Daily Flow
2018 Mean Daily Flow
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


14079800 Crooked R ab Prineville Res nr Post, OR
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
0.01
CFS
1962-2012 Maximum Mean Daily Flow
1962-2012 Mean Daily Flow
1962-2012 Minimum Mean Daily Flow
2018 Mean Daily Flow
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

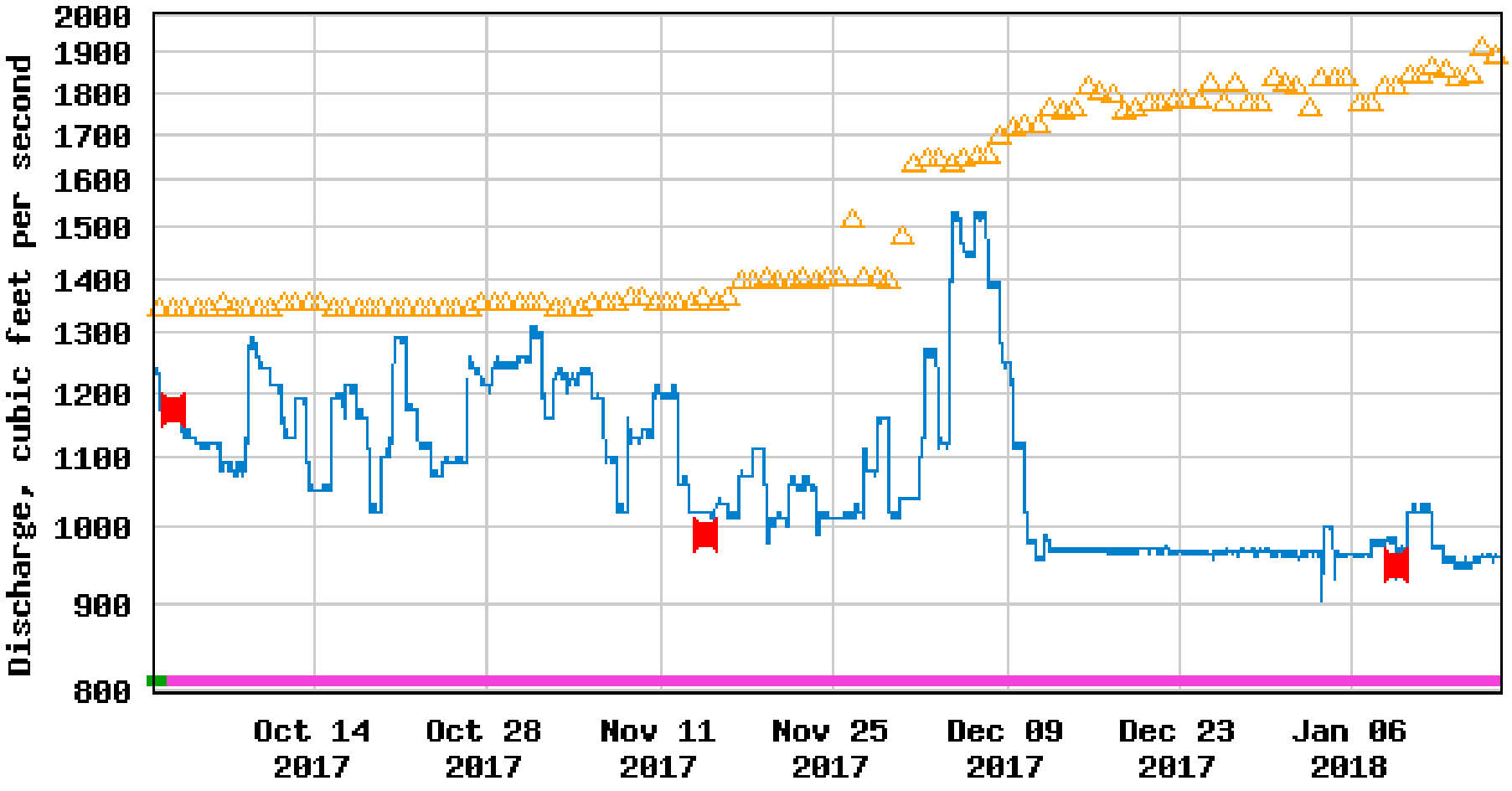

14079800 Crooked R ab Prineville Res nr Post, OR
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
0.01
CFS
1962-2012 Maximum Mean Daily Flow
1962-2012 Mean Daily Flow
1962-2012 Minimum Mean Daily Flow
2015 Mean Daily Flow
2018 Mean Daily Flow
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
Date


Reservoir Storage Summary
for the end of
December, 2017
Percent of Average Storage
WRD Basin
< 50%
50% - 65%
66% - 90%
91% - 100%
> 100%
NRCS Basin
County
North Coast
Hood
(86% of average)
(18% of capacity)
Sandy
Umatilla
(86% of average)
(22% of capacity)
Grande Ronde
Powder
(101% of average)
(45% of capacity)
John Day
Willamette
(87% of average)
(32% of capacity)
Mid Coast
Deschutes
(117% of average)
(70% of capacity)
Malheur
(145% of average)
(61% of capacity)
South Coast
Umpqua
Goose & Summer Lakes
(136% of average)
(85% of capacity)
Malheur Lake
Owyhee
(148% of average)
(65% of capacity)
Rogue
(93% of average)
(39% of capacity)
Klamath
(105% of average)
(46% of capacity)
NRCS Basinwide Summary: January 1, 2018
(averages based on 1981-2010 reference period)
Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

