

Washington Water Supply Availability Committee
Hosted by Jeff Marti

<https://watech.webex.com/watech/j.php?MTID=m35f37cc2f338fb71534395a866a79c2b>

Friday, Dec 3, 2021 10:00 am | 2 hours | (UTC-08:00) Pacific
Time (US & Canada)

Meeting number: 2453 974 2248

Password: thinkSnow2022

Agenda: The Washington Water Supply Availability Committee
meets periodically to monitor water supply conditions and
forecasts.

Join by video system

Dial 24539742248@webex.com

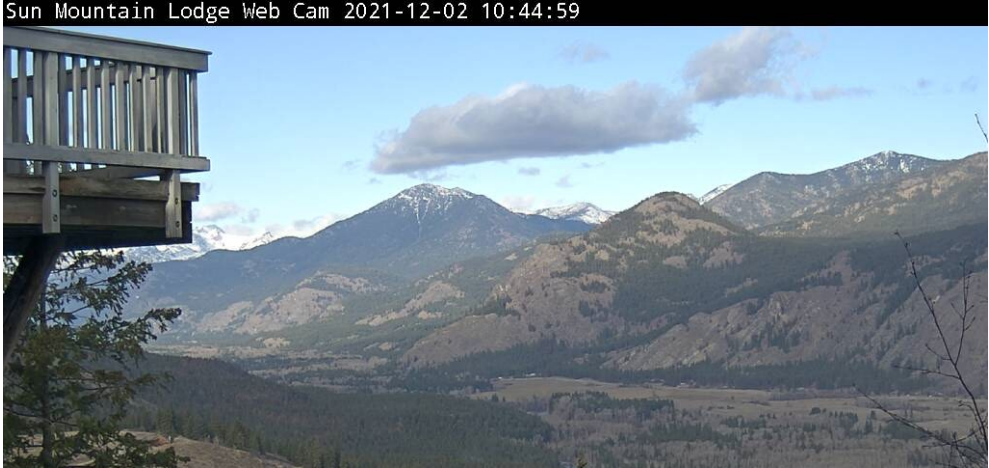
You can also dial 173.243.2.68 and enter your meeting number.

Water Supply Availability Committee
+1-415-655-0001 US Toll
+1-206-207-1700 United States Toll (Seattle)
Access code: 245 397 42248

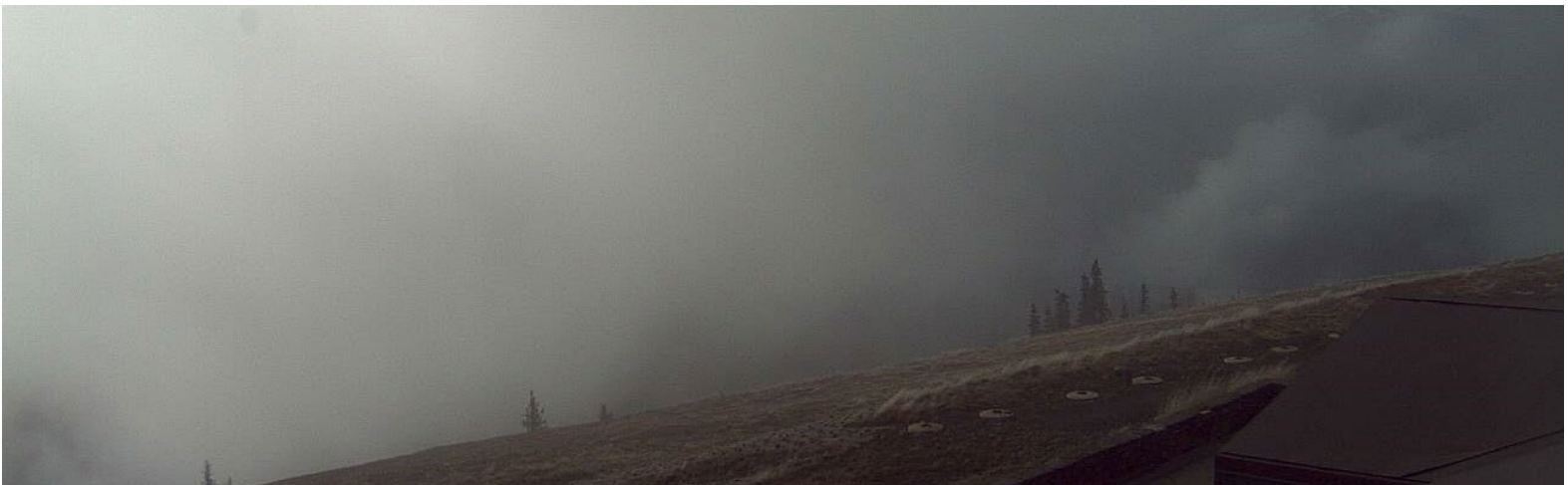
Friday December 3, 2021				
Start Time	End Time	Duration, min	Description	Presenter
10:00	10:15	15	Welcome & Introductions	Jeff Marti
10:15	10:30	15	Mountain Report	Scott Pattee, NRC
10:30	10:45	15	Regional Climate Perspective Recent precipitation and temperature Seasonal Forecasts/ENSO	Karin Bumbaco/Nick Bond, OWSC
10:45	10:55	10	Streamflow Conditions	Nick Sutfin, USGS
10:55	11:05	10	Streamflow Forecasting	Amy Burke, NWRFC
11:05	11:30	25	Continuing status of Drought Declaration Reports from other water managers	
	Total	1.50		
			NEXT MEETING: FRIDAY JANUARY 14TH	



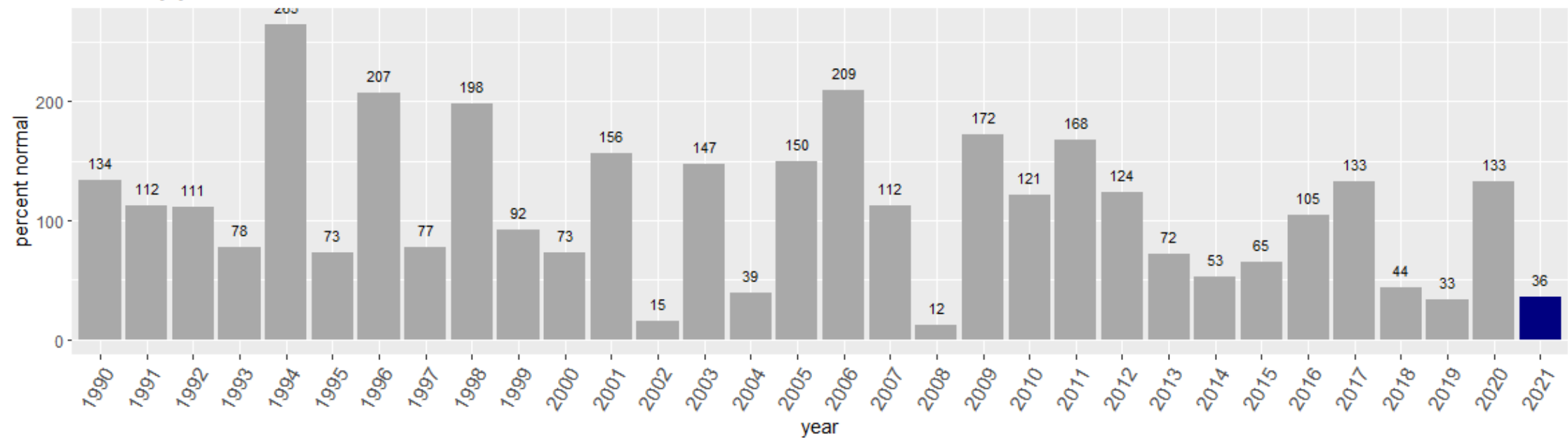
Park | Paradise | Henry M. Jackson Visitor Center | 12/02/2021 11:05:43 AM



Loup Loup Top Chair 2021-12-02 11:14:02

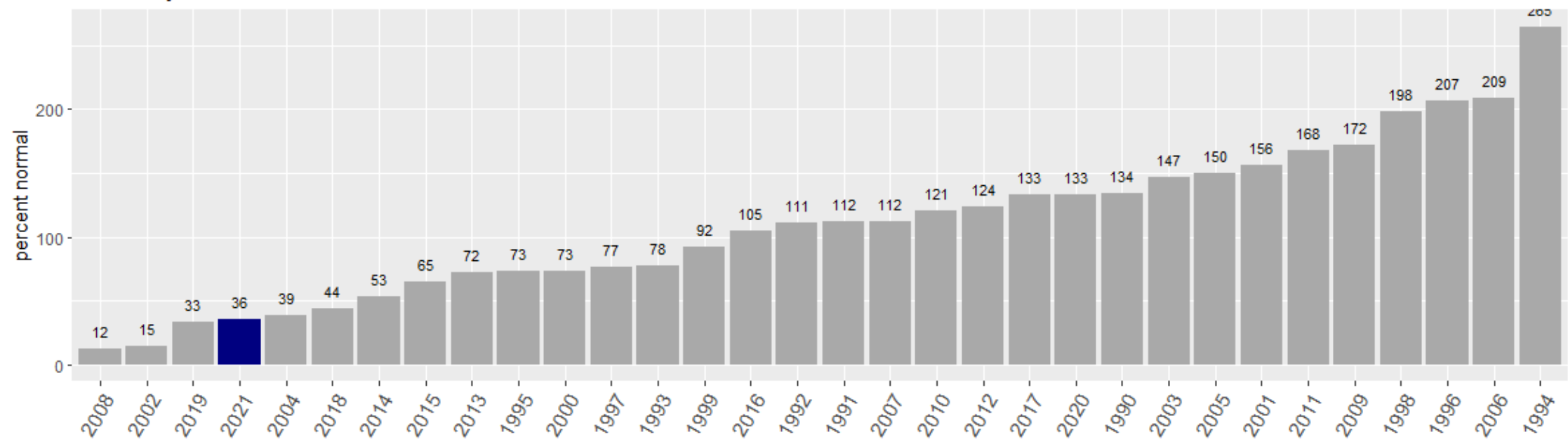


Washington statewide average Snow Water Equivalent on December 03 compared to previous years
sorted by year

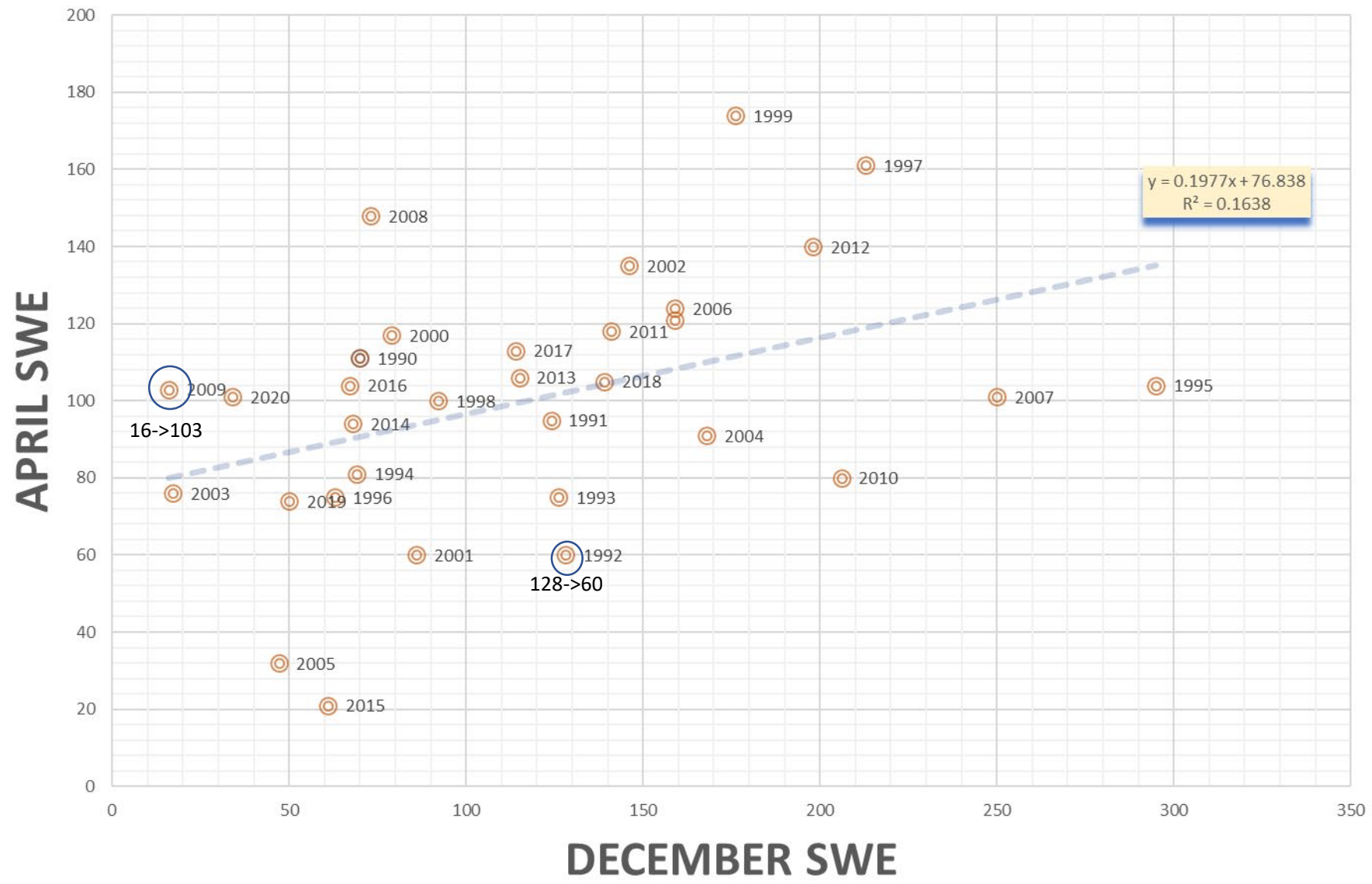


NRCS data

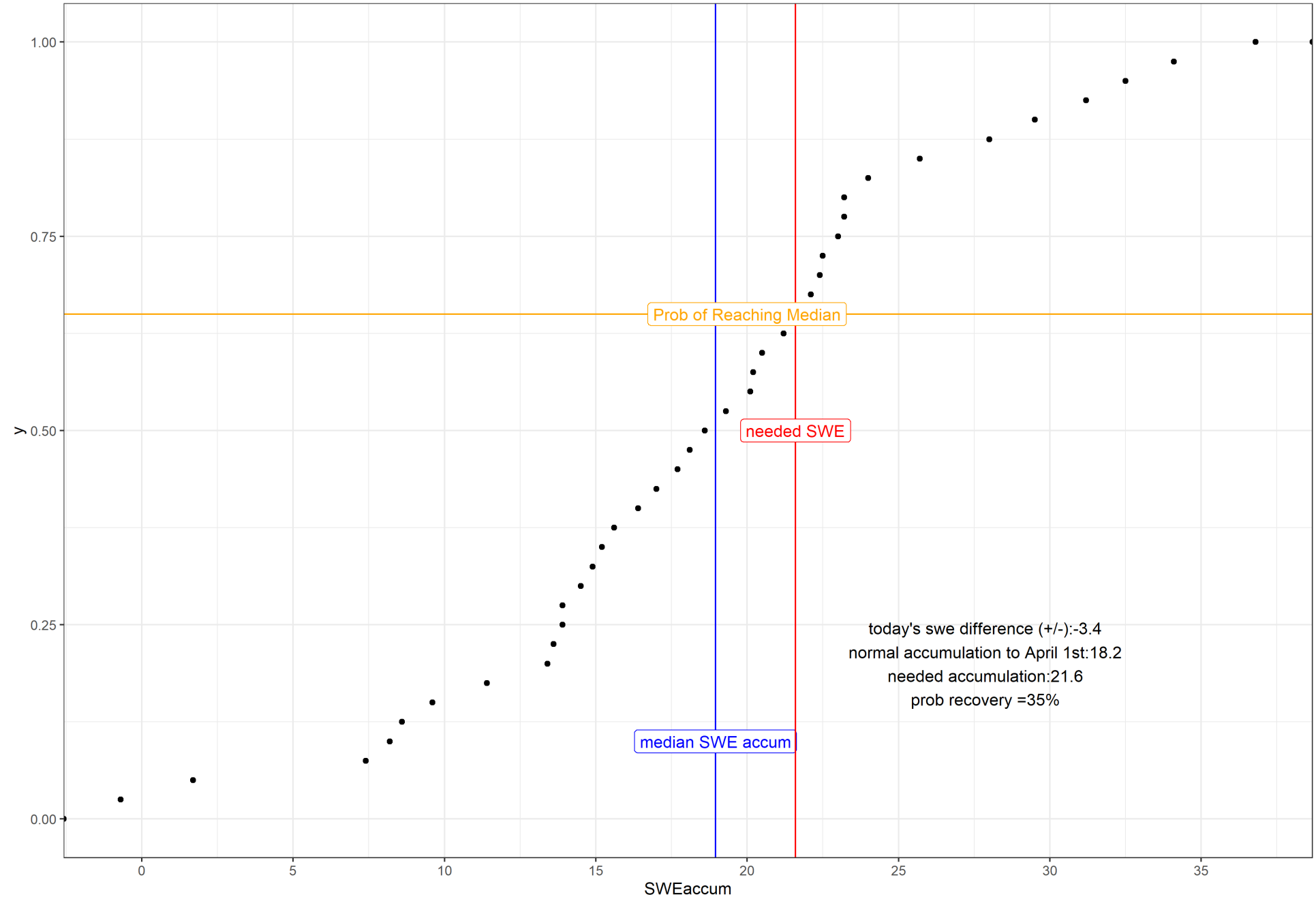
ranked by SWE



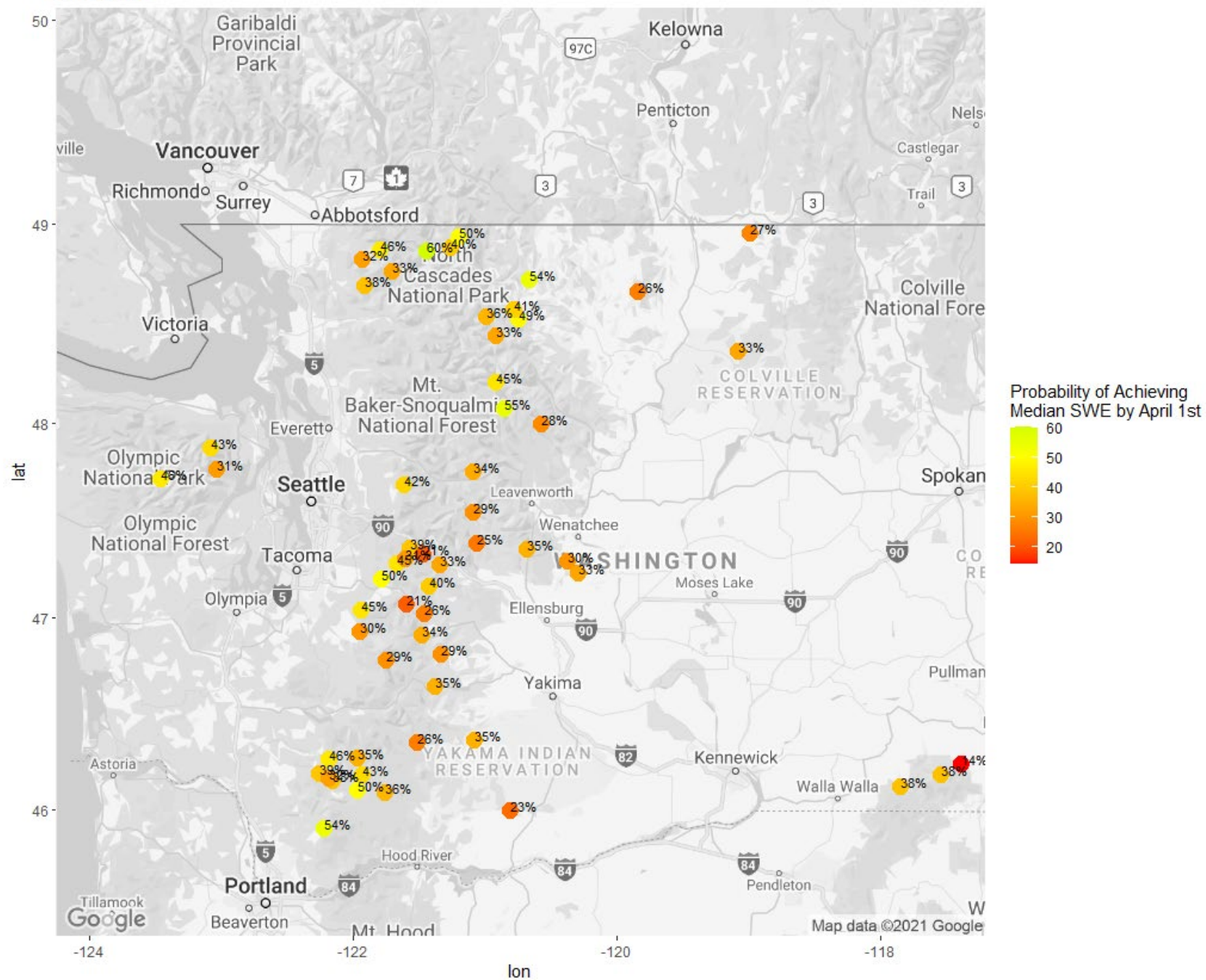
1990-2020 April vs December Statewide SWE (1991-2020 Normals)



Probability of SWE Recovery to Median by April 1
White Pass E.S. Site ID 863 Dec-2 thru Apr-1

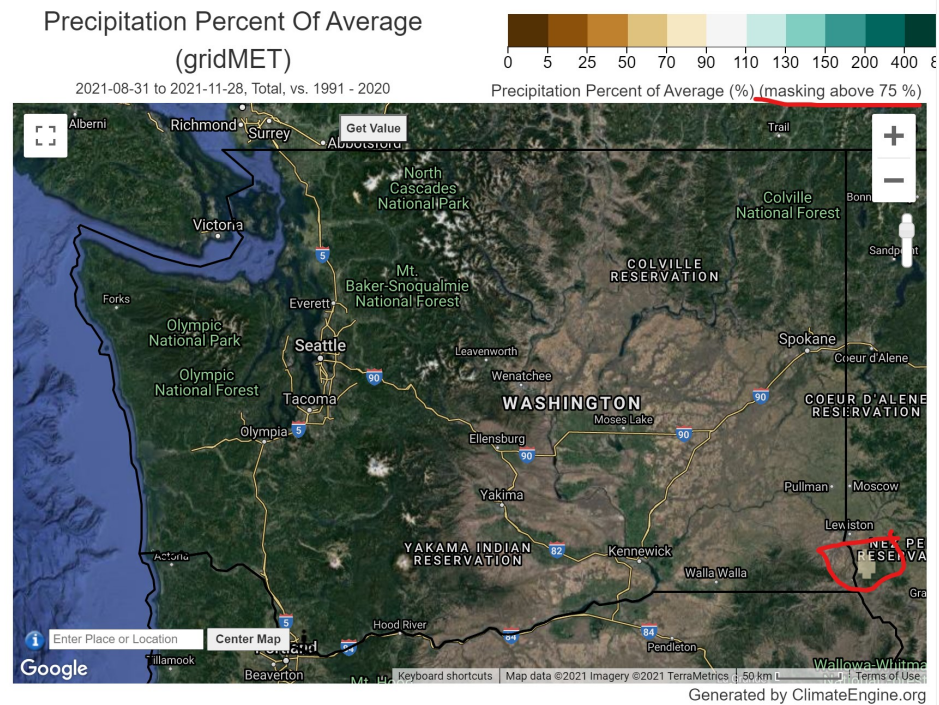


2021-12-02

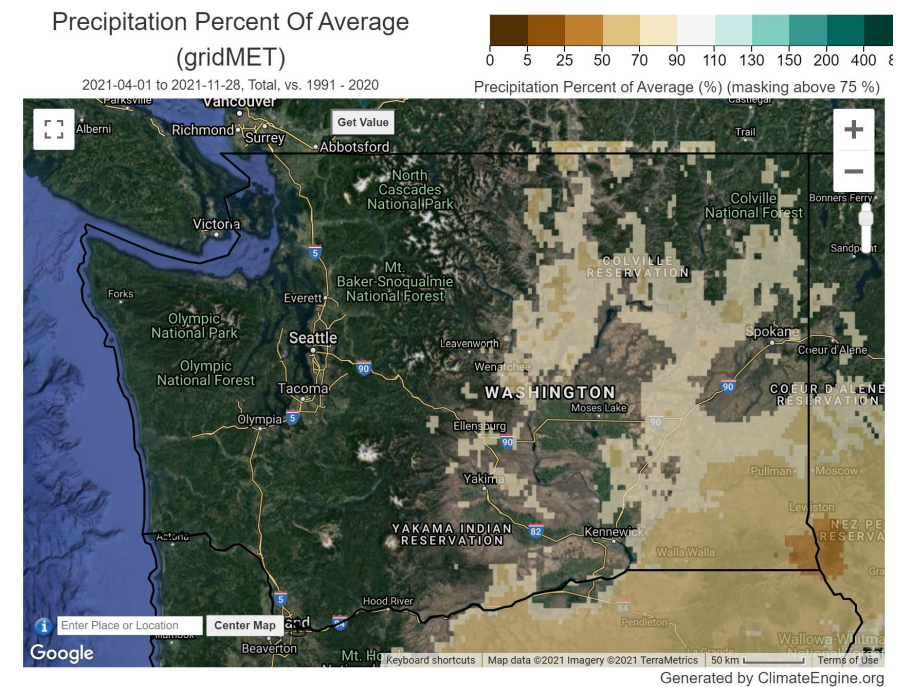


Where has precipitation been less than 75 percent of normal?

Last 90 Days



Since April 1st



Washington Drought Declaration Areas



Upcoming Event

December 13

Pacific Northwest DEWS December Drought & Climate Outlook

This webinar will feature recent and current conditions, outlooks, as well as presentations on a "Smoke Ready Community" and "An Analysis of the Impact of Drought on Agriculture, Local Economies, Public Health, and Crime Across the Western United States."

