Winter 2024-2025 Weather Forecast

32nd Winter Weather Forecast Meeting, OMSI and Oregon AMS, Portland

Kyle Dittmer, P.H.

Hydrologist-Meteorologist

Columbia River Inter-Tribal Fish Commission
Portland, Oregon, USA

Earth Science Instructor

Clark College, Vancouver, Washington

PCC – Southeast Campus, Portland, Oregon

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Columbia River Inter-Tribal Fish Commission - **CRITFC**

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

2023-2024 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)	0.7	**2.4**	Below Normal (70 - 90%)	82%	**95%**
December	Near Normal (-1.8 to + 1.8 degF)	0.5	**5.4**	Near Normal (90 - 110%)	104%	**158%**
January	Near Normal (-1.8 to + 1.8 degF)	1.3	**-0.8**	Above Normal (110 - 130%)	111%	**202%**
February	Near Normal (-1.8 to + 1.8 degF)	1.2	**2.1**	Below Normal (70 - 90%)	80%	**108%**
March	Near Normal (-1.8 to + 1.8 degF)	0.9	**1.8**	Near Normal (90 - 110%)	92%	**76%**
		average: 0.9	2.2		average: 94%	128%

...but what about _Snow events_?!

Forecasted two events: one moderate and one minor
(3-inch seasonal total), December to March.

Observed <u>one</u> snow event: Jan. 13 (plus trace snowfall),
… a **1.6-inch** seasonal total.

2023-2024 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)	-0.2	**0**	Below Normal (70 - 90%)	84%	**63%**
December	Near Normal (-1.8 to + 1.8 degF)	0.4	**3.6**	Near Normal (90 - 110%)	105%	**157%**
January	Near Normal (-1.8 to + 1.8 degF)	0.7	**-4.9**	Above Normal (110 - 130%)	113%	**129%**
February	Near Normal (-1.8 to + 1.8 degF)	1.5	**0.8**	Below Normal (70 - 90%)	83%	**77%**
March	Near Normal (-1.8 to + 1.8 degF)	0.4	**0**	Below Normal (70 - 90%)	86%	**59%**
		average: 0.6	-0.1		average: 94%	97%

2023-2024 Government Camp Climate Forecast Performance

Month:		Temperature:	Observed		Precipitation:	Observed		Snowfall	Observed	Forecast	Observed
November		-0.1	0.3		96%	54%		30	2	113%	7%
December		-0.1	6		96%	97%		43	36	97%	71%
January		2.1	-1.8		104%	96%		50	90	97%	183%
February		1	0		90%	92%		35	55	89%	139%
March		0.7	0.1		94%	57%		35	26	86%	73%
April		0.7	-0.1		100%	54%		21	16	97%	91%
May		0.7	-2.2		97%	95%		3	8.5	60%	202%
average:		0.7	0.3		97%	78%		217	233.5	91%	109%

Water Supply Forecast (MEI method): Columbia R. at The Dalles, Jan.-July:
96 MAF (issued Oct. 2023), 93%. Observed: 78.5 MAF. Error ±22%.
95 MAF (issued April 2024), 92%. Observed: 78.5 MAF. Error ±21%.

WEATHER, RIVERS, SALMON – WHY IT MATTERS
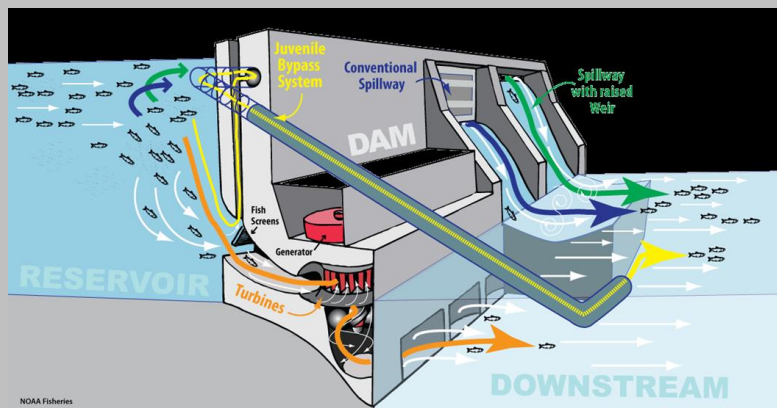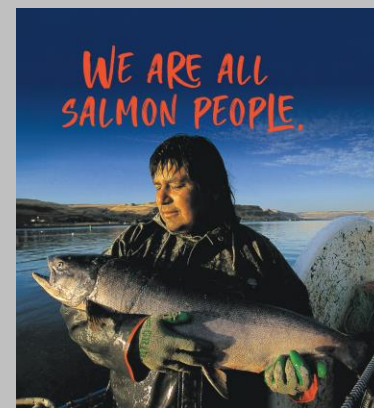
Travel Time Lower Granite tailwater to Ice Harbor Dam versus Average Flow at Little Goose, Lower Monumental and Ice Harbor dams (1998 to 2002)

