

# Winter 2023-2024 Weather Forecast

*31<sup>st</sup> Winter Weather Forecast Meeting, OMSI and Oregon AMS, Portland*



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October 28th, 2023

# Columbia River Inter-Tribal Fish Commission - CRITFC





## Columbia River Inter-Tribal Fish Commission

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*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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# 2022-2023 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)	0.9	<b>-1.6</b>	Above Normal (110 - 130%)	110%	<b>93%</b>
December	Near Normal (-1.8 to + 1.8 degF)	0.3	<b>-1.8</b>	Near Normal (90 - 110%)	98%	<b>140%</b>
January	Near Normal (-1.8 to + 1.8 degF)	-0.8	<b>2.2</b>	Above Normal (110 - 130%)	122%	<b>72%</b>
February	Near Normal (-1.8 to + 1.8 degF)	-0.8	<b>-2.8</b>	Near Normal (90 - 110%)	99%	<b>62%</b>
March	Near Normal (-1.8 to + 1.8 degF)	-1.6	<b>-3</b>	Above Normal (110 - 130%)	111%	<b>122%</b>
	average:	-0.4	-1.4	average:	108%	98%

## ...but what about Snow events?!

Forecasted five events: two moderate and three minor (8.5-inch seasonal total), December to March.

Observed three snow events: Dec. 4, 22; Feb. 22...  
an **11-inch** seasonal total.





# 2022-2023 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)	0.8	<b>-4.5</b>	Near Normal (90 - 110%)	101%	<b>91%</b>
December	Near Normal (-1.8 to + 1.8 degF)	0.3	<b>-3.8</b>	Near Normal (90 - 110%)	108%	<b>90%</b>
January	Near Normal (-1.8 to + 1.8 degF)	0.8	<b>1.1</b>	Above Normal (110 - 130%)	114%	<b>45%</b>
February	Above Normal ( > +1.8 degF)	-0.1	<b>-2.2</b>	Near Normal (90 - 110%)	93%	<b>51%</b>
March	Near Normal (-1.8 to + 1.8 degF)	-1.9	<b>-4.1</b>	Above Normal (110 - 130%)	124%	<b>115%</b>
	average:	0.0	<b>-2.7</b>	average:	108%	<b>78%</b>



# 2022-2023 Government Camp Climate Forecast Performance



Month:	Temperature:	<b>Observed</b>	Precipitation:	<b>Observed</b>	<b>Snowfall</b>	<b>Observed</b>	Forecast	<b>Observed</b>
November	0.8	<b>-4.6</b>	113%	<b>114%</b>	32	45	125%	147%
December	-0.9	<b>-2</b>	126%	<b>87%</b>	64	78	145%	151%
January	0.2	<b>-0.9</b>	134%	<b>40%</b>	72	24	142%	49%
February	-1.2	<b>-3.2</b>	121%	<b>54%</b>	55	30	137%	75%
March	-2	<b>-5.2</b>	122%	<b>80%</b>	55	58	142%	163%
April	-1.2	<b>-2.1</b>	96%	<b>133%</b>	25	60	118%	338%
May	-0.5	<b>3.7</b>	96%	<b>15%</b>	6	0	168%	0%
average:	-0.7	<b>-2.0</b>	115%	<b>75%</b>	309	295	140%	132%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:  
 123 MAF (issued Oct. 2022), 122%. Observed: 80 MAF. Error  $\pm$ 54%.  
 111 MAF (issued April 2023), 103%. Observed: 80 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 (1950-2023) vs. historic runoff for the Columbia River at The Dalles, then compute a 2024 Water Supply Forecast.
- Select the "right" mixture of 20 past Water Years (next slide).
- Pattern recognition is key: *El Niño* years.



