Winter 2018-2019 Climate Forecast

TMT End-of-Year Review Meeting

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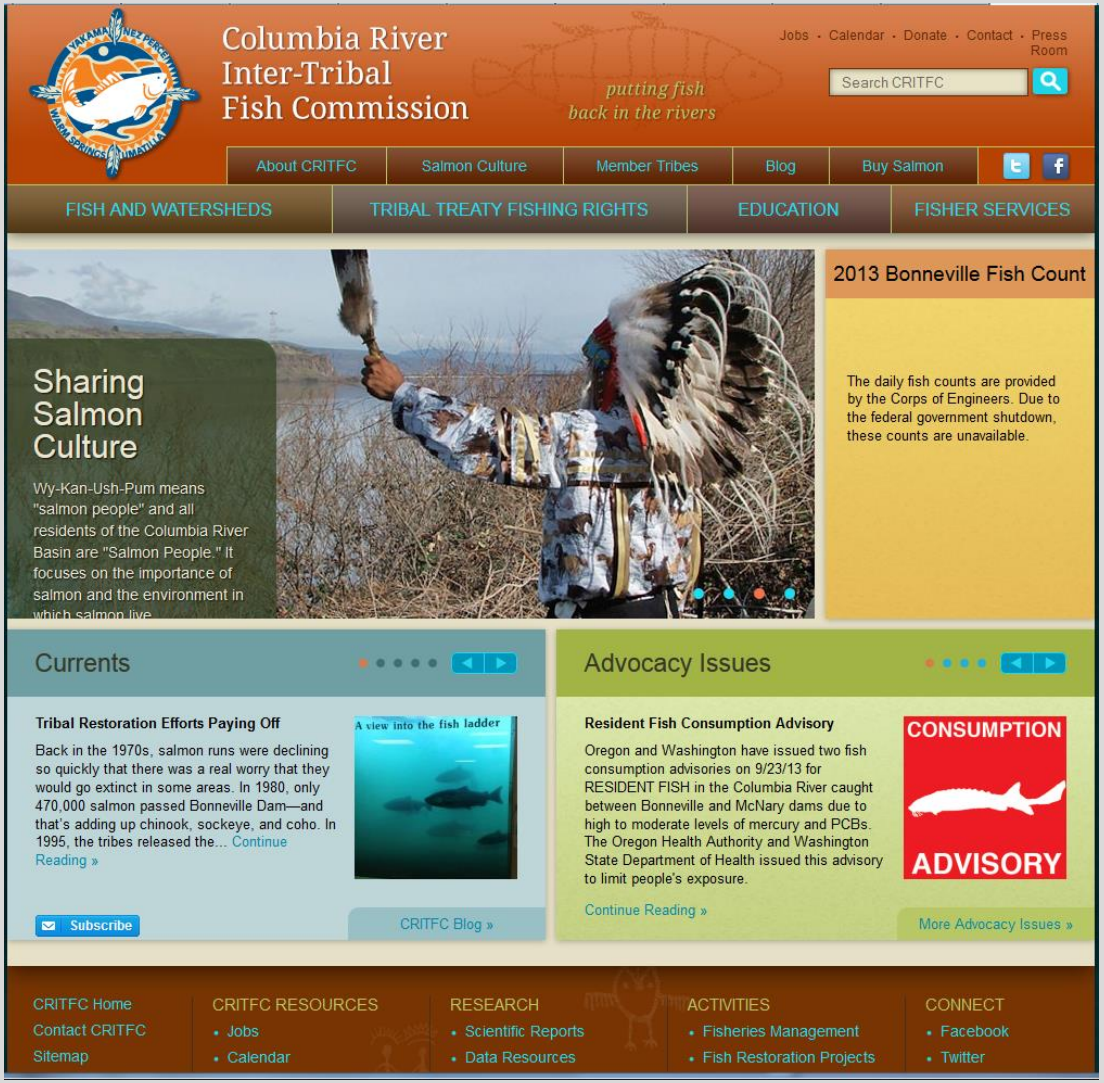
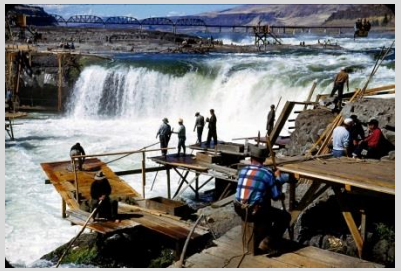
Columbia River Inter-Tribal Fish Commission - **CRITFC**





CRITFC website, http://www.critfc.org

2017-2018 Portland Climate Forecast Performance

Month:	Temperature (mean monthly):	Avg. (n=20)	**Observed**	Precipitation (% normal):	Avg. (n=20)	**Observed**
November	Near Normal (-1.8 to + 1.8 degF)	-0.2	**2.1**	Above Normal (110 - 130%)	118%	**116%**
December	Near Normal (-1.8 to + 1.8 degF)	-1.1	**-1**	Near Normal (90 - 110%)	93%	**56%**
January	Near Normal (-1.8 to + 1.8 degF)	1.6	**4.5**	Near Normal (90 - 110%)	102%	**115%**
February	Near Normal (-1.8 to + 1.8 degF)	-0.7	**-1.6**	Near Normal (90 - 110%)	98%	**47%**
March	Near Normal (-1.8 to + 1.8 degF)	0.2	**-1**	Above Normal (110 - 130%)	117%	**70%**
	average:	0.0	0.6	average:	106%	81%

…but what about Snow events?!