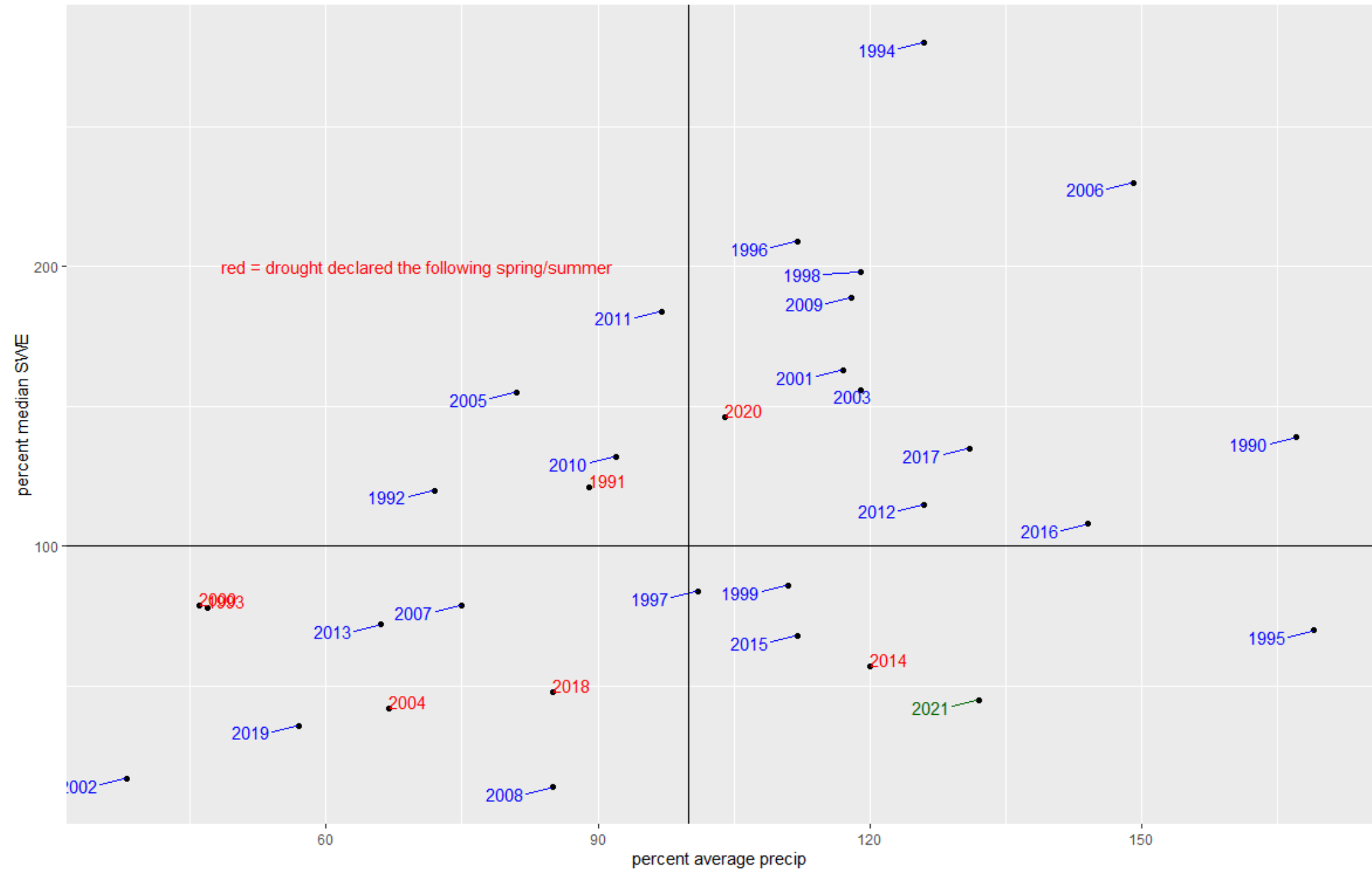
These webinars provide the region's stakeholders and interested parties with timely information on current and developing drought conditions, as well as climatic events like El Niño and La Niña. Speakers will also discuss the impacts of these conditions on things such as wildfires, floods, disruption to water supply and ecosystems, as well as impacts to affected industries like agriculture, tourism, and public health.

<https://www.drought.gov/events/pacific-northwest-dews-december-drought-climate-outlook>

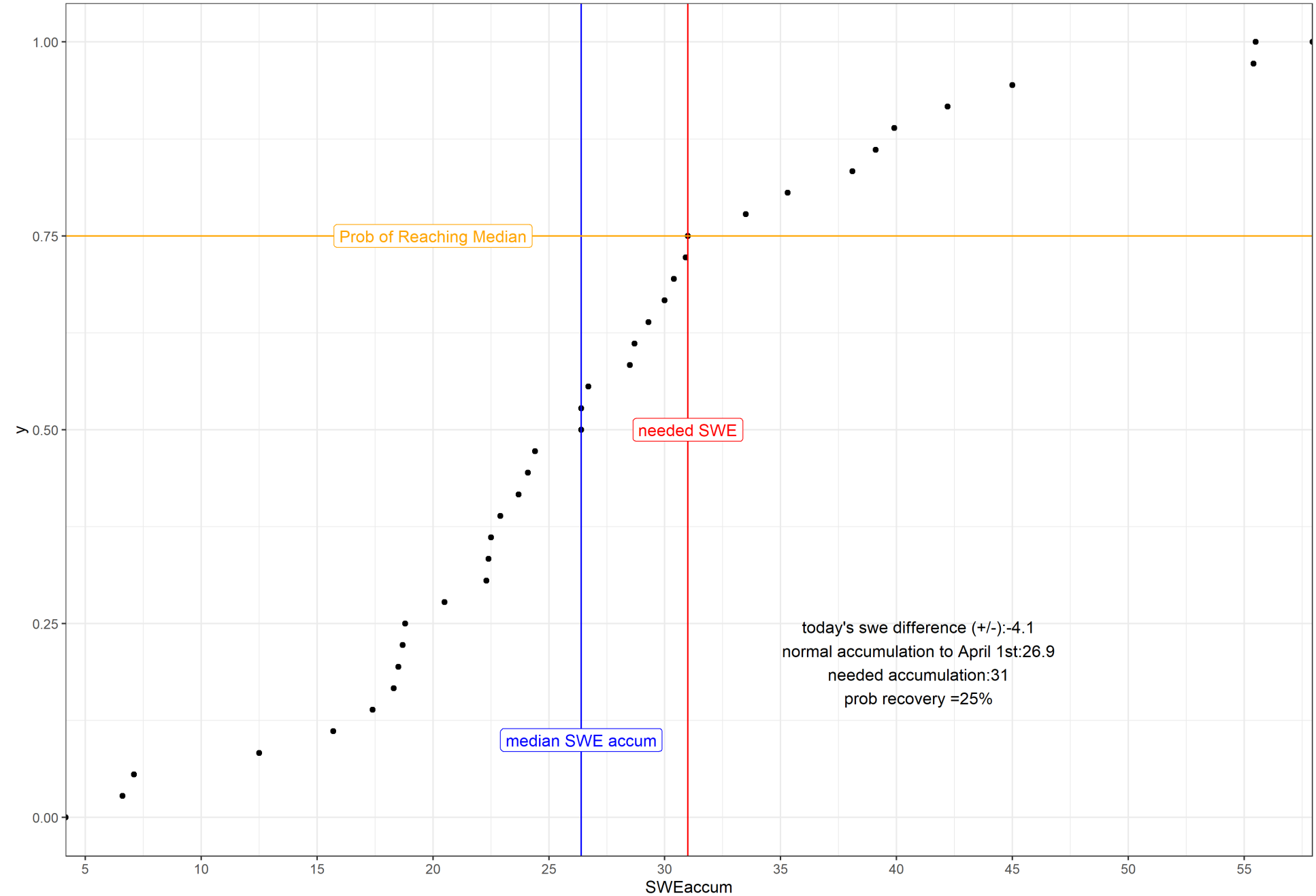


Mount Rainier National Park | Paradise | Henry M. Jackson Visitor Center | 12/03/2021 09:00:43 AM

statewide SWE vs accumulated precipitation since Oct 1
day of year December 02



Probability of SWE Recovery to Median by April 1
Sasse Ridge Site ID 734 Dec-2 thru Apr-1



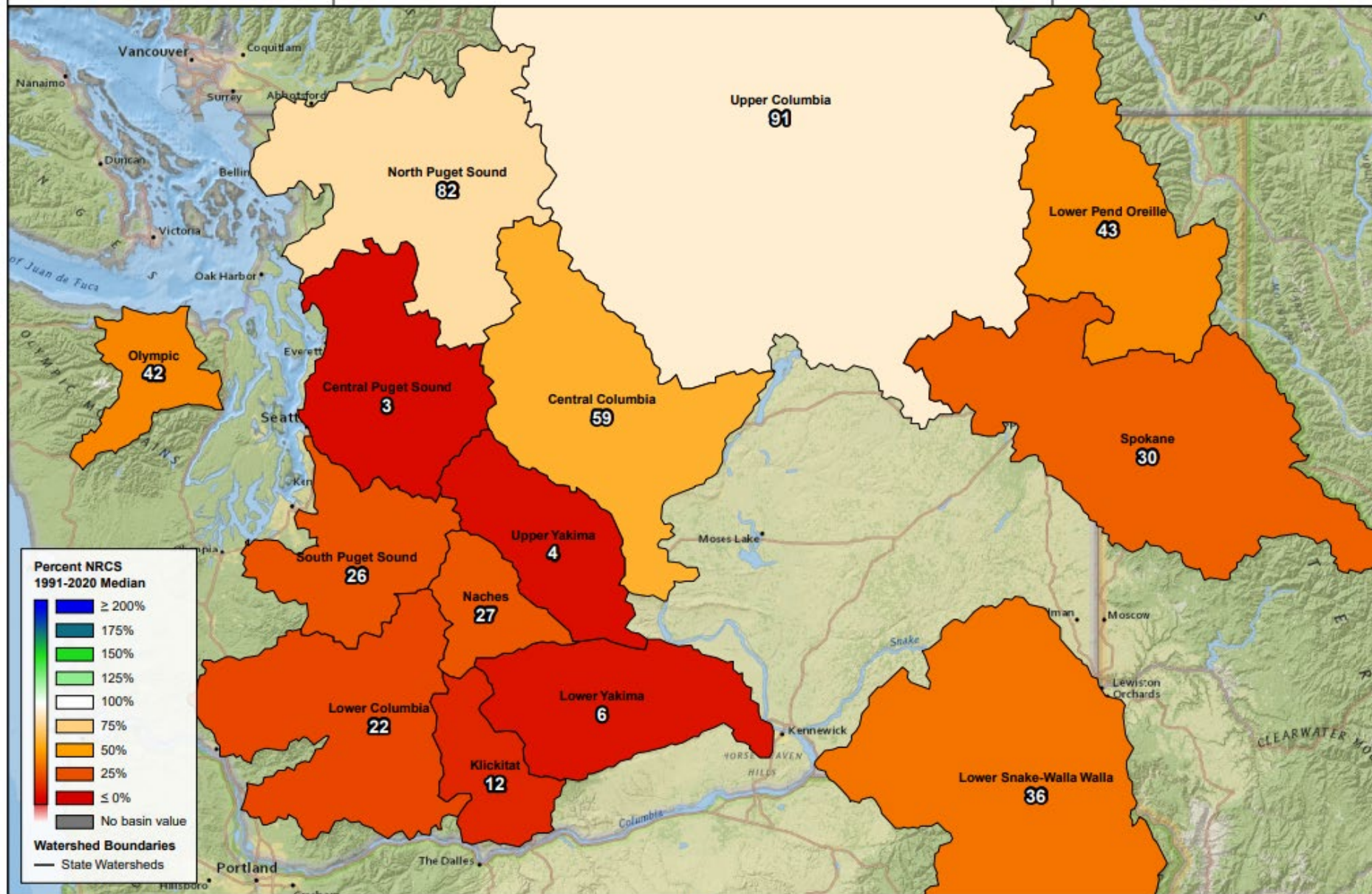
Touchet SNOTEL 10/13/2021



Snow Water Equivalent

Percent NRCS 1991-2020 Median

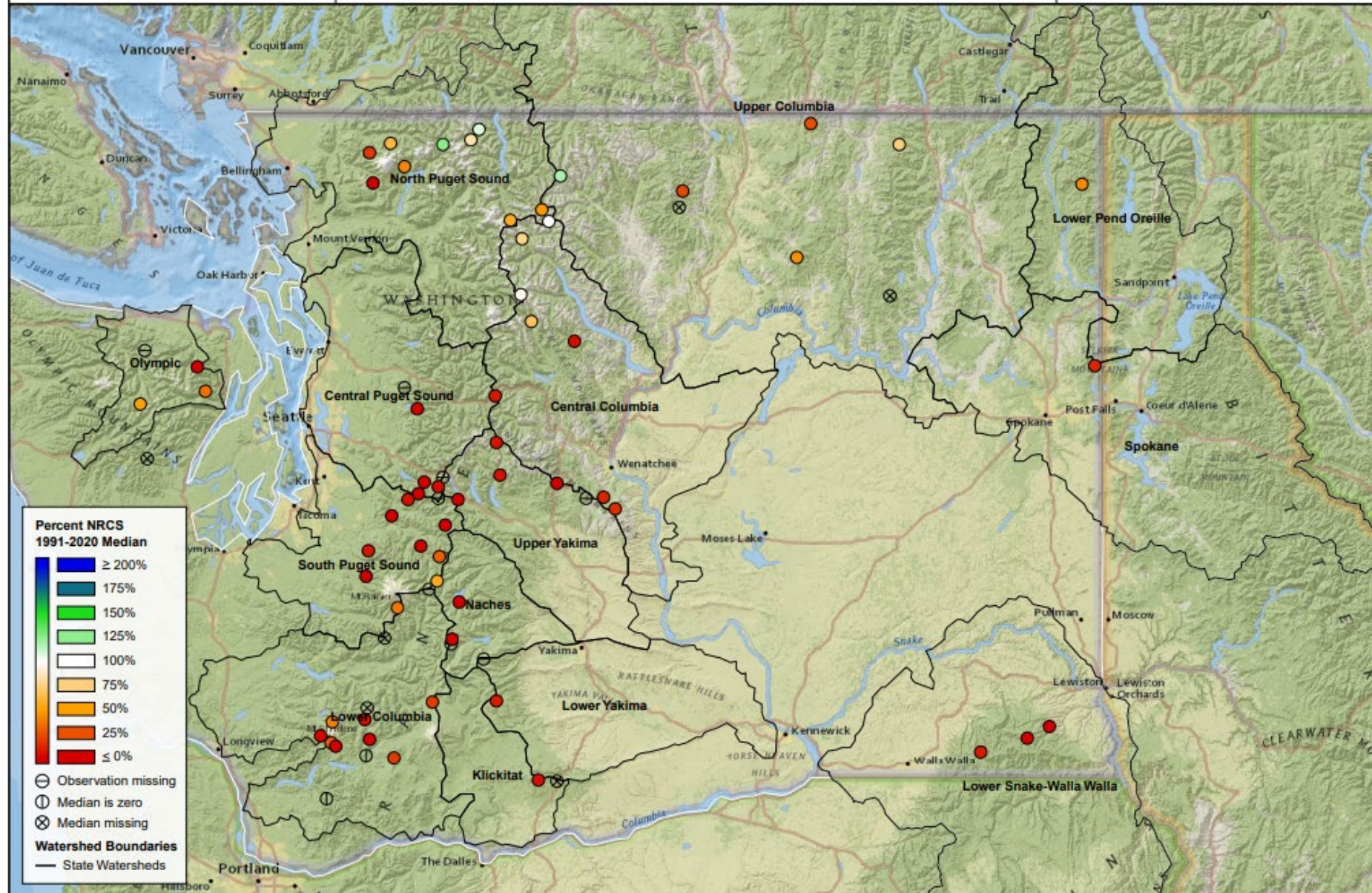
December 2, 2021, first of day



Snow Water Equivalent

Percent NRCS 1991-2020 Median

December 2, 2021, first of day



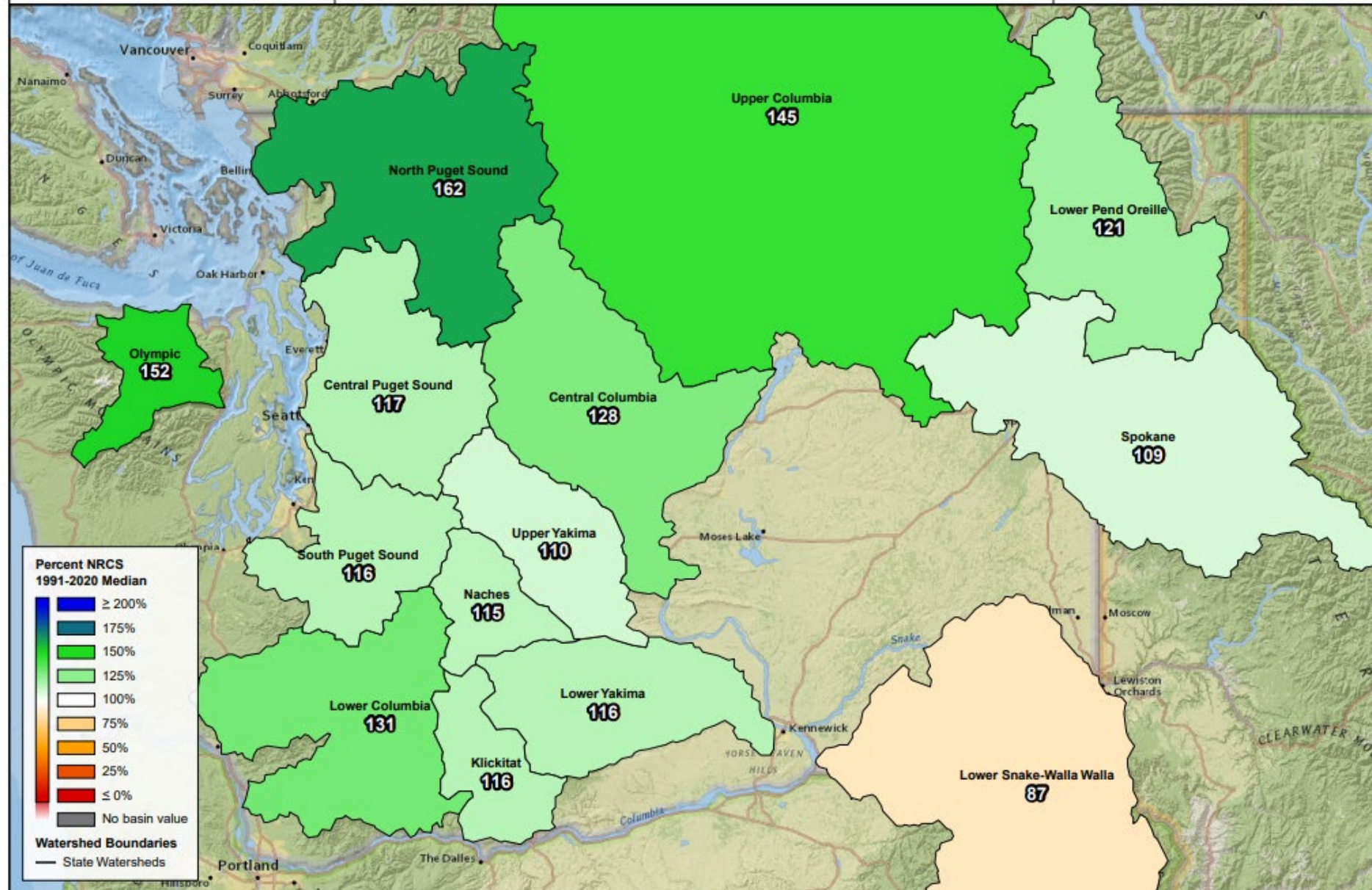


PRECIPITATION

Water Year to Date Precipitation

Percent NRCS 1991-2020 Median

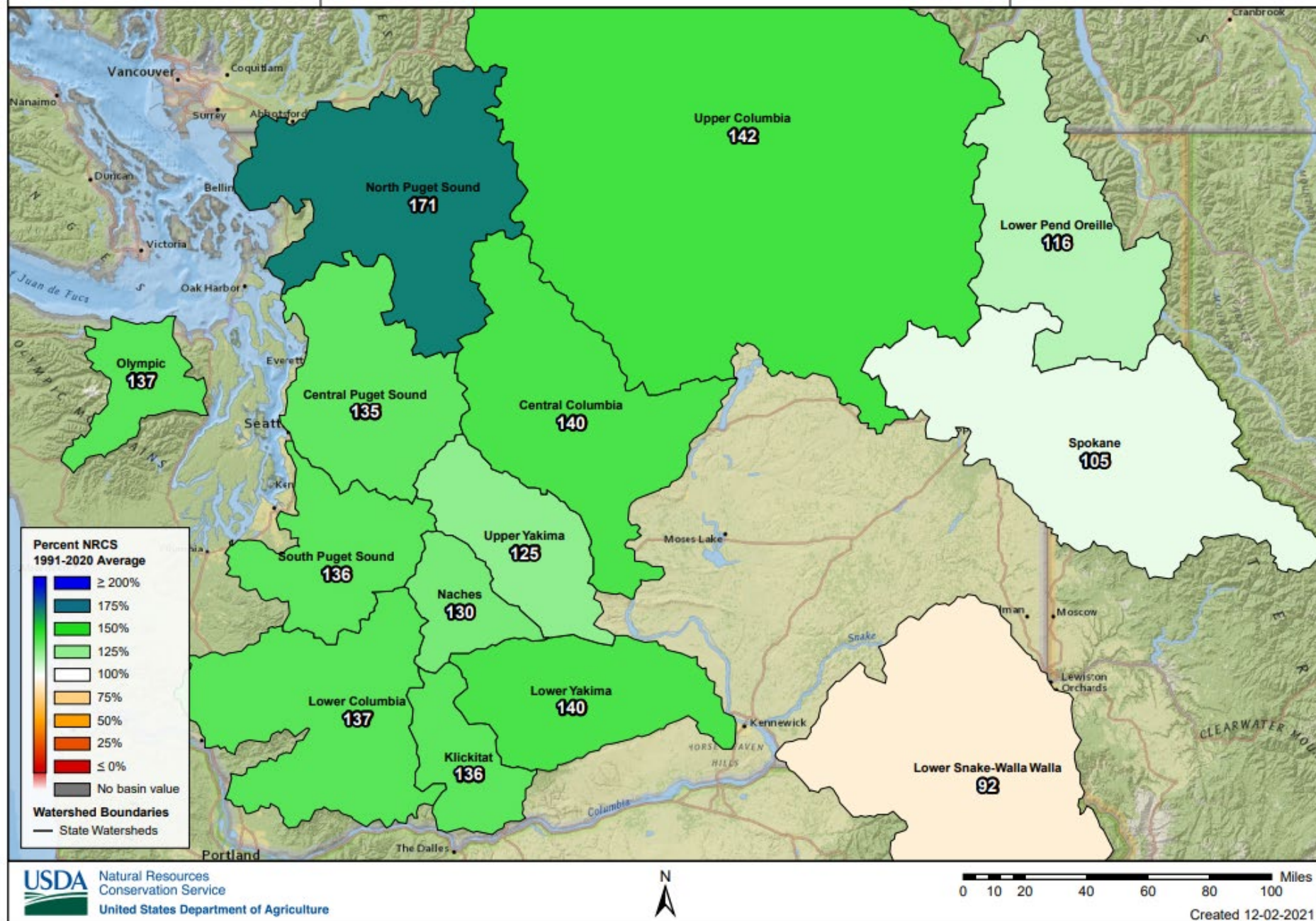
October 1, 2021 - December 1, 2021



30 day Precipitation

Percent NRCS 1991-2020 Average

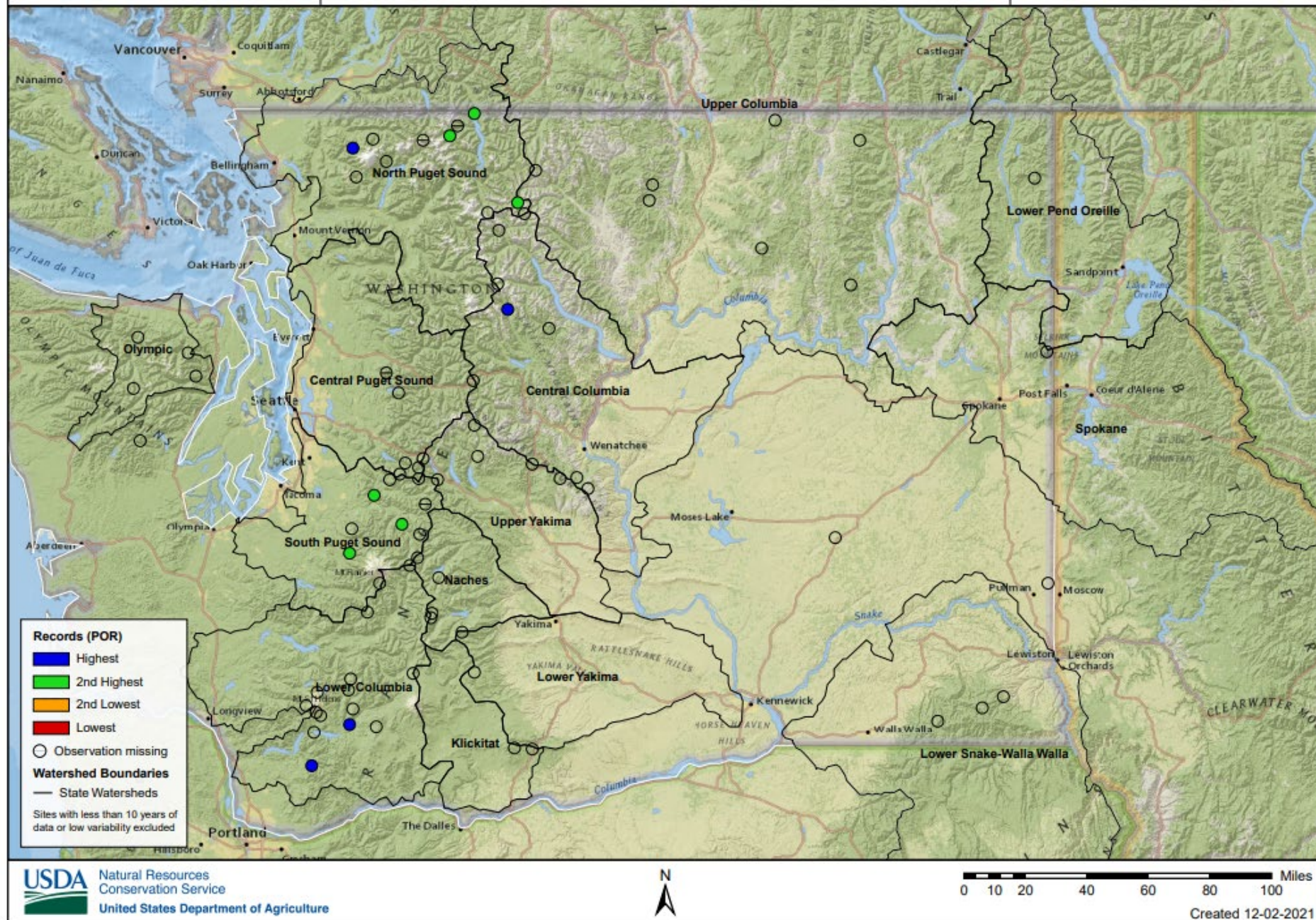
November 1, 2021 -
November 30, 2021



30 day Precipitation

Records (POR)

