

Washington Water Supply Availability Committee  
Hosted by Jeff Marti



<https://watech.webex.com/watech/j.php?MTID=mfd22bdb8531153f8796f6ba3ccca0fe1>

Friday, Oct 15, 2021 10:00 am | 1 hour 30 minutes | (UTC-07:00) Pacific Time (US & Canada)

Meeting number: 177 165 6376

Password: waterYear2022

Agenda: The Washington State Water Supply Availability Committee (WSAC) meets periodically to monitor water supply conditions and forecasts for Washington State.

Join by video system

Dial [1771656376@webex.com](mailto:1771656376@webex.com)

You can also dial 173.243.2.68 and enter your meeting number.

Join by phone

+1-415-655-0001 US Toll

+1-206-207-1700 United States Toll (Seattle)

Access code: 177 165 6376

**Water Supply Availability Committee  
October 15, 2021  
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Access code: 177 165 6376**

Start Time	End Time	Duration, min	Description	Presenter
10:00	10:15	15	Welcome & Introductions	Jeff Marti, WDOE
10:15	10:30	15	Regional Climate Perspective -Recent precipitation and temperature -Seasonal Forecasts/ENSO	Karin Bumbaco/Nick Bond, OWSC
10:30	10:45	15	Mountain Report	Scott Pattee, NRCS
10:45	10:55	10	Streamflow Conditions	Nick Sutfin, USGS Wendy Welch, USGS
10:55	11:05	10	Streamflow Forecasts	Amy Burke, NWRFC Brent Bower, NWS
11:05	11:15	10	Yakima Basin	Chris Lynch, BOR
11:15	11:30	15	Reports from Other Water Managers	All

# First CoCoRaHs Volunteer? David Douglas, July 1826.

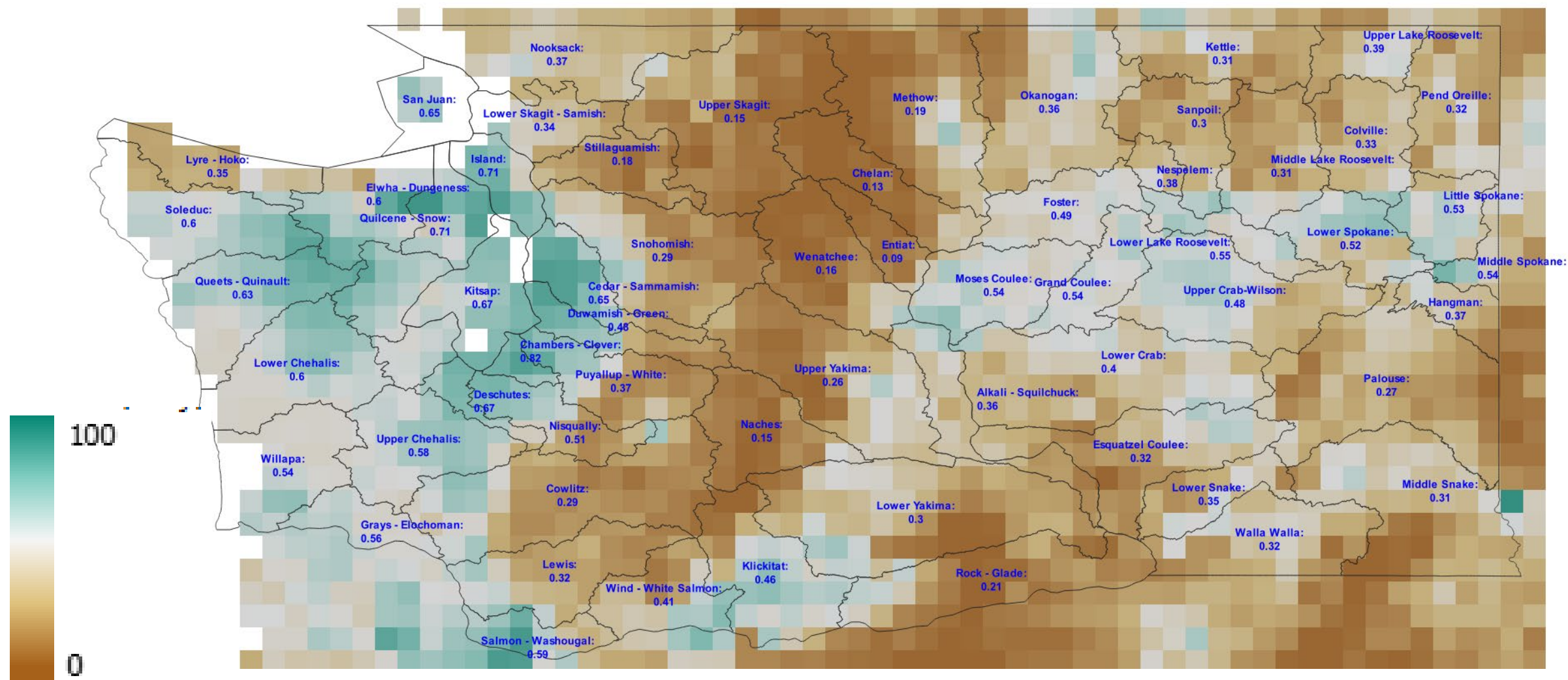
...[T]he thermometer frequently stood from 98 to 106 of Fahr. in the shade, destitute of a screen from the scorching sun. The only thing I might say that renders it superior to the deserts of Arabia is abundance of good water enjoyed in inland voyages. That excepted, there is but little difference.

