

Winter 2018-2019 Climate Forecast

TMT End-of-Year Review Meeting



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December 19th, 2018



**Portland
Community
College**

Columbia River Inter-Tribal Fish Commission - CRITFC





Columbia River Inter-Tribal Fish Commission

putting fish back in the rivers

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Sharing Salmon Culture

Wy-Kan-Ush-Pum means "salmon people" and all residents of the Columbia River Basin are "Salmon People." It focuses on the importance of salmon and the environment in which salmon live.




2013 Bonneville Fish Count

The daily fish counts are provided by the Corps of Engineers. Due to the federal government shutdown, these counts are unavailable.

Currents

Tribal Restoration Efforts Paying Off

Back in the 1970s, salmon runs were declining so quickly that there was a real worry that they would go extinct in some areas. In 1980, only 470,000 salmon passed Bonneville Dam—and that's adding up chinook, sockeye, and coho. In 1995, the tribes released the... [Continue Reading »](#)




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Advocacy Issues

Resident Fish Consumption Advisory

Oregon and Washington have issued two fish consumption advisories on 9/23/13 for RESIDENT FISH in the Columbia River caught between Bonneville and McNary dams due to high to moderate levels of mercury and PCBs. The Oregon Health Authority and Washington State Department of Health issued this advisory to limit people's exposure.



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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 $\pm 5\%$.
 110 MAF (issued April 2018), 108%. Observed: 118 MAF. Error $\pm 7\%$.



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.

