

The Washington Water Supply Availability Committee (WSAC) will be meeting on November 18th. WSAC convenes periodically to review water supply conditions and forecasts.

Join Zoom Meeting

<https://waecy-wa-gov.zoom.us/j/86155780583?pwd=MFdaL3hYSEJJK0llc3J0cllkSmlQUT09>

Meeting ID: 861 5578 0583

Passcode: 139010

One tap mobile

+12532158782,,86155780583#,,,,*139010# US (Tacoma)

+16694449171,,86155780583#,,,,*139010# US

Dial by your location

+1 253 215 8782 US (Tacoma)

+1 669 444 9171 US

+1 669 900 6833 US (San Jose)

+1 719 359 4580 US

+1 346 248 7799 US (Houston)

+1 312 626 6799 US (Chicago)

+1 386 347 5053 US

+1 564 217 2000 US

+1 646 931 3860 US

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Washington DC)

+1 309 205 3325 US

Meeting ID: 861 5578 0583

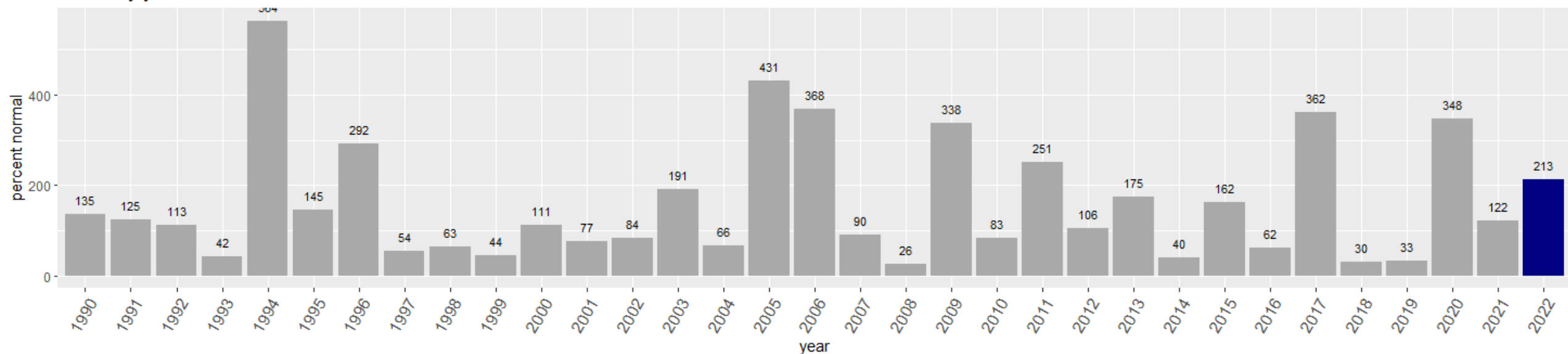
Passcode: 139010

Find your local number: <https://waecy-wa-gov.zoom.us/j/kxcuWYh8j>

Washington Water Supply Availability Committee

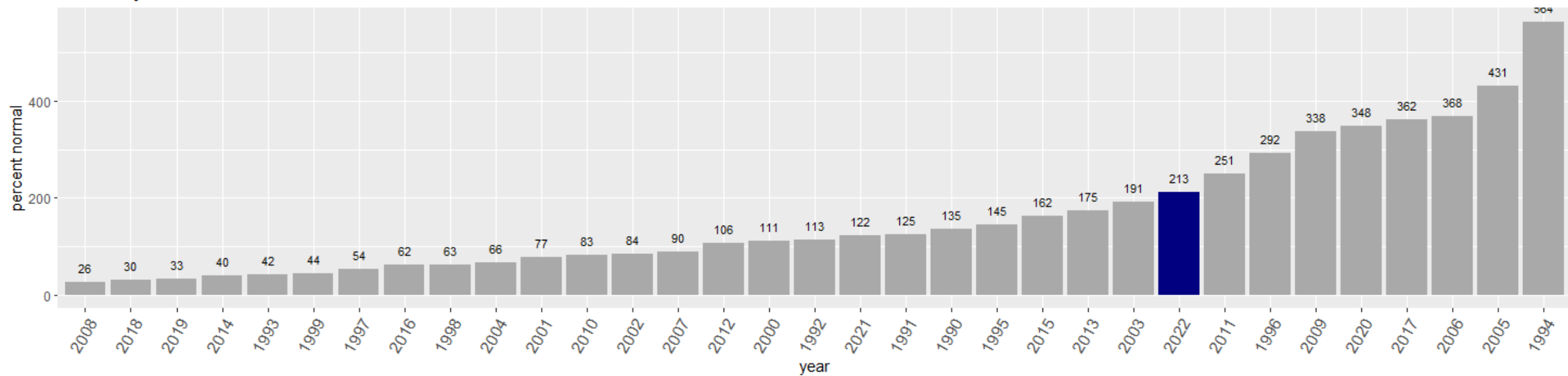
Friday, November 18, 2022				
Start Time	End Time	Duration, min	Description	
10:00	10:10	10	Welcome & Introductions	Jeff Marti, Ecology
10:10	10:25	15	Regional Climate Setting/ ENSO	Karin Bumbaco, OWSC Nick Bond, OWSC
10:25	10:35	10	Mountain Conditions	Scott Pattee, NRCS
10:35	10:45	10	Streamflow and Groundwater	Nick Sutfin, USGS
10:45	10:55	10	Water Supply Forecasts	Brent Bower/Amy Burke NWS
10:55	11:15	20	General Discussion	All
			Next Meeting: Friday, January 20th	

Washington statewide average Snow Water Equivalent on November 17 compared to previous years
sorted by year



NRCS data

ranked by SWE



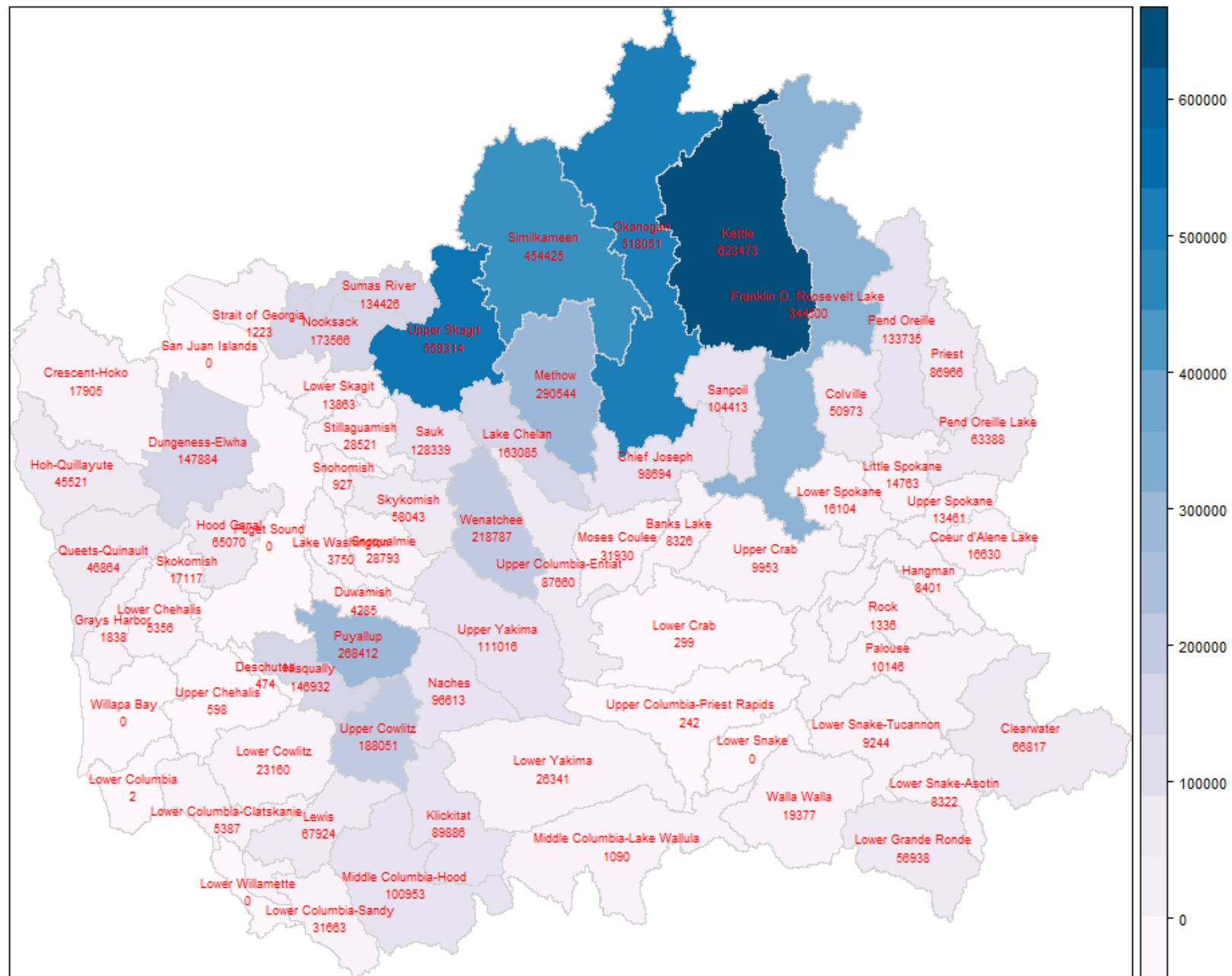
NRCS data

total volume of snow storage (acre-feet) by basin (HUC8)

Oct. 1 Snow Storage:
483,442 af

Nov. 17 Snow Storage:
6,171,010 af

Snow Storage Last Year
on Nov 17
3,390,765 af



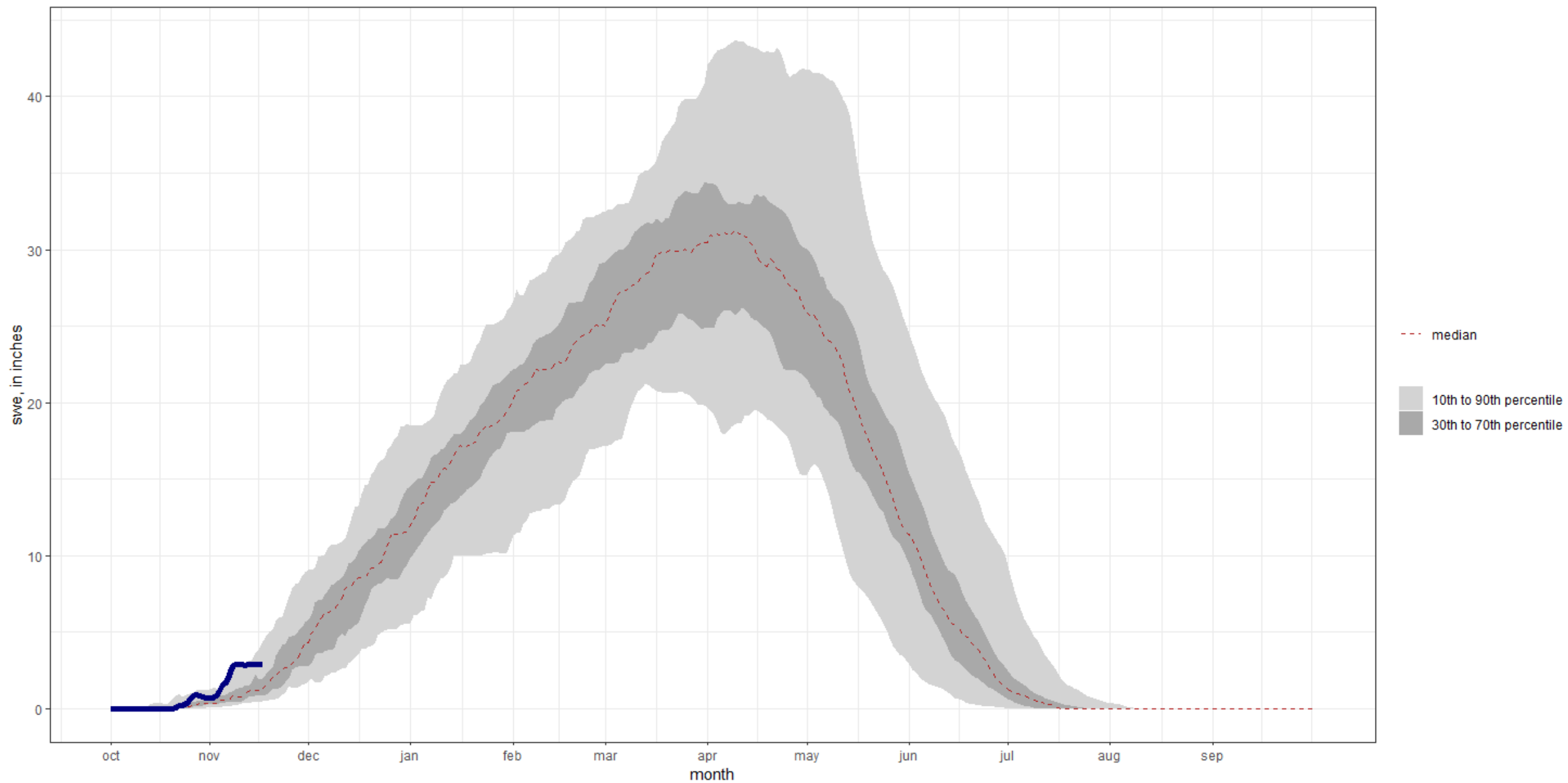
SNODAS_20221117.1



This is the end.

Washington State SWE (SNOTEL)

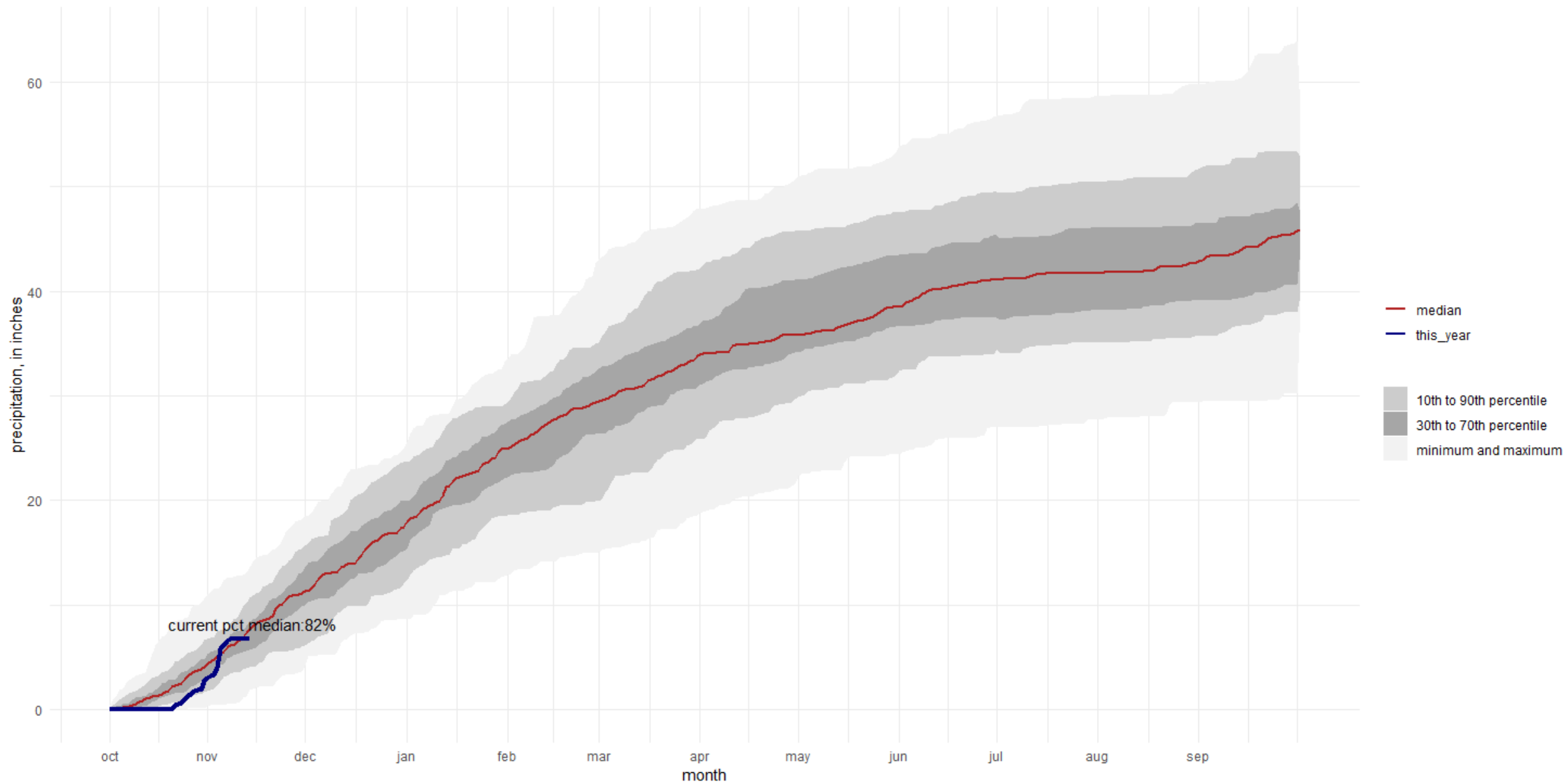
POR: 1989-10-01 - 2022-11-17 Created on: 2022-11-17



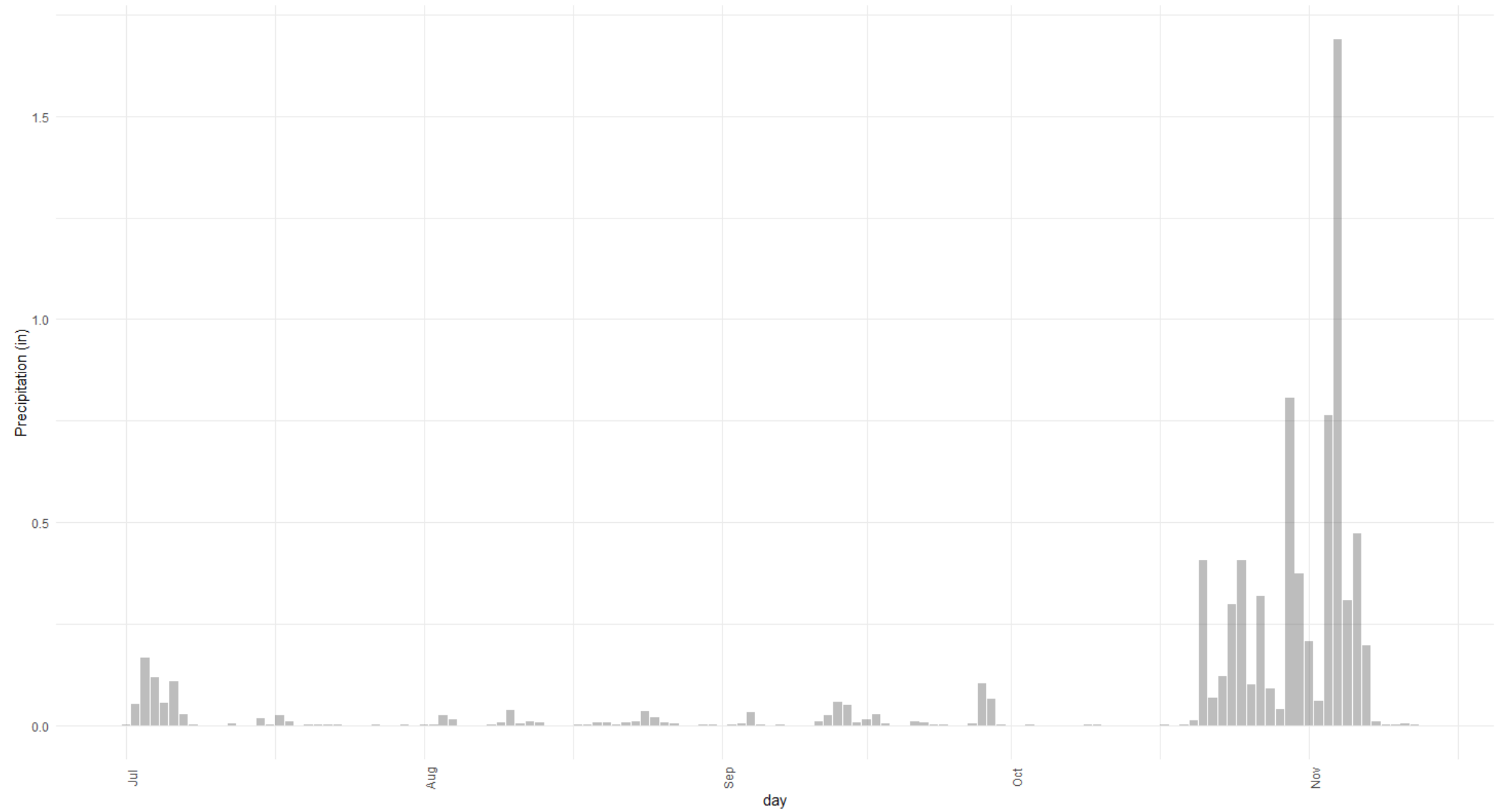
Data: NRCS

Washington State Cumulative Statewide Precipitation (gridMET)

POR: 1979-10-01 - 2022-11-13 Created on: 2022-11-17



Data: gridMET via Earth Engine





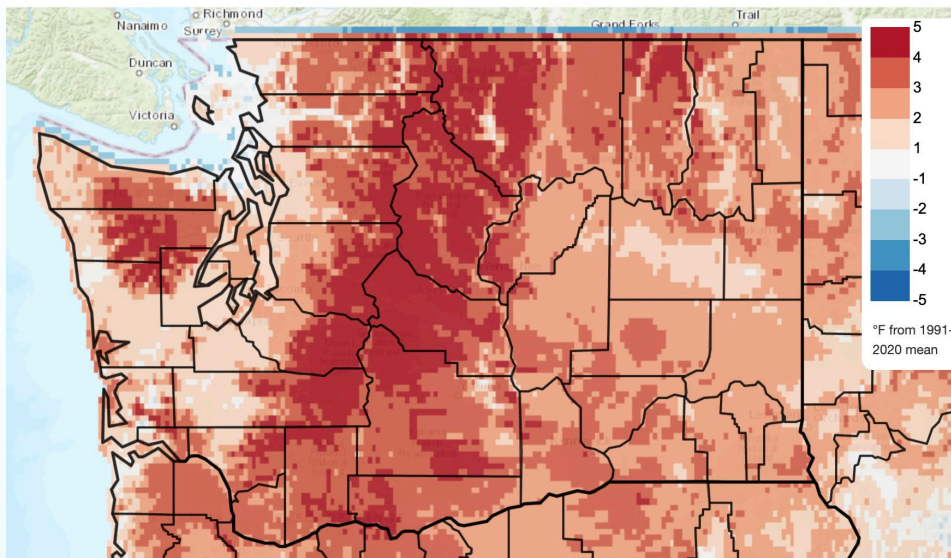
Current Conditions and Seasonal Outlook

Nick Bond & Karin Bumbaco
Office of the Washington State Climatologist
Cooperative Institute for Climate, Ocean, and Ecosystem Studies
University of Washington
18 November 2022

Water Year 2023

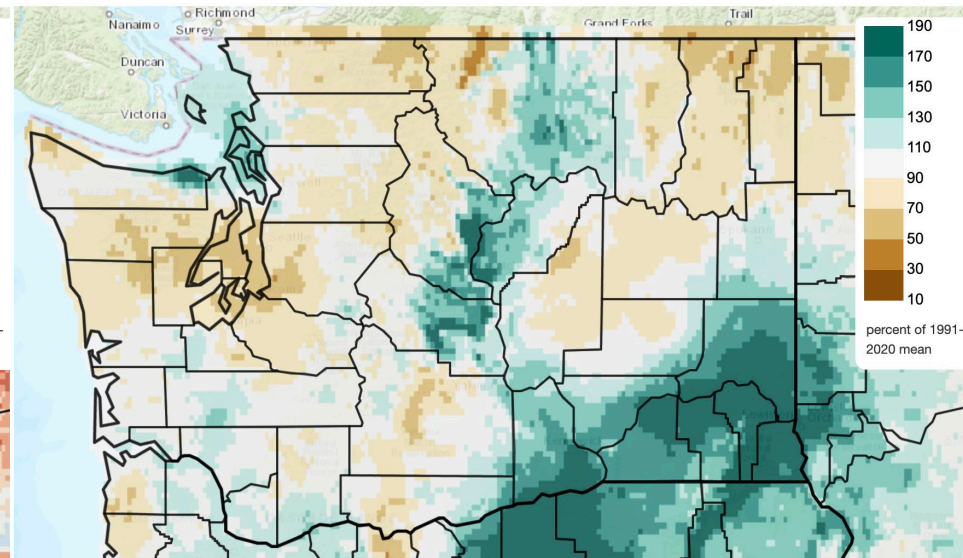
Temperature

Mean Daily Temperature Anomaly, Since Oct 1st
2022/10/01 - 2022/11/14



Precipitation

Total Precipitation Anomaly, Since Oct 1st
2022/10/01 - 2022/11/14



Climate Toolbox

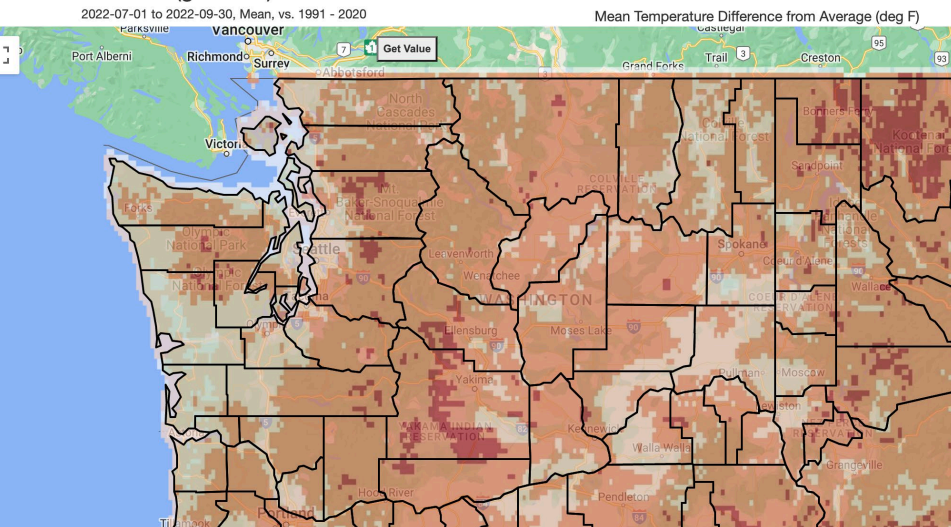
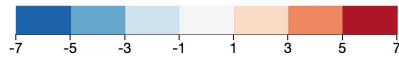
- Averaged statewide, October was the warmest on record* (+6.6°F)
- October precipitation was the 37th driest averaged statewide

*Records since 1895

July-September 2022

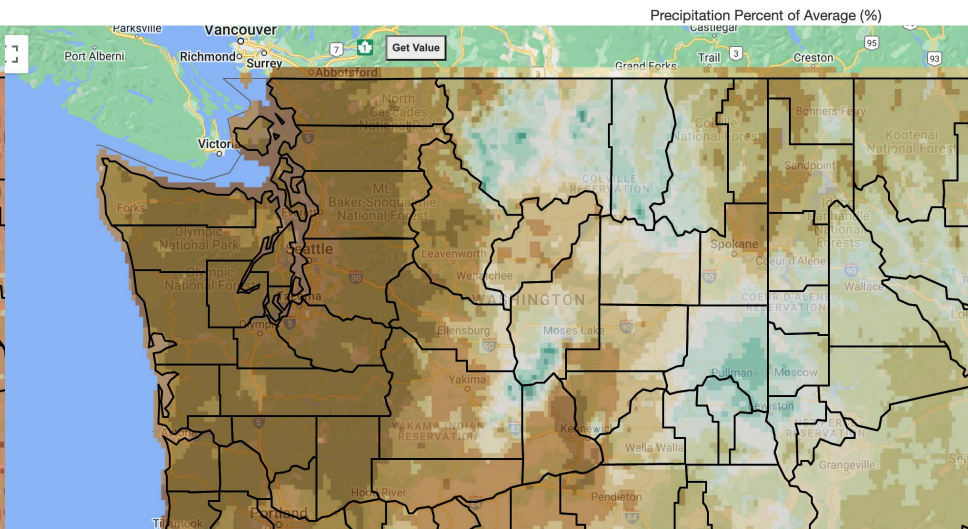
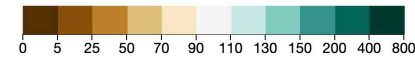
Temperature

Mean Temperature Difference from Average
(gridMET)



Precipitation

Precipitation Percent Of Average (gridMET)
2022-07-01 to 2022-09-30, Total, vs. 1991 - 2020



- Averaged statewide, July-September was the warmest on record* (+3.5°F)
- Averaged statewide, July-Sept precipitation was the 2nd driest on record

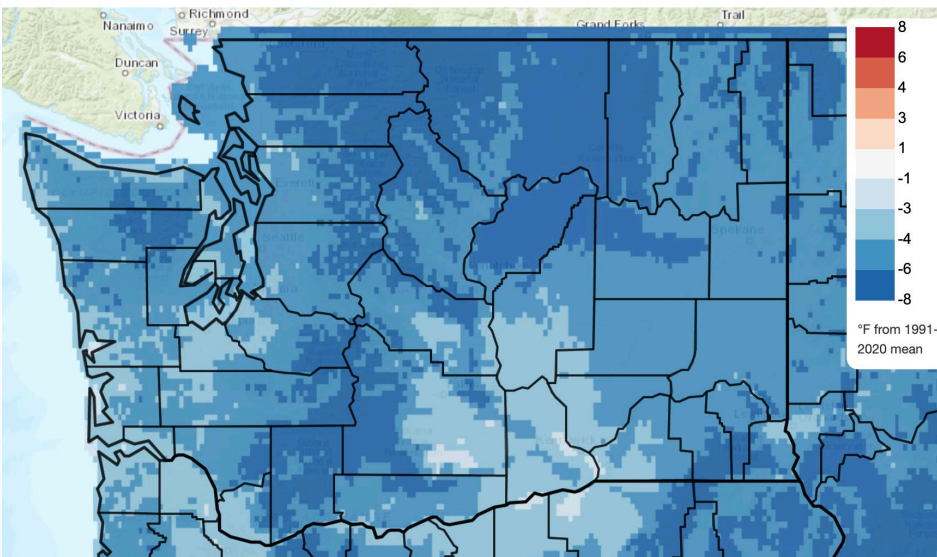
*Records since 1895

November 2022

Temperature

Mean Daily Temperature Anomaly, Last 15 Days

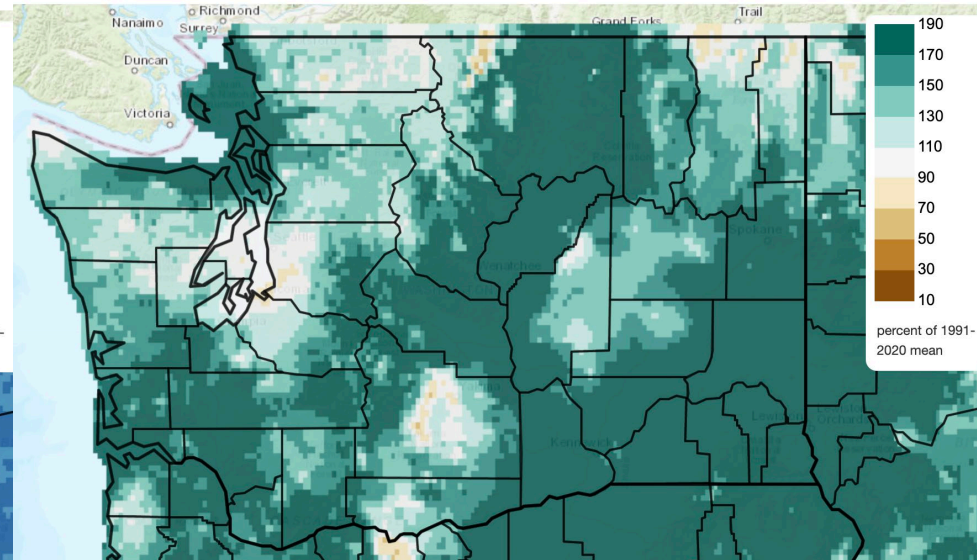
2022/10/31 - 2022/11/14



Precipitation

Total Precipitation Anomaly, Last 15 Days

2022/10/31 - 2022/11/14

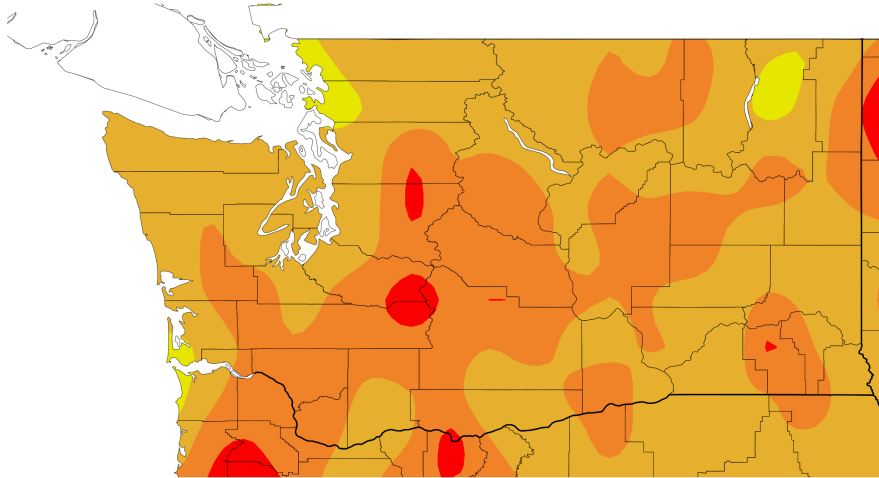


Climate Toolbox

*Records since 1895

Last 120 days

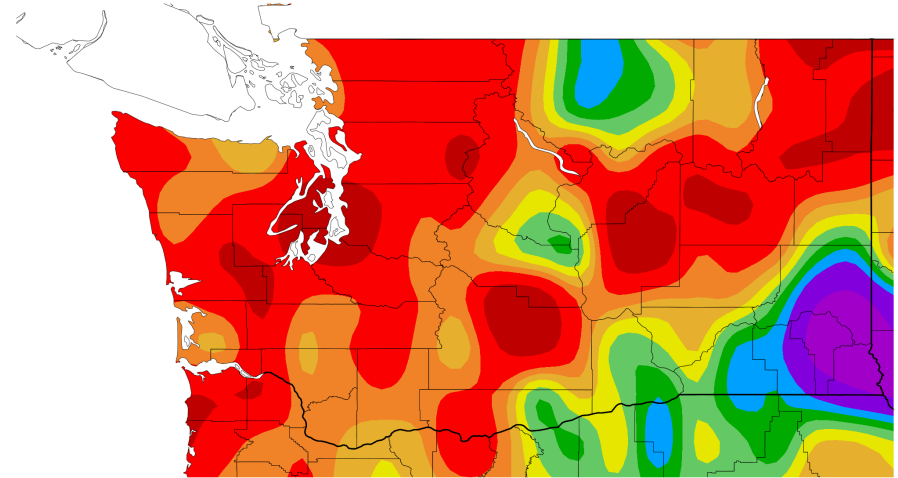
Departure from Normal Temperature (F)
7/19/2022 – 11/15/2022