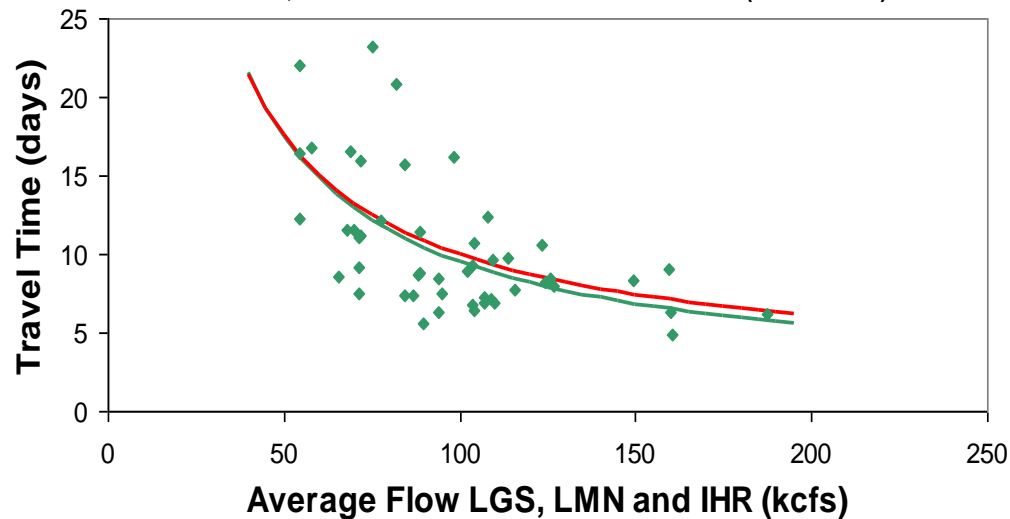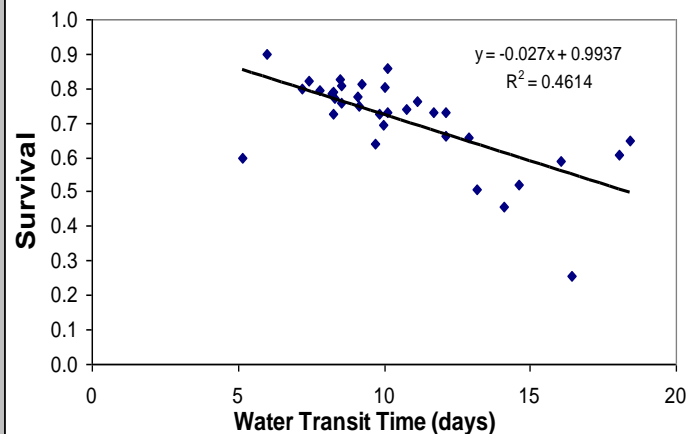Wild Yearling Chinook Survival and Water Transit Time from Lower Granite to McNary Dam (1998 to 2002)

$y = -0.027x + 0.9937$
$R^2 = 0.4614$

https://critfc.org/fish-and-watersheds/columbia-river-fish-species/columbia-river-salmon/

Introduction – Methods

- ➢ CRITFC forecast uses a holistic, integrated big picture view.

- ➢ Big-picture: **Solar Forcing** (e.g., sunspot cycles) <u>does</u> 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 (1950-2024) vs. historic runoff for the Columbia River at The Dalles, then compute a 2025 Water Supply Forecast.

- ➢ Select the "right" mixture of 20 past Water Years (next slide).

- ➢ Pattern recognition is key: *La Niña* years.

Introduction – Methods

Ensemble forecasting – 20 past water years:

WY2025	TDA runoff	PDO-warm	PDO-cold	El Nino	E-neutral	La Nina
1945	83.31	x				X
1955	96.9		x			X
1965	126.1		x			X
1967	113.7		x		X	
1968	95.54		x			X
1975	111.9		x			X
1976	122.7		x			X
1985	90.48	x				X
1989	93.2	x				X
1990	99.7	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
2018	118.5		x			X
2021	82.1		x			X
2022	105.3		x			X
2023	80.1		x			X
	(MAF)					
Average:	**104.8**		La-Nina:			17
STDEV:	12.7		ENSO neutral:			3

SUNSPOT COUNTS – "*El Niño* winter"

