

Winter 2019-2020 Climate Forecast

27th Winter Weather Meeting, OMSI and Oregon AMS, Portland



MULTNOMAH



UNIVERSITY



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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 contains "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 yellow box titled "2013 Bonneville Fish Count" with text about the unavailability of counts due to a federal government shutdown. Below this are two sections: "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 red "CONSUMPTION ADVISORY" banner is also visible. The footer contains links for "CRITFC Home", "Contact CRITFC", "Sitemap", "CRITFC RESOURCES", "RESEARCH", "ACTIVITIES", and "CONNECT".

Columbia River Inter-Tribal Fish Commission
putting fish back in the rivers

Jobs • Calendar • Donate • Contact • Press Room

Search CRITFC

About CRITFC | Salmon Culture | Member Tribes | Blog | Buy Salmon | Twitter | Facebook

FISH AND WATERSHEDS | TRIBAL TREATY FISHING RIGHTS | EDUCATION | FISHER SERVICES

Sharing Salmon Culture

Wya-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 »](#)

[Subscribe](#) [CRITFC Blog »](#)

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.

[Continue Reading »](#) [More Advocacy Issues »](#)

CONSUMPTION ADVISORY

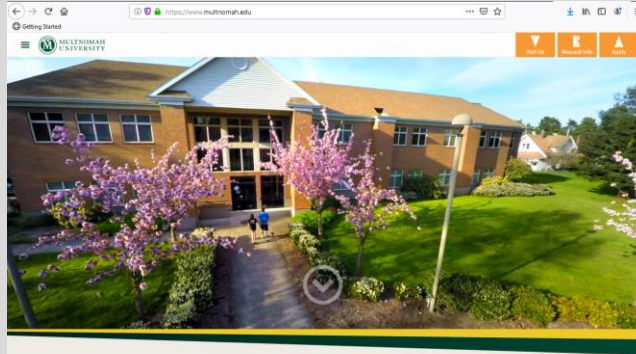
CRITFC Home | Contact CRITFC | Sitemap | CRITFC RESOURCES | RESEARCH | ACTIVITIES | CONNECT

- Jobs
- Scientific Reports
- Fisheries Management
- Facebook
- Calendar
- Data Resources
- Fish Restoration Projects
- Twitter

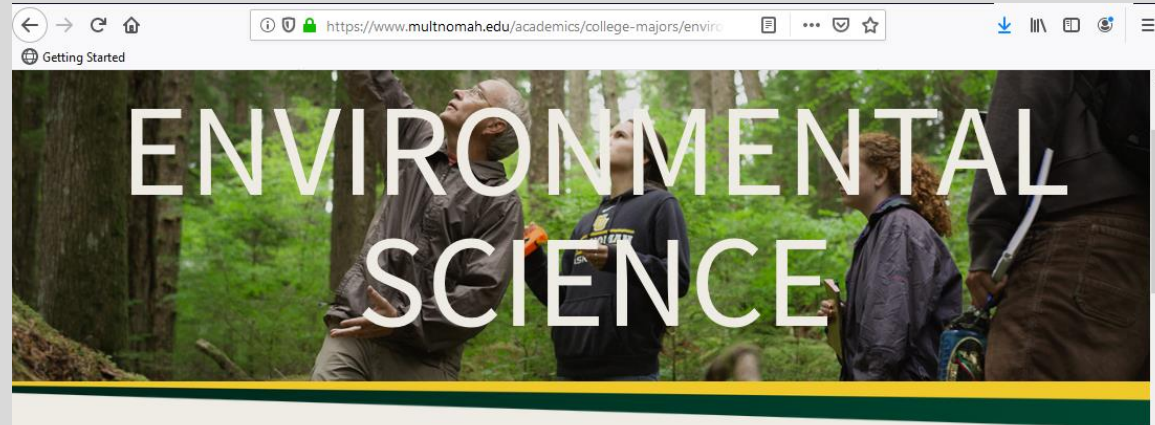


CRITFC website, <http://www.critfc.org>

Multnomah University



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Get the detailed info you need

First Name *

B.A. in Environmental Science

Be a catalyst for creation care

As an emerging environmental scientist, you'll incorporate studies in biology, chemistry, economics, politics, business and ethics to understand the relationship between humans and the natural world. You'll be equipped to pursue a career in urban development, field research, natural resource management, environmental restoration, or other related fields. And you'll emerge ready to tackle pressing creation care issues such as [climate change](#), pollution and sustainable agriculture.