Generated 11/16/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
7/19/2022 – 11/15/2022



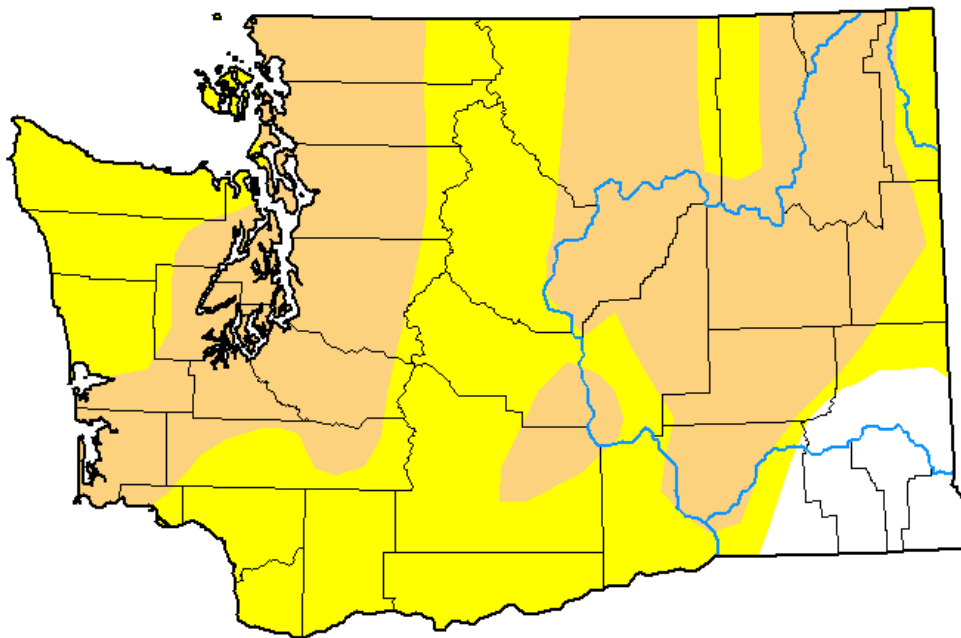
Generated 11/16/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

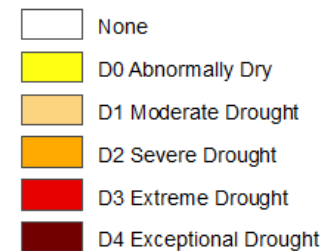
U.S. Drought Monitor

U.S. Drought Monitor Washington

November 15, 2022
(Released Thursday, Nov. 17, 2022)
Valid 7 a.m. EST



Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

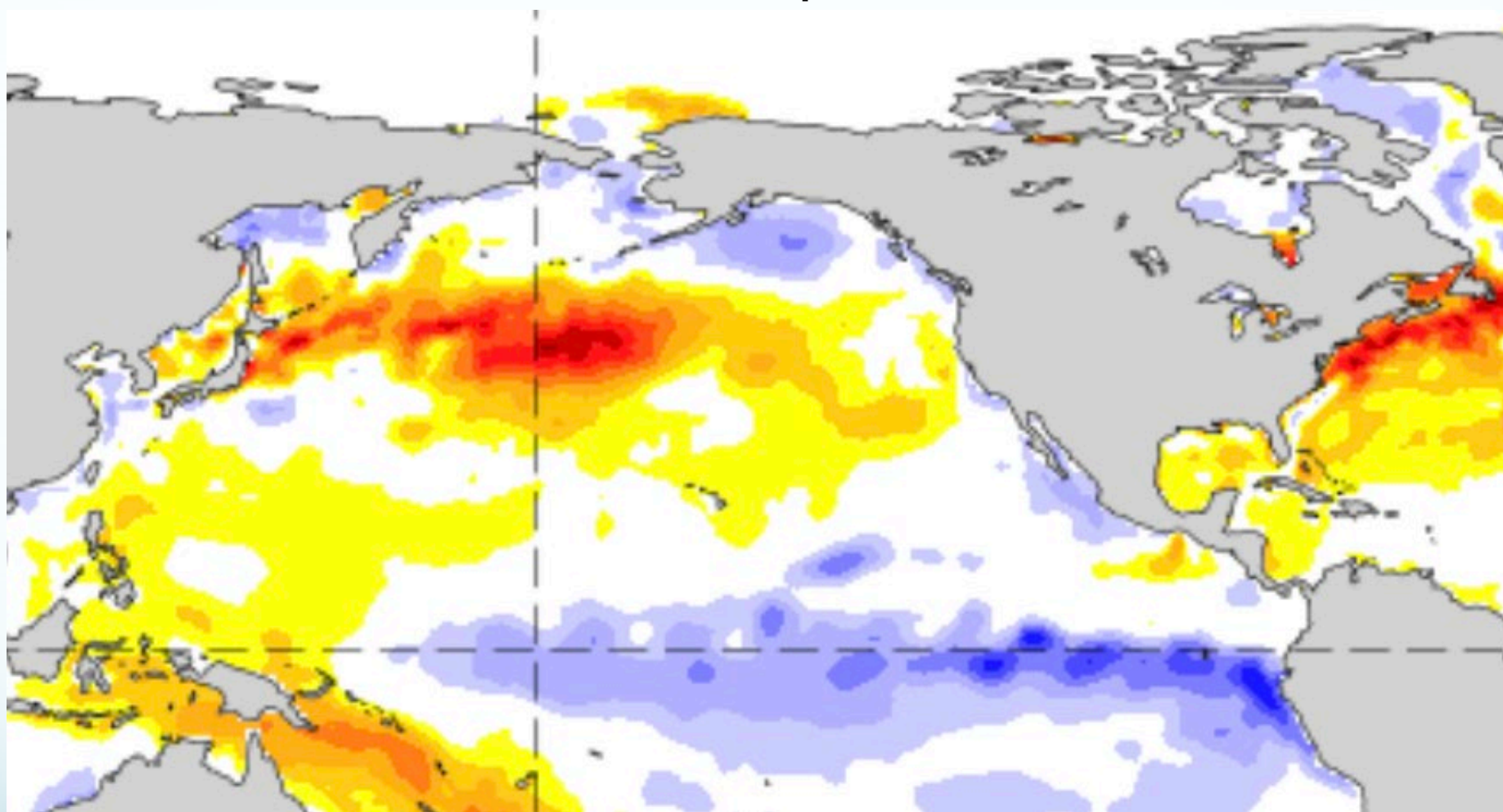
Author:

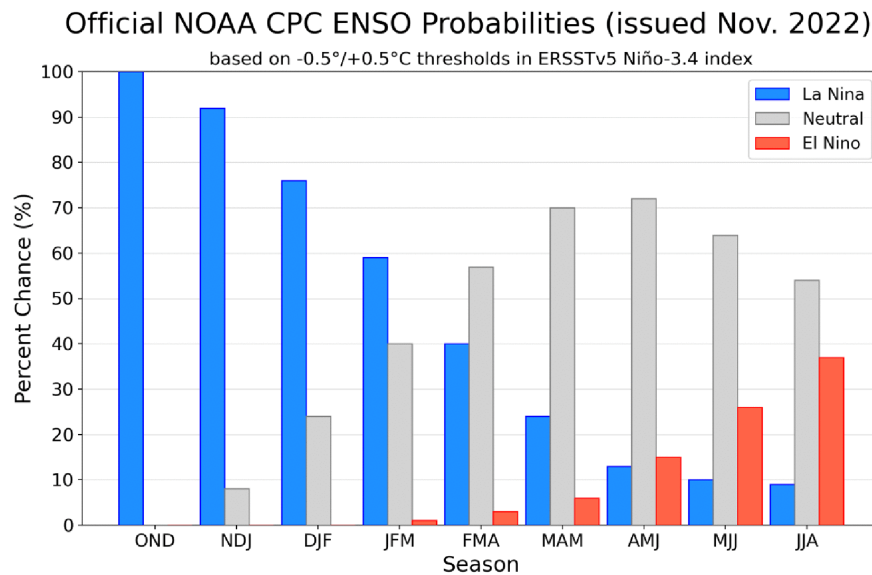
Brad Rippey
U.S. Department of Agriculture



droughtmonitor.unl.edu

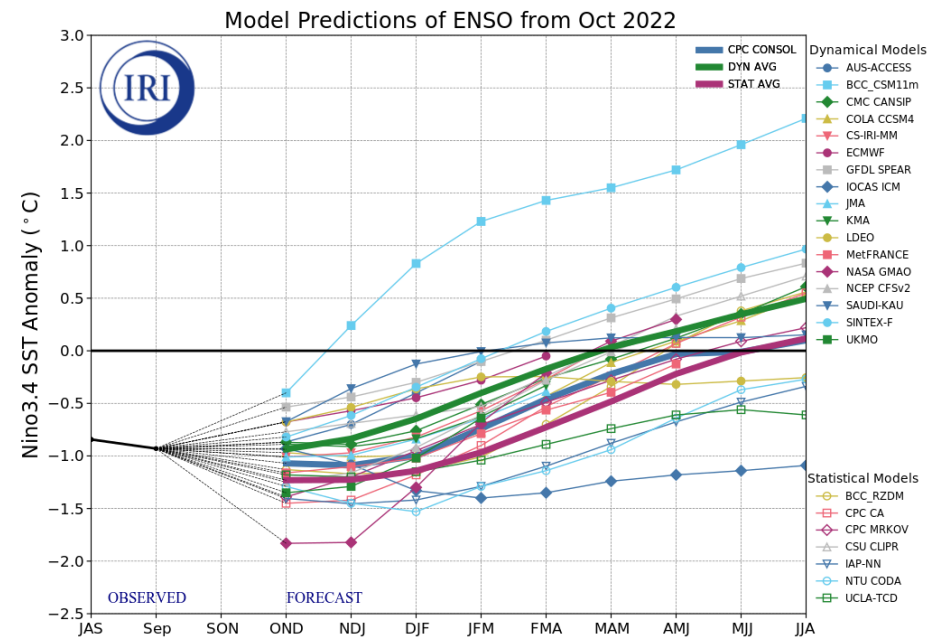
Sea Surface Temperature Anomalies: 06-12 Nov 2022



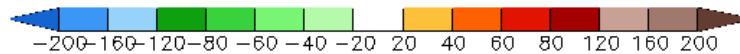
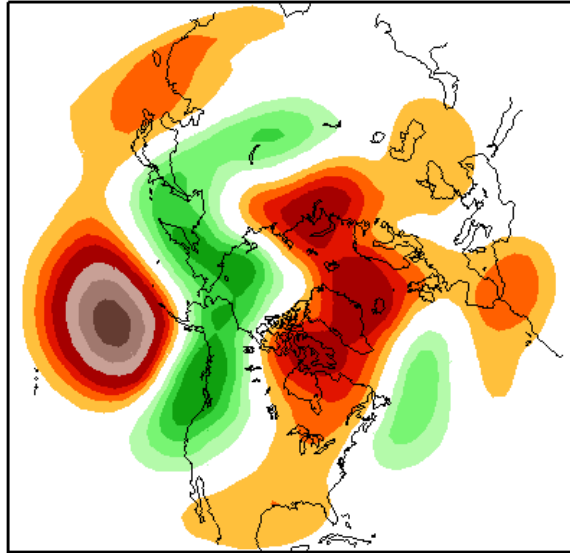


Latest ENSO predictions indicate that La Nina will remain into 2023

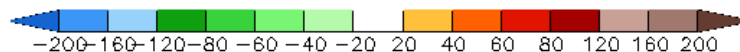
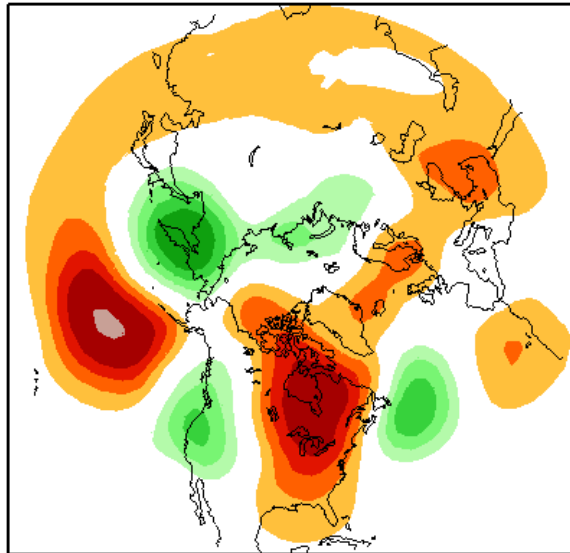
Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 10 November 2022.



Week 3 30Nov2022–6Dec2022

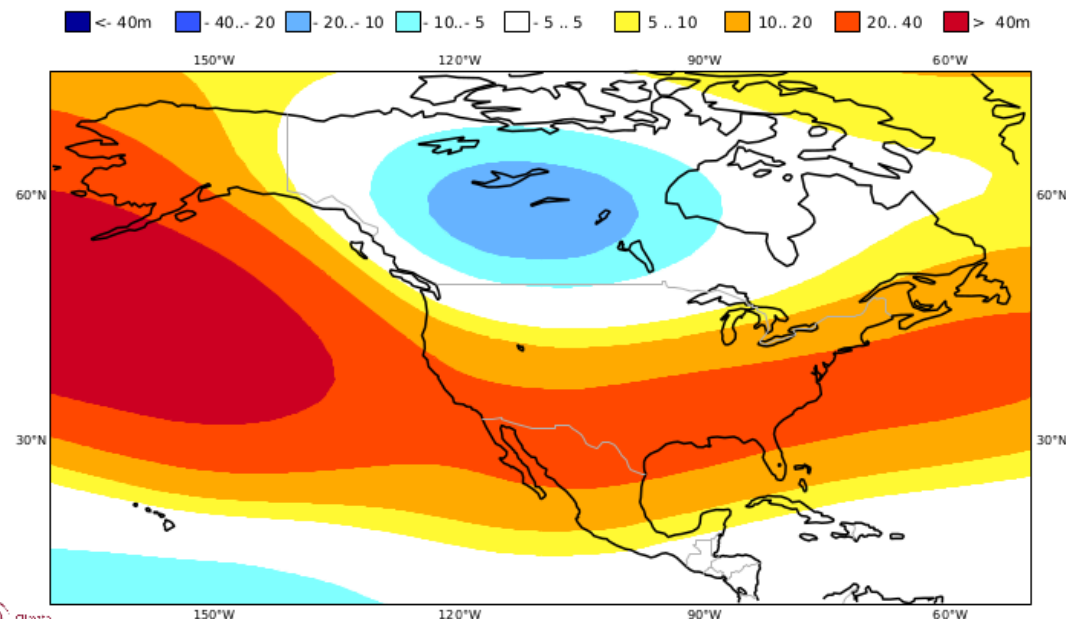


Week 4 7Dec2022–13Dec2022



**CFS 3 & 4 Week 500
hPa
Model Projections: Wet
Early and Cool Late**

500 hPa Z



**IMME Projections
for Dec-Feb:
Consistent with
La Nina Historical
Composites**

C3S multi-system seasonal forecast

ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/E

Mean T850 anomaly

DJF 202

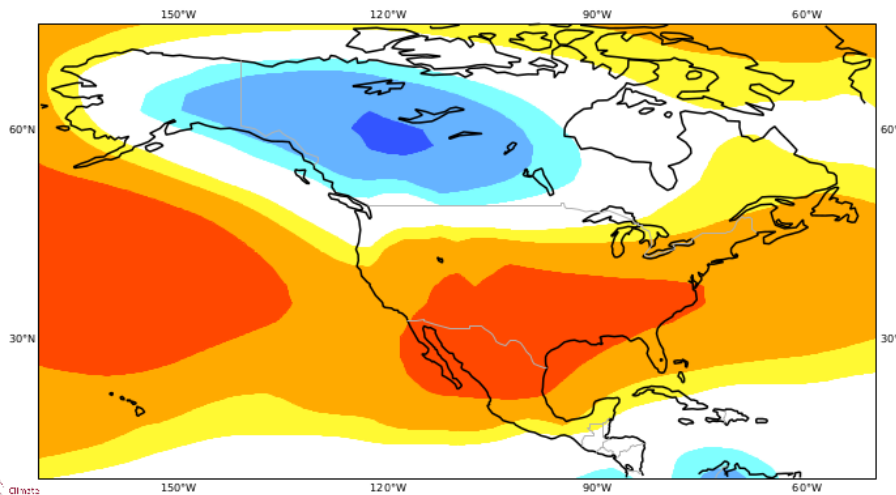
Nominal forecast start: 01/11/22

Variance-standardized mean

Temperature at 850 hPa

Color scale for Temperature at 850 hPa anomaly (K):

- <-2.0K
- 2.0..-1.0
- 1.0..-0.5
- 0.5..-0.2
- 0.2..0.2
- 0.2..0.5
- 0.5..1.0
- 1.0..2.0
- > 2.0K



C3S multi-system seasonal forecast

ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC

Mean precipitation anomaly

DJF 2022/23

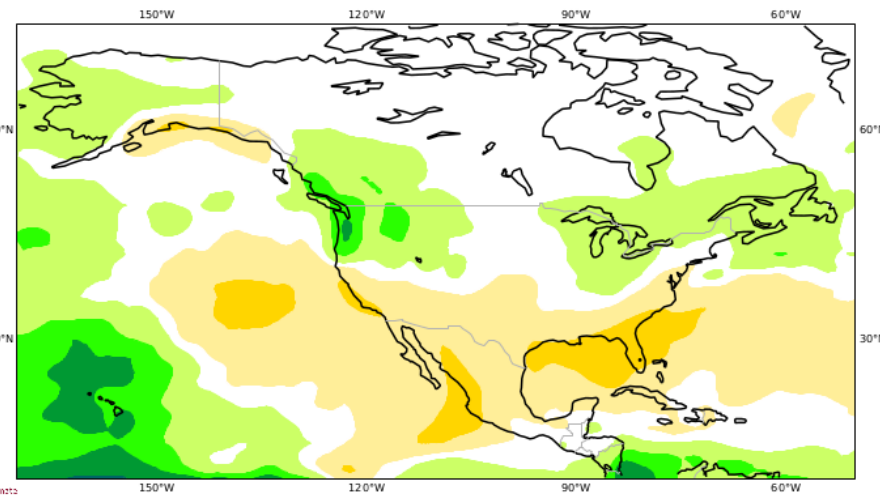
Nominal forecast start: 01/11/22

Variance-standardized mean

Precipitation

Color scale for Precipitation anomaly (mm):

- <-200mm
- 200..-100
- 100..-50
- 50..-10
- 10..10
- 10..50
- 50..100
- 100..200
- > 200mm

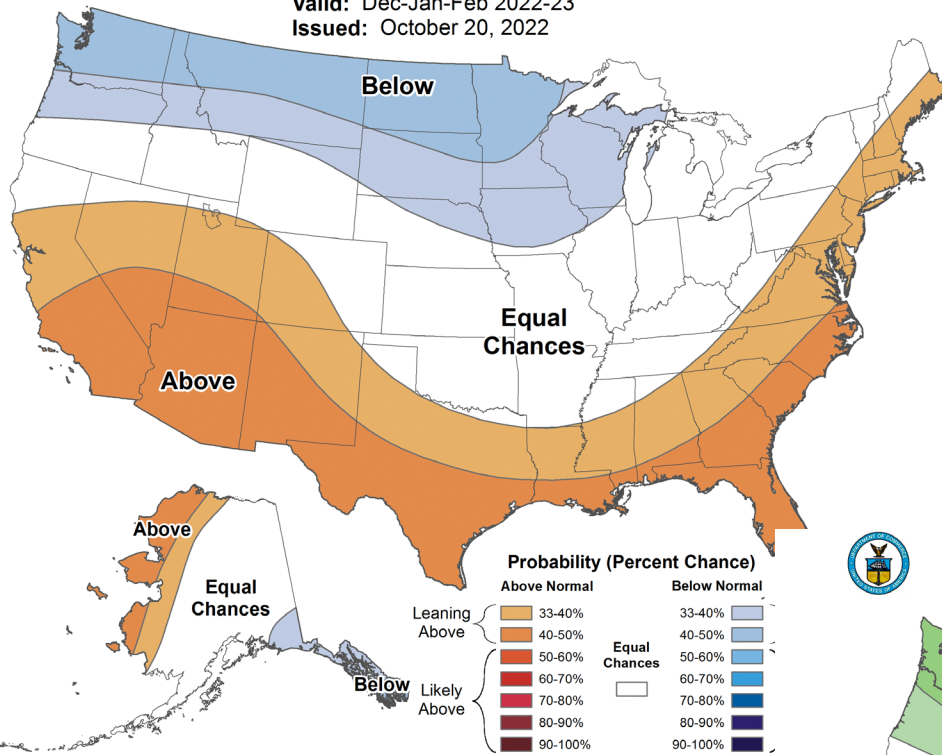




Seasonal Temperature Outlook

Valid: Dec-Jan-Feb 2022-23

Issued: October 20, 2022



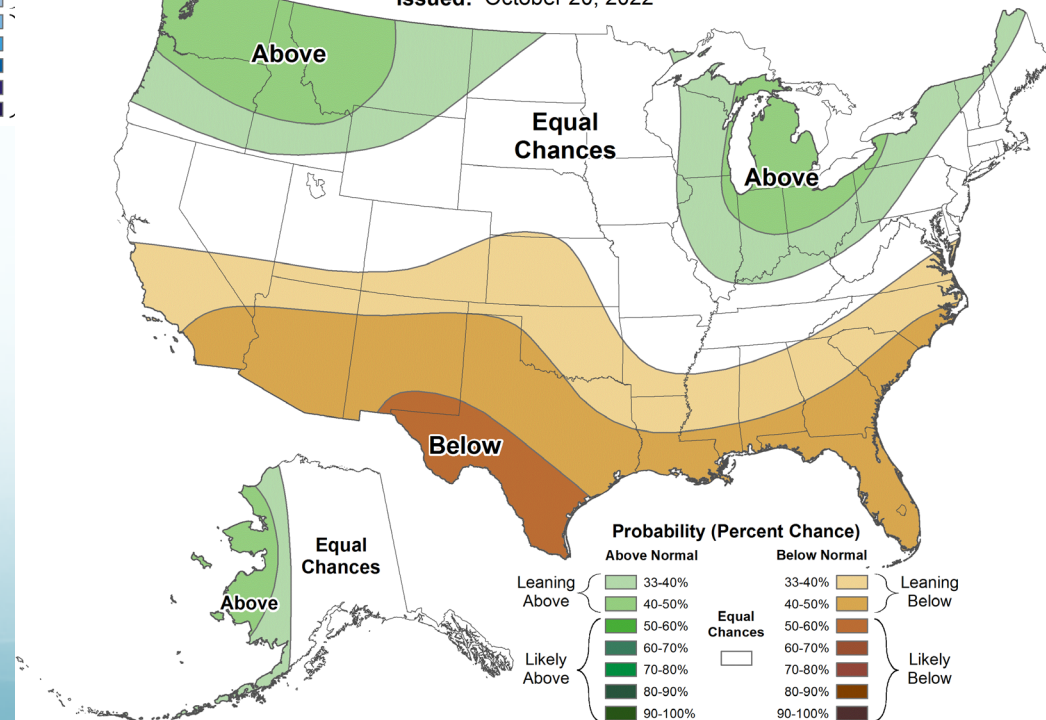
NOAA/CPC Forecasts for December-February 2023



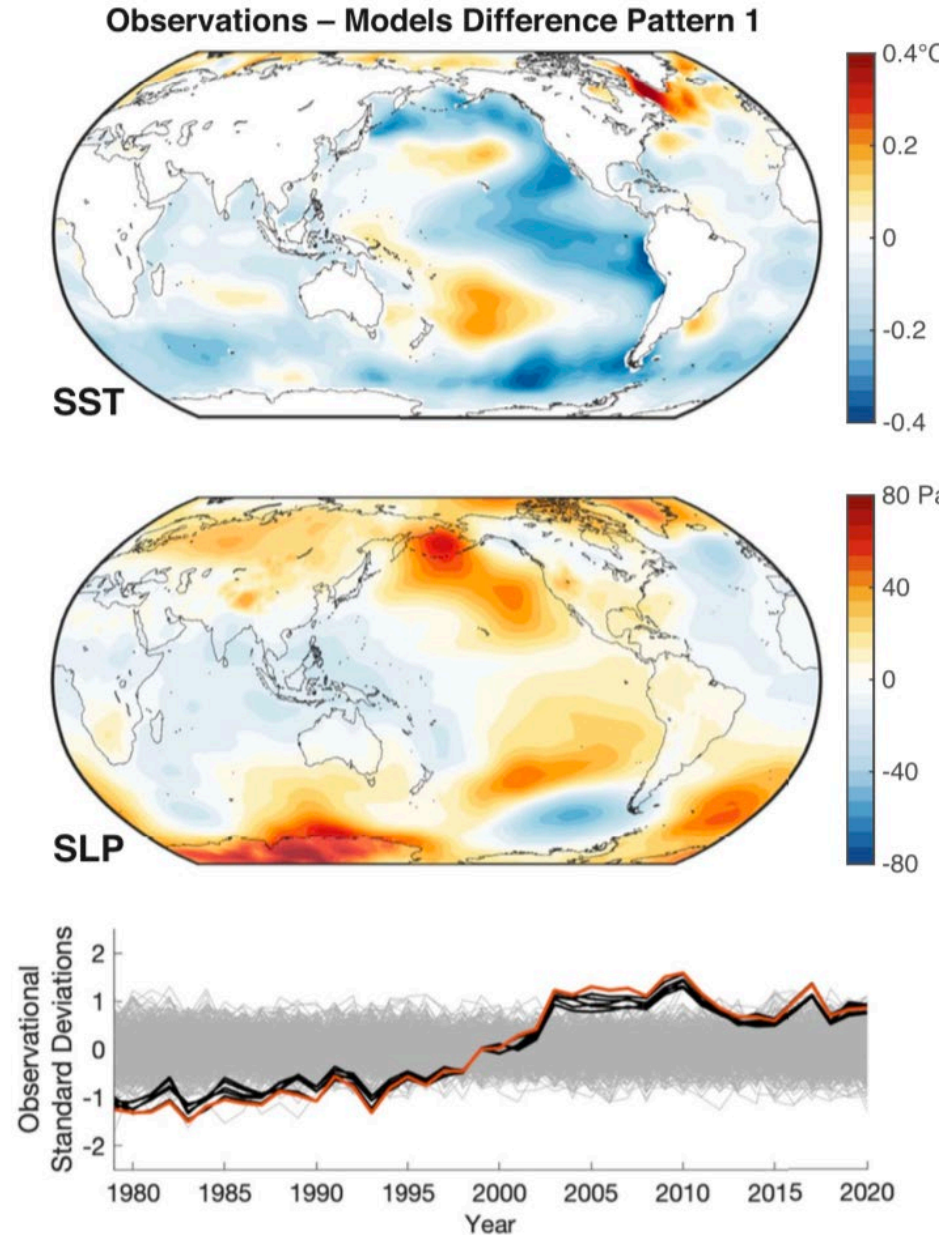
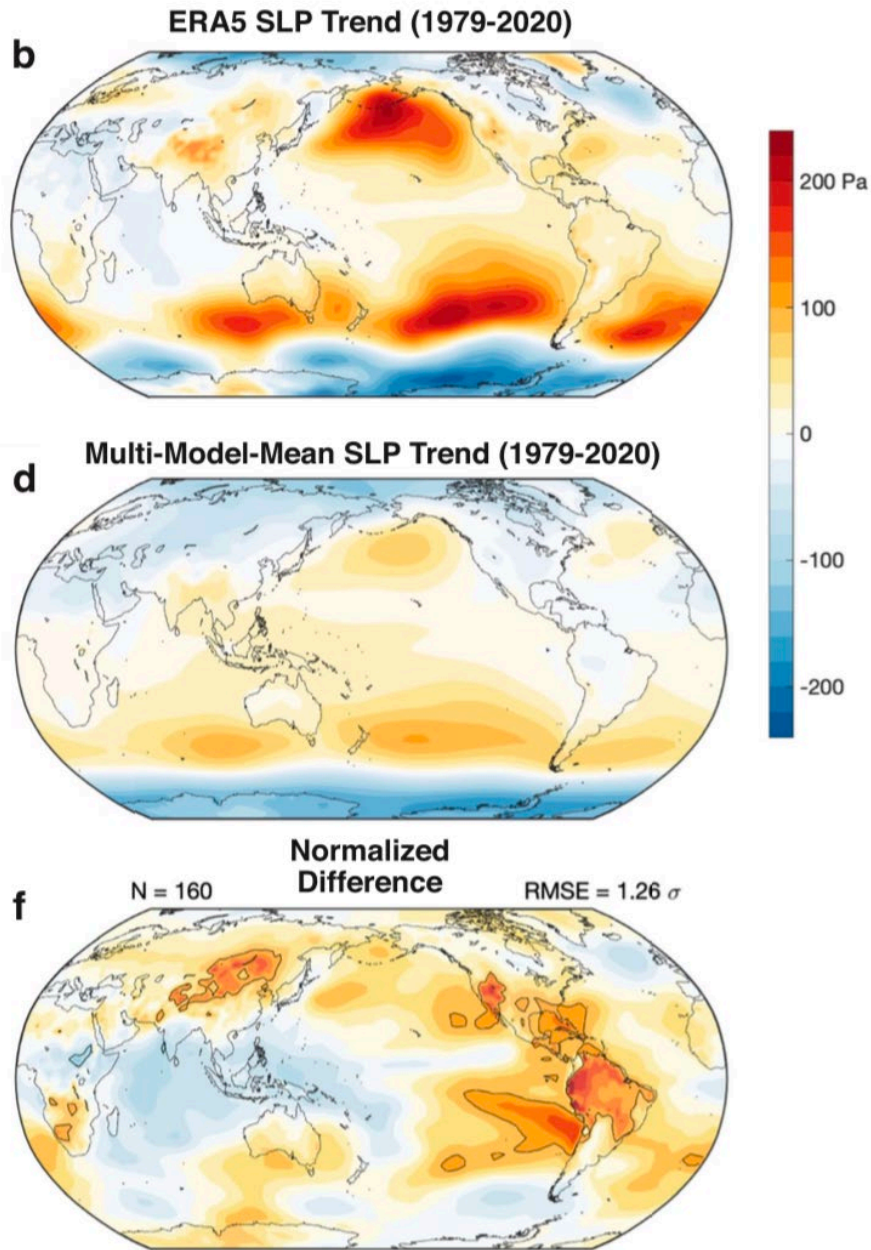
Seasonal Precipitation Outlook

Valid: Dec-Jan-Feb 2022-23

Issued: October 20, 2022



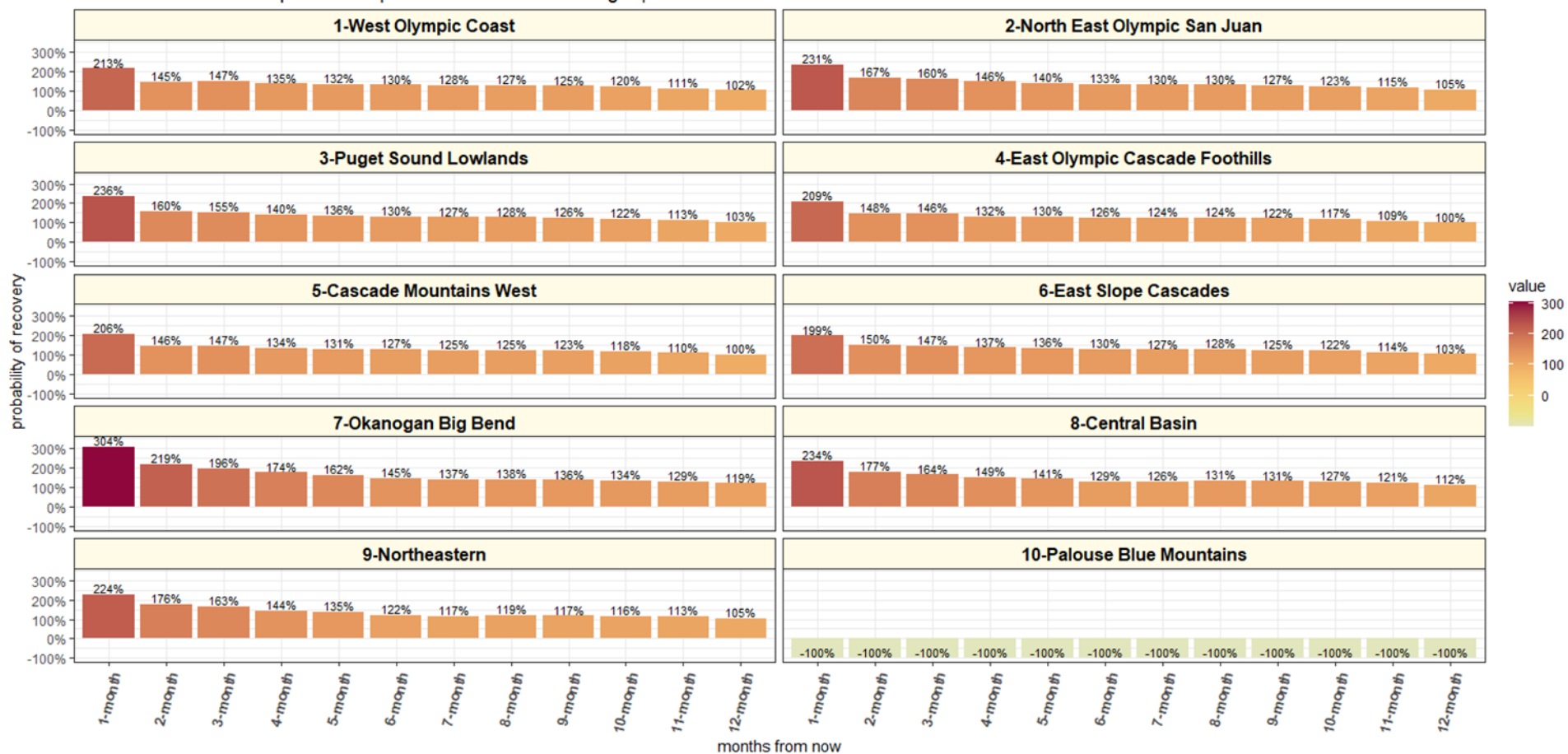
Haven't there been a lot of La Ninas lately? Systematic Climate Model Biases...(Wills et al. 2022)



Summary

- Fall precipitation started late (end of Oct) and despite our recent dry spell, Nov conditions have been cooler and wetter than normal
- Record warmth from July-October and 2nd driest Jul-Sept has started off the water year in a deficit
- La Nina Redux: A familiar, but **not** tiresome, refrain
- Not expecting a highly anomalous winter snowpack
- Spring 2023: No clue

Percent of Normal Precipitation Required to End Current Drought | 2022-11-17



Data: NOAA Drought Termination Tool

Assumes climatological conditions for the remainder of the month.