Forecasted five events…three moderate, two minor (6.5-inch seasonal total), December to March.

Observed four snow events: Dec. 24 (1-inch), Feb. 18 (0.2-inch); Feb. 20 (4.2-inch), Feb. 22 (2.2-inch) …a **7.6-inch** seasonal total. ☺

2017-2018 Government Camp Climate Forecast Performance

Month:	Temperature:	**Observed**	Precipitation:	**Observed**	**Snowfall**	**Observed**	Forecast	**Observed**
November	0.3	**0.2**	128%	**83%**	23	26	65%	67%
December	0.5	**0.5**	97%	**66%**	36	41	74%	75%
January	2.5	**1.6**	103%	**87%**	43	35	95%	72%
February	2.3	**-3**	115%	**138%**	28	57	81%	153%
March	1.5	**-1.7**	107%	**76%**	36	19	108%	58%
April	0.8	**0.3**	95%	**128%**	22	24	97%	107%
May	0.5	**5.2**	106%	**16%**	4	0	84%	0%
average:	1.2	**0.4**	107%	**85%**	192	202	86%	76%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:
112 MAF (issued Oct. 2017), 110%. Observed: 118 MAF. Error ±5%.
110 MAF (issued April 2018), 108%. Observed: 118 MAF. Error ±7%.

Introduction – Methods

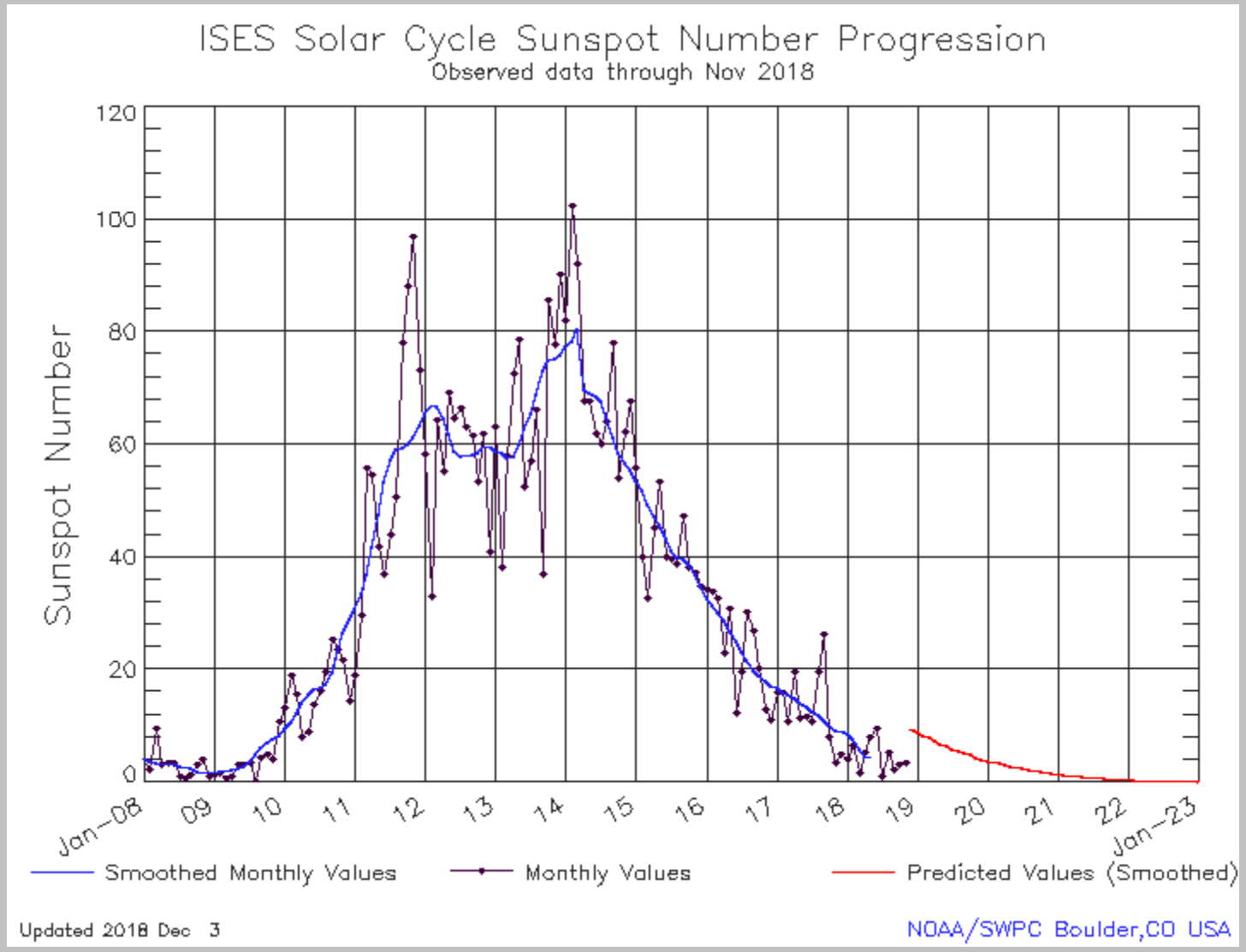
- CRITFC forecast uses a holistic, integrated big picture view.
- Big-picture: **Solar Forcing** (e.g., sunspot cycles) does influence our global weather patterns. *In memoriam:* Dr. Landscheidt, of Germany (1922 – 2004).
- Track ENSO with the Multi-variable ENSO Index: **MEI**.
- NOAA's Sea-Surface Temperature Departure Forecasts.
- Hydro-Climate approach: Use a regression: Multi-variable ENSO Index (1950-2018) vs. historic runoff for the Columbia River at The Dalles, then compute a 2019 Water Supply Forecast.
- Select the "right" mixture of 20 past Water Years (next slide).
- Pattern recognition is key: both ***El Niño*** and ENSO-Neutral years.