# Introduction – Methods

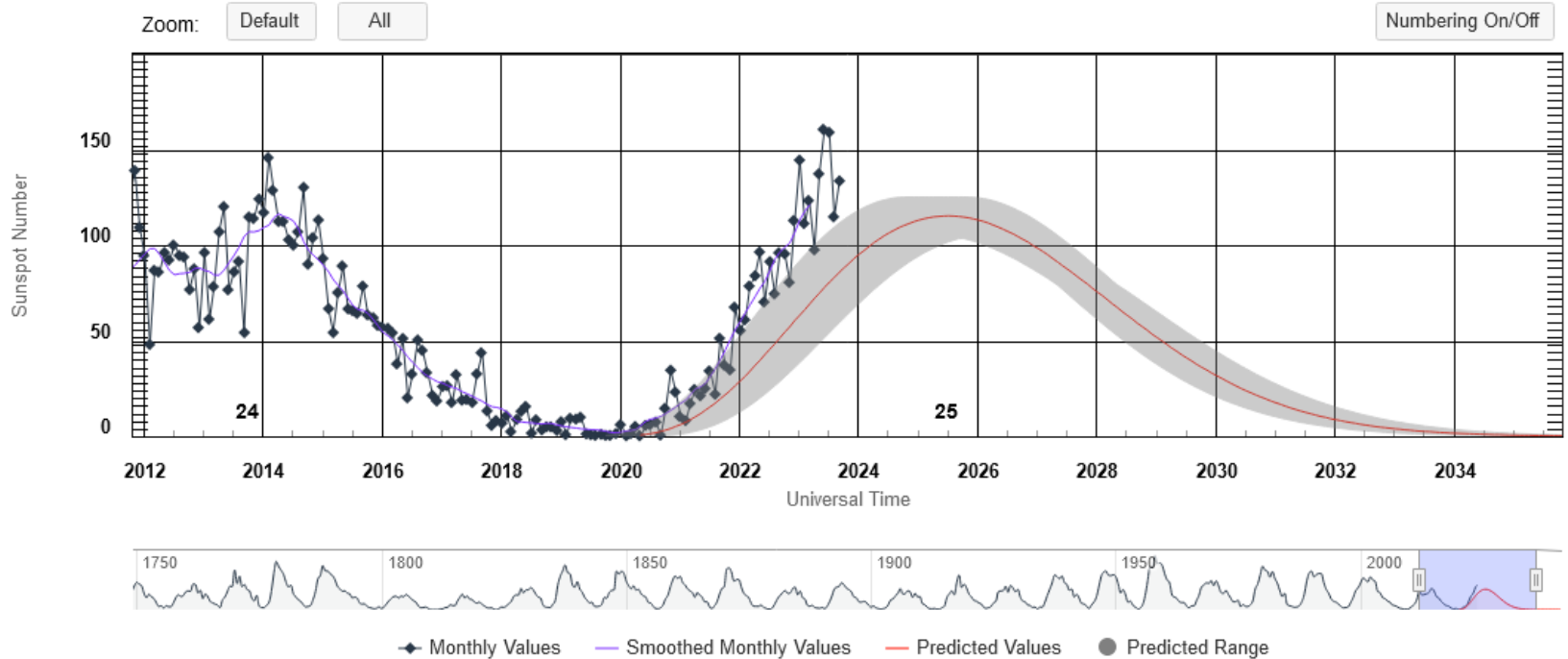
## Ensemble forecasting – 20 past water years:

WY2024	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1952	113.5		x	X		
1958	107.6		x	X		
<b>1964</b>	107.3		x	X		
1970	97.01		x	X		
1978	104.7	x		X		
1980	97.84	x		X		
1987	79.23	x		X		
1988	76.01	x		X		
1995	104	x		X		
1998	104.1	x		X		
2003	87.7		x	X		
2004	83		x	X		
2007	95.7		x			X
2010	84.7		x	X		
2013	97.7		x			X
2014	108.1		x			X
2015	83.5		x	X		
2016	97.4		x	X		
2019	90.1		x	X		
<b>2020</b>	101.3		x	X		
	(MAF)					
Average:	<b>96.0</b>		El-Nino:			17
STDEV:	10.5		ENSO-neutral:			3