Explore the field in depth

- Evaluate the many facets of human impact on the environment.
- Analyze environmental problems from a variety of disciplines, including the sciences, ethics, politics and economics.

MU website, <https://www.multnomah.edu/>



2018-2019 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)	-0.4	1.5	Near Normal (90 - 110%)	93%	51%
December	Near Normal (-1.8 to + 1.8 degF)	-0.2	3.3	Near Normal (90 - 110%)	94%	91%
January	Near Normal (-1.8 to + 1.8 degF)	1.1	1.7	Near Normal (90 - 110%)	106%	57%
February	Near Normal (-1.8 to + 1.8 degF)	0.5	-6.5	Below Normal (70 - 90%)	83%	103%
March	Near Normal (-1.8 to + 1.8 degF)	-0.3	-1.5	Below Normal (70 - 90%)	88%	43%
	average:	0.1	-0.3	average:	93%	69%

...but what about Snow events?!

Forecasted three events...one moderate, two minor (5.5-inch seasonal total), November to March.

Observed five snow events: Feb. 4/5 (1.2-inch); Feb. 9 (4.9-inch), Feb. 25 (0.3-inch), Feb. 26 (0.1-inch), March 6 (0.5-inch)...a **7.0-inch** seasonal total. ☺



2018-2019 Hood River Forecast Performance



HOOD RIVER							
Month:	Temperature (mean monthly):	Avg. (n=20)	Observed	Precipitation (% normal):	Avg. (n=20)	Observed	
November	Near Normal (-1.8 to + 1.8 degF)	-0.1	0.3	Near Normal (90 - 110%)	91%	47%	
December	Near Normal (-1.8 to + 1.8 degF)	-0.1	2.9	Near Normal (90 - 110%)	106%	105%	
January	Above Normal (> + 1.8 degF)	1.9	1.6	Near Normal (90 - 110%)	107%	56%	
February	Near Normal (-1.8 to + 1.8 degF)	1.6	-7.5	Below Normal (70 - 90%)	88%	76%	
March	Near Normal (-1.8 to + 1.8 degF)	0	-5.7	Near Normal (90 - 110%)	101%	100%	
	average:	0.7	-1.7	average:	99%	77%	





2018-2019 Government Camp Climate Forecast Performance

Month:	Temperature:	Observed	Precipitation:	Observed	Snowfall	Observed	Forecast	Observed
November	0	2.1	101%	67%	25	9	110%	22%
December	0	-0.1	100%	117%	48	45	118%	83%
January	1.3	2.6	105%	47%	54	15	109%	30%
February	0.5	-8.6	95%	76%	42	93	102%	248%
March	0.4	-2.1	93%	44%	45	28	117%	87%
April	0.2	2	114%	170%	23	5	119%	23%
May	-0.2	3.5	106%	40%	4	0	143%	0%
average:	0.3	-0.1	102%	80%	241	195	117%	70%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:
 101 MAF (issued Oct. 2018), 100%. Observed: 101 MAF. **Error $\pm 0\%$.**
 95 MAF (issued April 2019), 94%. Observed: 101 MAF. Error $\pm 6\%$.



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 (1950-2019) vs. historic runoff for the Columbia River at The Dalles, then compute a 2020 Water Supply Forecast.
- Select the "right" mixture of 20 past Water Years (next slide).
- Pattern recognition is key: ENSO-Neutral, *El Niño*, *La Niña* years.