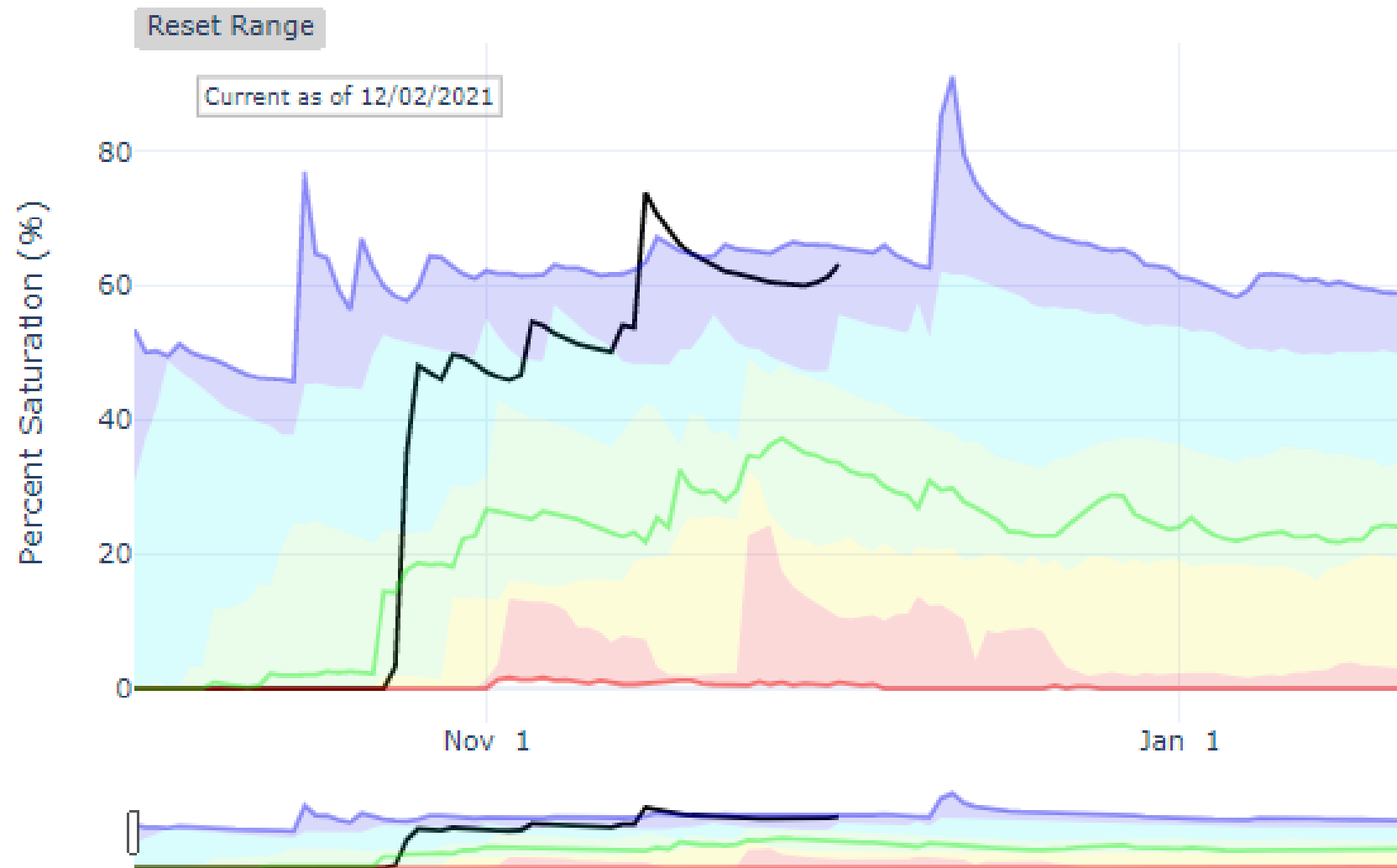
November 1, 2021 -
November 30, 2021





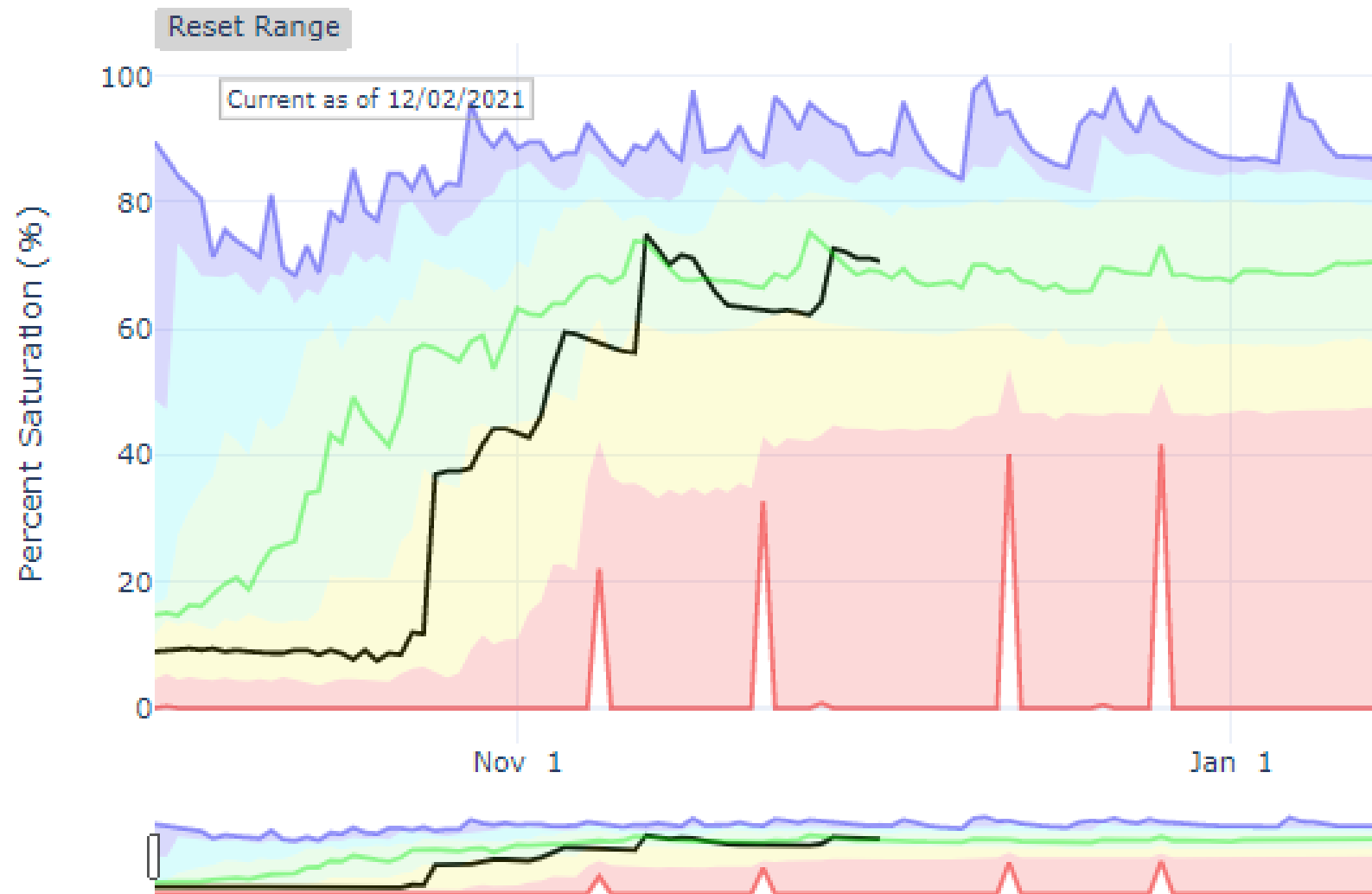
BASIN SOIL MOISTURE

DEPTH AVERAGED SOIL SATURATION IN CONCULLY LAKE



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: [30-Year Hydroclimatic Normals](#)

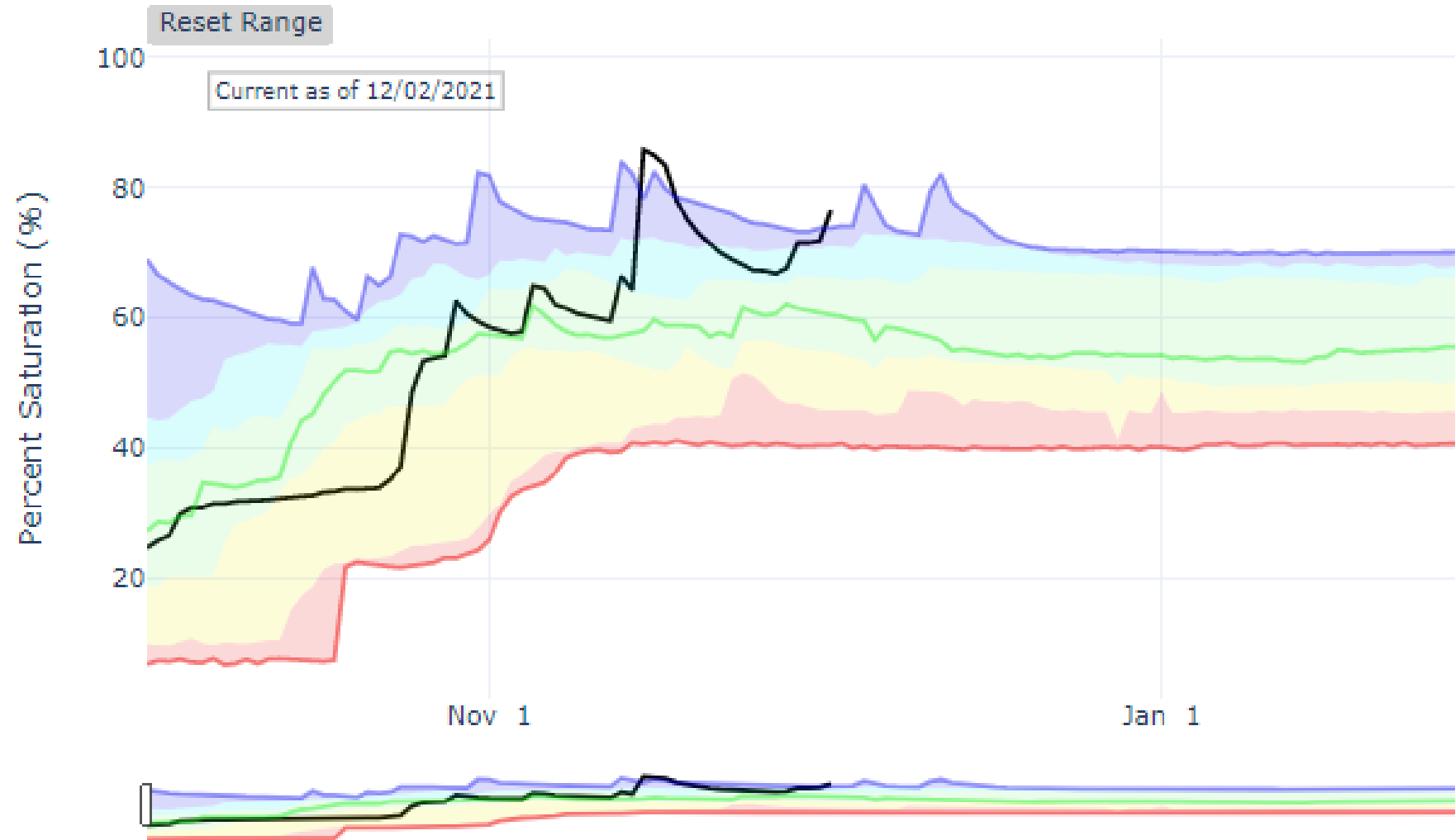
DEPTH AVERAGED SOIL SATURATION IN COLCKUM



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.

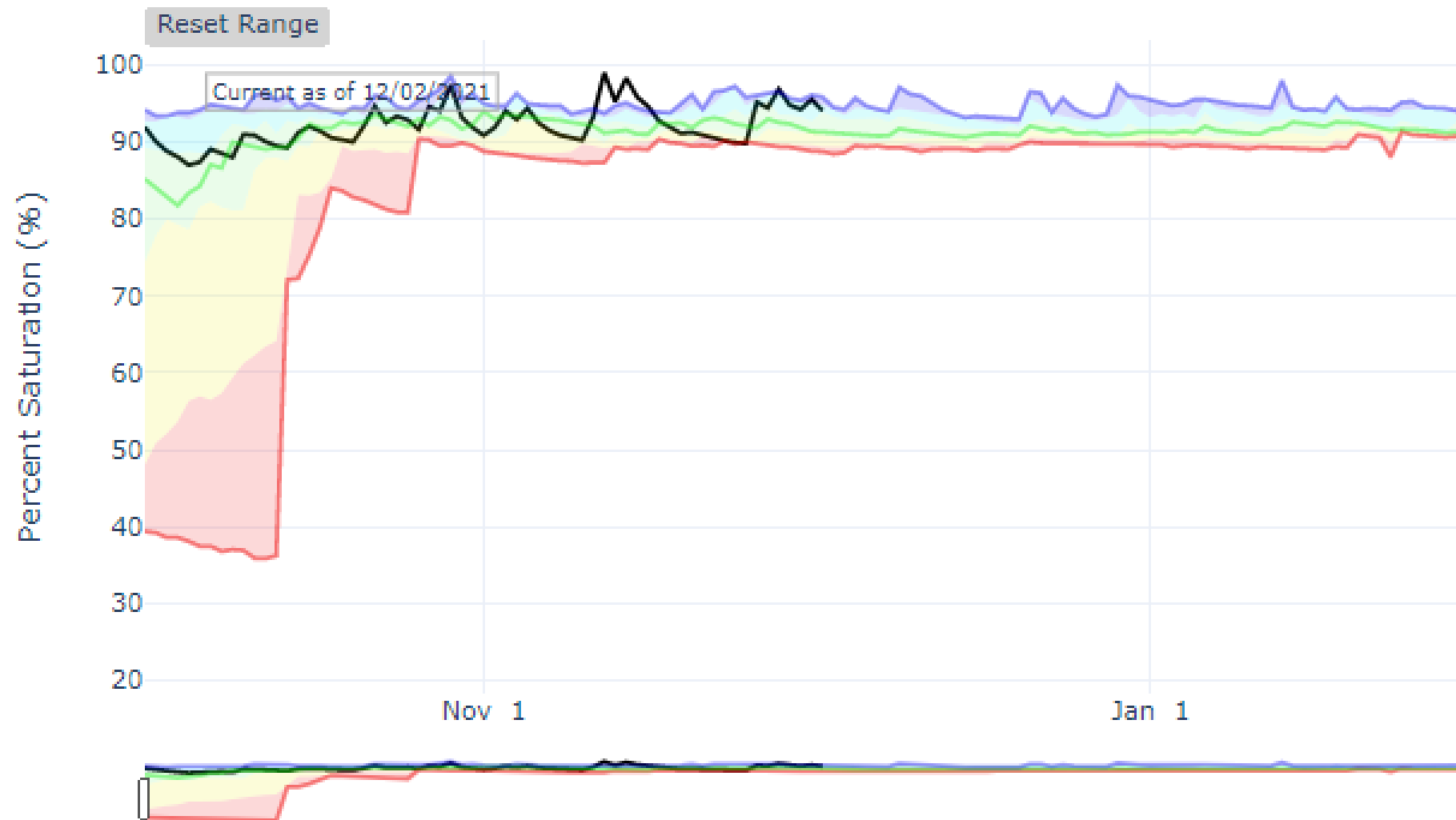
For more information visit: [30-Year Hydroclimatic Normals](#)

DEPTH AVERAGED SOIL SATURATION IN METHOW



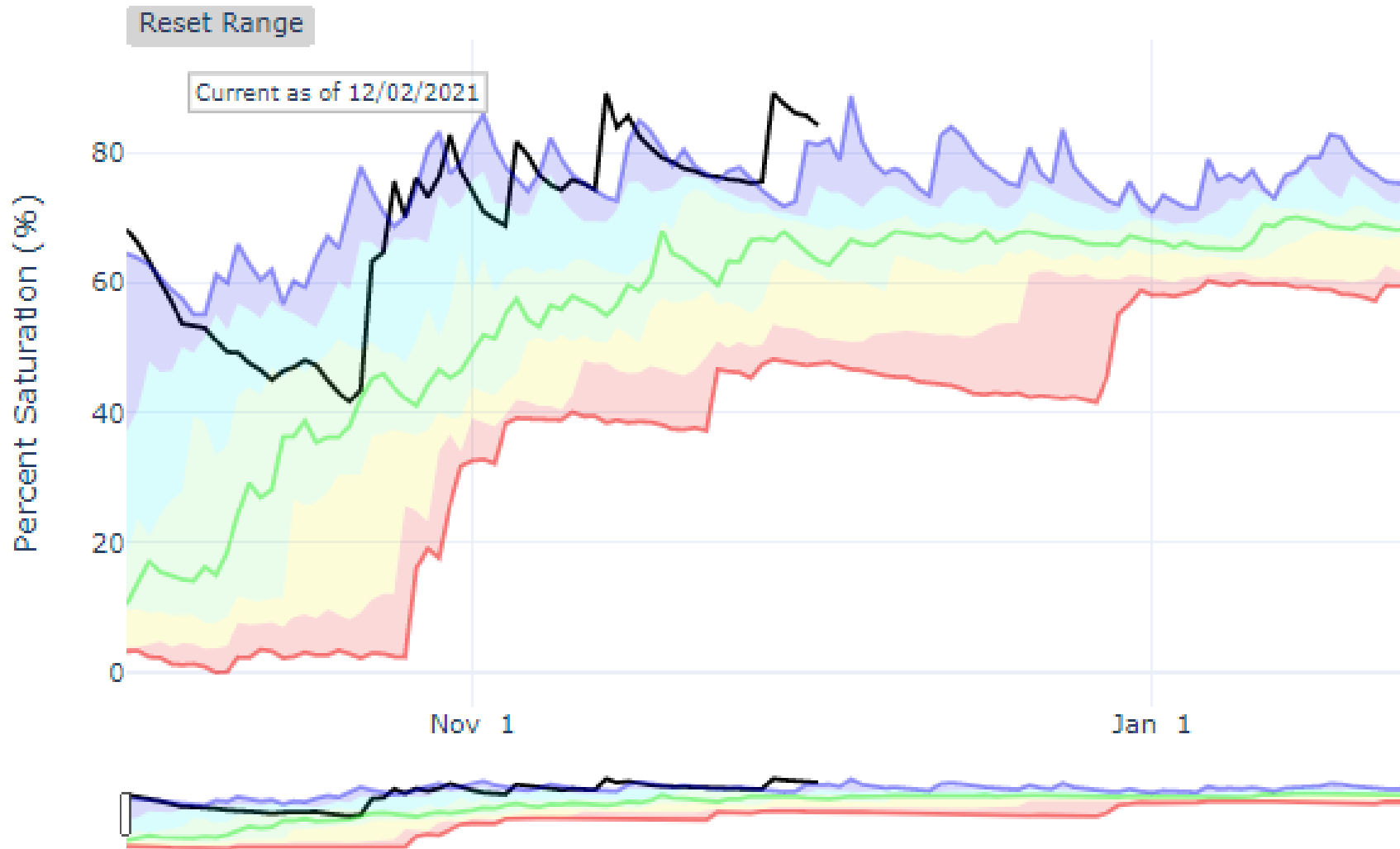
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: [30-Year Hydroclimatic Normals](#)

DEPTH AVERAGED SOIL SATURATION IN COWLITZ



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: [30-Year Hydroclimatic Normals](#)

DEPTH AVERAGED SOIL SATURATION IN NEWMAN LAKE



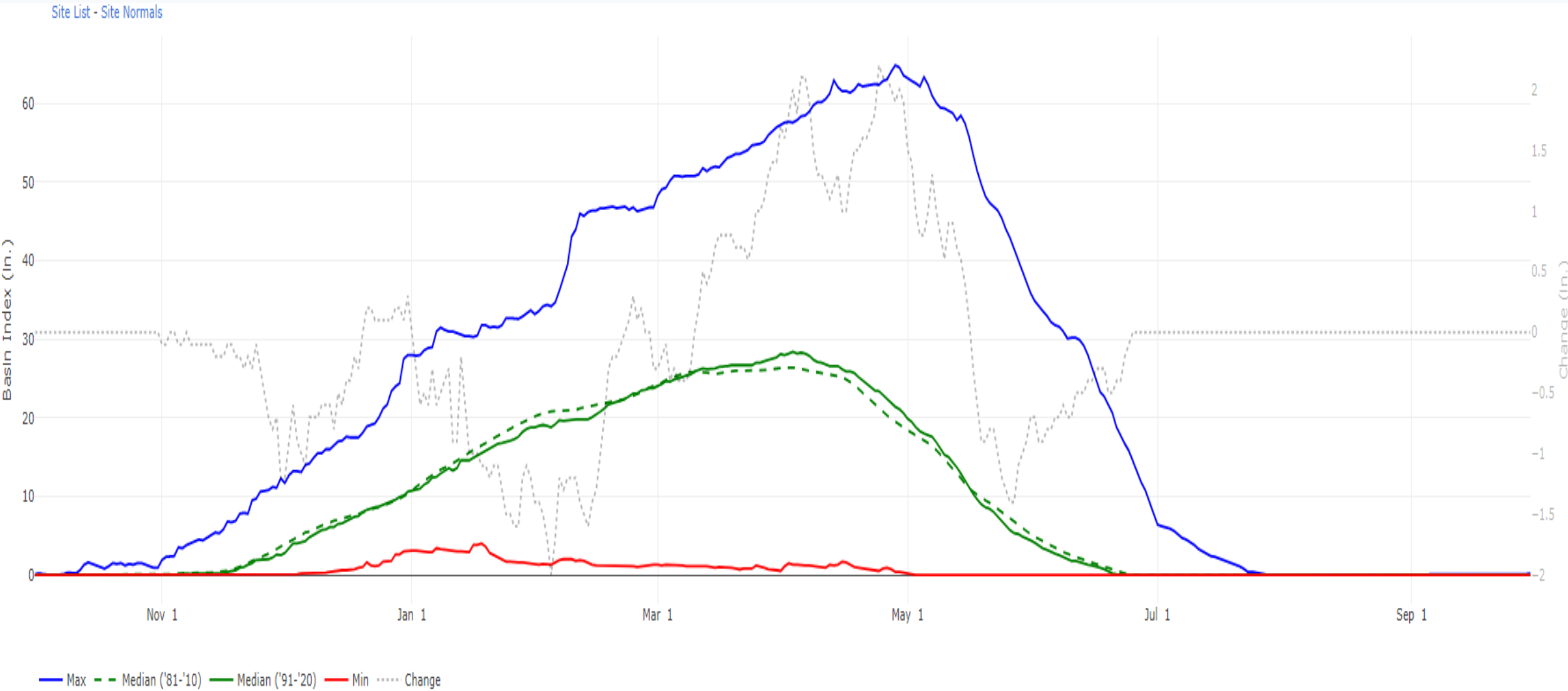
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: [30-Year Hydroclimatic Normals](#)