David Douglas, somewhere upstream from the mouth of the Snake River ~ July 17-24, 1826



MR DAVID DOUGLASS. <sup>3</sup>

# Total Moisture Percentile (Not Percent of Normal)



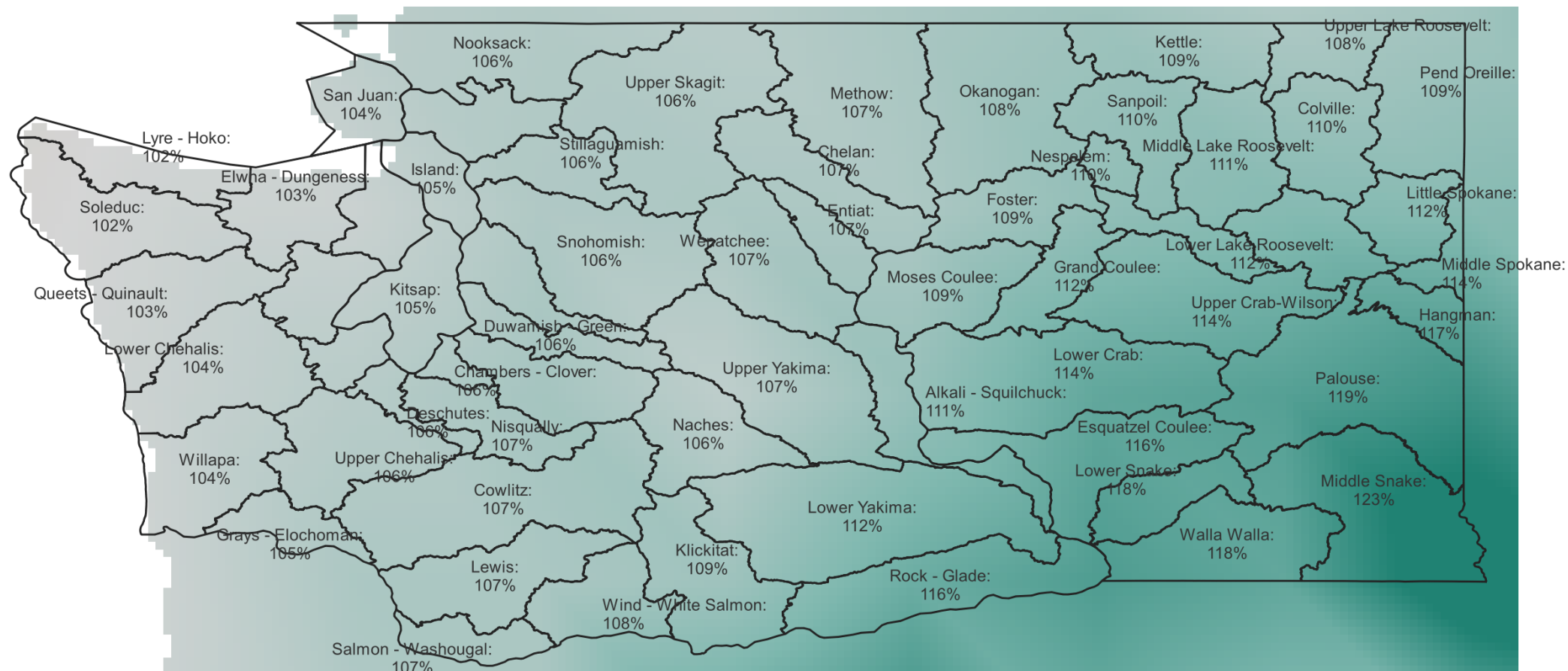
Statewide mean: 0.37

Climate Toolbox. UCLA-VIC 10/04/2021



# Total Precipitation Anomaly, Nov 2021 to Jan 2022 Average

Multi-model mean from 5 downscaled NMME models - forecast made Oct 8, 2021. Adapted from Climate Toolbox.