Monthly timesteps are not interdependent.

A drought is considered to be ameliorated when the PHDI is raised to -2.0, and ended when above -0.5.



Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

 Search



CONSERVATION BASICS

GETTING ASSISTANCE

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Washington Snow Survey & Water Supply Program

WSAC November 2022

[Home](#) > [Conservation Basics](#) > [Conservation By State](#) > [Washington](#) > [Washington Snow Survey & Water Supply Program](#)

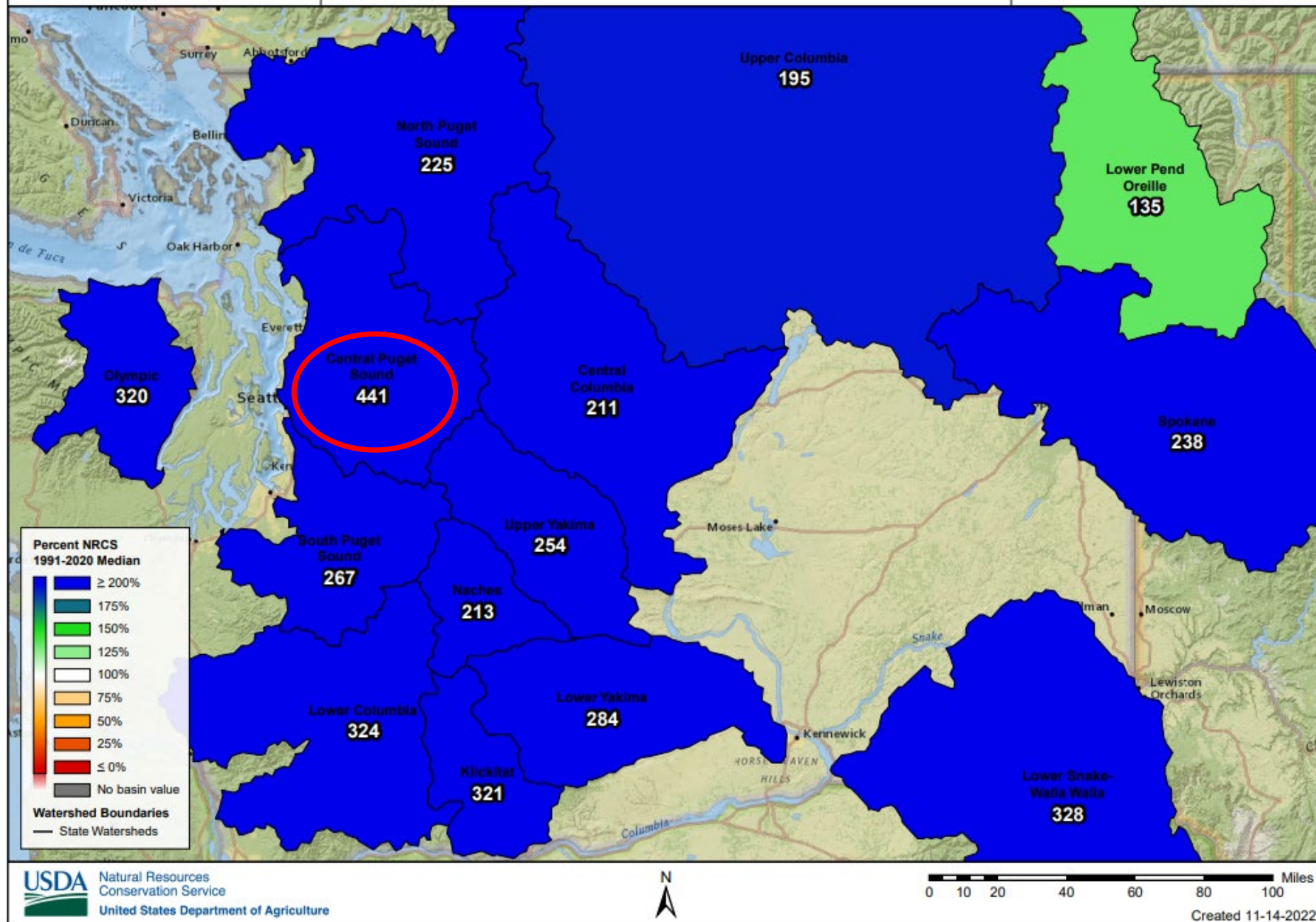
The NRCS Snow Survey Program provides mountain snowpack data and streamflow forecasts for the western United States. Applications of snow survey products include water supply management, flood control, climate modeling, recreation, and



Snow Water Equivalent

Percent NRCS 1991-2020 Median

November 13, 2022, first of day

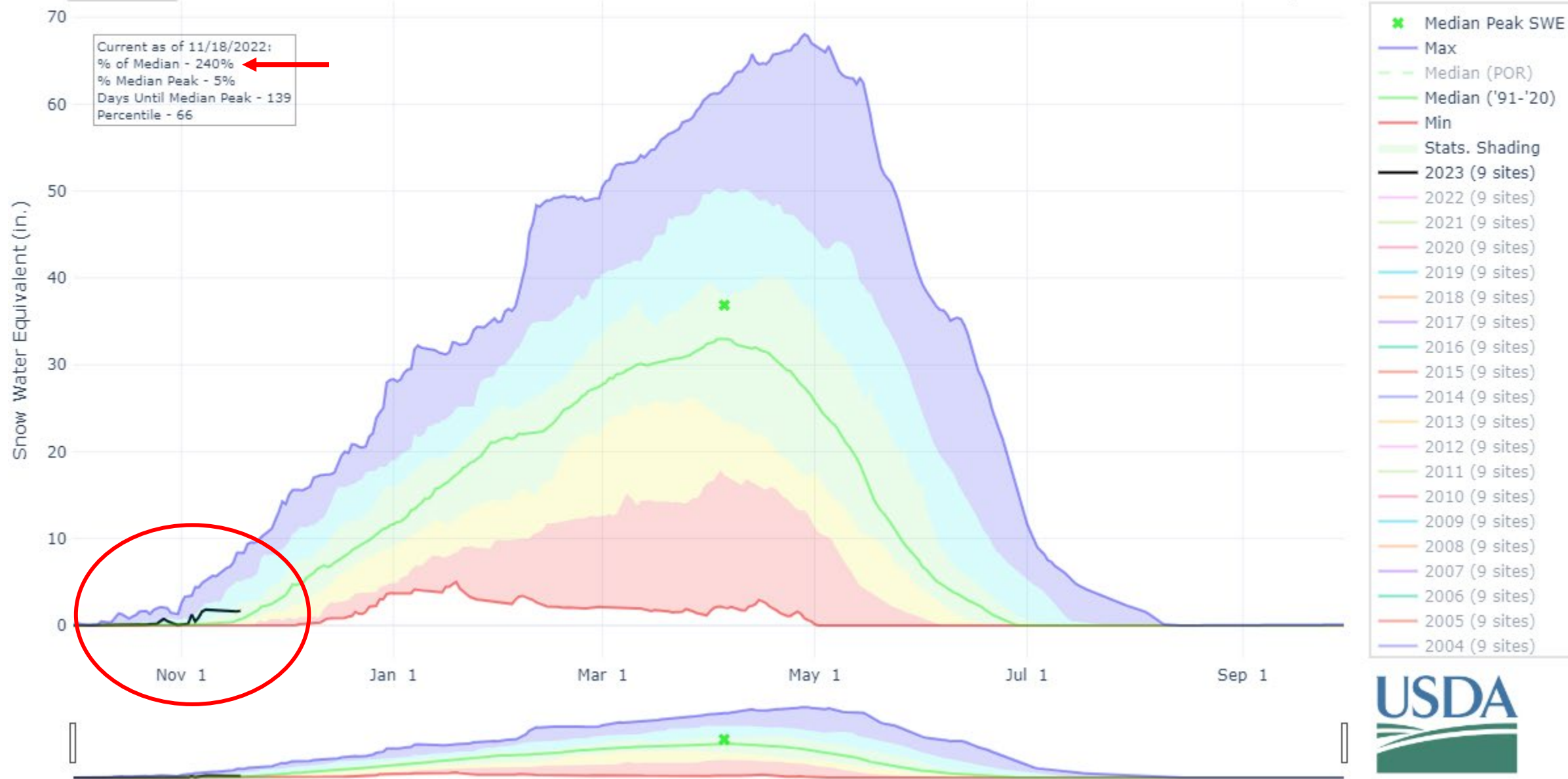


SNOW WATER EQUIVALENT IN CENTRAL PUGET SOUND

Reset Range

[Link to data: CSV / JSON](#)

Station List



Crystal Mountains opens to pass holders today

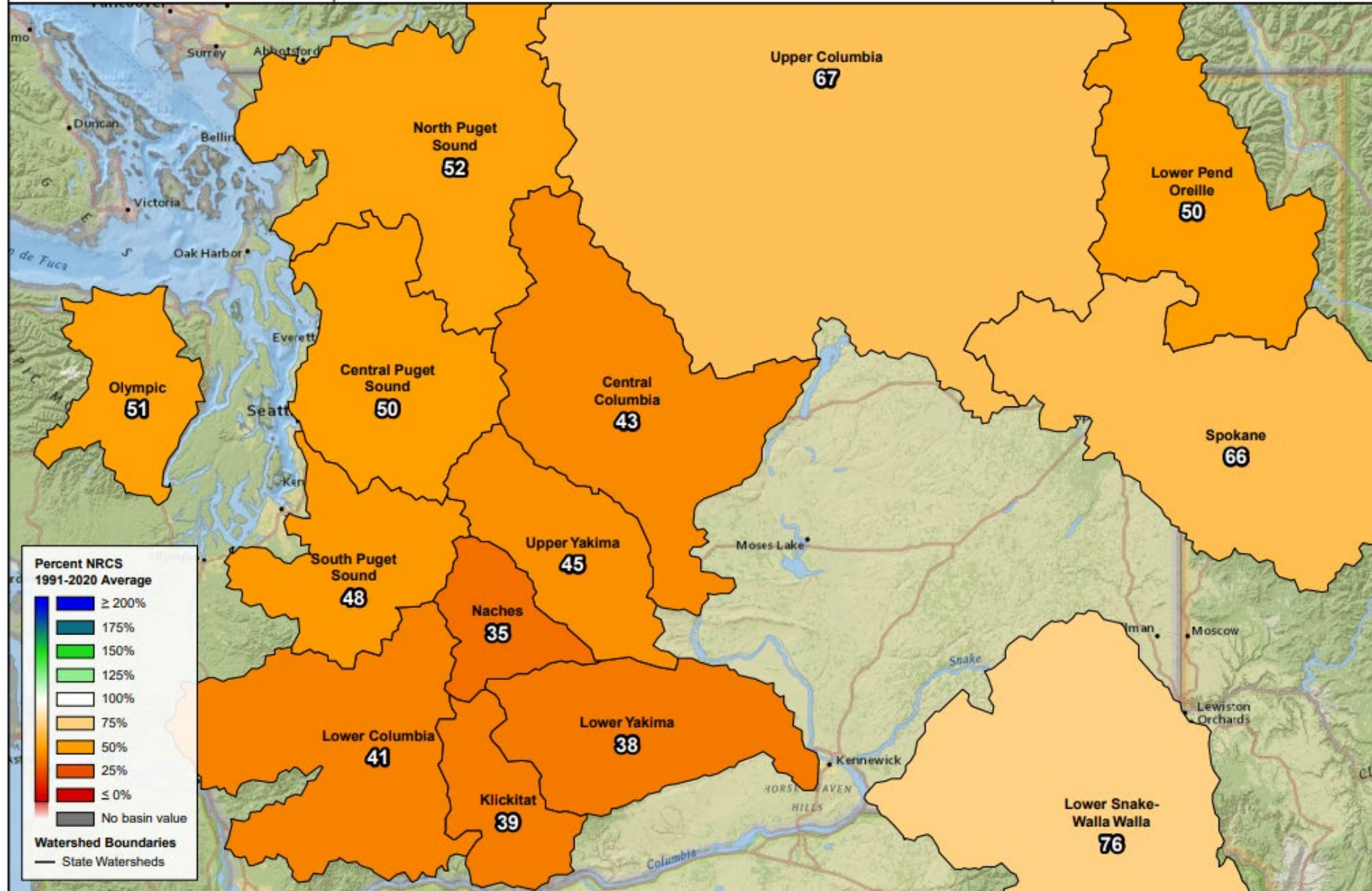


Pass holders at Crystal Mountain can hit the slopes starting today. Non-pass holders can start on Monday.

123 day Precipitation

Percent NRCS 1991-2020 Average

July 1, 2022 - October 31, 2022



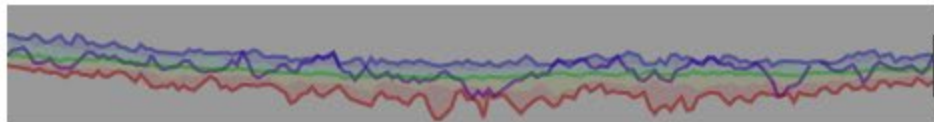
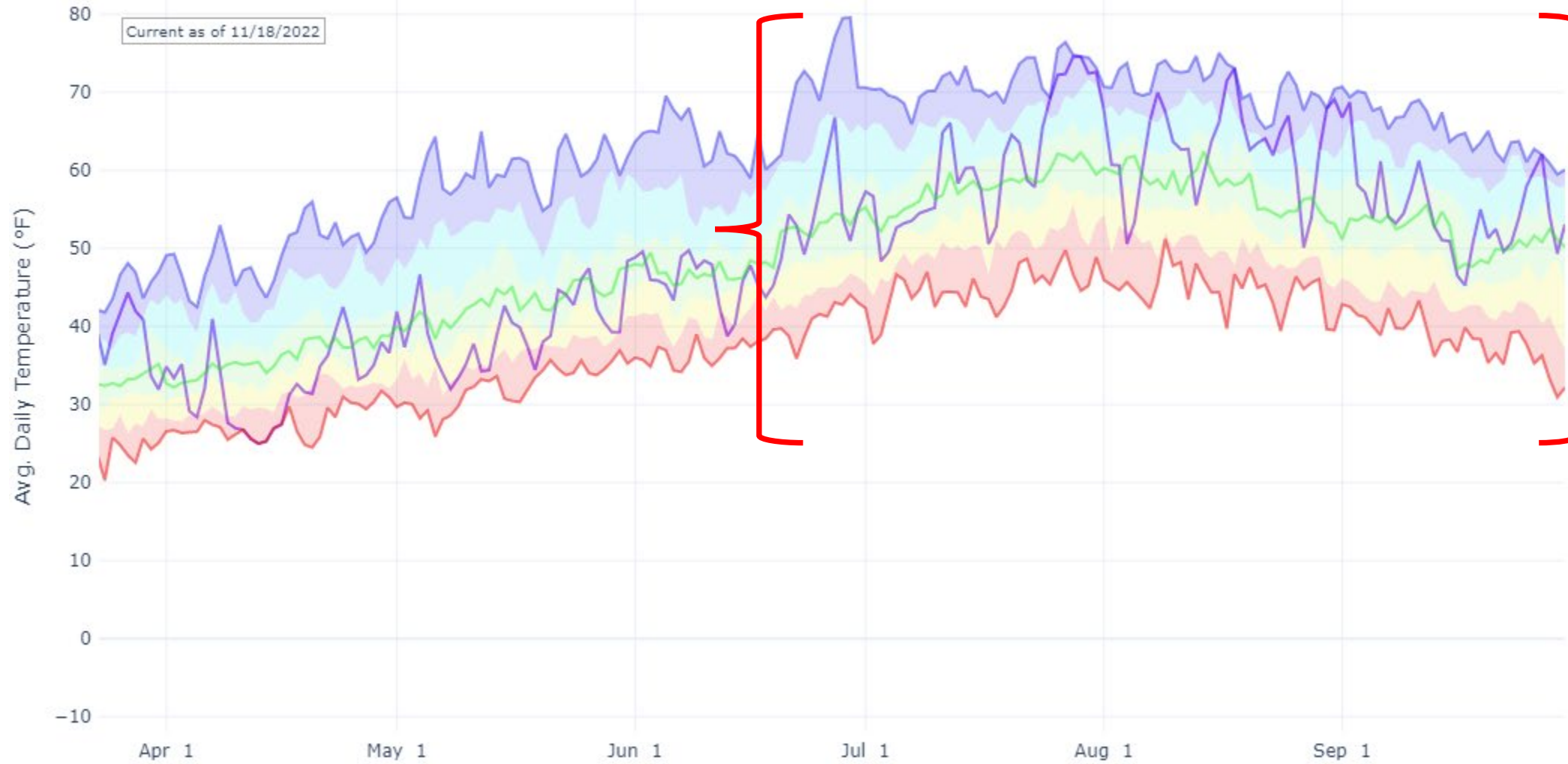
DAILY AVERAGE TEMPERATURE IN UPPER YAKIMA

Reset Range

[Link to data: CSV / JSON](#)

Station List

- Max
- Median (POR)
- Min
- Stats. Shading
- 2023 (7 sites)
- 2022 (7 sites)
- 2021 (7 sites)
- 2020 (7 sites)
- 2019 (7 sites)
- 2018 (7 sites)
- 2017 (7 sites)
- 2016 (7 sites)
- 2015 (7 sites)
- 2014 (7 sites)
- 2013 (7 sites)
- 2012 (7 sites)
- 2011 (7 sites)
- 2010 (7 sites)
- 2009 (7 sites)
- 2008 (7 sites)
- 2007 (7 sites)
- 2006 (7 sites)
- 2005 (7 sites)
- 2004 (7 sites)
- 2003 (7 sites)
- 2002 (7 sites)

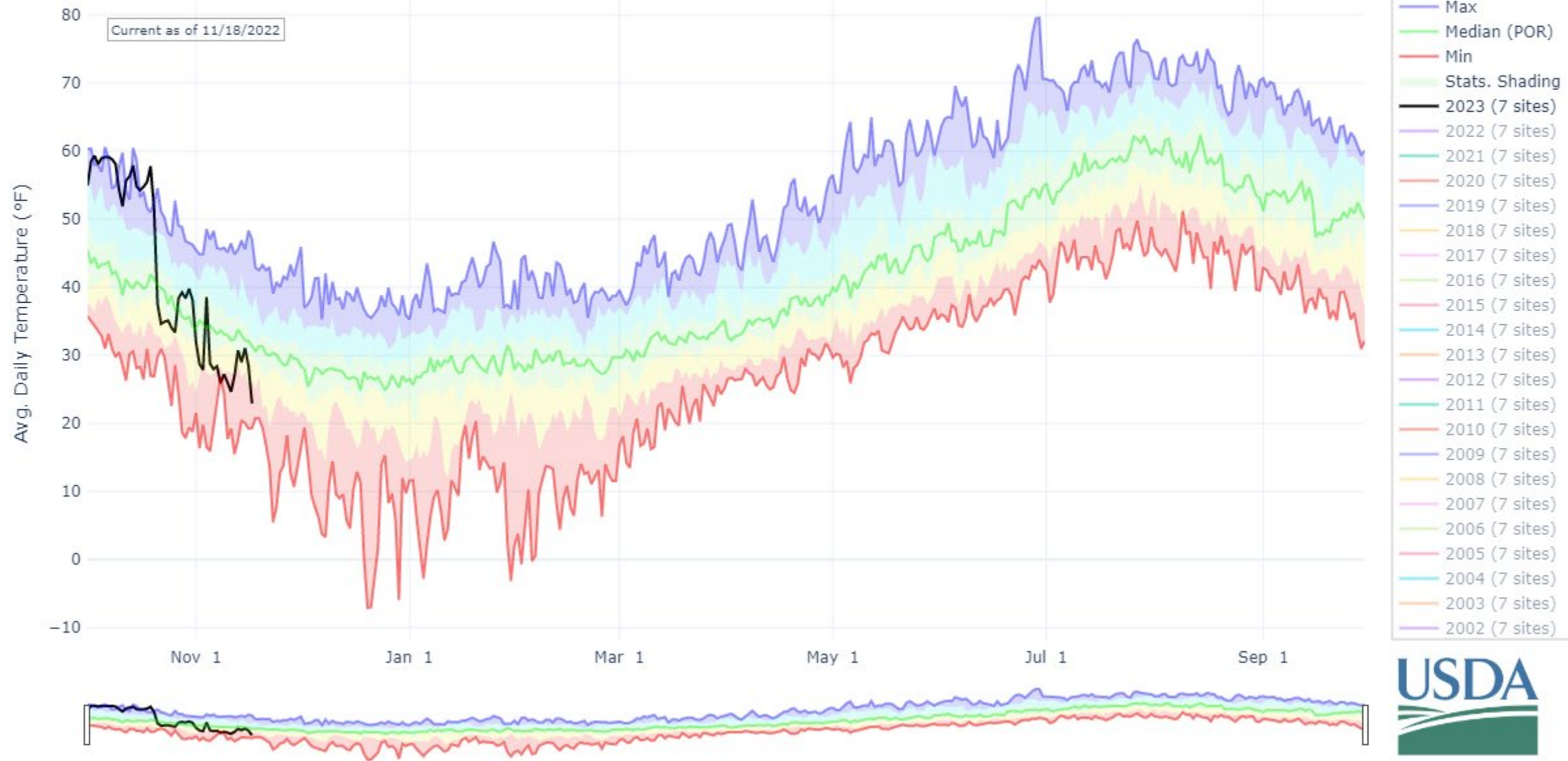


DAILY AVERAGE TEMPERATURE IN UPPER YAKIMA

Reset Range

[Link to data: CSV / JSON](#)

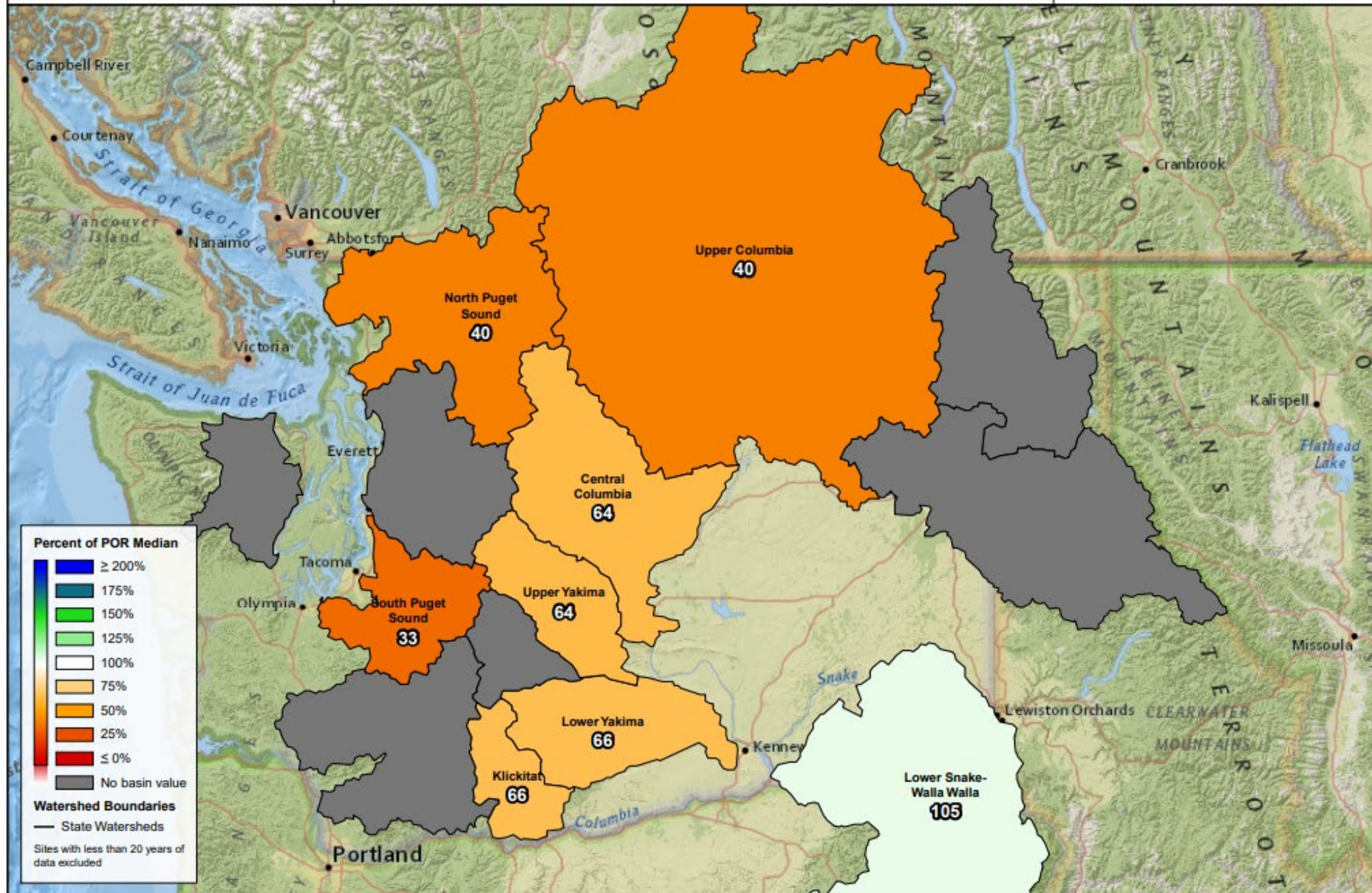
Station List



Soil Moisture (8 in.)

Percent of POR Median

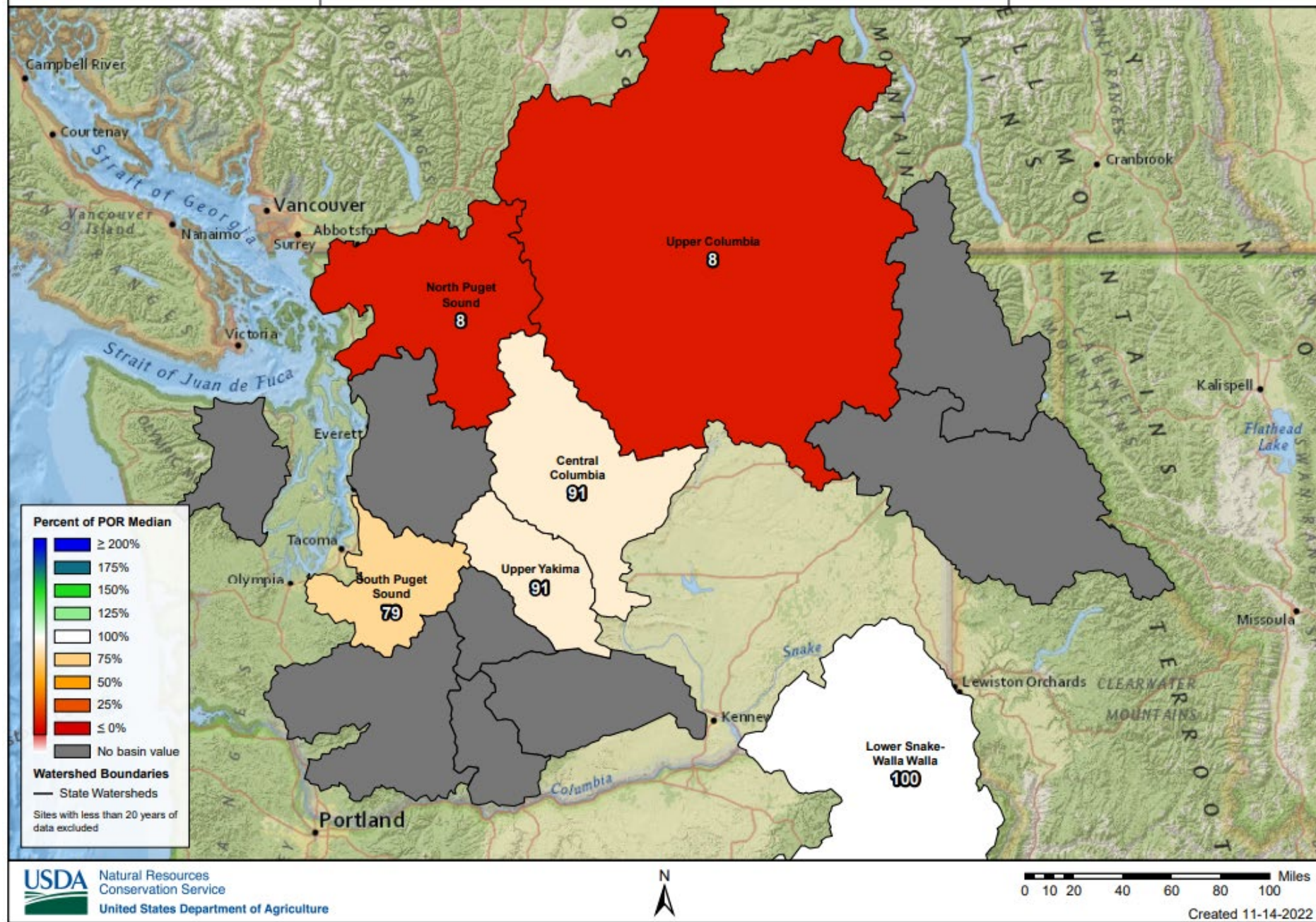
October 1, 2022, first of day



Soil Moisture (8 in.)

