

Winter 2021-2022 Climate Forecast

29th Winter Weather Forecast 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 with a top navigation bar containing the logo, name, tagline 'putting fish back in the rivers', and links for Jobs, Calendar, Donate, Contact, and Press Room. A search bar is also present. Below the navigation bar are tabs for About CRITFC, Salmon Culture, Member Tribes, Blog, Buy Salmon, and social media links. A main content area features a large image of a person in traditional regalia holding a fishing net, with a sidebar for '2013 Bonneville Fish Count' stating that counts are unavailable due to a federal government shutdown. Below this are sections for 'Currents' (Tribal Restoration Efforts Paying Off) and 'Advocacy Issues' (Resident Fish Consumption Advisory). The footer contains links to CRITFC Home, Resources, Research, Activities, and Connect.

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

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

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.

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

CONSUMPTION ADVISORY

CRITFC Home | Contact CRITFC | Sitemap | CRITFC RESOURCES (Jobs, Calendar) | RESEARCH (Scientific Reports, Data Resources) | ACTIVITIES (Fisheries Management, Fish Restoration Projects) | CONNECT (Facebook, Twitter)



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



2020-2021 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)	0.6	1.1	Above Normal (110 - 130%)	112%	95%
December	Near Normal (-1.8 to + 1.8 degF)	-0.1	3.2	Near Normal (90 - 110%)	100%	92%
January	Near Normal (-1.8 to + 1.8 degF)	0.8	3.4	Above Normal (110 - 130%)	114%	144%
February	Near Normal (-1.8 to + 1.8 degF)	-0.6	-2.2	Near Normal (90 - 110%)	94%	93%
March	Near Normal (-1.8 to + 1.8 degF)	-1.5	-1	Near Normal (90 - 110%)	100%	43%
	average:	-0.2	0.9	average:	104%	93%

...but what about Snow events?!

Forecasted five events: two moderate, three minor (6-inch seasonal total), November to March.

Observed only two snow events: January 26 (trace) and Feb. 12-14... a **10-inch** seasonal total.



2020-2021 Hood River 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)	-0.1	0.2	Near Normal (90 - 110%)	109%	102%
December	Near Normal (-1.8 to + 1.8 degF)	-0.3	2.9	Near Normal (90 - 110%)	93%	74%
January	Near Normal (-1.8 to + 1.8 degF)	0.9	3.4	Near Normal (90 - 110%)	86%	99%
February	Above Normal (> +1.8 degF)	0	-0.7	Near Normal (90 - 110%)	84%	83%
March	Near Normal (-1.8 to + 1.8 degF)	-1	-0.9	Above Normal (110 - 130%)	117%	20%
	average:	-0.1	1.0	average:	98%	76%



2020-2021 Government Camp Climate Forecast Performance



Month:	Temperature:	Observed	Precipitation:	Observed	Snowfall	Observed	Forecast	Observed
November	0	3.2	101%	32%	25	21	110%	84%
December	0	2.6	100%	105%	48	48.5	118%	89%
January	1.3	2	105%	82%	54	22	109%	44%
February	0.5	-4.2	95%	216%	42	134.5	102%	361%
March	0.4	-0.9	93%	59%	45	28.5	117%	80%
April	0.2	2.8	114%	25%	23	17.5	119%	23%
May	-0.2	-0.1	106%	74%	4	0.5	143%	12%
average:	0.3	0.8	102%	85%	241	272.5	117%	99%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:
 115 MAF (issued Oct. 2020), 114%. Observed: 82 MAF. Error $\pm 40\%$.
 114 MAF (issued April 2021), 113%. Observed: 82 MAF. Error $\pm 39\%$.



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 over the long term (decades).
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 (1950-2021) vs. historic runoff for the Columbia River at The Dalles, then compute a 2022 Water Supply Forecast.
- Select the "right" mixture of 20 past Water Years (next slide).
- Pattern recognition is key: *La Niña* years, double *La Niña* pairs.



