

Winter 2020-2021 Weather Forecast

TMT Year-End-Review Meeting



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 horizontal menu lists "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 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](#)

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 »](#)

CONSUMPTION ADVISORY

[More Advocacy Issues »](#)

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



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



2019-2020 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%	27%
December	Near Normal (-1.8 to + 1.8 degF)	-0.2	2.3	Near Normal (90 - 110%)	94%	79%
January	Near Normal (-1.8 to + 1.8 degF)	1.1	4.4	Near Normal (90 - 110%)	106%	155%
February	Near Normal (-1.8 to + 1.8 degF)	0.5	0.1	Below Normal (70 - 90%)	83%	42%
March	Near Normal (-1.8 to + 1.8 degF)	-0.3	-1.8	Below Normal (70 - 90%)	88%	66%
	average:	0.1	1.3	average:	93%	74%

...but what about Snow events?!

Forecasted seven events... two moderate, five minor (7.5-inch seasonal total), November to March.

Observed only one snow event: March 14 (0.5-inch)... a **0.5-inch** seasonal total. ☹️



2019-2020 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	-0.4	Near Normal (90 - 110%)	109%	14%
December	Near Normal (-1.8 to + 1.8 degF)	-0.3	2	Near Normal (90 - 110%)	93%	58%
January	Near Normal (-1.8 to + 1.8 degF)	0.9	3.5	Near Normal (90 - 110%)	86%	143%
February	Above Normal (> +1.8 degF)	0	3	Near Normal (90 - 110%)	84%	43%
March	Near Normal (-1.8 to + 1.8 degF)	-1	-1.2	Above Normal (110 - 130%)	117%	72%
	average:	-0.1	1.4	average:	98%	66%





2019-2020 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	2.7	100%	45%	48	19.5	118%	36%
January	1.3	1	105%	176%	54	102	109%	206%
February	0.5	-0.6	95%	145%	42	38	102%	102%
March	0.4	-1.7	93%	69%	45	33	117%	101%
April	0.2	2.3	114%	50%	23	7	119%	32%
May	-0.2	1.9	106%	118%	4	5	143%	91%
average:	0.3	1.3	102%	91%	241	225.5	117%	93%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:
 98 MAF (issued Oct. 2019), 97%. Observed: 101 MAF. **Error $\pm 3\%$.**
 97 MAF (issued April 2020), 96%. Observed: 101 MAF. Error $\pm 4\%$.

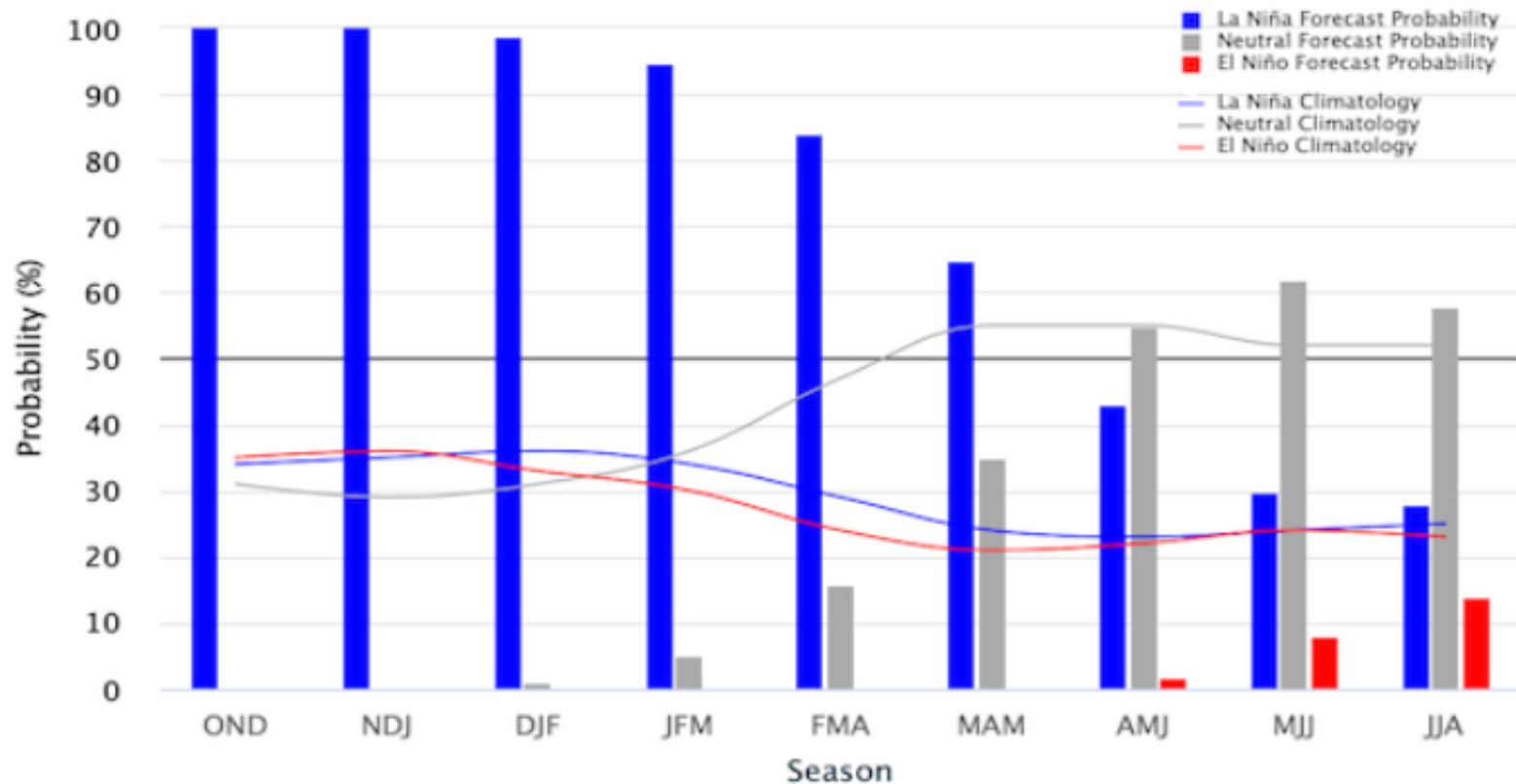
NOAA/CPC and Columbia U. IRI ENSO 2020-2021 Forecast