Percent of POR Median

November 14, 2022, first of day

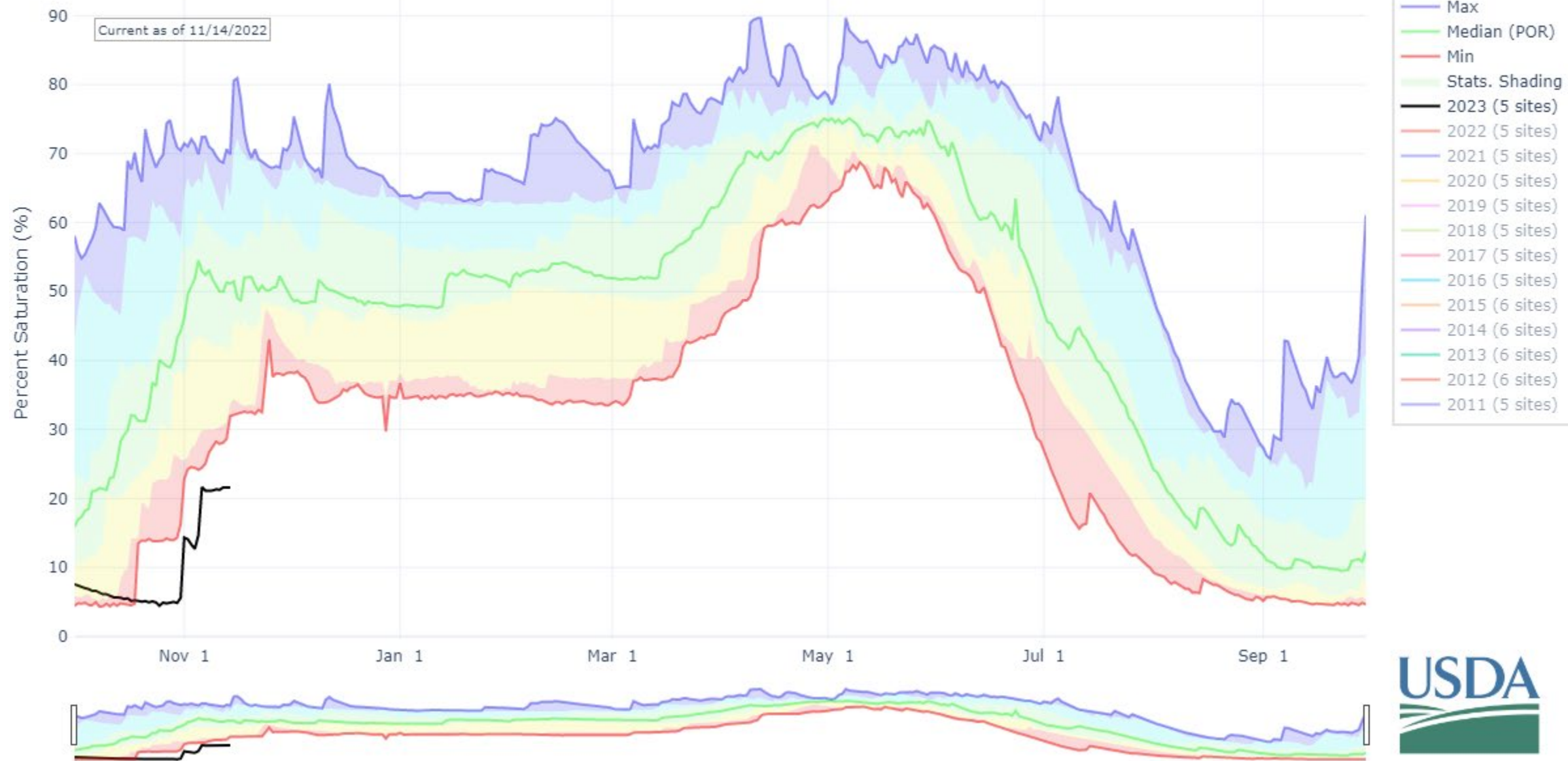


DEPTH AVERAGED SOIL SATURATION IN UPPER COLUMBIA

Reset Range

[Link to data: CSV / JSON](#)

Station List

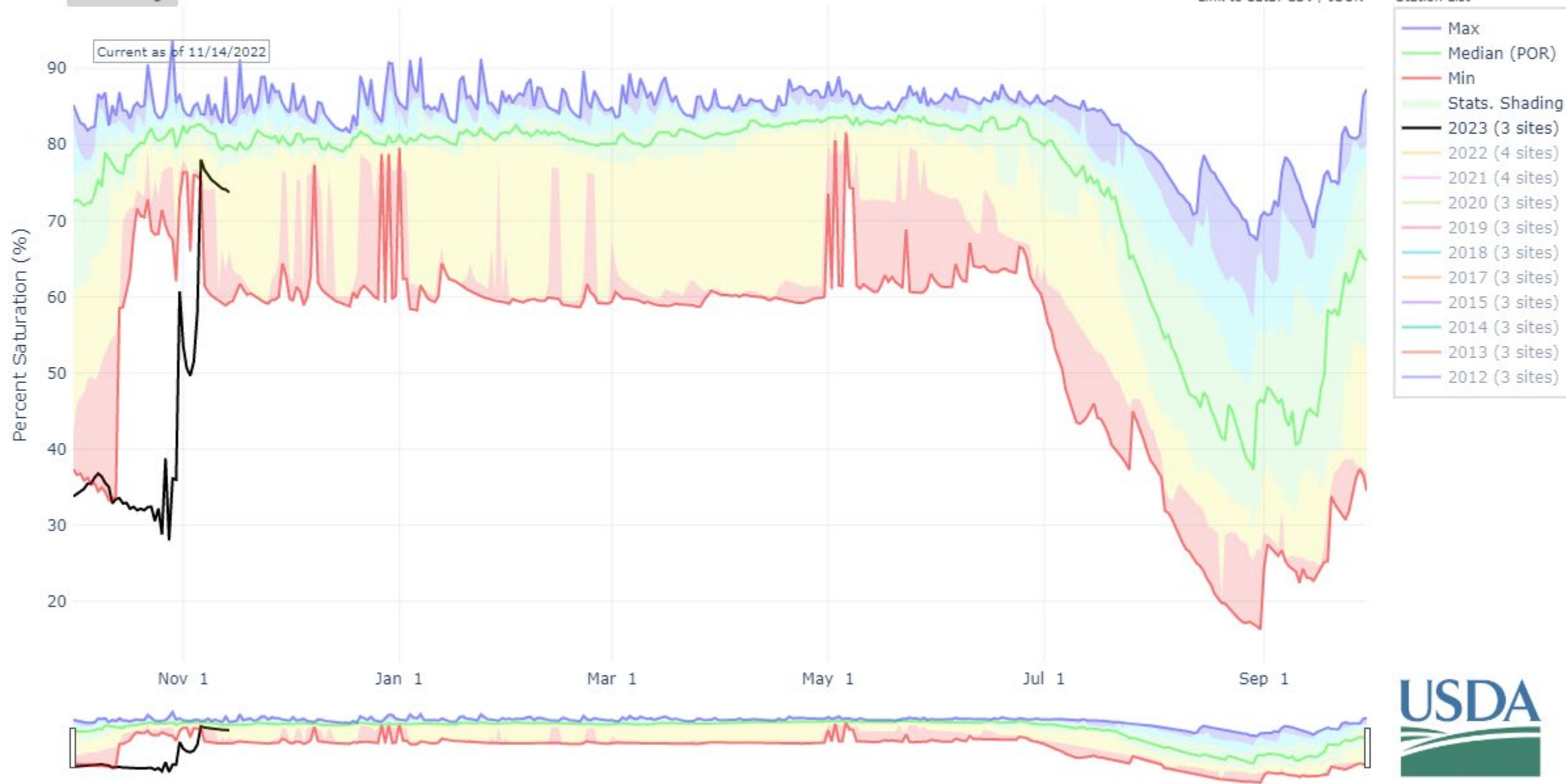


DEPTH AVERAGED SOIL SATURATION IN SOUTH PUGET SOUND

Reset Range

[Link to data: CSV / JSON](#)

Station List

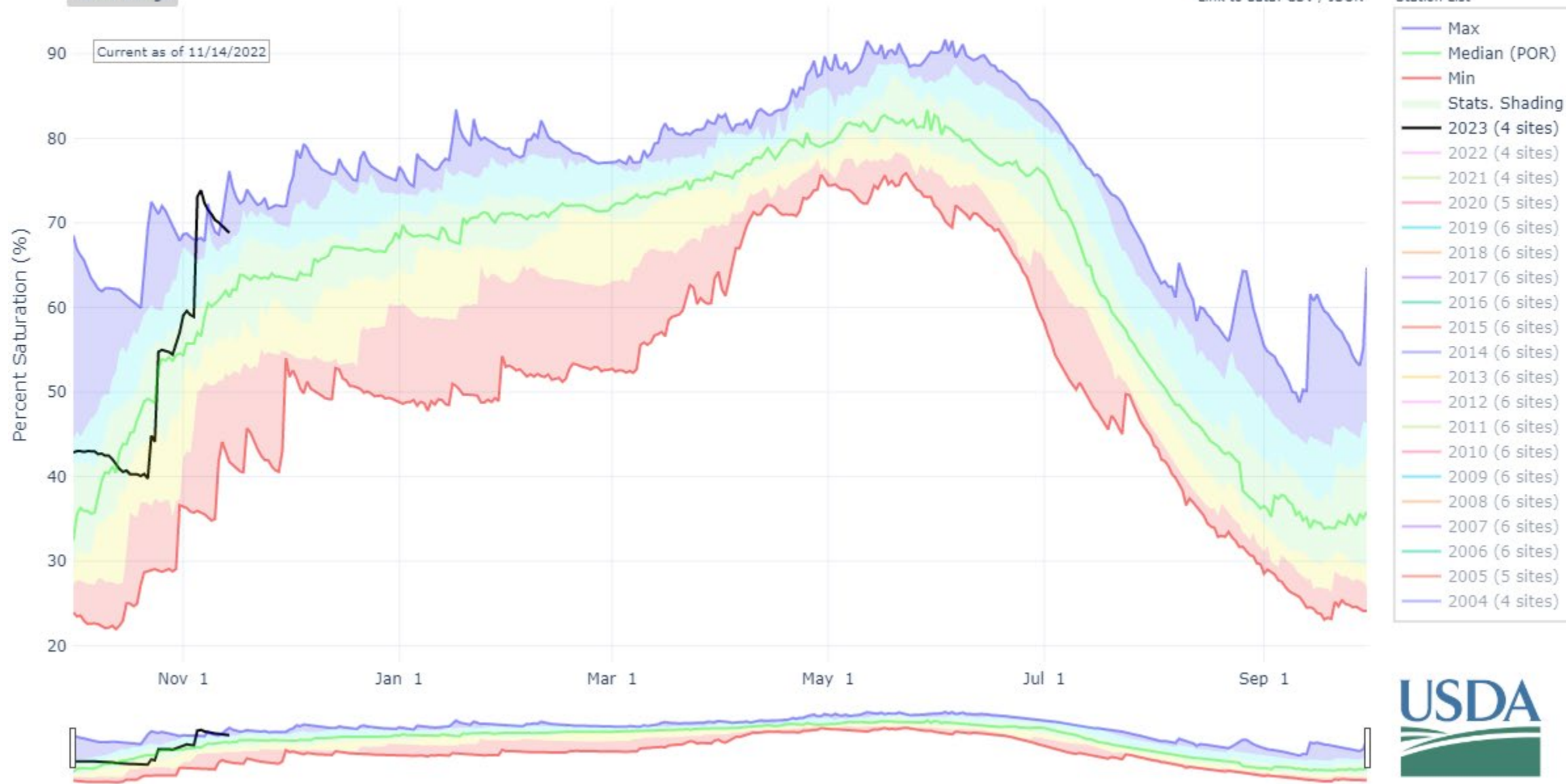


DEPTH AVERAGED SOIL SATURATION IN LOWER SNAKE-WALLA WALLA

Reset Range

[Link to data: CSV / JSON](#)

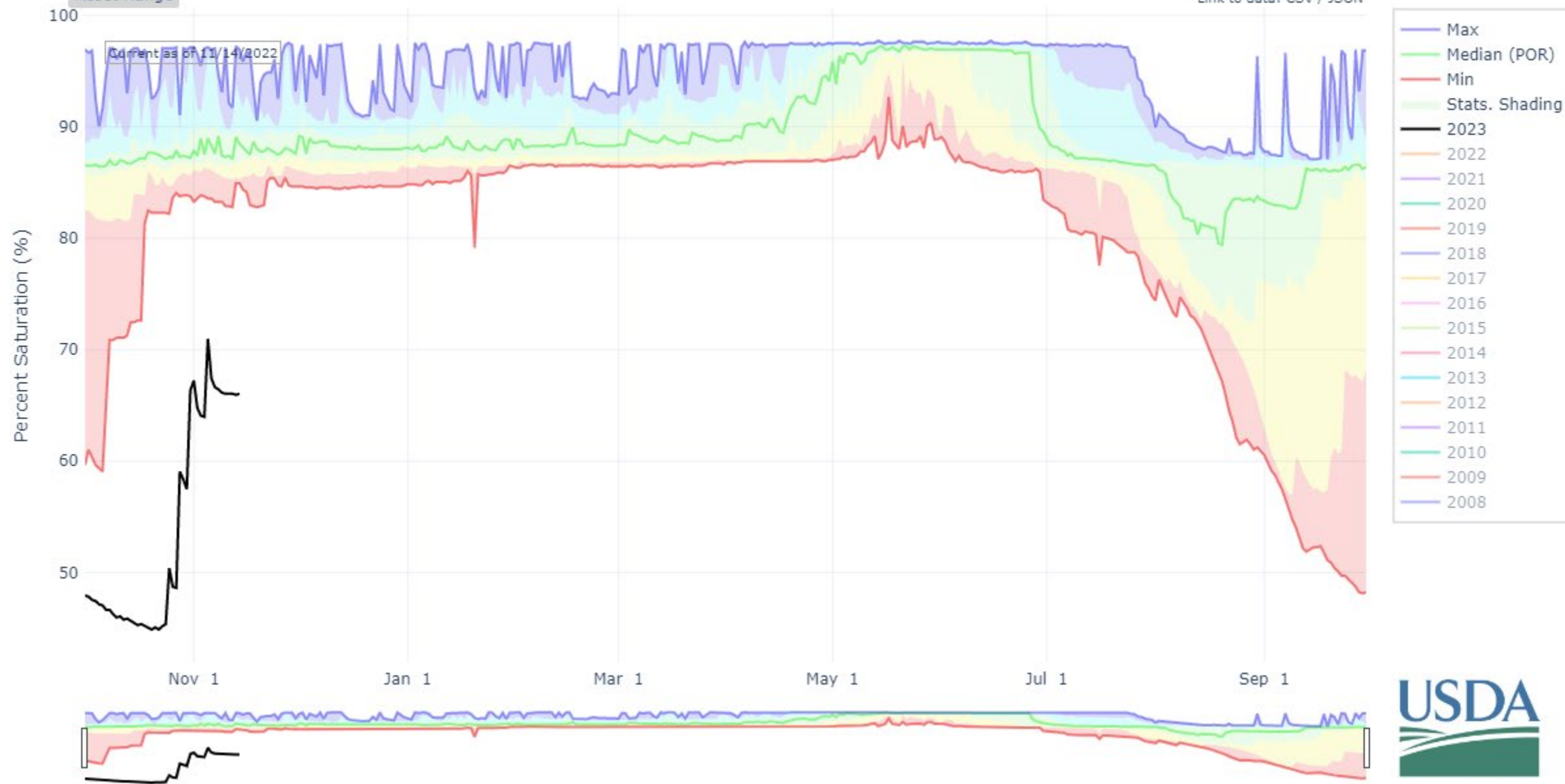
Station List



DEPTH AVERAGED SOIL SATURATION AT BEAVER PASS

Reset Range

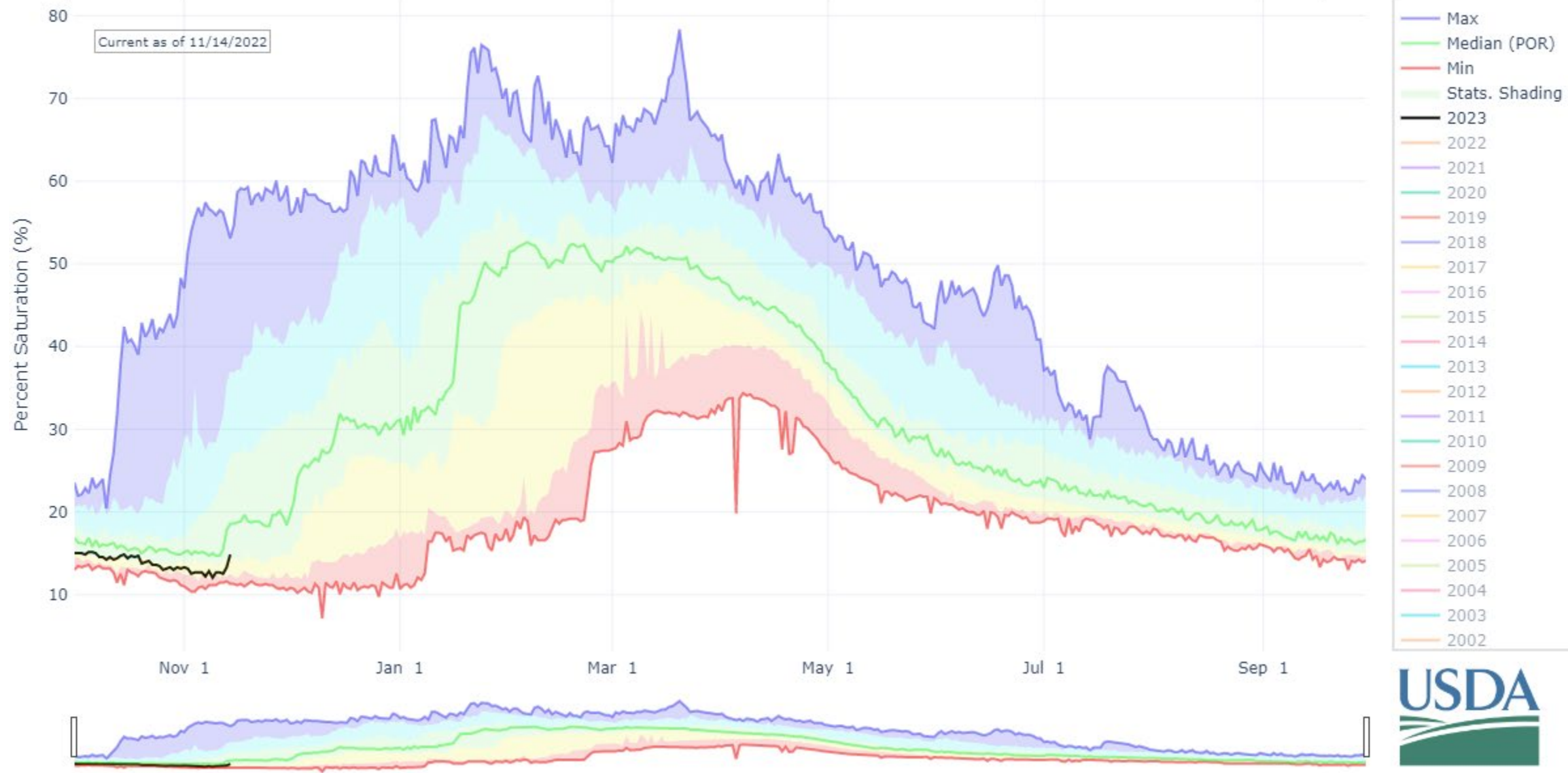
[Link to data: CSV / JSON](#)



DEPTH AVERAGED SOIL SATURATION AT LIND #1

Reset Range

[Link to data: CSV / JSON](#)



Questions?

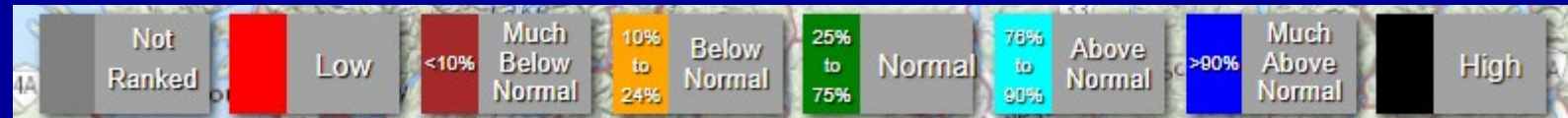
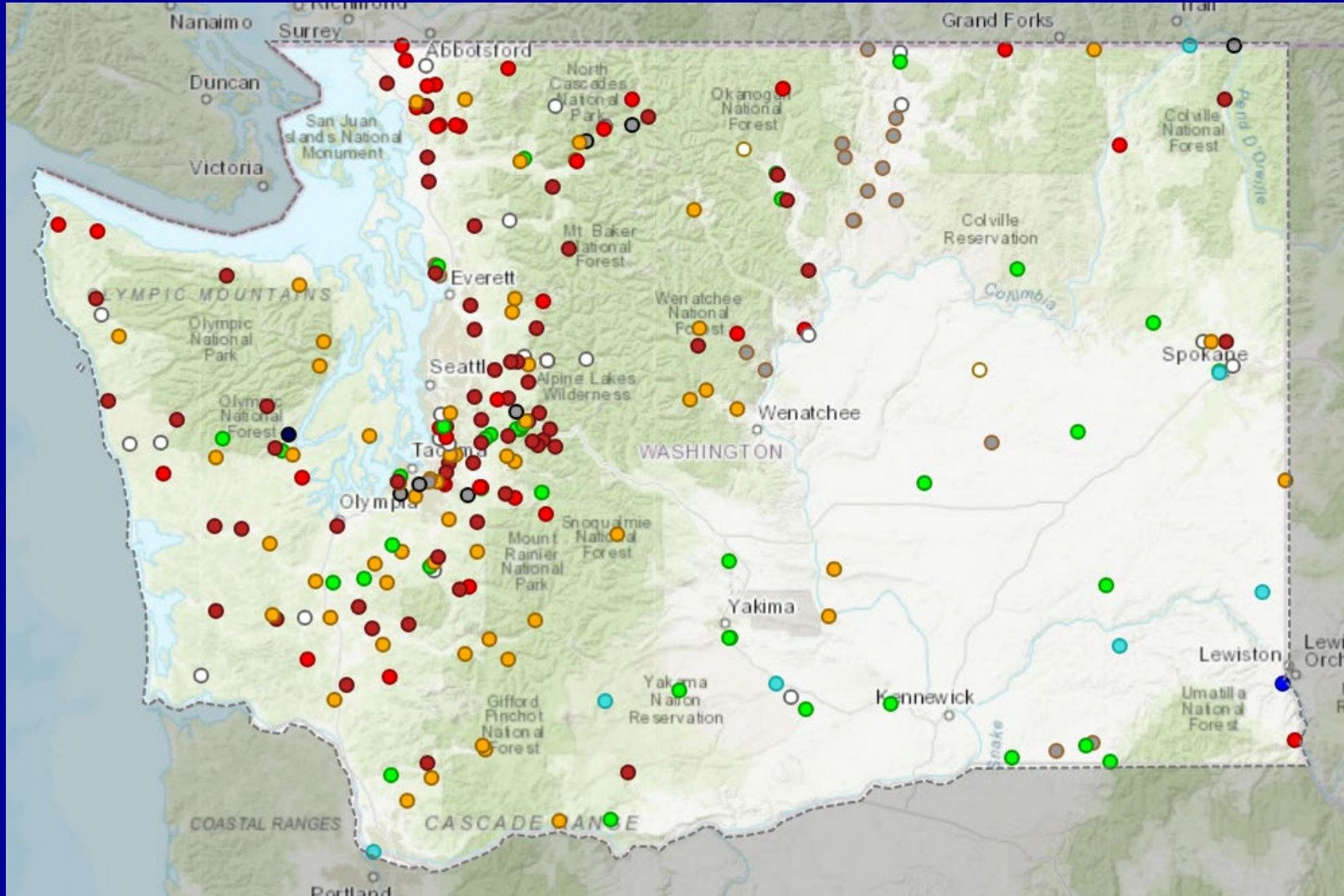
Streamflow & Groundwater Conditions in Washington State as of 18 Nov. 2022

Presented to
The Washington State
Water Supply Availability Committee
on 18 Nov. 2022

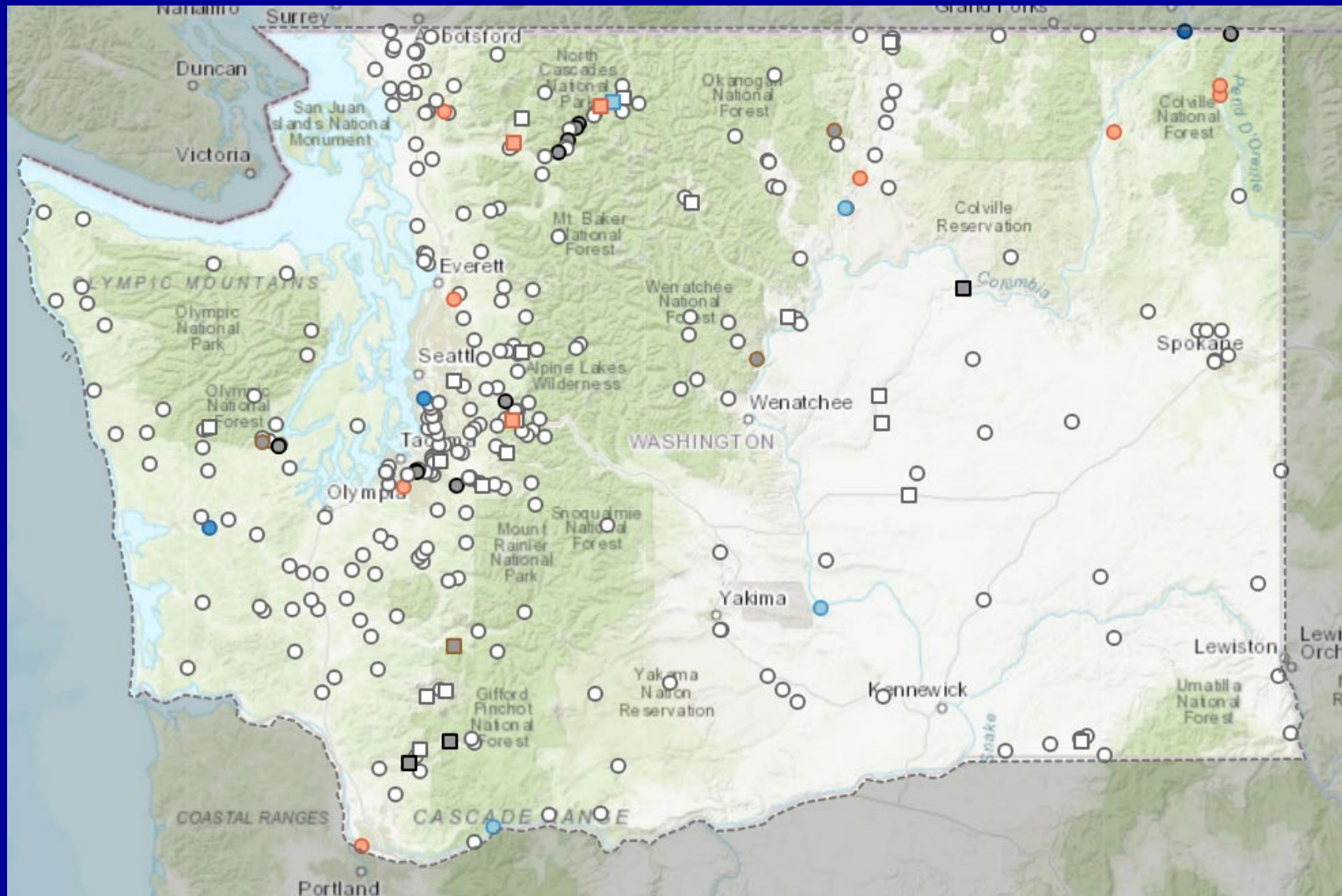
by
Nicholas Sutfin
USGS Washington Water Science Center



WA Current Streamflow Conditions, 18 Nov. 2022



Rising and Falling conditions of WA streams on 18 Nov. 2022



Surface-Water Levels: Rising and falling

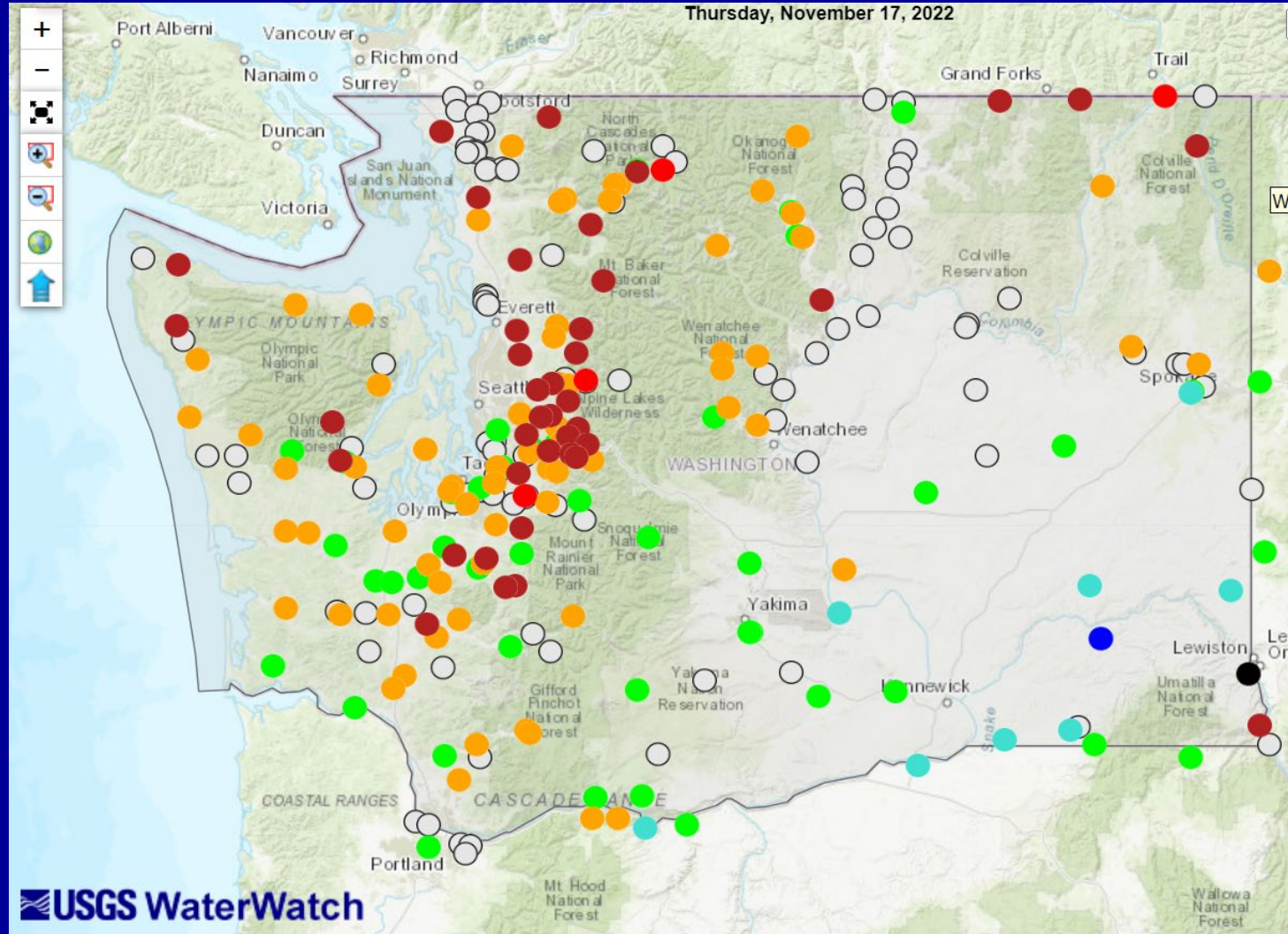
COLOR – CHANGE

- Water level rising ≥ 1 foot/hour
- Water level rising $\geq 0.5 - 1$ foot/hour
- Water level rising $\geq 0.05 - 0.5$ foot/hour
- Water level changing < 0.05 foot/hour
- Water level falling $\geq 0.05 - 0.5$ foot/hour
- Water level falling $\geq 0.5 - 1$ foot/hour
- Water level falling ≥ 1 foot/hour