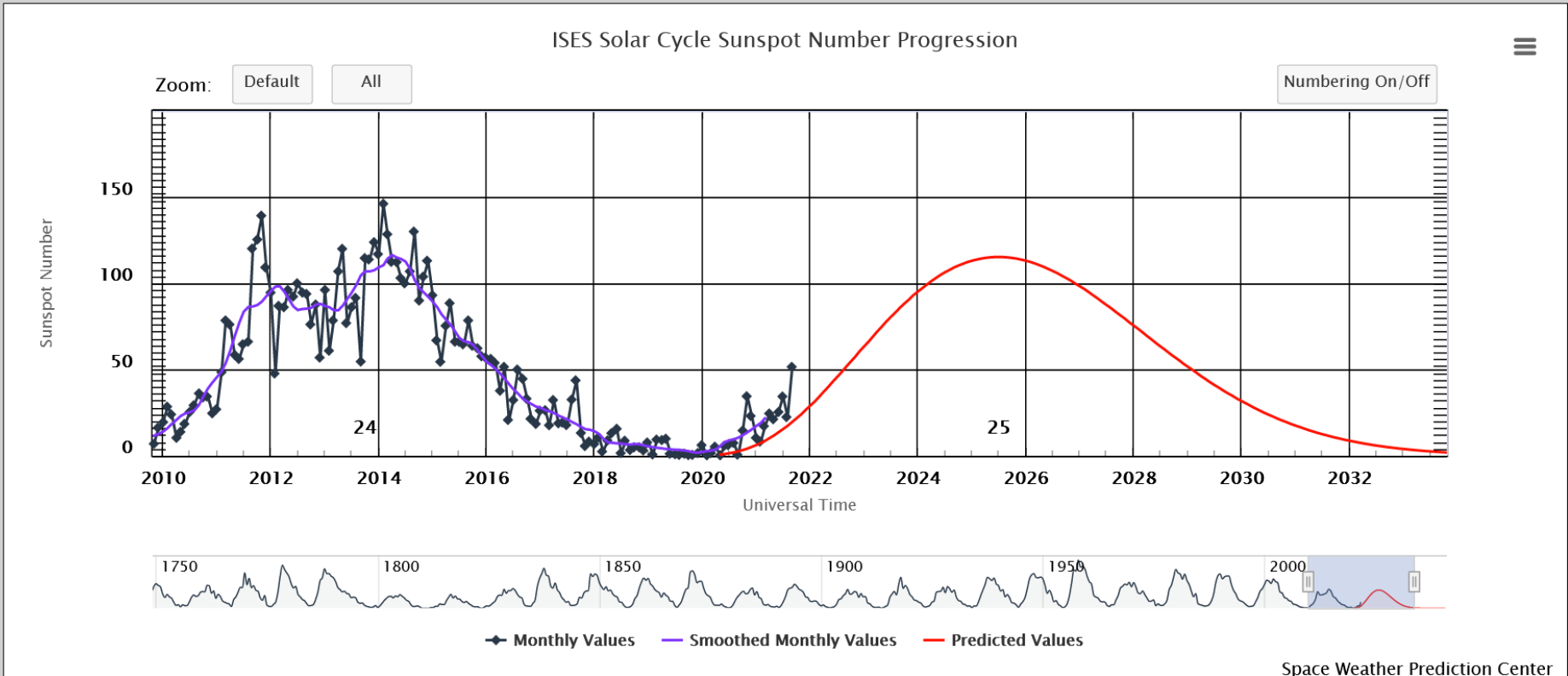
Introduction – Methods

Ensemble forecasting – 20 past water years:

WY2022	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1950	124.9		x			X
1951	125		x			X
1960	102.5		x		X	
1965	126.1		x			X
1967	113.7		x		X	
1971	138.9		x			X
1972	152.5		x			X
1975	111.9		x			X
1976	122.7		x			X
1999	124.1		x			X
2000	98		x			X
2002	103.8		x		X	
2006	114.7		x			X
2008	99.2		x			X
2009	90.2		x			X
2011	141.9		x			X
2012	129.4		x			X
2017	136.8		x			X
2018	118.5		x			X
2021	82.1		x			X
	(MAF)					
Average:	117.8		La-Nina:			17
STDEV:	17.6		Solar minimums:			5
			Double La-Nina events:			15
			High Water years (>120 MAF)			10