Introduction – Methods

Ensemble forecasting – 20 past water years:

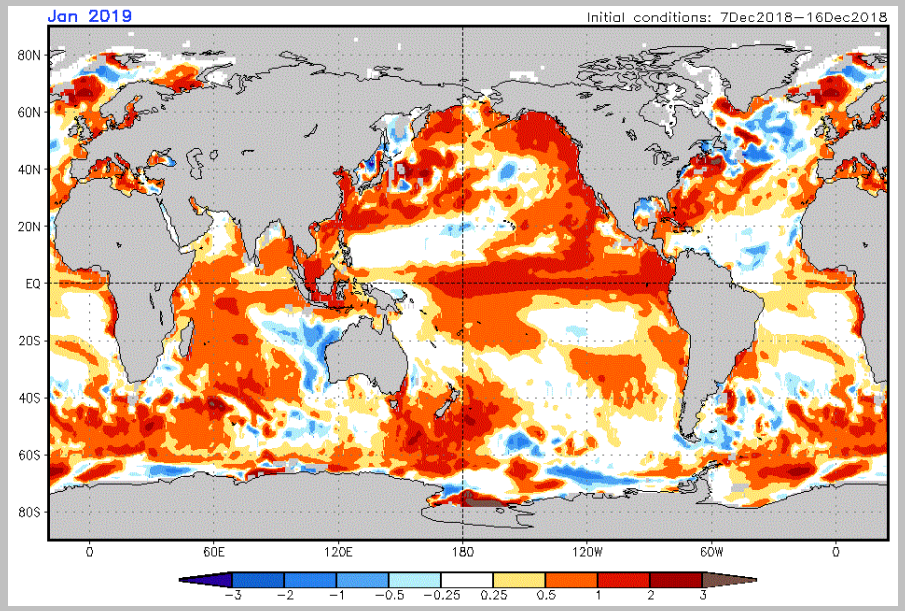
WY2019	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1947	106.7		x		X	
1949	102.5		x		X	
1951	125		x			X
1953	106.8		x		X	
1958	107.6		x	X		
1960	102.5		x		X	
1962	97.23		x		X	
1964	107.3		x	X		
1970	97.01		x	X		
1981	104.5	x			X	
1990	99.7	x			X	
1991	107.1	x			X	
1993	88.1	x			X	
1994	75	x			X	
2002	103.75		x		X	
2003	87.7		x	X		
2006	114.7		x			X
2007	95.7		x		X	
2010	84.7		x	X		
2013	97.7		x		X	
	(MAF)					
Average:	**100.6**		ENSO-neutral/El Nino border:			7
STDEV:	10.8		Solar minimums:			4

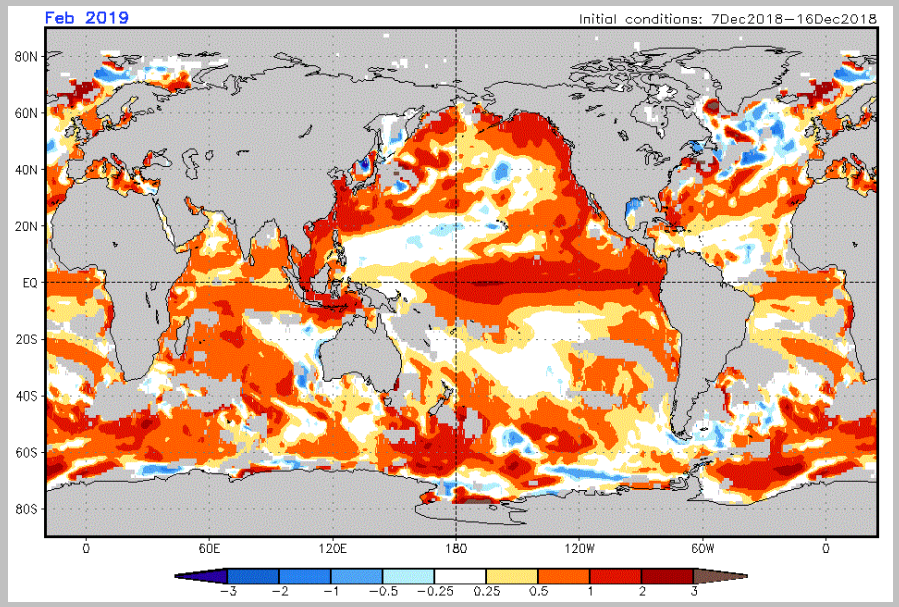
SUNSPOT COUNTS – "LA NIÑA"