# 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  
15 October 2021

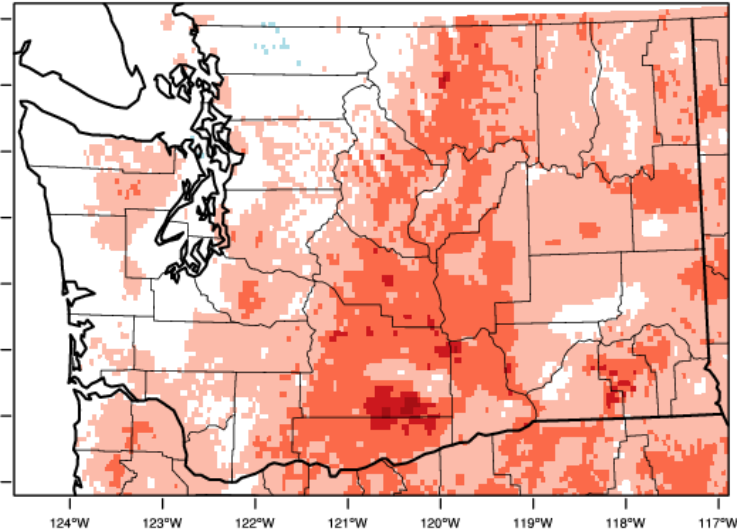


# 2021 Water Year

## Temperature

### Washington - Mean Temperature

October-September 2021 Departure from 1981-2010 Normal

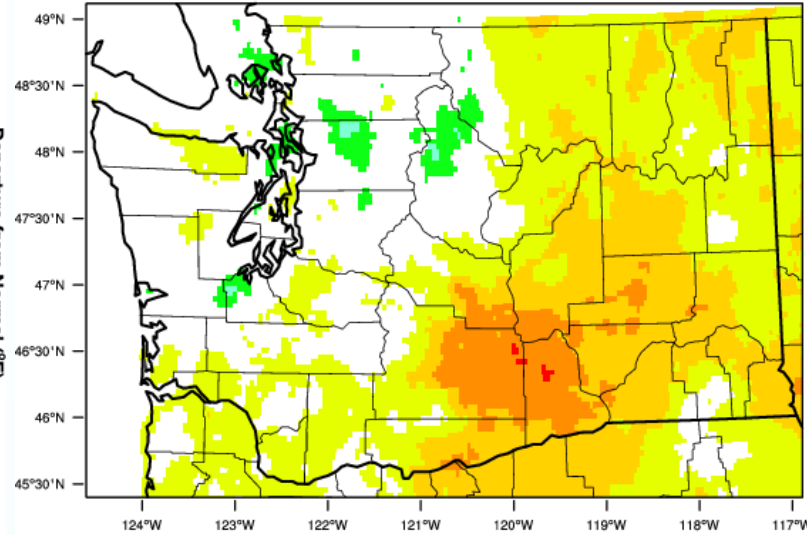


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 11 OCT 2021