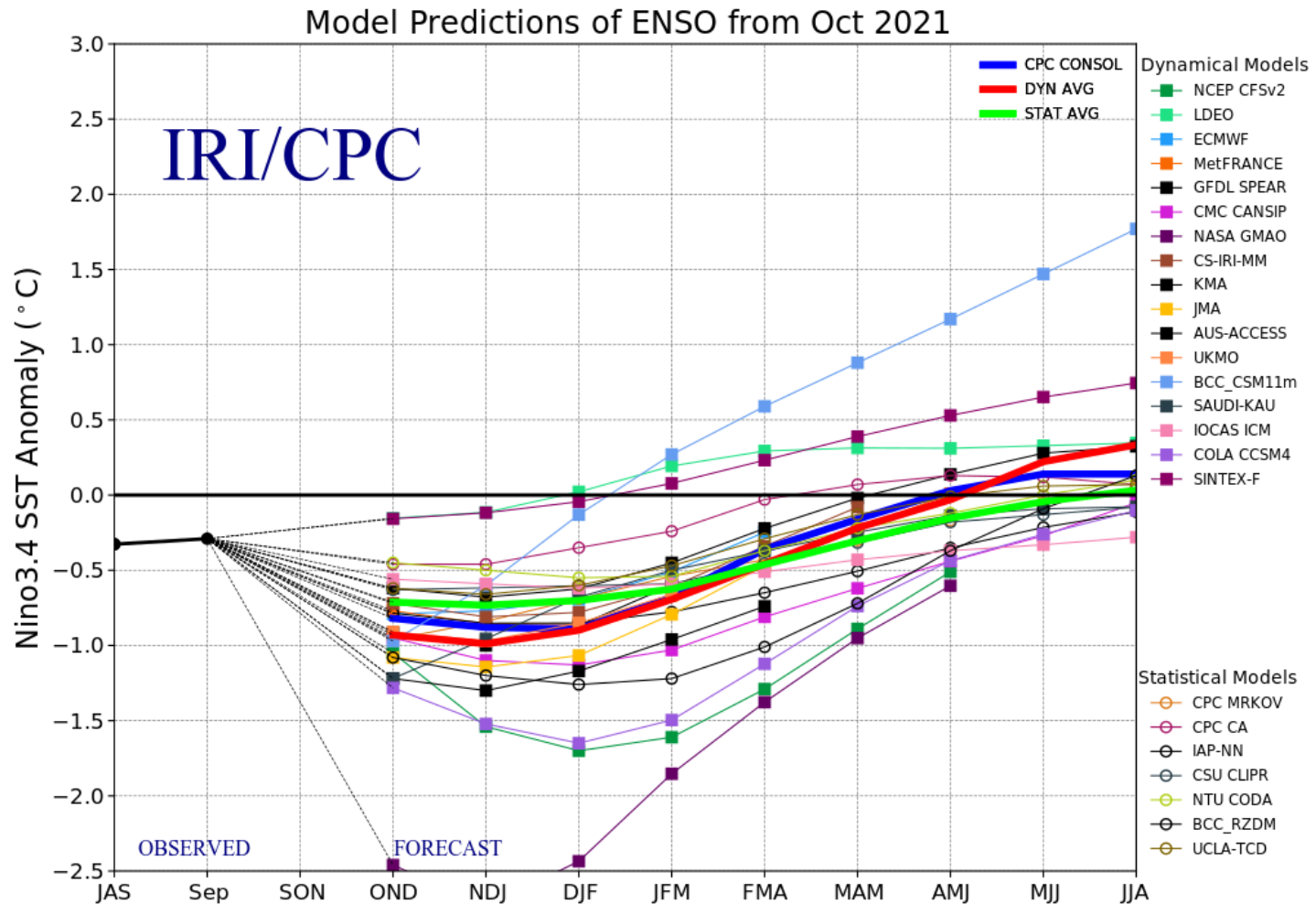
SUNSPOT COUNTS – “*La Niña* winter”