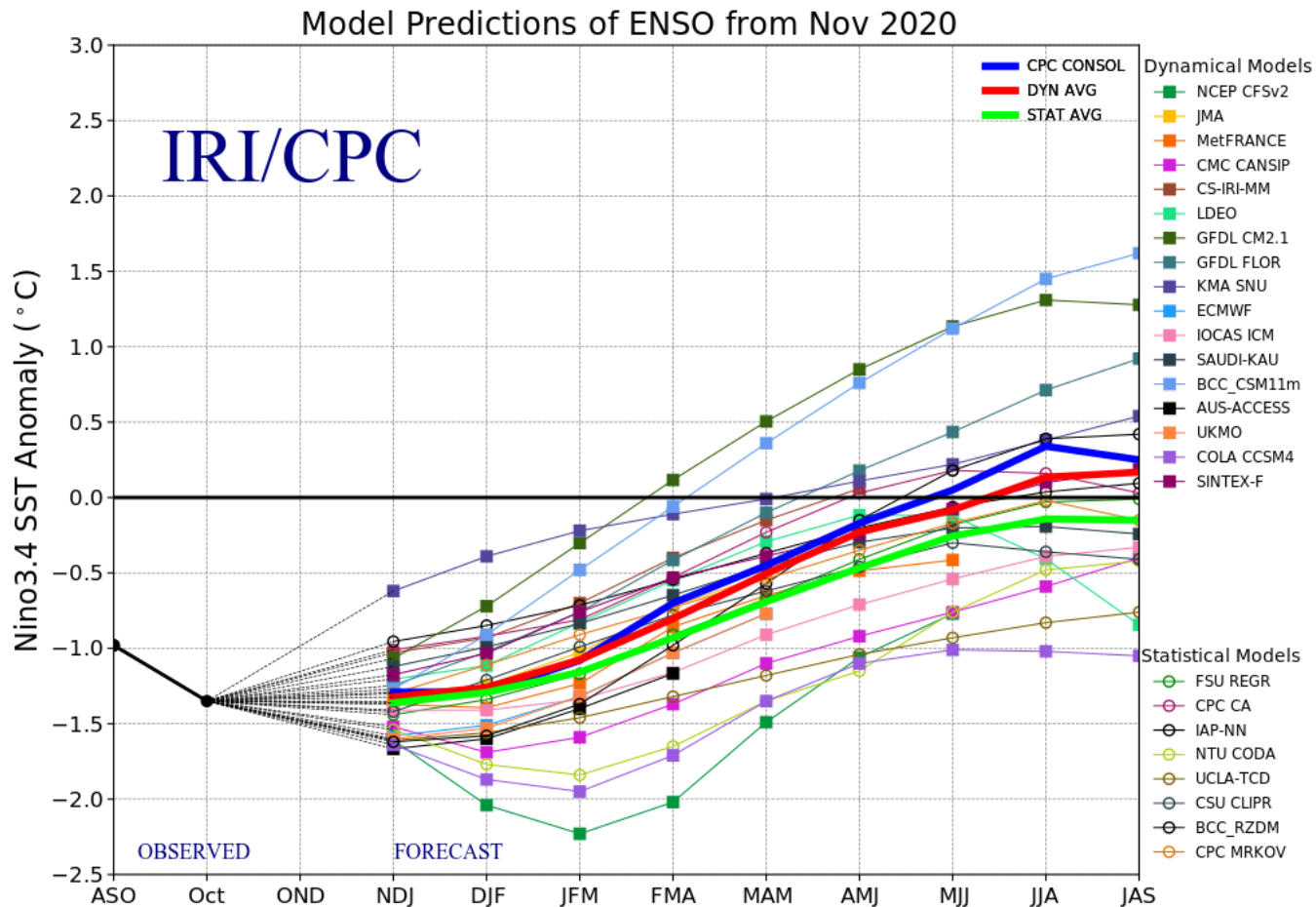
Early-November 2020 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly

