

Winter 2018-2019 Climate Forecast

26th Winter Weather Meeting, OMSI and Oregon AMS, Portland



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Columbia River Inter-Tribal Fish Commission - CRITFC



The screenshot shows the CRITFC website homepage. At the top is the CRITFC logo and the text "Columbia River Inter-Tribal Fish Commission" with the tagline "putting fish back in the rivers". Navigation links include "Jobs", "Calendar", "Donate", "Contact", and "Press Room". A search bar is labeled "Search CRITFC". Below this are tabs for "About CRITFC", "Salmon Culture", "Member Tribes", "Blog", "Buy Salmon", and social media icons for Twitter and Facebook. A main navigation bar includes "FISH AND WATERSHEDS", "TRIBAL TREATY FISHING RIGHTS", "EDUCATION", and "FISHER SERVICES". The main content area features a large image of a person in traditional regalia holding a fishing net, with the text "Sharing Salmon Culture" and a paragraph about the meaning of "Wya-Kan-Ush-Pum". To the right is a section titled "2013 Bonneville Fish Count" with a notice that counts are unavailable due to a government shutdown. Below this are two columns: "Currents" with an article "Tribal Restoration Efforts Paying Off" and a "Subscribe" button, and "Advocacy Issues" with a "Resident Fish Consumption Advisory" and a "Continue Reading" link. A "CRITFC Blog" link is also present. The footer contains links for "CRITFC Home", "Contact CRITFC", "Sitemap", "CRITFC RESOURCES" (Jobs, Calendar), "RESEARCH" (Scientific Reports, Data Resources), "ACTIVITIES" (Fisheries Management, Fish Restoration Projects), and "CONNECT" (Facebook, Twitter).



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 $\pm 5\%$.
 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.