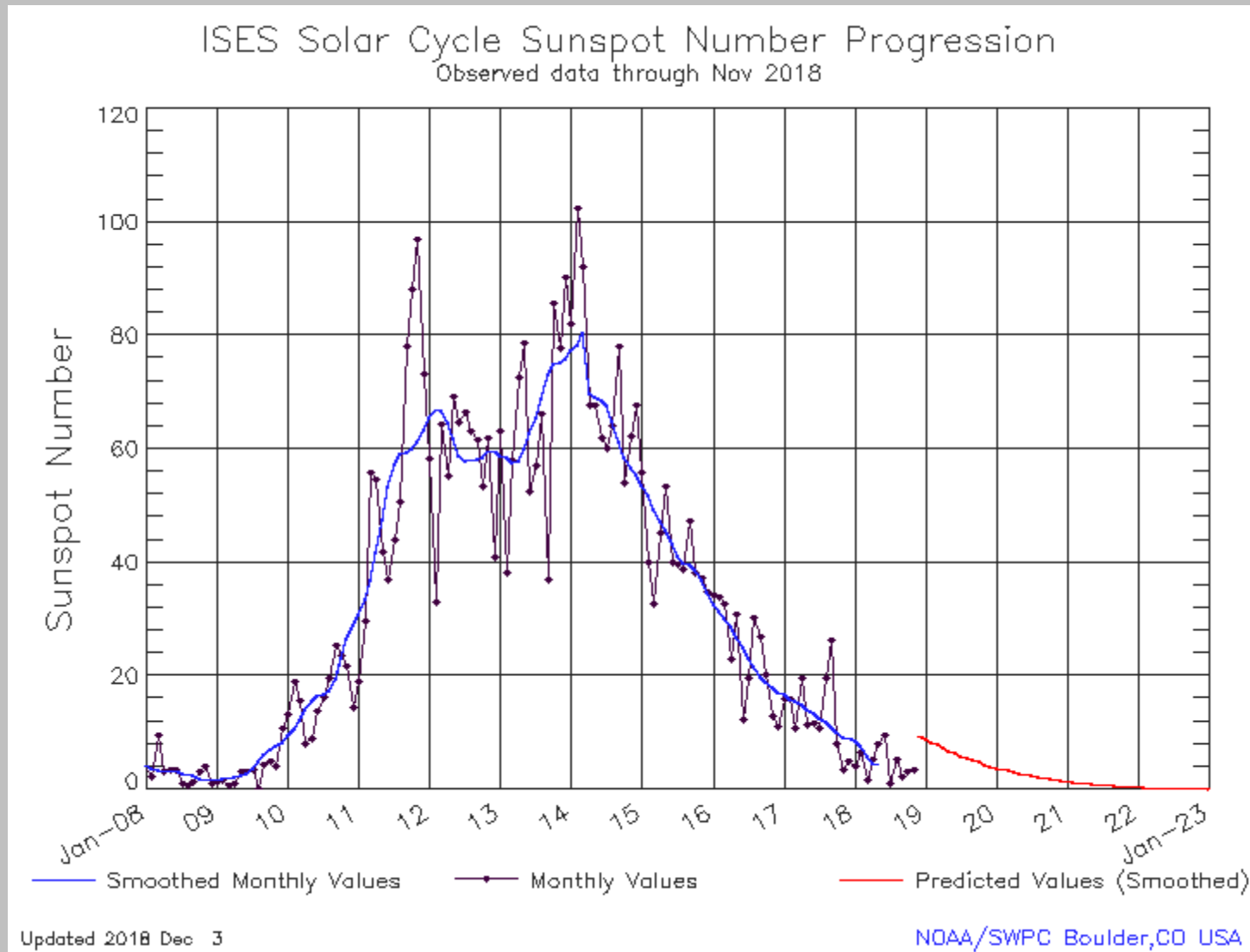


Introduction – Methods

Ensemble forecasting – 20 past water years:

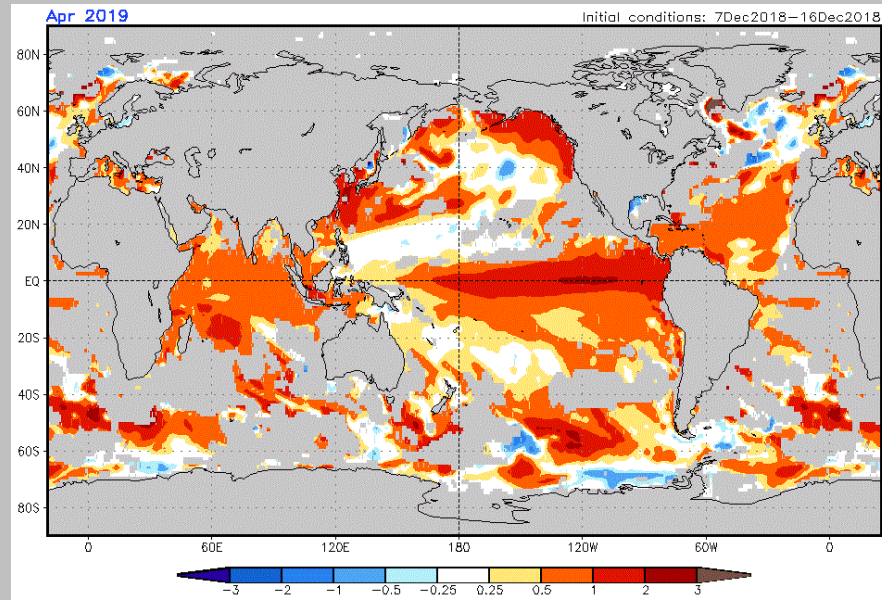
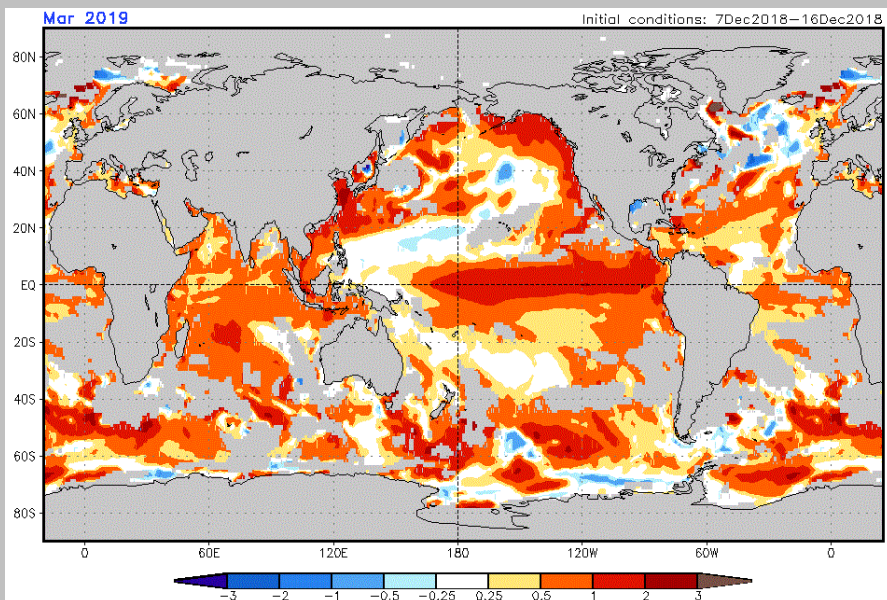
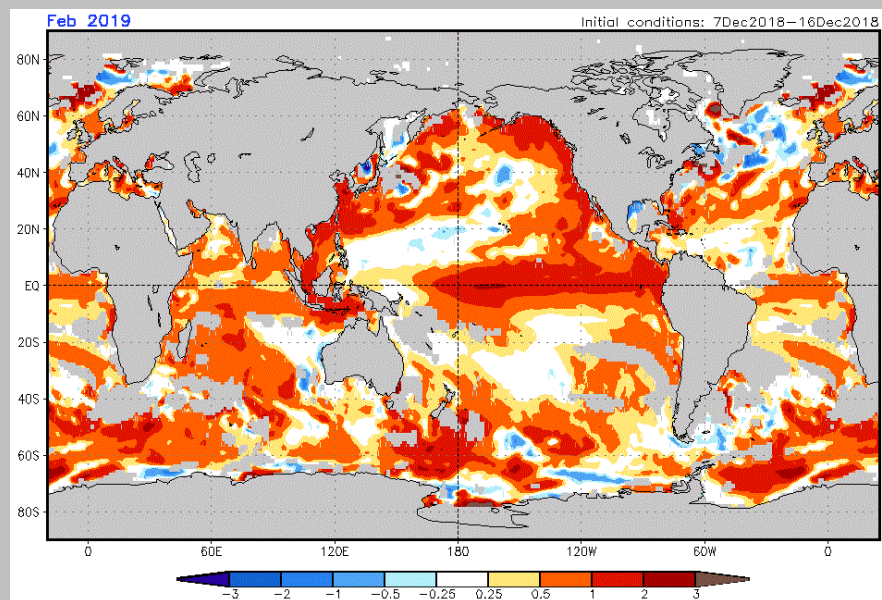
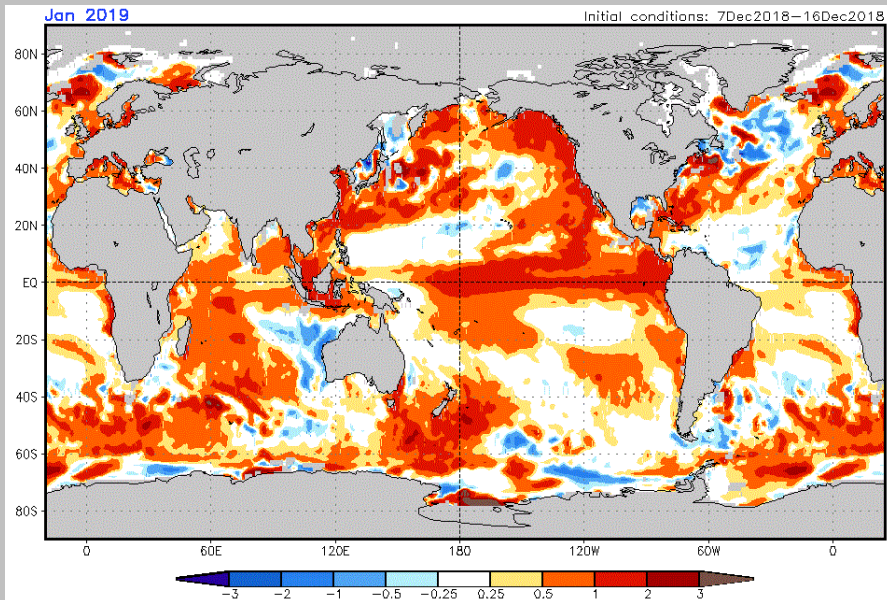
WY2019	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1947	106.7		x		X	
1949	102.5		x		X	
1951	125		x			X
1953	106.8		x		X	
1958	107.6		x	X		
1960	102.5		x		X	
1962	97.23		x		X	
1964	107.3		x	X		
1970	97.01		x	X		
1981	104.5	x			X	
1990	99.7	x			X	
1991	107.1	x			X	
1993	88.1	x			X	
1994	75	x			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”