1991-2020 Averages/Medians

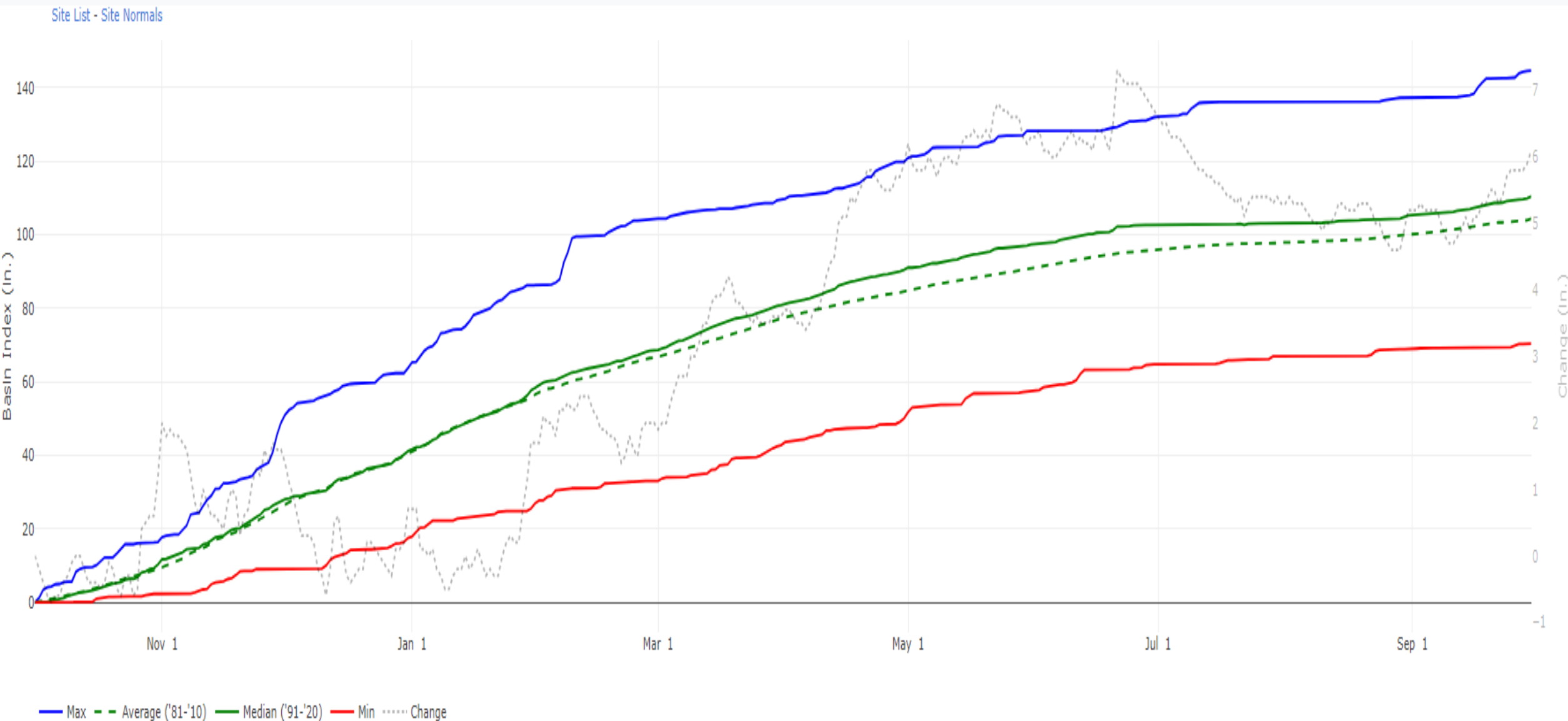
CEDAR

Snow Water Equivalent Normals Comparison

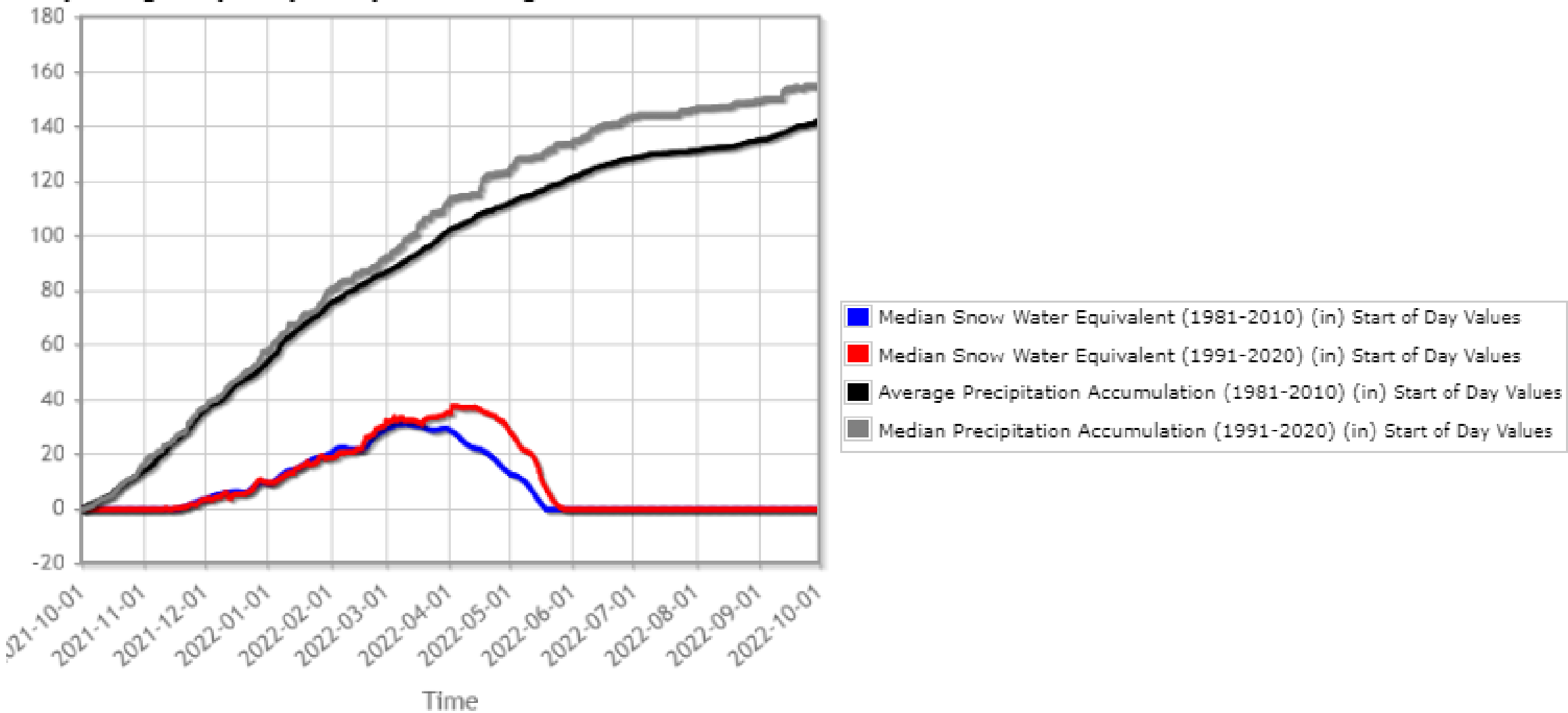


CEDAR

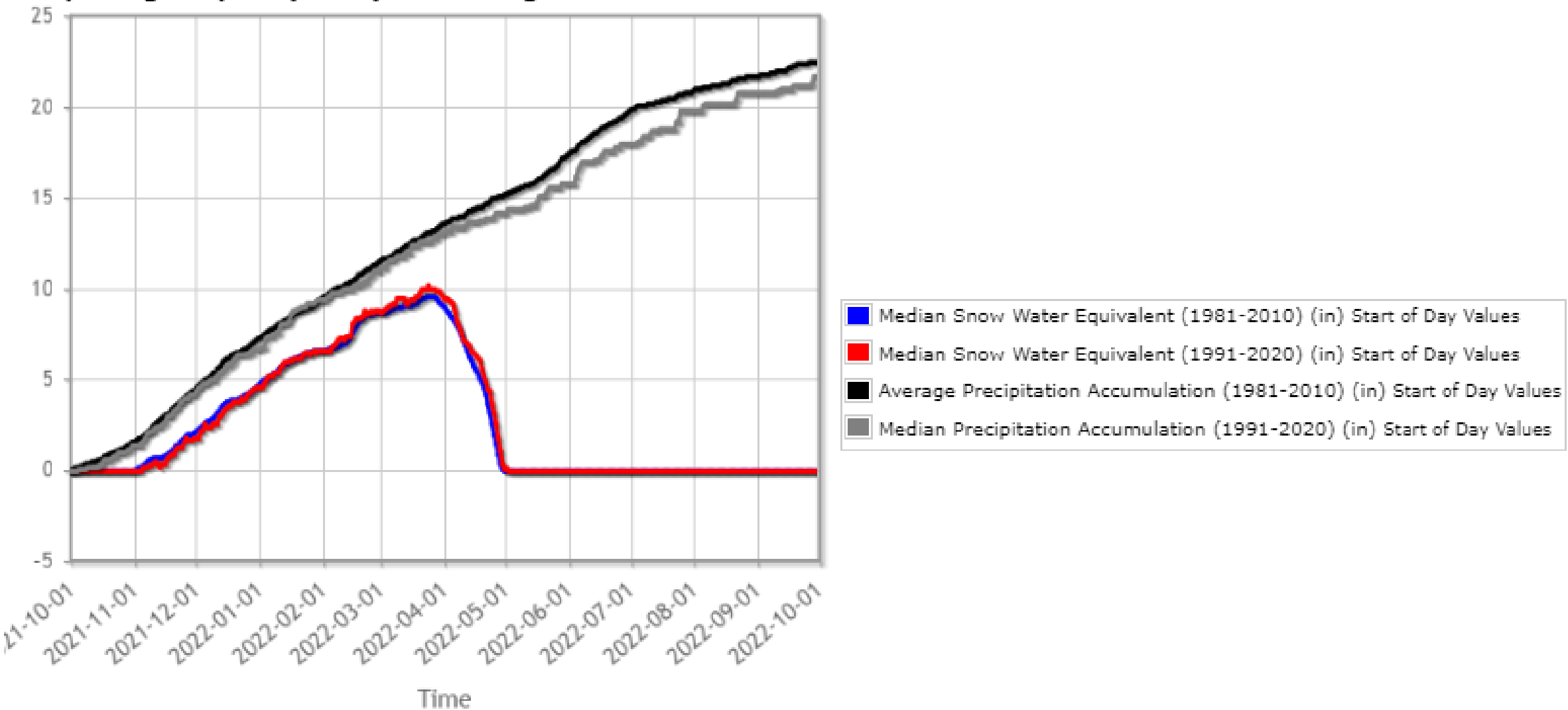
Precipitation Normals Comparison



Skookum Creek (912) Washington SNOTEL Site - 3310 ft
Reporting Frequency: Daily; Date Range: 2021-10-01 to 2022-09-30

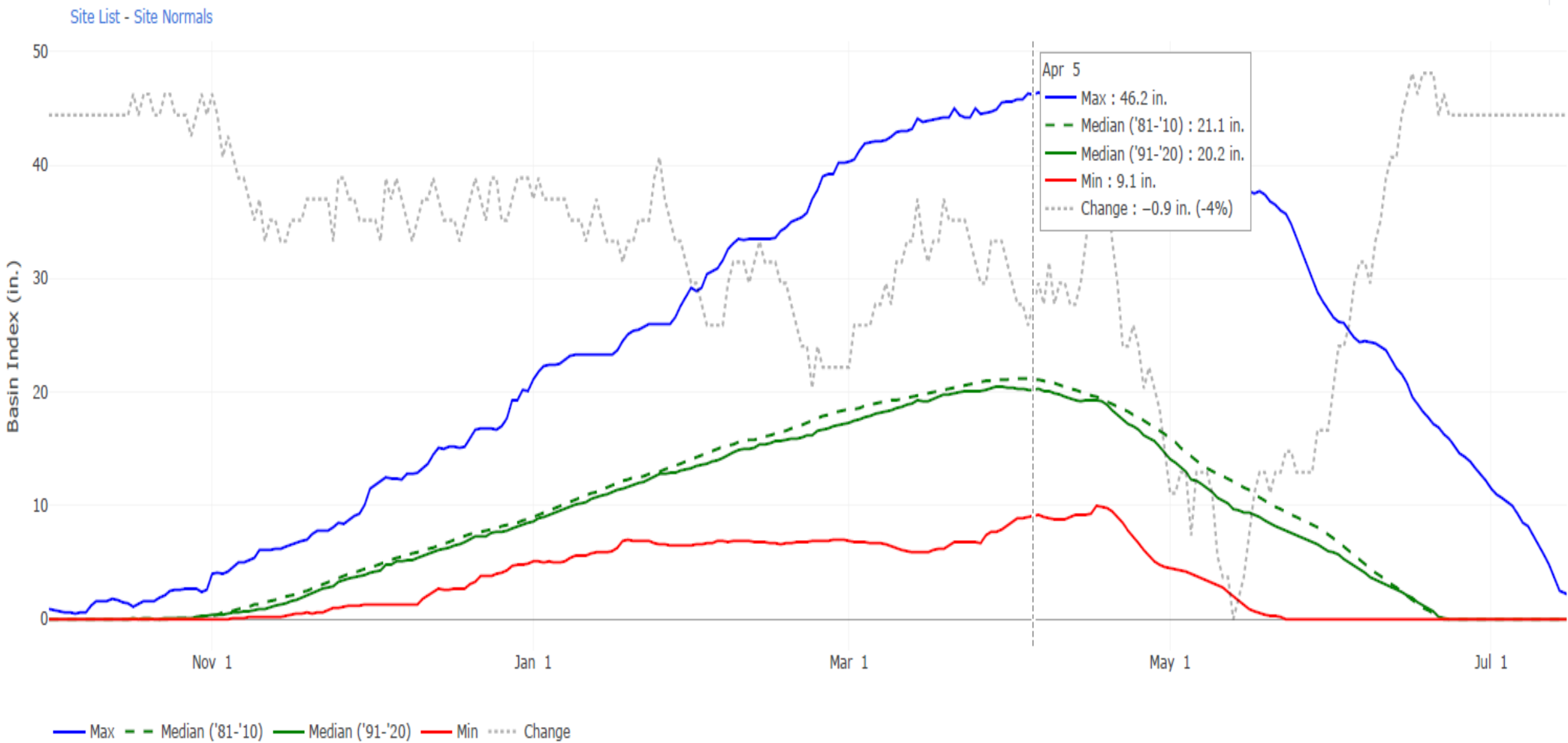


Salmon Meadows (728) Washington SNOTEL Site - 4460 ft
Reporting Frequency: Daily; Date Range: 2021-10-01 to 2022-09-30



UPPER COLUMBIA

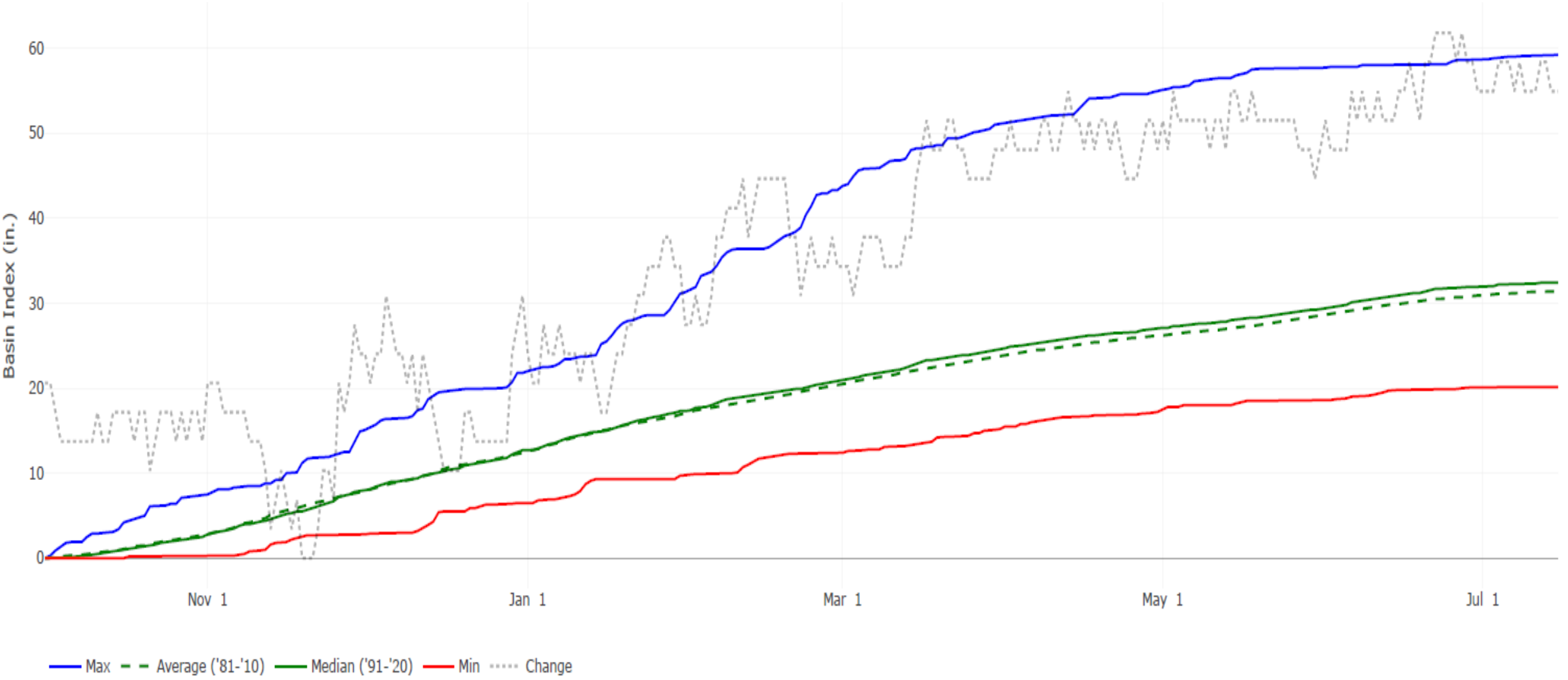
Snow Water Equivalent Normals Comparison



UPPER COLUMBIA

Precipitation Normals Comparison

Site List - Site Normals



A shift in normals may occur for several reasons including:

- 1) change in underlying data due to different 30-year reference periods
- 2) change in calculation methods
- 3) change in number of stations with official normals
- 4) change in monitoring site conditions.



Office of the Washington State Climatologist



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

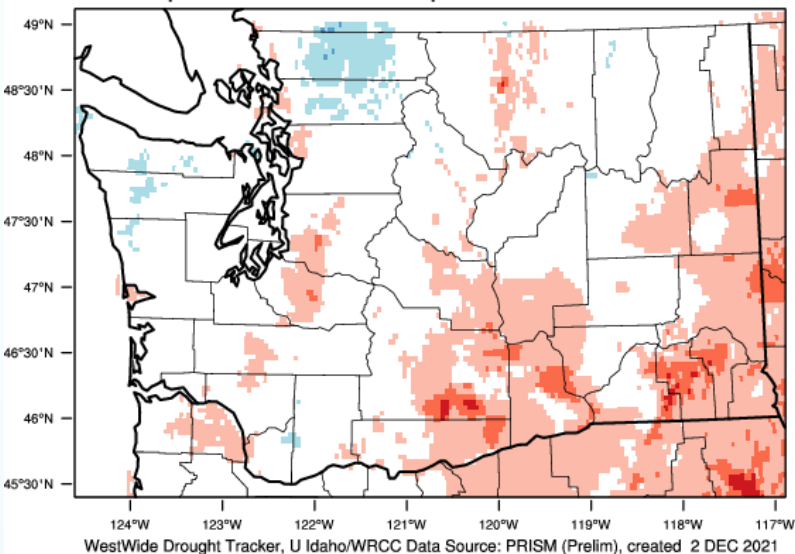
3 December 2021

Sept-Oct-Nov 2021

Temperature

Washington - Mean Temperature

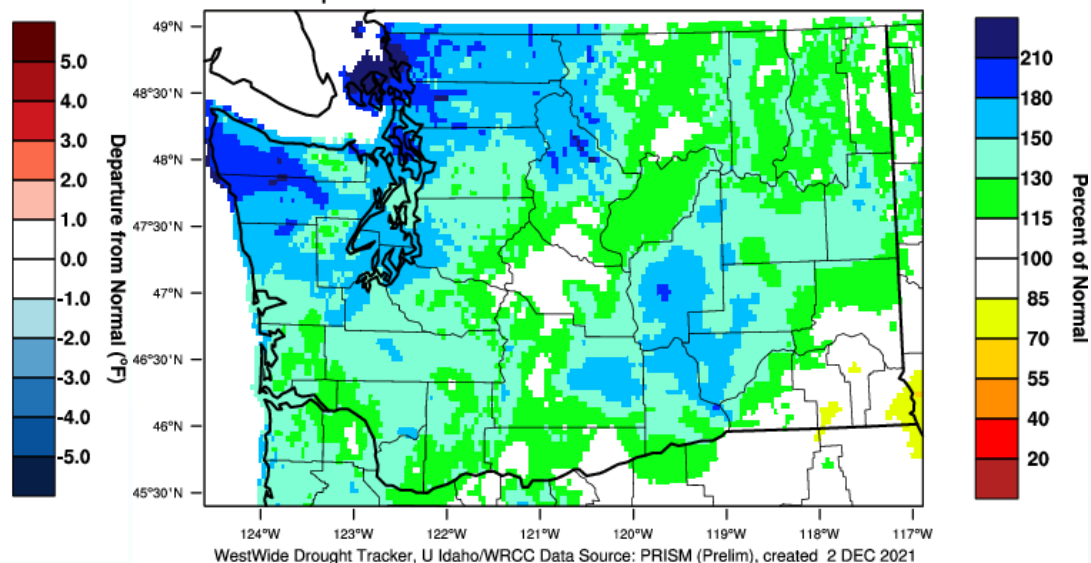
September-November 2021 Departure from 1981-2010 Normal



Precipitation

Washington - Precipitation

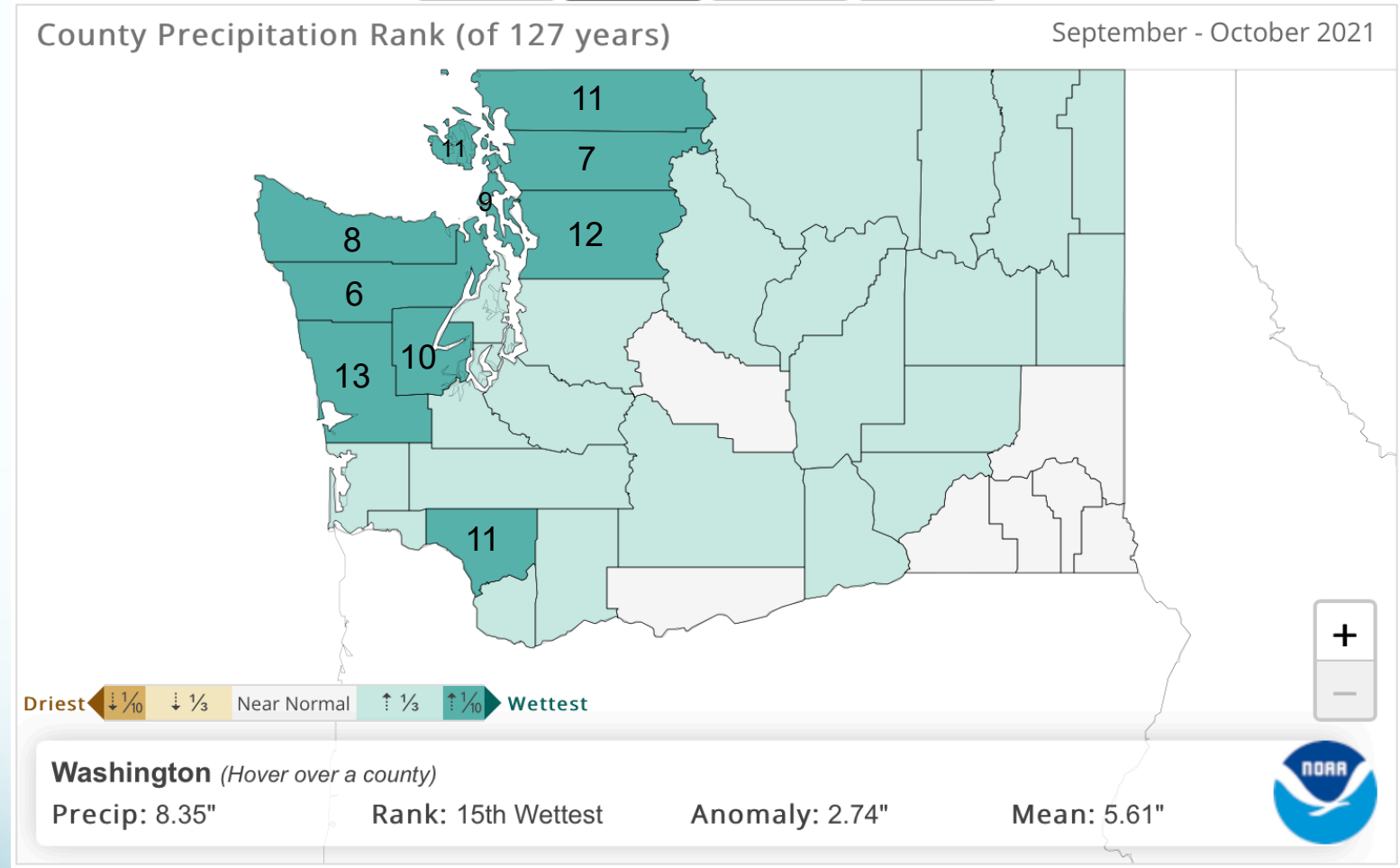
September-November 2021 Percent of 1981-2010 Normal



- Averaged statewide, Sept-Oct rank as 15th wettest* (+2.99")
- SeaTac AP, Bellingham, and Quillayute measured wettest Sept-Nov on record

*Records since 1895

Sept-Oct County Precipitation

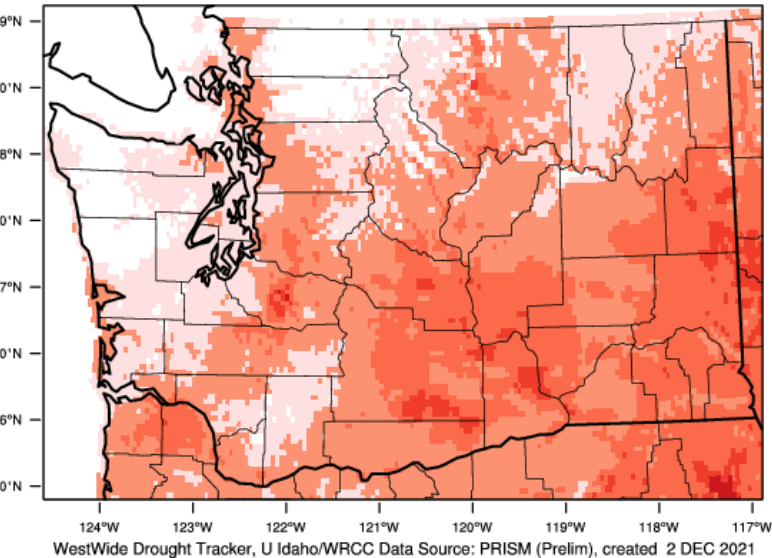


November 2021

Temperature

Washington - Mean Temperature

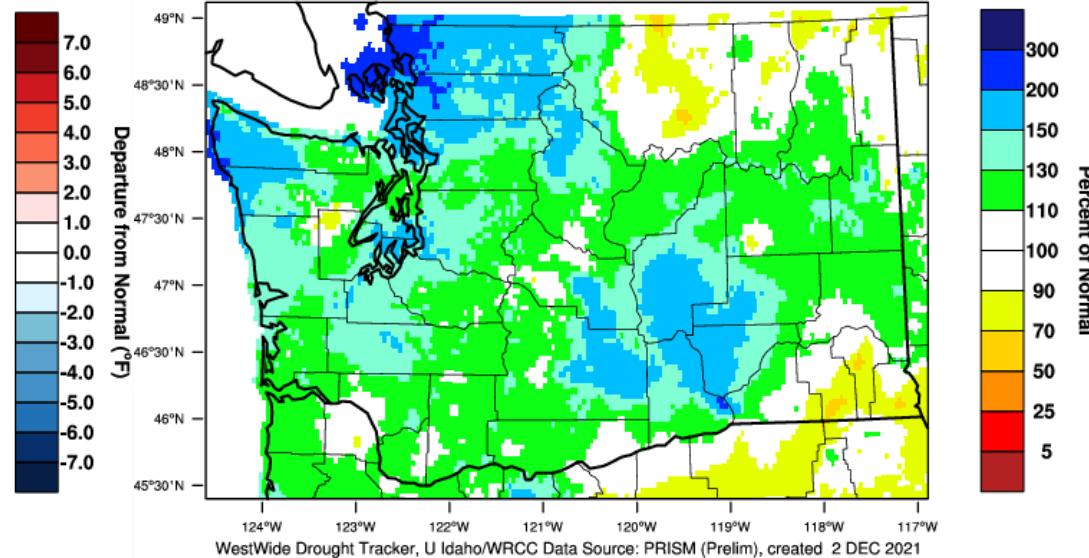
November 2021 Departure from 1981-2010 Normal



Precipitation

Washington - Precipitation

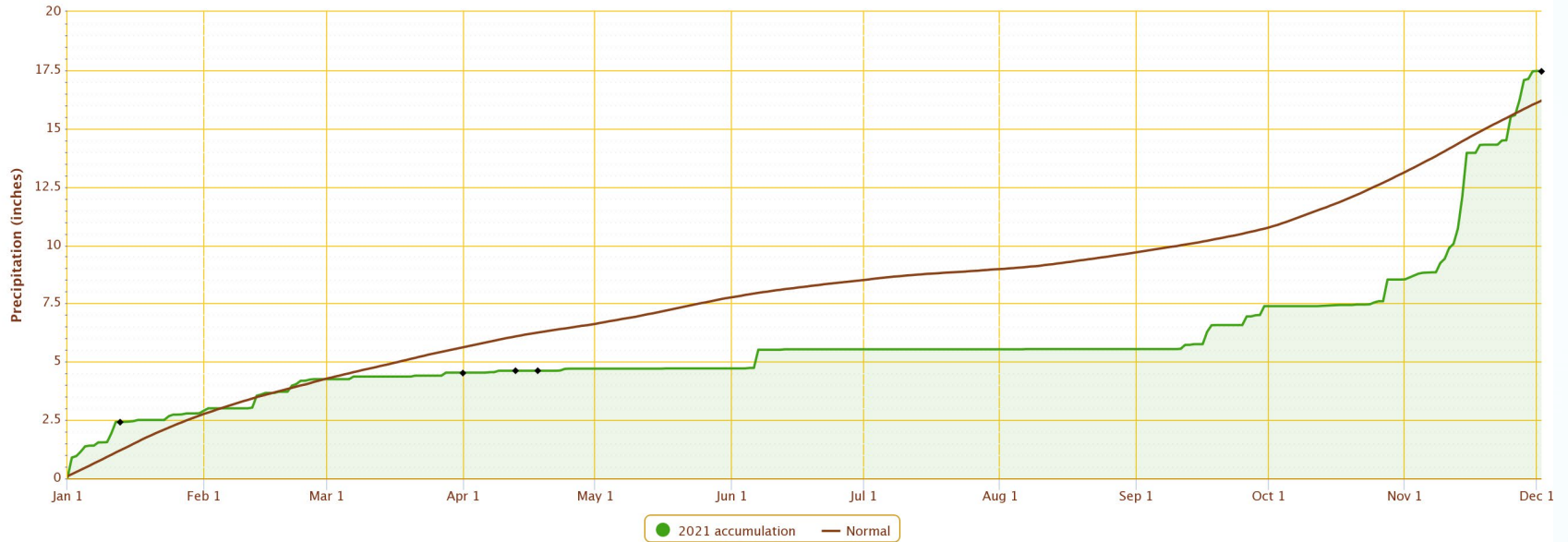
November 2021 Percent of 1981-2010 Normal



- Warm temperatures were primarily overnight
- Multiple atmospheric river events leading to heavy precipitation and flooding