SOLAR CYCLE PROGRESSION

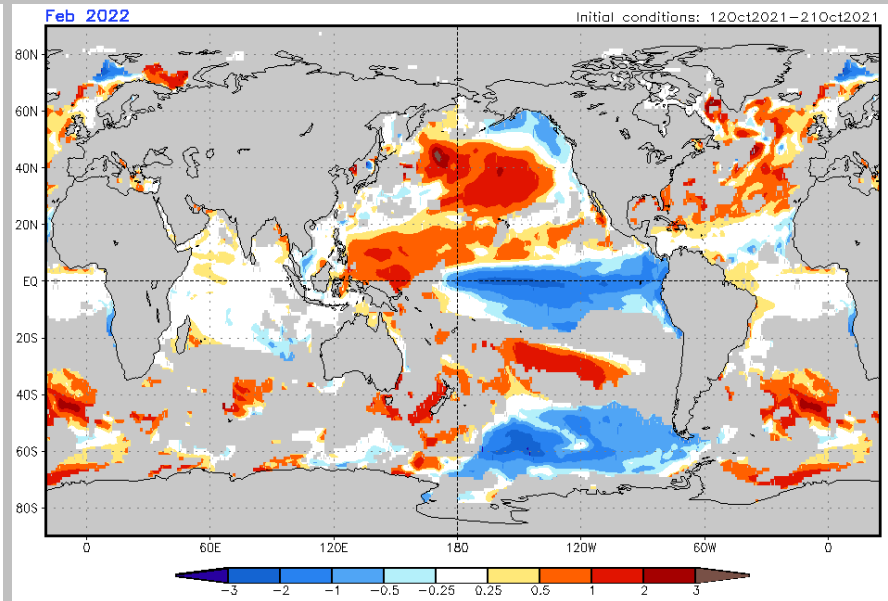
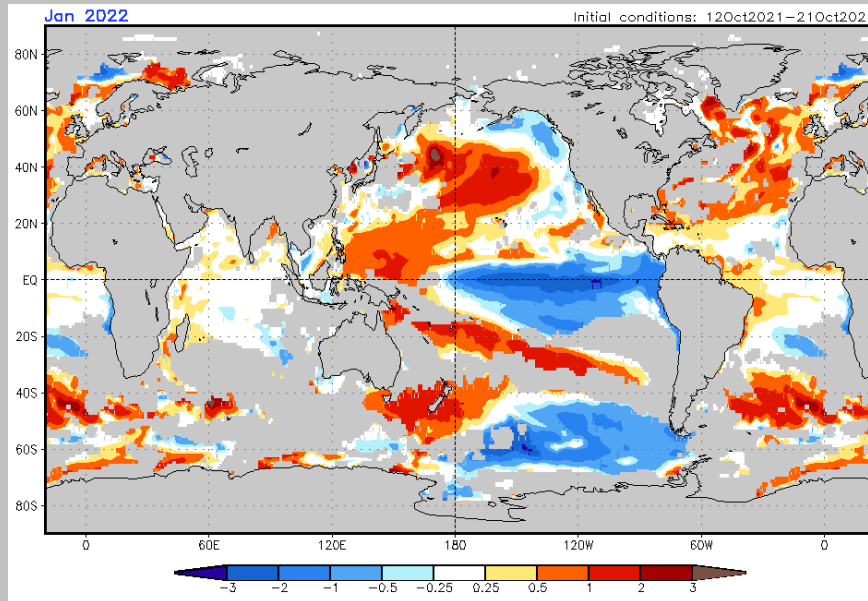
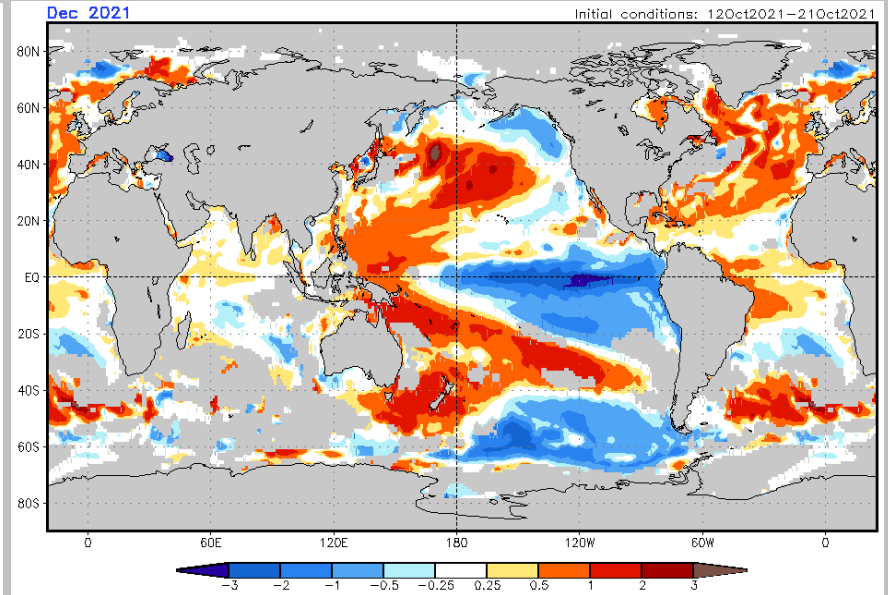
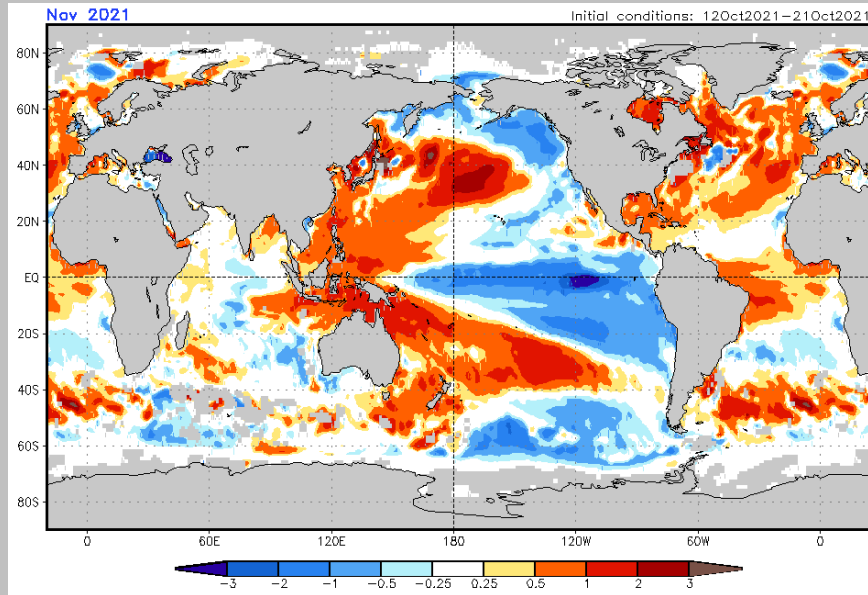