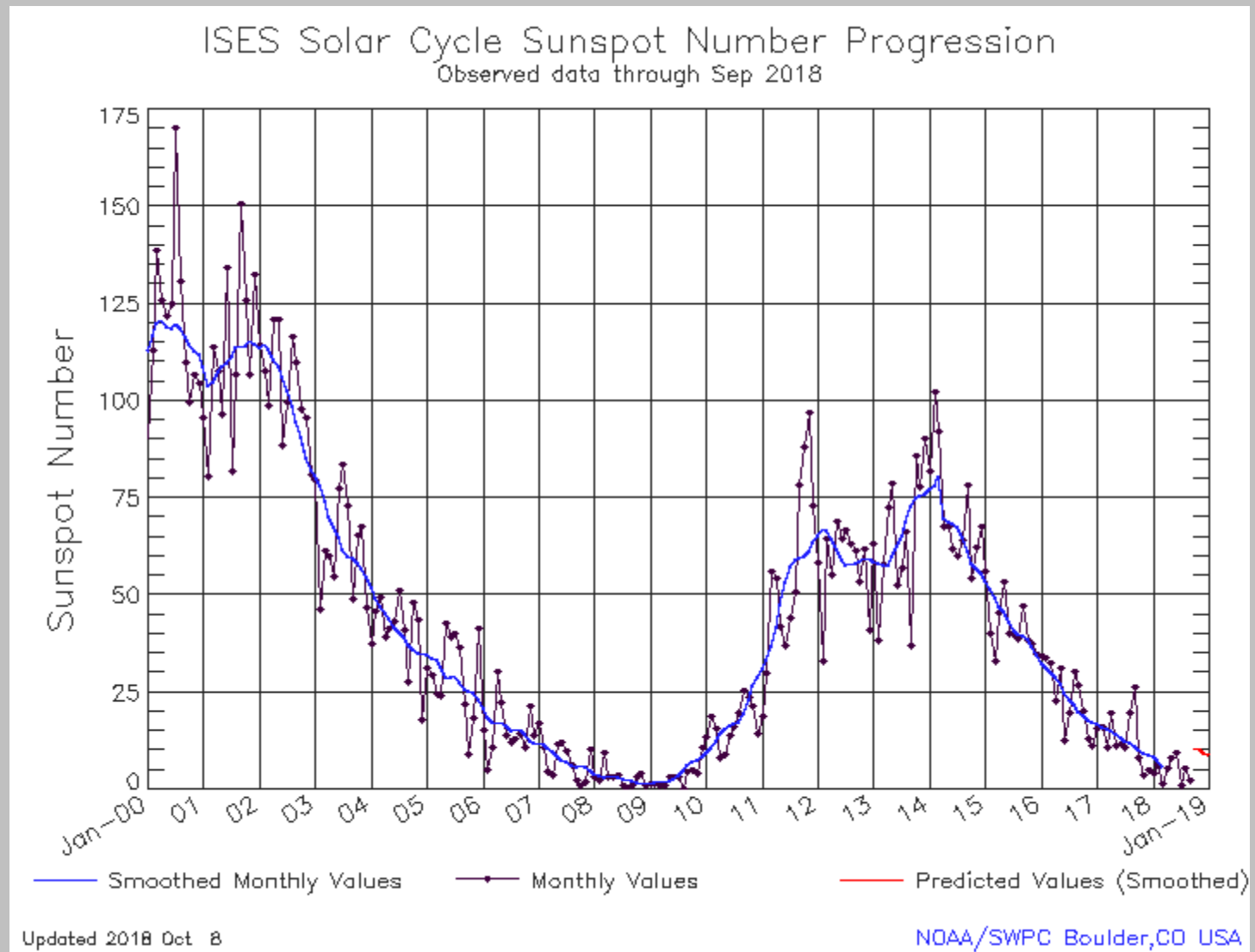


Introduction – Methods

Ensemble forecasting – 20 past water years:

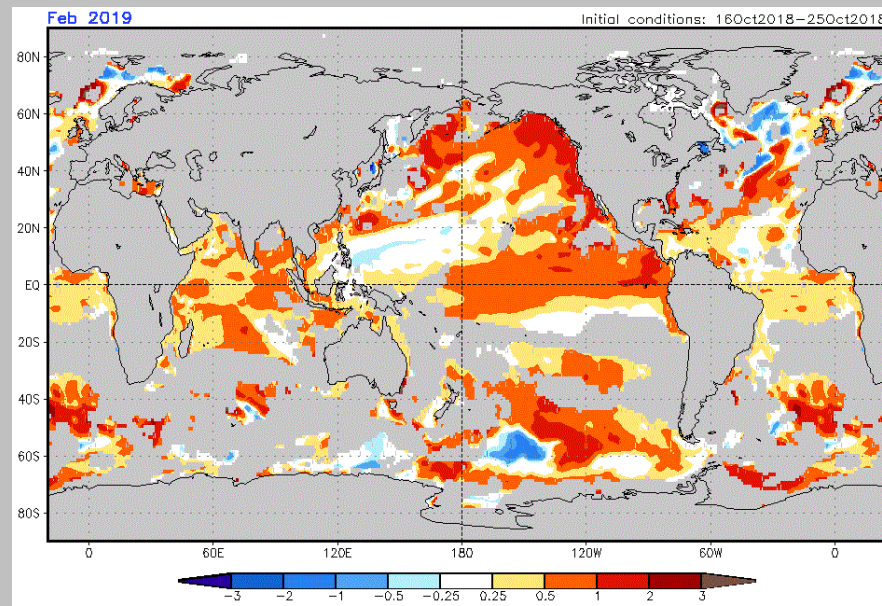
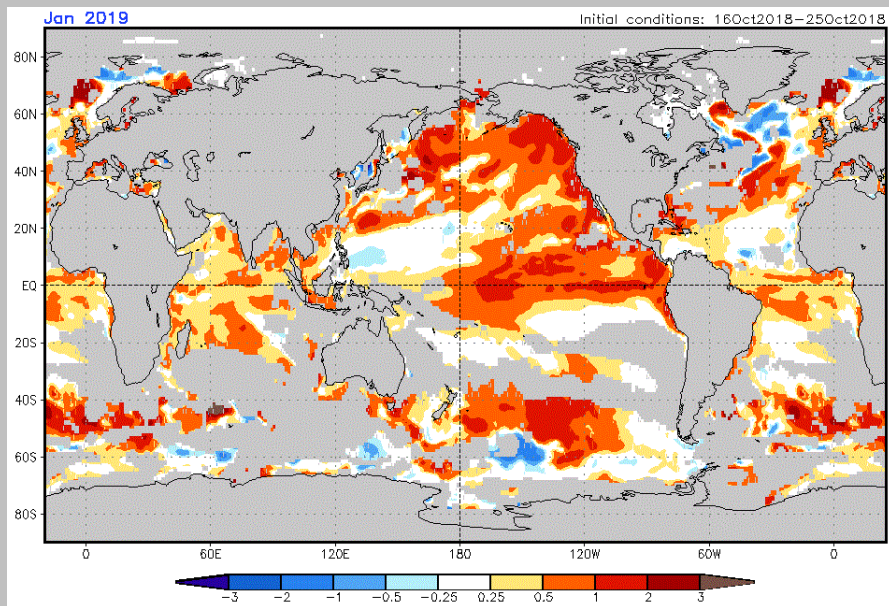
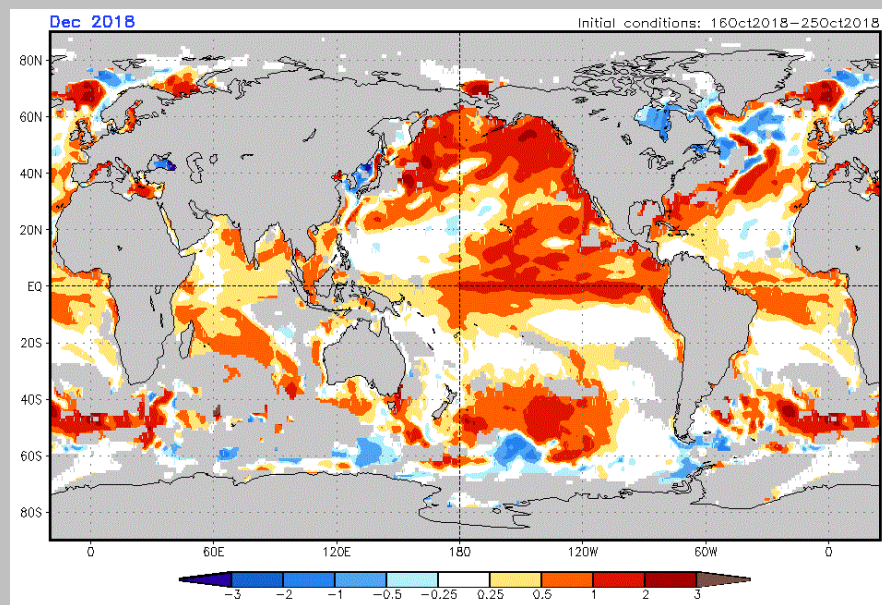
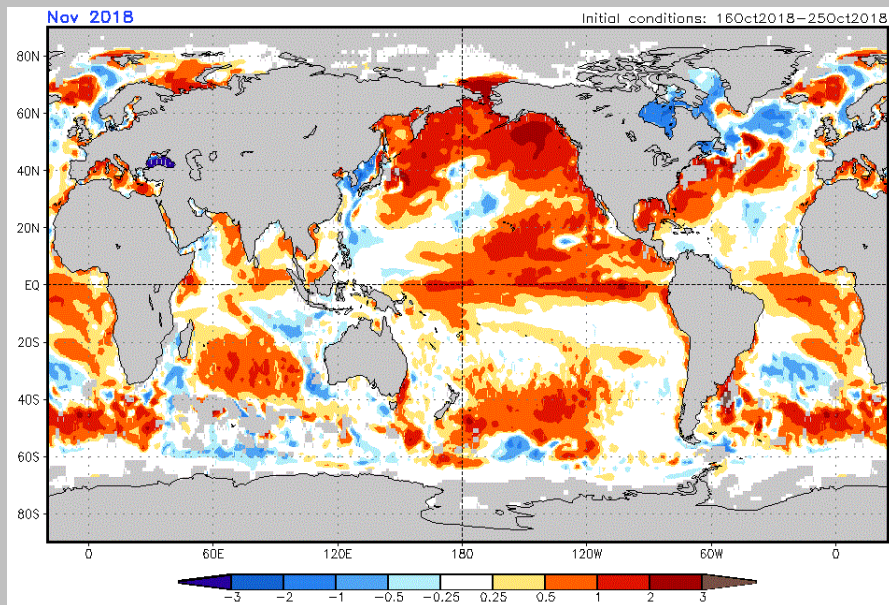
WY2019	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1947	106.7		x		X	
1949	102.5		x		X	
1951	125		x			X
1953	106.8		x		X	
1958	107.6		x	X		
1960	102.5		x		X	
1962	97.23		x		X	
1964	107.3		x	X		
1970	97.01		x	X		
1981	104.5	x			X	
1990	99.7	x			X	
1991	107.1	x			X	
1993	88.1	x			X	
1994	75	x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