SHAPE – SITE TYPE

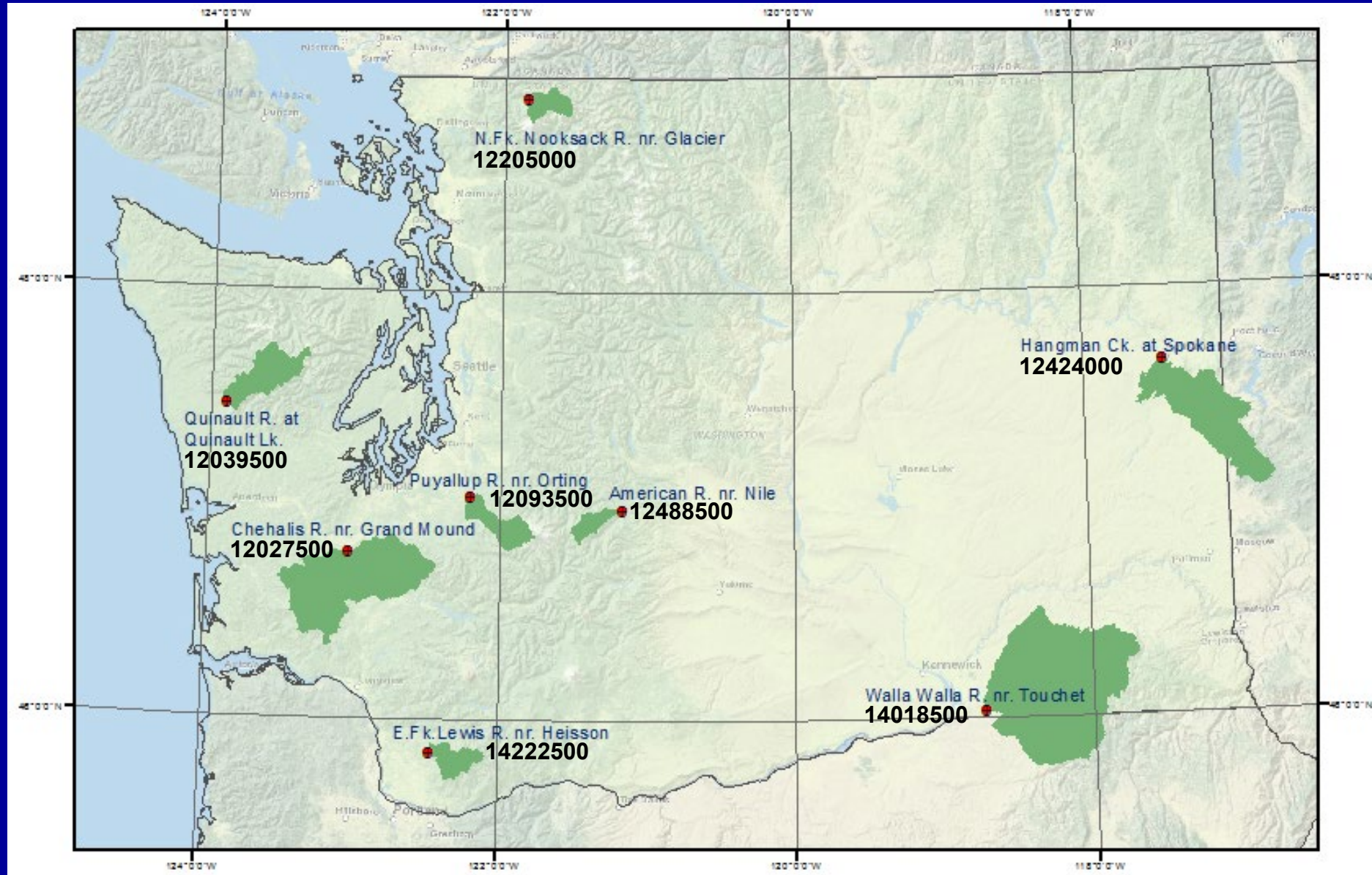
- Stream
- Lake
- Wetland
- Estuary
- Coastal

WA 7-day Average Streamflow Conditions as of 17 Nov. 2022

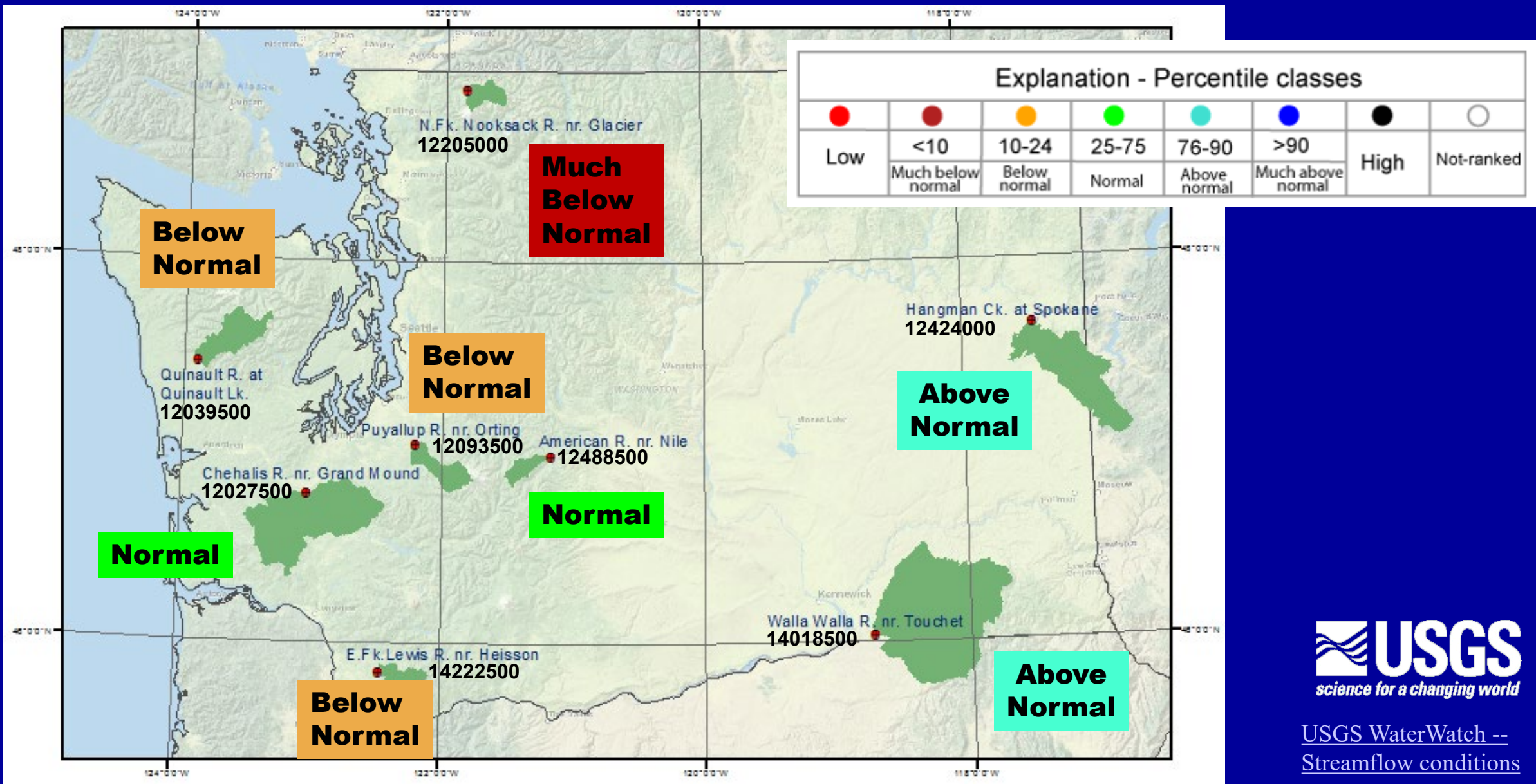


Index Gaging Stations

(Stations that measure natural or near-natural streamflow)

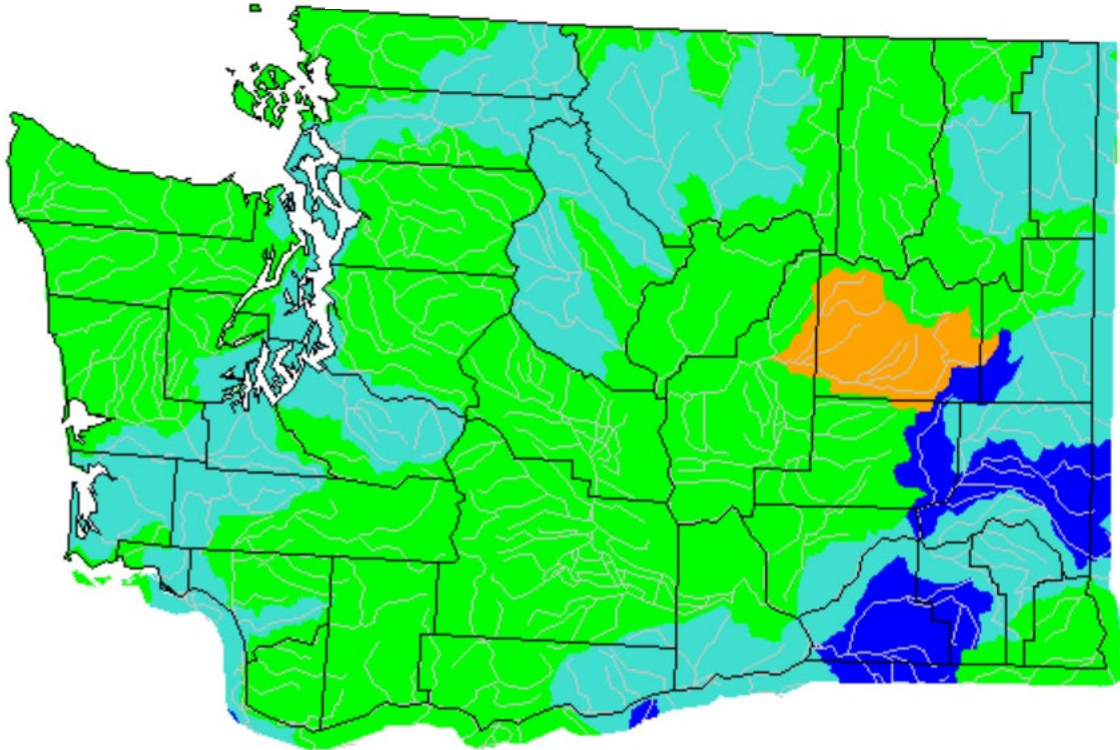


Index Gaging Stations, 7-day average streamflow (as of 18 Nov. 2022)

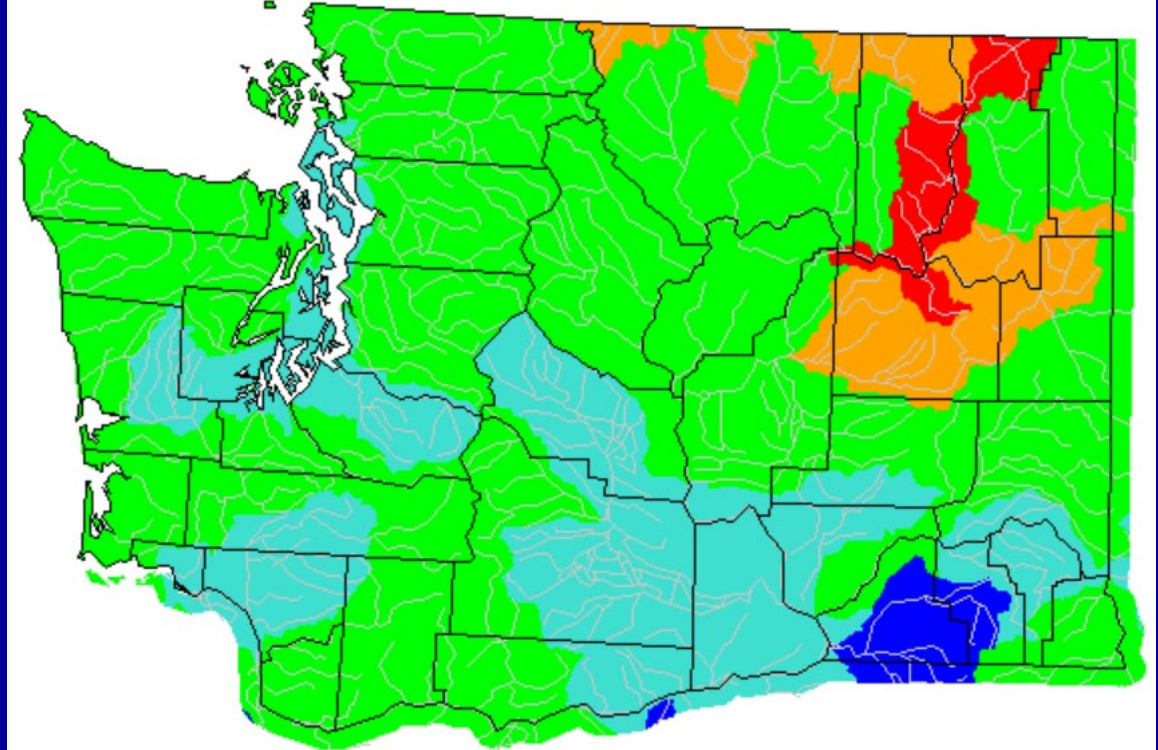


Monthly average streamflow compared to historical record for June 2022

July 2022



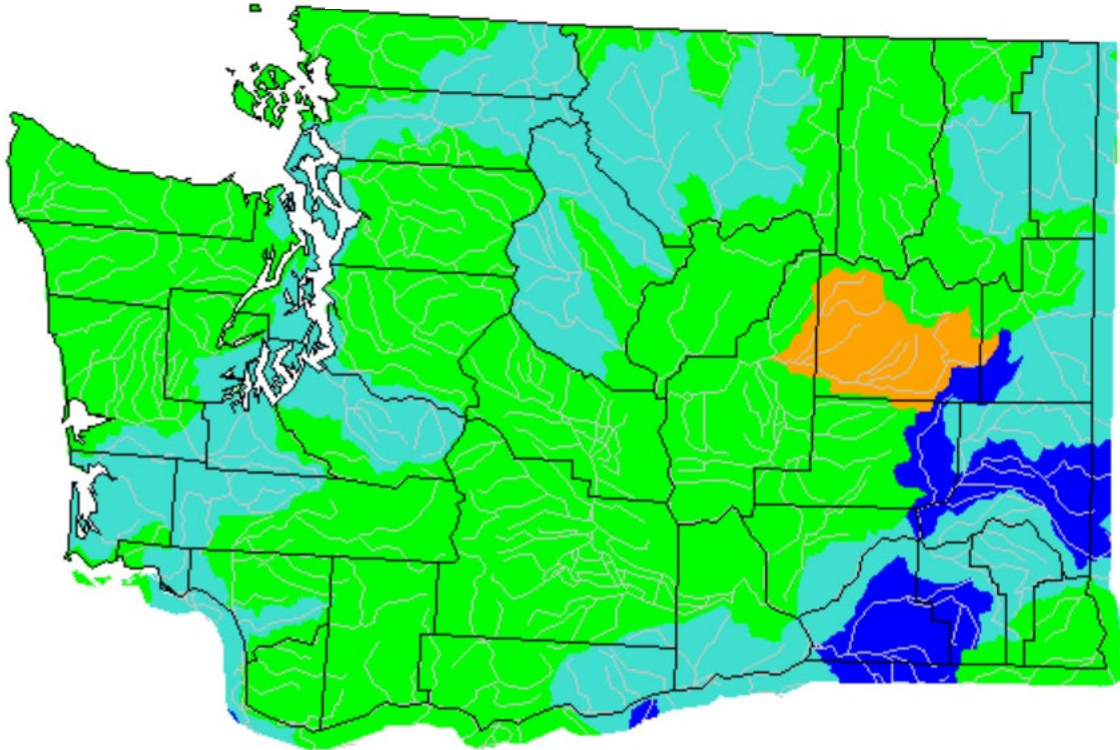
August 2022



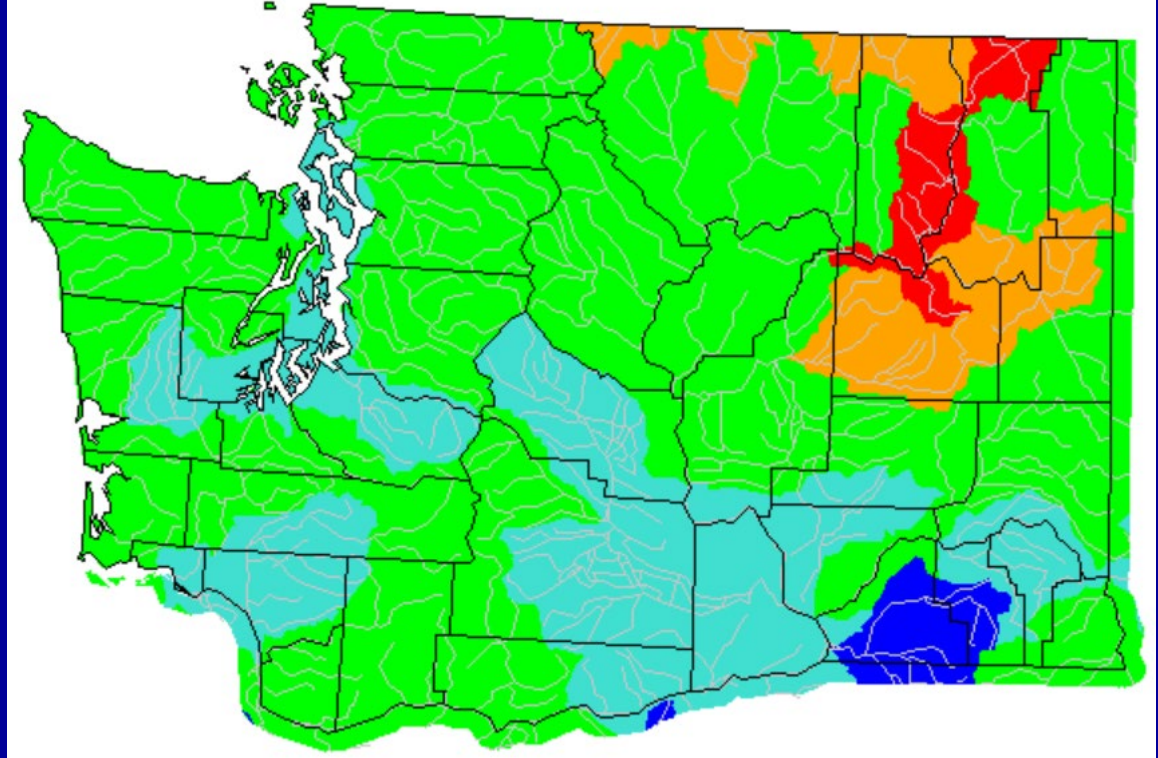
Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

Monthly average streamflow compared to historical record for July 2022 & August 2022

July 2022



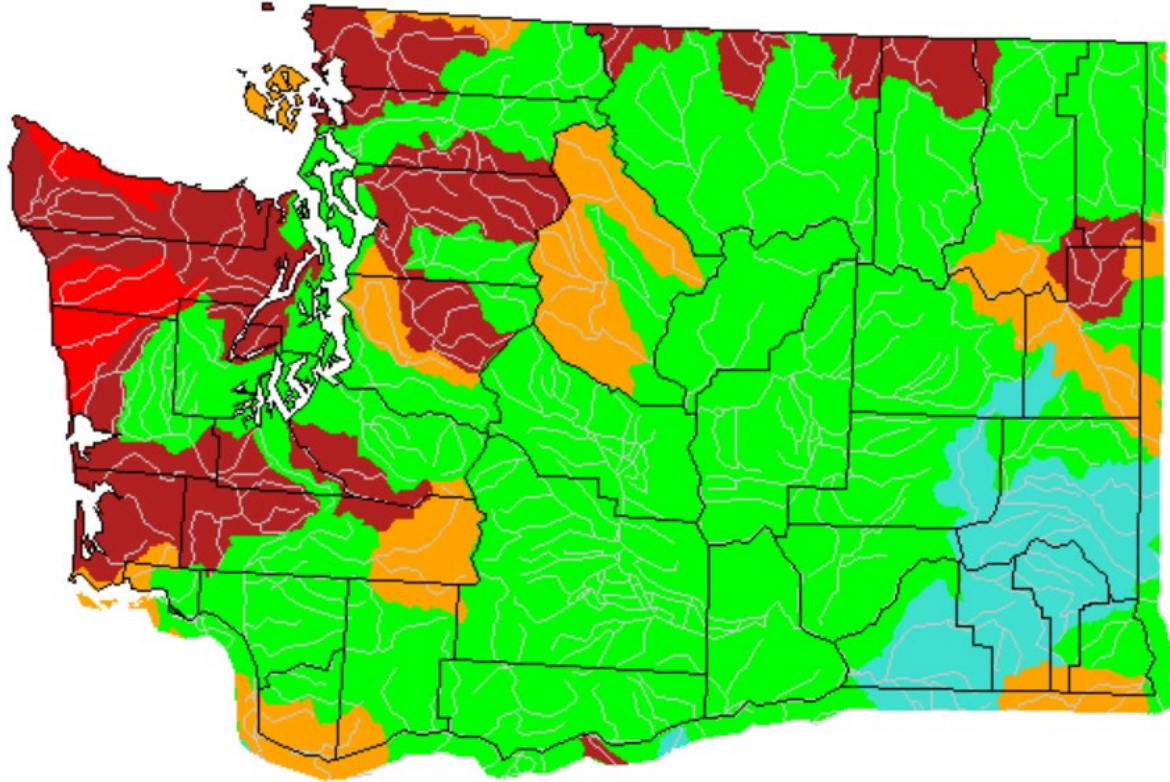
August 2022



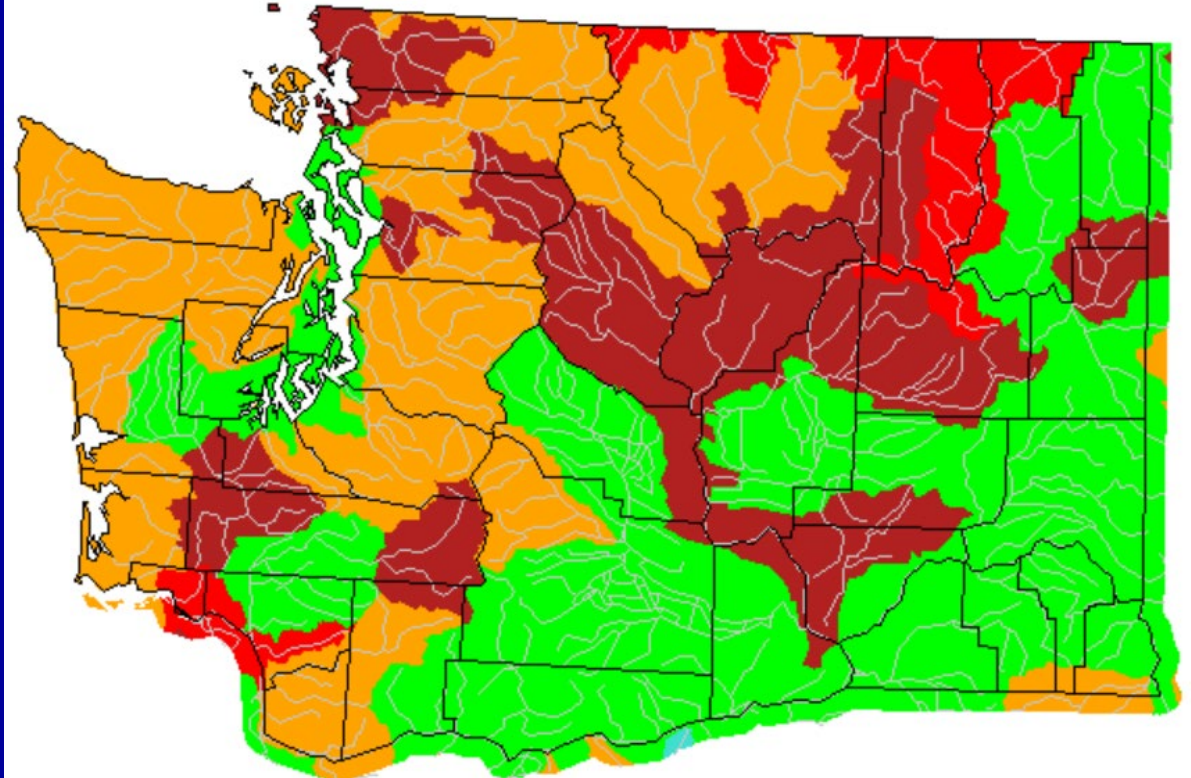
Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	


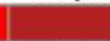




Monthly average streamflow compared to historical record for Sept. 2022 & Oct 2022

September 2022



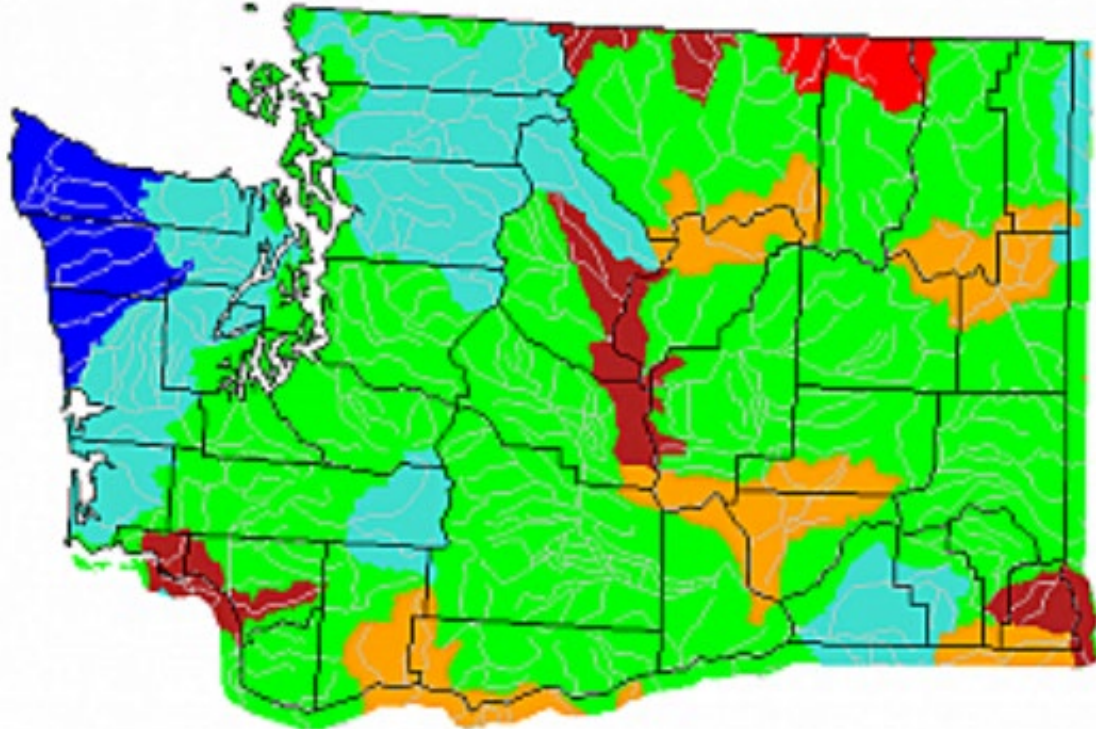
October 2022



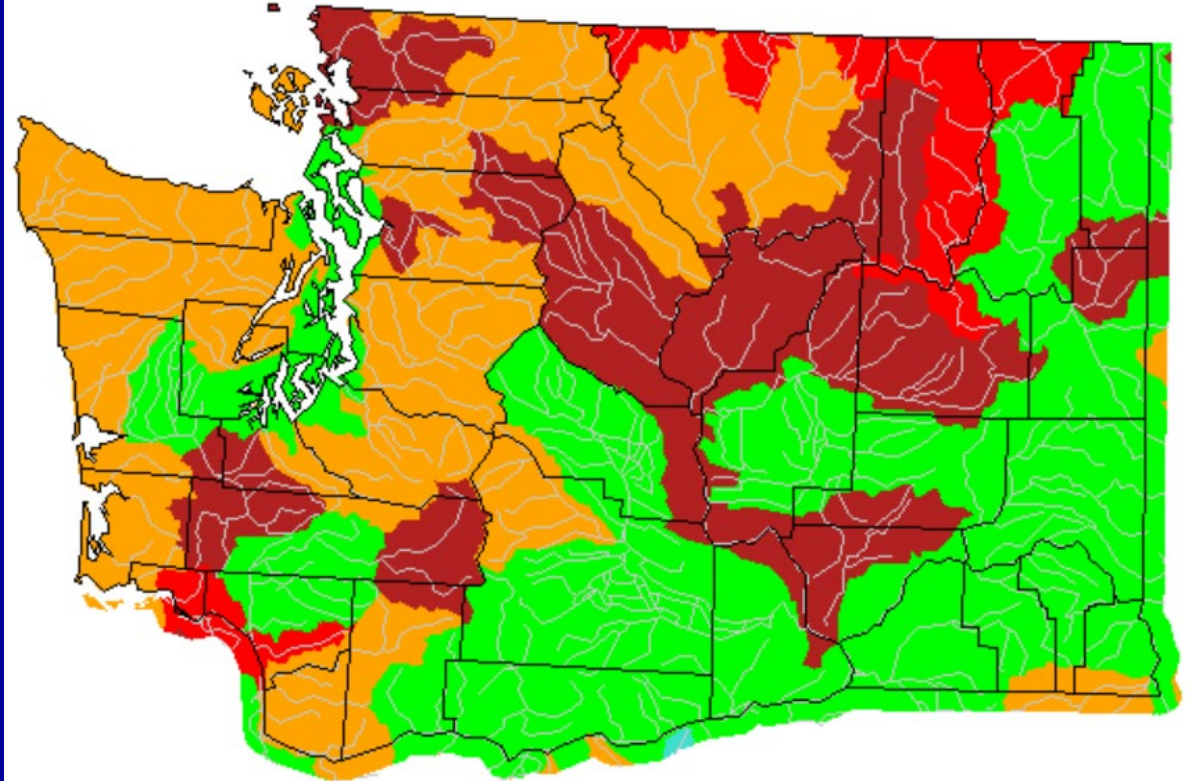
Explanation - Percentile classes						
						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	


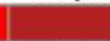




Monthly average streamflow compared to historical record for Sept. 2022 & Oct 2022

October 2021



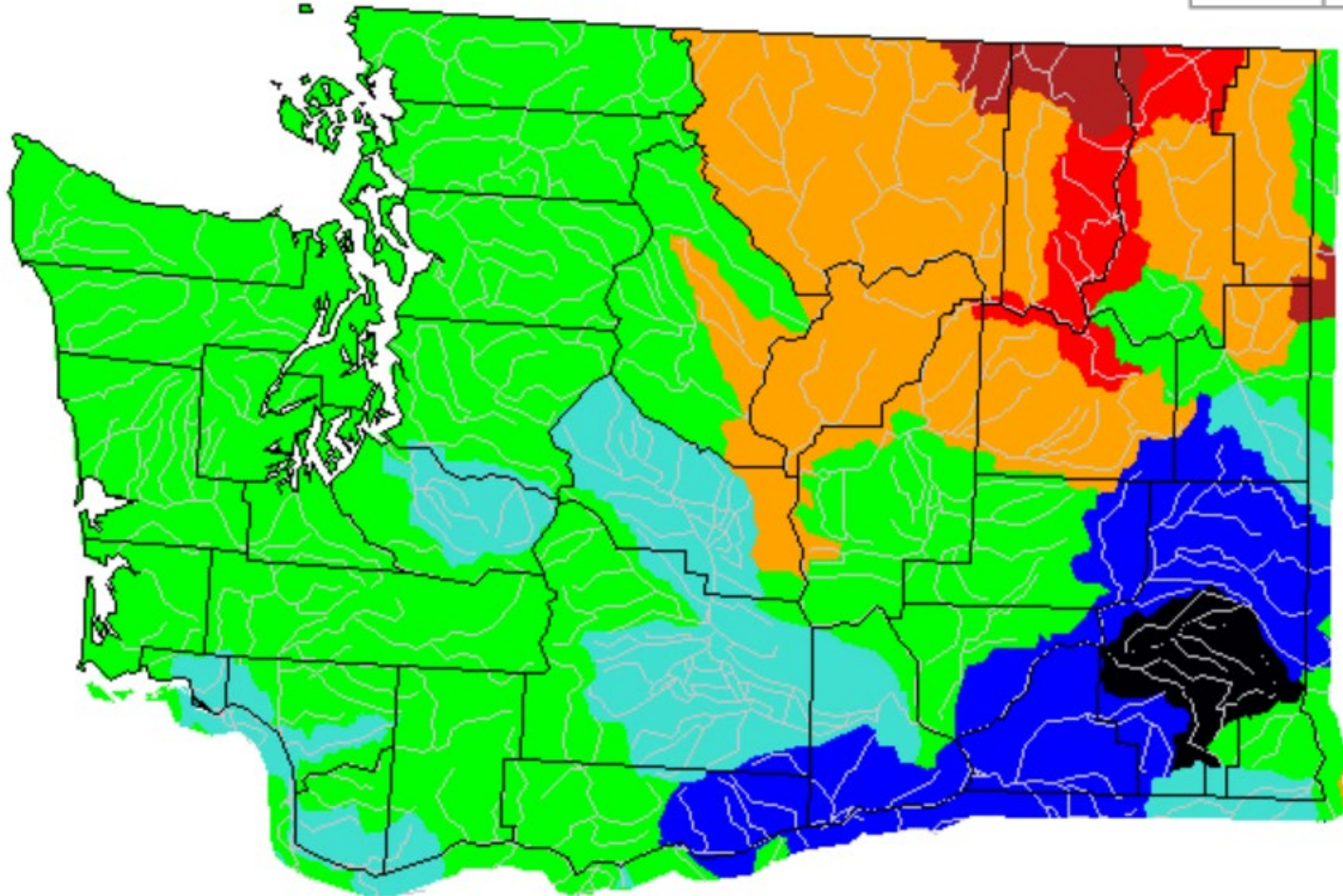
October 2022



Explanation - Percentile classes						
						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