# SUNSPOT COUNTS – “*El Niño* winter”

## SOLAR CYCLE PROGRESSION

ISES Solar Cycle Sunspot Number Progression

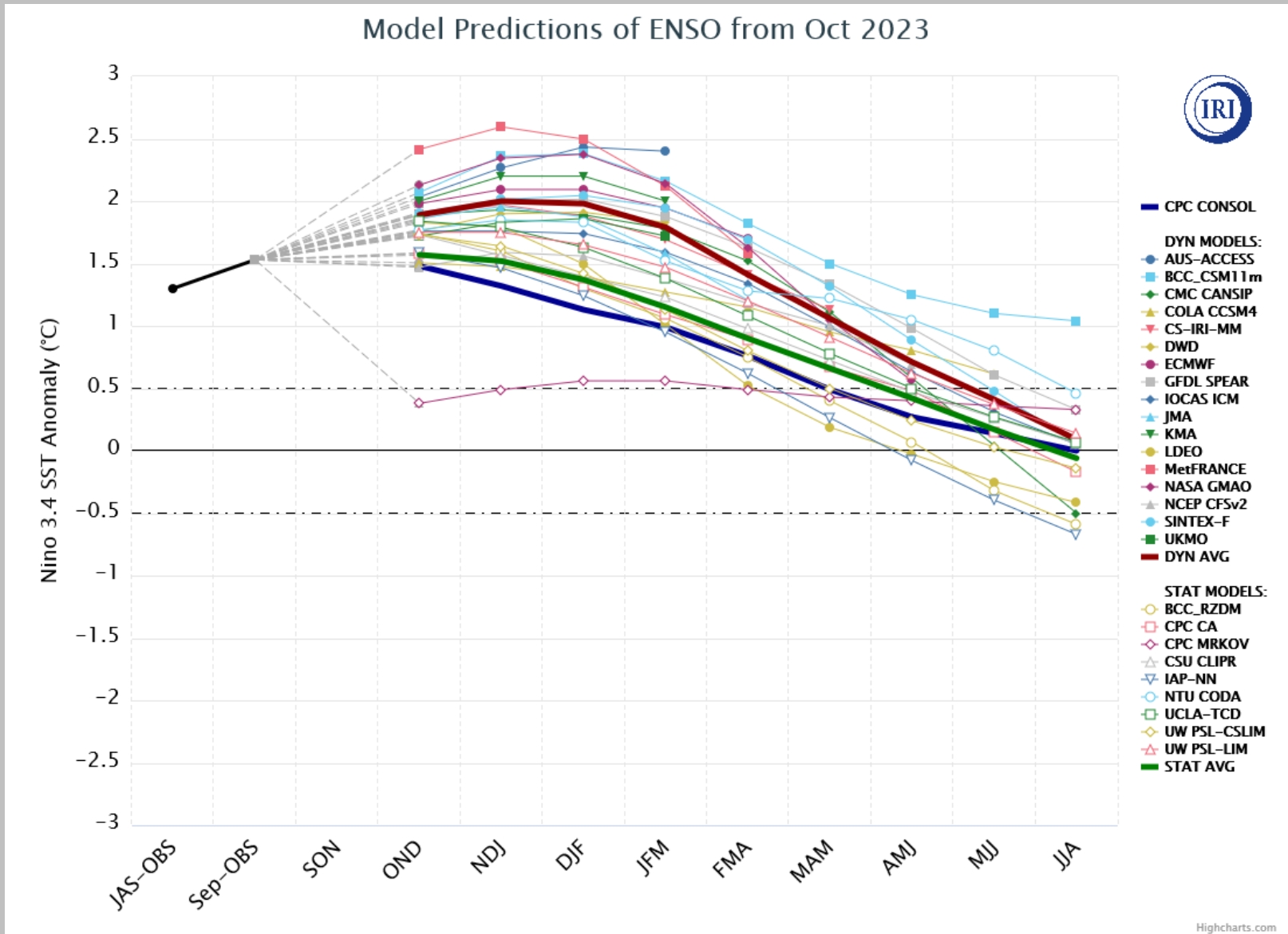


Space Weather Prediction Center