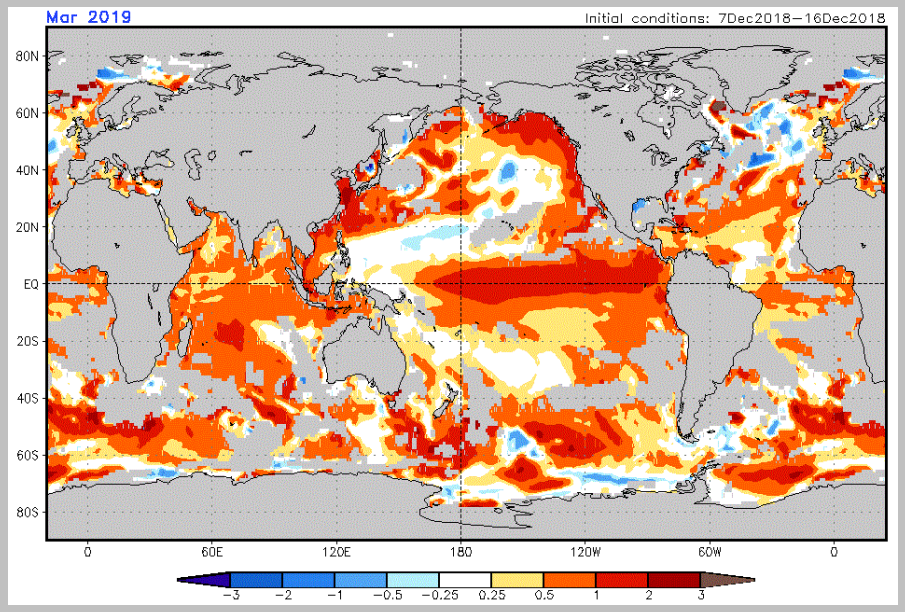


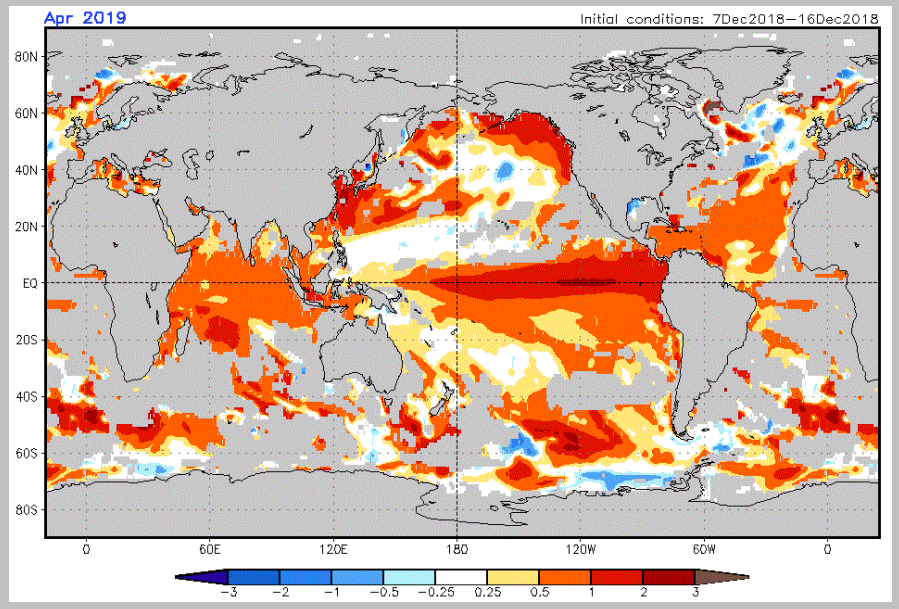
http://services.swpc.noaa.gov/images/solar-cycle-sunspot-number.gif

NOAA SEA SURFACE TEMPERATURES - "EL NIÑO"