https://www.swpc.noaa.gov/products/solar-cycle-progression
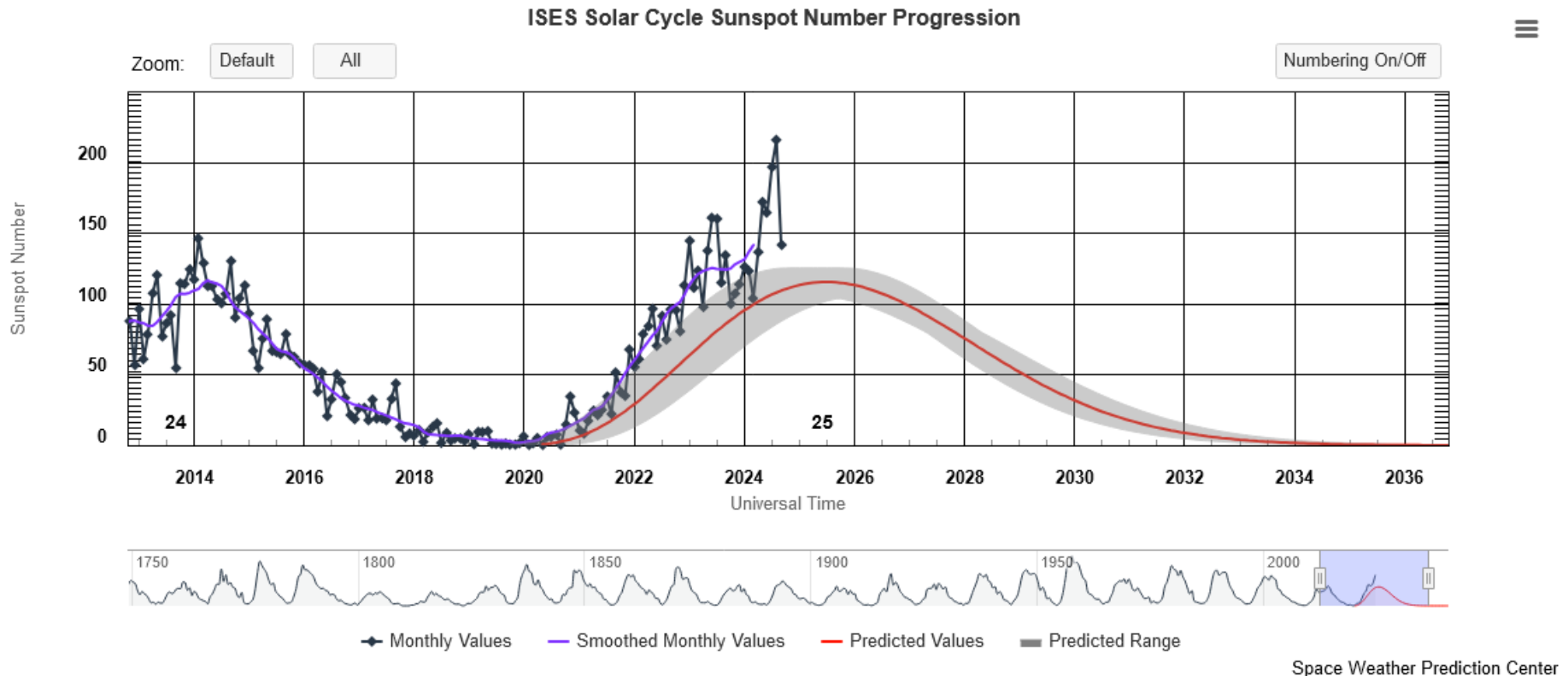
https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table