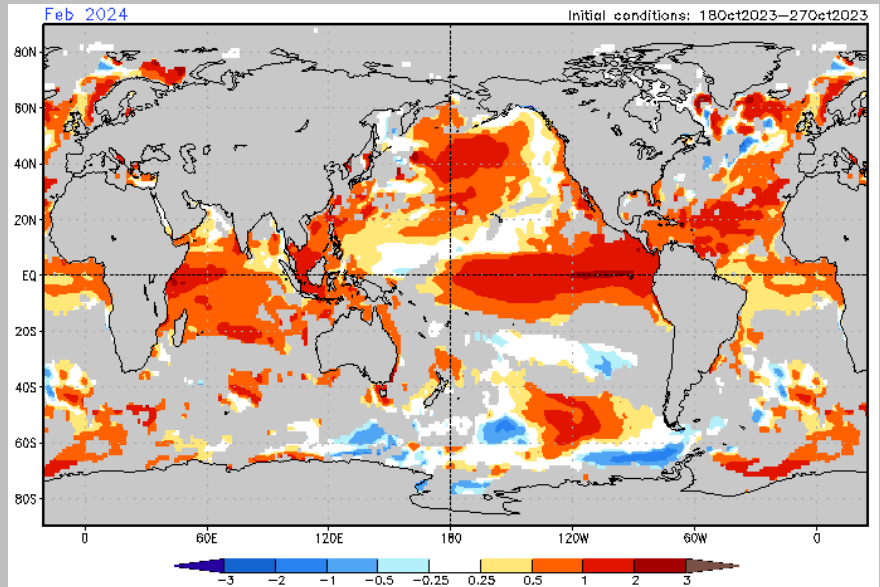
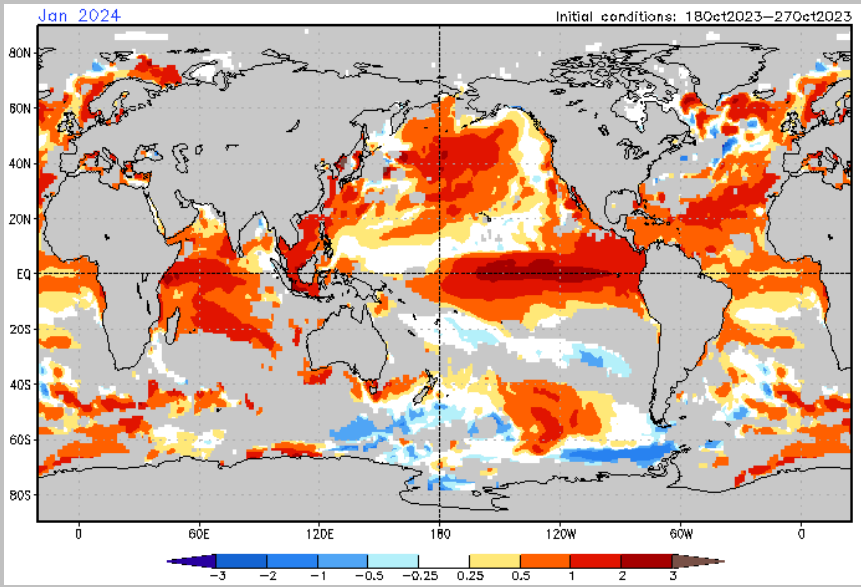
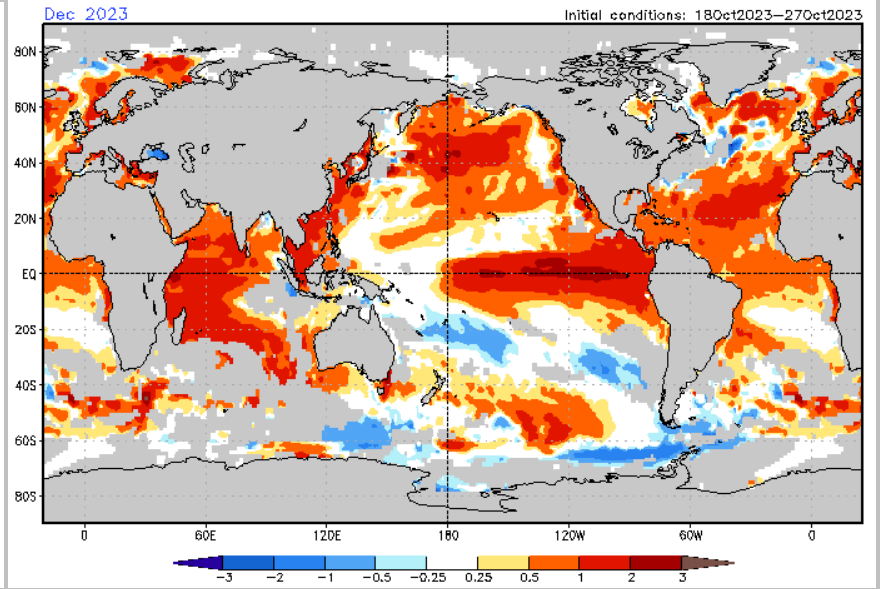
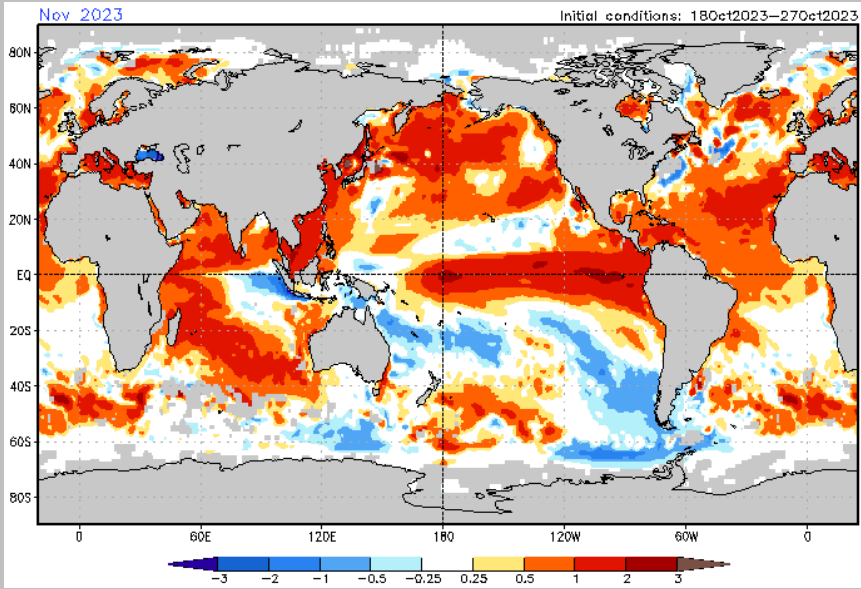
<https://www.swpc.noaa.gov/products/solar-cycle-progression>