<https://www.swpc.noaa.gov/products/solar-cycle-progression>

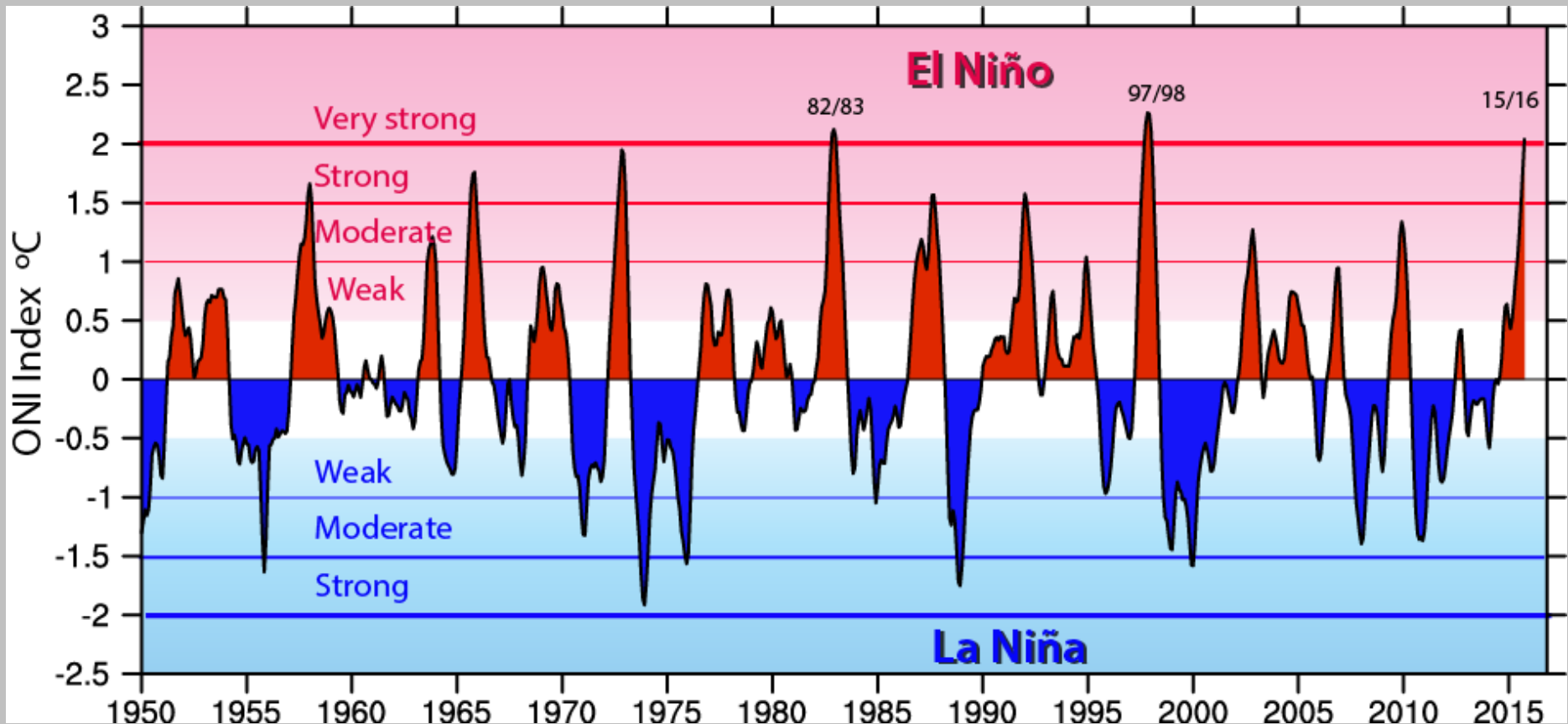
COLUMBIA U. IRI & NOAA's CPC ENSO FORECAST



NOAA SEA SURFACE TEMPERATURES - "*La Niña* winter"

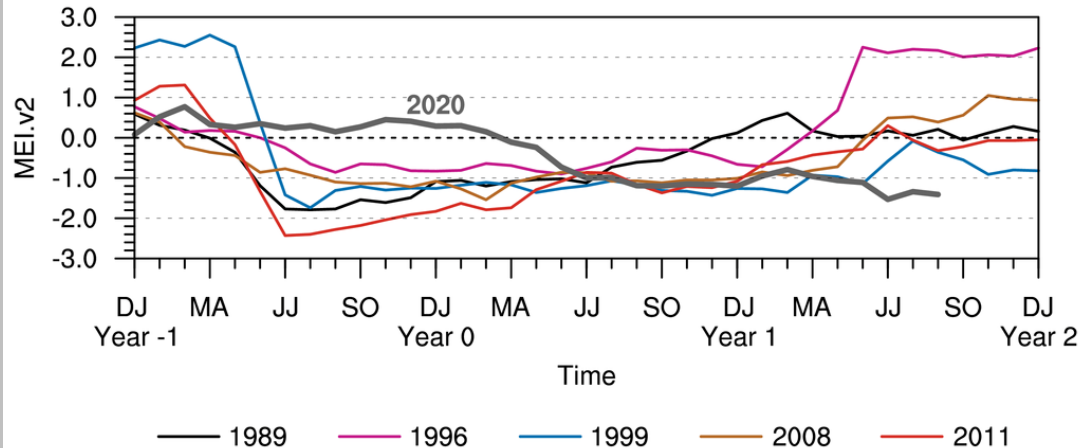


NINO SEA SURFACE TEMPERATURE INDICES



MEI SIGNAL SUGGESTS “*La Niña* winter”