WA 14-day average streamflow as of Nov. 18, 2022

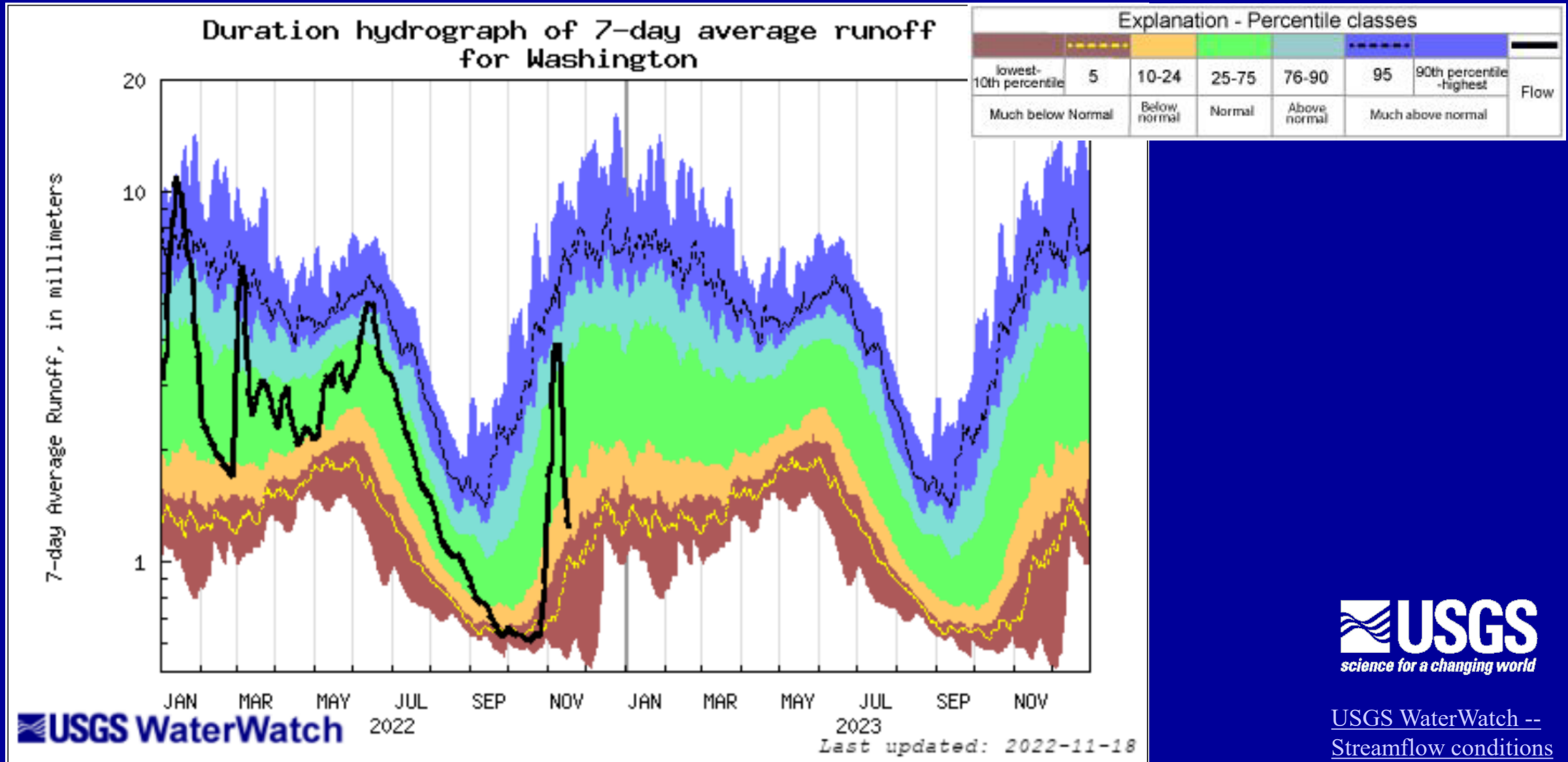
November 2022



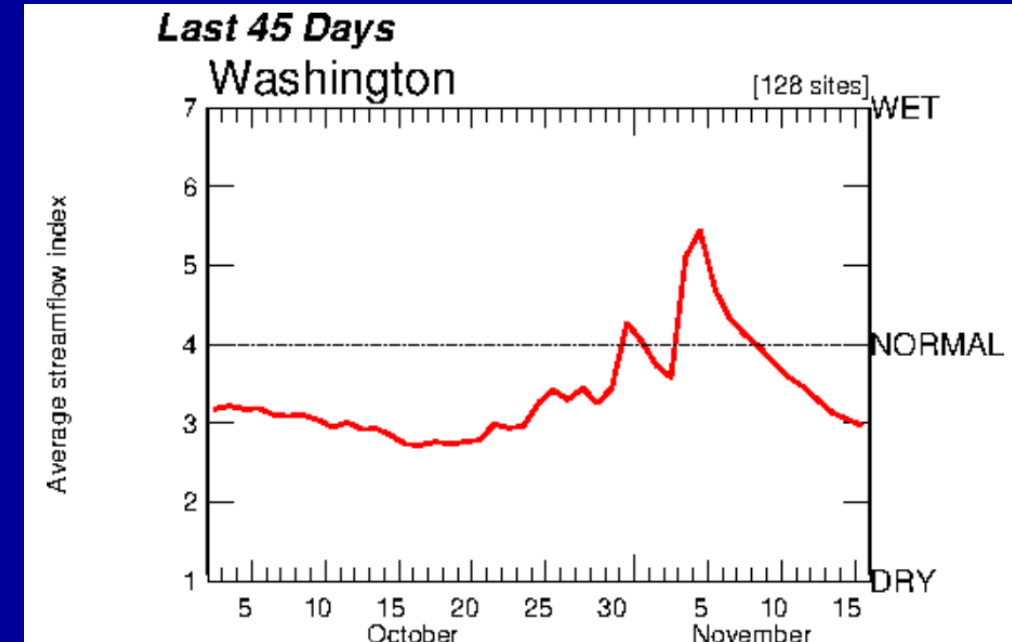
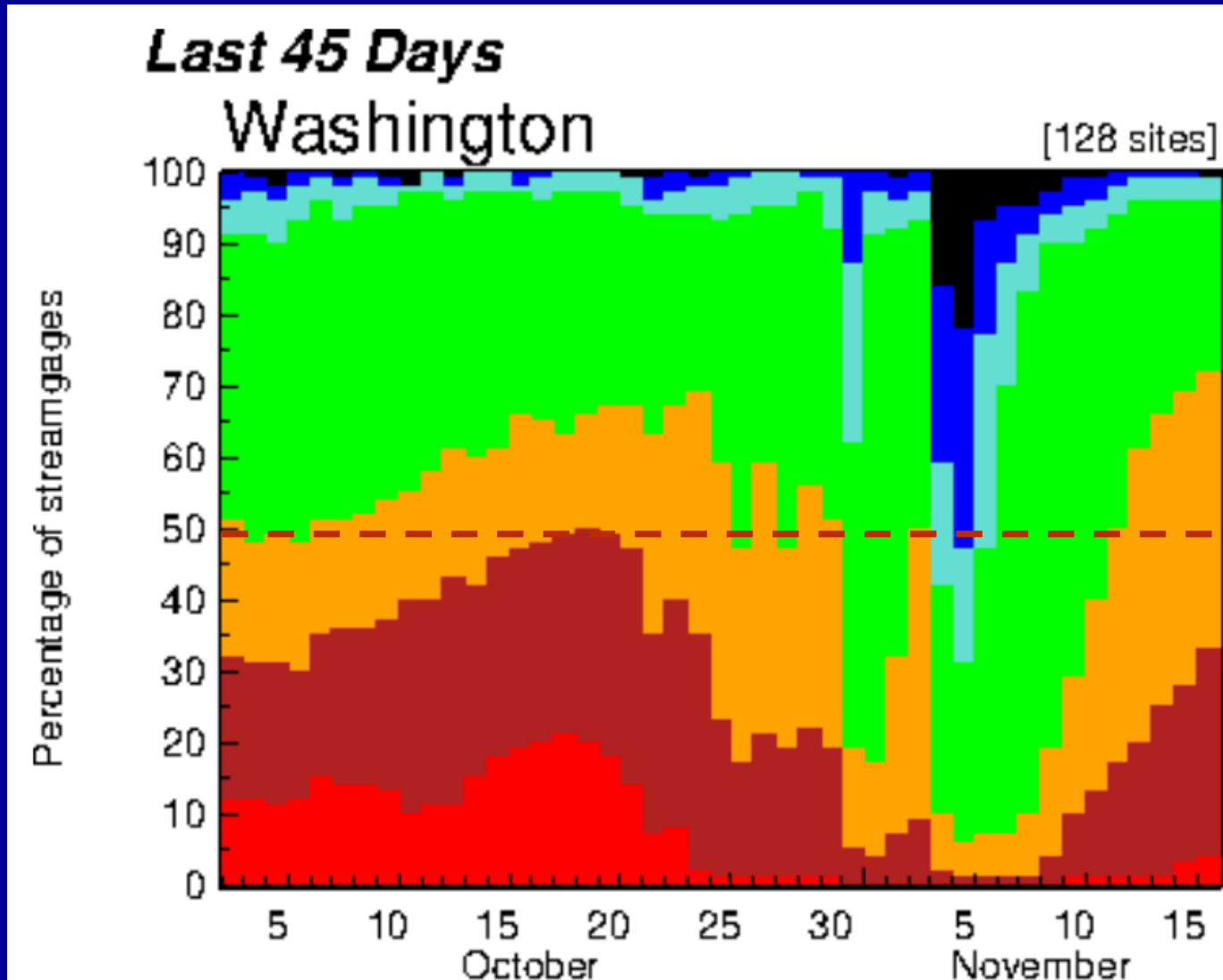
Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

Duration Hydrograph, Washington State

7-day Average Streamflow (as of 18 Nov. 2022) is below normal



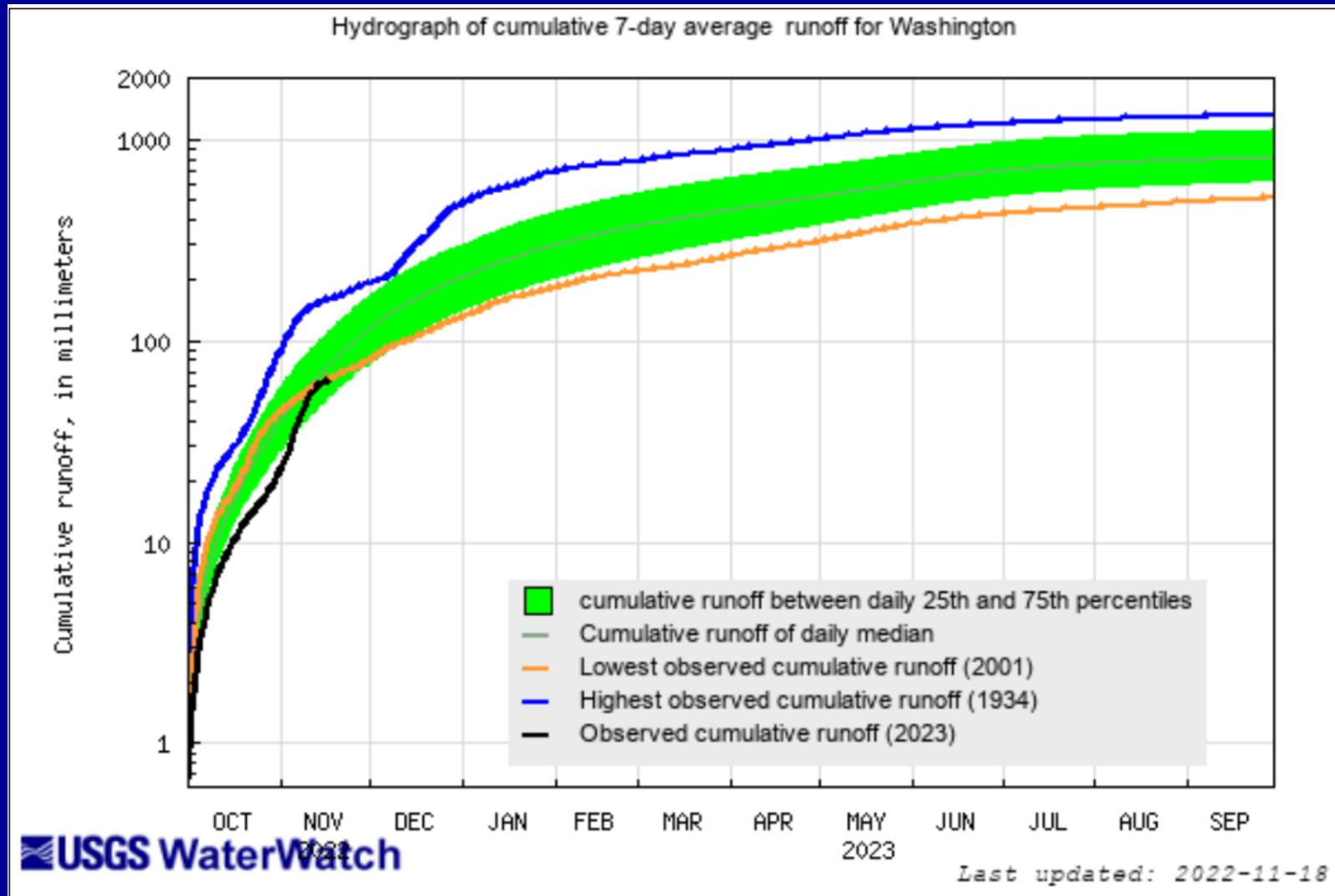
Daily streamflow in Washington Rivers compared to historical streamflow, Oct.-Nov. 2022



Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

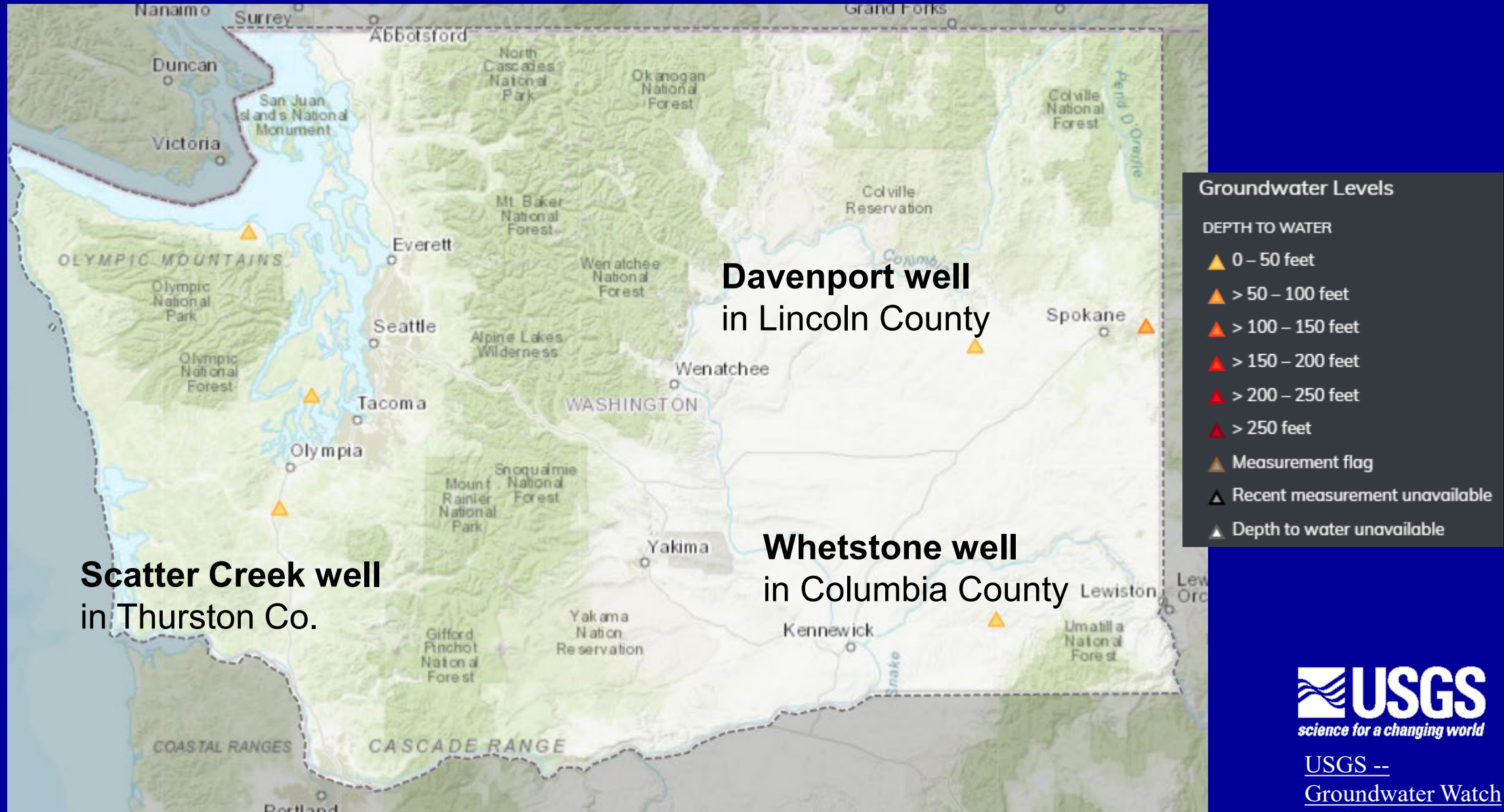
Hydrograph of cumulative 7-day average Area-based Hydrograph, Washington State

2023 Water year (as of 18 Nov. 2022) is normal

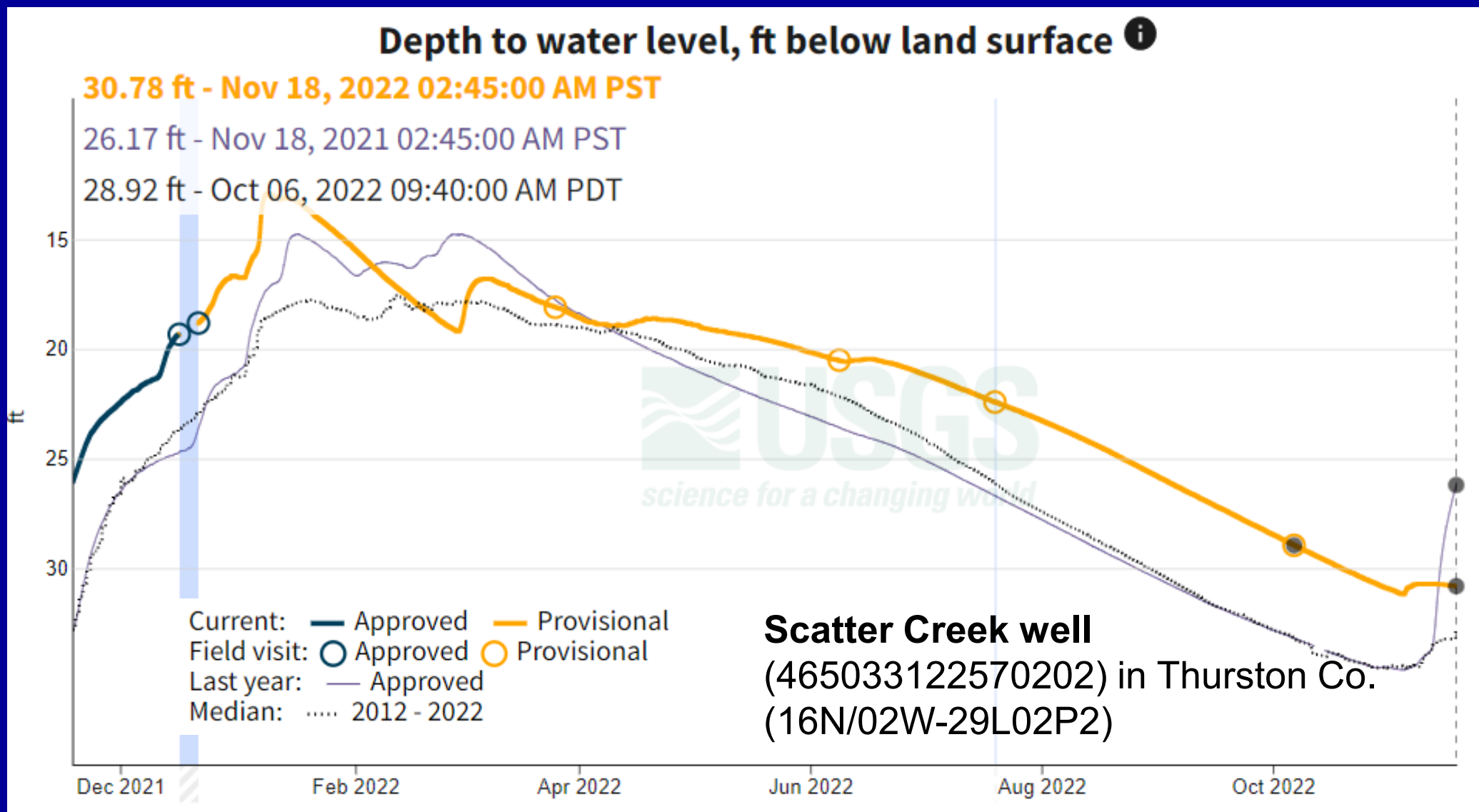


USGS WaterWatch --
[Streamflow conditions](#)

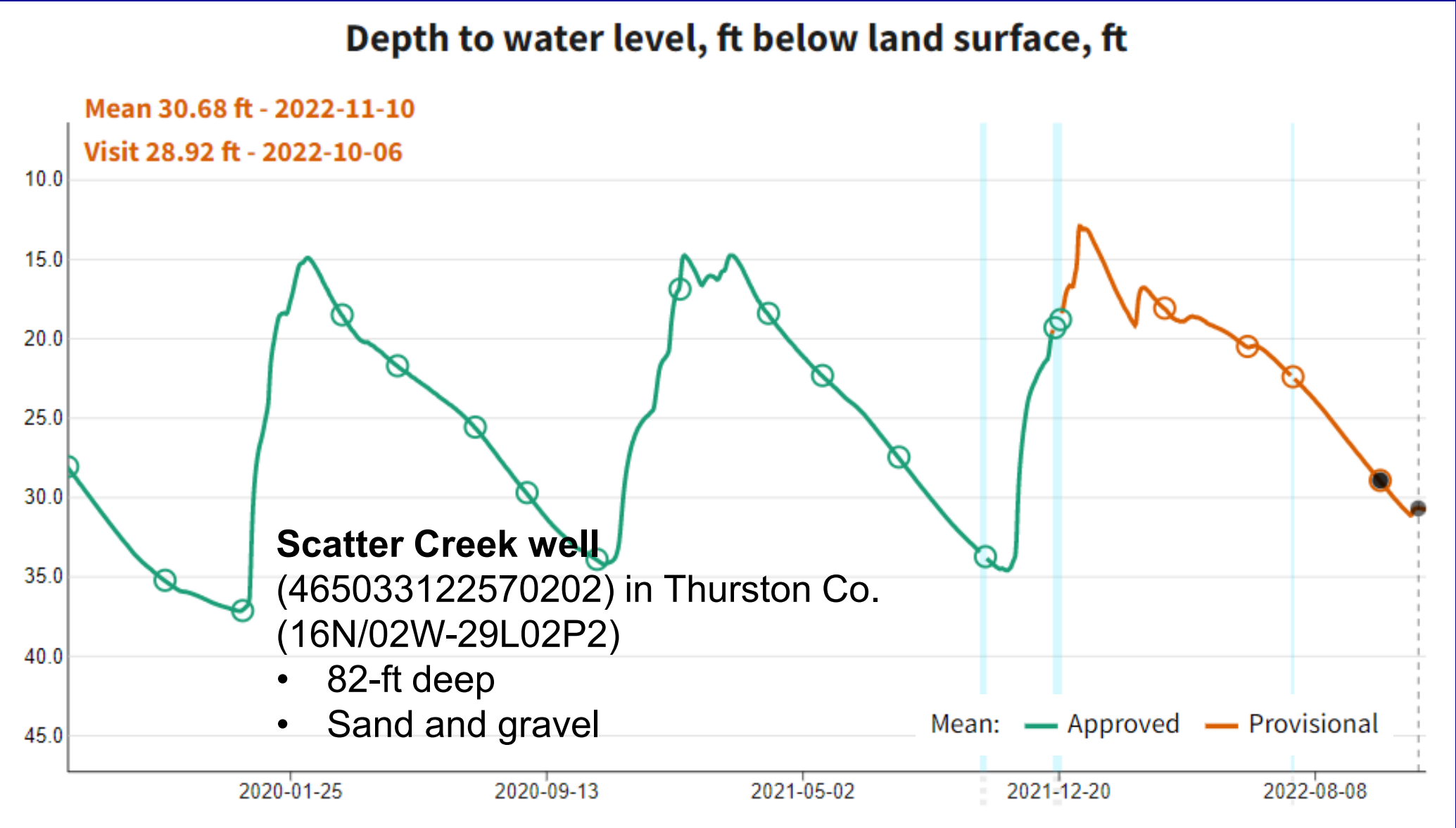
WA Current Groundwater Conditions (18 Nov. 2022)



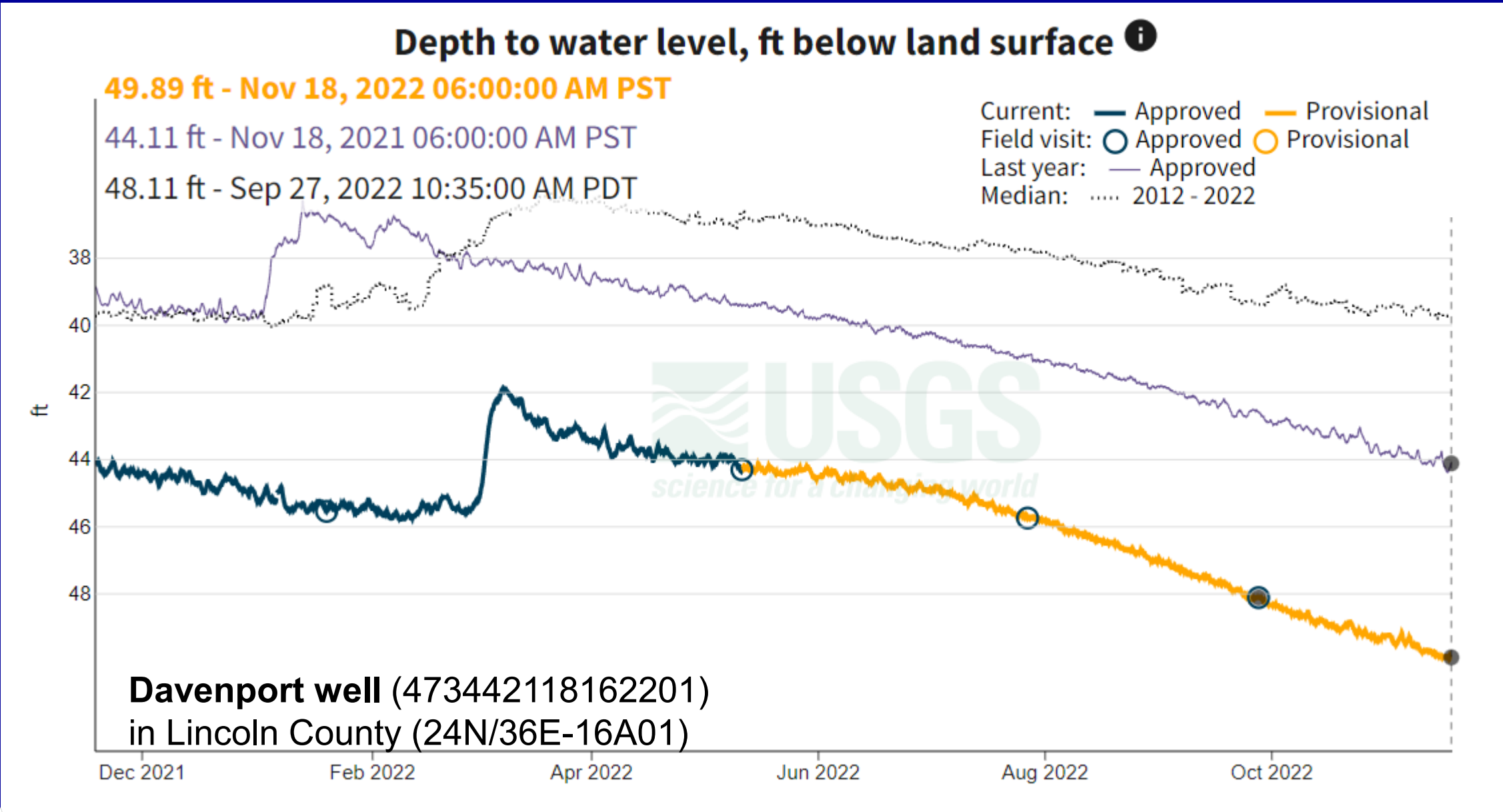
Scatter Creek Well Groundwater Conditions (15 Nov. 2022)



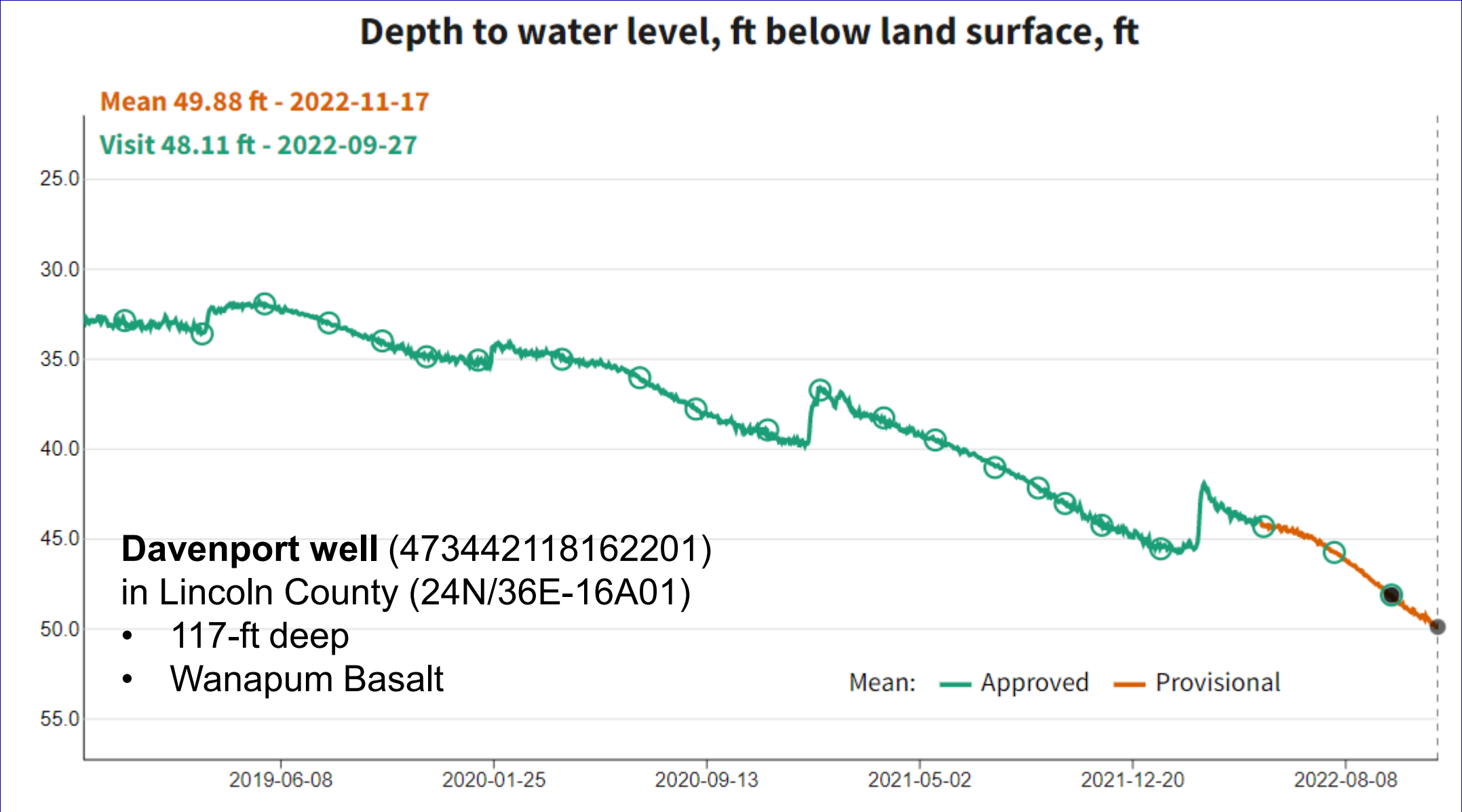
Scatter Creek Well Groundwater Conditions (15 Nov 2022)