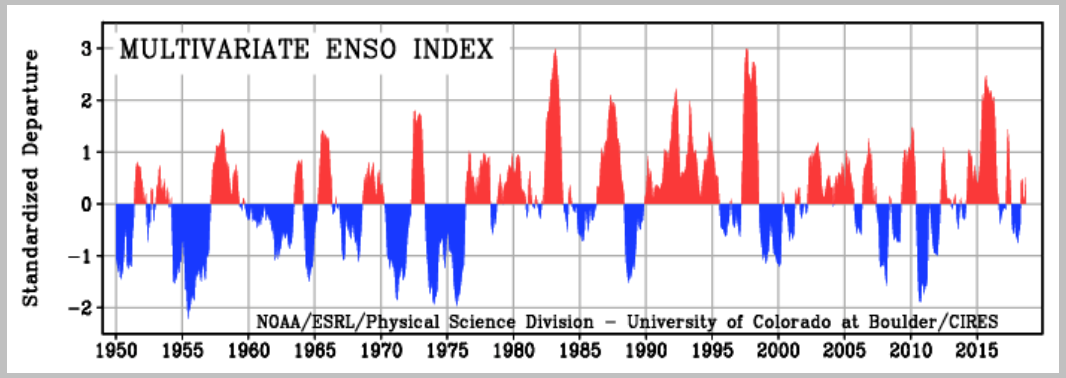


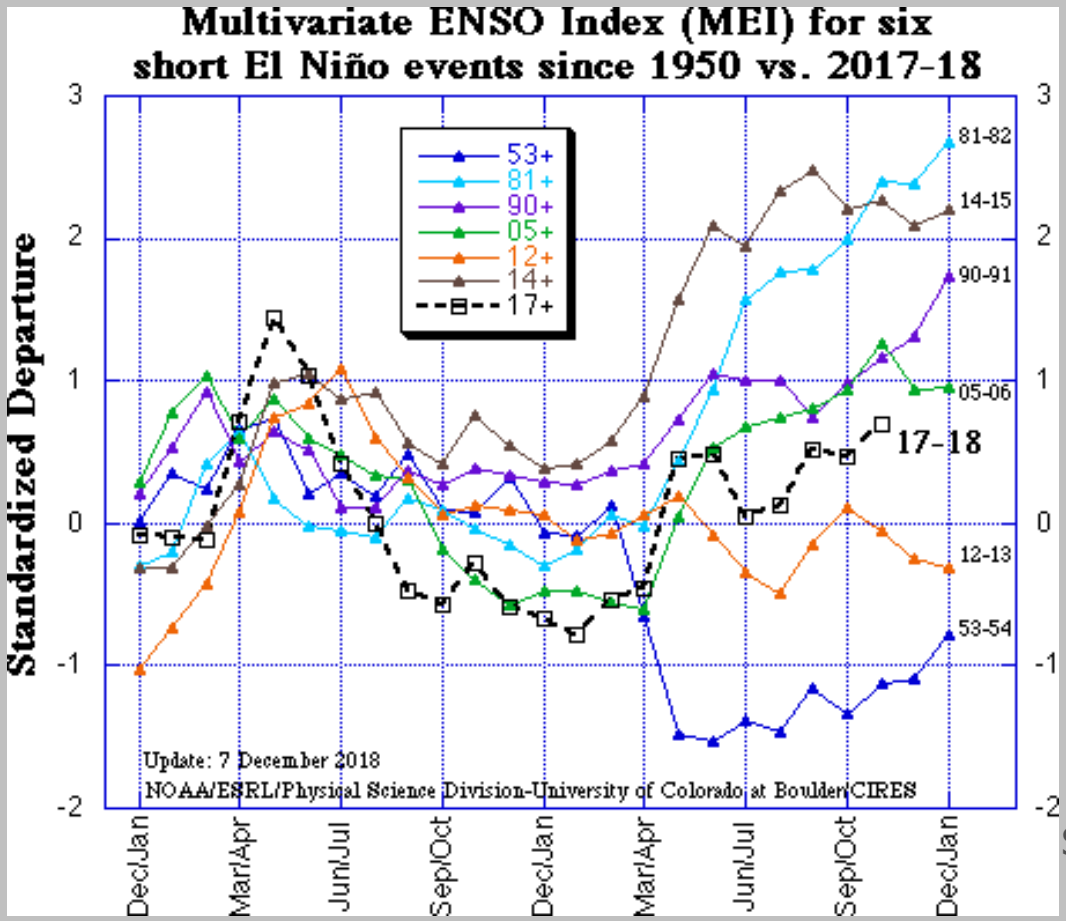




http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml

MEI SIGNAL SUGGESTS "ENSO-NEUTRAL"