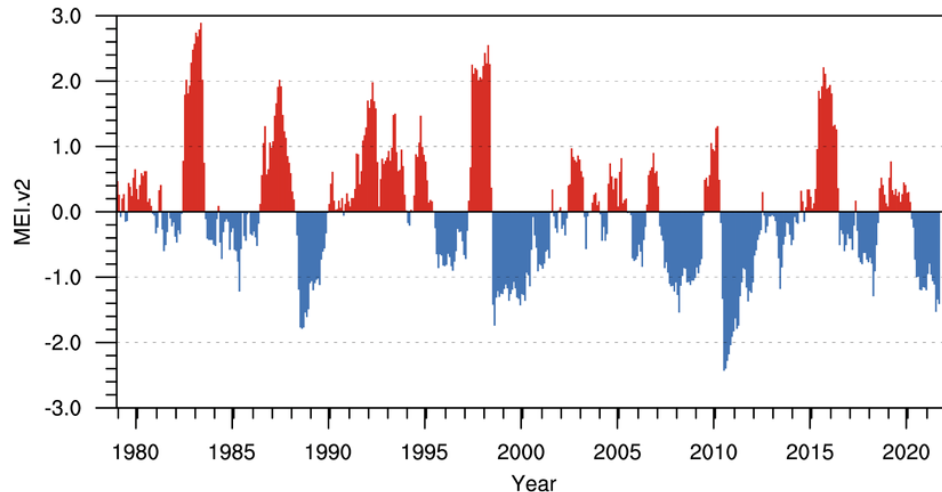
MEI.v2 Evolution of Current ENSO Event in Historical Context



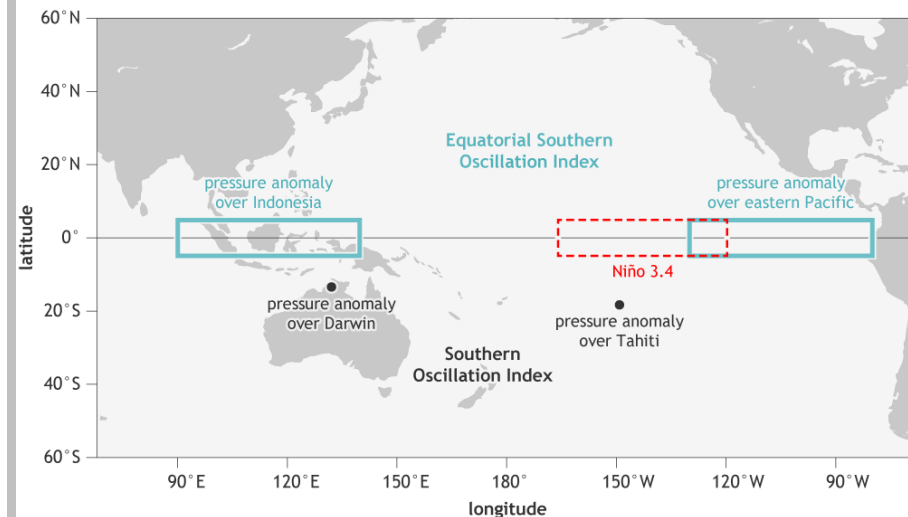
MEI – one index that tracks:

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

Multivariate ENSO Index Version 2



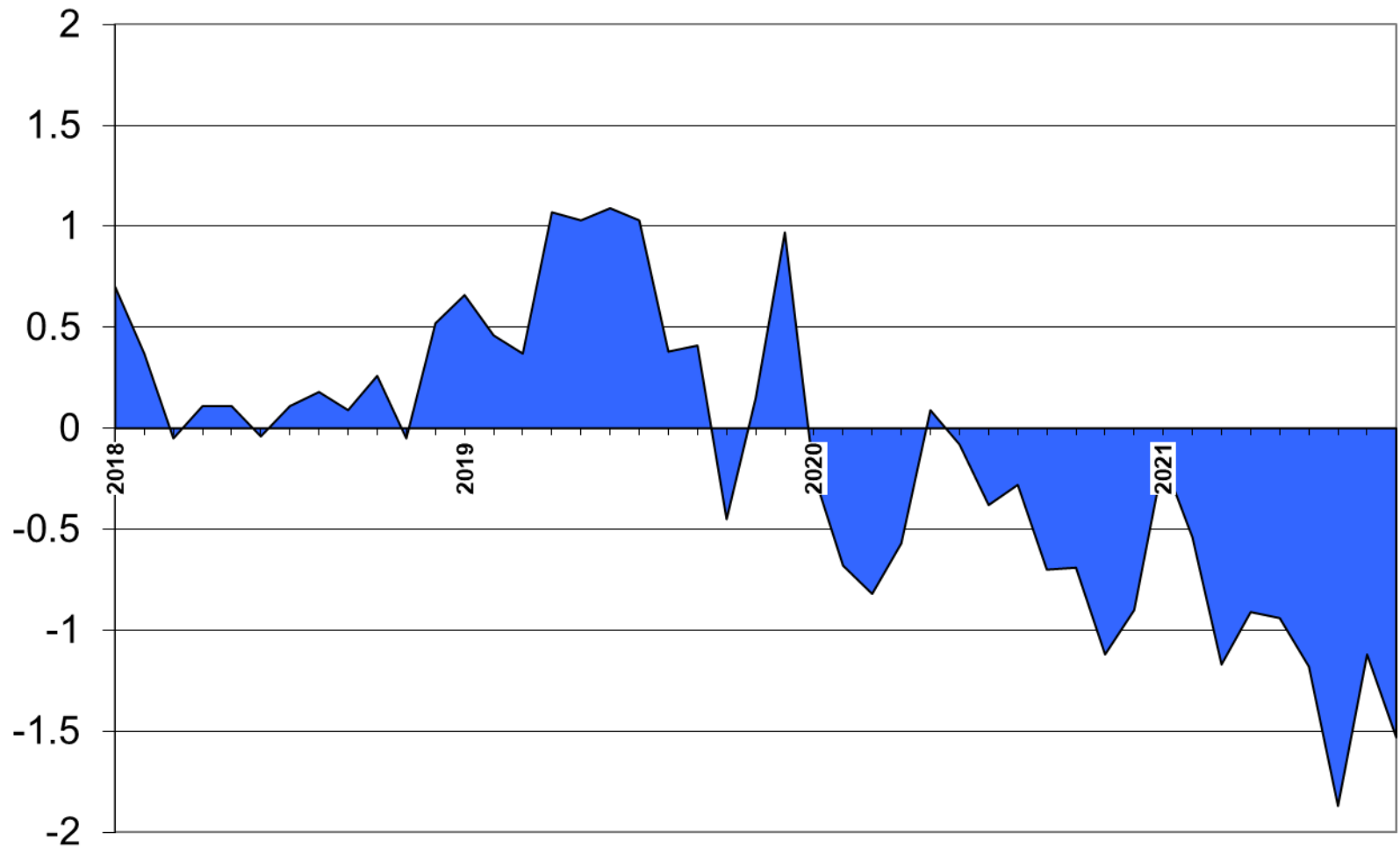
ENSO indexes



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

PDO SIGNAL: COLD PHASE...MORE NEGATIVE

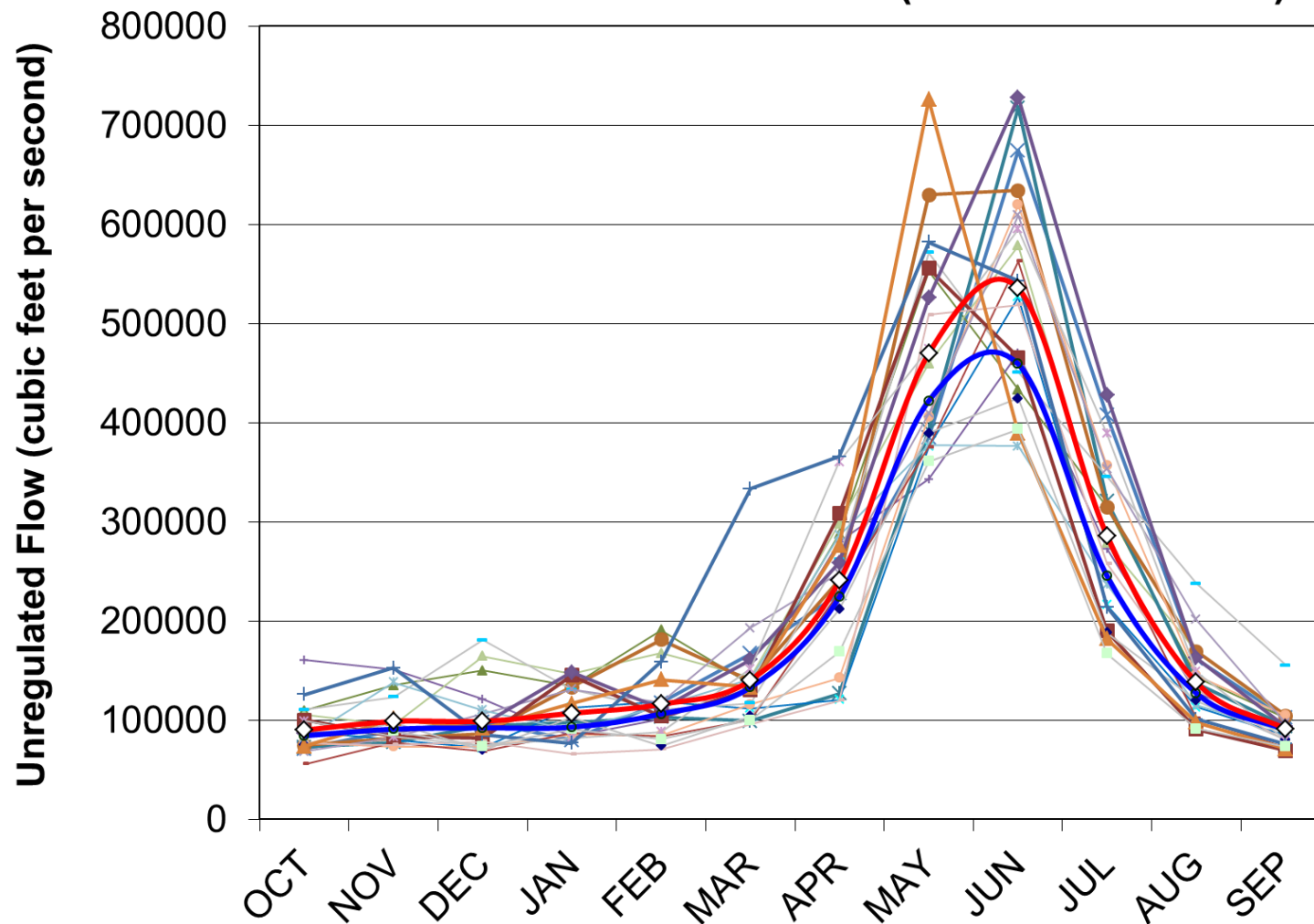
PACIFIC DECADAL OSCILLATION (PDO)