Accumulated Precipitation – FRIDAY HARBOR AIRPORT, WA

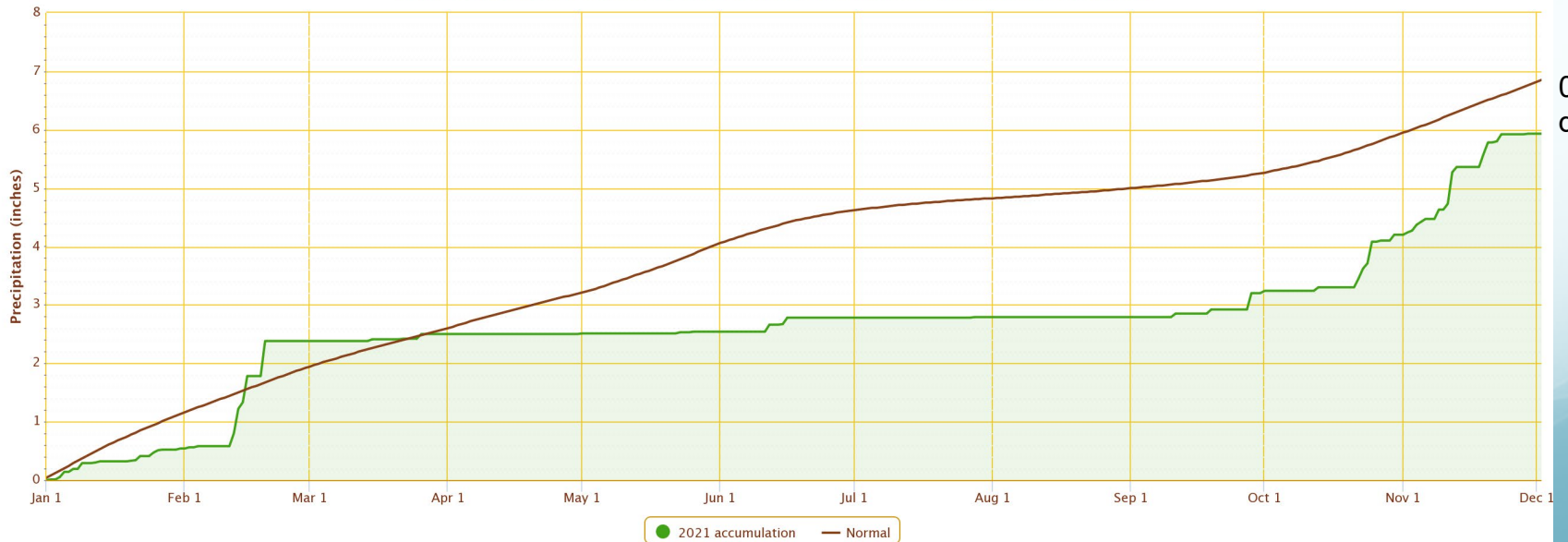
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Accumulated Precipitation – KENNEWICK, WA

Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



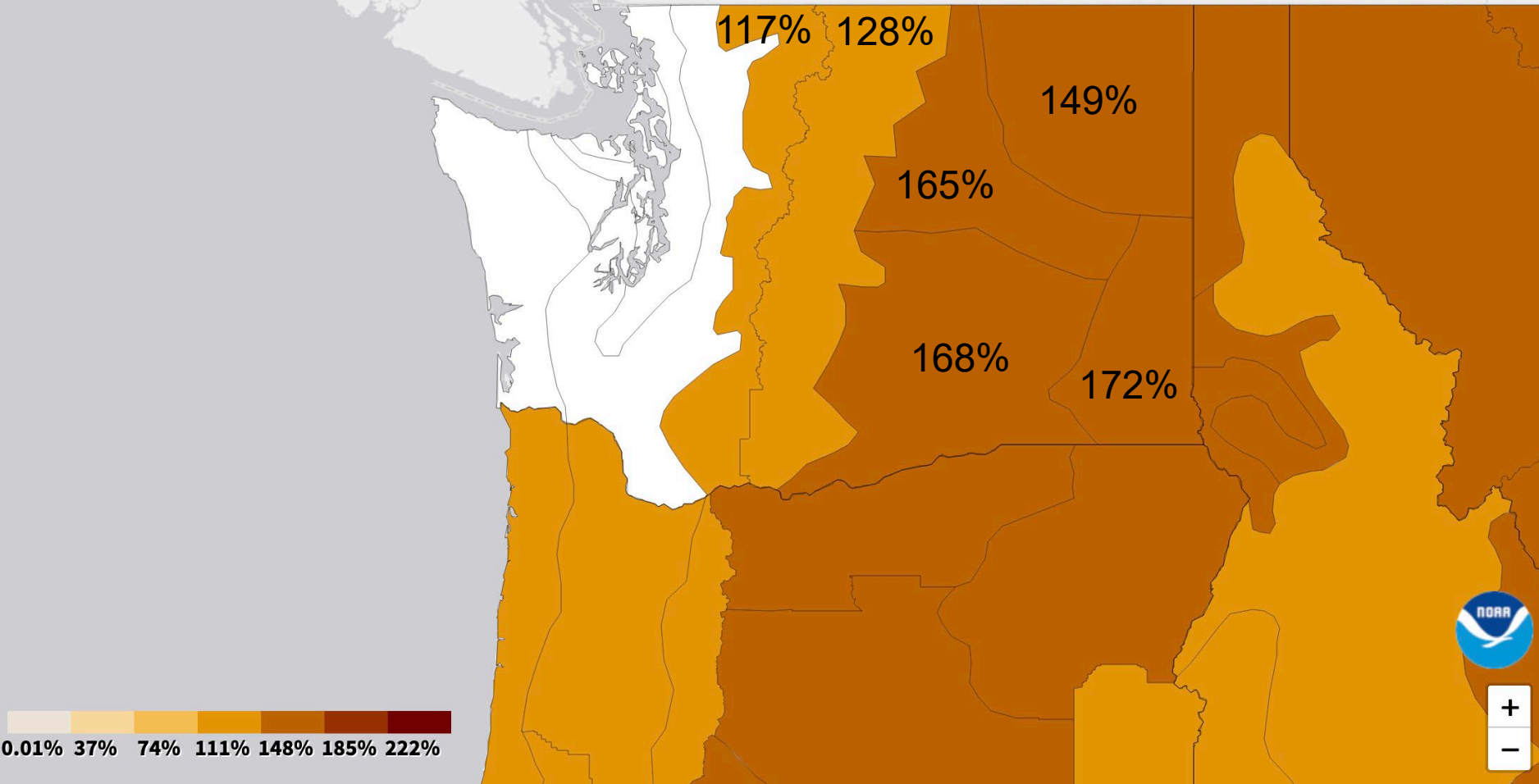
Powered by ACIS

0.92"
deficit

Precipitation Required to End the Drought

Percent of Normal Precip Needed to End Drought Conditions in 5 Months
(by the end of Apr)

Climatological Conditions
30 Nov 2021

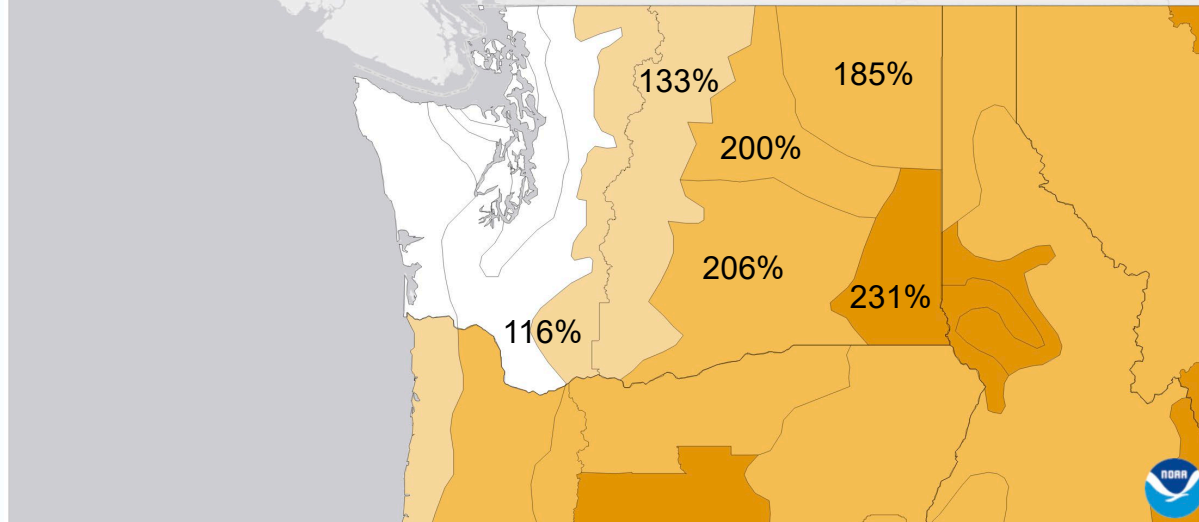


(uses 1981-2010 normal)

Percent of Normal Precip Needed to End Drought Conditions in 3 Months

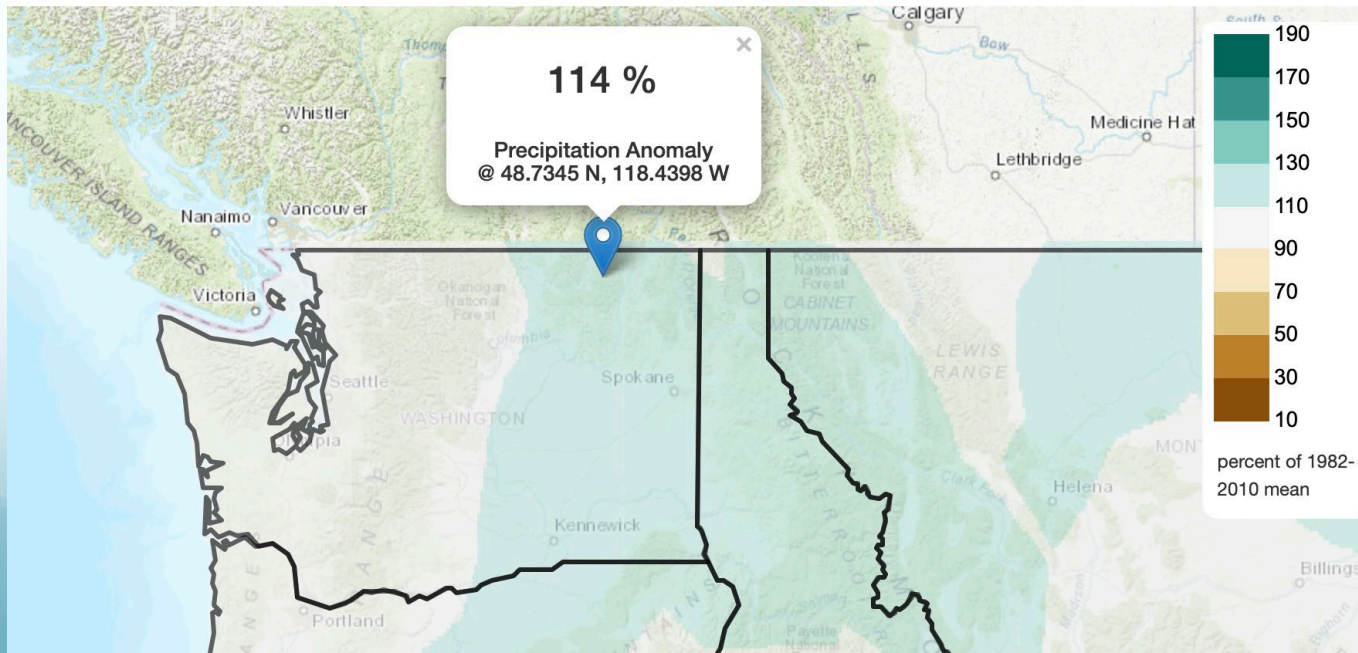
Climatological Conditions

30 Nov 2021



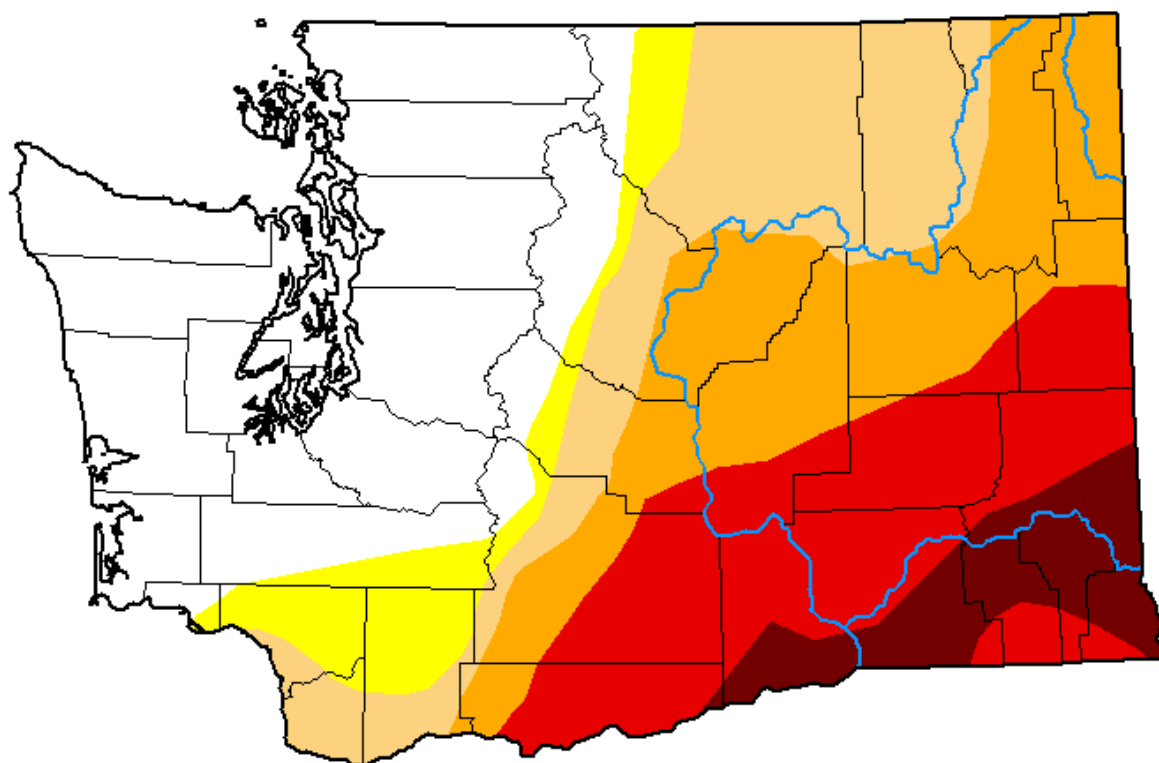
Total Precipitation Anomaly, Dec 2021 to Feb 2022 Average

Multi-model mean from 5 downscaled NMME models - forecast made Nov 8, 2021









U.S. Drought Monitor Washington

November 30, 2021
(Released Thursday, Dec. 2, 2021)
Valid 7 a.m. EST



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

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>

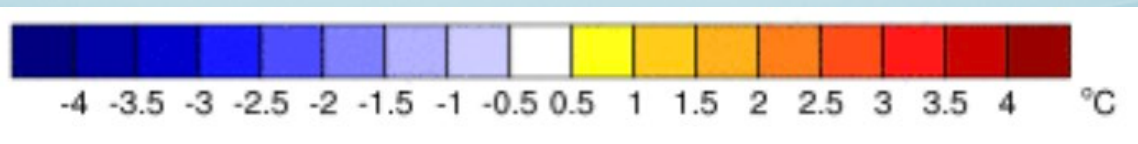
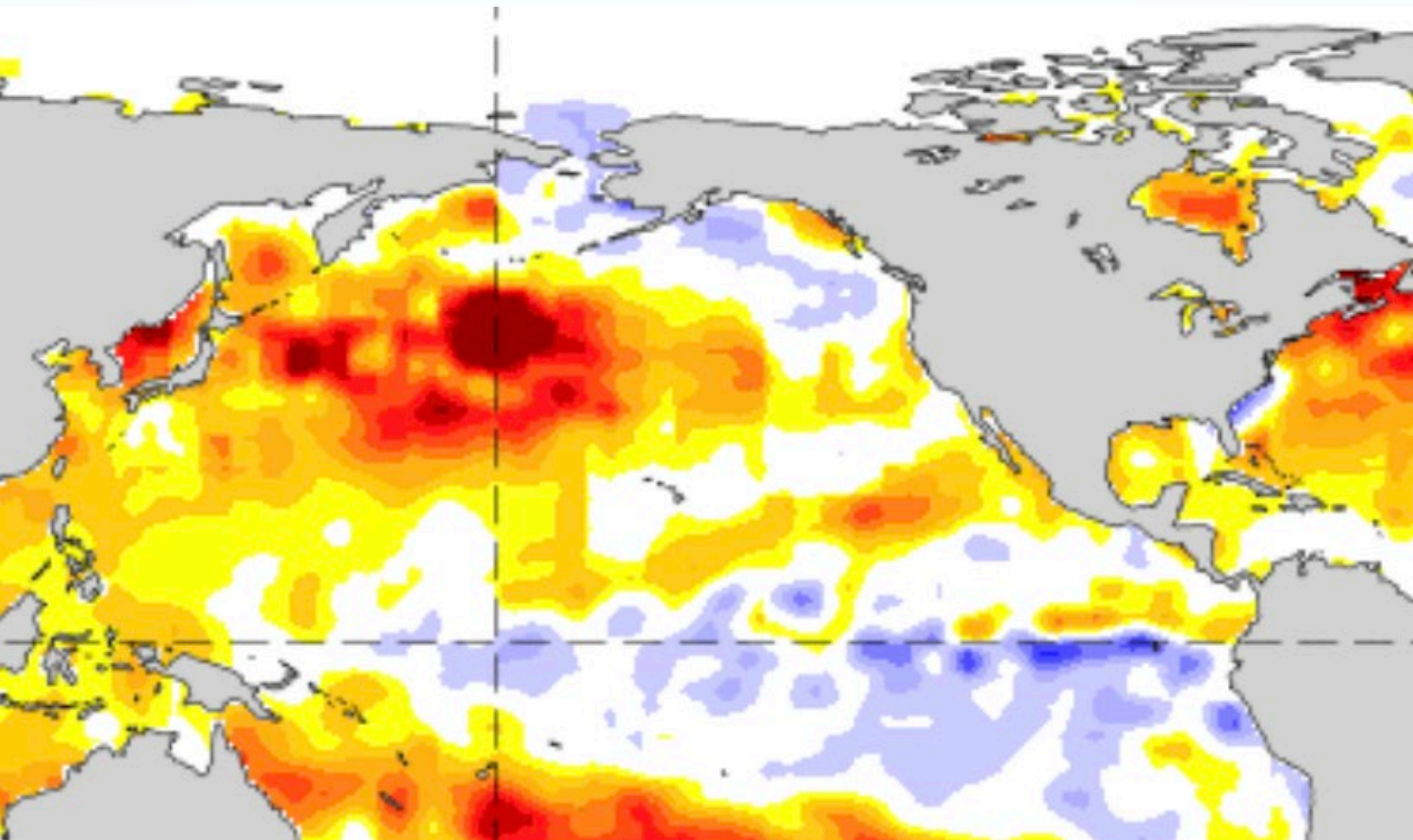
Author:

Richard Heim
NCEI/NOAA



droughtmonitor.unl.edu

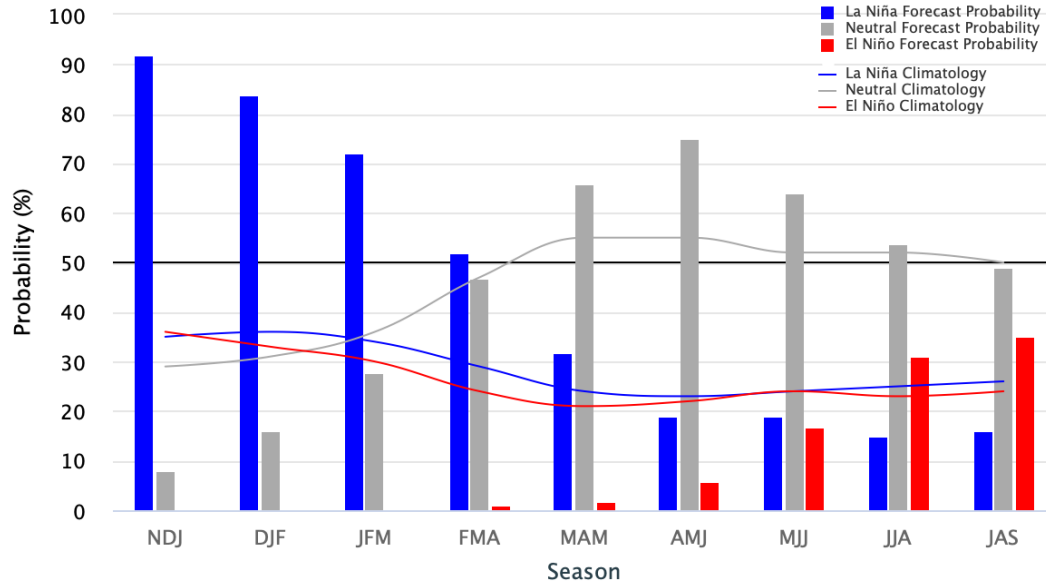
Sea Surface Temperature Anomalies: 21-27 November 2021



Mid-November 2021 IRI/CPC Model-Based Probabilistic ENSO Forecasts

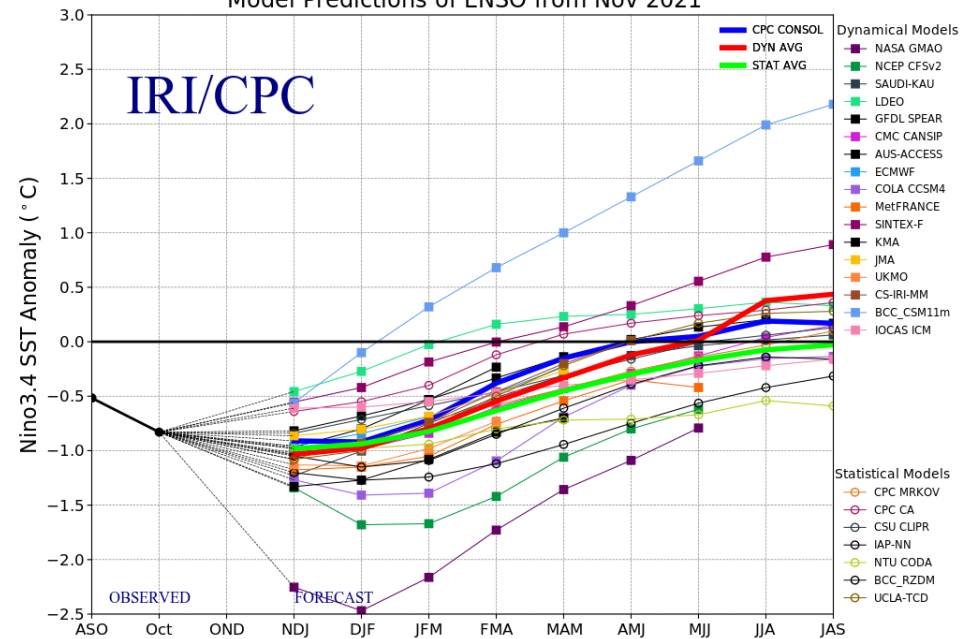
ENSO state based on NINO3.4 SST Anomaly

Neutral ENSO: -0.5°C to 0.5°C



ENSO Predictions

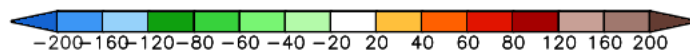
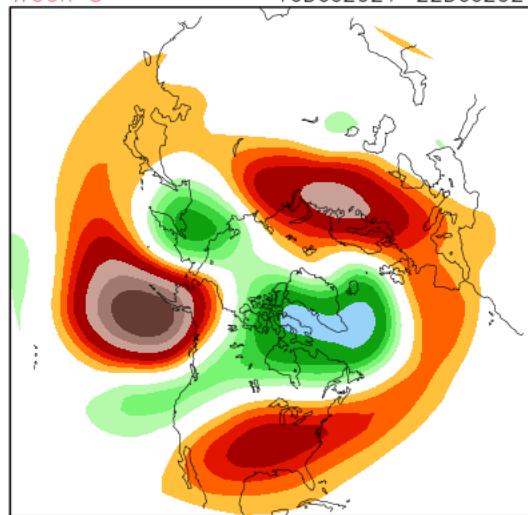
Model Predictions of ENSO from Nov 2021



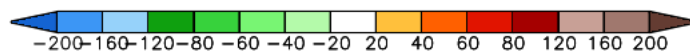
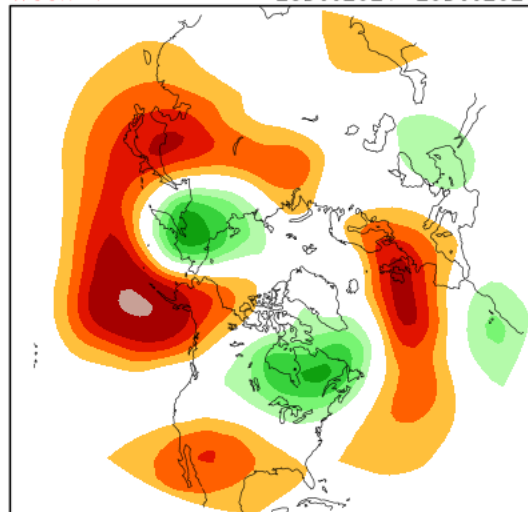
Latest Set of Week 3-4 Forecasts from CFSv2

CFSv2 Weeks 3 & 4 500 hPa Z Anomalies (m)
16 Member Ensemble Mean Forecast from 01Dec2021