Created: Thu Jan 4 10:40:40 2018

USGS

USGS 11516530 KLAMATH R BL IRON GATE DAM CA



Thank You

METEOROLOGICAL TERMINOLOGY

Climate: ENSO, MJO, the ‘Blob’ and North Pacific SSTs

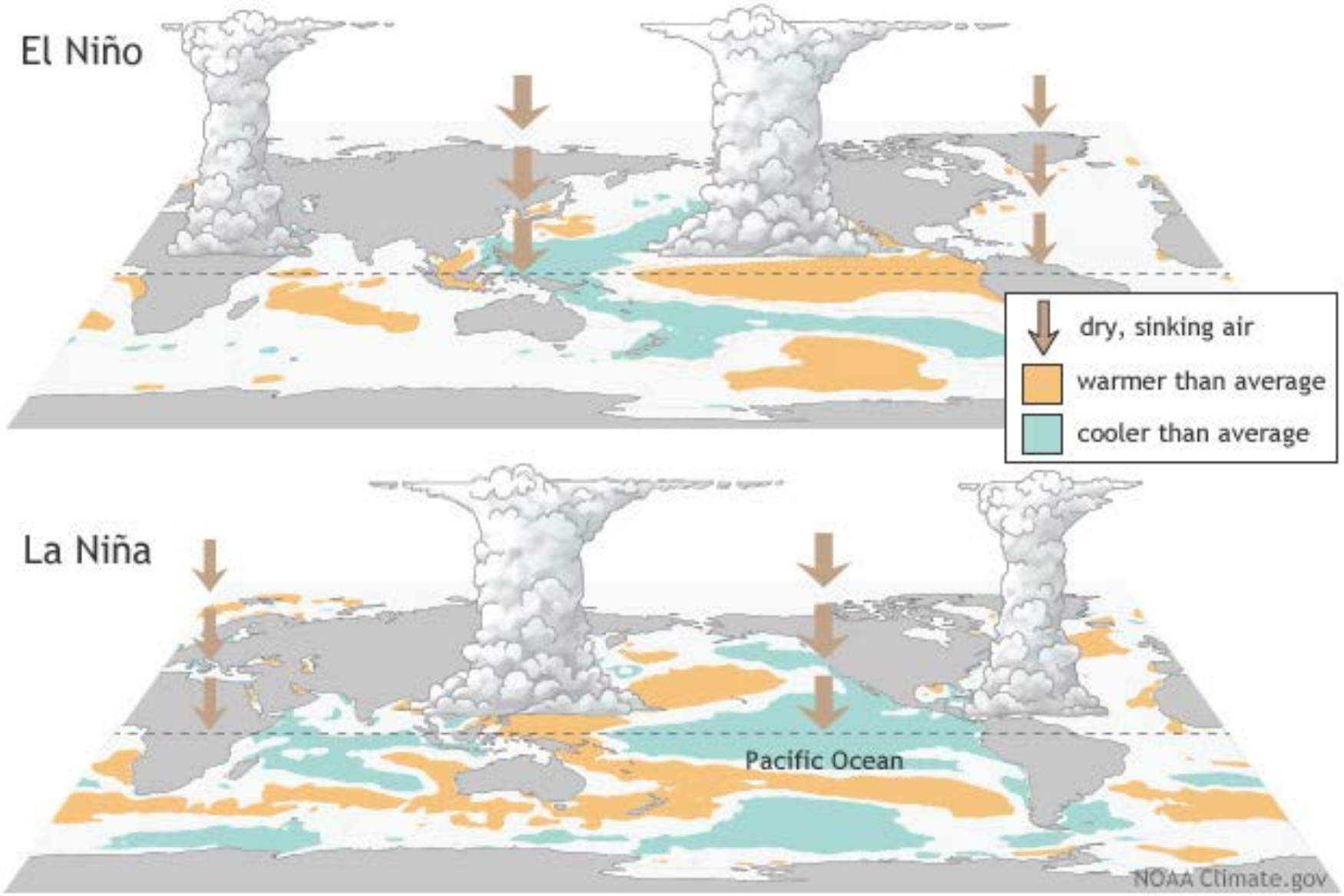
Weather: Bombogenesis, Atmospheric Rivers