## Precipitation

### Washington - Precipitation

October-September 2021 Percent of 1981-2010 Normal

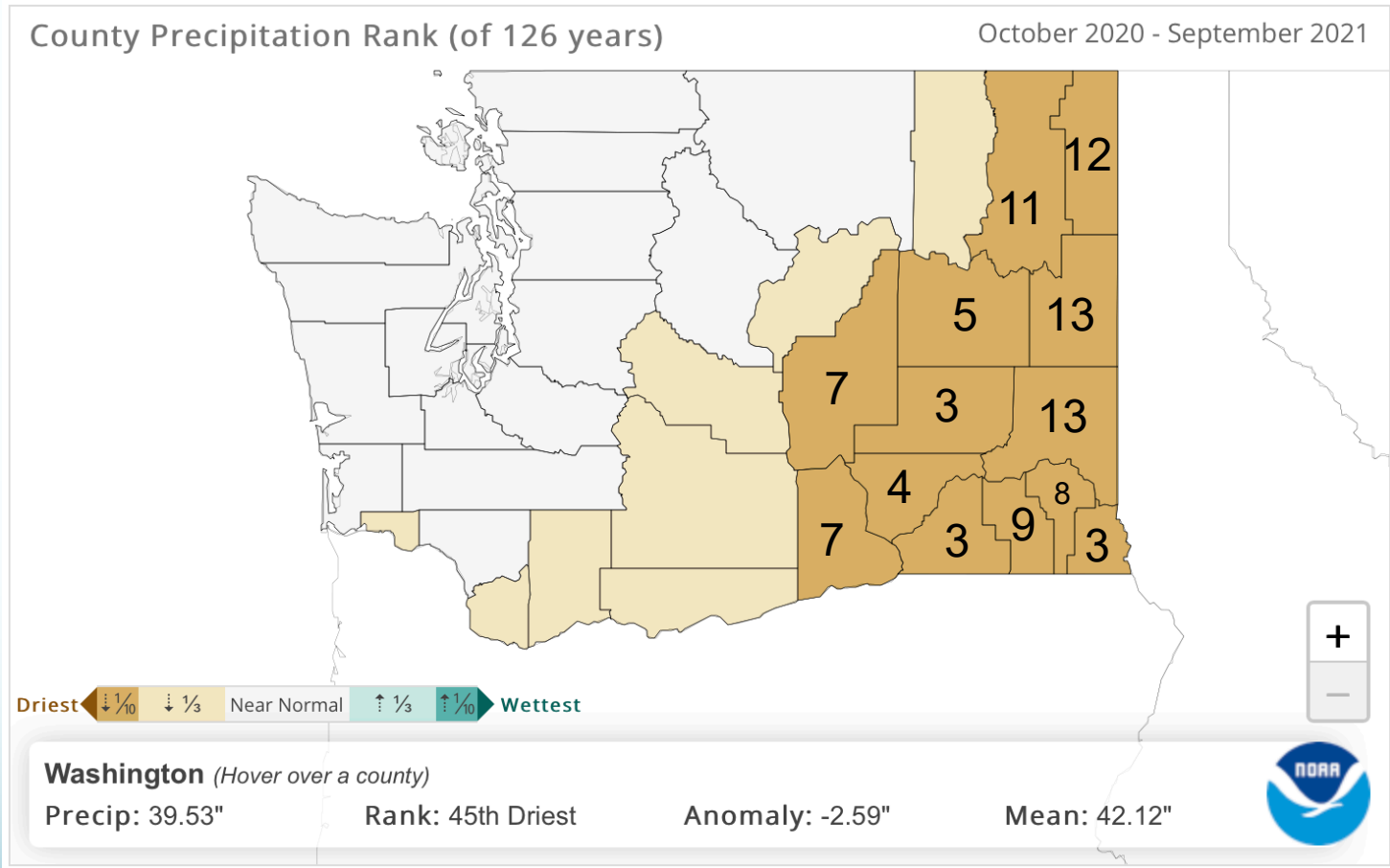


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 11 OCT 2021

- Averaged statewide, WY 2021 was warmer than normal (+1.7°F), ranking as the 8<sup>th</sup> warmest\*
- Averaged statewide, below normal precipitation for WY 2021 (-3.02")