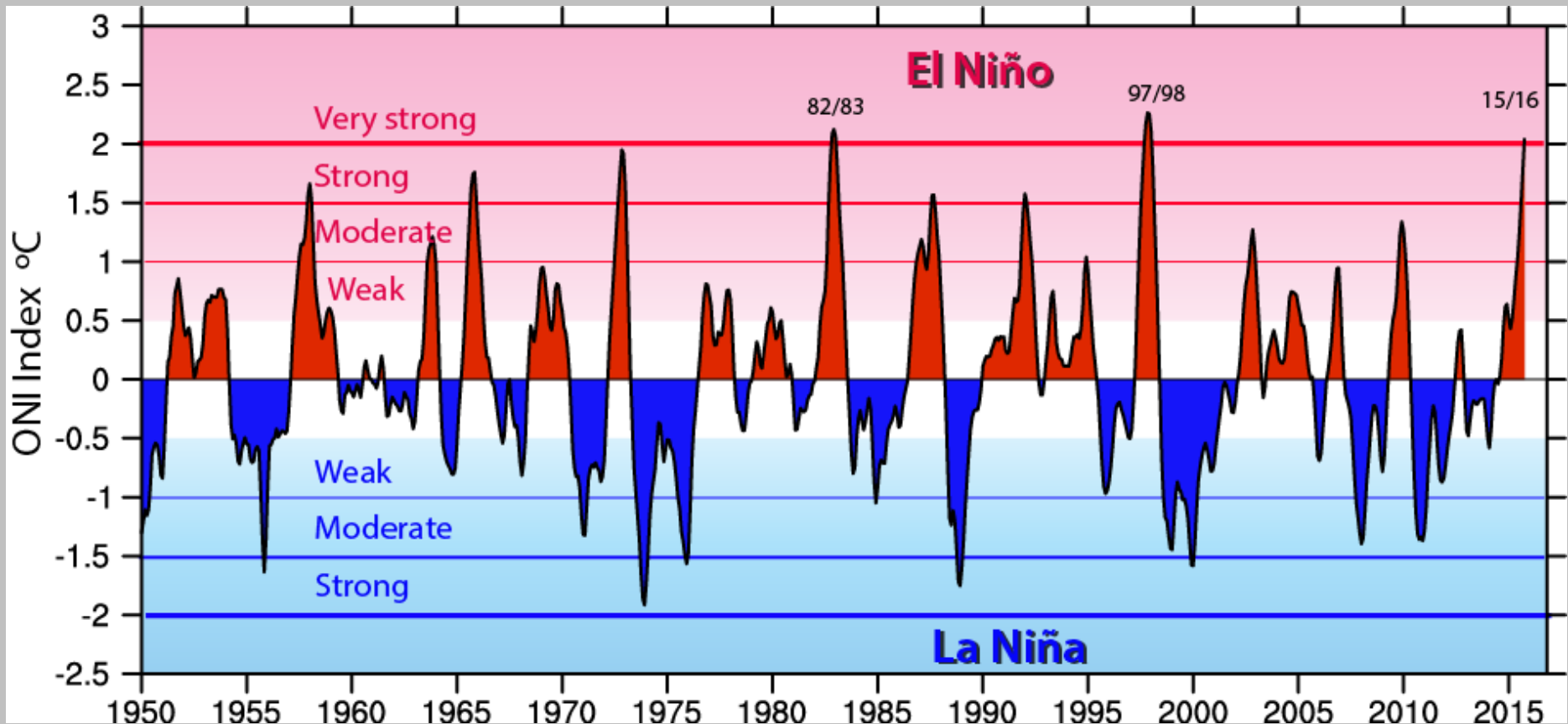
Neutral ENSO: -0.5°C to 0.5°C



NOAA/CPC and Columbia U. IRI ENSO 2020-2021 Forecast

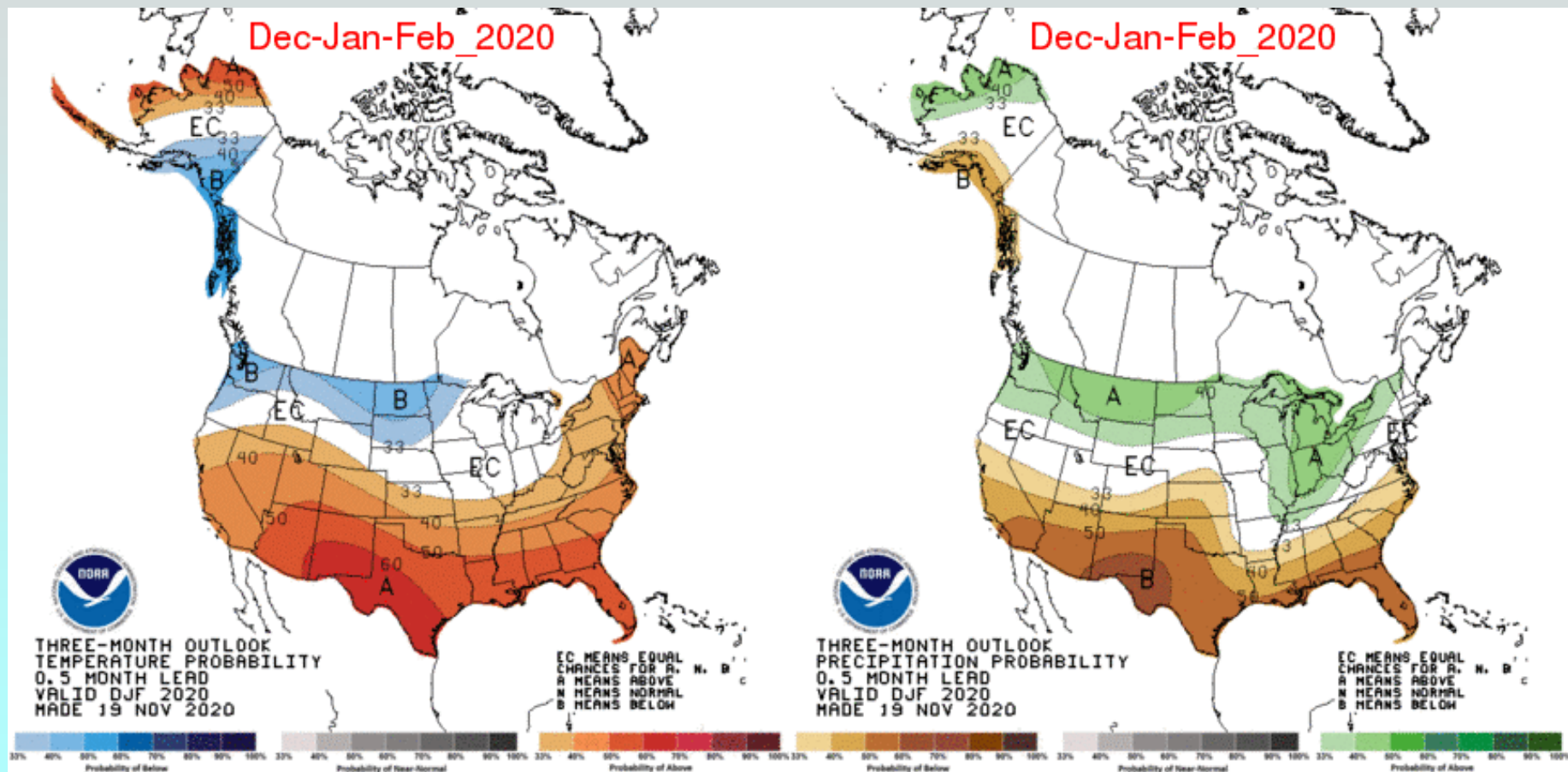


NINO SEA SURFACE TEMPERATURE INDICES



Source: <https://climatedataguide.ucar.edu/climate-data/nino-sst-indices-nino-12-3-34-4-oni-and-tni>

NOAA/CPC Winter Forecast



Source: https://www.cpc.ncep.noaa.gov/products/predictions/long_range/index.php



NOAA/NWS Portland Forecast

Takeaways

- ▶ La Niña is likely to persist through winter.
- ▶ Odds favor **above normal precipitation.**
- ▶ Odds favor **below normal temperatures.**
- ▶ Decent chance for a good ski season in the Cascades.
 - ▶ **Lower snow levels in general**
- ▶ Fewer warm, atmospheric river events to rip away snowpack.
 - ▶ Also good news for areas burned by Labor Day Firestorm.
- ▶ FOR THE LOWLANDS: **TIMING WILL BE EVERYTHING!**



NATIONAL WEATHER SERVICE
NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION
Portland, OR





NWRFC Water Supply Forecast

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COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2021

Official Water Supply

ESP with 10 Days QPF Ensemble: 2020-12-01 Issued: 2020-12-01

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	68251	85195	92	111933	92704
APR-JUL	56965	72682	91	94654	79855
APR-AUG	62930	80122	92	104801	87532
JAN-SEP	85377	104177	91	130473	114216
JAN-JUL	74614	91719	90	116155	101368
OCT-SEP	100418	119176	91	145689	130518

Experimental Water Supply

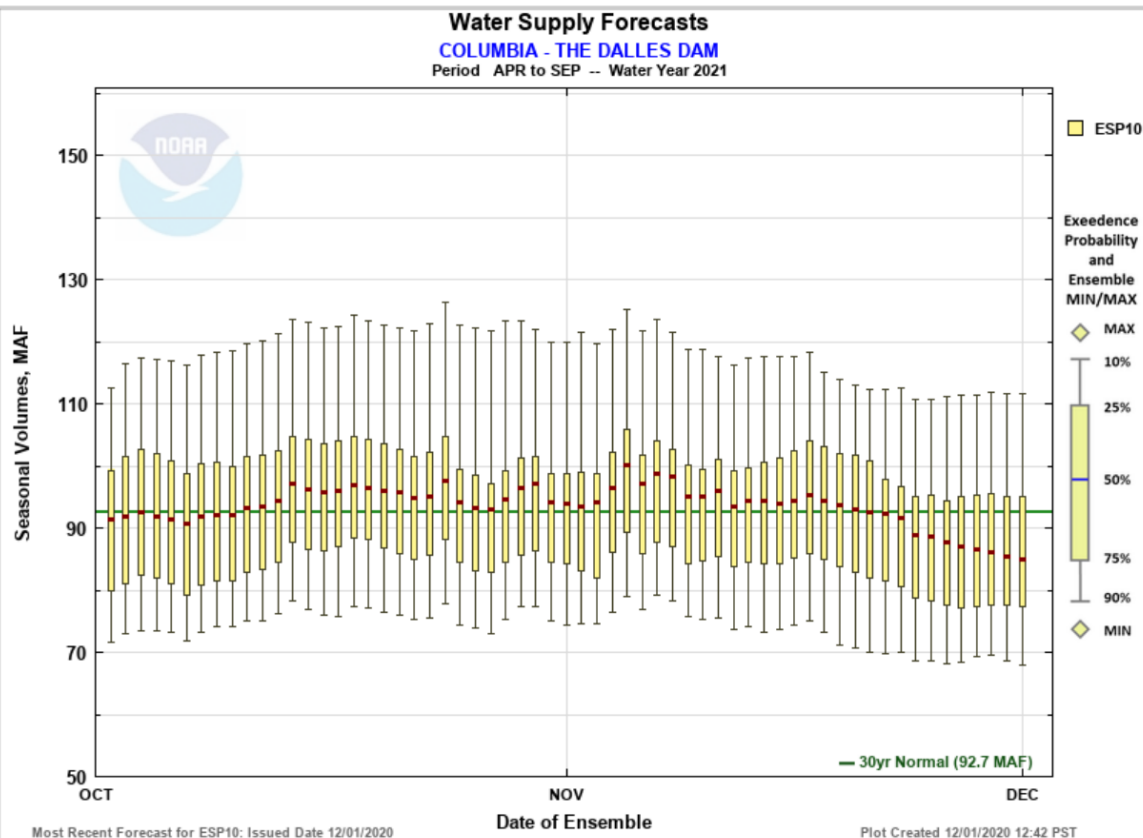
HEFS with 15 days EQPF Ensemble: 2020-12-01 Issued: 2020-12-01