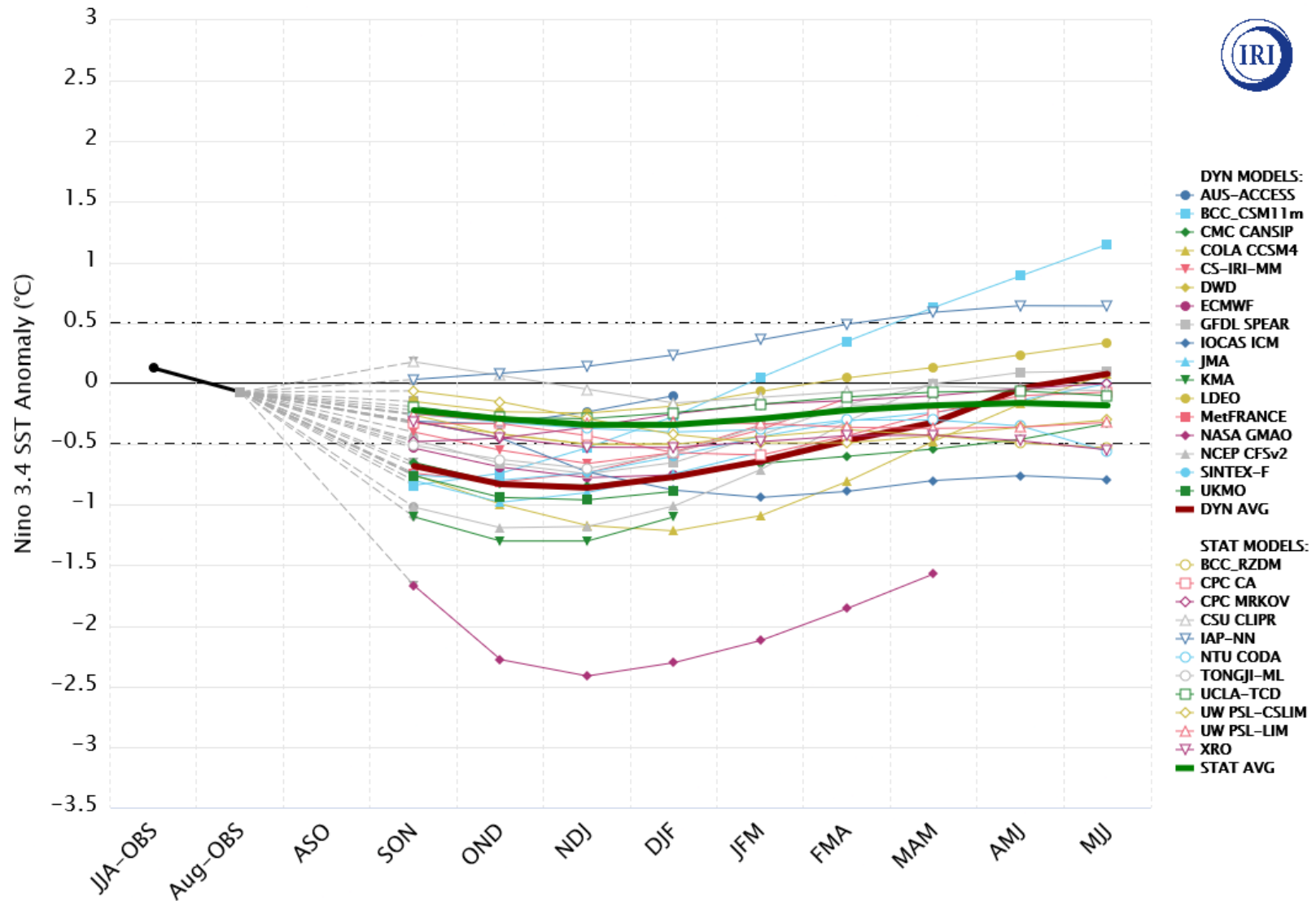
NOAA SEA SURFACE TEMPERATURES - "*La Niña* winter"
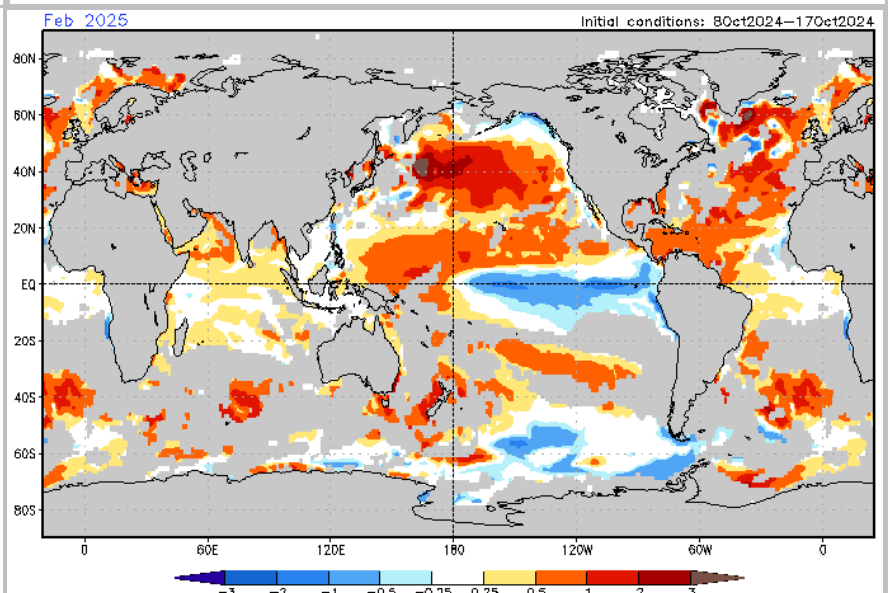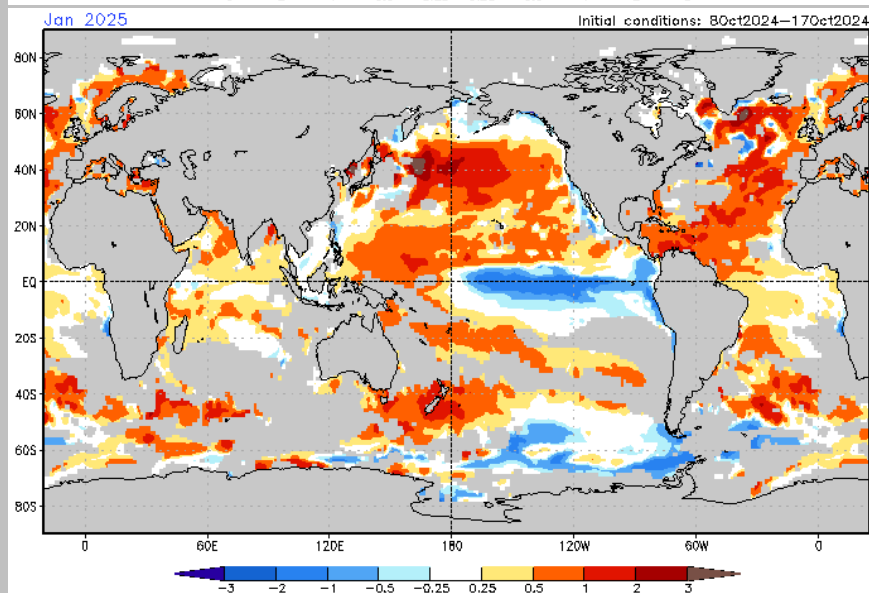