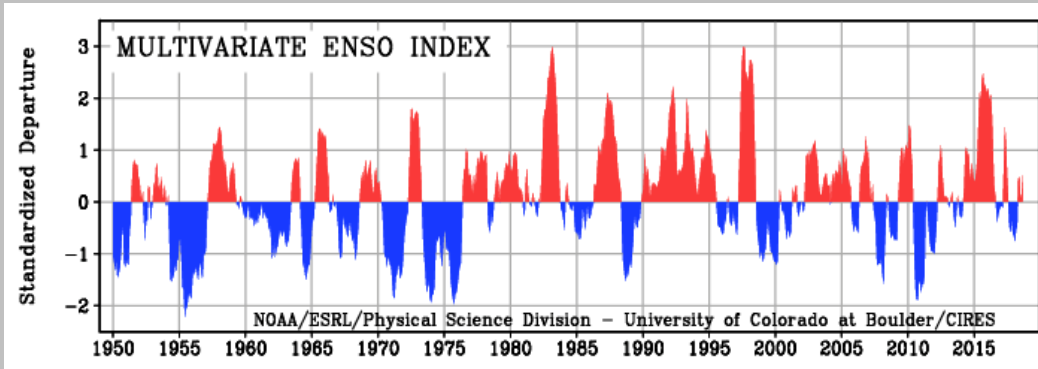


<http://services.swpc.noaa.gov/images/solar-cycle-sunspot-number.gif>

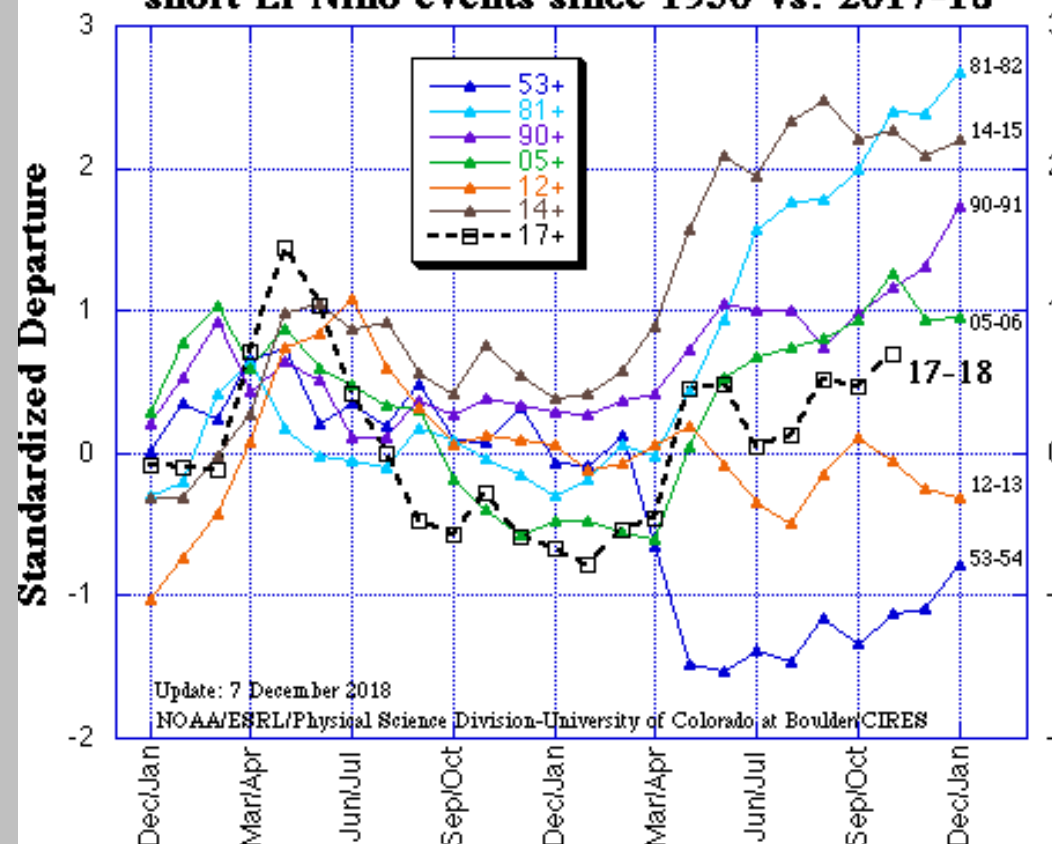
NOAA SEA SURFACE TEMPERATURES - "EL NIÑO"