APR-SEP	69546	87292	94	112247	92704
APR-JUL	58690	74264	93	96964	79855
APR-AUG	64465	81844	94	107032	87532
JAN-SEP	85598	106661	93	130806	114216
JAN-JUL	74778	93895	93	116698	101368
OCT-SEP	101354	121716	93	145985	130518

Reference

ESP with 0 Days QPF Ensemble: 2020-12-01 Issued: 2020-12-01

APR-SEP	70405	92732	100	112555	92704
APR-JUL	59514	80590	101	98134	79855
APR-AUG	65437	87121	100	107323	87532
JAN-SEP	88425	113445	99	133887	114216



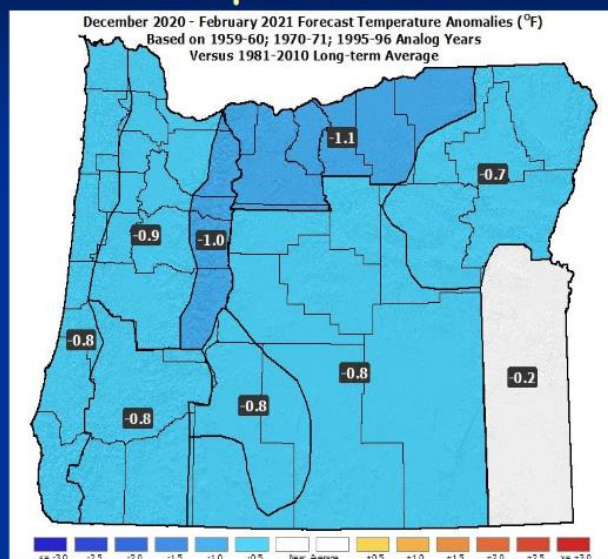
Source: <https://www.nwrfc.noaa.gov/ws/index.html?version=20190313v1>



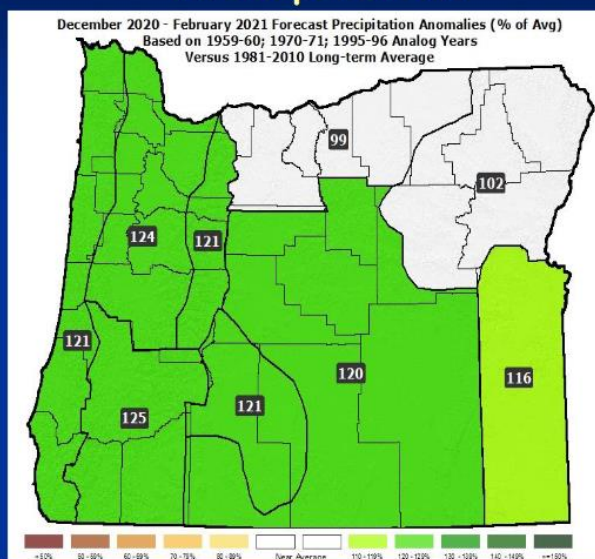
OREGON DEPT. AGRICULTURE

Dec. 2020 – Feb. 2021 Forecast

Temperatures



Precipitation



- Should be colder, relative to average, than the previous 3-month period.
- Elevated chances for heavy rain, strong winds, above-average mountain snow, cold-air outbreaks, and valley snow events, especially in January.

Method (Pete Parsons): Analogue, 3-year average (WY 1960, 1971, 1996)

Source: <https://www.oregon.gov/ODA/programs/NaturalResources/Pages/Weather.aspx>

OSU – AMS CHAPTER



The Basics

- Rain: Above Average: 37-47" for the water year.
 - Best estimate: 43"
 - Enhanced chance of a hyperactive season (25%).
- Temps: Near to below normal (up to 3°F degrees below average)
 - Best estimate: 1°F below average.
- Windstorm: Some activity, with a peak gust between 45-55 mph.
 - Does not include September 7th peak gust of 52 mph.
- Lowest Temp below 20°F.
 - Enhanced chance of an arctic blast.
 - Best Estimate: 15°F

2020-21 Winter Weather Forecast

By: Tanis Leach



Oregon State University
Ecampus

Snow

- Mountain snowfall between 110-180% of normal.
 - Average to above average winter likely (85% chance of hitting 100% or better)
- Winter favor a slightly above average winter: 2-8 inches.
 - Best odds: 4" with 1-3 snowstorms with 1" or more.
 - Chance of 2-inch snowstorm: 60%
 - Chance of 5-inch major snowstorm: 20%
 - Chance of 8-inch snowpocalypse: 10%
 - Heightened chance of a bust winter: 35%.

Method: Analogue (26 years), Oceanic Nino Index (ONI), PDO, AMO, Sunspots

<https://oregonams.files.wordpress.com/2020/11/winter-weather-predictions-2020-21-tanis-leach.pdf>



Introduction – CRITFC 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 (1950-2020) vs. historic runoff for the Columbia River at The Dalles, then compute a WY2021 Water Supply Forecast.
- Select the "right" mixture of 20 past Water Years (next slide).
- Pattern recognition is key: ENSO-Neutral and *La Niña* years.