\*Records since 1895

# WY Precipitation County Rankings

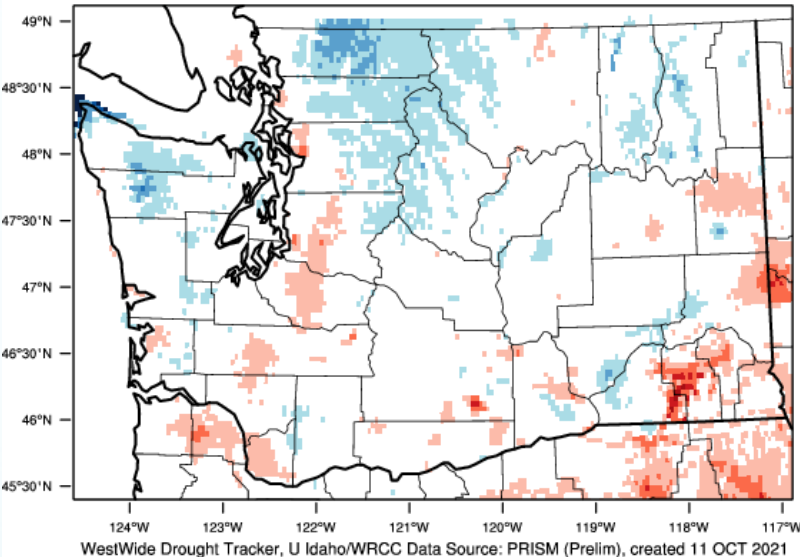


# September 2021

## Temperature

### Washington - Mean Temperature

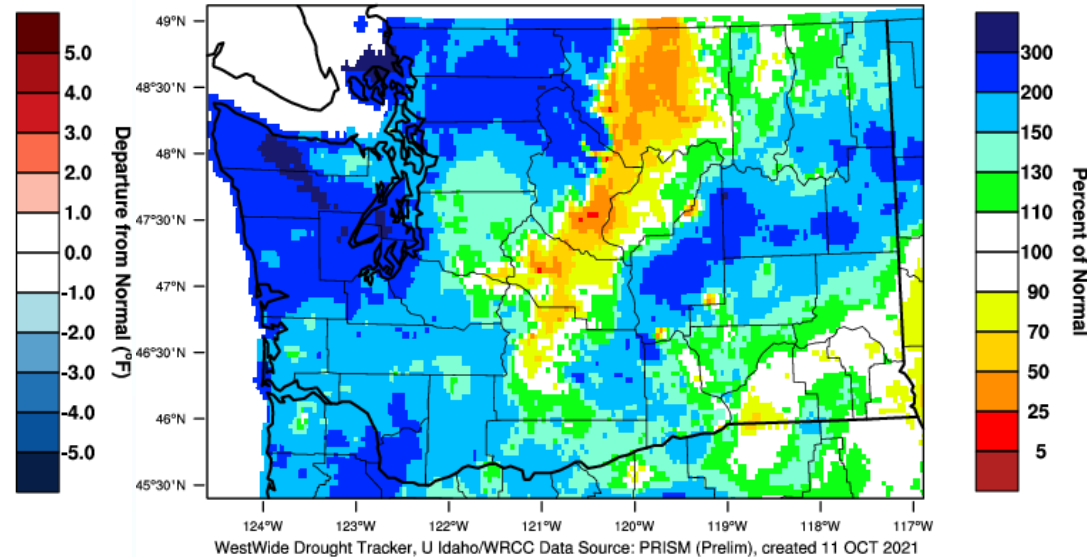
September 2021 Departure from 1981-2010 Normal