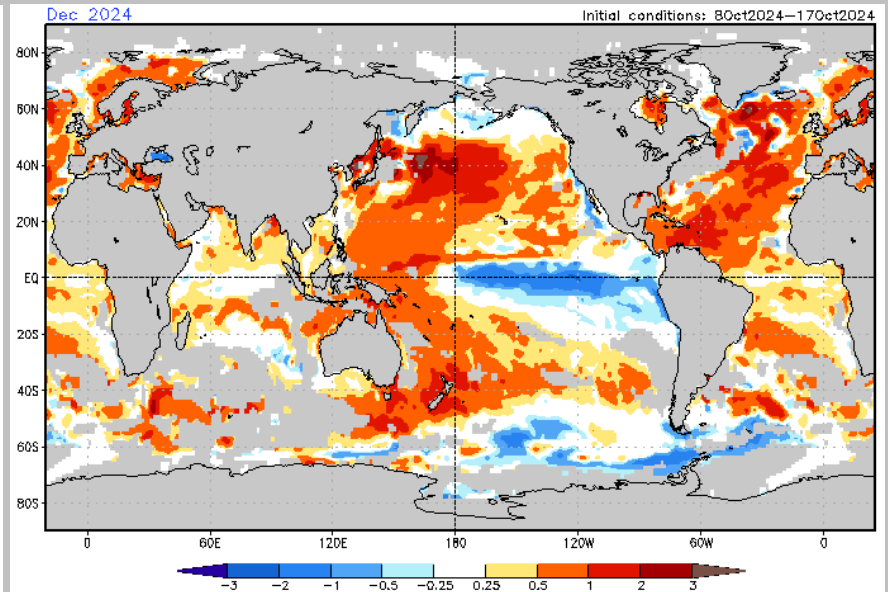
NINO SEA SURFACE TEMPERATURE INDICES
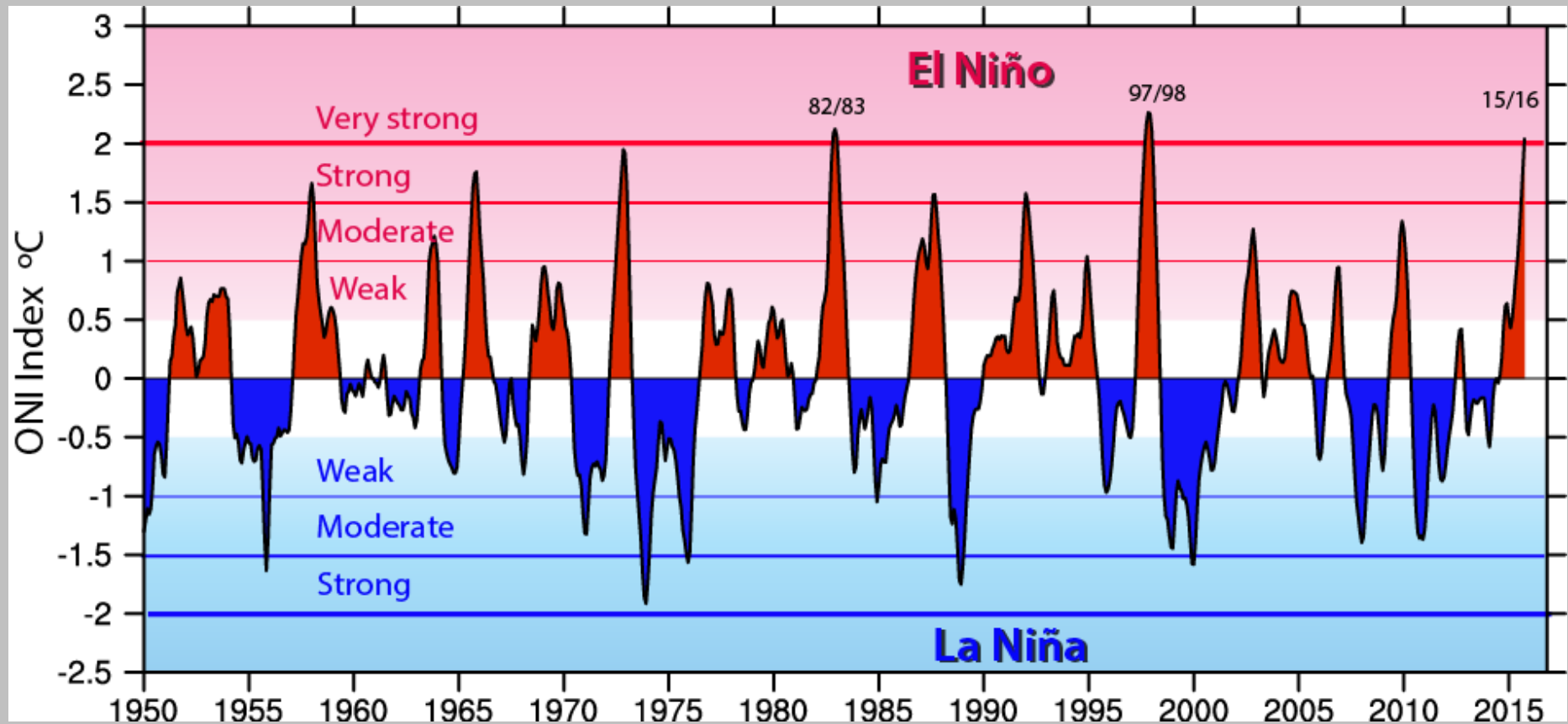
MEI SIGNAL SUGGESTS "*La Niña* winter"