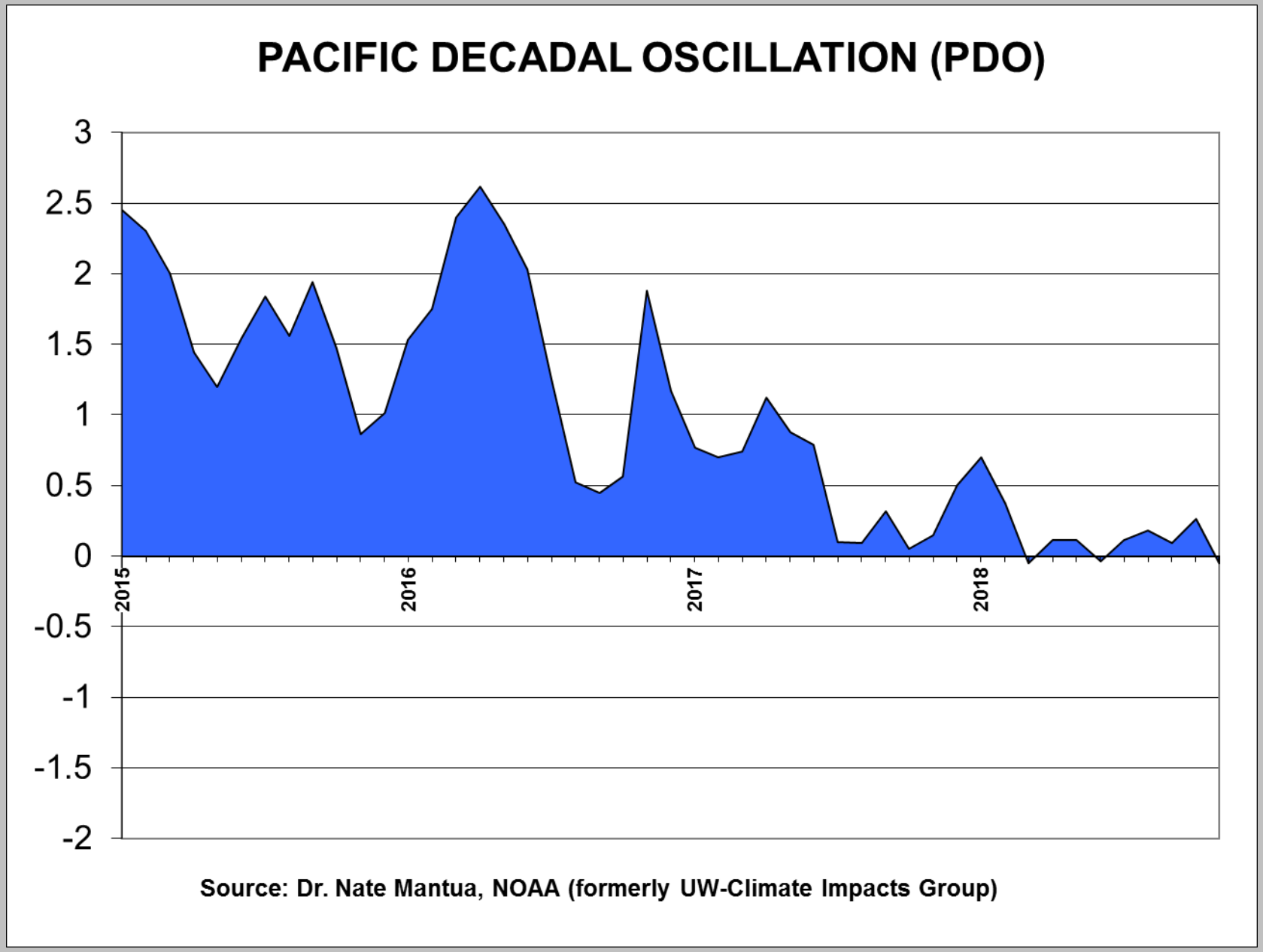


MEI – one index that tracks:

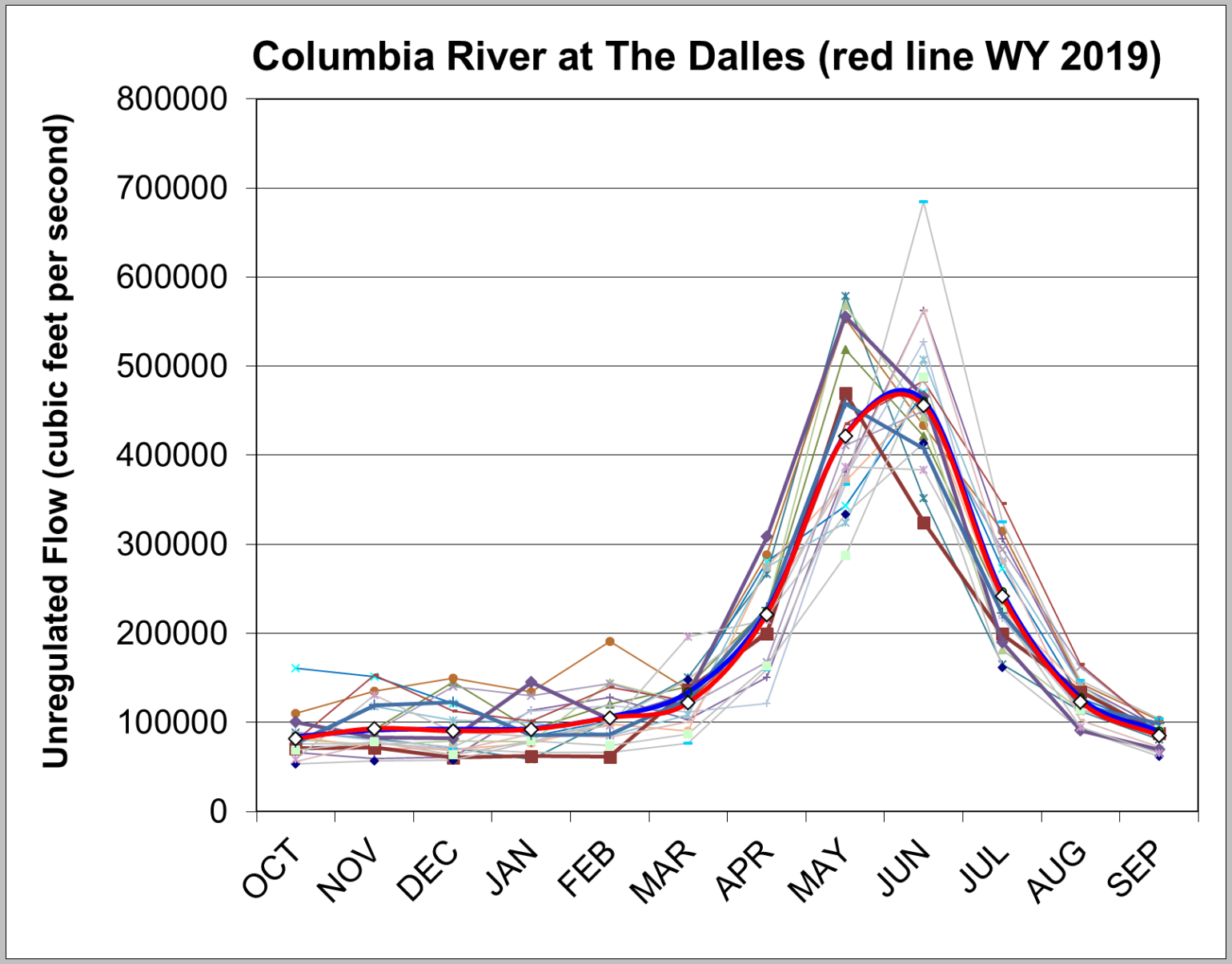
- Sea-Level Pressure
- Surface winds (2D)
- Sea-surface Temperature
- Surface Air Temperature
- Fraction of Cloud cover

Source: https://www.esrl.noaa.gov/psd/enso/mei

PDO SIGNAL: COLD PHASE…BUT NEAR NEUTRAL



ENSEMBLE STREAMFLOW FORECAST



Blue line = long-term average (WY 1929-2018)

Summary: Columbia R. Gorge

Hood River

Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)
November	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	91%
December	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	106%
January	Above Normal (> + 1.8 degF)	1.9	Near Normal (90 - 110%)	107%
February	Near Normal (-1.8 to + 1.8 degF)	1.6	Below Normal (70 - 90%)	88%
March	Near Normal (-1.8 to + 1.8 degF)	0	Near Normal (90 - 110%)	101%

Expect many snow events or **121%** of normal (NOV-MAR); seasonal total 23-inches.