## Precipitation

### Washington - Precipitation

September 2021 Percent of 1981-2010 Normal

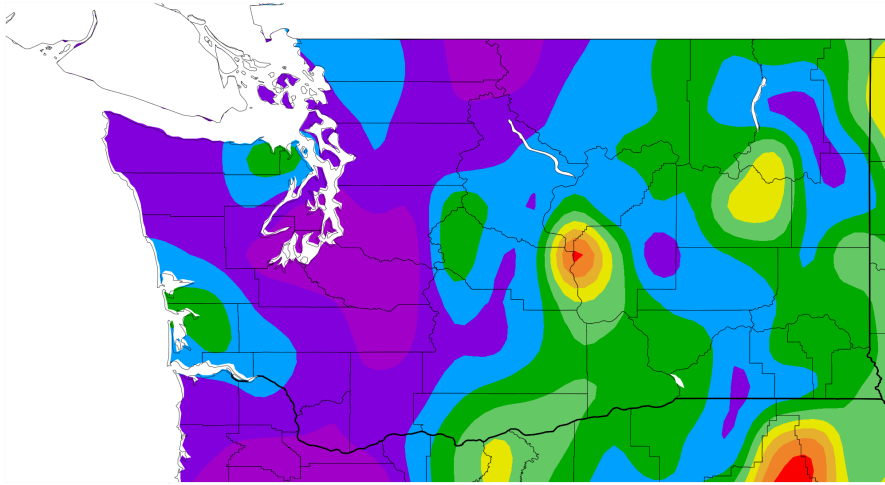


- Averaged statewide, near-normal temperatures (0.2°F)
- Wetter than normal (+1.51") averaged statewide

# October 2021

## Temperature

Departure from Normal Temperature (F)  
10/1/2021 – 10/11/2021

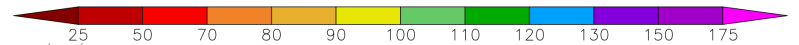
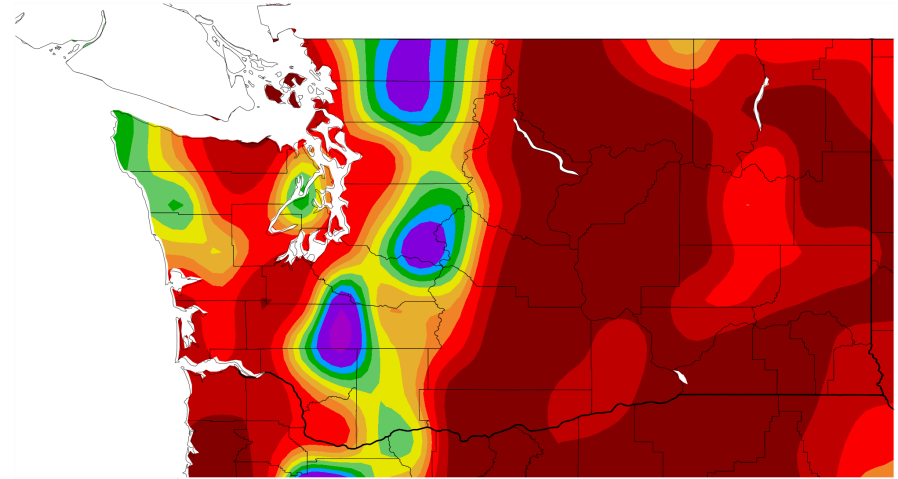


Generated 10/12/2021 at HPRCC using provisional data.

NOAA Regional Climate Center: Generated 10/12/2021 at HPRCC using provisional data.