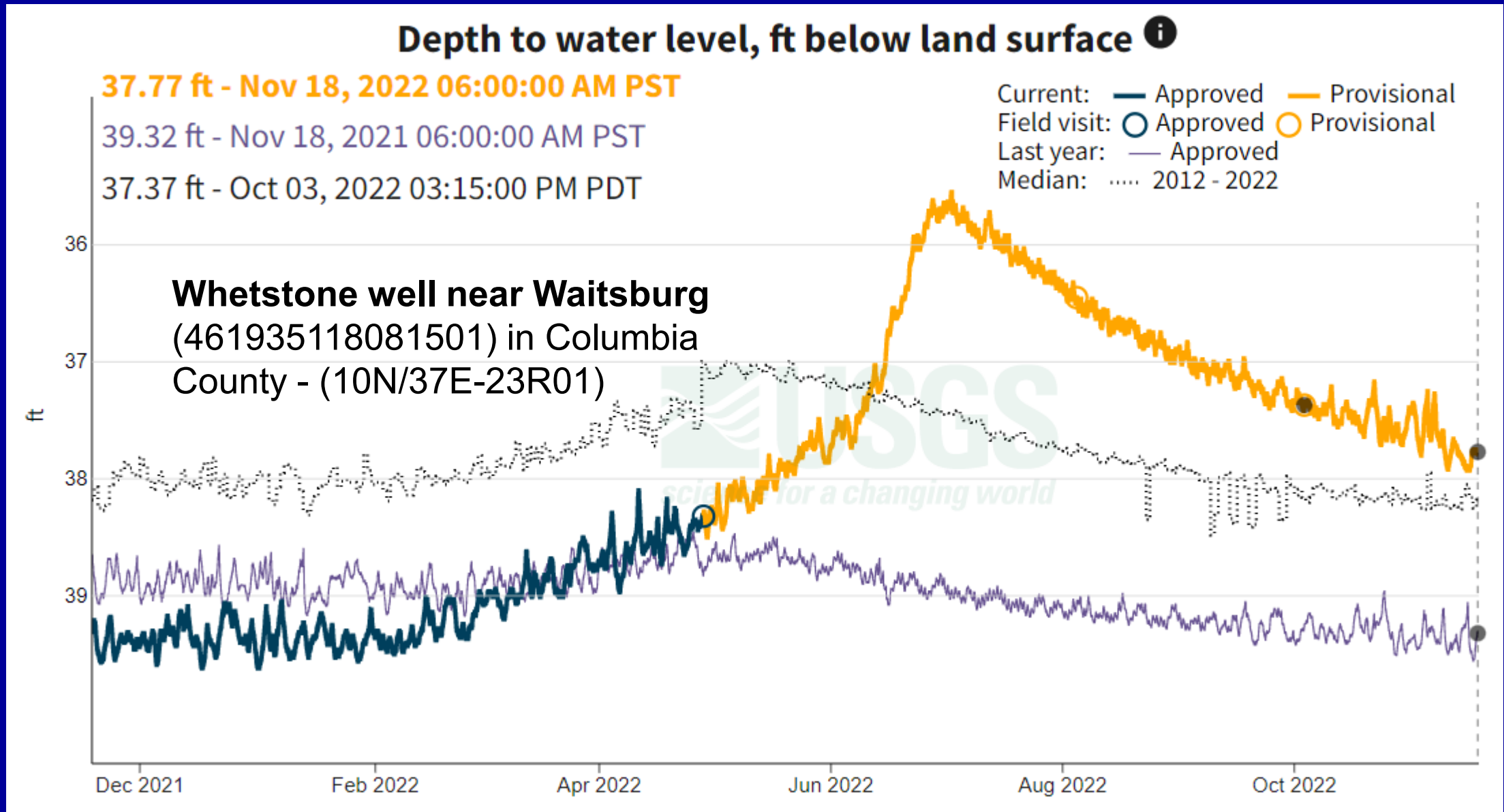
Davenport Well Groundwater Conditions (18 Nov. 2022)



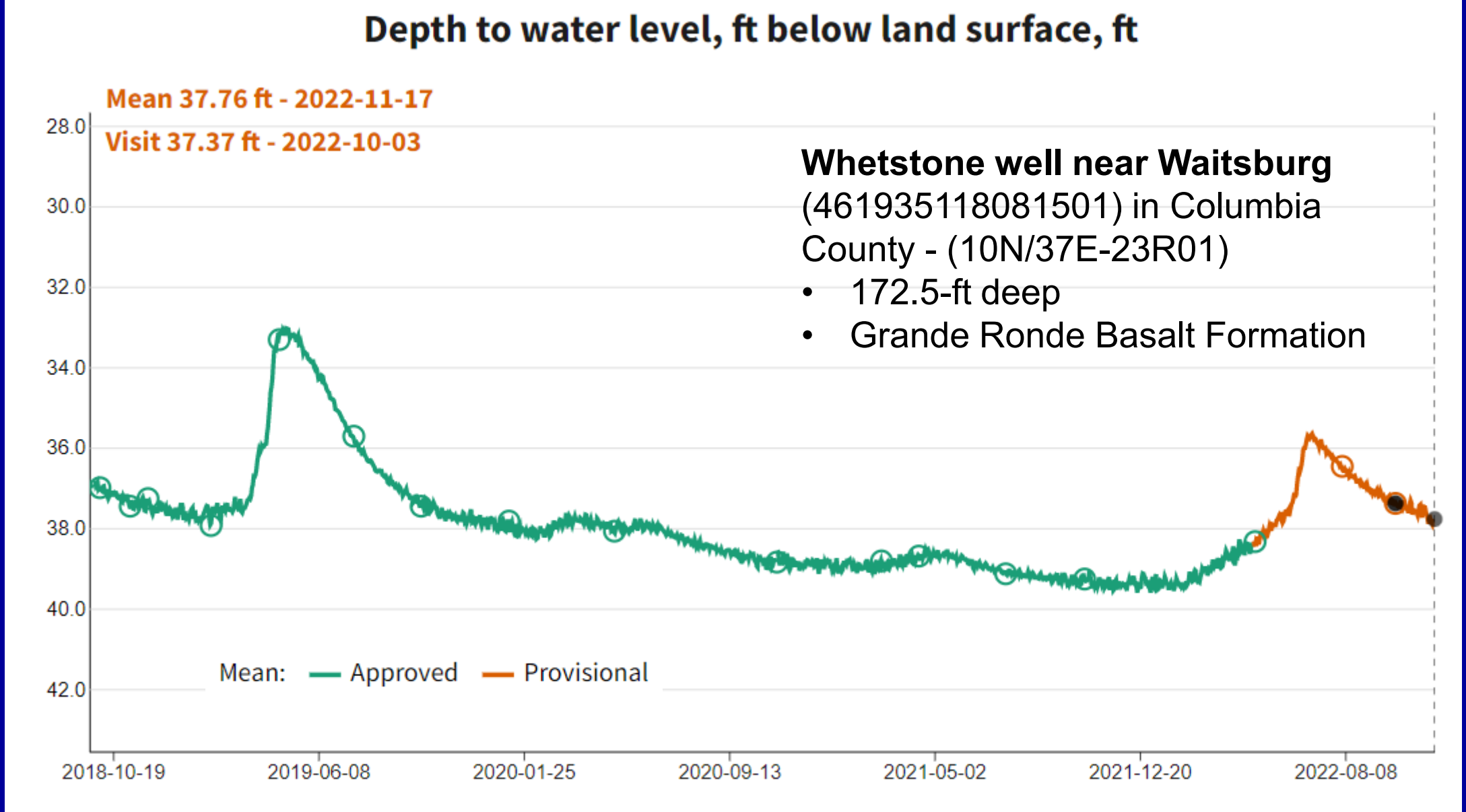
Davenport Well Groundwater Conditions (17 Nov. 2022)



Whetstone Well Groundwater Conditions (18 Nov. 2022)

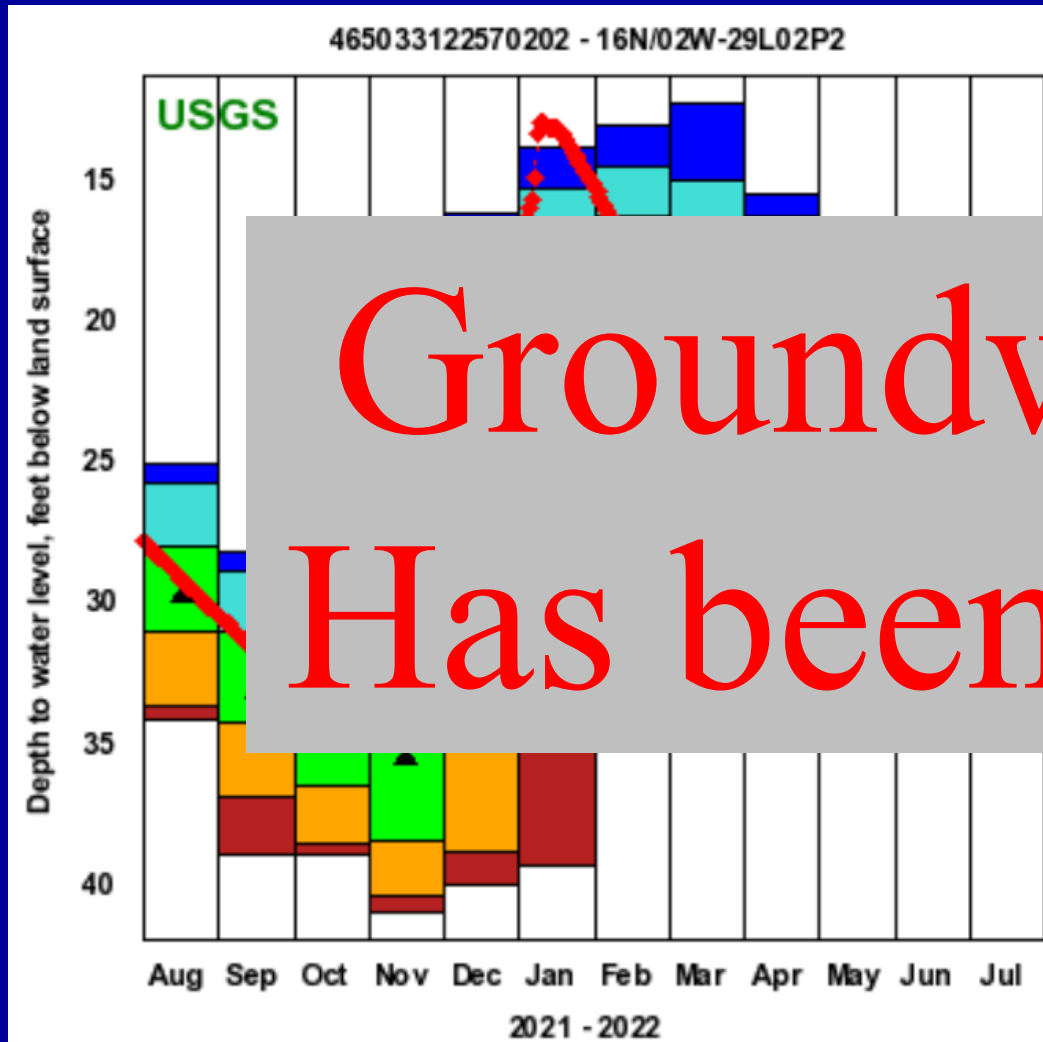


Whetstone Well Groundwater Conditions (17 Nov. 2022)

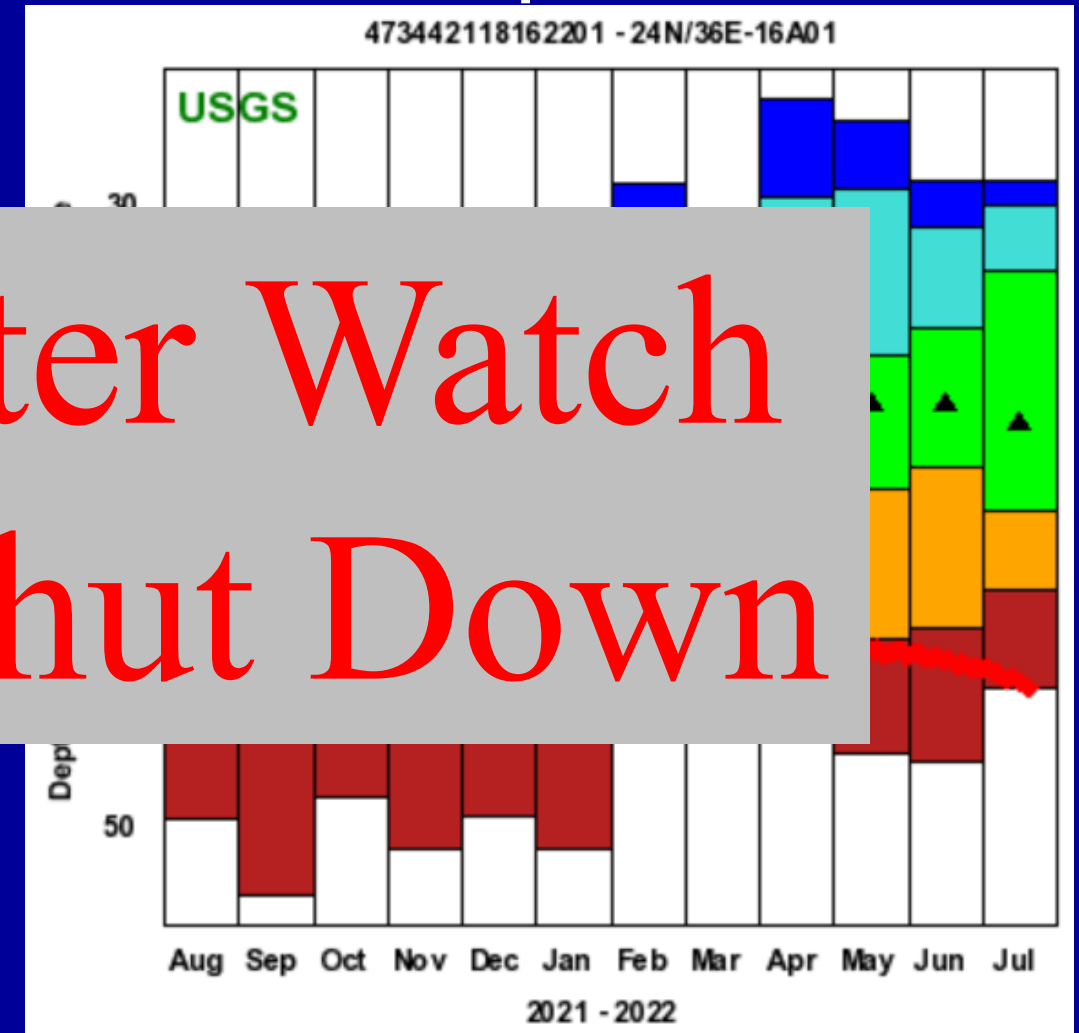


WA Current Groundwater Condition

Scatter Creek well

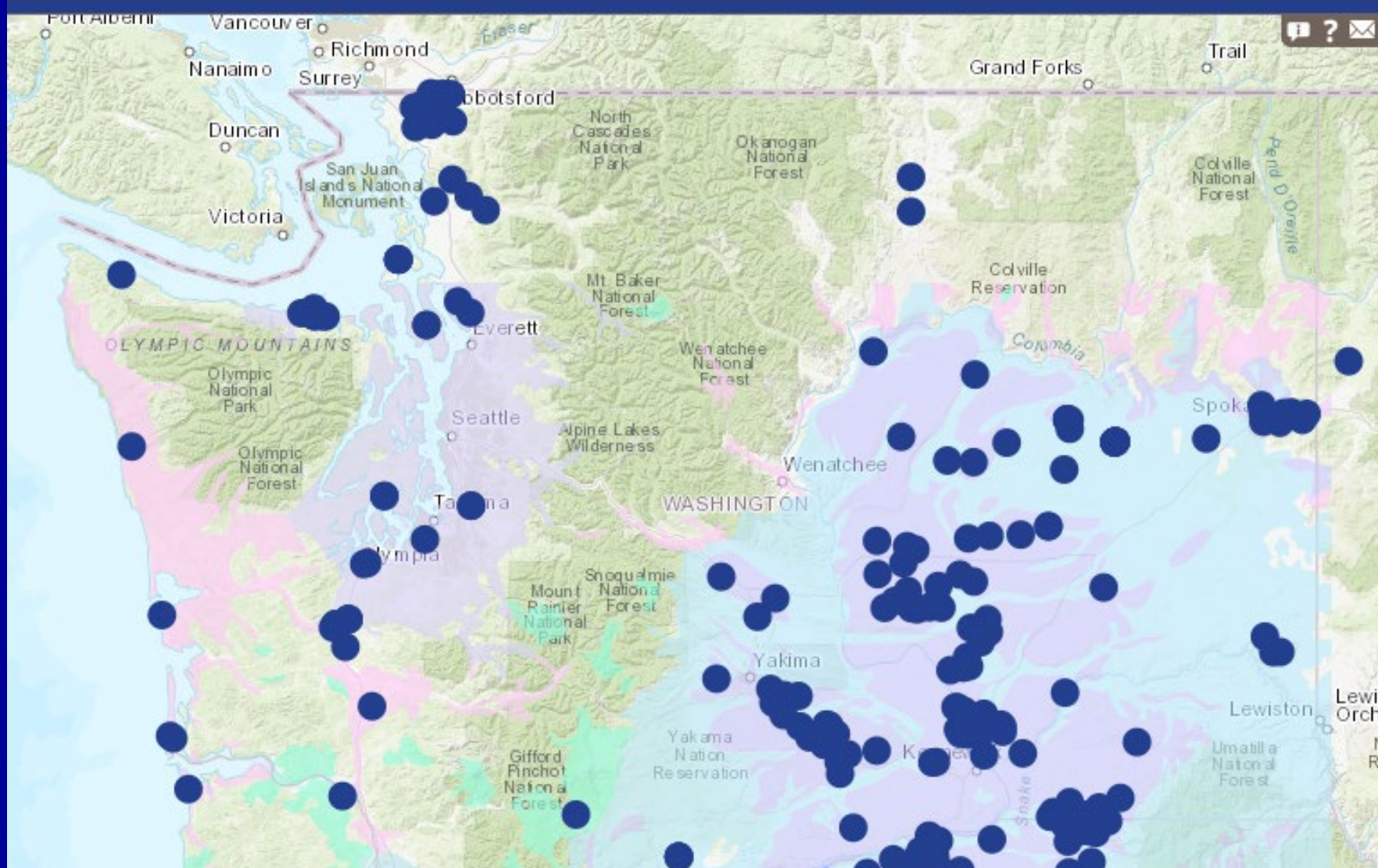


Davenport well



Groundwater Watch
Has been Shut Down

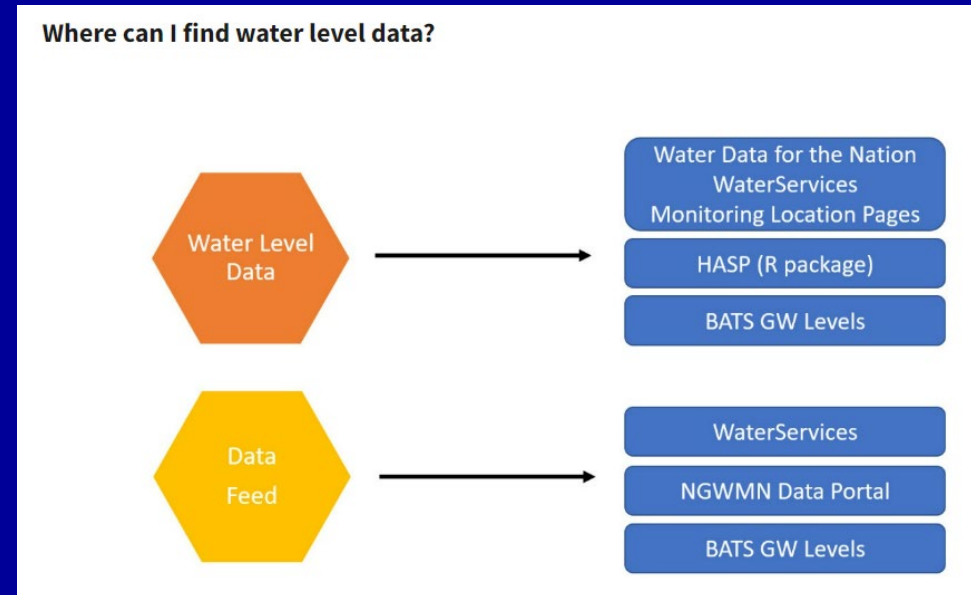
National Ground-Water Monitoring Network



[National Ground-Water Monitoring Network \(usgs.gov\)](https://usgs.gov)

Other Groundwater Resources

- Groundwater Watch (usgs.gov)



- Climate Response Network - USGS Water Data for the Nation
- National Ground-Water Monitoring Network (usgs.gov)

Summary of Washington Streamflow & GW conditions as of 18 Nov. 2022

- 7-day average streamflow statewide is normal
- 7-day average streamflow at eight index gaging stations:

Western WA

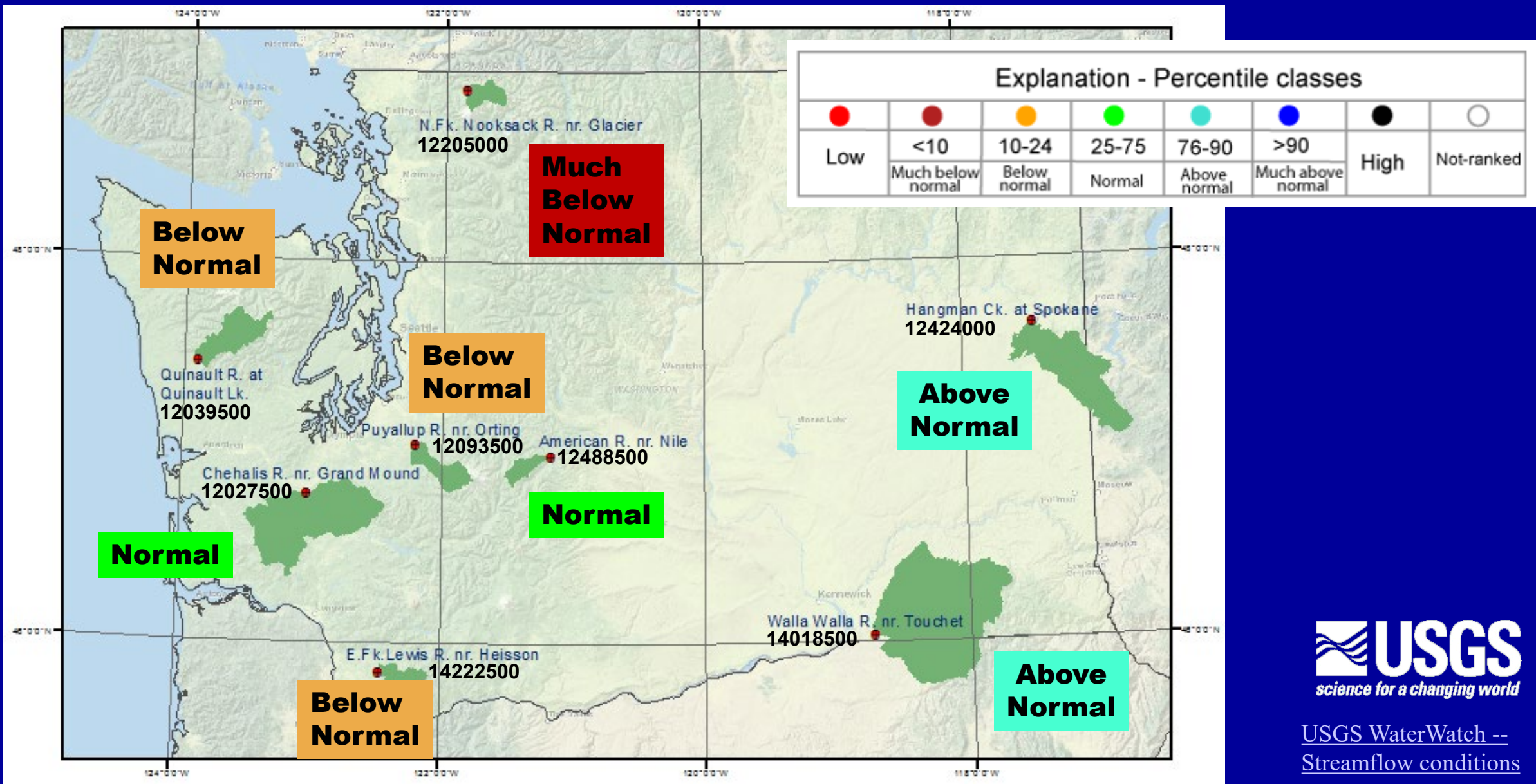
- Chehalis River nr. Grand Mound – Normal
- American River - Normal
- Puyallup River nr. Orting – Below Normal
- Quinault River – Below Normal
- EF Lewis River – Below Normal
- NF Nooksack River – Much Below Normal

Eastern

- Hangman Creek – Above normal
- Walla Walla River – Above normal

- Index groundwater sites: (below normal)
 - Scatter Creek well (west) – Above median
 - Davenport well (east) – Below median
 - Waitsburg well - Above median

Index Gaging Stations, 7-day average streamflow (as of 18 Nov. 2022)