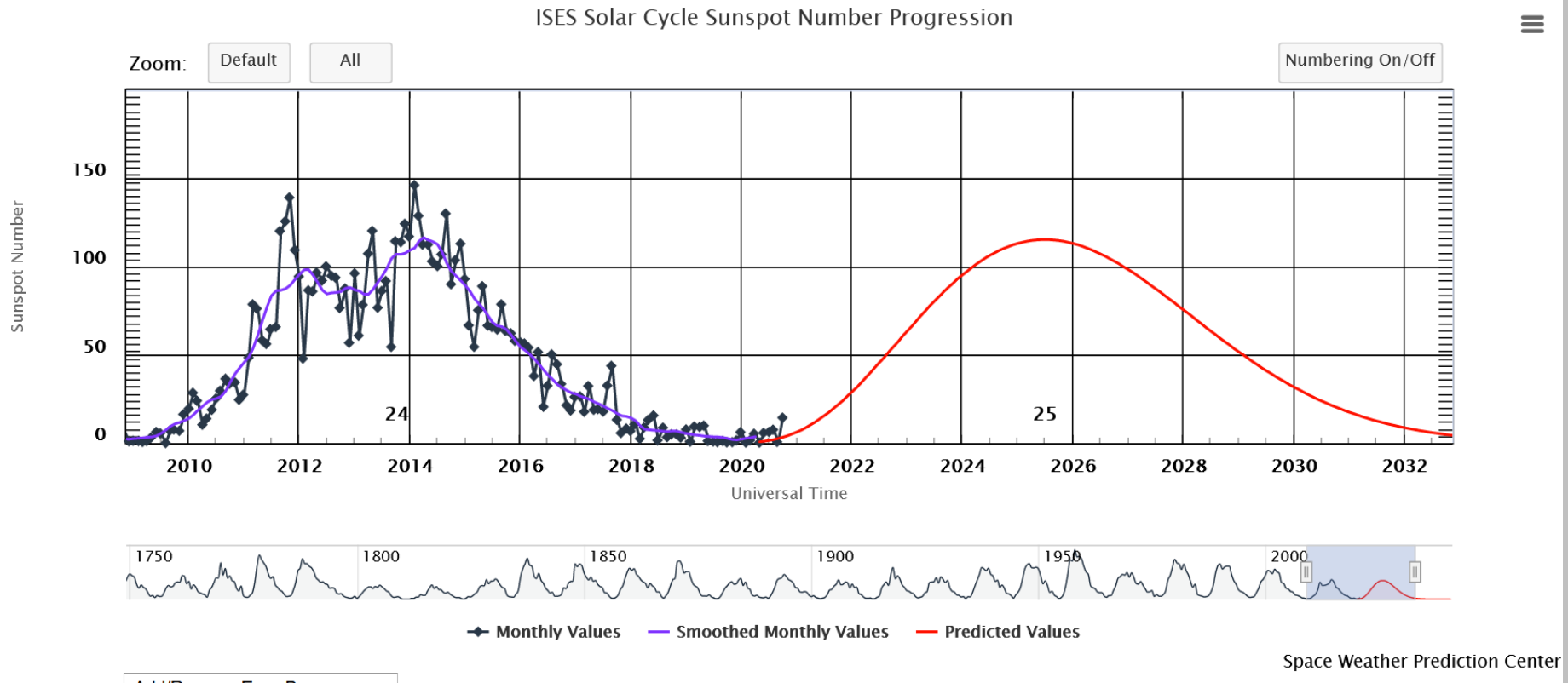
Introduction – Analogue Years

Ensemble forecasting – 20 past water years:

WY2021	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1951	125		x			X
1953	106.8		x		X	
1955	96.9		x			X
1960	102.5		x		X	
1965	126.1		x			X
1968	95.54		x			X
1975	111.9		x			X
1976	122.7		x			X
1985	90.48	x				X
1996	139.3	x				X
1997	159	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
2013	97.7		x		X	
2017	136.8		x			X
2018	118.5		x			X
	(MAF)					
Average:	115.4		LaNina:			16
STDEV:	18.8		Solar minimums:			9
			ENSO-neutral/LaNina border:			3
			High Water years (>120 MAF)			8

SUNSPOT COUNTS – “*La Niña* winter”