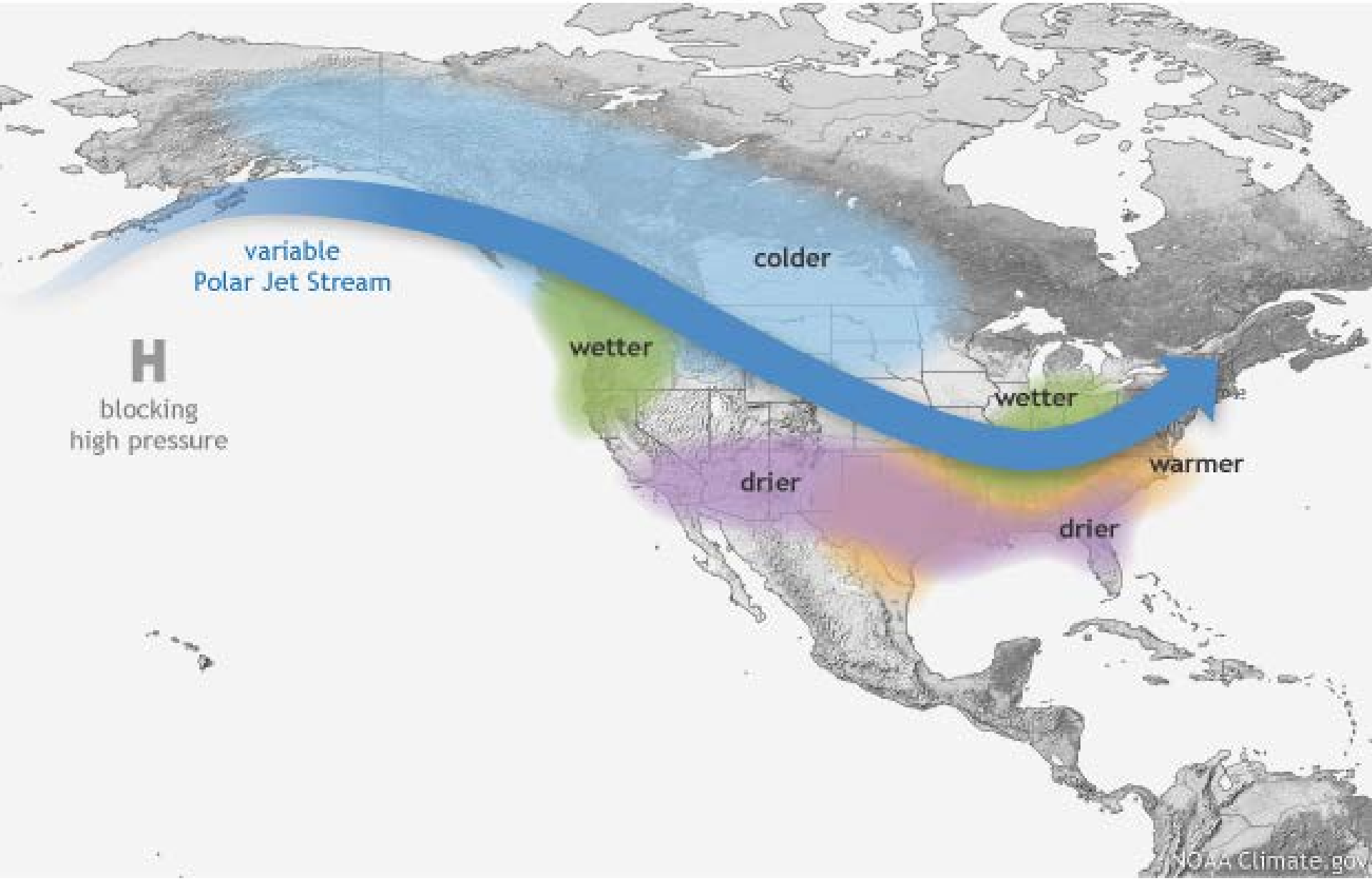
Hydrology: Seasonal Runoff Volume

Kathie Dello, Oregon Climate Change Research Institute

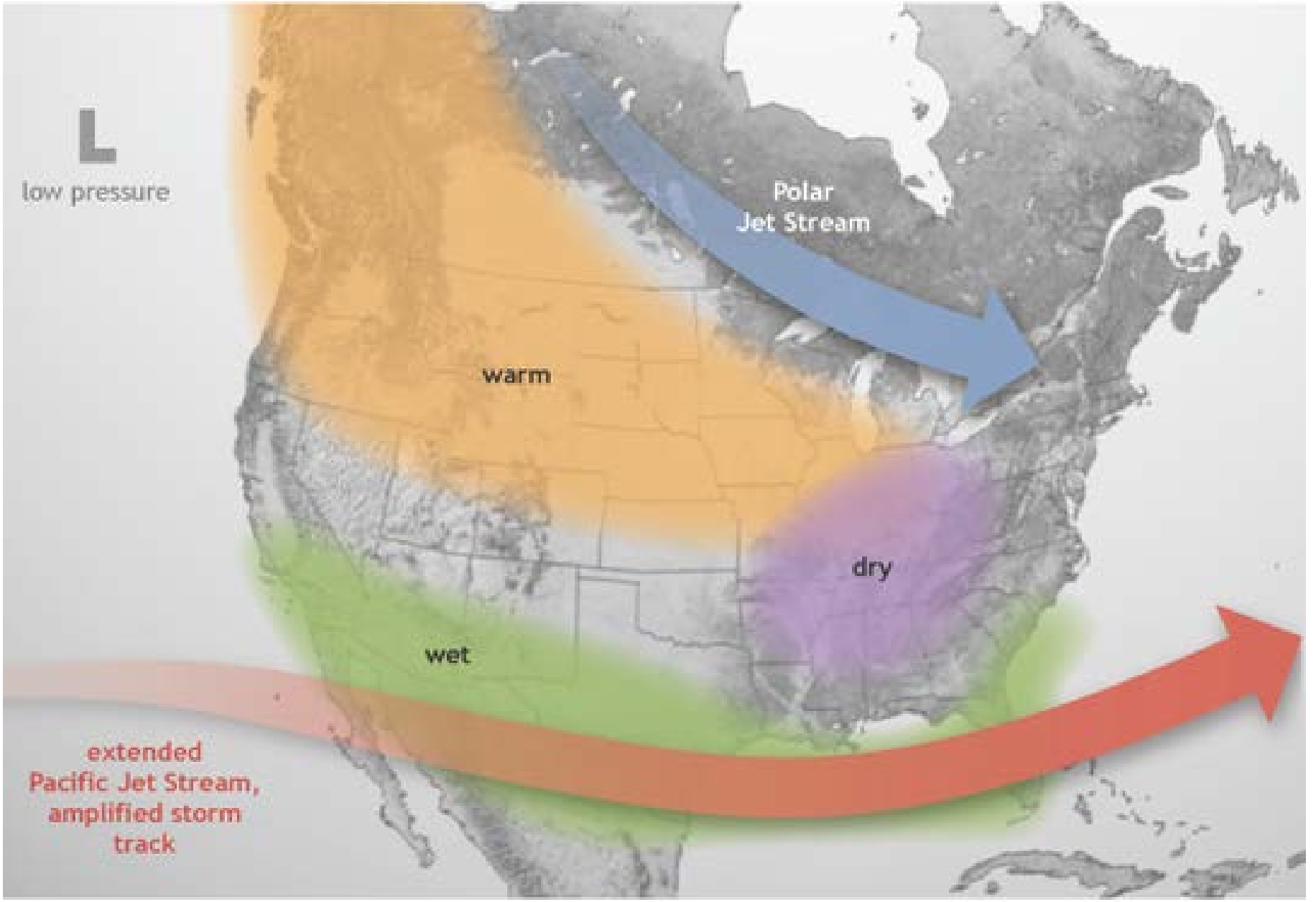
Andy Bryant, hydrologist & Clinton Rockey, meteorologist
NOAA National Weather Service – Portland, Oregon

El Niño & La Niña
El Niño – Southern Oscillation (ENSO)