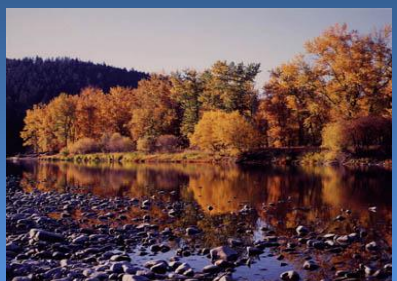
Northwest River Forecast Center



Nov 18, 2022 Washington Water Supply Availability Meeting

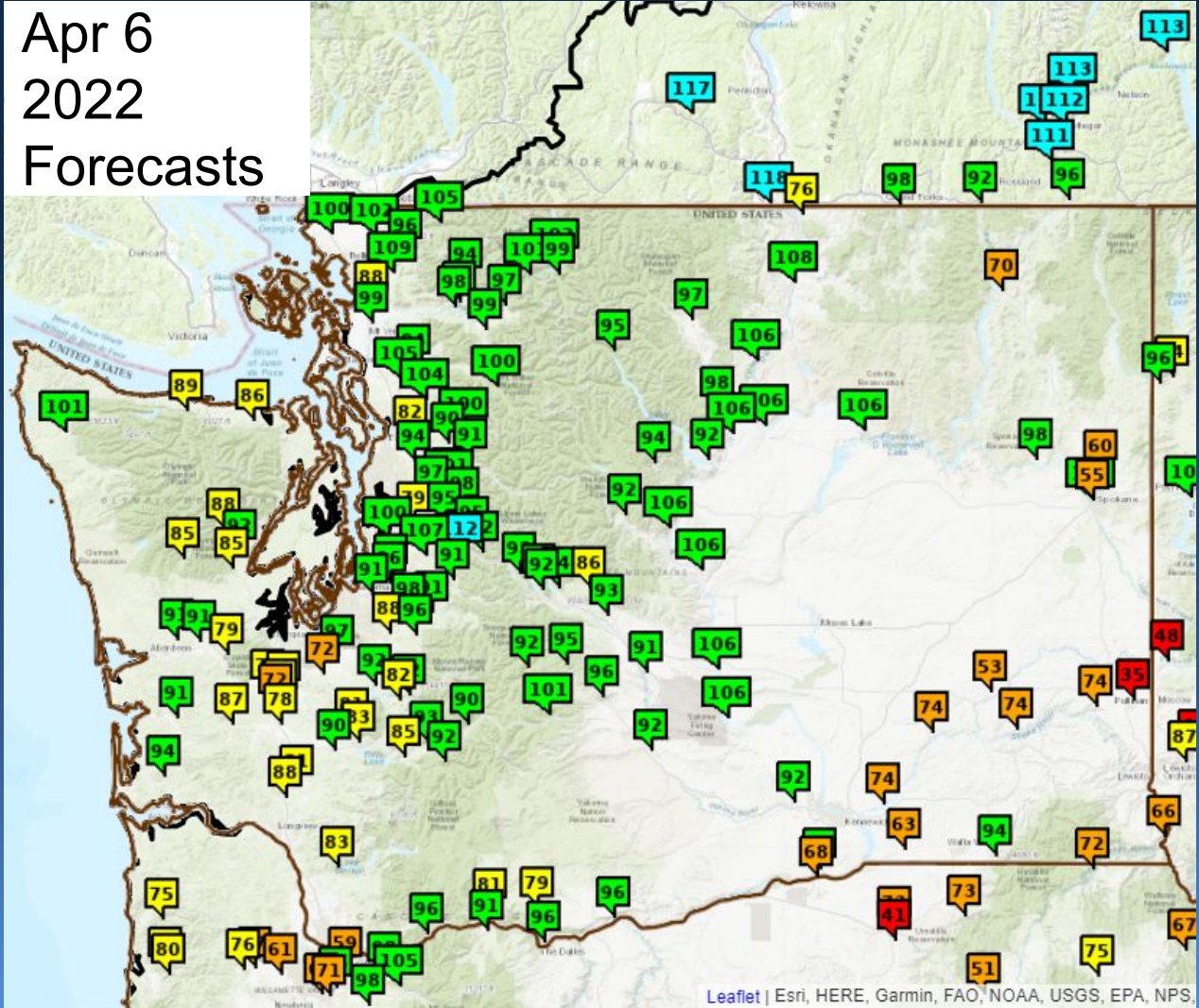
Amy Burke

NWRFC.watersupply@noaa.gov

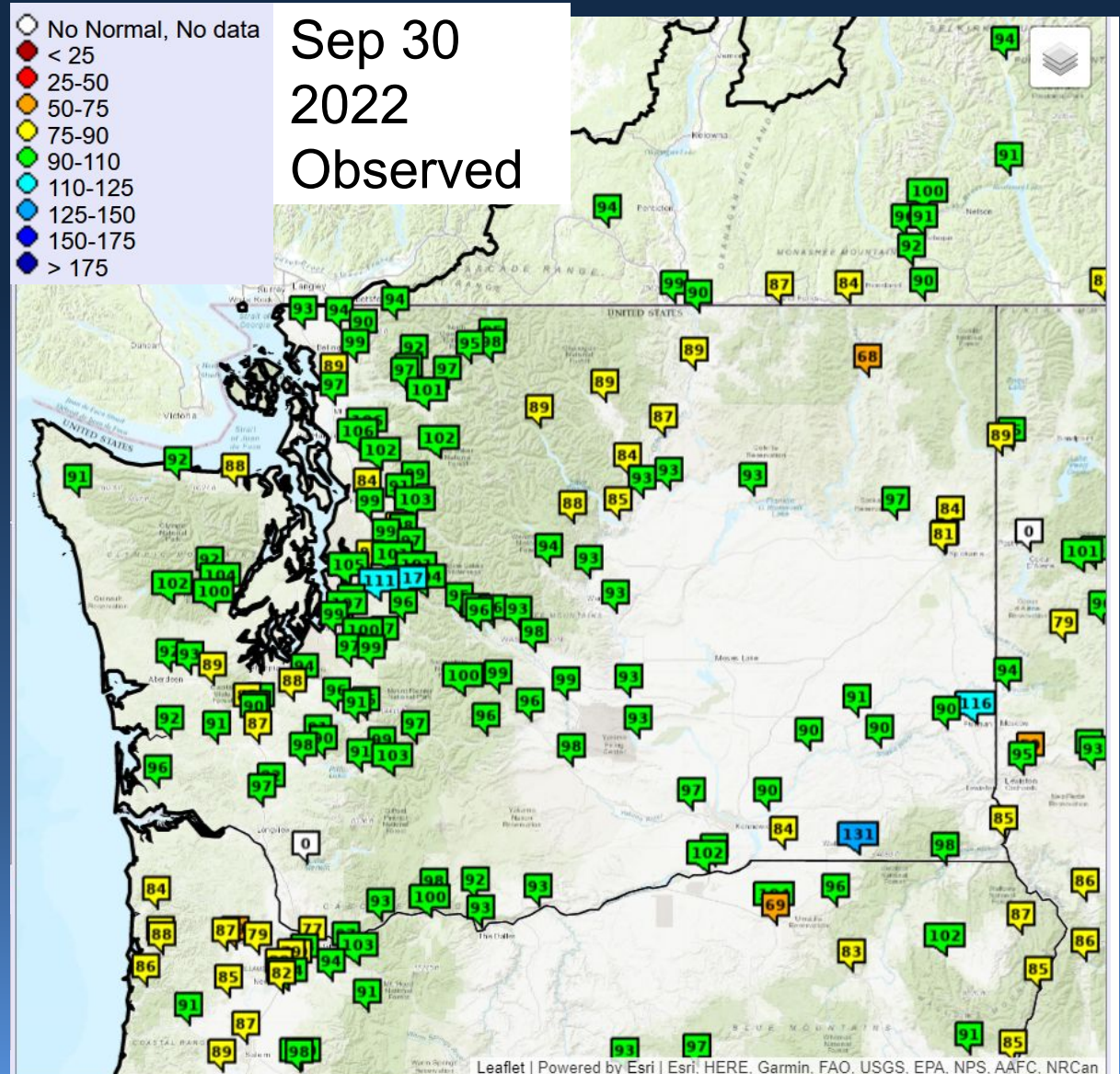


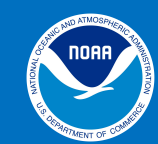
2022 Apr-Sep Adjusted Runoff

Apr 6
2022
Forecasts

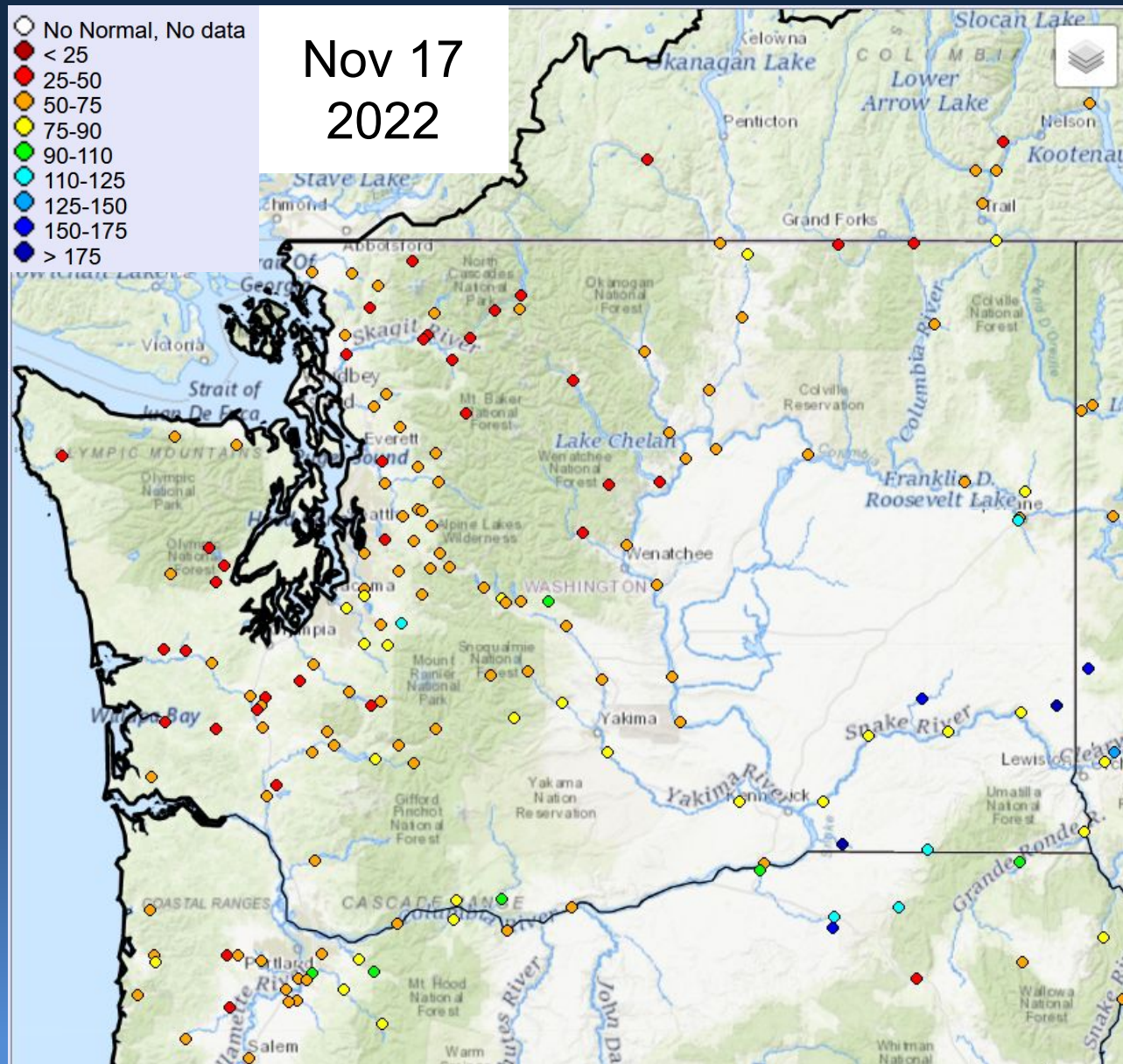


Sep 30
2022
Observed





2023 Water Year to Date Adjusted Runoff

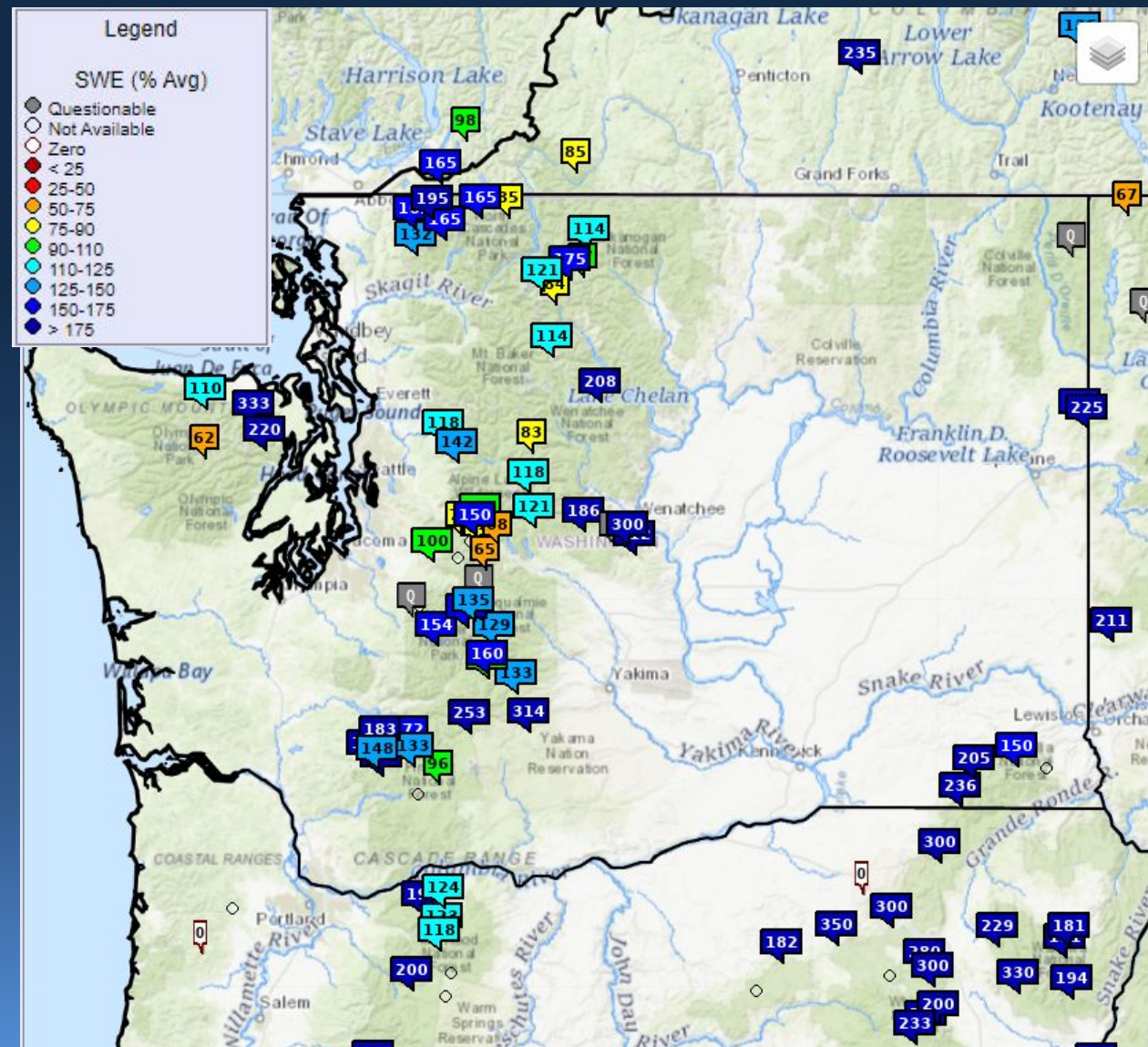
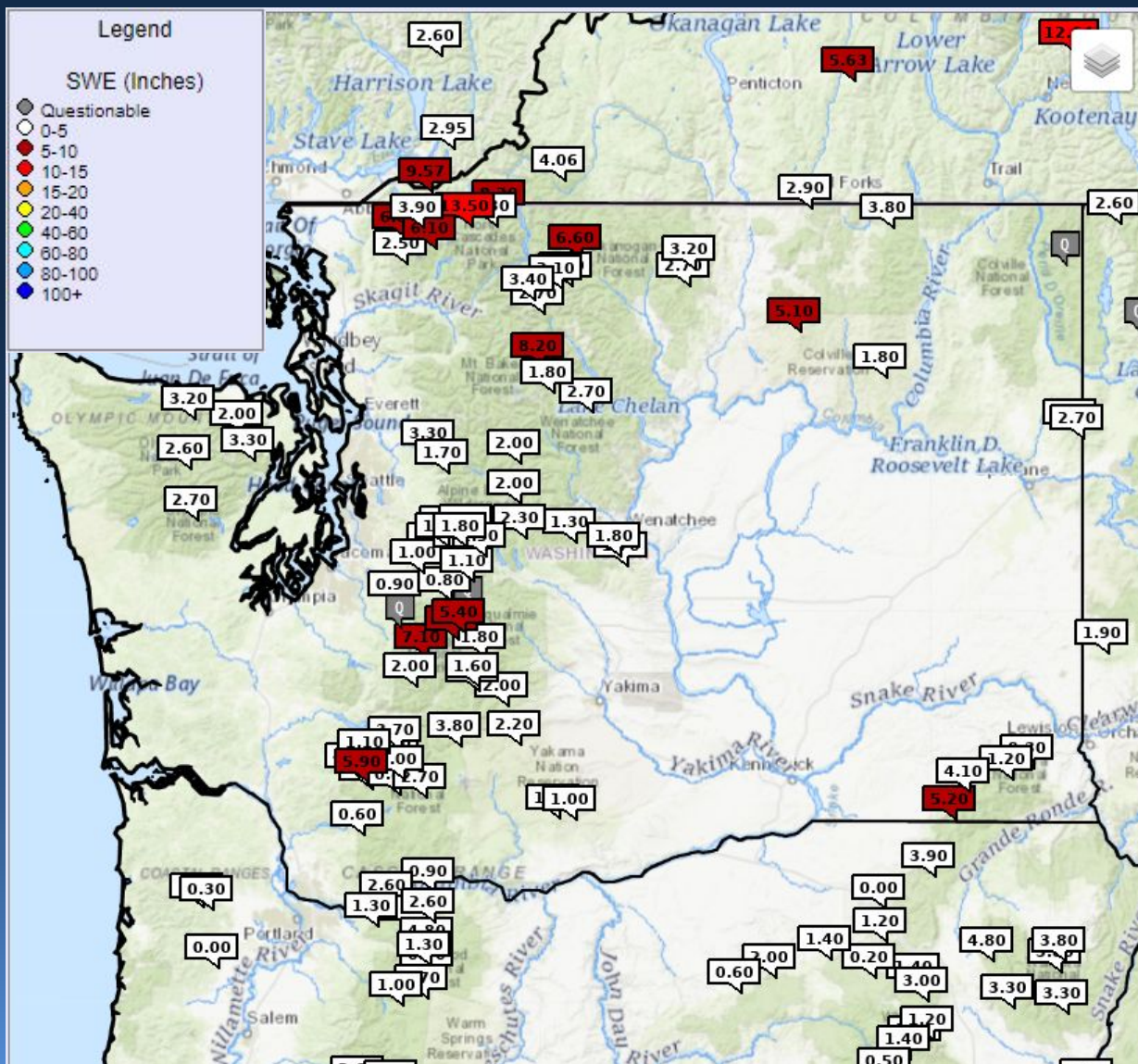


% Normal Runoff Oct 1 - Nov 17

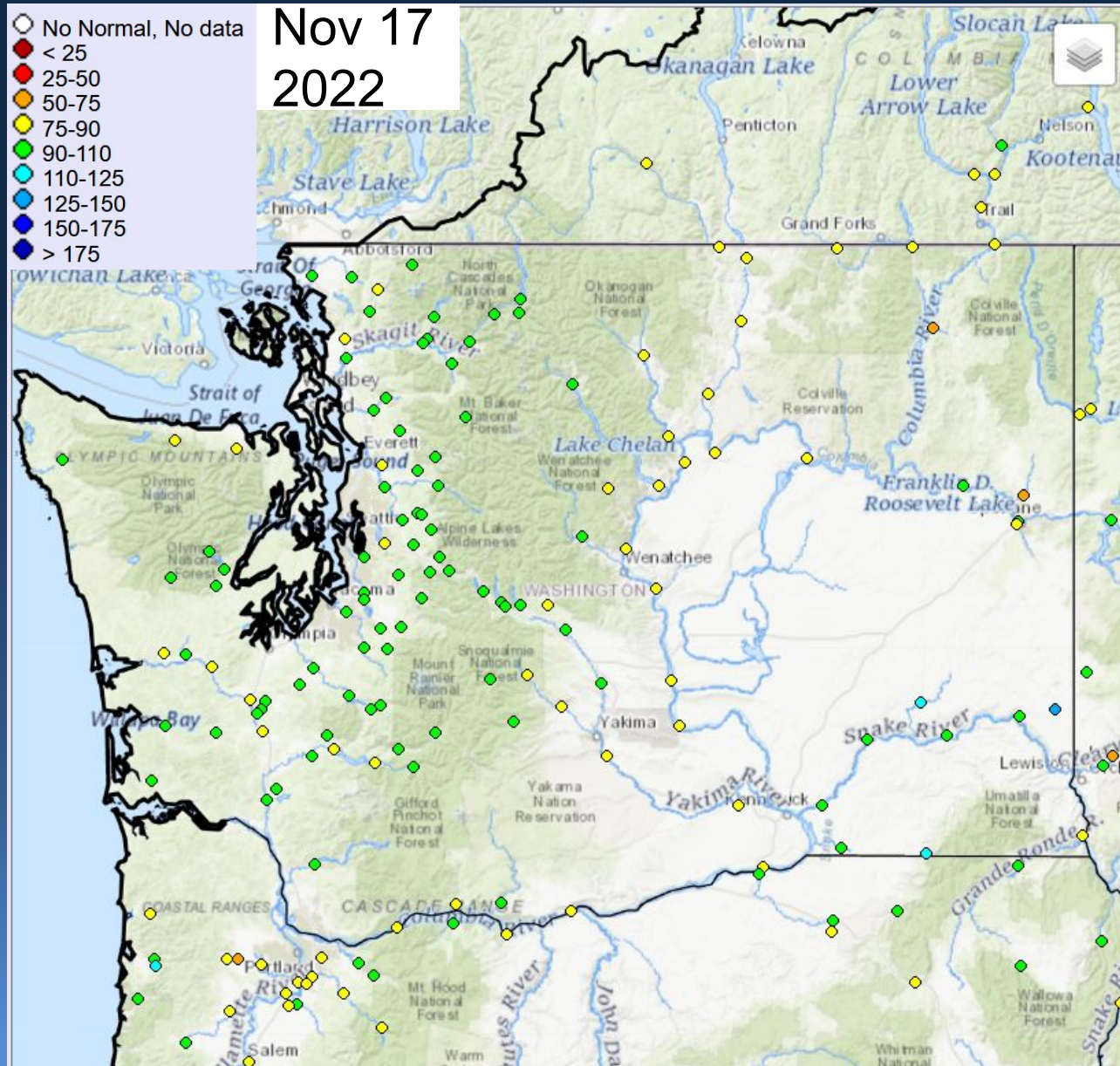
Washington

Skagit nr Mt Vernon	45
Dungeness nr Sequim	50
Chehalis at Porter	51
Okanogan at Malott	62
Methow nr Pateros	58
Yakima at Parker	81
Walla Walla nr Touchet	183

Snowpack



Water Supply Forecasts (Natural)



% Normal Apr -Sep Volume

Washington

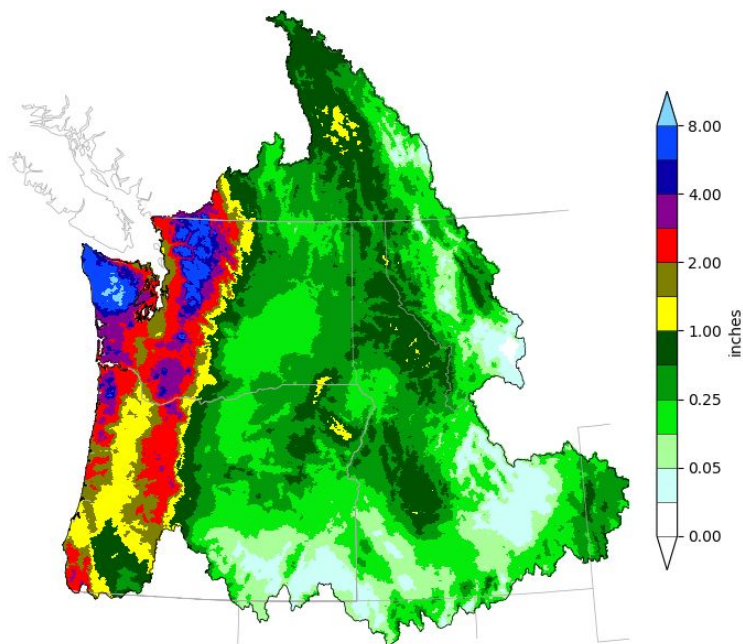
Skagit nr Mt Vernon	95
Dungeness nr Sequim	83
Chehalis at Porter	89
Okanogan at Malott	78
Methow nr Pateros	84
Yakima at Parker	89
Walla Walla nr Touchet	91



10 Day Precipitation Forecast



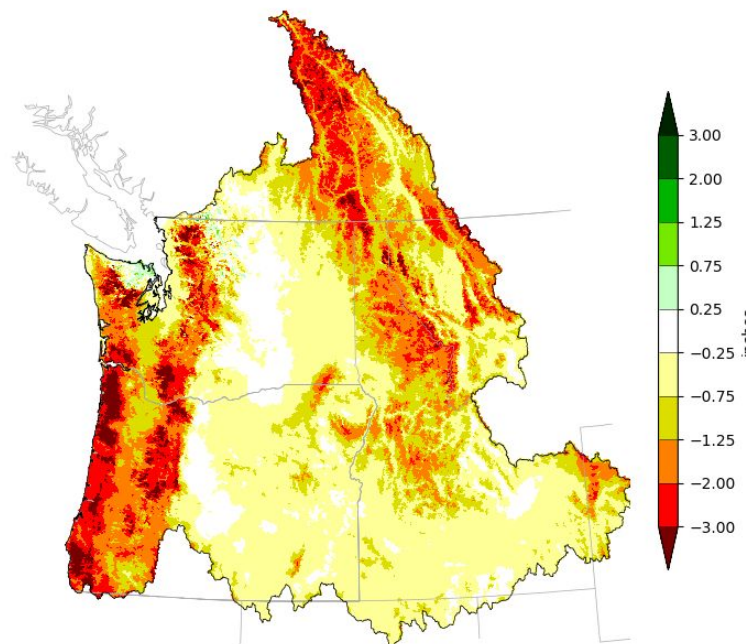
Northwest River Forecast Center
10 Day QPF, Ending 12Z, 11/27/22



Creation Time: Thu Nov 17 15:27:15 UTC 2022



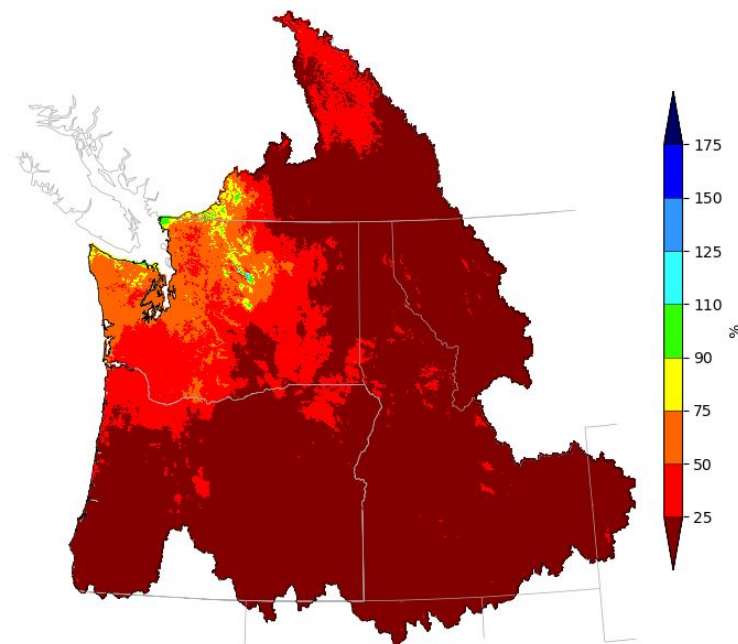
Northwest River Forecast Center
10 Day QPF (Deviation from Climatology), Ending 12Z, 11/27/22



Creation Time: Thu Nov 17 15:28:49 UTC 2022



Northwest River Forecast Center
10 Day QPF (Percent of Climatology), Ending 12Z, 11/27/22



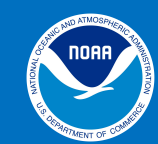
Creation Time: Thu Nov 17 21:31:11 UTC 2022

QPF Sources

Days 1 - 2 NWS Weather Forecast Offices (WFO) in the US, WPC in BC

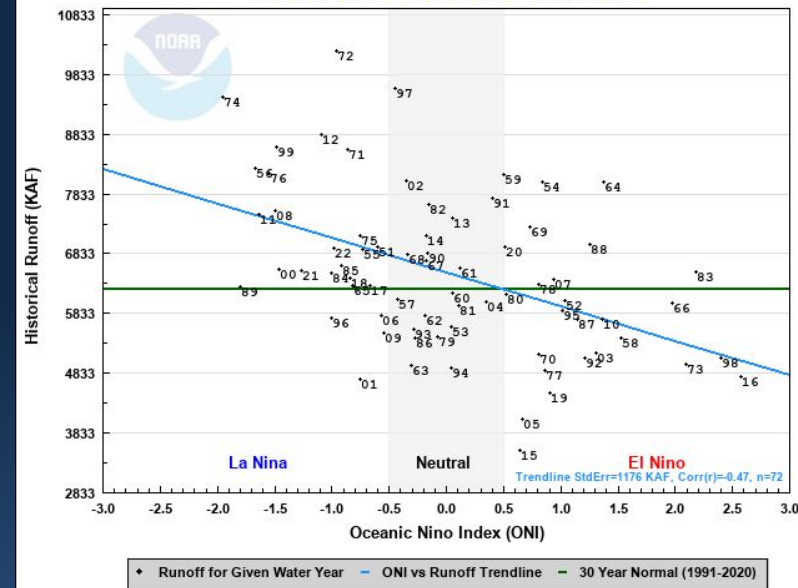
Days 3 - 7 NWS Weather Prediction Center (WPC)

Days 8 - 10 NWS National Blend of Models (NBM)



Oceanic Niño Index vs Apr - Sep Runoff Volumes

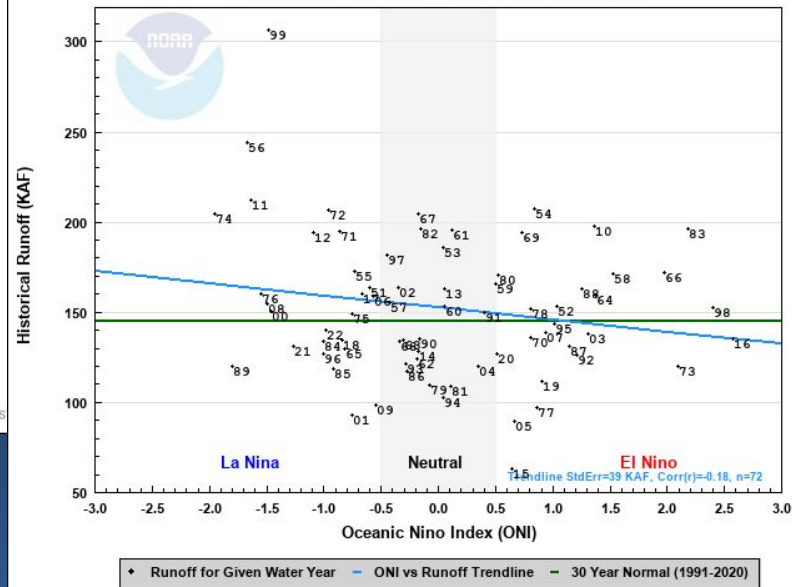
OCT-DEC Oceanic Niño Index vs APR-SEP Historical Natural Runoff
(MVEW1) SKAGIT - NEAR MT VERNON (1951-2022)



Latest Available ONI Index for OND:11/01/2021

Created: 11/17/2022 03:17 PS

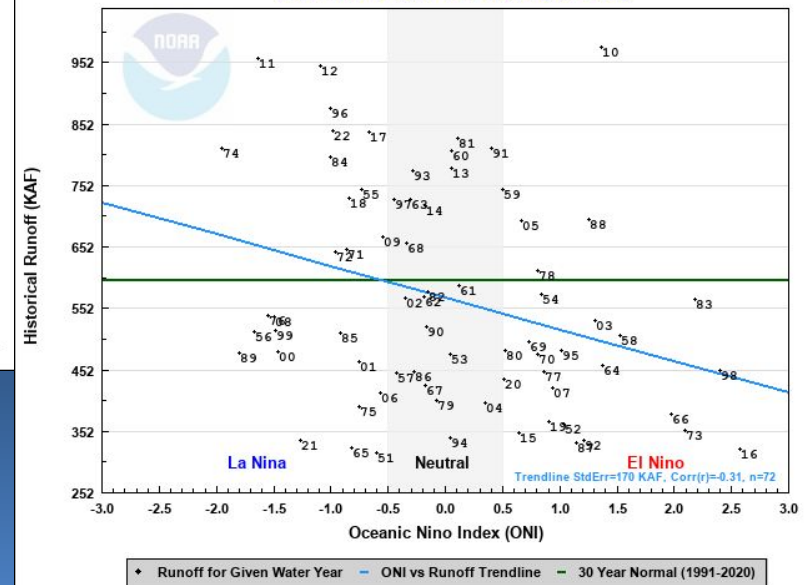
OCT-DEC Oceanic Niño Index vs APR-SEP Historical Natural Runoff
(DRSW1) DUNGENESS - NEAR SEQUIM (1951-2022)



Latest Available ONI Index for OND:11/01/2021

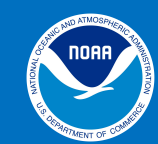
Created: 11/17/2022 03:25 PST

OCT-DEC Oceanic Niño Index vs APR-SEP Historical Natural Runoff
(CRPW1) CHEHALIS - AT PORTER (1951-2022)



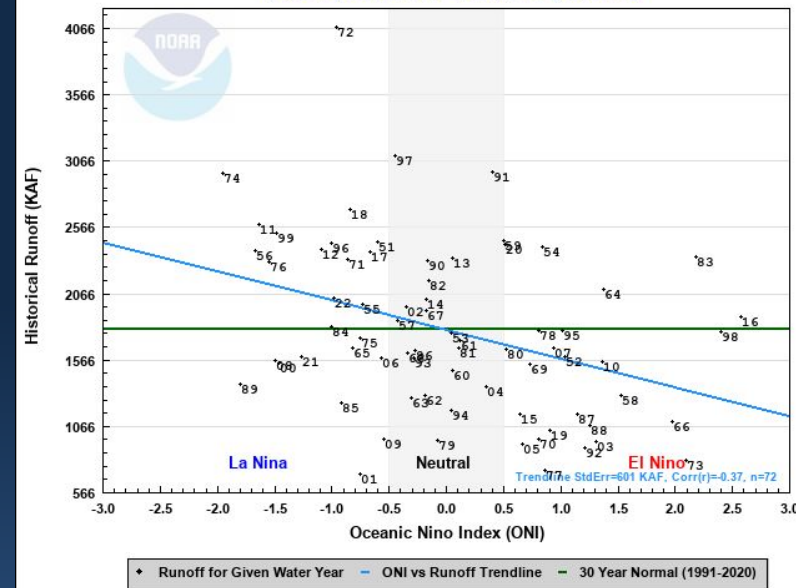
Latest Available ONI Index for OND:11/01/2021

Created: 11/17/2022 03:26 PST



Oceanic Niño Index vs Apr - Sep Runoff Volumes

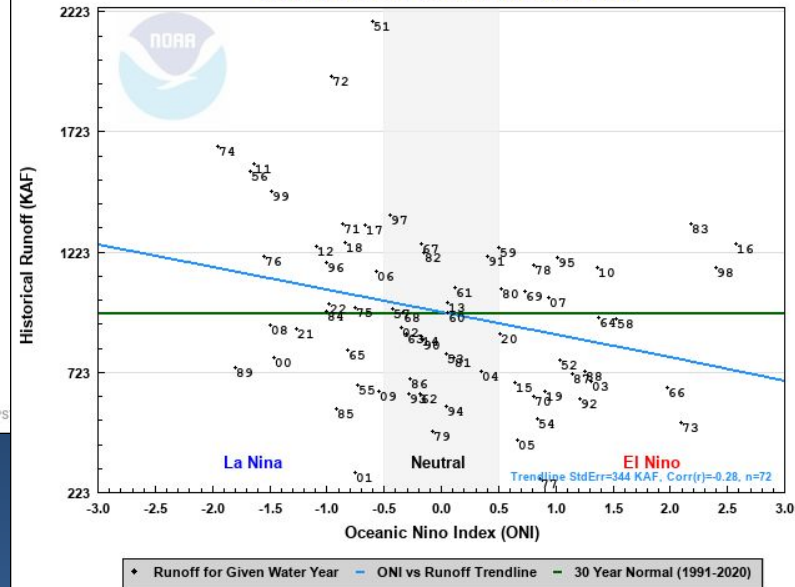
OCT-DEC Oceanic Nino Index vs APR-SEP Historical Natural Runoff
(OKMW1) OKANOGAN - AT MALOTT (1951-2022)



Latest Available ONI Index for OND:11/01/2021

Created: 11/17/2022 03:29 PST

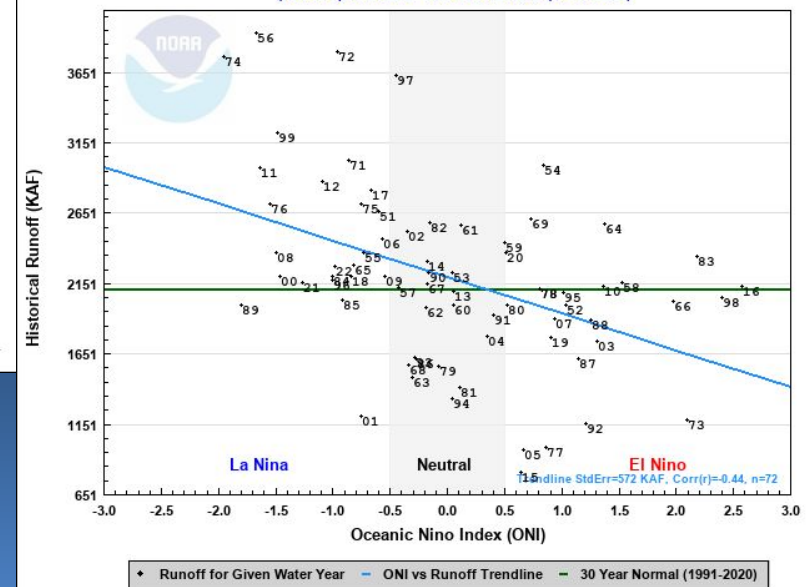
OCT-DEC Oceanic Nino Index vs APR-SEP Historical Natural Runoff
(PATW1) METHOW - NEAR PATEROS (1951-2022)



Latest Available ONI Index for OND:11/01/2021

Created: 11/17/2022 03:30 PST

OCT-DEC Oceanic Nino Index vs APR-SEP Historical Natural Runoff
(PARW1) YAKIMA - NEAR PARKER (1951-2022)



Latest Available ONI Index for OND:11/01/2021

Created: 11/17/2022 03:31 PST



Monthly Water Supply Briefings

WY2023 Schedule for Live Water Supply Briefings

Jan	Feb	Mar	Apr	May
5	2	2	6	4

All presentations held at 10:00 am PST/PDT unless noted otherwise

https://www.nwrfc.noaa.gov/water_supply/ws_schd.cgi?version=20190204v1

NWRFC.watersupply@noaa.gov