SOLAR CYCLE PROGRESSION

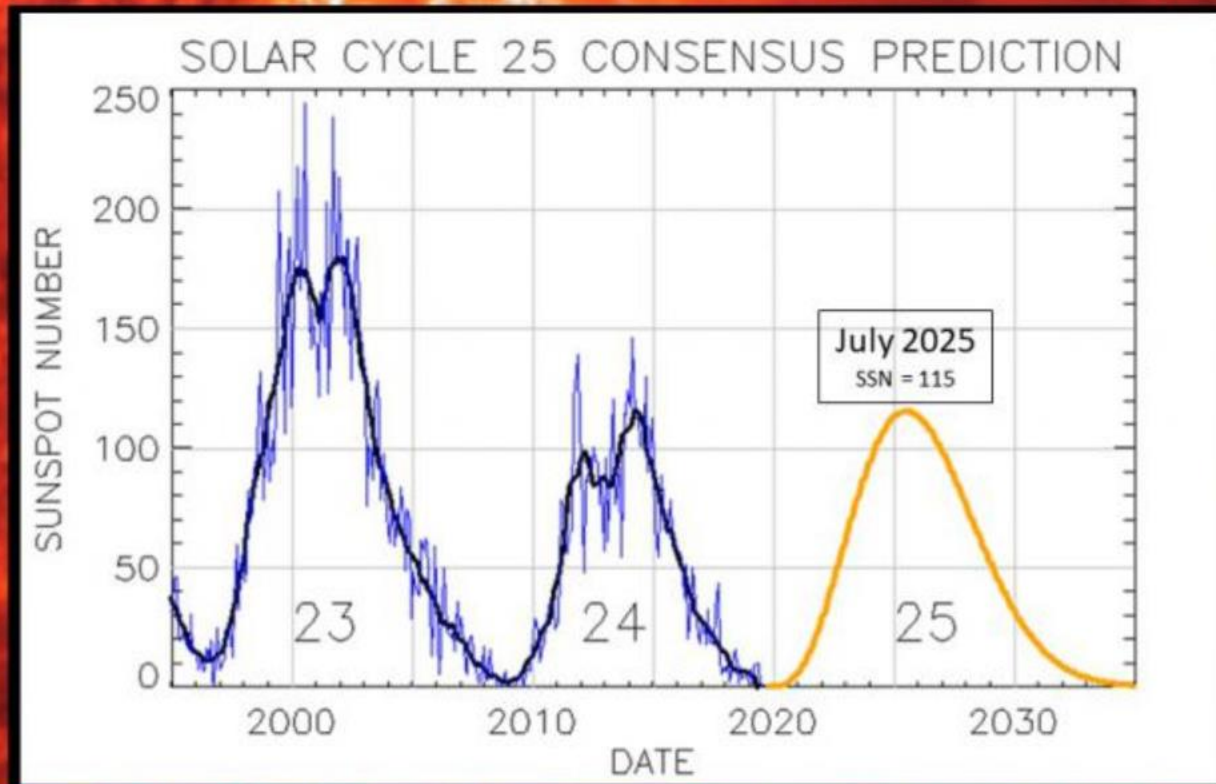


Source: <https://www.swpc.noaa.gov/products/solar-cycle-progression>

SUNSPOT COUNTS – long term view

Solar Cycle 25 Forecast Update

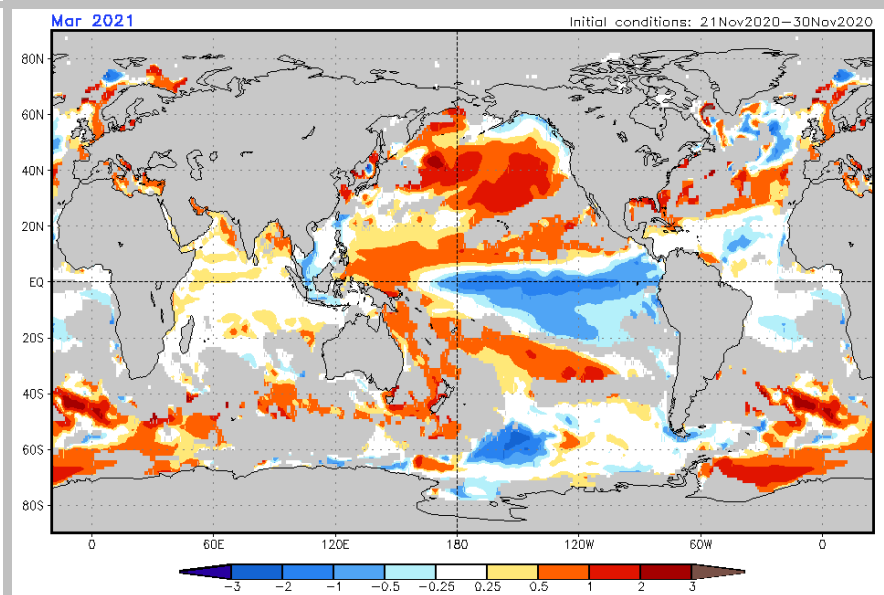
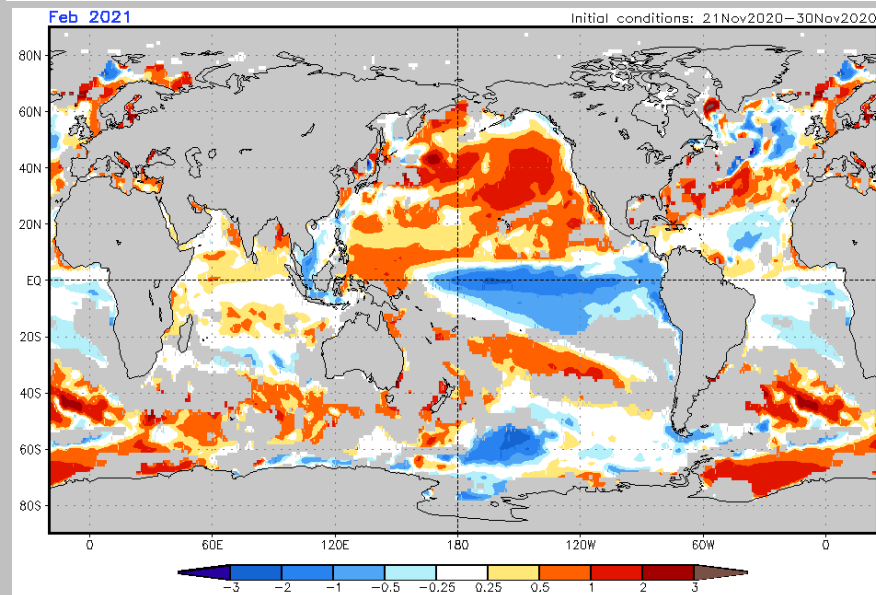
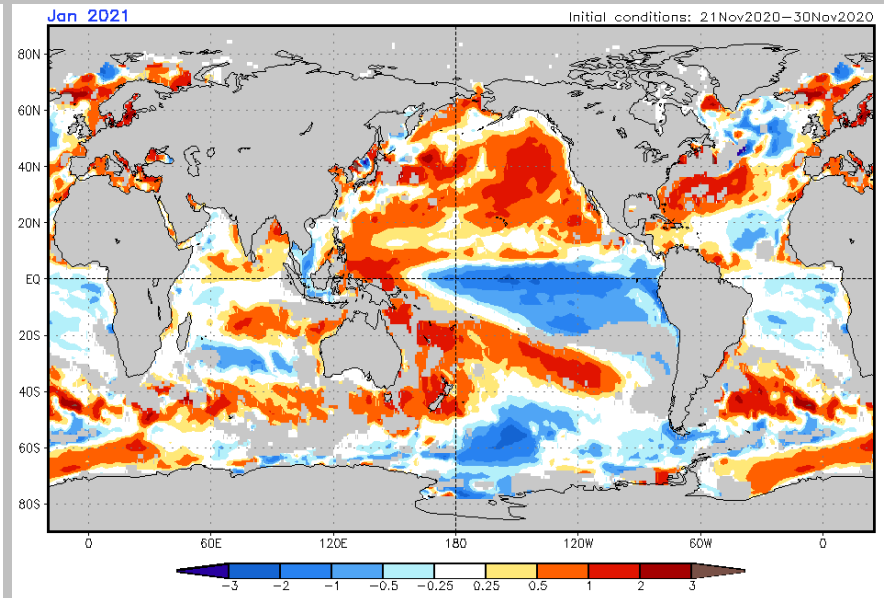
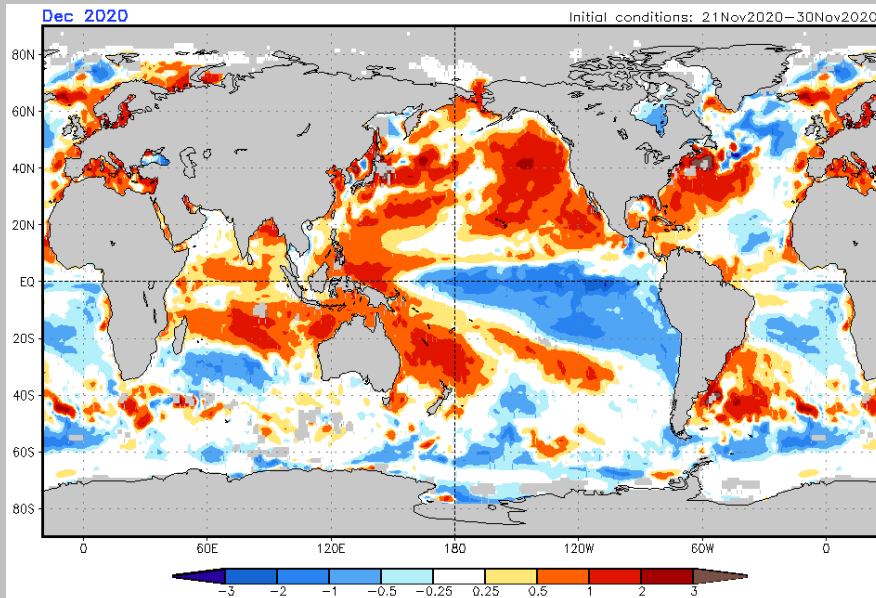
- Released December 9th, 2019 -



Solar Cycle 25 will have a peak SSN of 115 (± 10) in July 2025
Solar Cycle 24/25 minimum will occur in April, 2020 (± 6 months)

Source: <https://www.swpc.noaa.gov/news/solar-cycle-25-forecast-update>

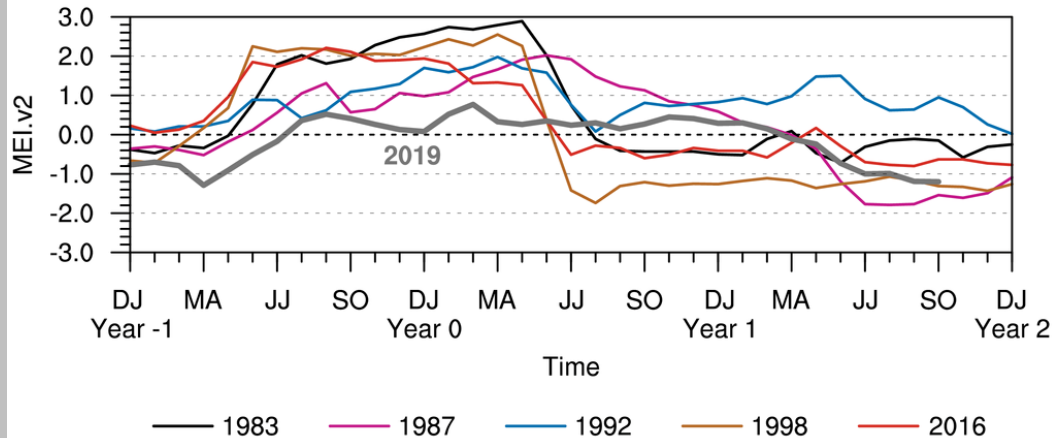
NOAA/CPC SEA SURFACE TEMPERATURES - "*La Niña* winter"