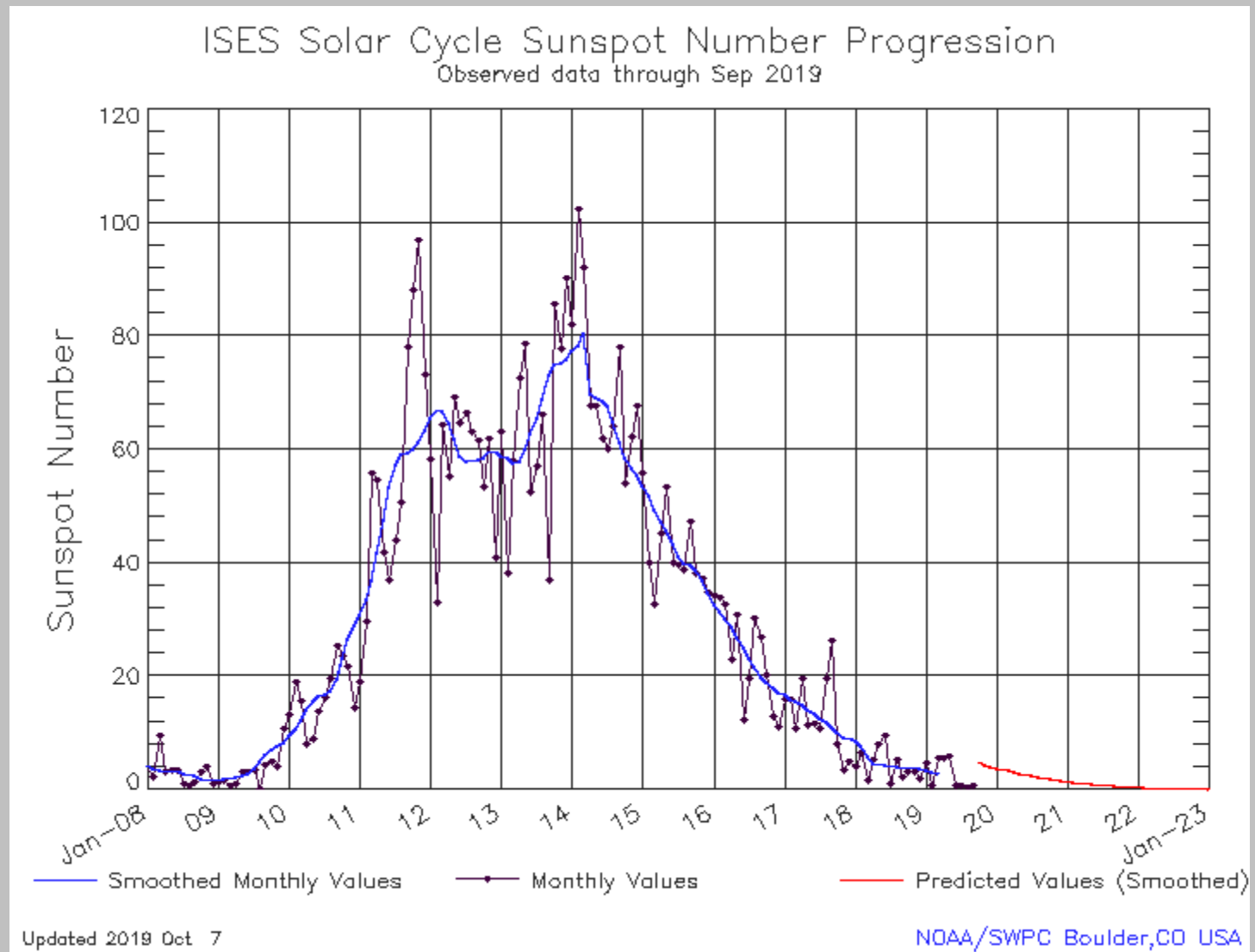


Introduction – Methods

Ensemble forecasting – 20 past water years:

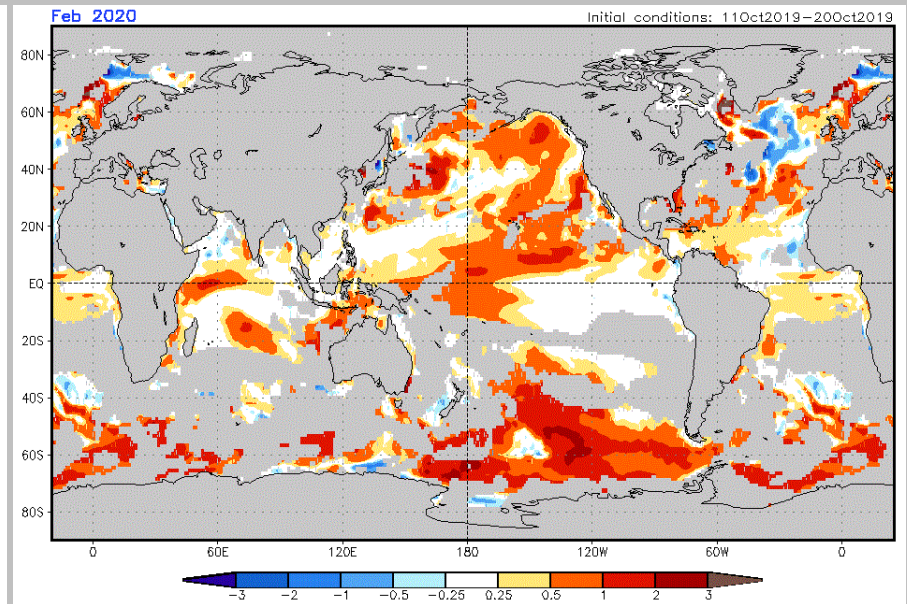
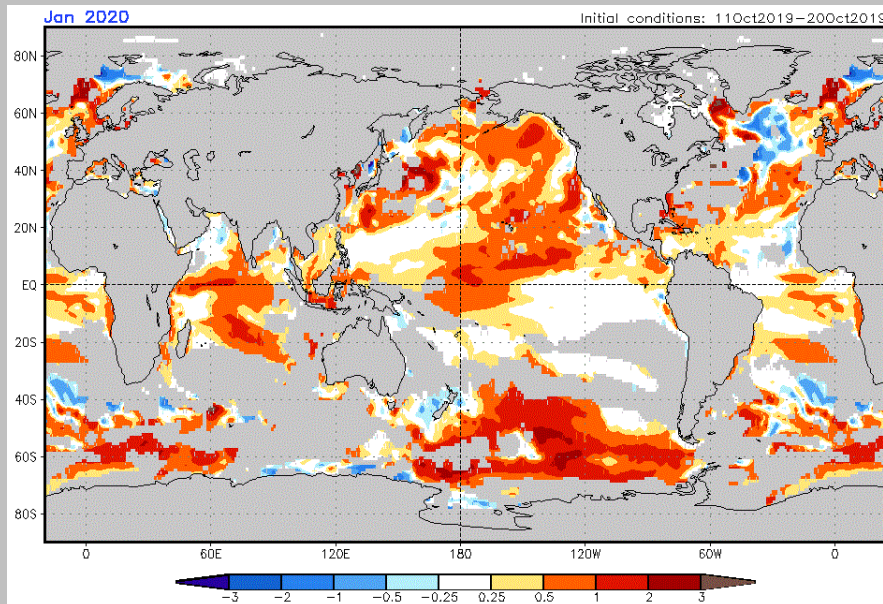
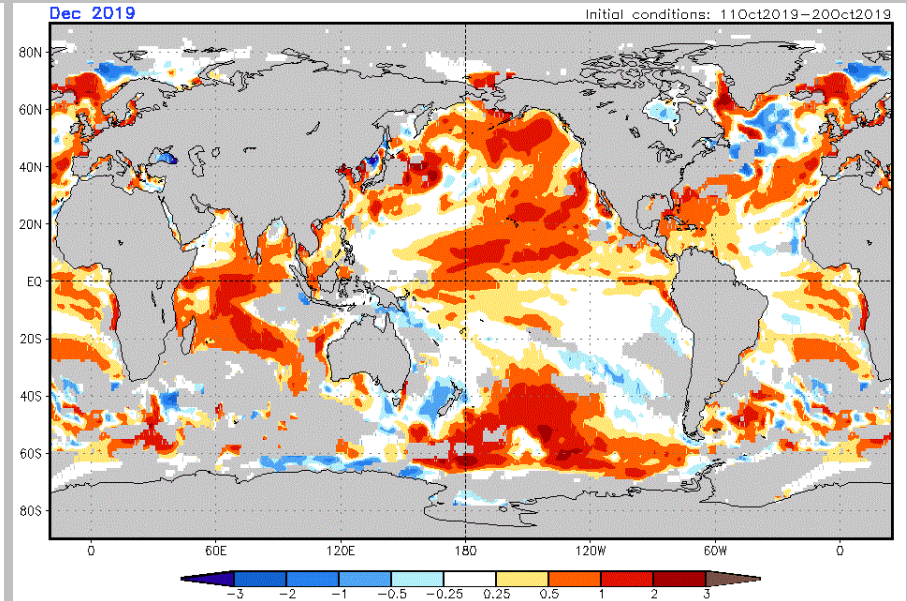
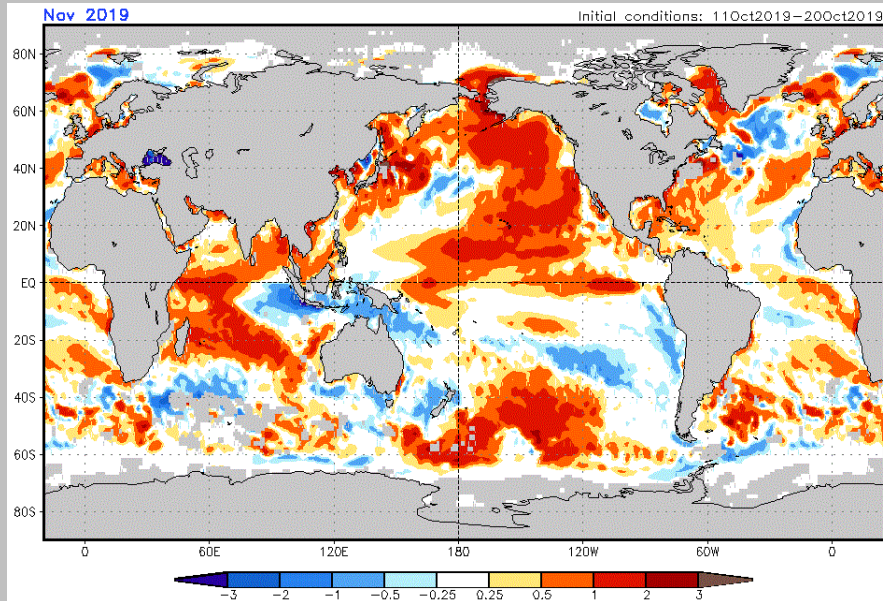
WY2020	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1933	108.4	x			X	
1946	111.8	x			X	
1947	106.7		x		X	
1949	102.5		x		X	
1951	125		x			X
1953	106.8		x		X	
1955	96.9		x			X
1960	102.5		x		X	
1962	97.23		x		X	
1964	107.3		x	X		
1975	111.9		x			X
1985	90.48	x				X
1993	88.1	x			X	
2003	87.7		x	X		
2005	81.3		x	X		
2007	95.7		x		X	
2009	90.2		x			X
2010	84.7		x	X		
2013	97.7		x		X	
2019	100.9		x	X		
	(MAF)					
Average:	99.7		ENSO-neutral/La Nina border:			4
STDEV:	10.6		Solar minimums:			7