Week 3 16Dec2021–22Dec2021



Week 4 23Dec2021–29Dec2021

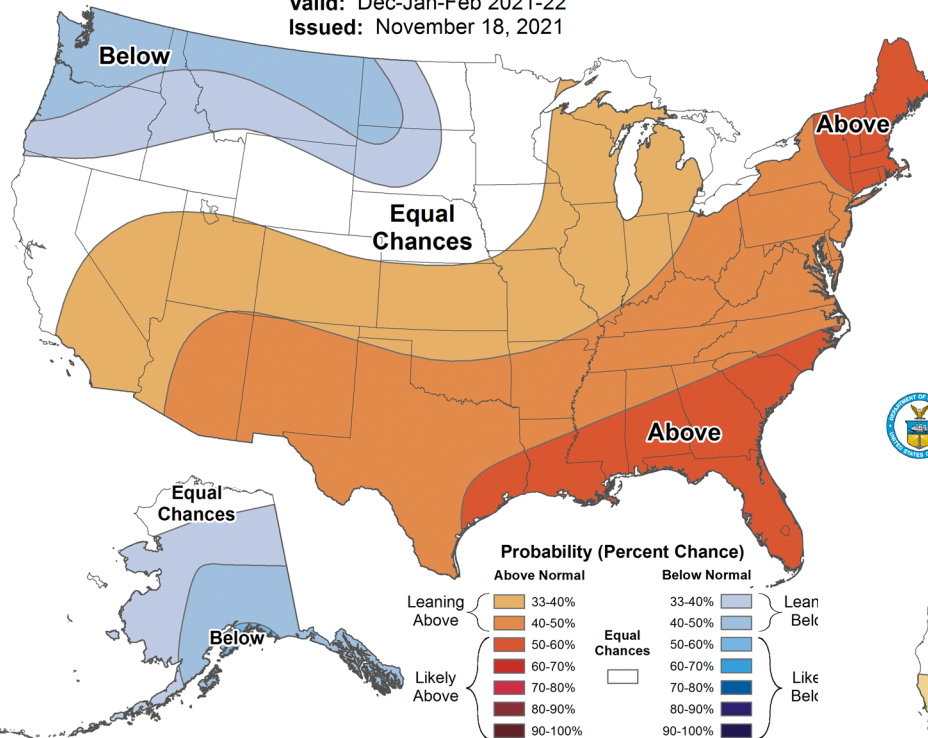




Seasonal Temperature Outlook

Valid: Dec-Jan-Feb 2021-22

Issued: November 18, 2021



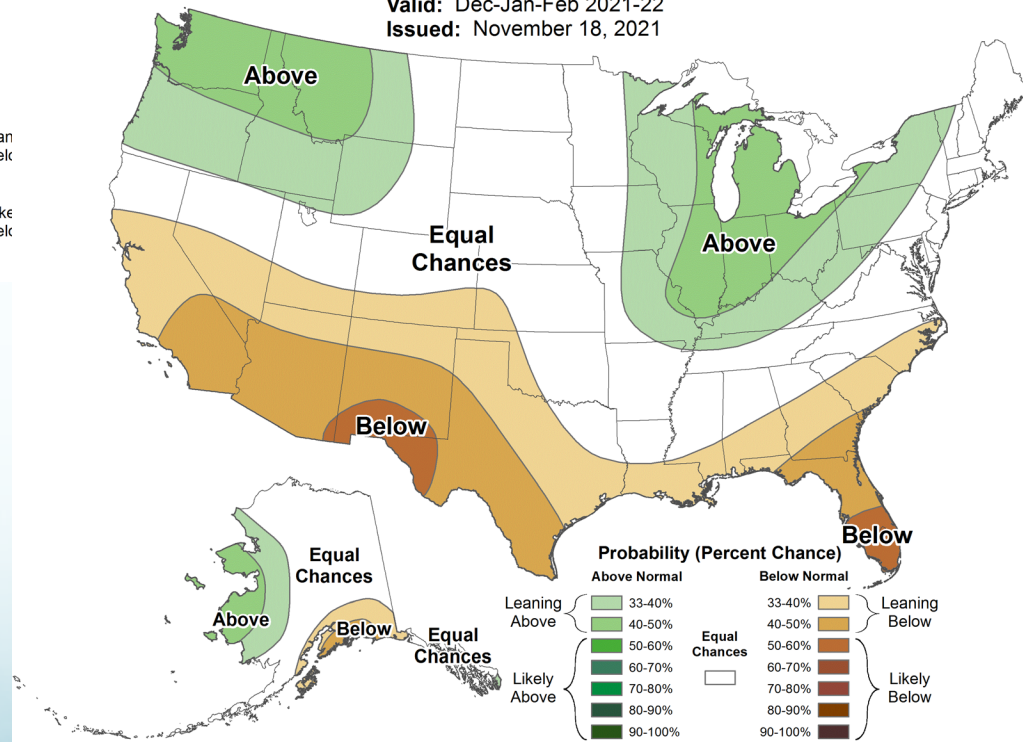
NOAA/CPC Forecasts for Dec-Feb 2022



Seasonal Precipitation Outlook

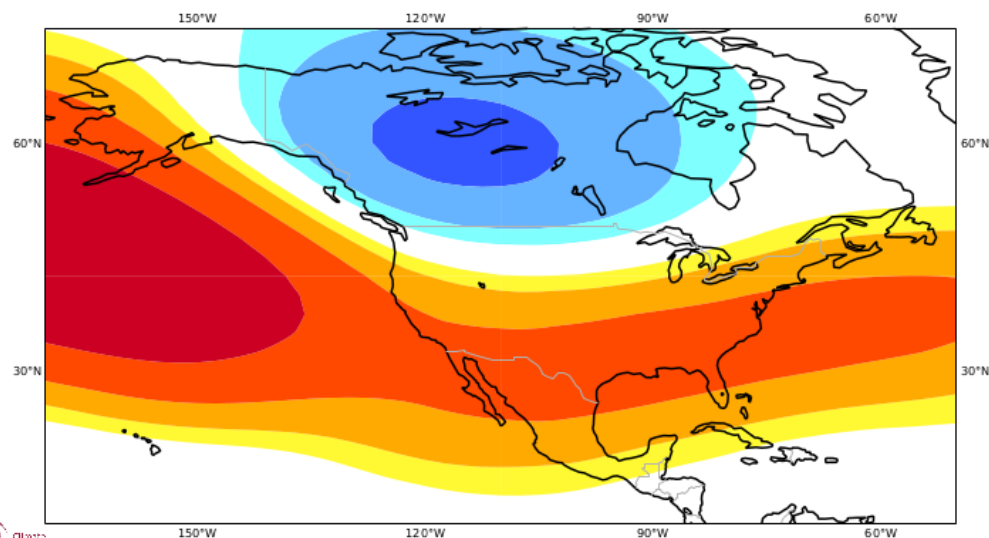
Valid: Dec-Jan-Feb 2021-22

Issued: November 18, 2021



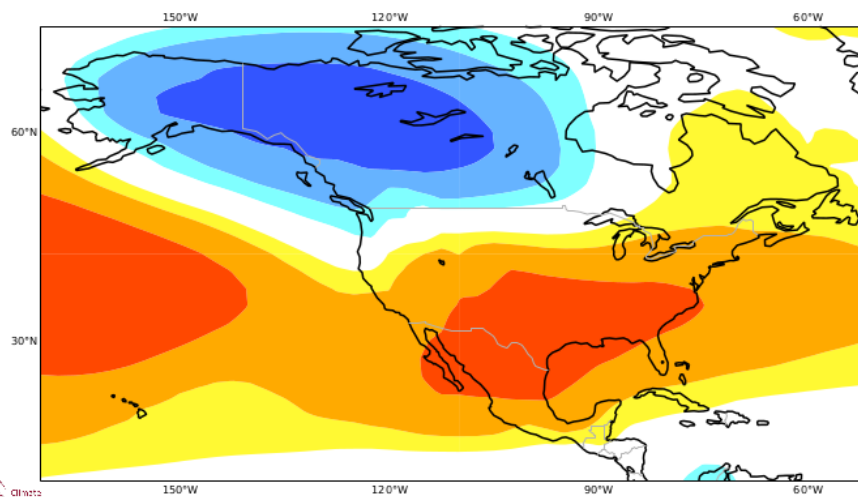
500 hPa Z Anomaly

■ <- 40m ■ - 40..- 20 ■ - 20..- 10 ■ - 10..- 5 ■ - 5 .. 5 ■ 5 .. 10 ■ 10.. 20 ■ 20.. 40 ■ > 40m



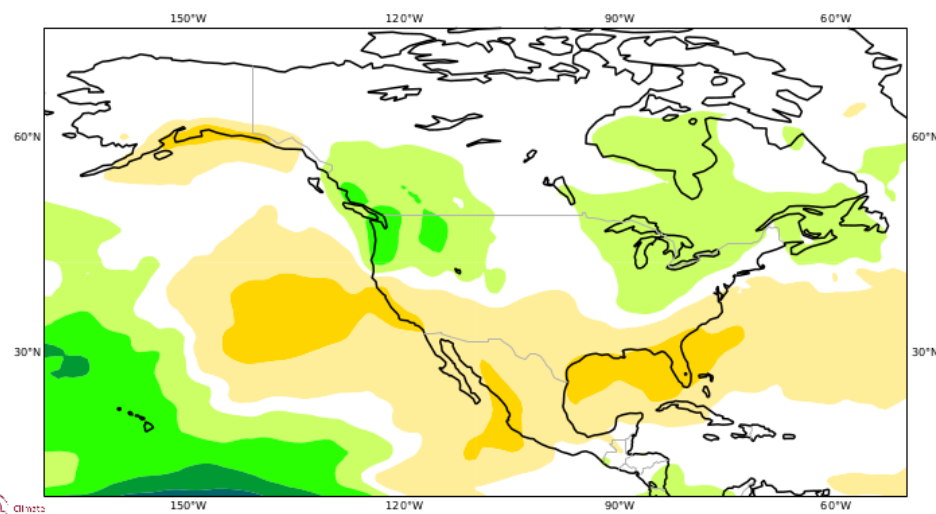
850 hPa Temperature Anomaly

■ <-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



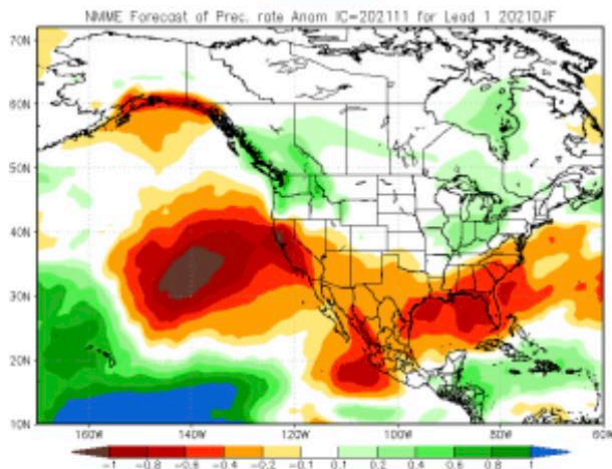
Precipitation Anomaly

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

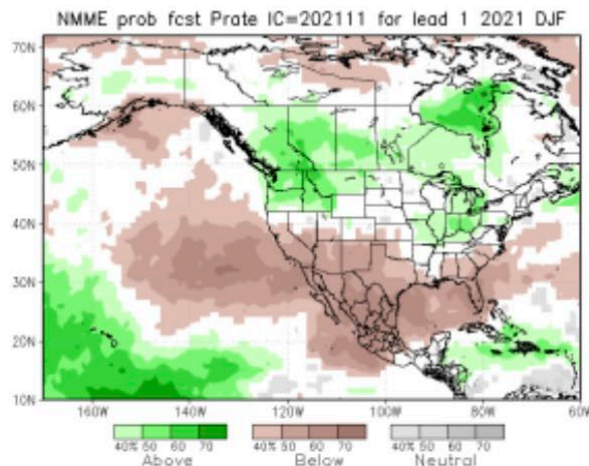


Dec-Feb Precipitation Anomalies

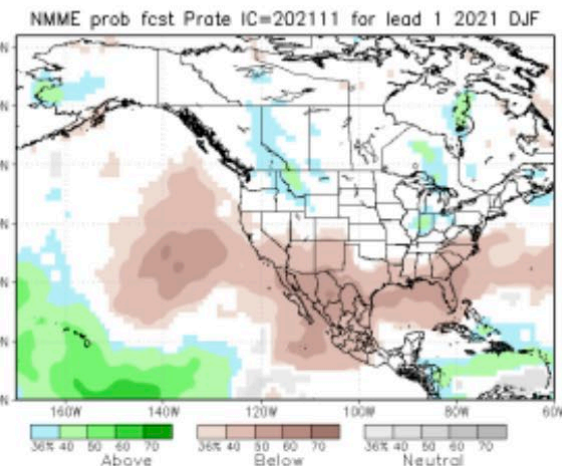
NMME



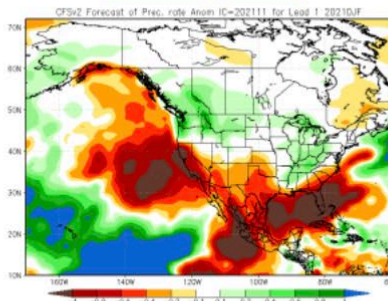
Prob fcst



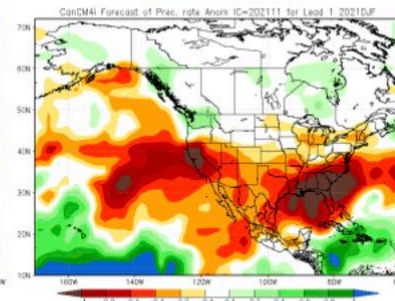
PAC calib. prob fcst



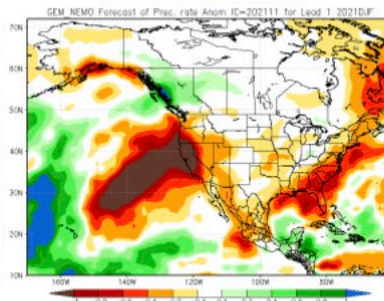
NCEP_CFSv2



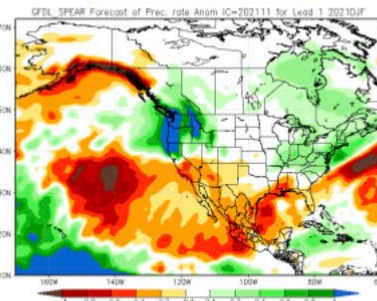
CanCM4i



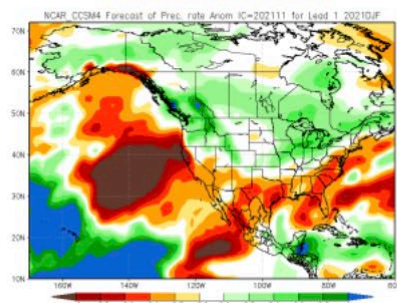
GEM_NEMO



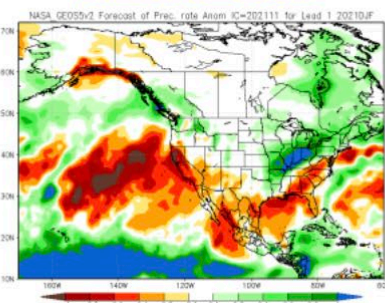
GFDL_SPEAR



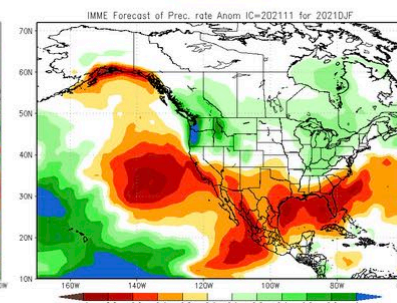
NCAR_CCSM4



NASA_GEOS5v2



IMME



Summary

- The autumn of 2021 has been wet in WA state compared to historical norms and drought conditions have improved, particularly west of the Cascade Mountains
- The precipitation to completely end the drought is unlikely to materialize in the areas of southeastern WA with the largest deficits
- A more typical La Niña pattern – with cooler and wetter conditions – is likely to emerge to help produce a decent mountain snowpack in the winter of 2021-22

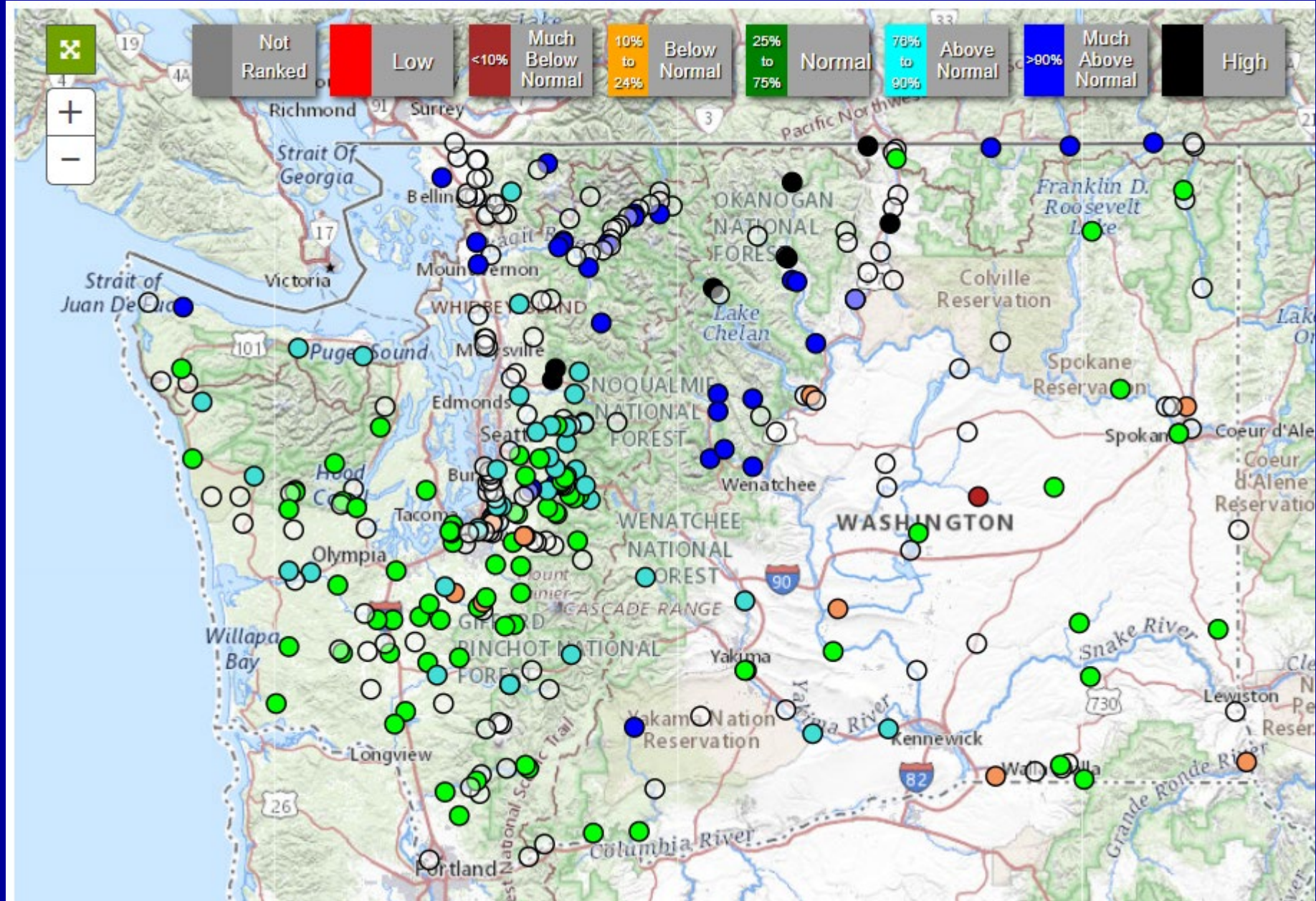
Streamflow Conditions in Washington State as of December 2, 2021

**Presented
to
The Washington State
Water Supply Availability Committee
on
Dec. 3rd, 2021**

**by
Nicholas Sutfin
USGS Washington Water Science Center**



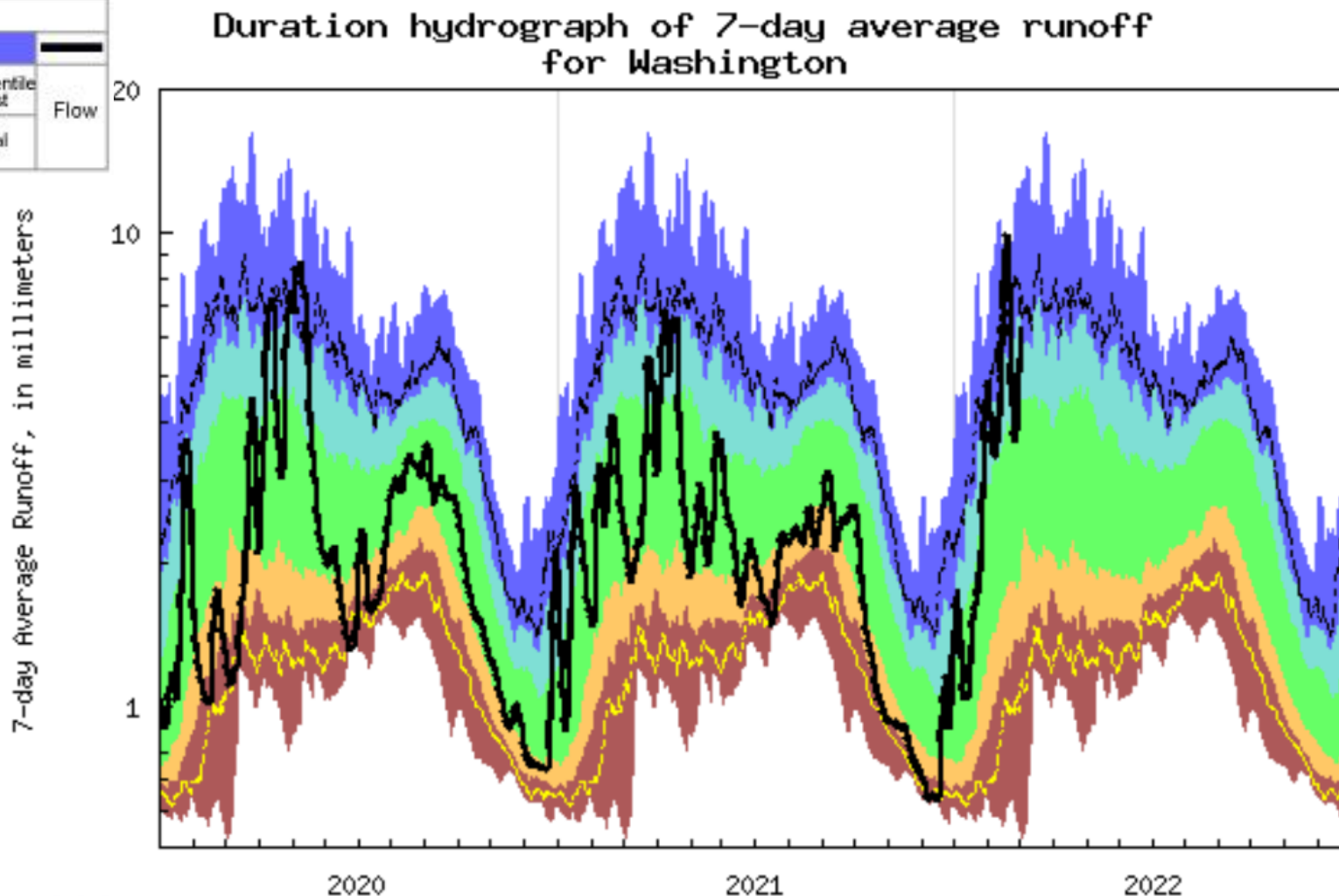
WA Current Streamflow Conditions



Duration Hydrograph, Washington State

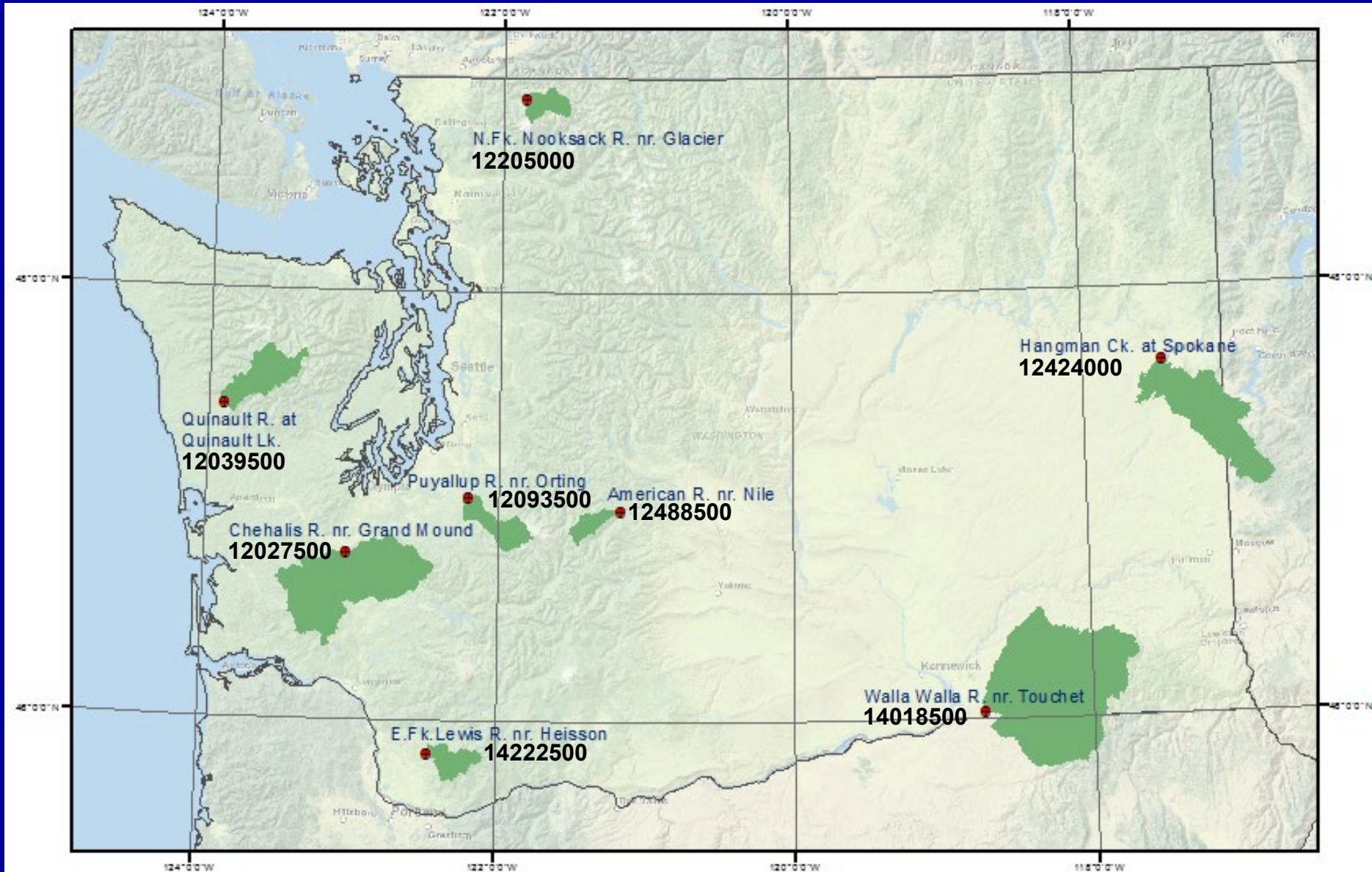
7-day Average Streamflow (as of Dec. 2, 2021) is near the 90th percentile

Explanation - Percentile classes						
lowest-10th percentile	5	10-24	25-75	76-90	95	90th percentile - highest
Much below Normal	Below normal	Normal	Above normal	Much above normal		