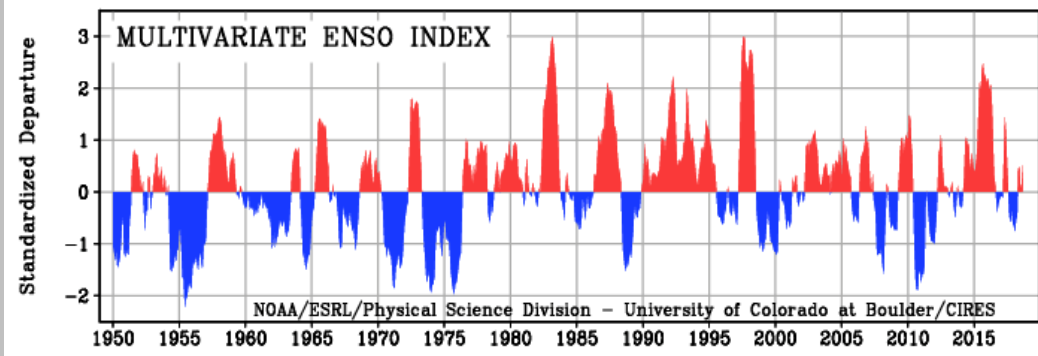


<http://services.swpc.noaa.gov/images/solar-cycle-sunspot-number.gif>

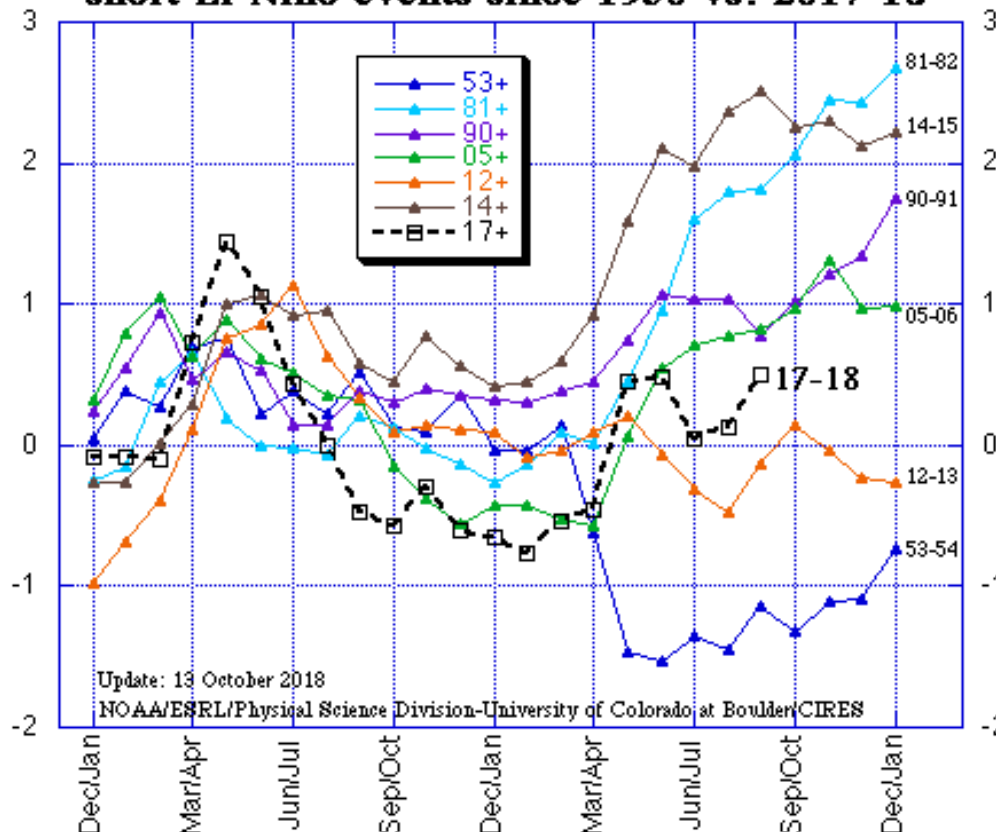
NOAA SEA SURFACE TEMPERATURES - "EL NIÑO"