MEI SIGNAL SUGGESTS "ENSO-NEUTRAL"



Multivariate ENSO Index (MEI) for six short El Niño events since 1950 vs. 2017-18

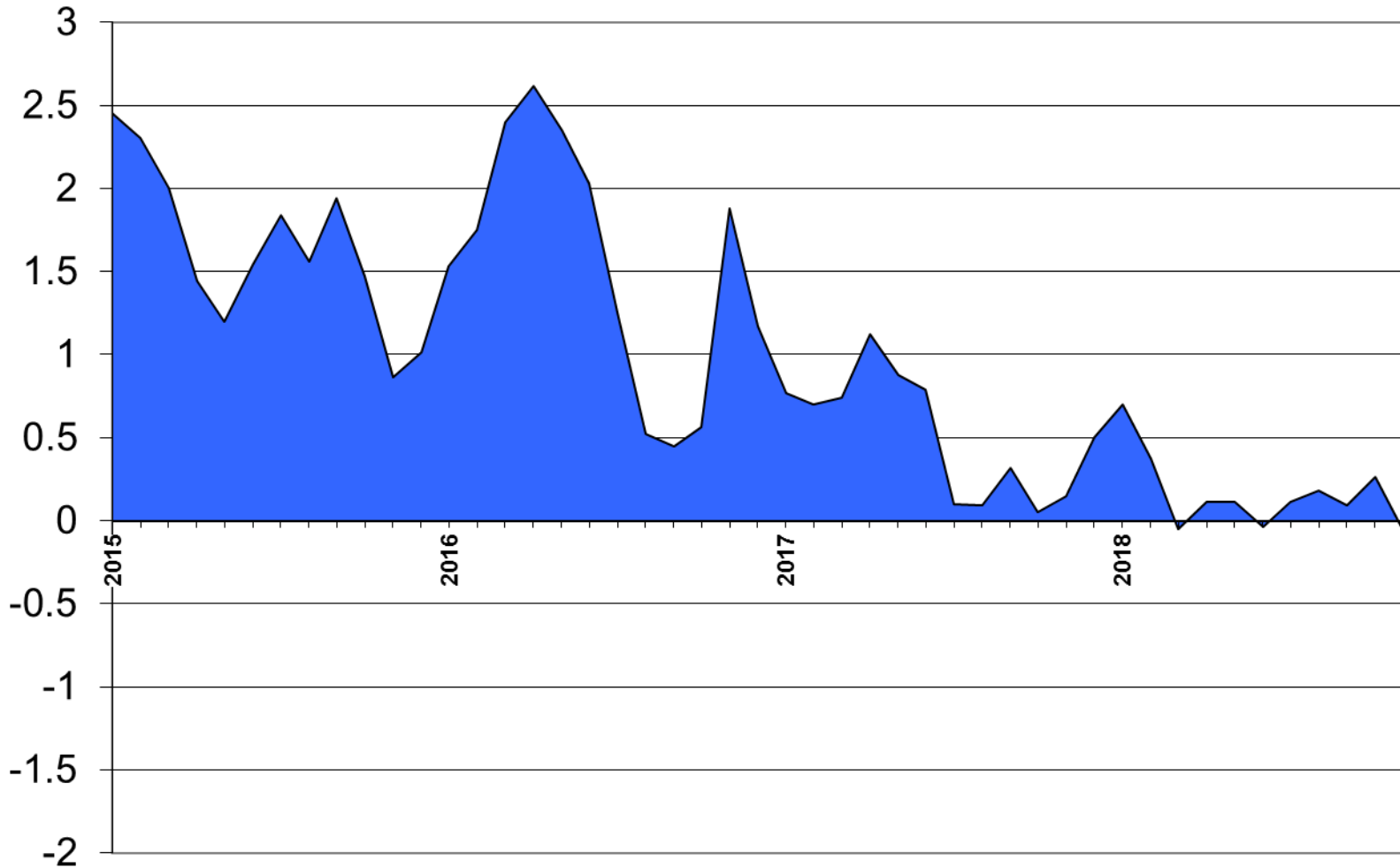