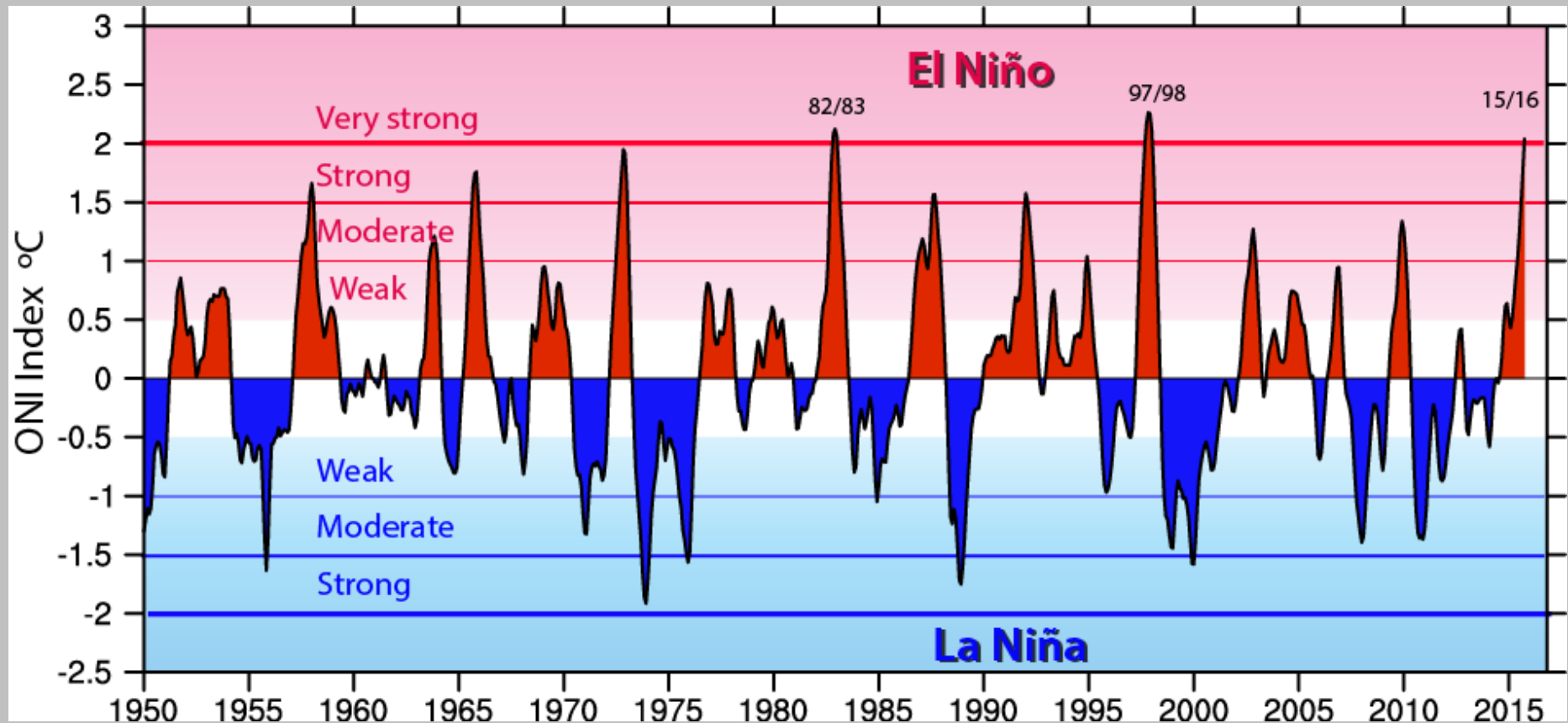
# COLUMBIA U. IRI & NOAA's CPC ENSO FORECAST



# NOAA SEA SURFACE TEMPERATURES - "*El Niño* winter"



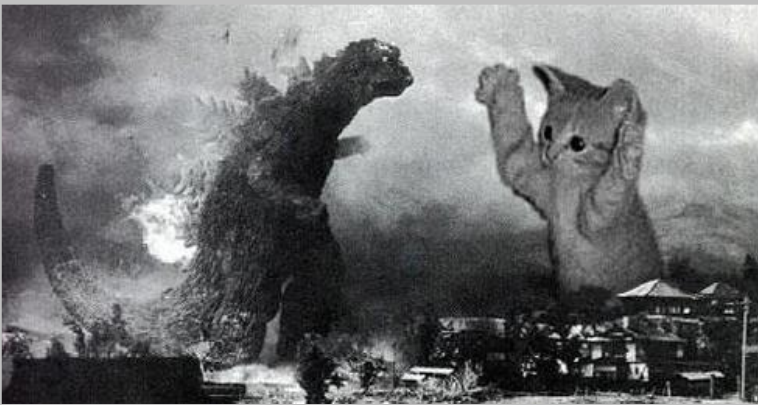
# NINO SEA SURFACE TEMPERATURE INDICES



# WHAT TYPE OF *El Niño* EVENT CAN WE EXPECT?

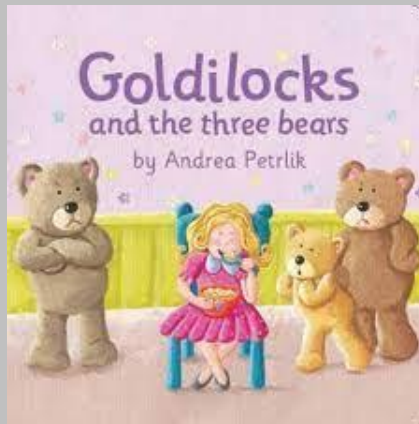


VERY STRONG



NOAA guidance: 8-of-10 models suggest "Moderate"