MEI SIGNAL SUGGESTS "ENSO-NEUTRAL"



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



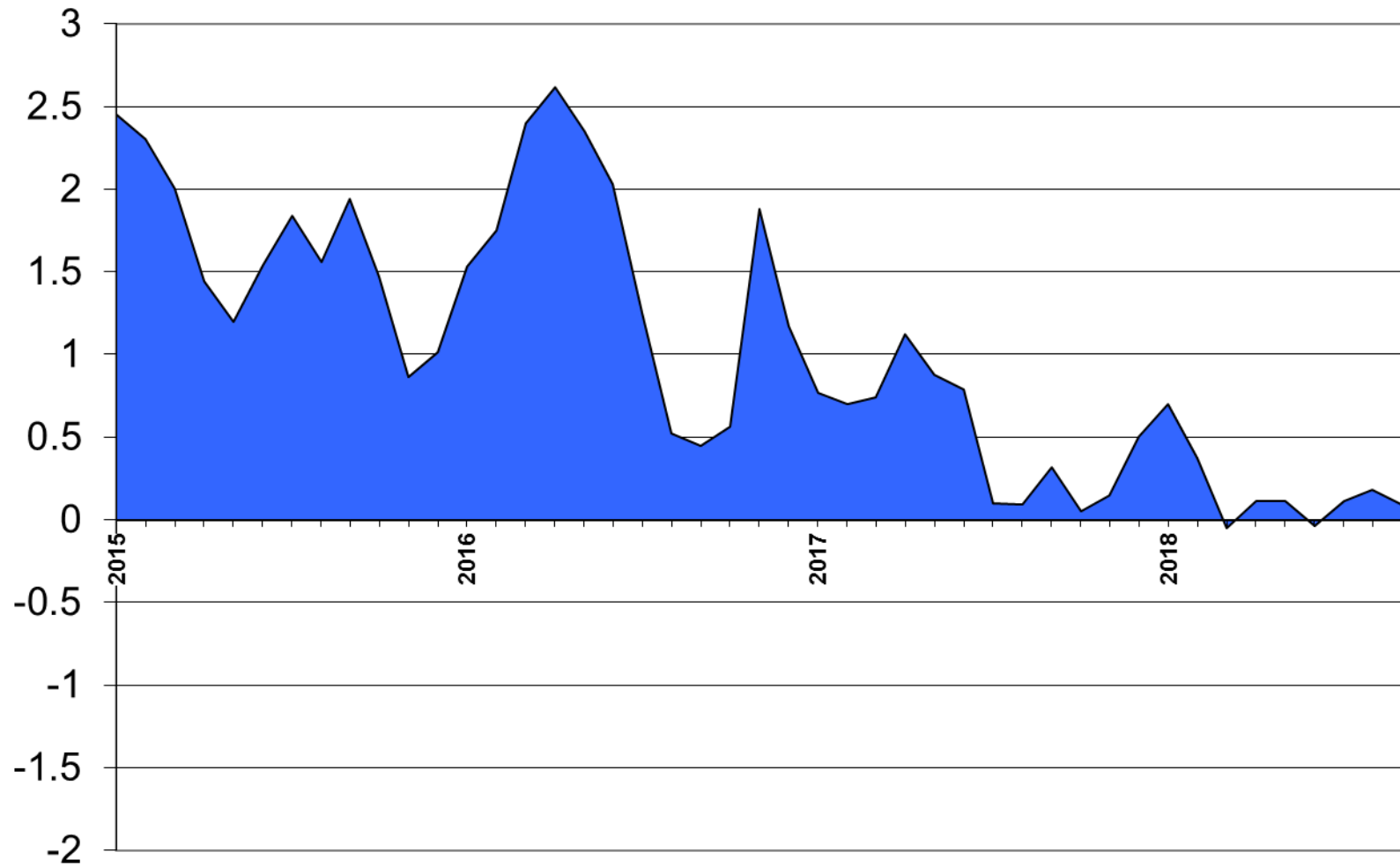
MEI – one index that tracks:

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

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

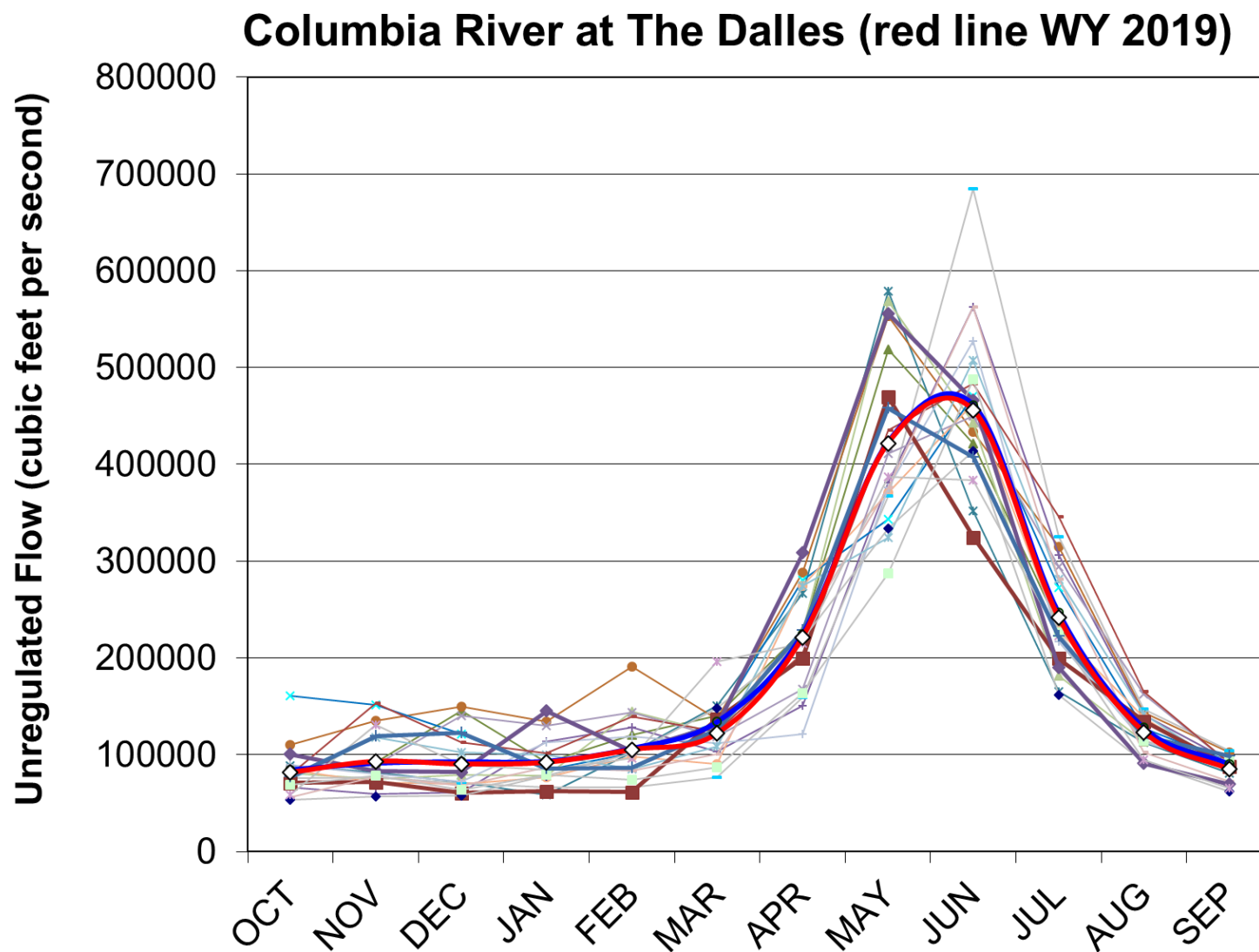
PDO SIGNAL: COLD PHASE...BUT NEAR NEUTRAL

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: **101 MAF** (± 11 MAF) or 100%, COLUMBIA RIVER AT THE DALLES, JANUARY - JULY.

...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