Source: <https://www.cpc.ncep.noaa.gov/products/CFSv2/htmls/glbSSTe3MonMask.html>

MEI SIGNAL SUGGESTS “*La Niña* winter”

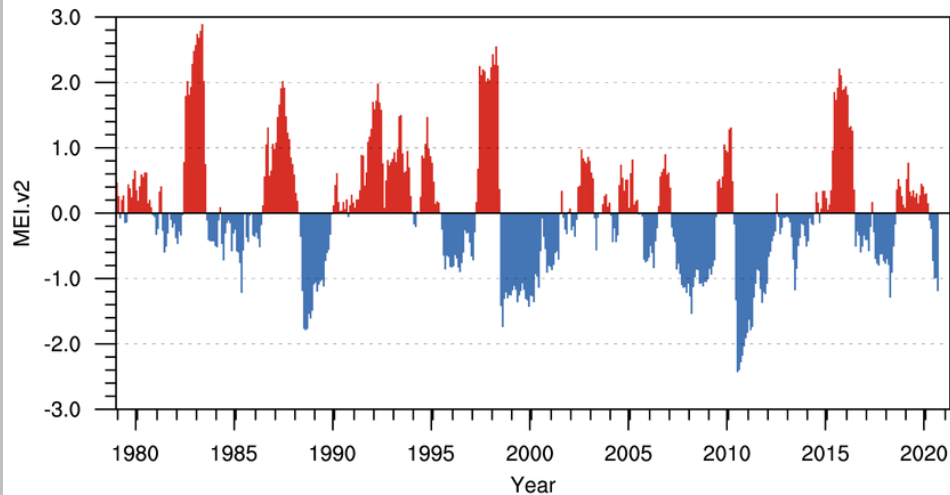
MEI.v2 Evolution of Current ENSO Event in Historical Context



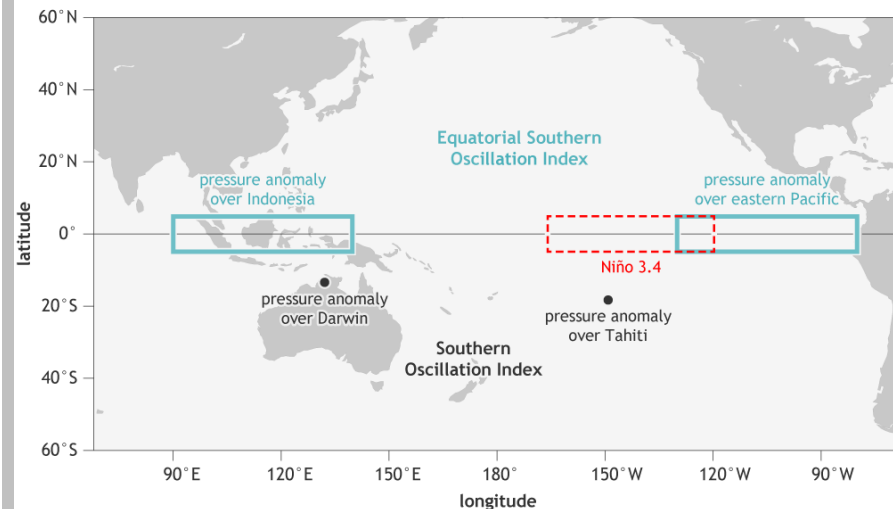
MEI – one index that tracks:

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

Multivariate ENSO Index Version 2



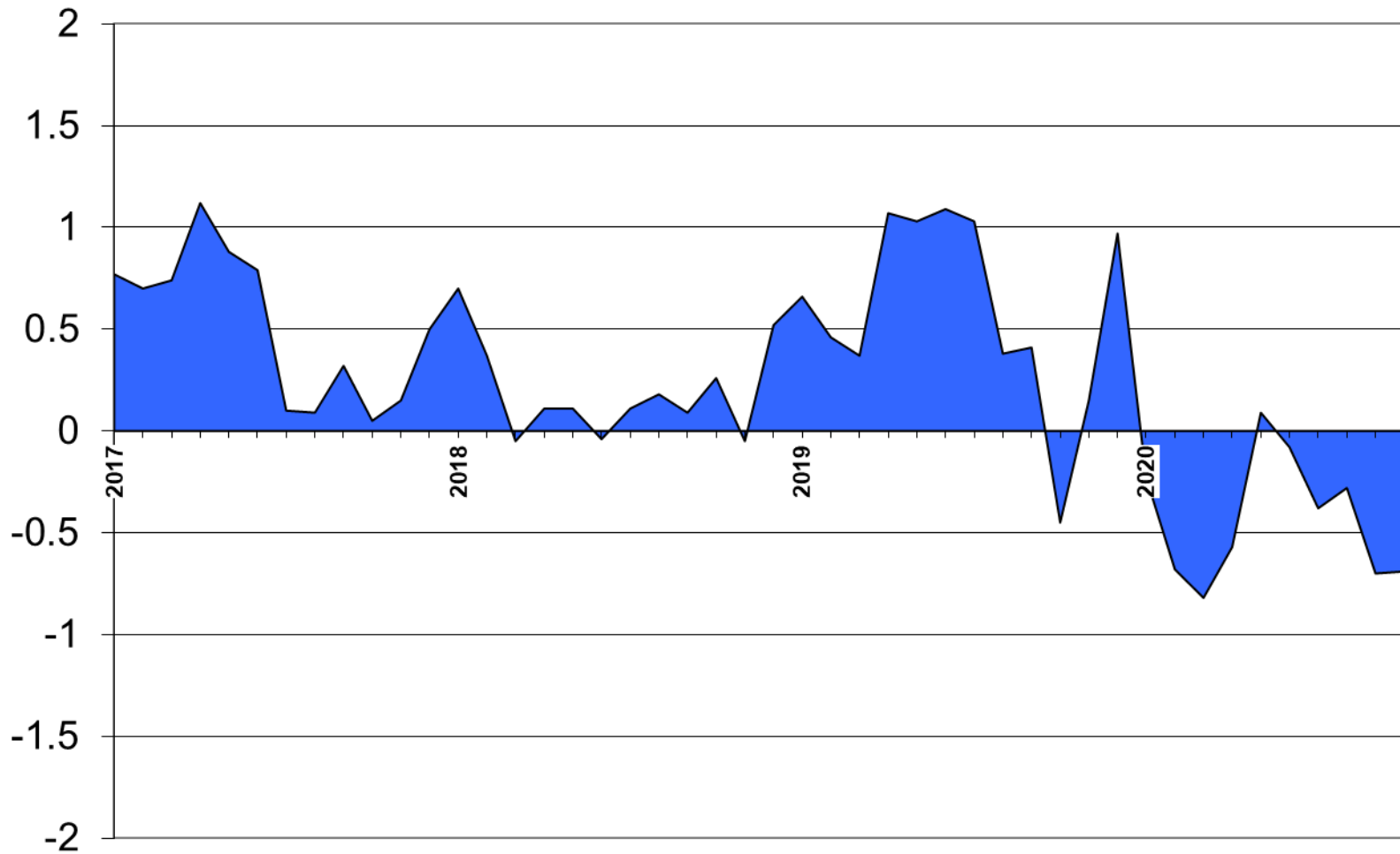
ENSO indexes



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

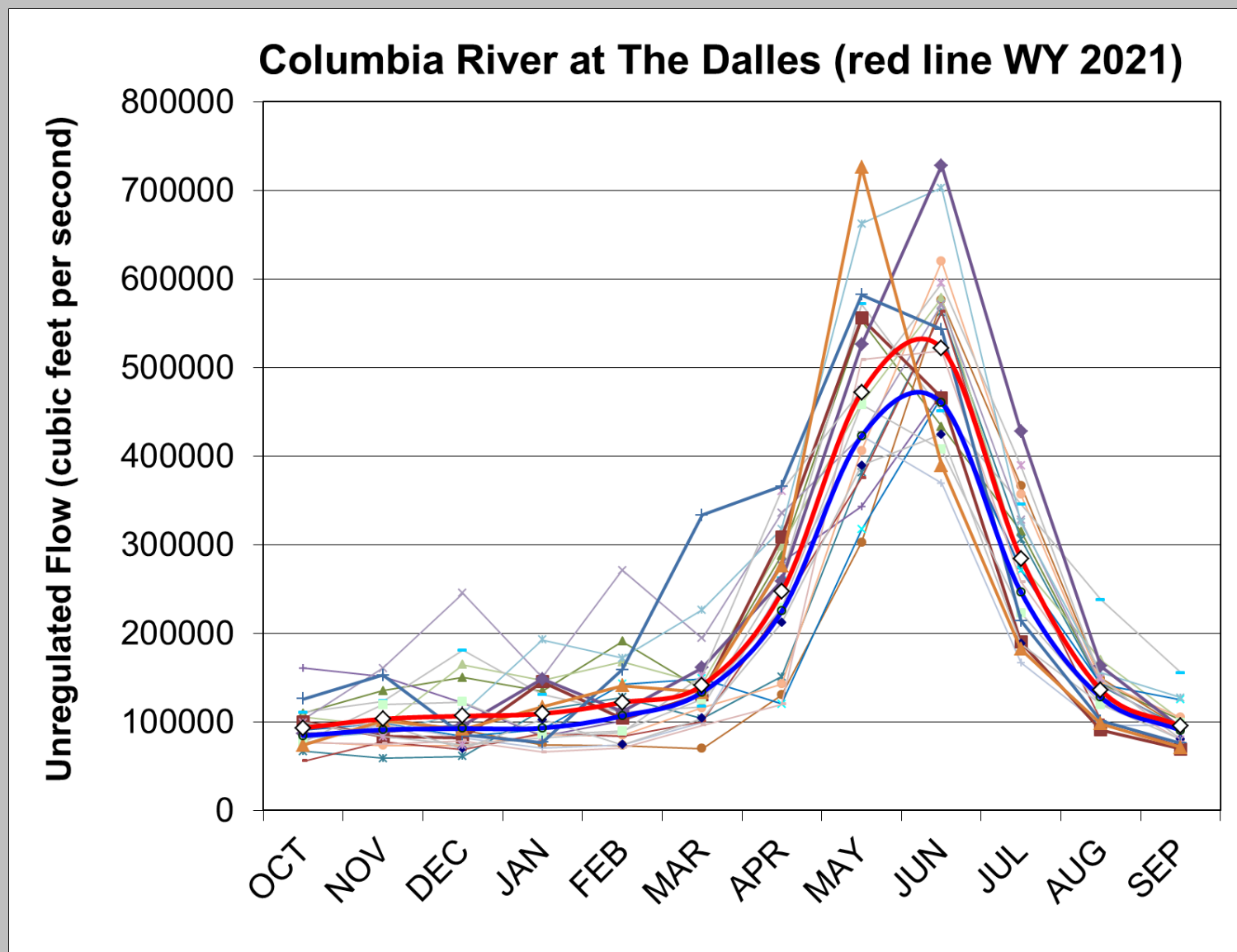
PDO SIGNAL: COLD PHASE...BUT NEAR NEUTRAL

PACIFIC DECADAL OSCILLATION (PDO)



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

CRITFC ENSEMBLE STREAMFLOW FORECAST



Blue line = long-term average (WY 1929-2020)



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)	0.3	Near Normal (90 - 110%)	106%
December	Near Normal (-1.8 to + 1.8 degF)	-0.3	Above Normal (110 - 130%)	113%
January	Near Normal (-1.8 to + 1.8 degF)	1	Near Normal (90 - 110%)	103%
February	Near Normal (-1.8 to + 1.8 degF)	0	Near Normal (90 - 110%)	96%
March	Near Normal (-1.8 to + 1.8 degF)	-1.5	Above Normal (110 - 130%)	124%

Expect many snow events: **134%** of normal (NOV-MAR); seasonal total **31-inches**.

DEC 11-inch (up to 23), JAN 9-inch (up to 19), FEB 6-inch (up to 15), MAR 3-inch (up to 9)



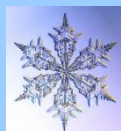


Summary: Cascade Mountains

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	Near Normal (90 - 110%)	106%	32	93%
December	Near Normal (-1.8 to + 1.8 degF)	-1	Above Normal (110 - 130%)	128%	62	135%
January	Near Normal (-1.8 to + 1.8 degF)	1.1	Above Normal (110 - 130%)	116%	62	95%
February	Near Normal (-1.8 to + 1.8 degF)	-1.2	Near Normal (90 - 110%)	104%	49	151%
March	Near Normal (-1.8 to + 1.8 degF)	-1.7	Way Above Normal (130 - 150%)	147%	57	153%
April	Near Normal (-1.8 to + 1.8 degF)	-1.1	Above Normal (110 - 130%)	122%	29	133%
May	Near Normal (-1.8 to + 1.8 degF)	-0.6	Near Normal (90 - 110%)	93%	6	74%

Expect a seasonal total of: **297**-inches or **119%** 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)	0.6	Above Normal (110 - 130%)	112%
December	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	100%
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)	-0.6	Near Normal (90 - 110%)	94%
March	Near Normal (-1.8 to + 1.8 degF)	-1.5	Near Normal (90 - 110%)	106%

EXPECT **HIGH** VARIABILITY – INTENSE RAIN EVENTS, FLOODS, FOG, WIND STORMS, GORGE WIND, FREEZING RAIN, etc.
 WATER SUPPLY FORECAST (JANUARY - JULY): **115 MAF** (± 19 MAF) or 114%, COLUMBIA RIVER AT THE DALLES.

...but what about Snow events?!

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

DEC 2-inch (up to 7), JAN 2-inch (up to 5), FEB 1-inch (up to 2.5), and MAR 1-inch (up to 4).

(75%- 85% likely) Season: **6-inches**