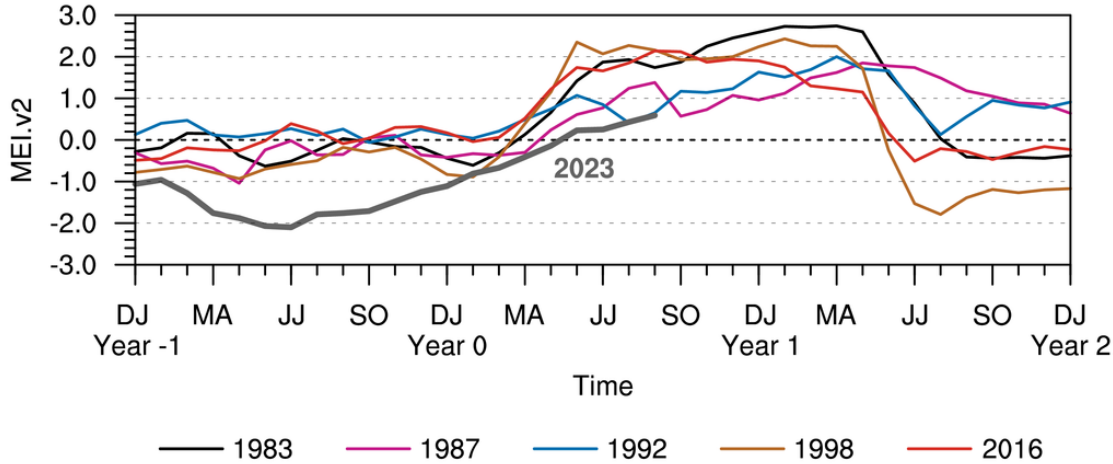
WEAK (AS A KITTEN)



"NOT TOO STRONG...  
NOT TOO WEAK...  
BUT JUST RIGHT"

# MEI SIGNAL SUGGESTS “*El Niño* winter”

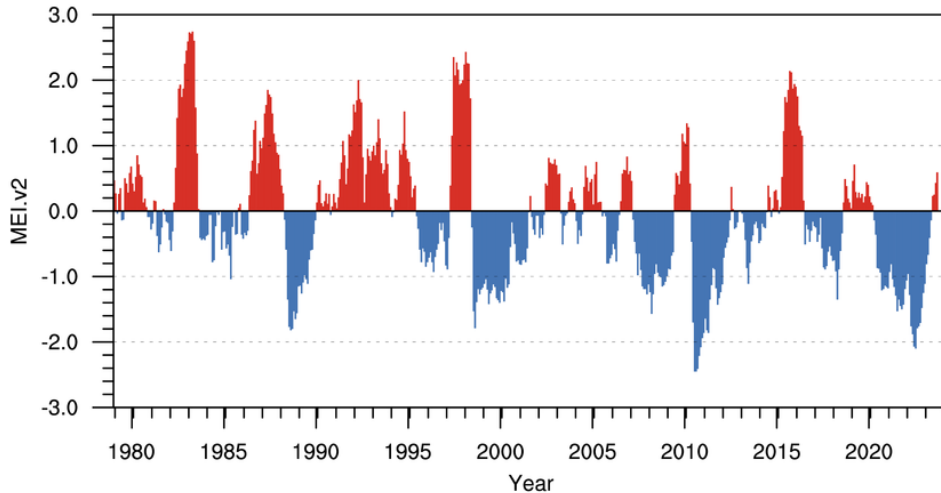
### MEI.v2 Evolution of Current ENSO Event in Historical Context



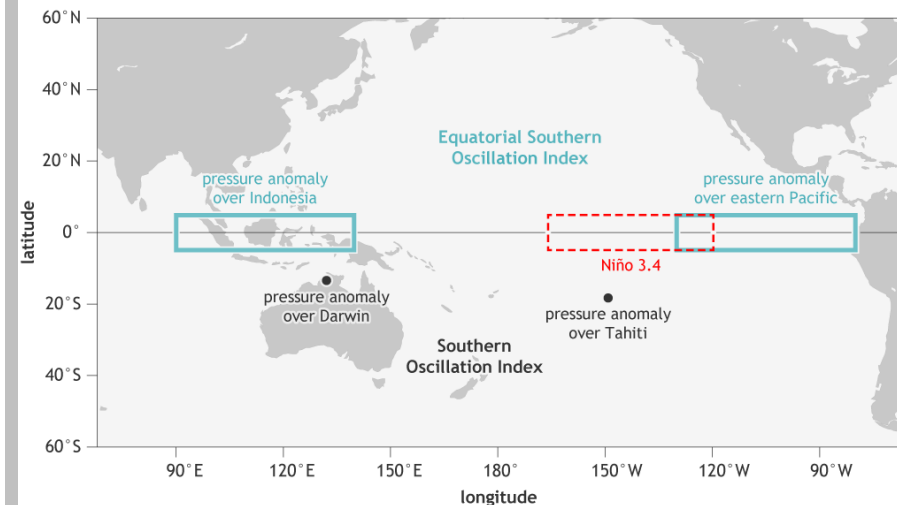
**MEI** – one index that tracks:

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

### Multivariate ENSO Index Version 2



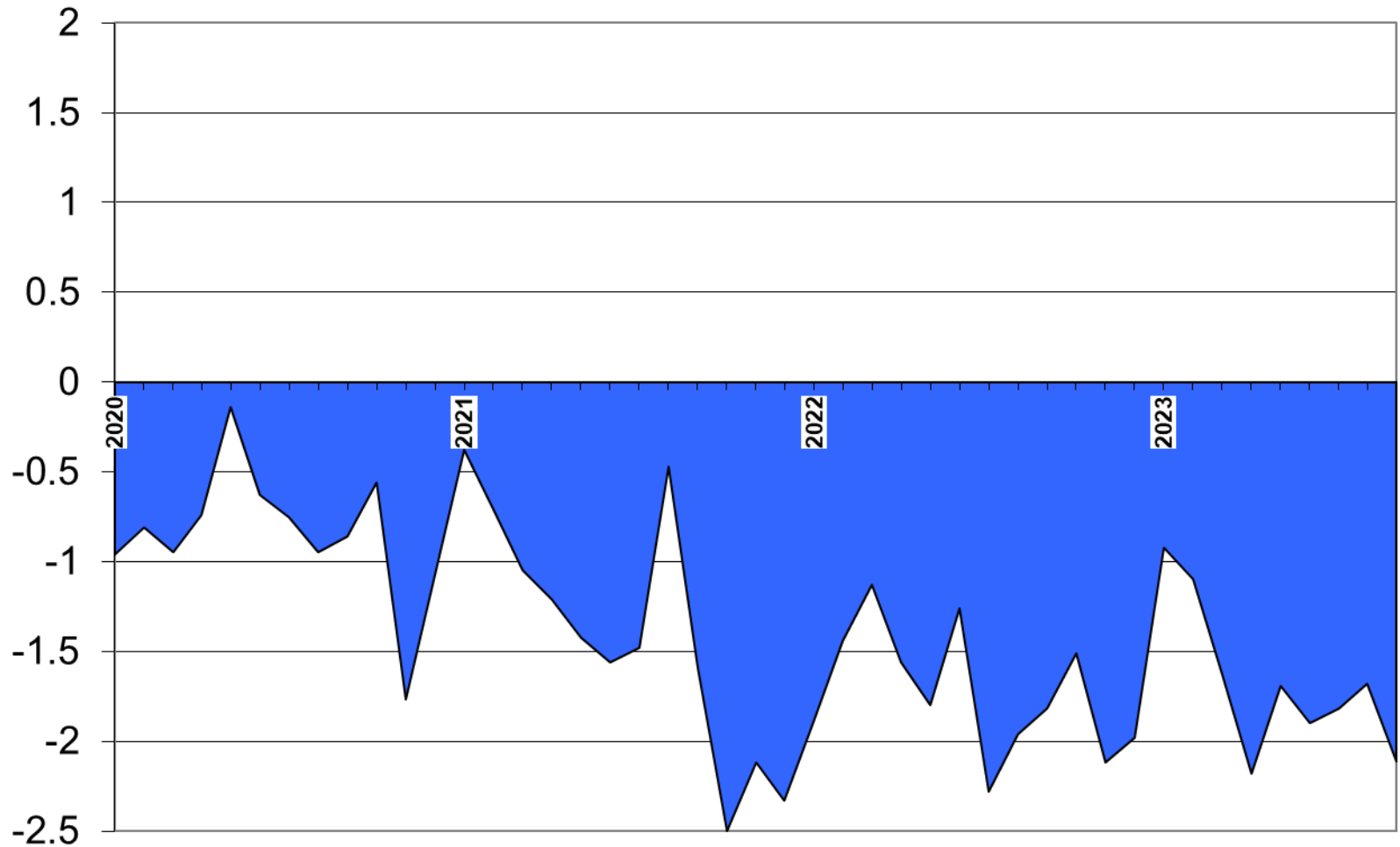
### ENSO indexes





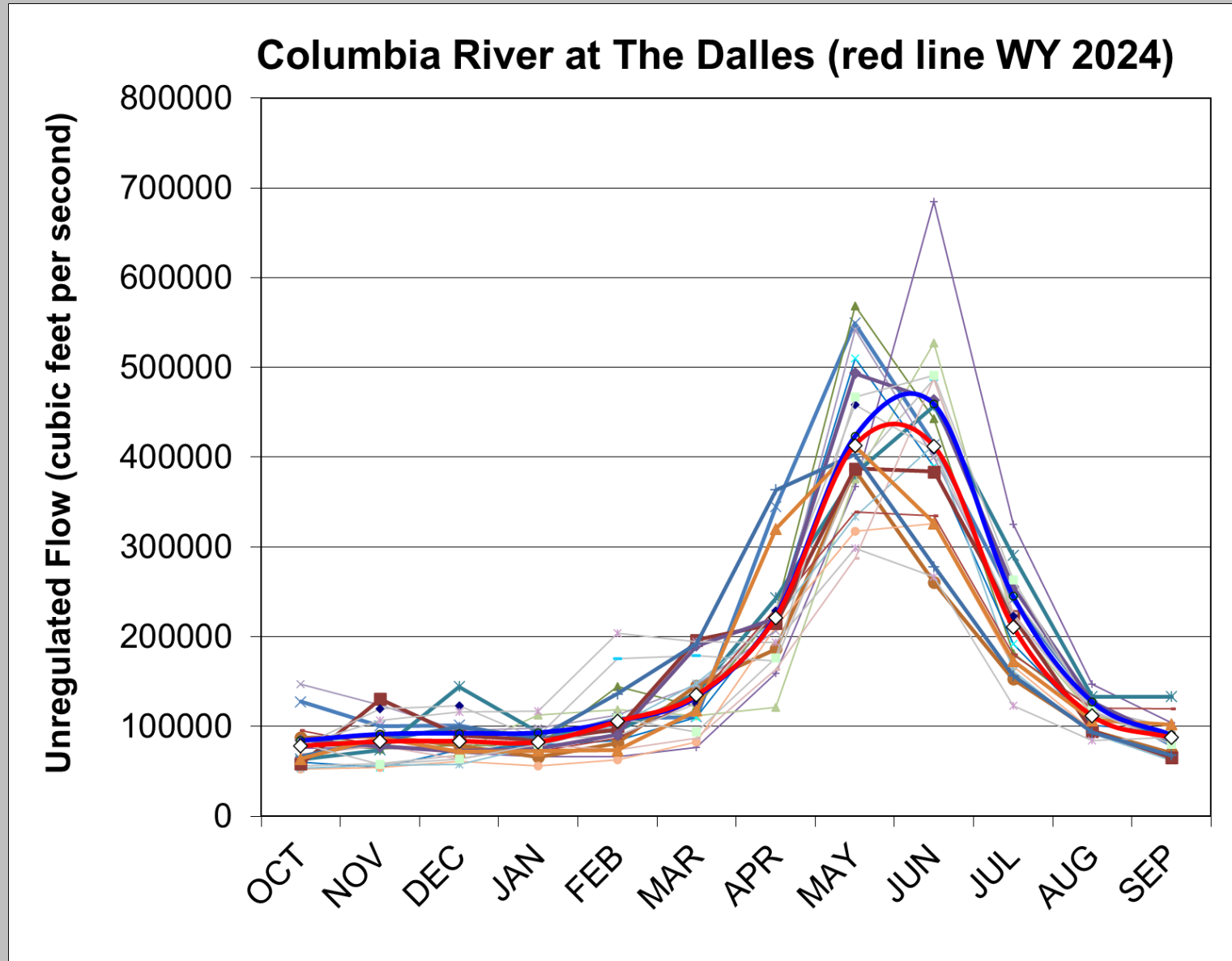
# PDO SIGNAL: COLD PHASE...MORE NEGATIVE

## PACIFIC DECADAL OSCILLATION (PDO), v.5



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

# ENSEMBLE STREAMFLOW FORECAST – Water Year 2024



Blue line = long-term average (WY 1929-2023)



# 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)	-0.2	Below Normal (70 - 90%)	84%
December	Near Normal (-1.8 to + 1.8 degF)	0.4	Near Normal (90 - 110%)	105%
January	Near Normal (-1.8 to + 1.8 degF)	0.7	Above Normal (110 - 130%)	113%
February	Near Normal (-1.8 to + 1.8 degF)	1.5	Below Normal (70 - 90%)	83%
March	Near Normal (-1.8 to + 1.8 degF)	0.4	Below Normal (70 - 90%)	86%

Expect many snow events: **81%** of normal (NOV-MAR); seasonal total **26-inches**.

NOV 2-inch (up to 8), DEC 4-inch (up to 7), JAN 15-inch (up to 35), FEB 5-inch (up to 14), MAR 0.5-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)	-0.1	Near Normal (90 - 110%)	96%	30	113%
December	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	96%	43	97%
January	Above Normal (> + 1.8 degF)	2.1	Near Normal (90 - 110%)	104%	50	97%