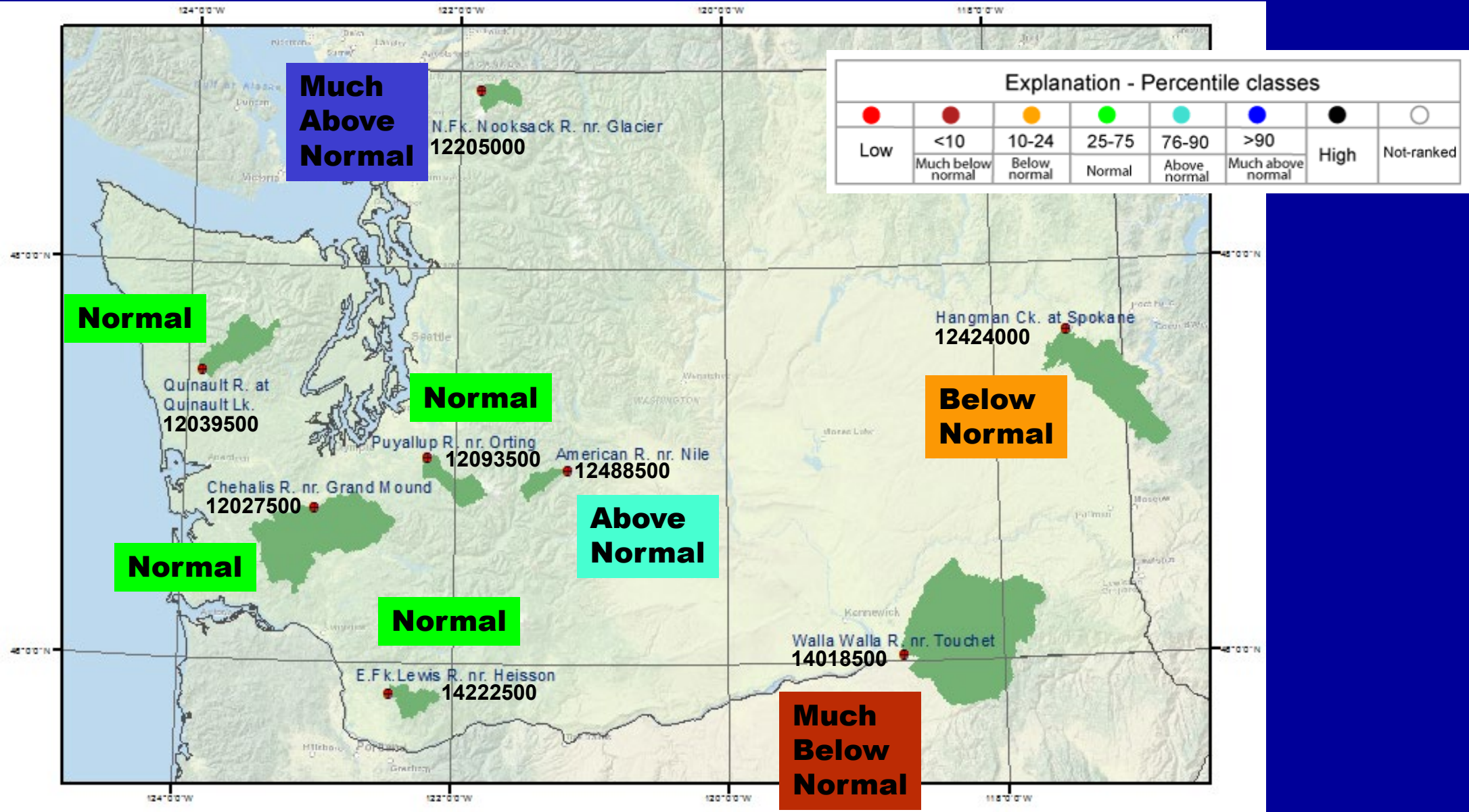


Index Gaging Stations

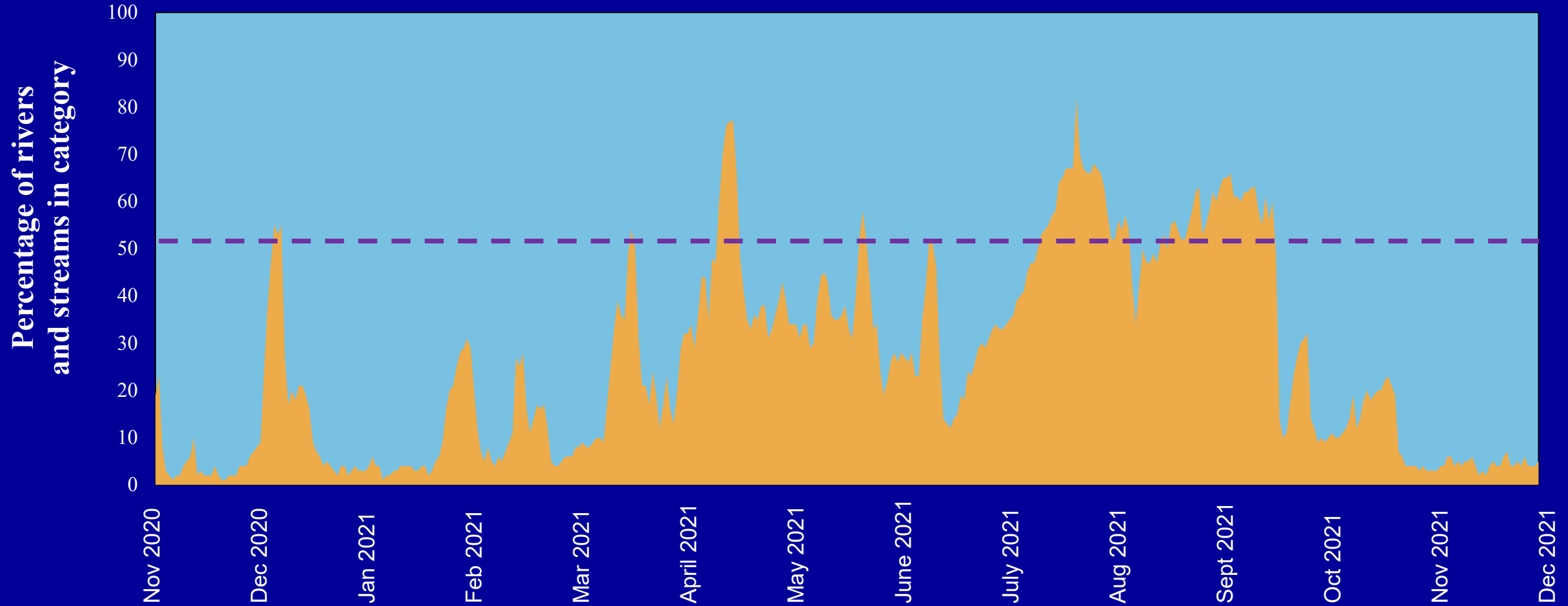
(Stations that measure natural or near-natural streamflow)



Index Gaging Stations, 7-day average streamflow (as of Dec. 3, 2021)

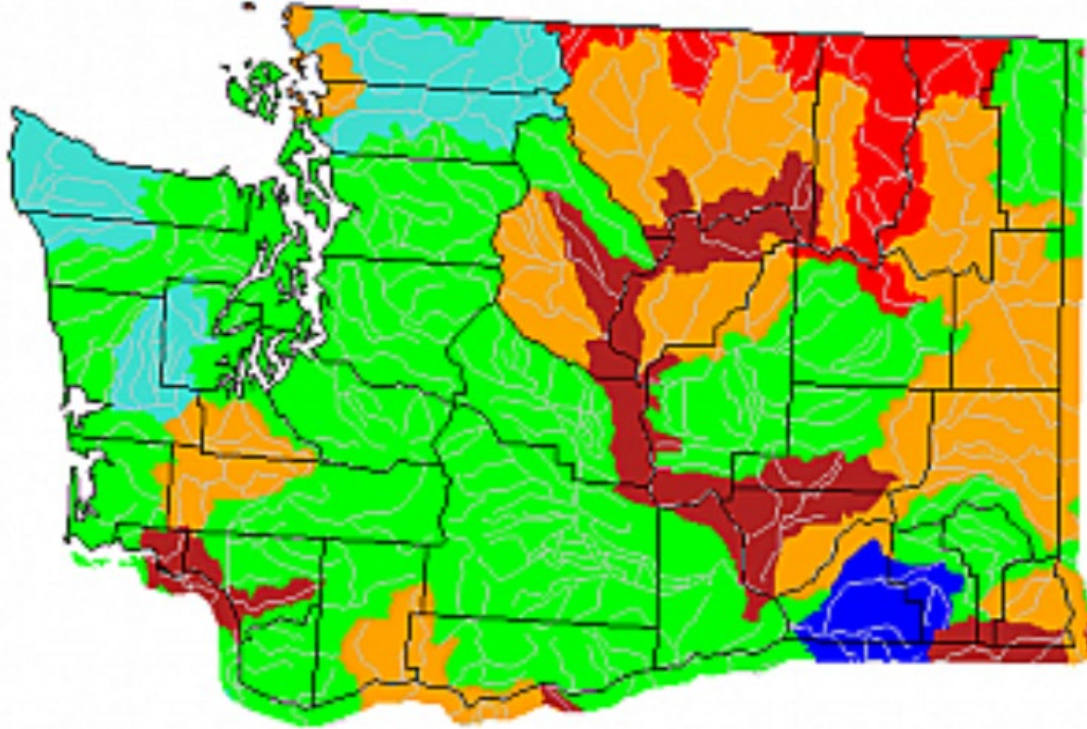


Daily streamflow in Washington Rivers compared to historical streamflow, Nov. 1, 2020 – Dec 2, 2021

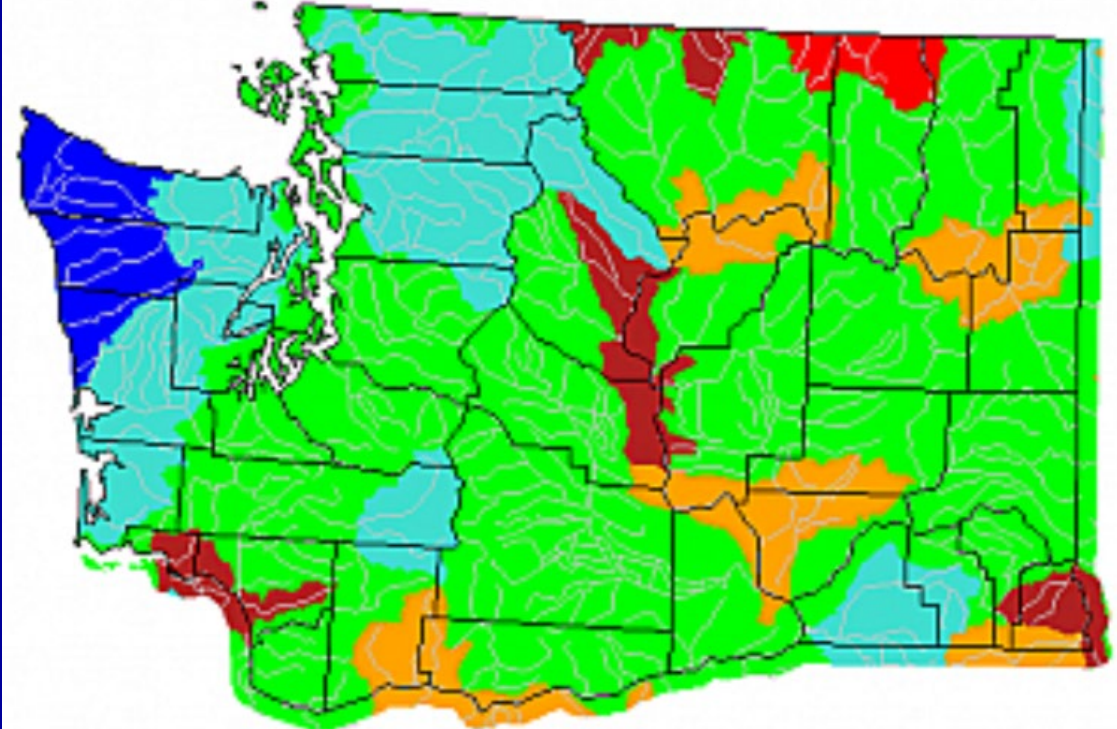


Monthly average streamflow for Sept. and Oct. 2021

September 2021



October 2021

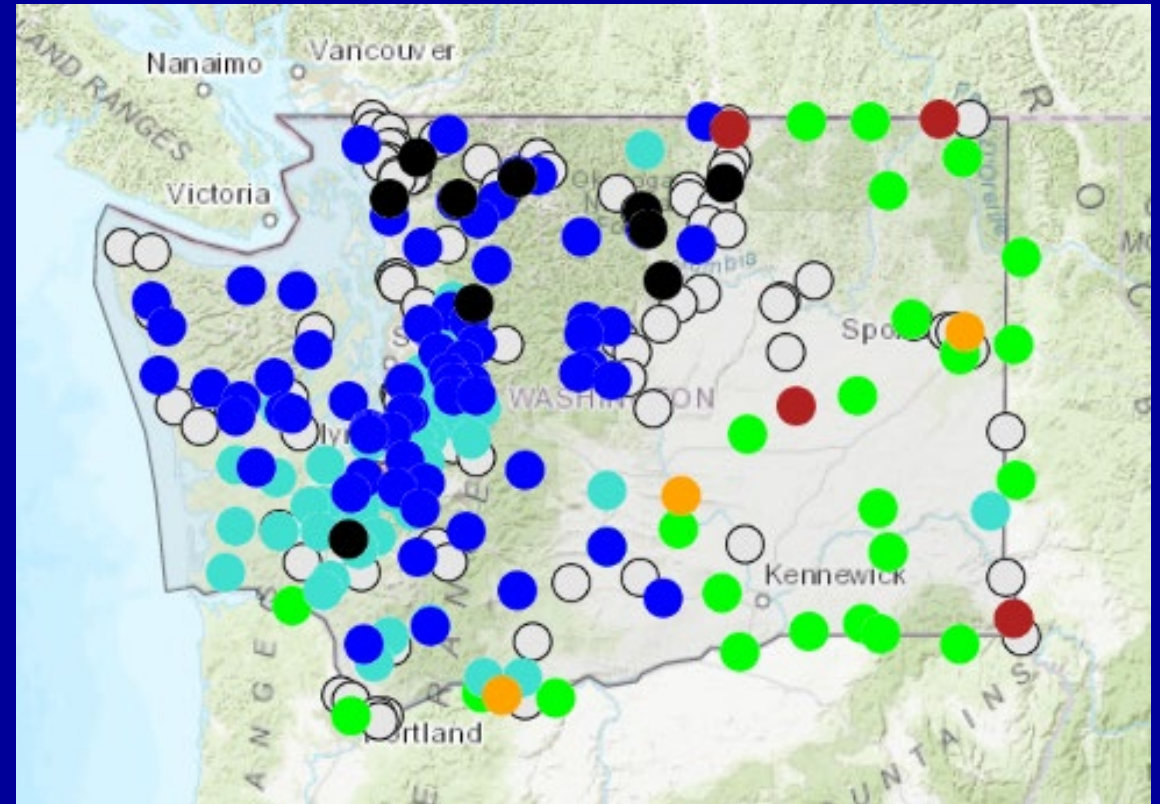
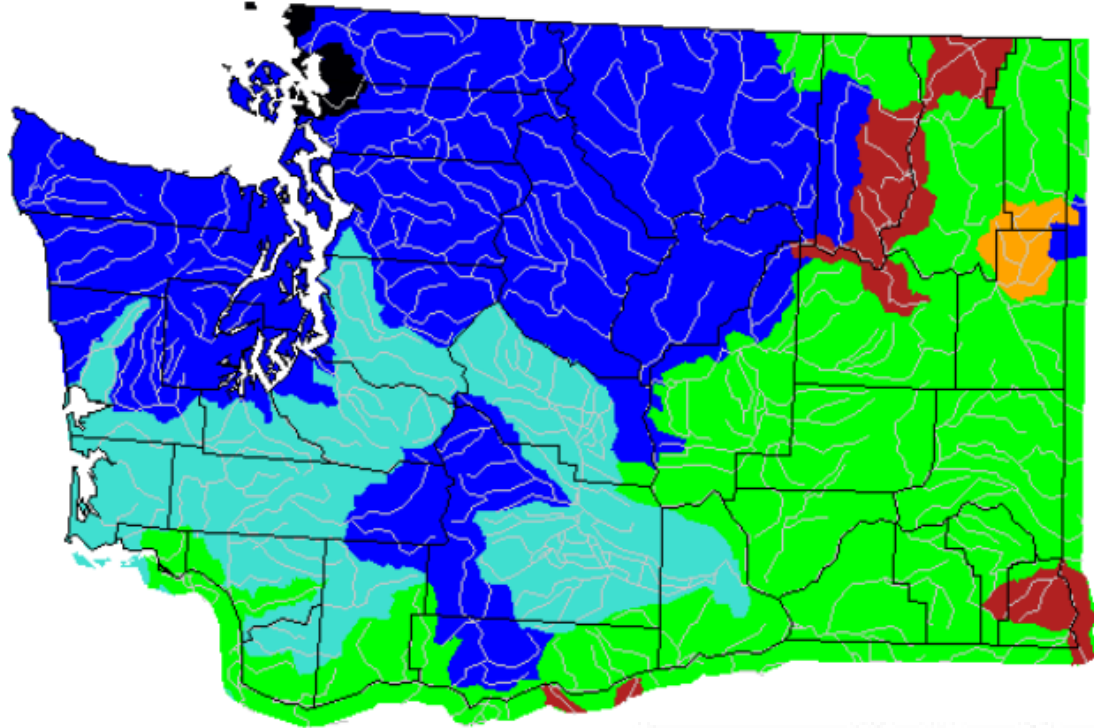


Explanation - Percentile classes

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

Monthly Average Streamflow for December 2021

November 2021

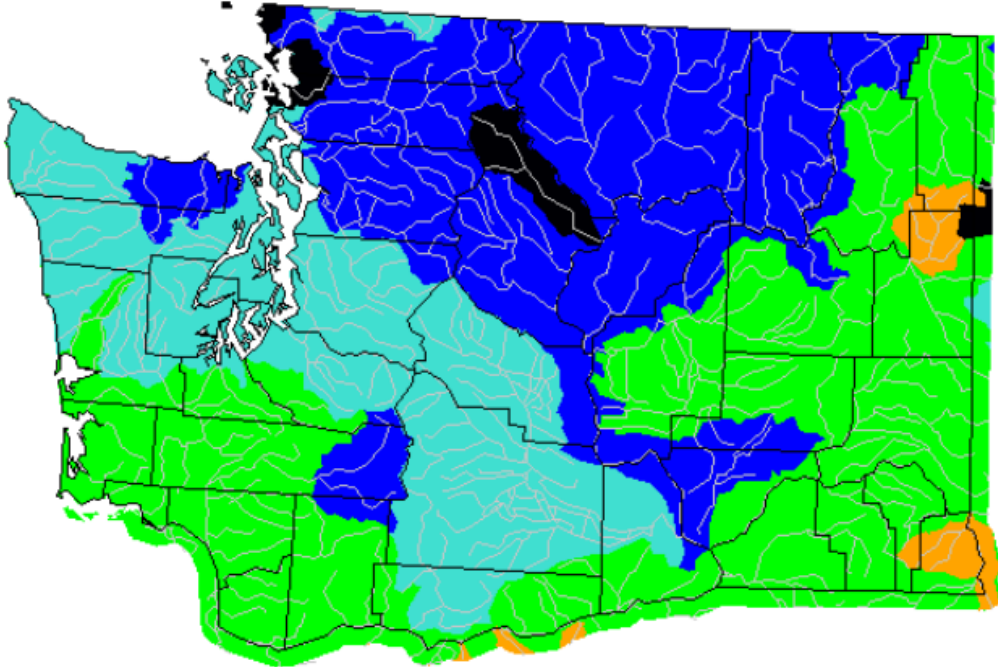


Explanation - Percentile classes

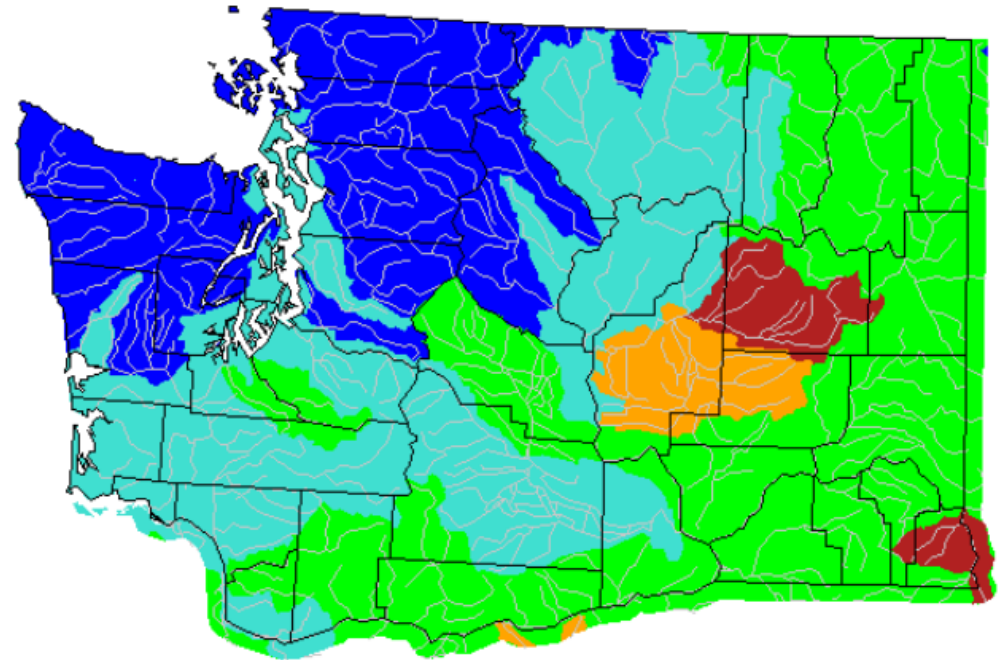
Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

Average Dec. Streamflow 2021

Streamflow for December 1st



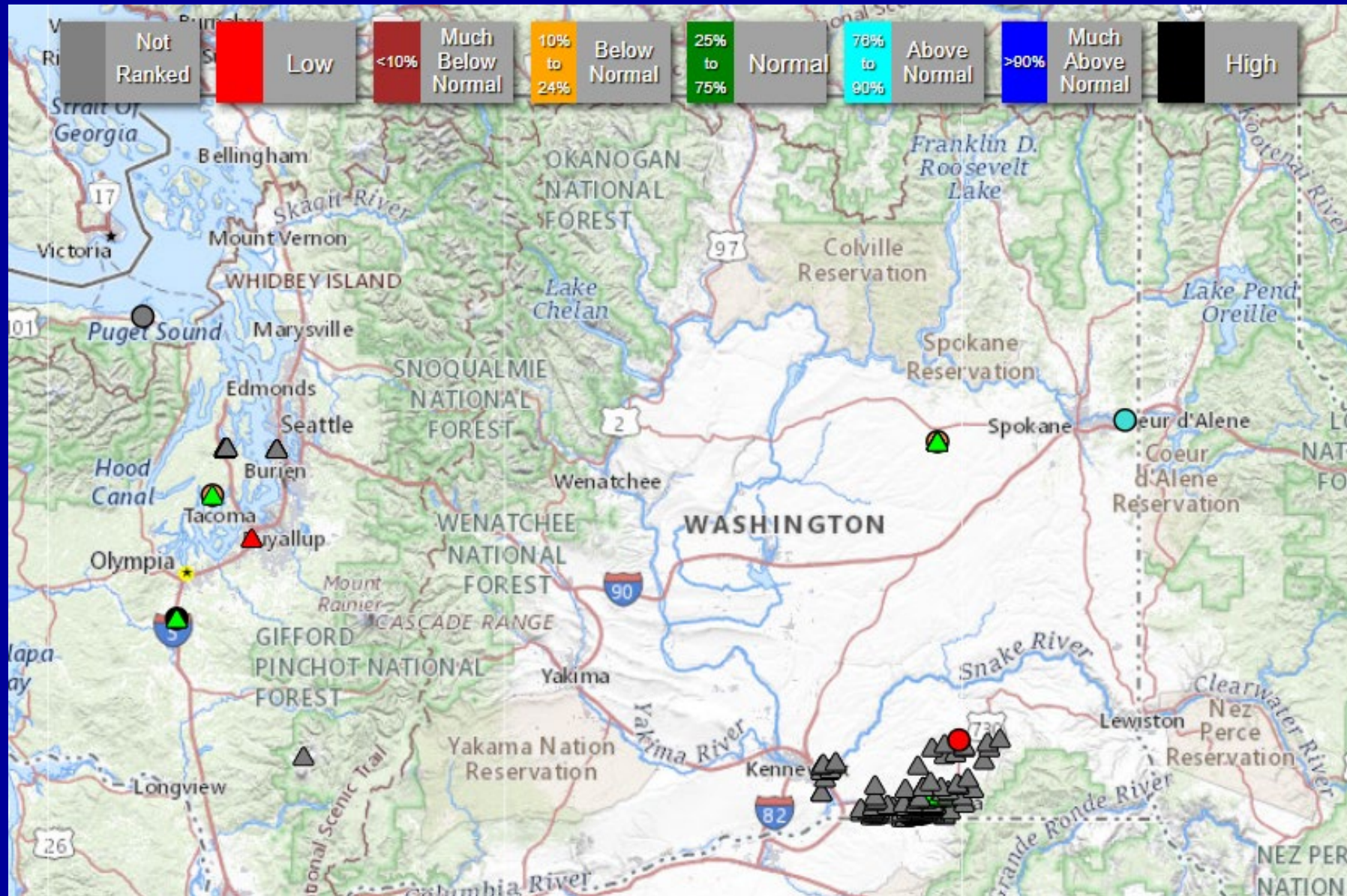
Streamflow for all days of the year



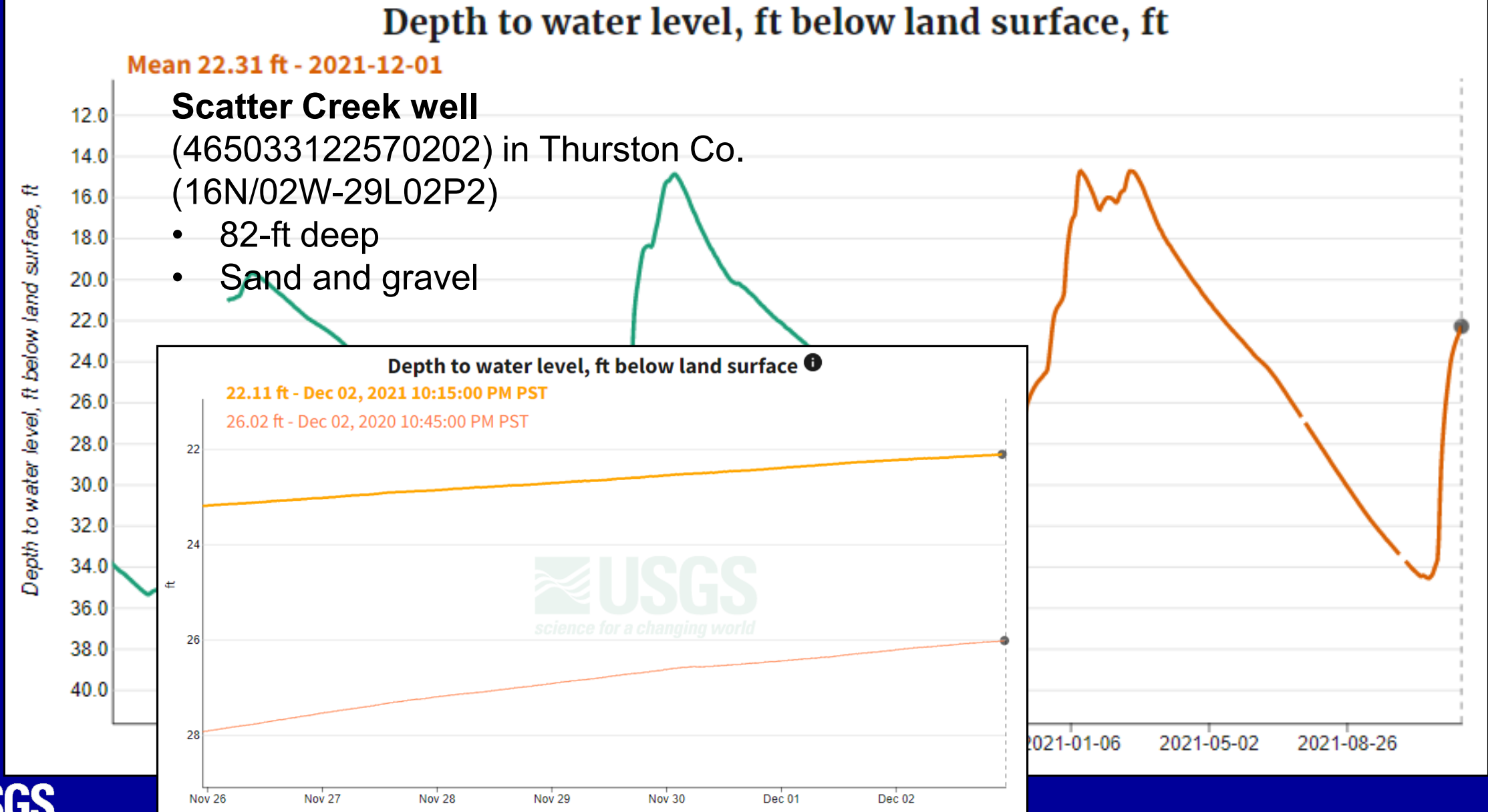
Explanation - Percentile classes

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

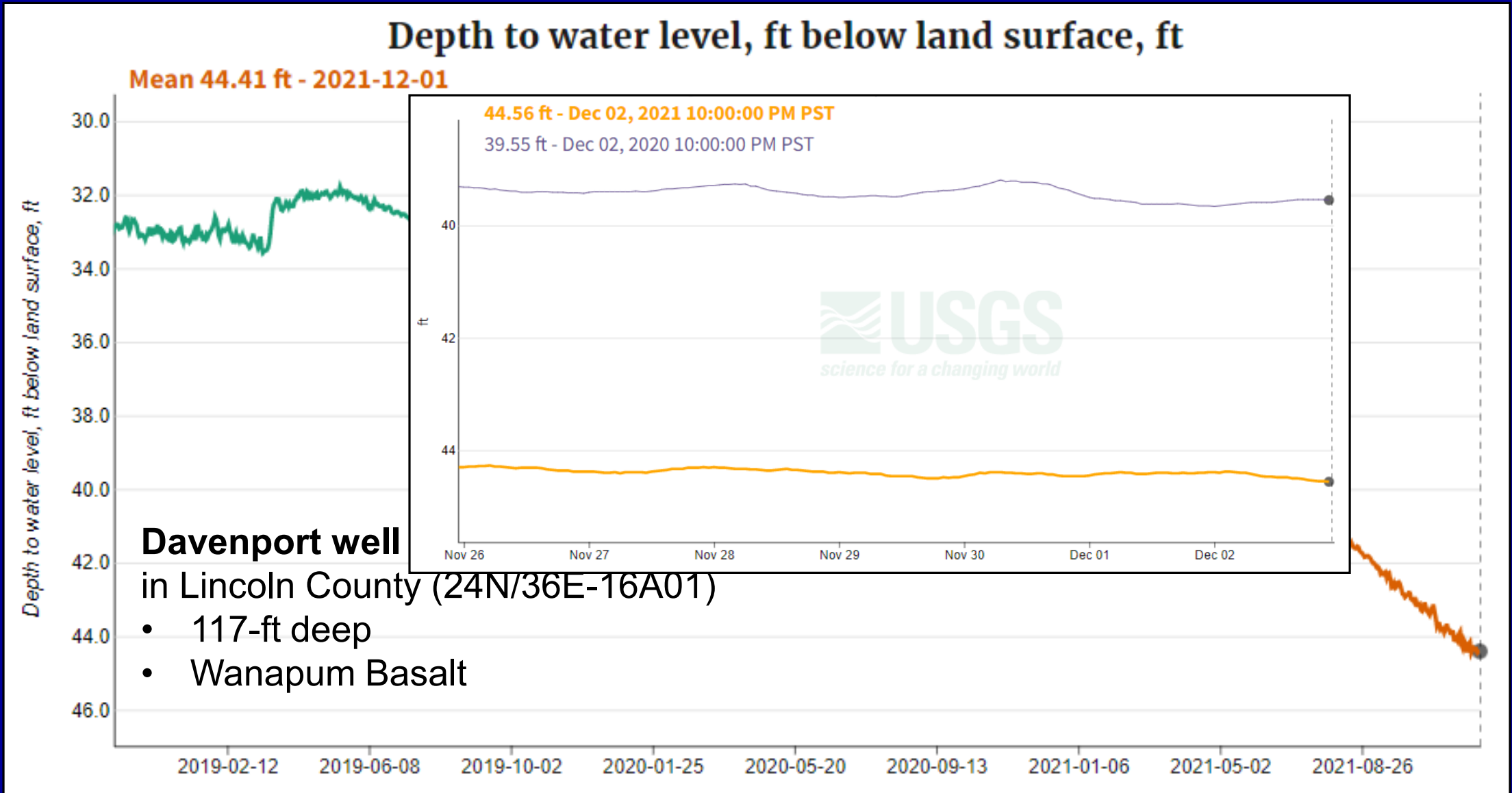
WA Current Groundwater Conditions (Dec. 2nd, 2021)