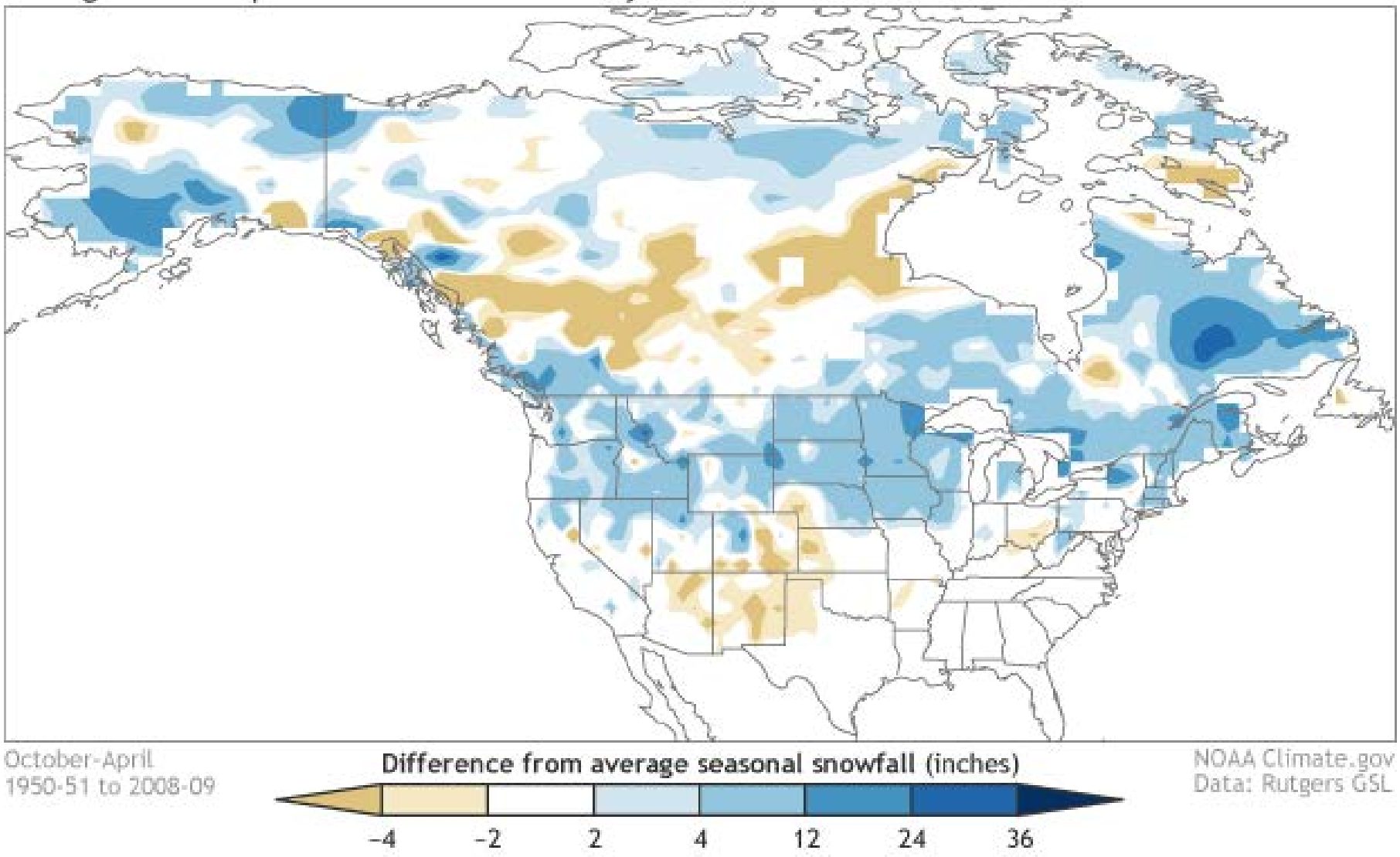

Wintertime La Niña pattern
variable
Polar Jet Stream
colder
wetter
wetter
H
blocking
high pressure
warmer
drier
drier
NOAA Climate.gov