February	Near Normal (-1.8 to + 1.8 degF)	1	Near Normal (90 - 110%)	90%	35	89%
March	Below Normal (< -1.8 degF)	0.7	Near Normal (90 - 110%)	94%	35	86%
April	Near Normal (-1.8 to + 1.8 degF)	0.7	Near Normal (90 - 110%)	100%	21	97%
May	Near Normal (-1.8 to + 1.8 degF)	0.7	Near Normal (90 - 110%)	97%	3	60%

Expect a seasonal snow total: **216**-inches or **91%** 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)	0.7	Below Normal (70 - 90%)	82%
December	Near Normal (-1.8 to + 1.8 degF)	0.5	Near Normal (90 - 110%)	104%
January	Near Normal (-1.8 to + 1.8 degF)	1.3	Above Normal (110 - 130%)	111%
February	Near Normal (-1.8 to + 1.8 degF)	1.2	Below Normal (70 - 90%)	80%
March	Near Normal (-1.8 to + 1.8 degF)	0.9	Near Normal (90 - 110%)	92%

EXPECT LOW VARIABILITY – HARD RAIN EVENTS, MORE/LONGER DRY-SPELLS, FOG, FEW GORGE WIND EVENTS, etc.

WATER SUPPLY FORECAST: **96 MAF** ( $\pm 10$  MAF) or **94%**, COLUMBIA RIVER AT THE DALLES, JANUARY - JULY.

## *...but what about Snow events?!*

Expect **TWO** events: 1 moderate (2 inch), 1 minor (1 inch or less).

NOV 0.5-inch, DEC 0.75-inch (up to 2), JAN 2.5-inch (up to 7), FEB 0.5-inch (up to 2), and MAR 0.25-inch (up to 0.75).

(35% - 70% likely) Season: **4.5-inches**