WA Current Groundwater Conditions (Dec. 2nd, 2021)

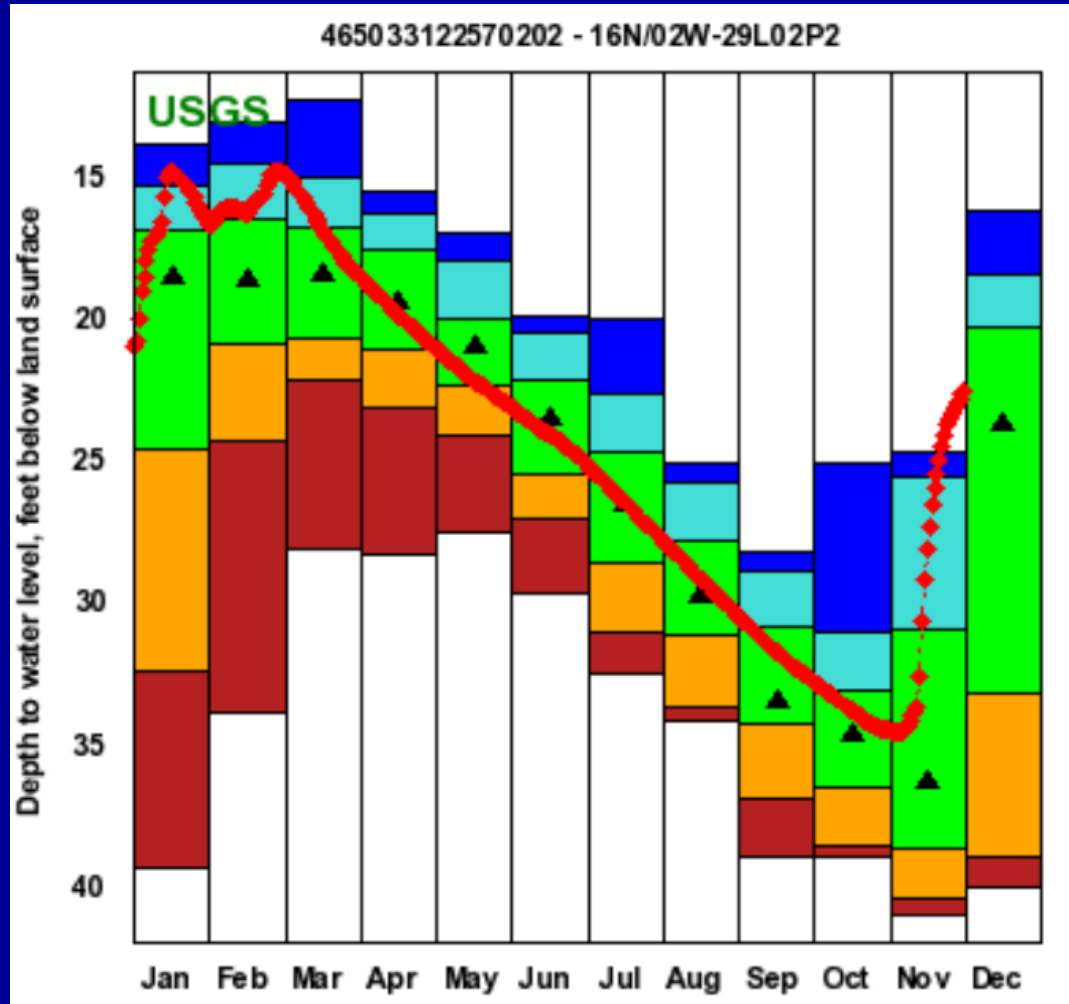


WA Current Groundwater Conditions (Dec. 2nd, 2021)

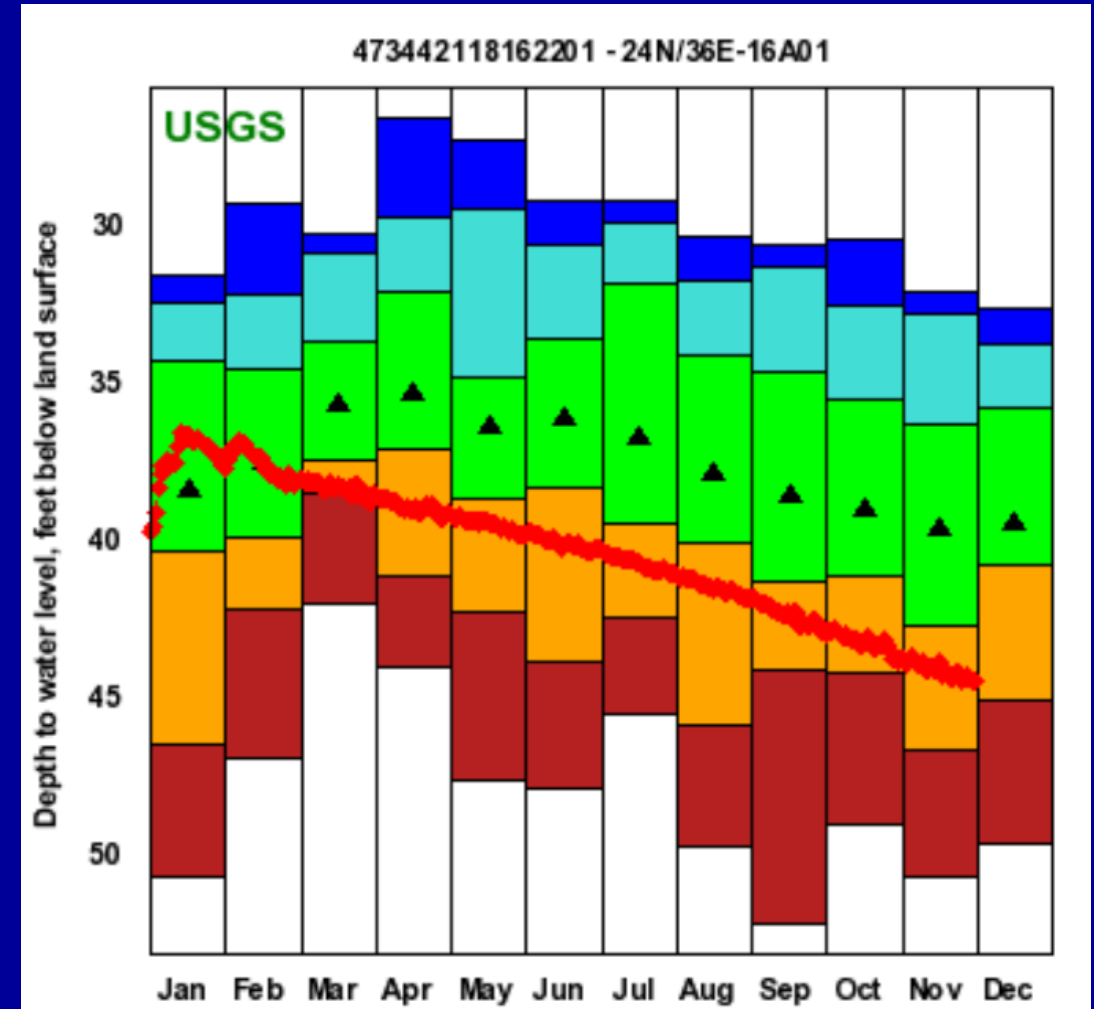


WA Current Groundwater Conditions (Dec. 2nd)

Scatter Creek well



Davenport well



Explanation - Percentile Classes

◆ Data Point

● < 10 ● 10 - 24 ● 25 - 75 ● 76 - 90 ● > 90

▲ Monthly Median

Summary Conditions as of Dec 3, 2021

Streamflow

7-day average streamflow statewide is above normal (near 90th percentile).

- Much of the state is currently at normal flow conditions whereas the north central part of the state and the northern Cascades are much above normal conditions (>90th percentile)

7-day average streamflow at eight index gaging stations:

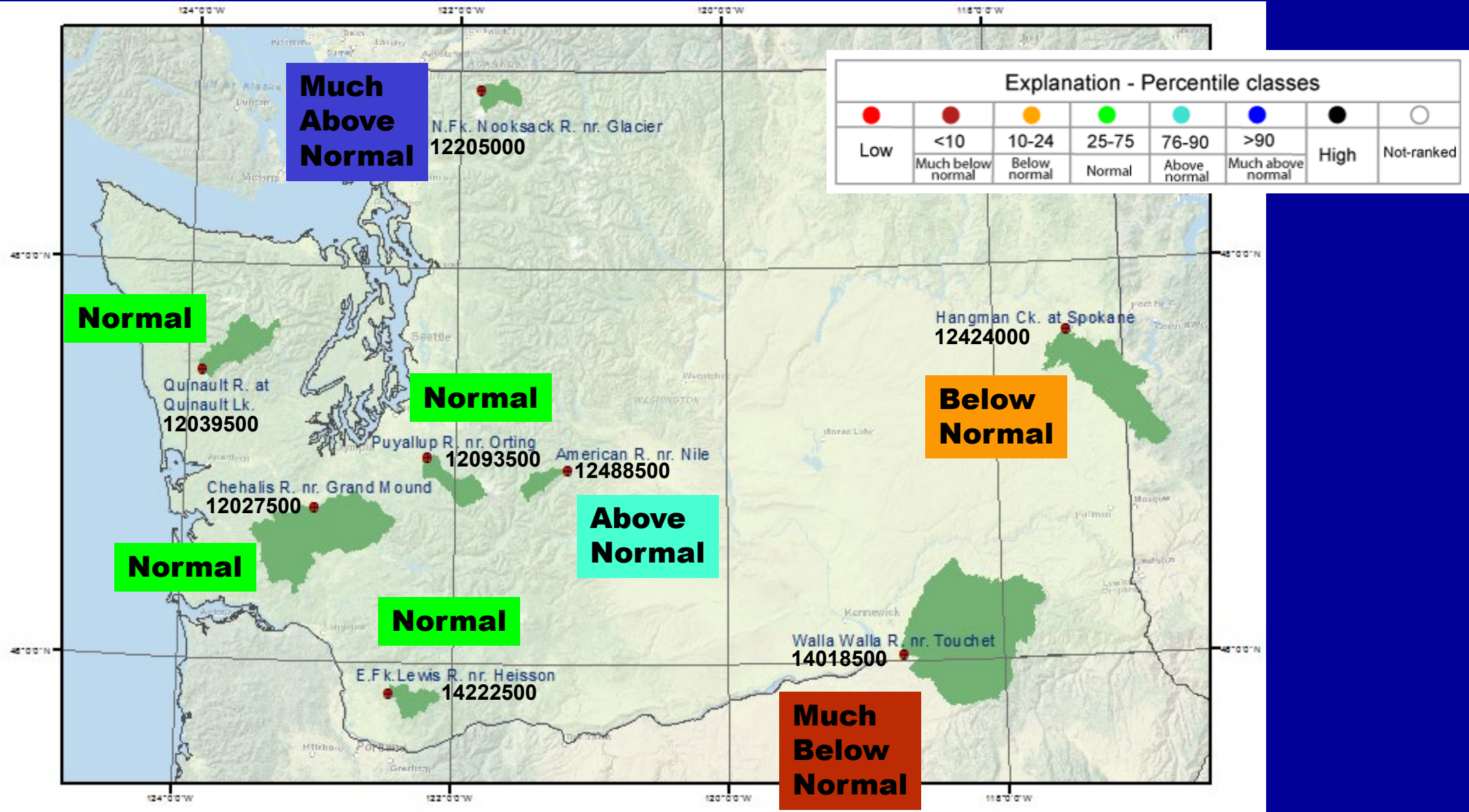
- North:
 - Nooksack River: Much Above Normal
- Southwest : Normal
 - Chehalis River nr. Grand Mound, EF Lewis River, Quinalt River at Quinalt Lake, Puyallup River nr. Orting
 - American River: Above Normal
- East side:
 - Hangman Creek – Below normal
 - Walla Walla River– Much Below Normal

Groundwater

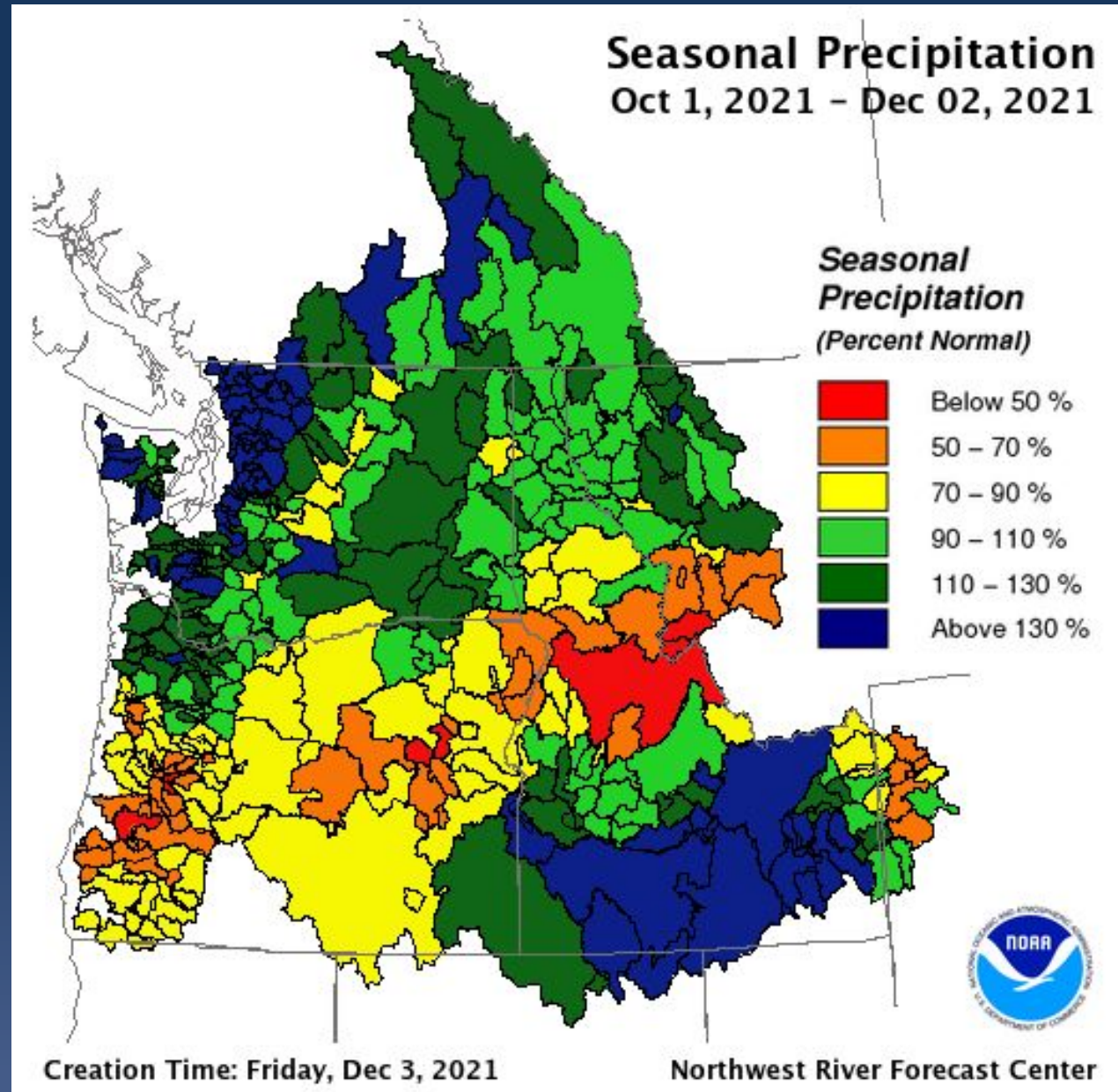
Index groundwater sites:

- Davenport well (east) – Below Normal
- Scatter Creek well (west) – Much Above Normal

Index Gaging Stations, 7-day average streamflow (as of Dec. 3, 2021)

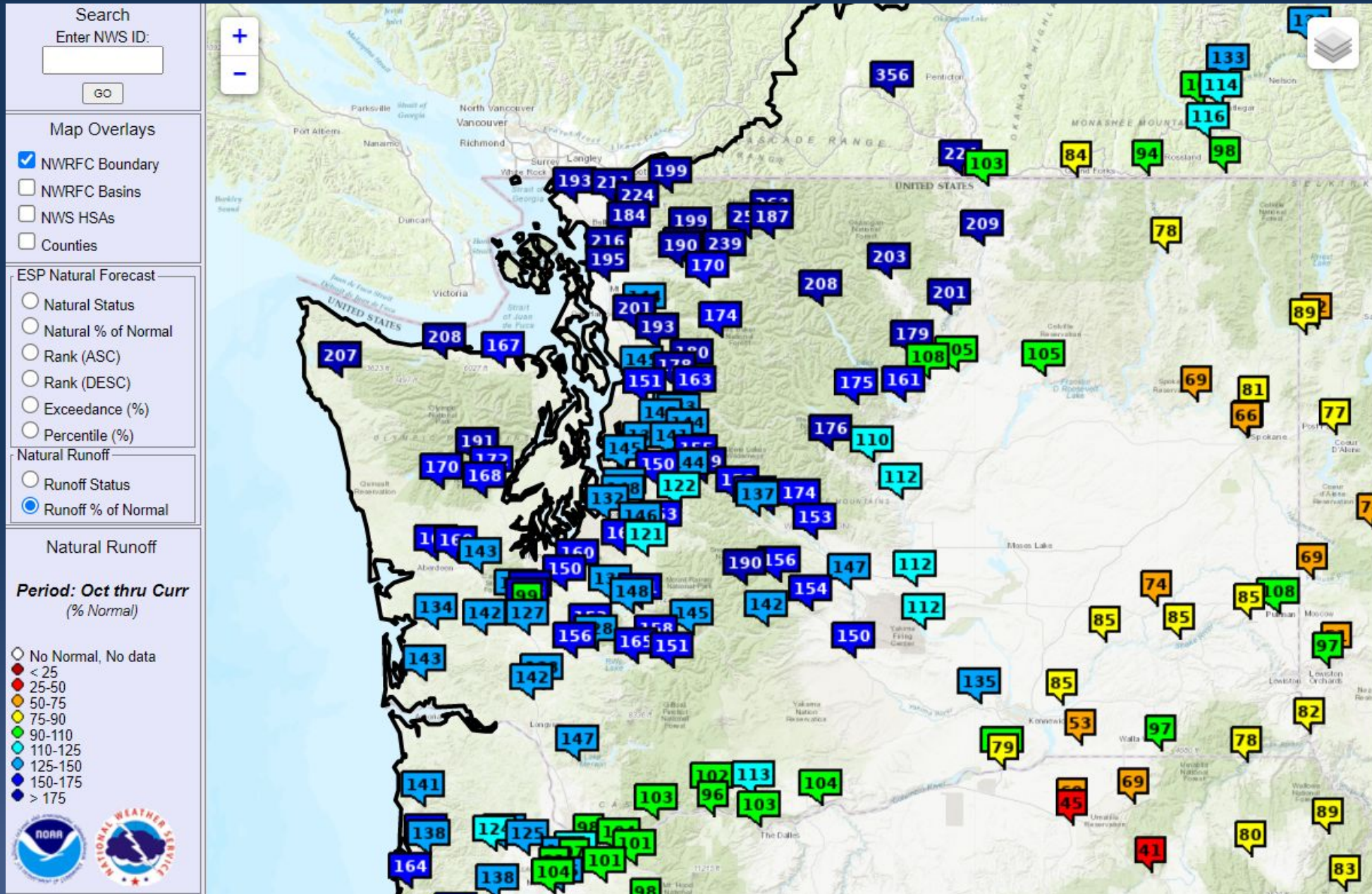


Precipitation



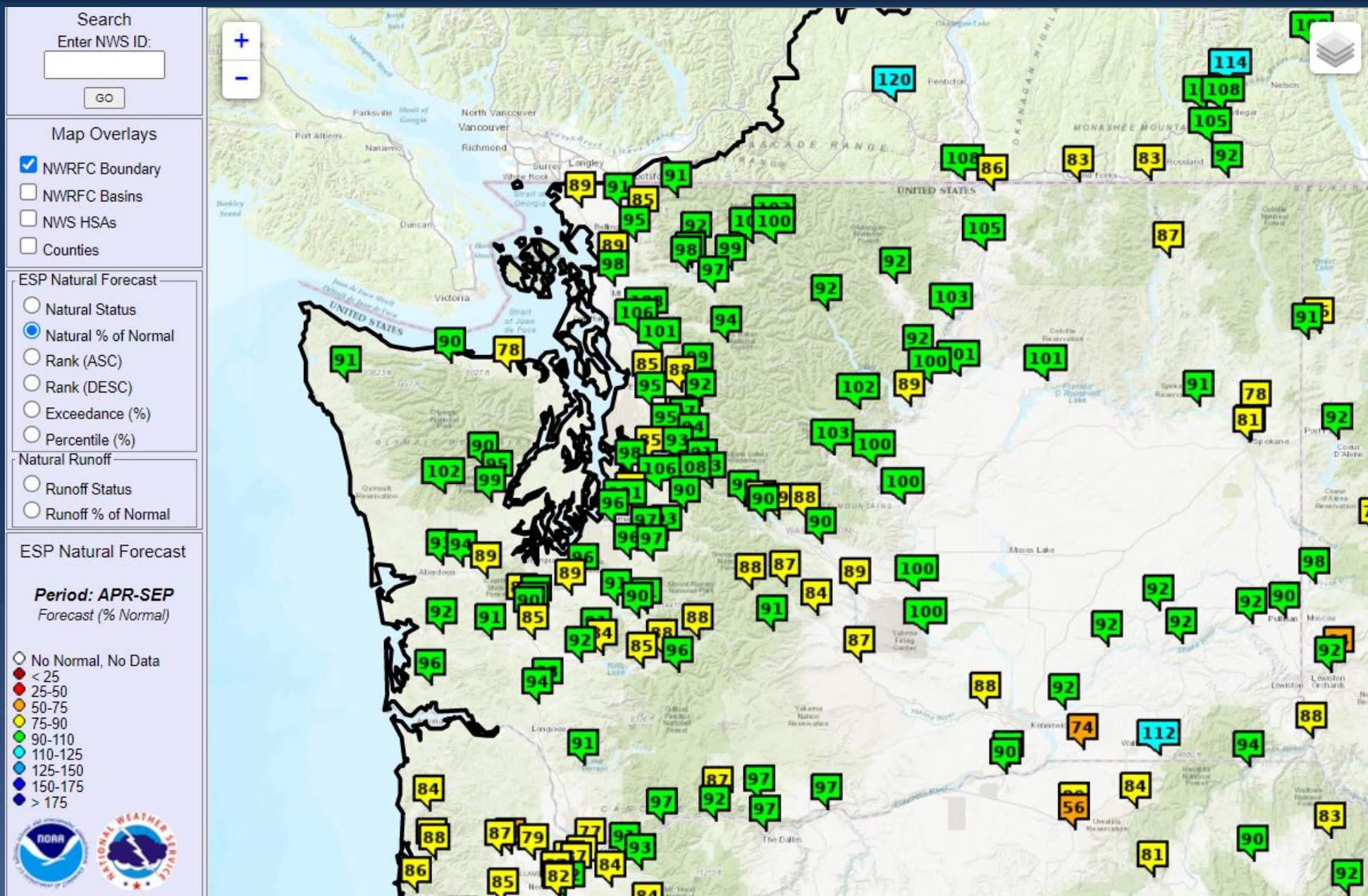


Natural Runoff - WA





Natural ESP10 - WA





— BUREAU OF —
RECLAMATION

Yakima River Basin

Yakima Basin, Washington

Dec 2, 2021, WY 2022

KYKM - Oct 2021 Through Sep 2022