SUNSPOT COUNTS – “LA NIÑA”



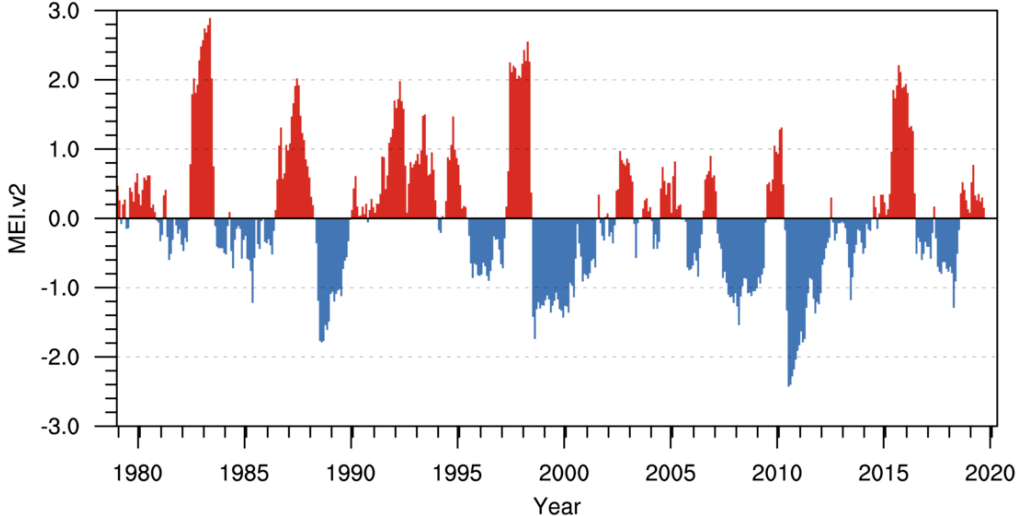
<http://services.swpc.noaa.gov/images/solar-cycle-sunspot-number.gif>