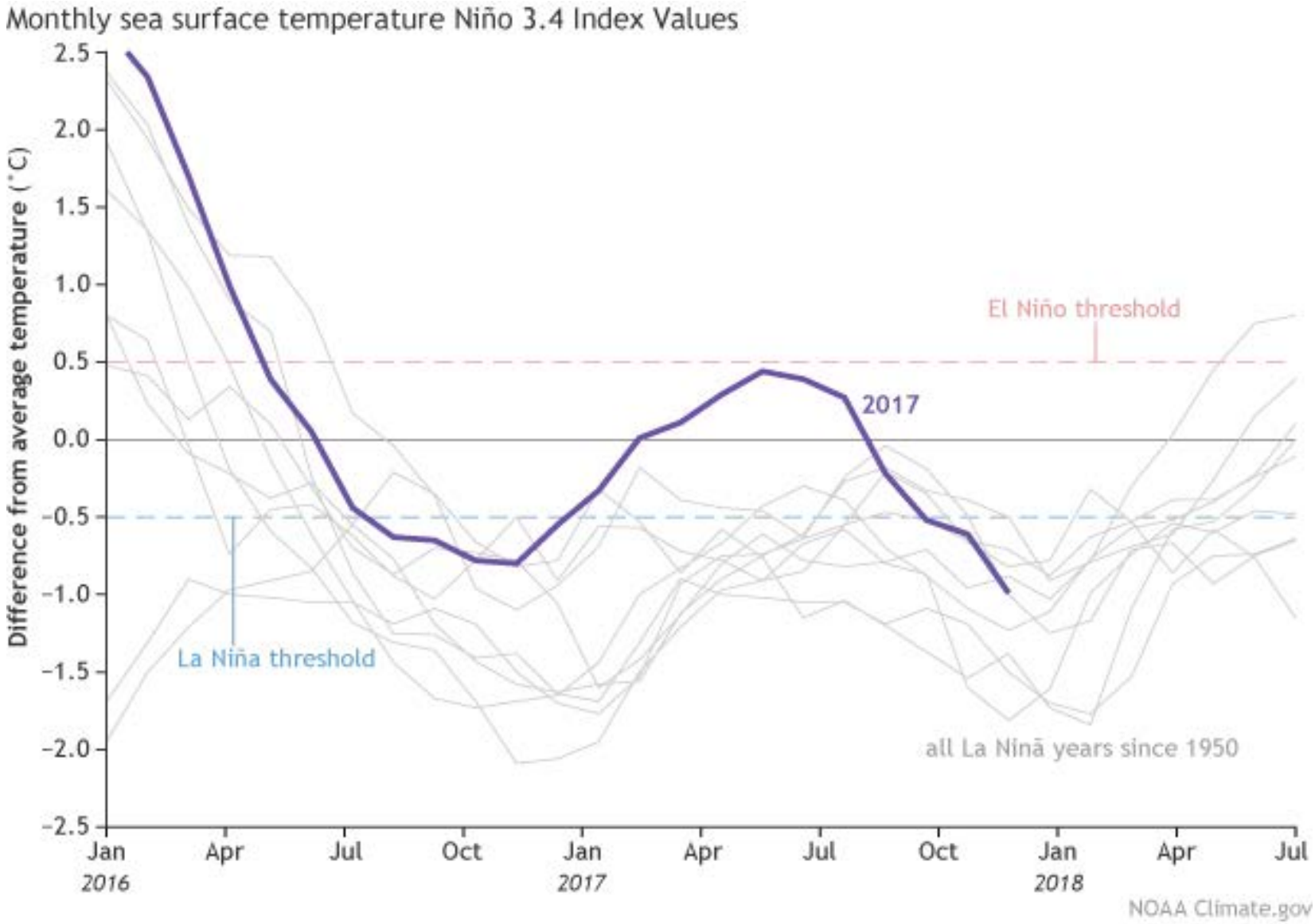
Wintertime El Niño pattern



NOAA Climate.gov

Average snowfall patterns for weak La Niña years



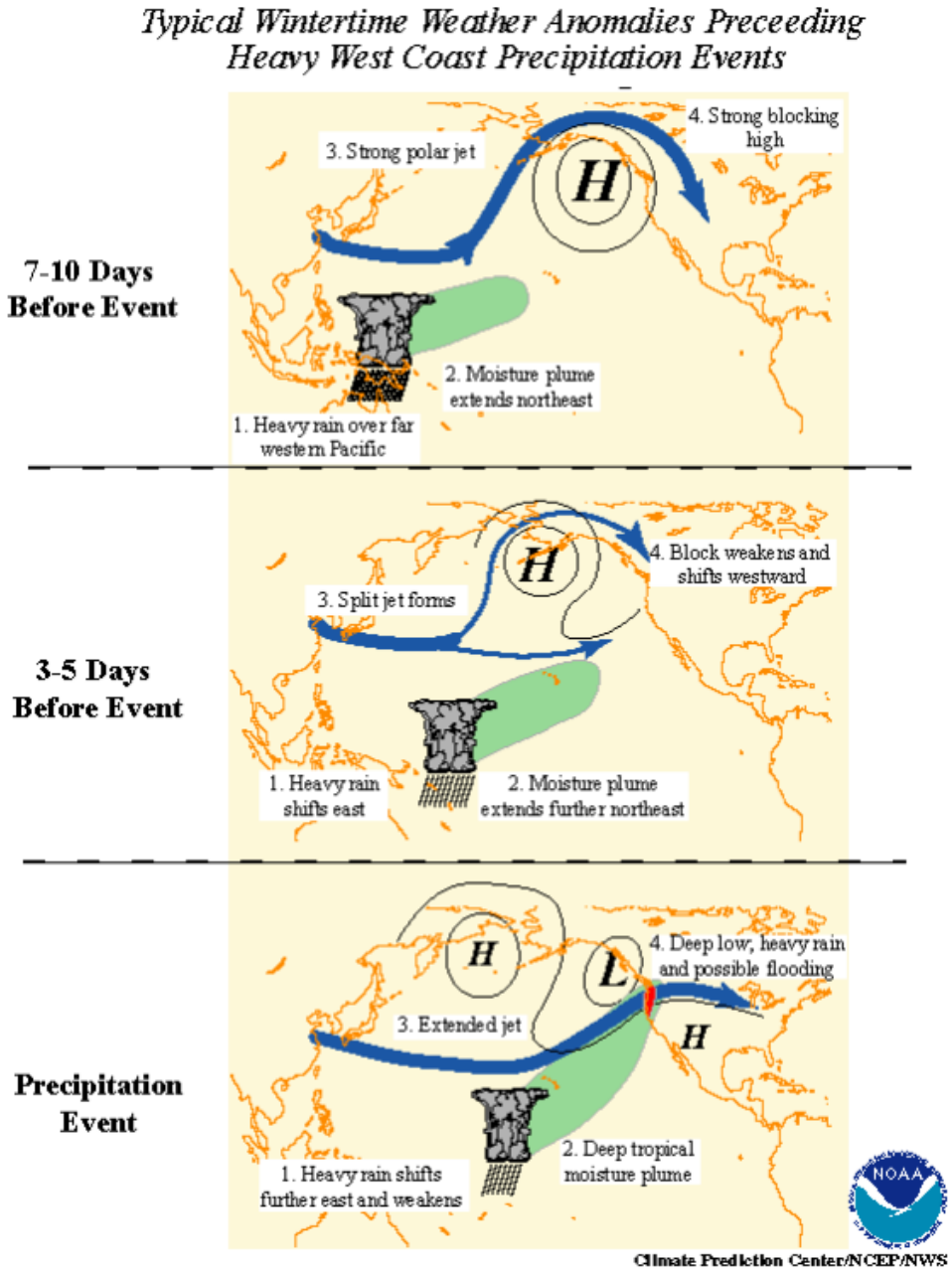


7 La Niñas have been of the double-dip variety, including this one.
This is the first time ocean conditions were warm before cooling again.

El Niño & La Niña
El Niño – Southern Oscillation (ENSO)

- El Niño tends to be warmer and drier in the Pacific Northwest.
  - El Niño tends to increase global temperature (2 warmest years on record: 2016, 2015)
- La Niña tends to be cooler and wetter in Pacific Northwest, but stronger signal in WA.

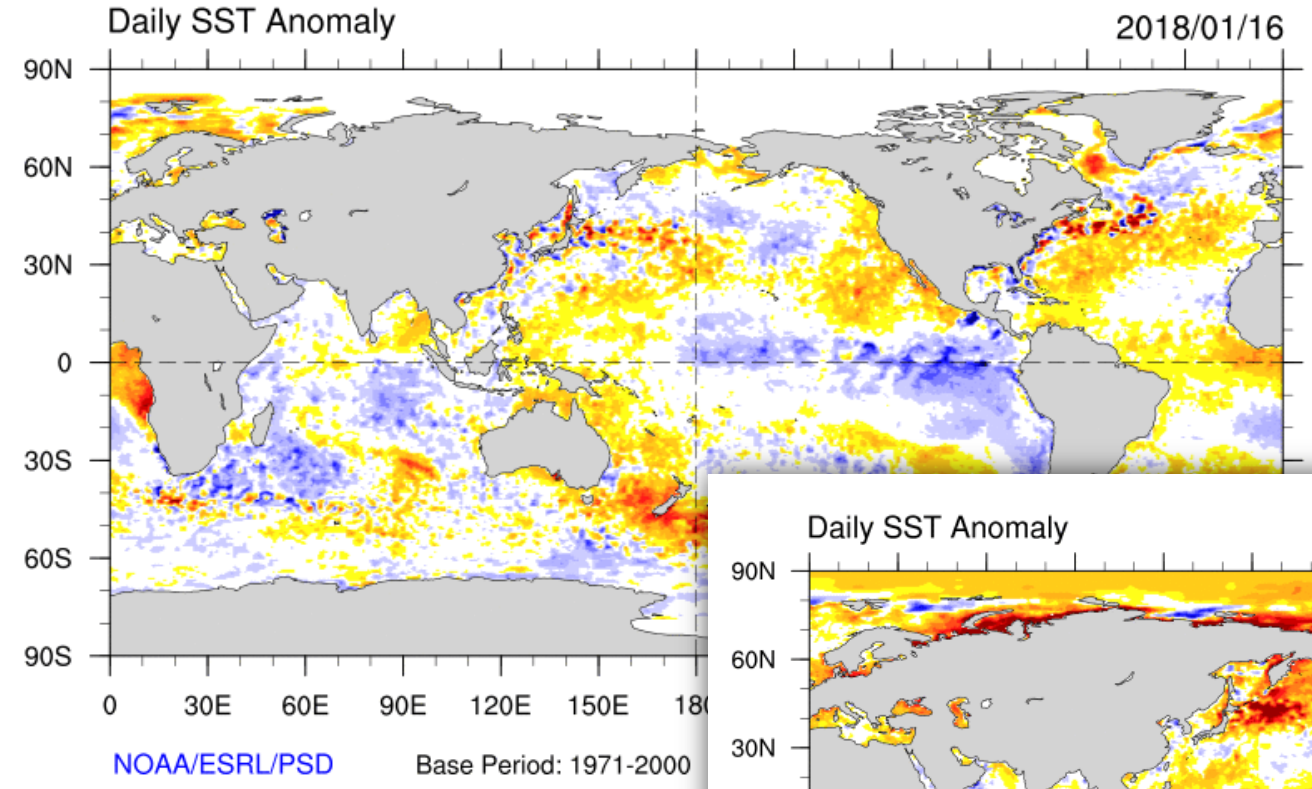
Madden-Julian Oscillation (MJO)