MEI – one index that tracks:

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

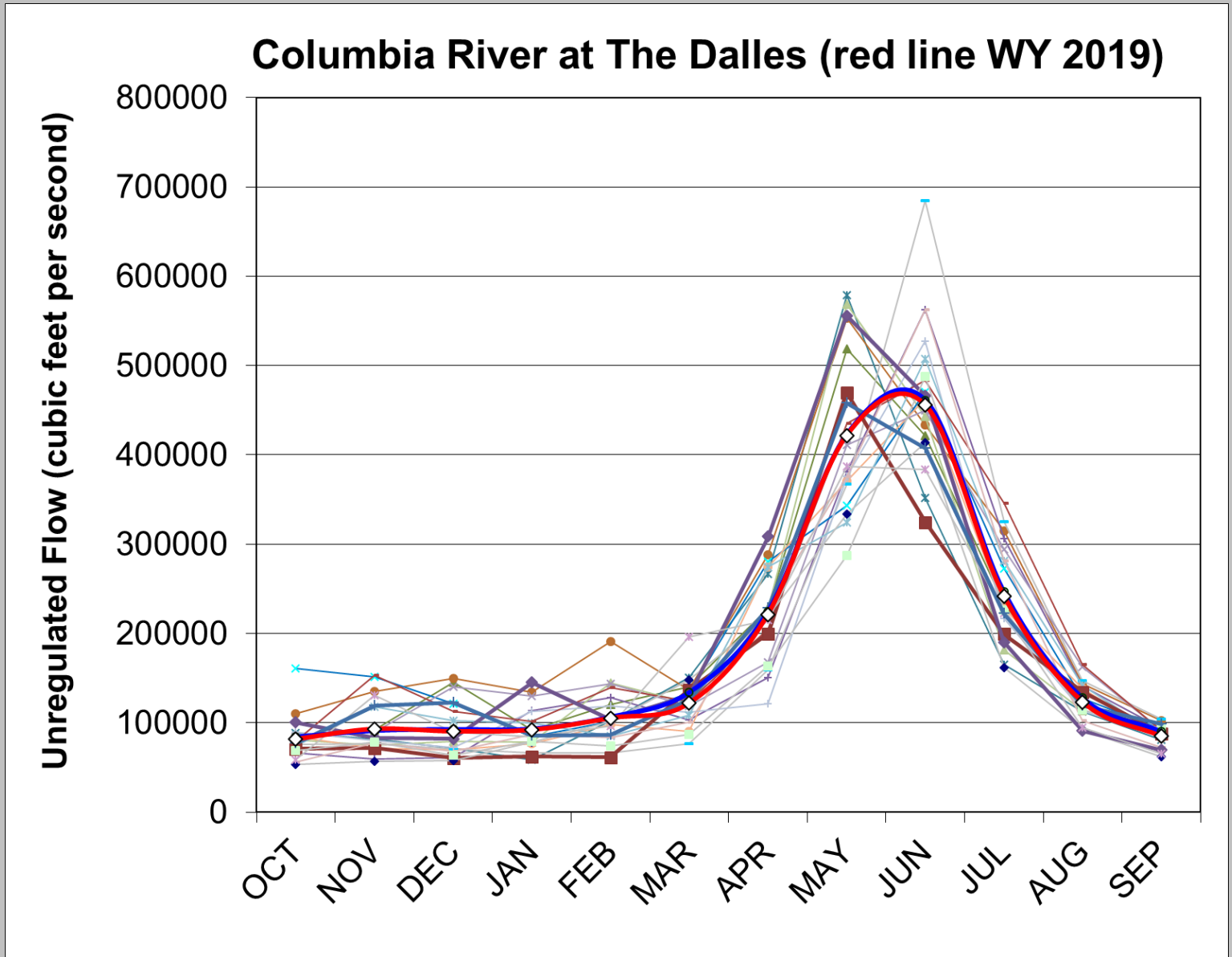
PDO SIGNAL: COLD PHASE...BUT NEAR NEUTRAL