MEI.v2 Evolution of Current ENSO Event in Historical Context

2024

— 1996   — 1999   — 2008   — 2011   — 2022
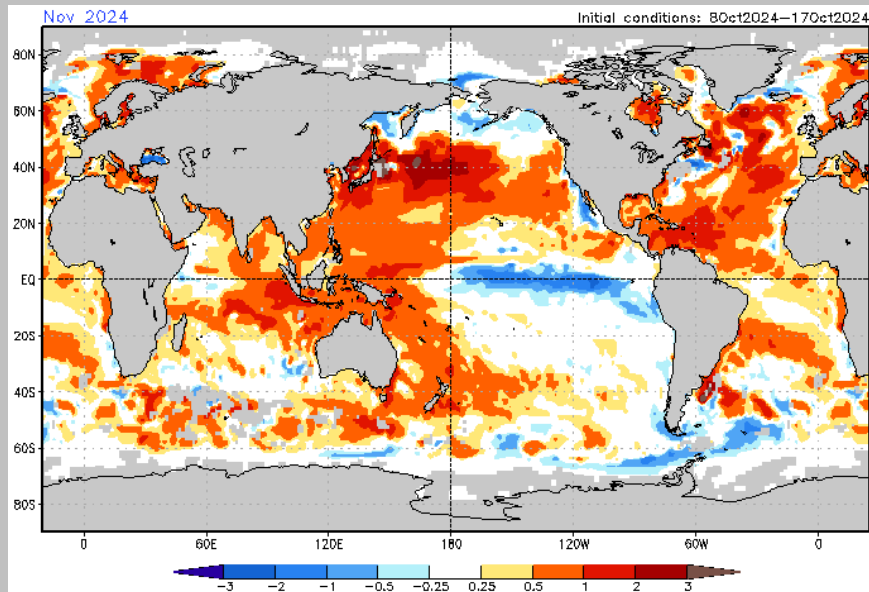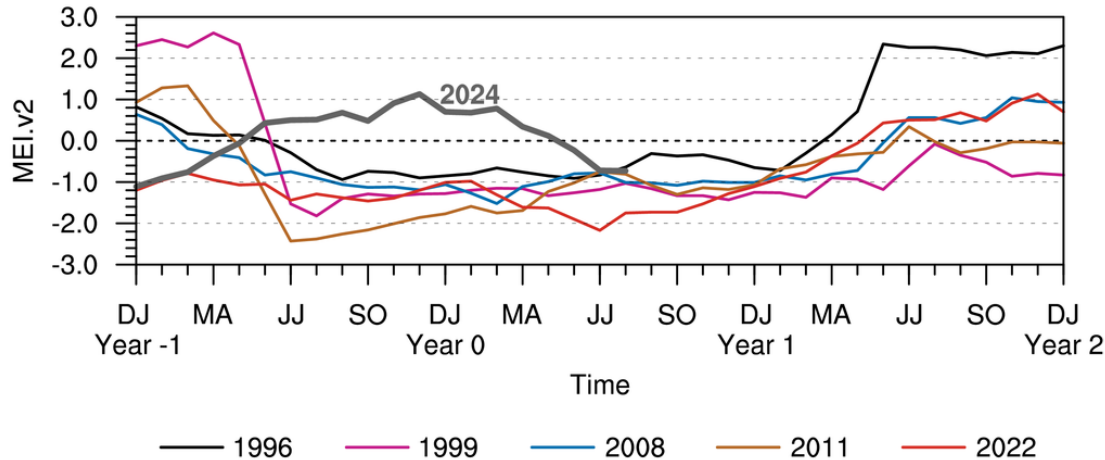
MEI – one index that tracks:

➤ Sea-Level Pressure

➤ Surface winds (2D)

➤ Sea-surface Temperature

➤ Surface Air Temperature

➤ Fraction of Cloud cover

Multivariate ENSO Index Version 2 using JRA3Q

ENSO indexes

Source: https://www.esrl.noaa.gov/psd/enso/mei
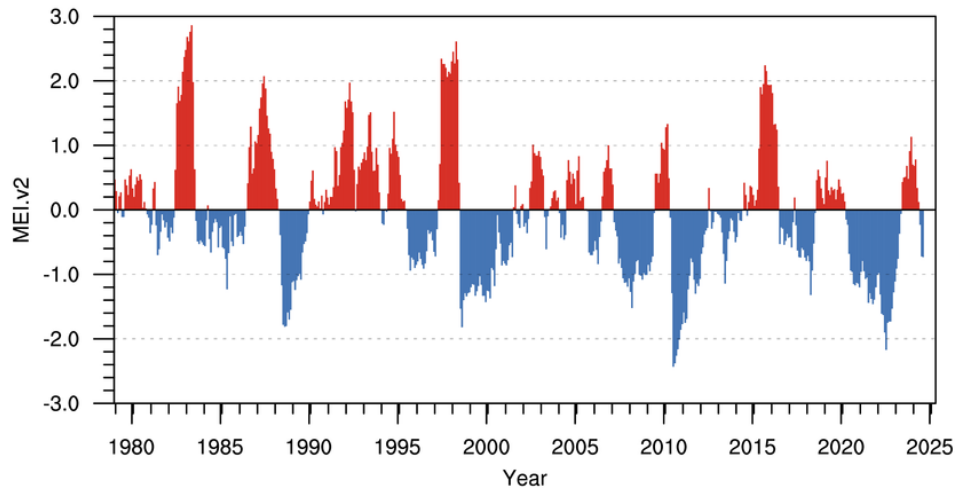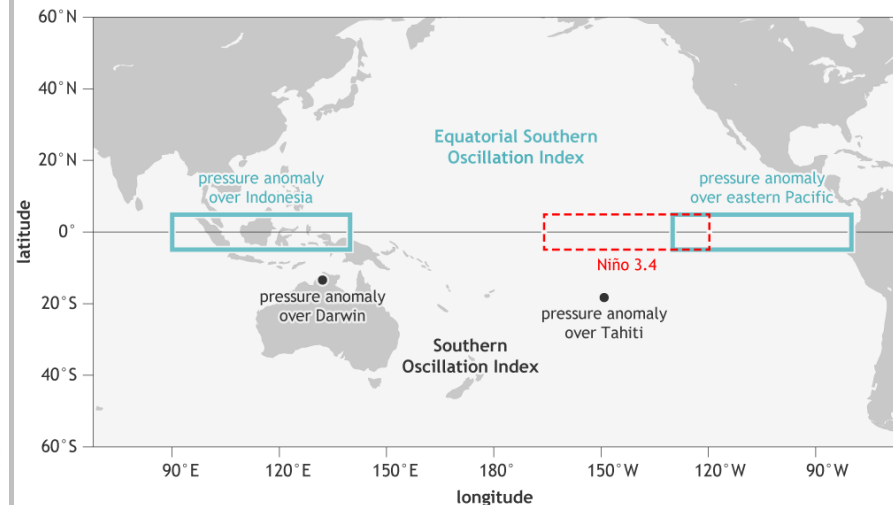
PDO SIGNAL: COLD PHASE...MORE NEGATIVE