## Precipitation

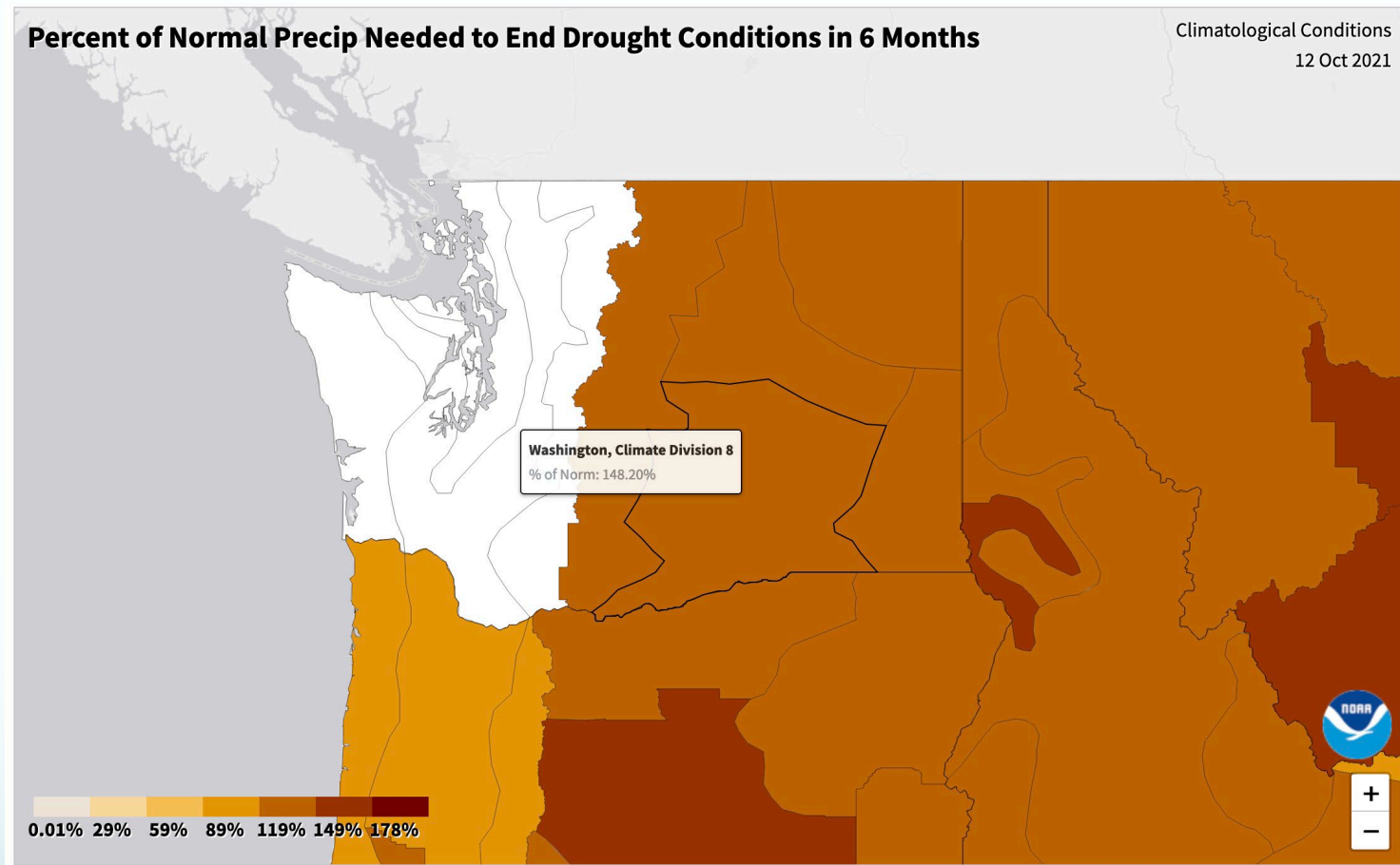
Percent of Normal Precipitation (%)  
10/1/2021 – 10/11/2021