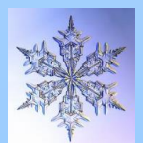
NOV 1.5-inch (up to 6), DEC 6-inch (up to 14), JAN 6-inch (up to 14), FEB 6-inch (up to 17), MAR 3-inch

Summary: the mountains

Government Camp

Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)	Snowfall	% Normal
November	Near Normal (-1.8 to + 1.8 degF)	0	Near Normal (90 - 110%)	101%	25	110%
December	Near Normal (-1.8 to + 1.8 degF)	0	Near Normal (90 - 110%)	100%	48	118%
January	Near Normal (-1.8 to + 1.8 degF)	1.3	Near Normal (90 - 110%)	105%	54	109%
February	Near Normal (-1.8 to + 1.8 degF)	0.5	Near Normal (90 - 110%)	95%	42	102%
March	Near Normal (-1.8 to + 1.8 degF)	0.4	Near Normal (90 - 110%)	93%	45	117%
April	Near Normal (-1.8 to + 1.8 degF)	0.2	Above Normal (110 - 130%)	114%	23	119%
May	Near Normal (-1.8 to + 1.8 degF)	-0.2	Near Normal (90 - 110%)	106%	4	143%

Expect a seasonal total of: **240**-inches or **117%** of normal (NOV-MAY).



Summary: the Portland Forecast

Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)
November	Near Normal (-1.8 to + 1.8 degF)	-0.4	Near Normal (90 - 110%)	93%
December	Near Normal (-1.8 to + 1.8 degF)	-0.2	Near Normal (90 - 110%)	94%
January	Near Normal (-1.8 to + 1.8 degF)	1.1	Near Normal (90 - 110%)	106%
February	Near Normal (-1.8 to + 1.8 degF)	0.5	Below Normal (70 - 90%)	83%
March	Near Normal (-1.8 to + 1.8 degF)	-0.3	Below Normal (70 - 90%)	88%

EXPECT **HIGH** VARIABILITY – INTENSE RAIN EVENTS, FLOODS, FOG, WIND STORMS, GORGE WIND, FREEZING RAIN, etc.

WATER SUPPLY FORECAST: **97 MAF** (±10 MAF) or 96%, COLUMBIA R. AT THE DALLES, JANUARY – JULY; NWRFC 91 MAF.

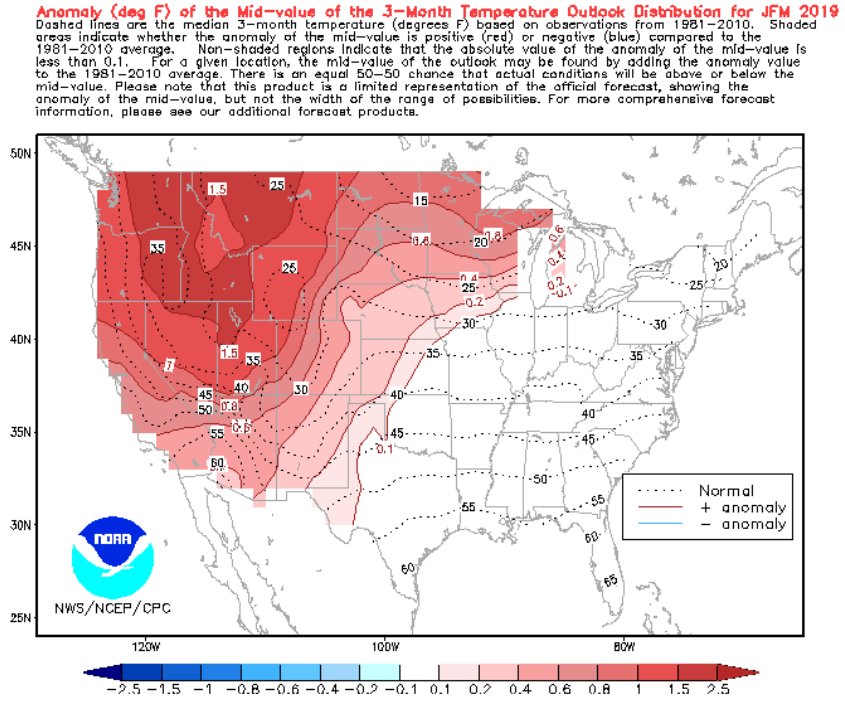
…but what about Snow events?!