PACIFIC DECADAL OSCILLATION (PDO), v.5

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

ENSEMBLE STREAMFLOW FORECAST

Columbia River at The Dalles (red line WY 2025)

Blue line = long-term average (WY 1929-2024)

Summary: Columbia R. Gorge

Hood River, Oregon

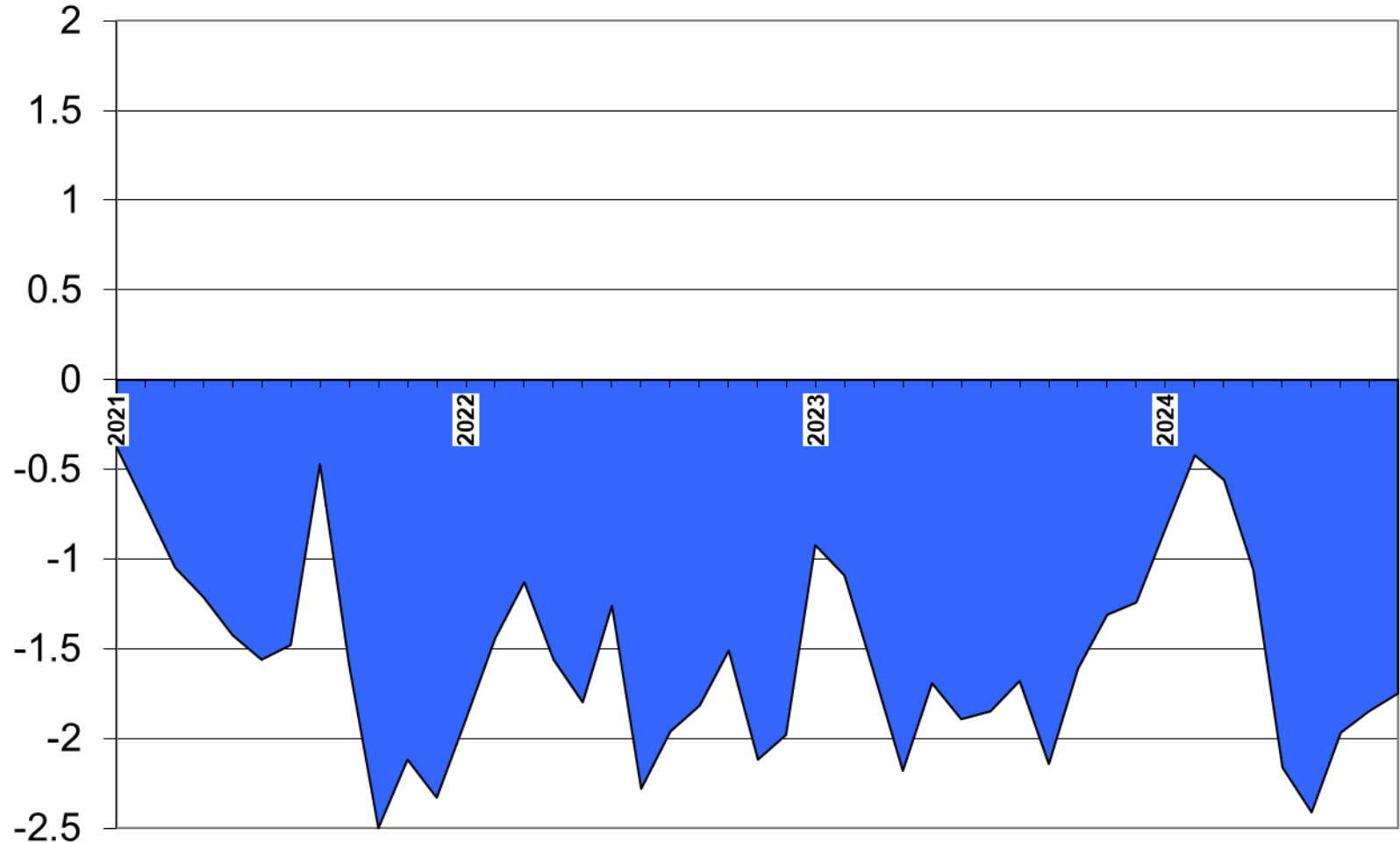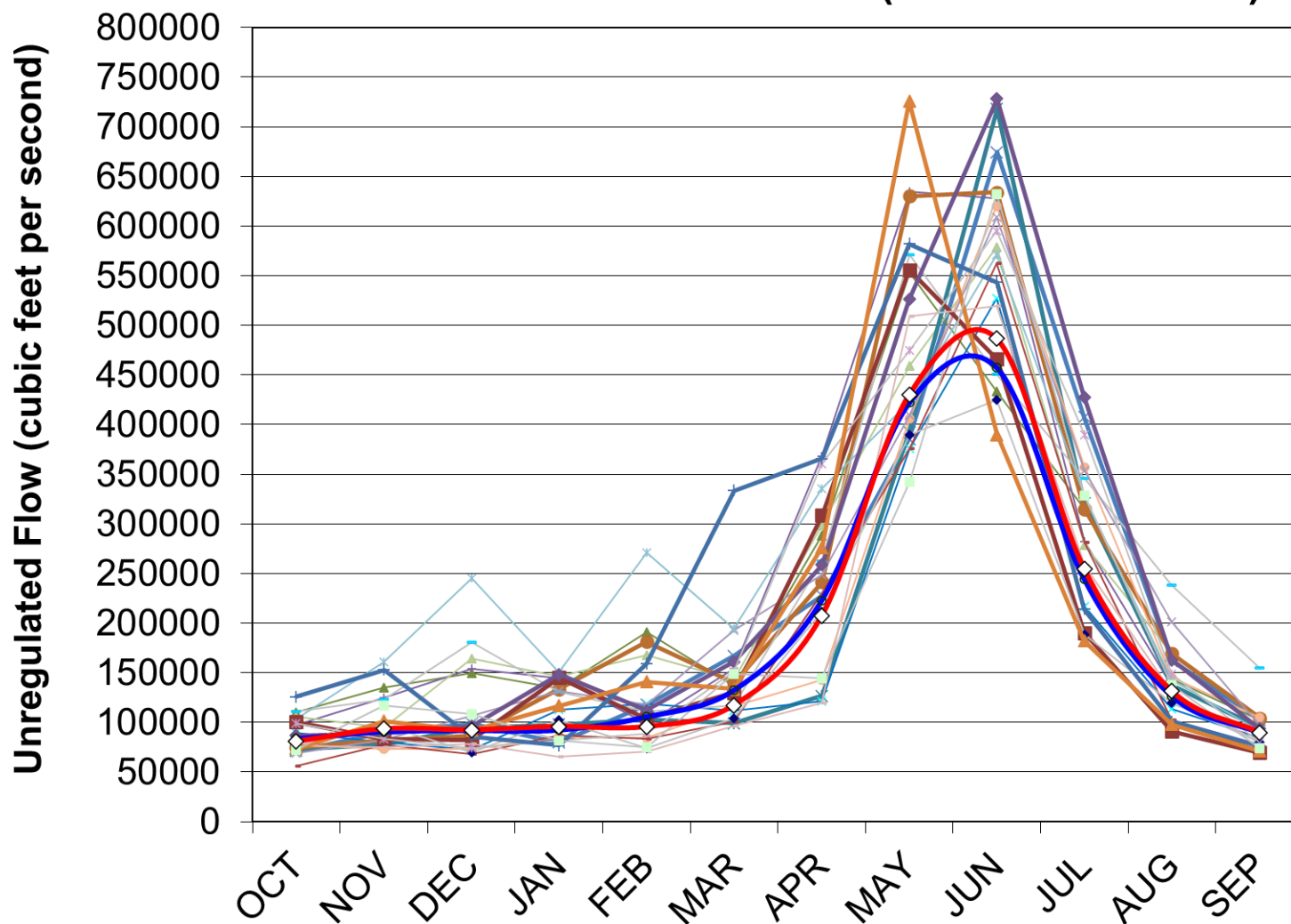| Month:	Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)
November	Near Normal (-1.8 to + 1.8 degF)	1	Above Normal (110 - 130%)	111%
December	Near Normal (-1.8 to + 1.8 degF)	-0.2	Near Normal (90 - 110%)	96%
January	Above Normal (> + 1.8 degF)	3	Near Normal (90 - 110%)	95%
February	Near Normal (-1.8 to + 1.8 degF)	-0.1	Near Normal (90 - 110%)	95%
March	Near Normal (-1.8 to + 1.8 degF)	-1	Below Normal (70 - 90%)	88%