NOAA SEA SURFACE TEMPERATURES - "ENSO-neutral"



MEI SIGNAL SUGGESTS "ENSO-NEUTRAL"

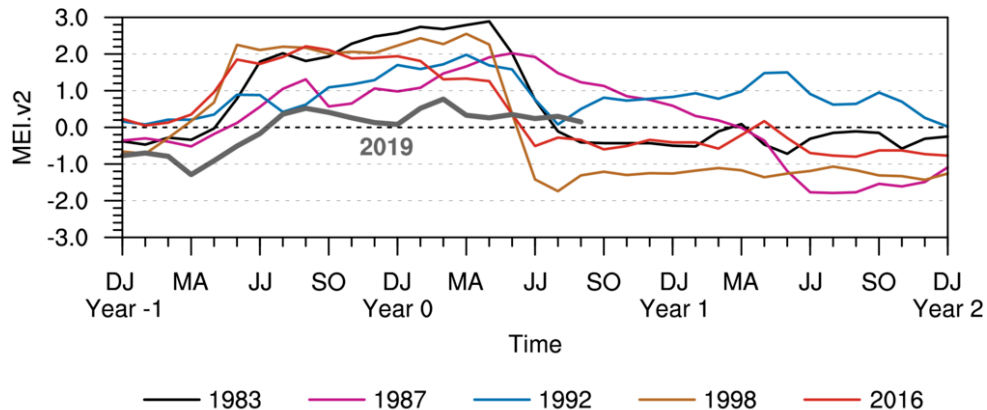
Multivariate ENSO Index Version 2



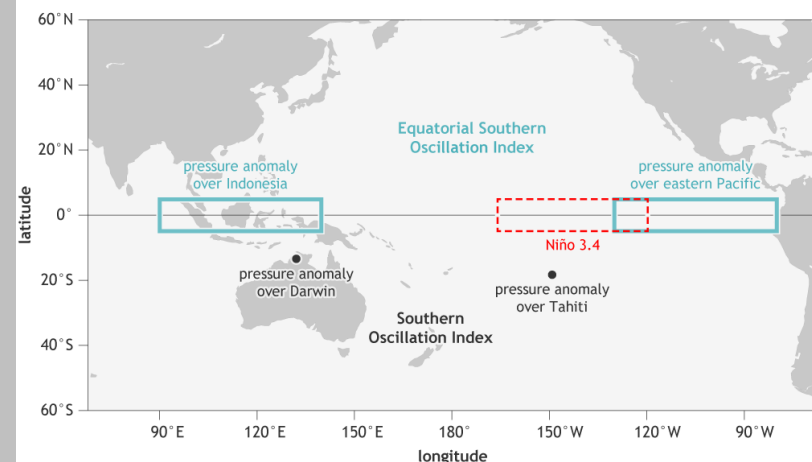
MEI – one index that tracks:

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

MEI.v2 Evolution of Current ENSO Event in Historical Context

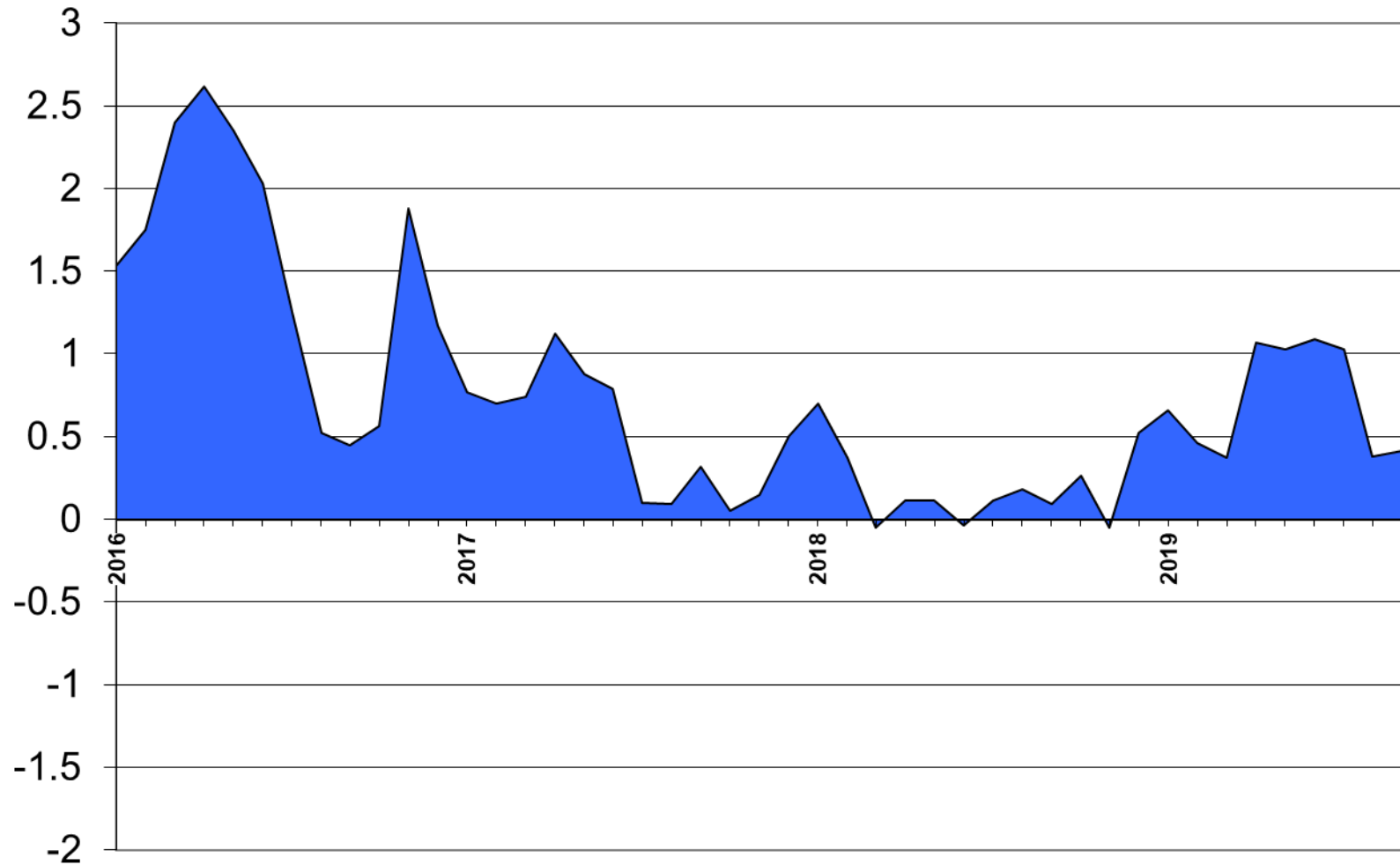


ENSO indexes



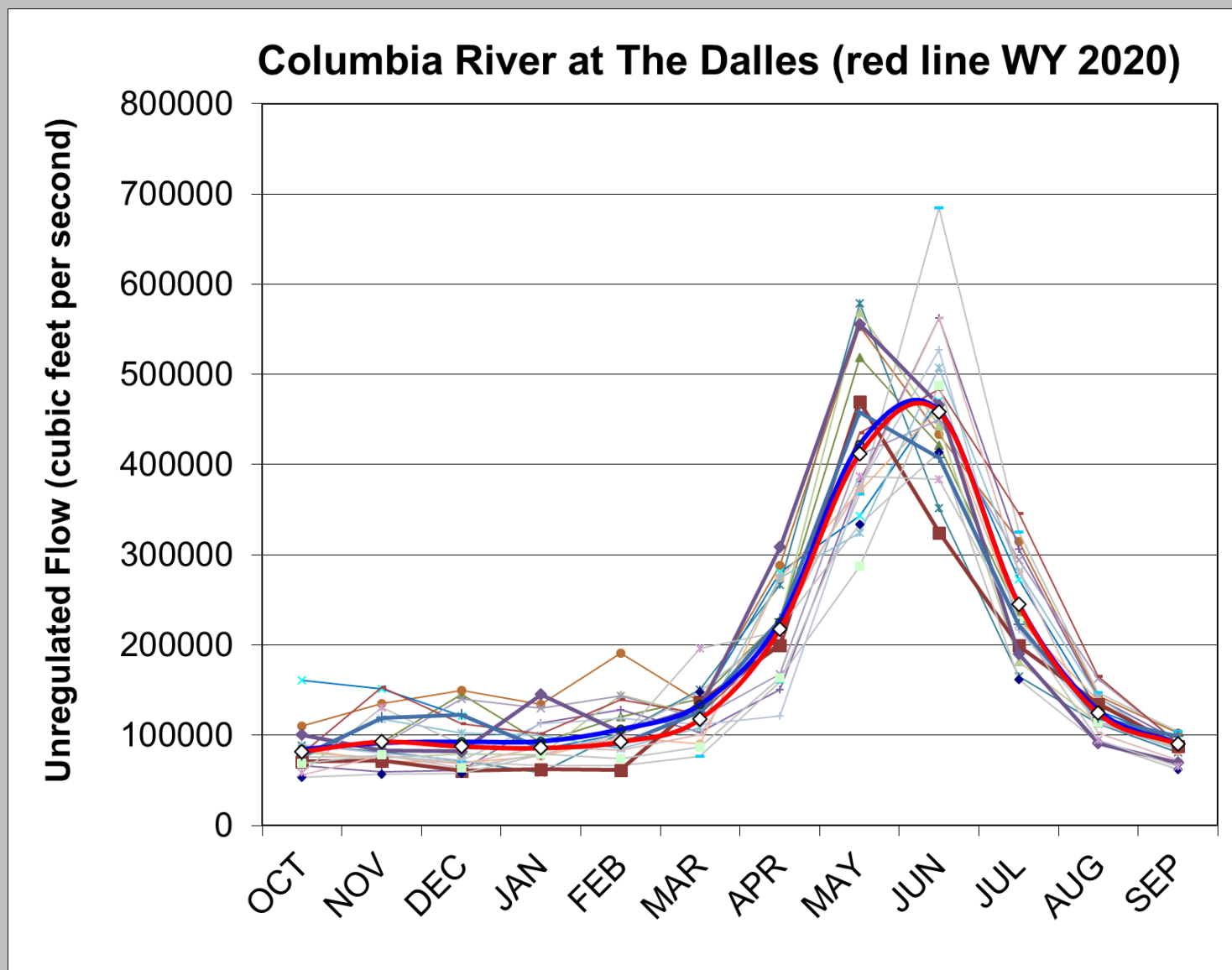
PDO SIGNAL: COLD PHASE...BUT NEAR NEUTRAL

PACIFIC DECADAL OSCILLATION (PDO)



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

ENSEMBLE STREAMFLOW FORECAST



Blue line = long-term average (WY 1929-2019)



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%)	109%
December	Near Normal (-1.8 to + 1.8 degF)	-0.3	Near Normal (90 - 110%)	93%
January	Near Normal (-1.8 to + 1.8 degF)	0.9	Below Normal (70 - 90%)	86%
February	Near Normal (-1.8 to + 1.8 degF)	0	Below Normal (70 - 90%)	84%
March	Near Normal (-1.8 to + 1.8 degF)	-1	Above Normal (110 - 130%)	117%

Expect many snow events: **152%** of normal (NOV-MAR); seasonal total **29-inches**.

NOV 2-inch (up to 6), DEC 7-inch (up to 17), JAN 7-inch (up to 14), FEB 9-inch (up to 22), MAR 4-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: **263**-inches or **141%** 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: **100 MAF** (± 10 MAF) or 99%, COLUMBIA RIVER AT THE DALLES, JANUARY - JULY.

...but what about Snow events?!

Expect **SEVEN** events: 2 moderate (3 inch), 5 minor (0.25-0.5 inch).

NOV 0.25-inch (up to 1-inch), DEC 1-inch (up to 6), JAN 2.5-inch (up to 6),
FEB 2-inch (up to 5.5), and MAR 1-inch (up to 4).

(25%- 90% likely) Season: **7.5** inches