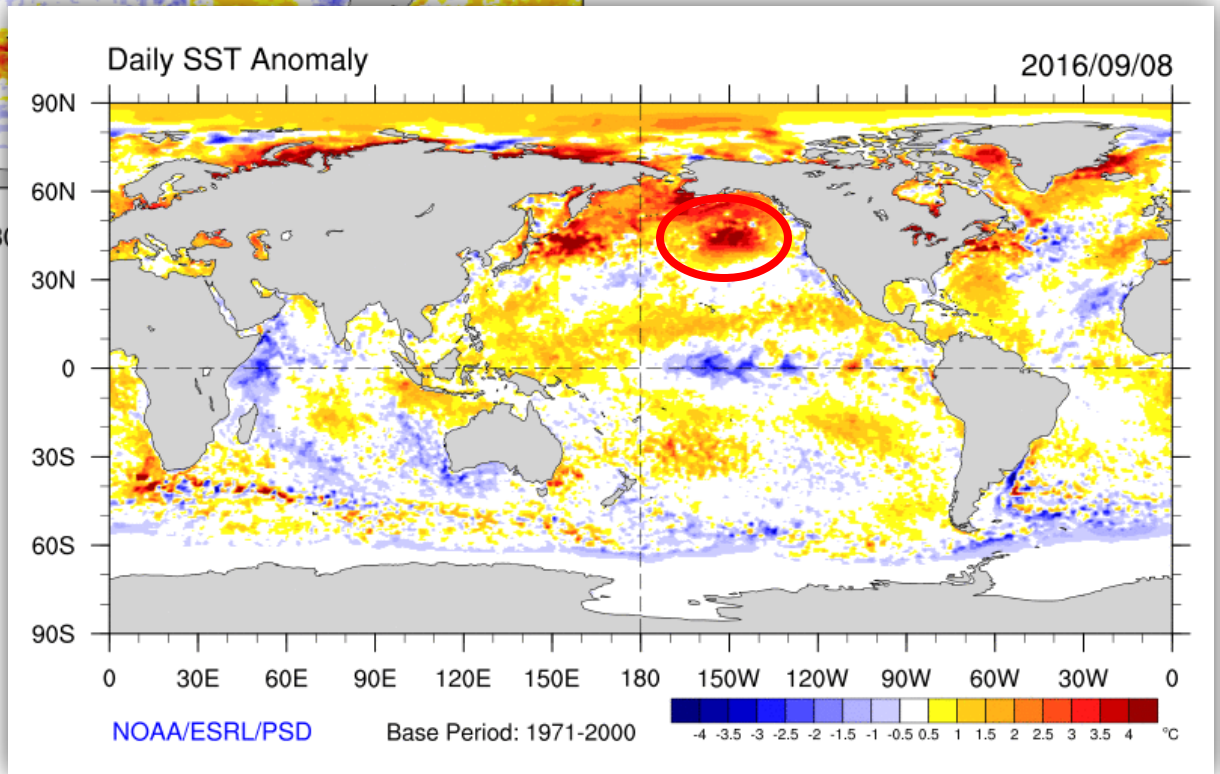


- Upper level wave / disturbance that moves through tropics and enhances convection
- Source of additional atmospheric moisture, which can then feed into atmospheric rivers
- 30 to 60 day cycle
- Tend to be more prevalent late fall through early spring
- More of an impact during ENSO neutral or La Niña patterns

- Additional info: www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml

The Blob & North Pacific Sea-Surface Temperatures





Bombogenesis / Bomb Cyclones

Bombs, or bomb cyclones weren't invented by the media.

An extratropical surface cyclone with a central pressure that falls on the average at least 1 mb/hr for 24 hours.

Sanders, F., and J. R. Gyakum **1980**. Synoptic–dynamic climatology of the "bomb". Mon. Wea. Rev.. 108. 1589–1606.