Expect <u>many</u> snow events: **103%** of normal (NOV-MAR); seasonal total 26-inches.

NOV 2-inch (up to 4), DEC 9-inch (up to 20), JAN 6-inch (up to 16), FEB 8-inch (up to 19), 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	Near Normal (90 - 110%)	109%	32	123%
December	Near Normal (-1.8 to + 1.8 degF)	-0.5	Near Normal (90 - 110%)	105%	59	129%
January	Near Normal (-1.8 to + 1.8 degF)	1.6	Above Normal (110 - 130%)	112%	61	113%
February	Near Normal (-1.8 to + 1.8 degF)	-1.3	Above Normal (110 - 130%)	111%	54	130%
March	Below Normal (< -1.8 degF)	-1.5	Near Normal (90 - 110%)	99%	50	123%
April	Near Normal (-1.8 to + 1.8 degF)	-0.8	Near Normal (90 - 110%)	98%	29	145%
May	Near Normal (-1.8 to + 1.8 degF)	-0.5	Near Normal (90 - 110%)	99%	7	177%

Expect a seasonal snow total: **293**-inches or **134%** of normal (NOV-MAY).

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TIMBERLINE
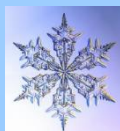
Summary: the Portland Forecast

Month:		Temperature (mean monthly):	Avg. (n=20)	Precipitation (% normal):	Avg. (n=20)
November		Near Normal (-1.8 to + 1.8 degF)	1	Near Normal (90 - 110%)	107%
December		Near Normal (-1.8 to + 1.8 degF)	-0.1	Below Normal (70 - 90%)	89%
January		Above Normal (> + 1.8 degF)	2	Near Normal (90 - 110%)	101%
February		Near Normal (-1.8 to + 1.8 degF)	-0.6	Below Normal (70 - 90%)	86%
March		Near Normal (-1.8 to + 1.8 degF)	-1.1	Below Normal (70 - 90%)	89%

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

WATER SUPPLY FORECAST: **105 MAF** (±13 MAF) or **104%**, 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 2.5-inch (up to 7), JAN 1-inch (up to 2), FEB 2-inch (up to 6), and MAR 0.25-inch (up to 1).

(70% - 85% likely) Season: **5.5**-inches