PACIFIC DECADAL OSCILLATION (PDO)



Source: Dr. Nate Mantua, NOAA (formerly UW-Climate Impacts Group)

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)	Snow fall	% 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).

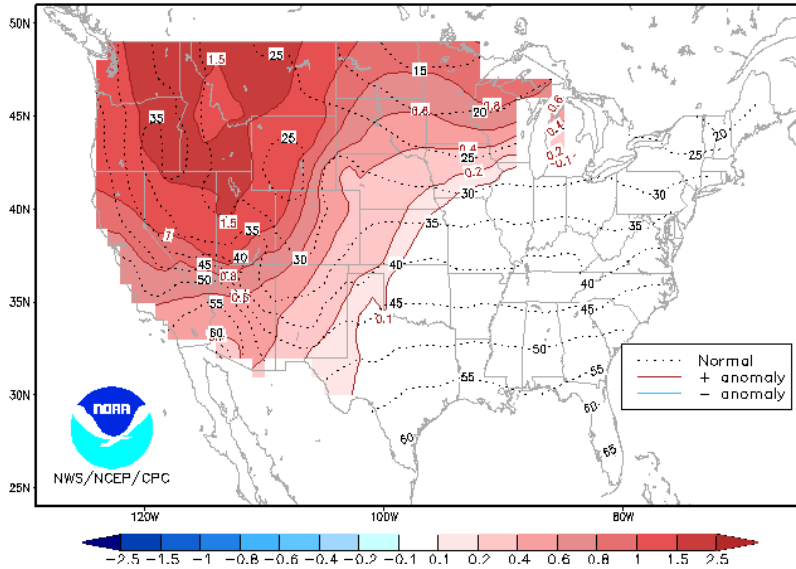
(35%- 75% likely) Season: **5.5** inches



Other forecasts...

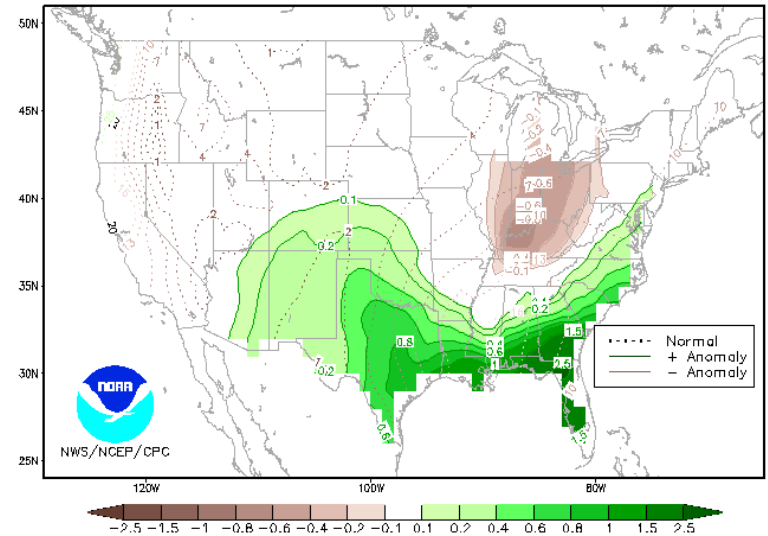
Anomaly (deg F) of the Mid-value of the 3-Month Temperature Outlook Distribution for JFM 2019

Dashed lines are the median 3-month temperature (degrees F) based on observations from 1981-2010. Shaded areas indicate whether the anomaly of the mid-value is positive (red) or negative (blue) compared to the 1981-2010 average. Non-shaded regions indicate that the absolute value of the anomaly of the mid-value is less than 0.1. For a given location, the mid-value of the outlook may be found by adding the anomaly value to the 1981-2010 average. There is an equal 50-50 chance that actual conditions will be above or below the mid-value. Please note that this product is a limited representation of the official forecast, showing the anomaly of the mid-value, but not the width of the range of possibilities. For more comprehensive forecast information, please see our additional forecast products.