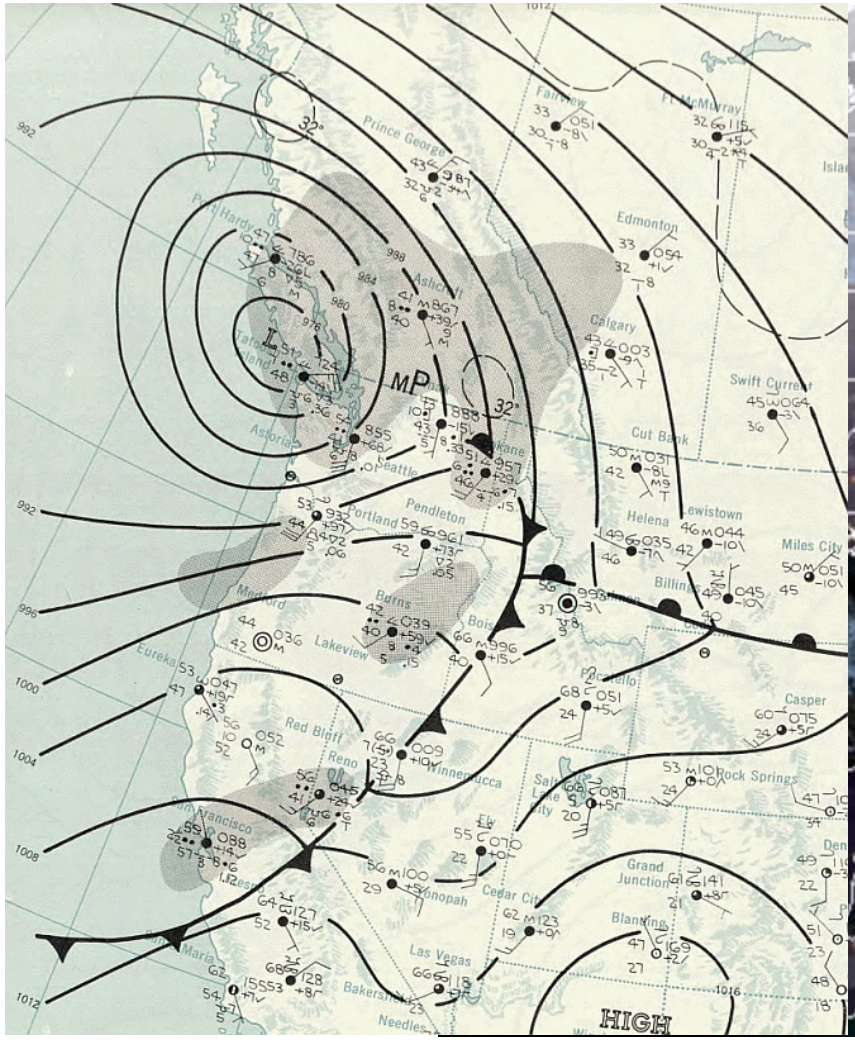
Bombogenesis / Bomb Cyclones

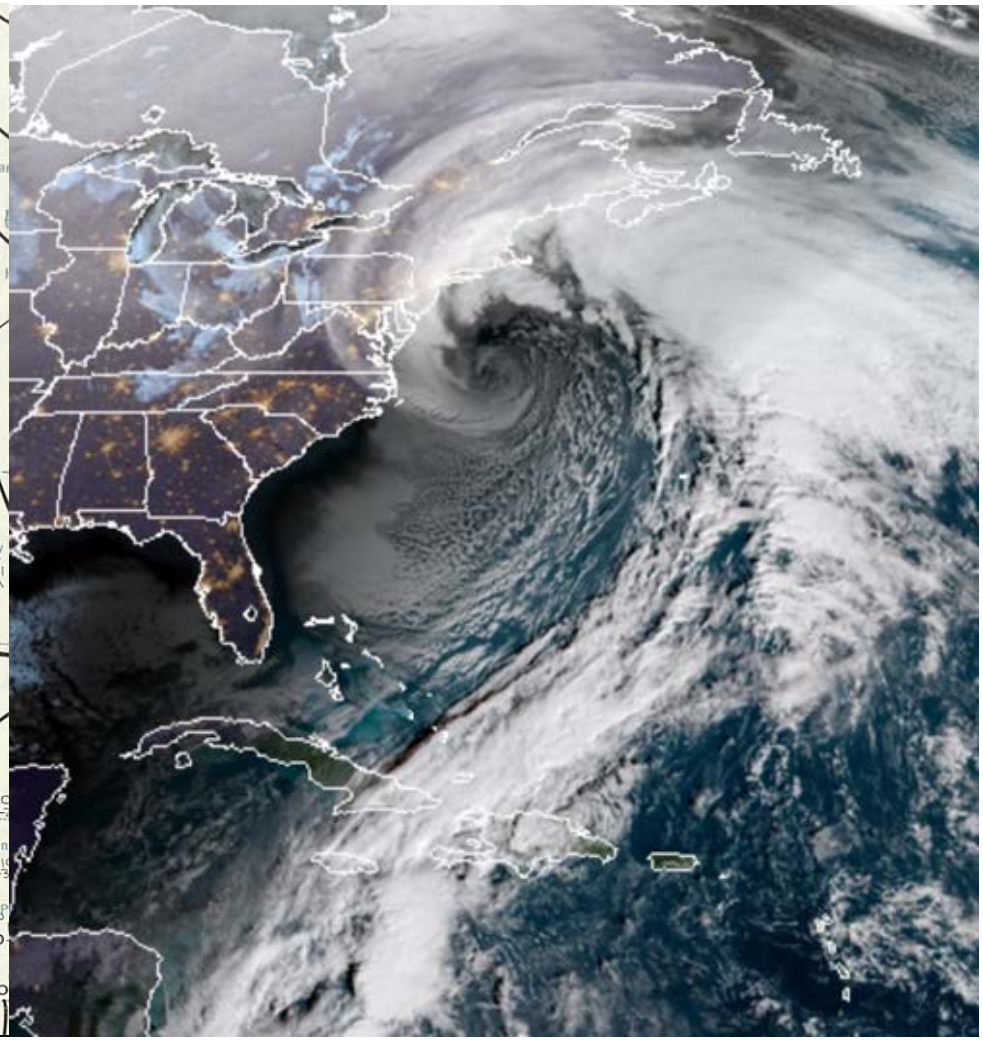
Unpacking the definition:

- **extratropical**: outside the tropics
- **cyclone**: large air mass that rotates around an area of low pressure, winds blow inward. Counter-clockwise in NH, clockwise in SH
- **extratropical cyclone**: cold-centered storm system that derives its energy from the temperature contrast between warm and cold air masses (fronts)
  - tropical cyclone: hurricane, warm-center, no fronts. Energy from evaporation/heat release