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

ENSEMBLE STREAMFLOW FORECAST

Columbia River at The Dalles (red line WY 2022)



Blue line = long-term average (WY 1929-2021)



Summary: Columbia R. Gorge

Hood River, Oregon

Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)
November	Near Normal (-1.8 to + 1.8 degF)	0.8	Near Normal (90 - 110%)	101%
December	Near Normal (-1.8 to + 1.8 degF)	0.3	Near Normal (90 - 110%)	108%
January	Near Normal (-1.8 to + 1.8 degF)	0.8	Above Normal (110 - 130%)	114%
February	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	93%
March	Below Normal (< -1.8 degF)	-1.9	Above Normal (110 - 130%)	124%

Expect many snow events: **119%** of normal (NOV-MAR); seasonal total **30-inches**.

NOV 1-inch (up to 4), DEC 10-inch (up to 22), JAN 12-inch (up to 32), FEB 4-inch (up to 10), MAR 2-inch



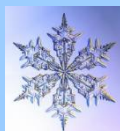


Summary: the mountains

Government Camp, Oregon

Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)	Snowfall	% Normal
November	Near Normal (-1.8 to + 1.8 degF)	0.8	Above Normal (110 - 130%)	113%	32	125%
December	Near Normal (-1.8 to + 1.8 degF)	-0.9	Above Normal (110 - 130%)	126%	64	145%
January	Near Normal (-1.8 to + 1.8 degF)	0.2	Way Above Normal (130 - 150%)	134%	72	142%
February	Near Normal (-1.8 to + 1.8 degF)	-1.2	Above Normal (110 - 130%)	121%	55	137%
March	Near Normal (-1.8 to + 1.8 degF)	-2	Above Normal (110 - 130%)	122%	55	142%
April	Near Normal (-1.8 to + 1.8 degF)	-1.2	Near Normal (90 - 110%)	96%	25	118%
May	Near Normal (-1.8 to + 1.8 degF)	-0.5	Near Normal (90 - 110%)	96%	5	168%

Expect a seasonal total of: **310**-inches or **140%** 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)	0.9	Above Normal (110 - 130%)	110%
December	Near Normal (-1.8 to + 1.8 degF)	0.3	Near Normal (90 - 110%)	98%
January	Near Normal (-1.8 to + 1.8 degF)	0.5	Above Normal (110 - 130%)	122%
February	Near Normal (-1.8 to + 1.8 degF)	-0.8	Near Normal (90 - 110%)	99%
March	Near Normal (-1.8 to + 1.8 degF)	-1.6	Above Normal (110 - 130%)	111%

EXPECT MEDIUM VARIABILITY – HARD RAIN EVENTS, FLOODS, FOG, WIND STORMS, GORGE WIND, FREEZING RAIN, etc.

WATER SUPPLY FORECAST: **118 MAF** (± 17 MAF) or **116%**, COLUMBIA RIVER AT THE DALLES, JANUARY - JULY.

...but what about Snow events?!

Expect **FOUR** events: 2 moderate (2-3 inch), 2 minor (1 inch or less).

NOV 0-inch, DEC 2-inch (up to 7), JAN 4-inch (up to 13), FEB 1-inch (up to 4), and MAR 1-inch (up to 4).

(65% - 90% likely) Season: **8-inches**