Anomaly (inches) of the Mid-value of the 3-Month Precipitation Outlook Distribution for JFM 2019

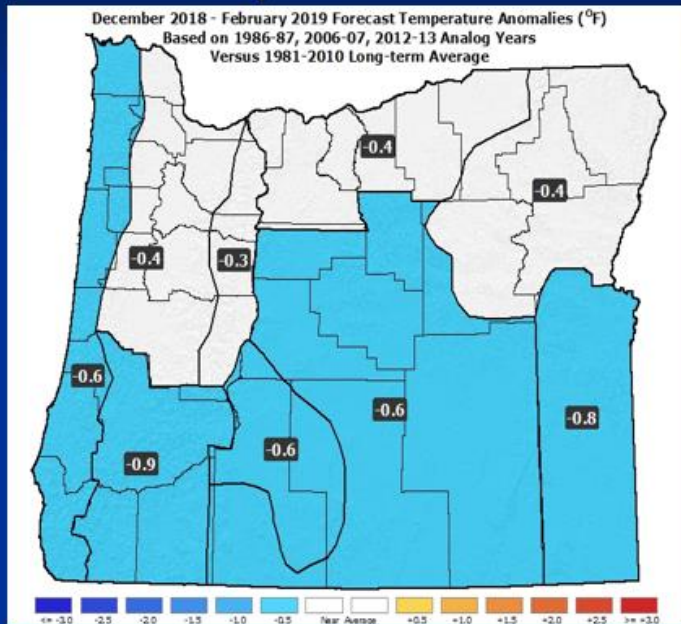
Dashed lines are the median 3-month precipitation (inches) based on observations from 1981-2010. Shaded areas indicate whether the anomaly of the mid-value is positive (green) or negative (brown) compared to the 1981-2010 average. Non-shaded regions indicate that the absolute value of the anomaly of the mid-value is less than 0.1. For a given location, the mid-value of the outlook may be found by adding the anomaly value to the 1981-2010 average. There is an equal 50-50 chance that actual conditions will be above or below the mid-value. Please note that this product is a limited representation of the official forecast, showing the anomaly of the mid-value, but not the width of the range of possibilities. For more comprehensive forecast information, please see our additional forecast products.



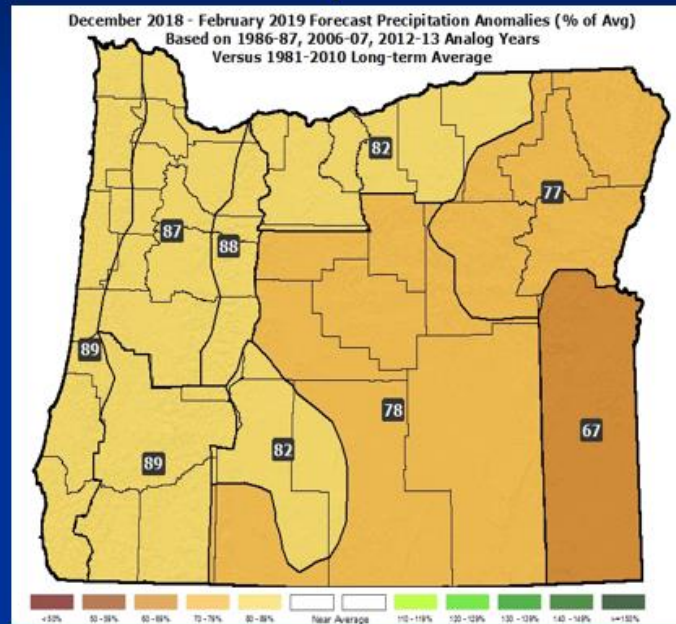
Other forecasts...

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!