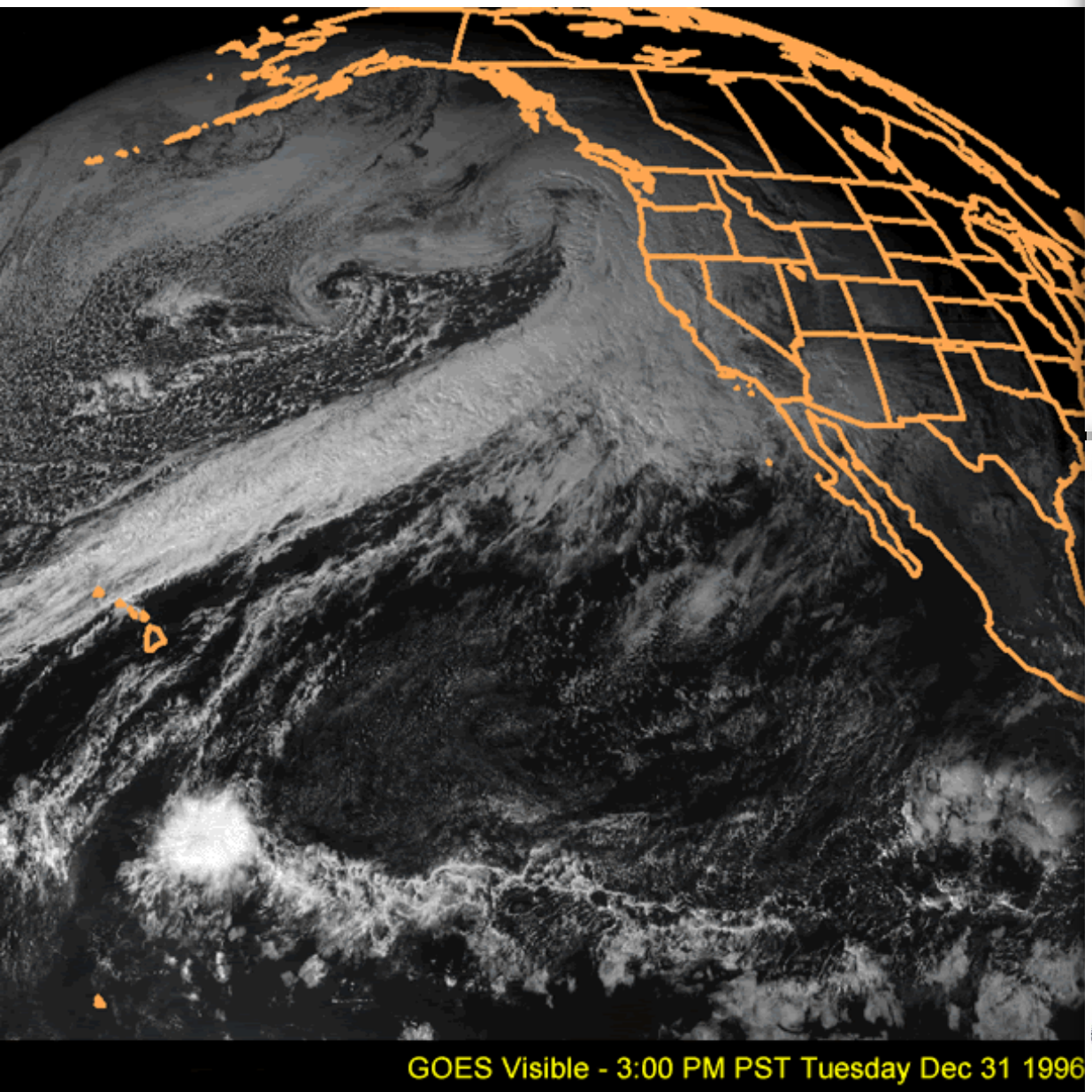
Bombogenesis / Bomb Cyclones

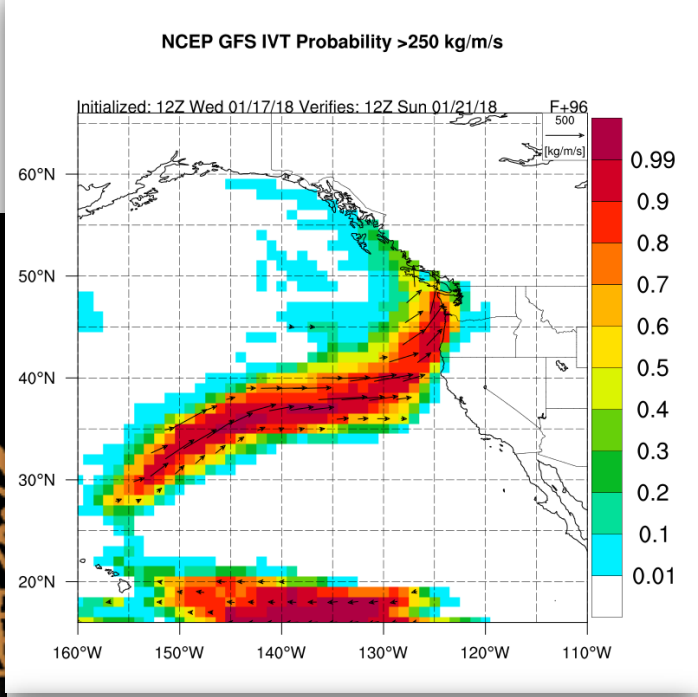
famous bomb cyclones (or storms, or nor'easters)

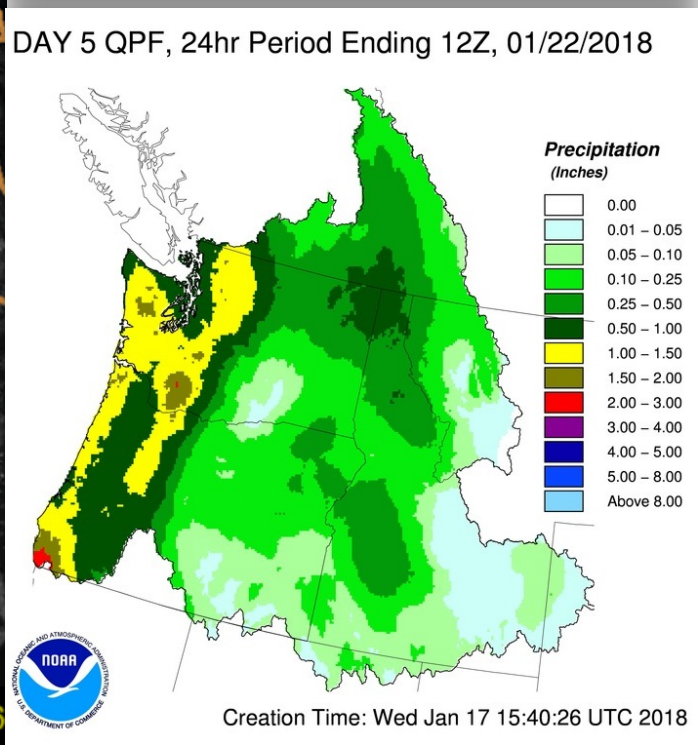




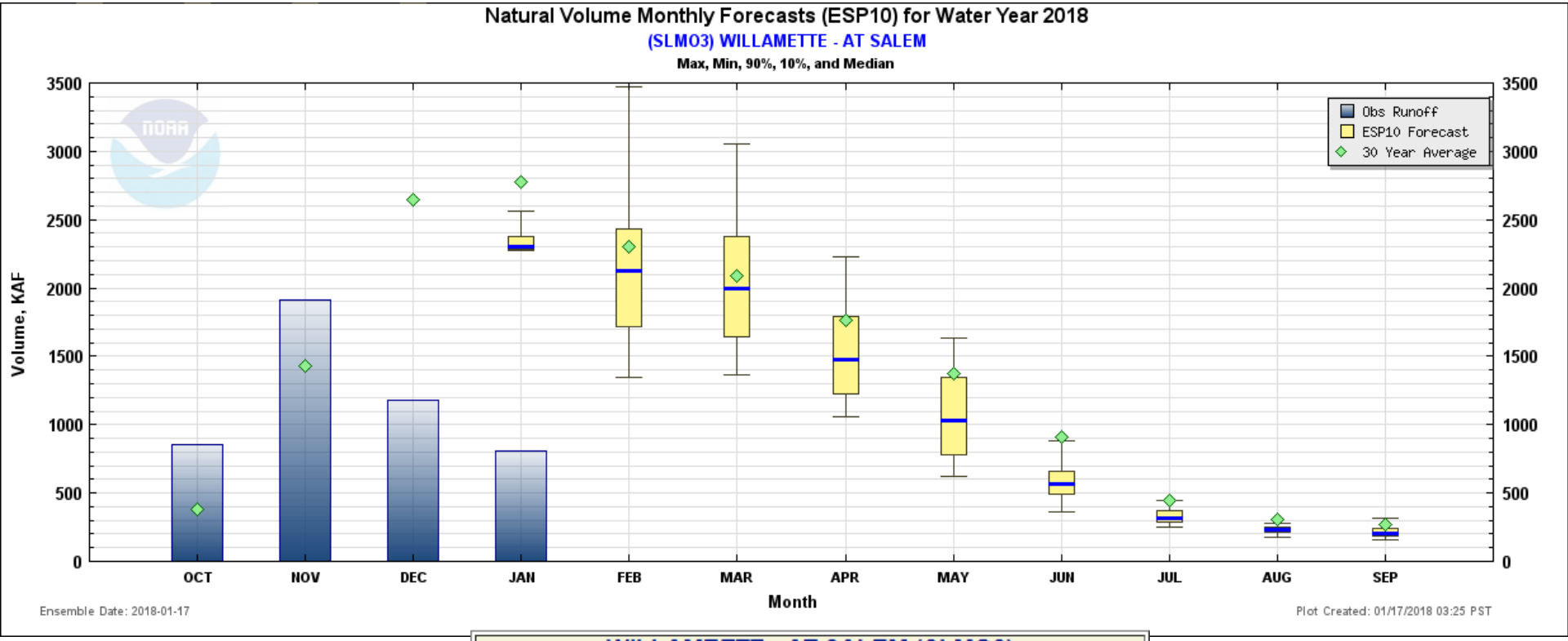
Atmospheric Rivers







Seasonal Runoff Volume



WILLAMETTE - AT SALEM (SLMO3)
Forecasts for Water Year 2018

ESP Natural Forecast

10 days QPF: Ensemble: 2018-01-17 *Issued:* 2018-01-17

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	2801	3879	77	5740	5067
APR-JUL	2390	3412	76	5225	4496
JAN-SEP	8643	10433	85	13649	12226
JAN-JUL	8204	9997	86	13129	11656
OCT-SEP	12597	14387	86	17603	16680