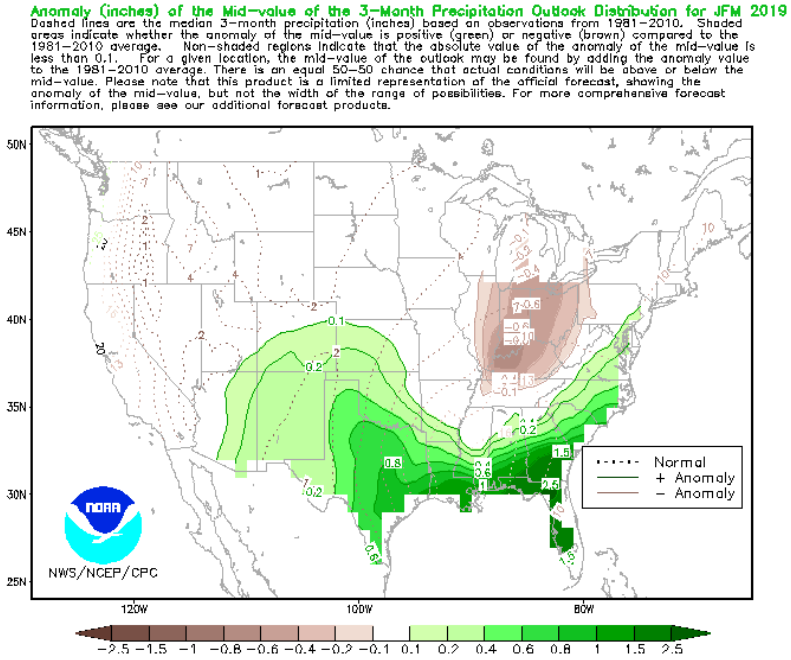
Expect **THREE** events: 1 moderate (3 inch), 2 minor (0.5-1 inch).

NOV 0.25-inch (up to 1-inch), DEC 1-inch (up to 2), JAN 2-inch (up to 5.5), FEB 1.5-inch (up to 5), and MAR 1-inch (up to 4).

(35%- 75% likely) Season: **5.5** inches

Other forecasts…



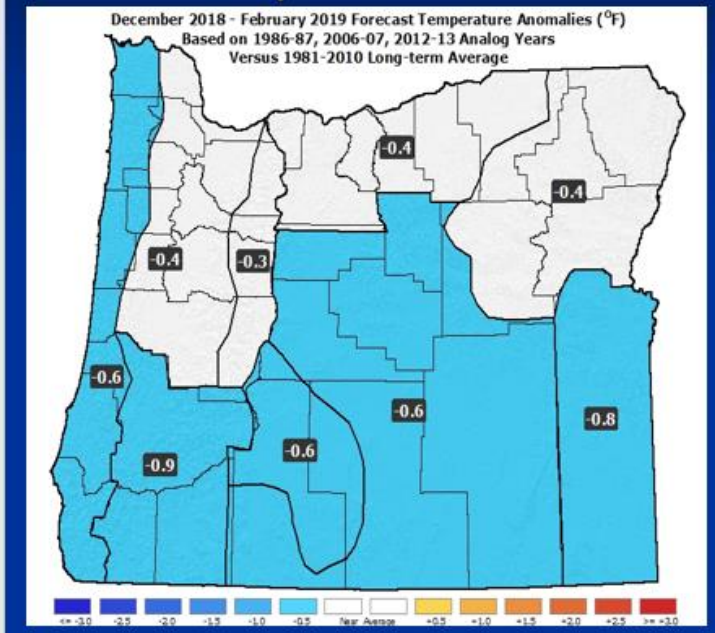


Source: NOAA – National Weather Service and Climate Prediction Center

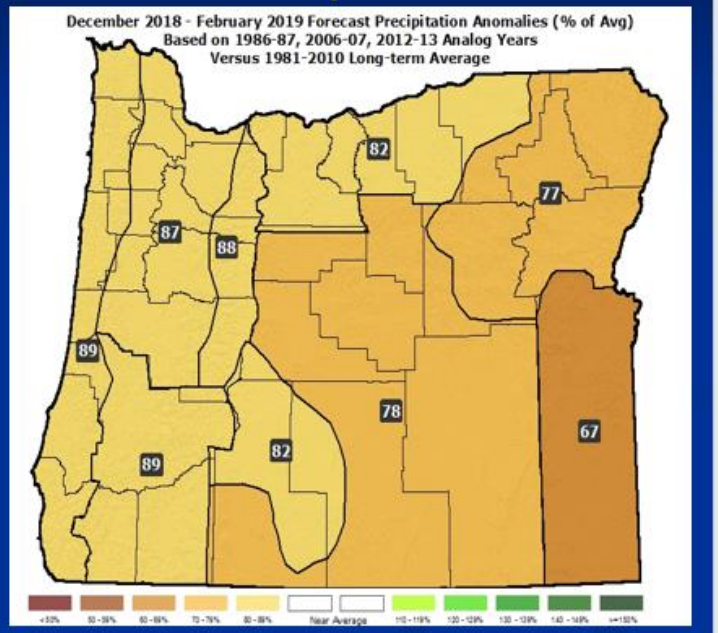
Other forecasts…

Dec. 2018 – Feb. 2019 Forecast

Temperatures



Precipitation



- High-elevation sites should be warmer than average, but valley locations may stay near or even slightly cooler than average, due to temperature inversions. Extreme/prolonged cold periods are unlikely.
- Below-average precipitation, mountain snowpacks, and valley snowfall.

ANALOGUE YEARS: 1986, 2006, 2012

What are *your* questions? Thank you for your attention! ☺

Source: ODA https://www.oregon.gov/oda/programs/naturalresources/pages/weather.aspx