NOAA Regional Climate Centers



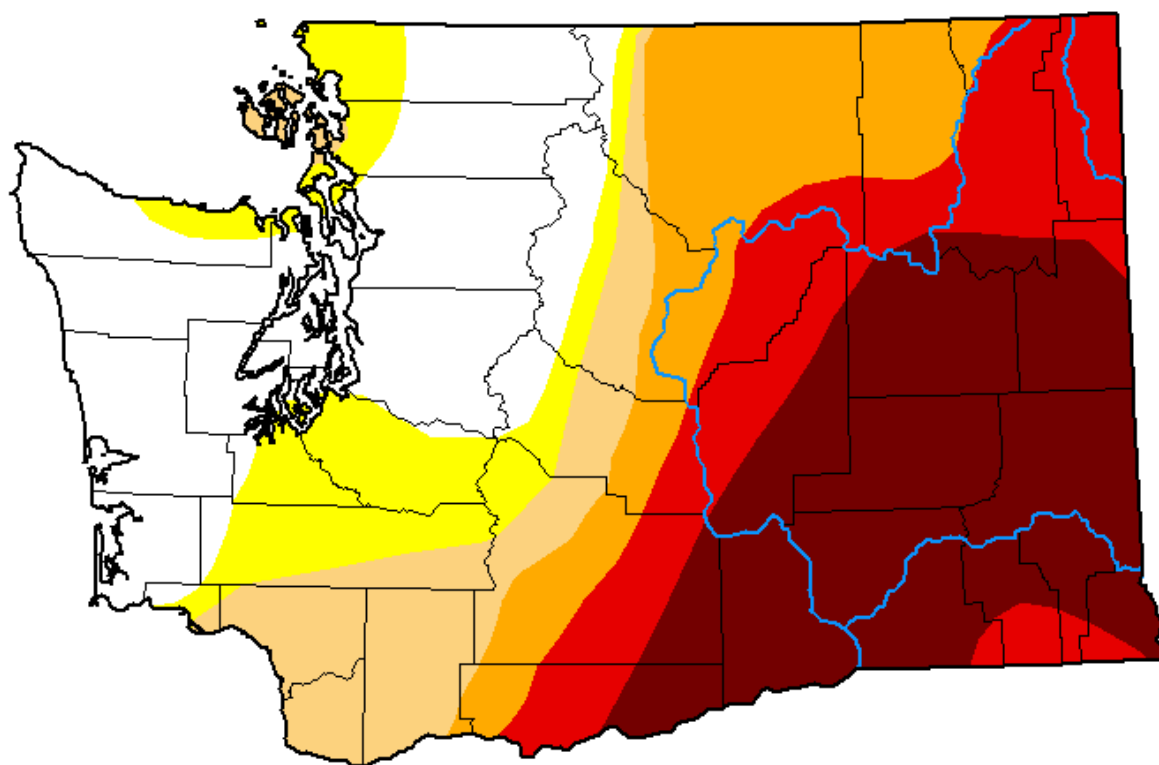
# NOAA Drought Termination Tool









- Probability of drought ending for 4 eastern-most climate divisions is 2-4%

# U.S. Drought Monitor Washington

**October 12, 2021**  
(Released Thursday, Oct. 14, 2021)  
Valid 8 a.m. EDT



## 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:

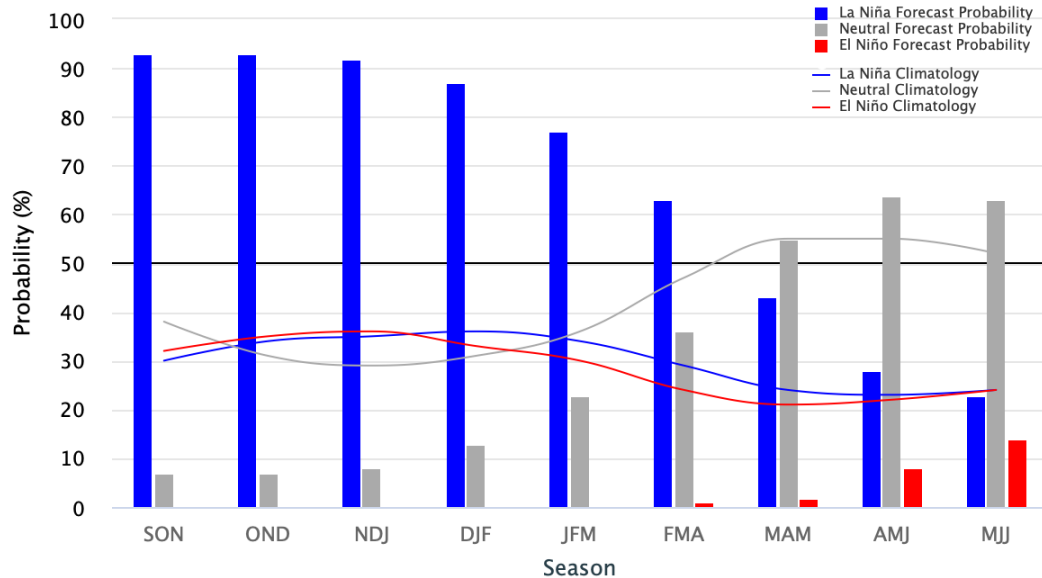
Adam Hartman  
NOAA/NWS/NCEP/CPC



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

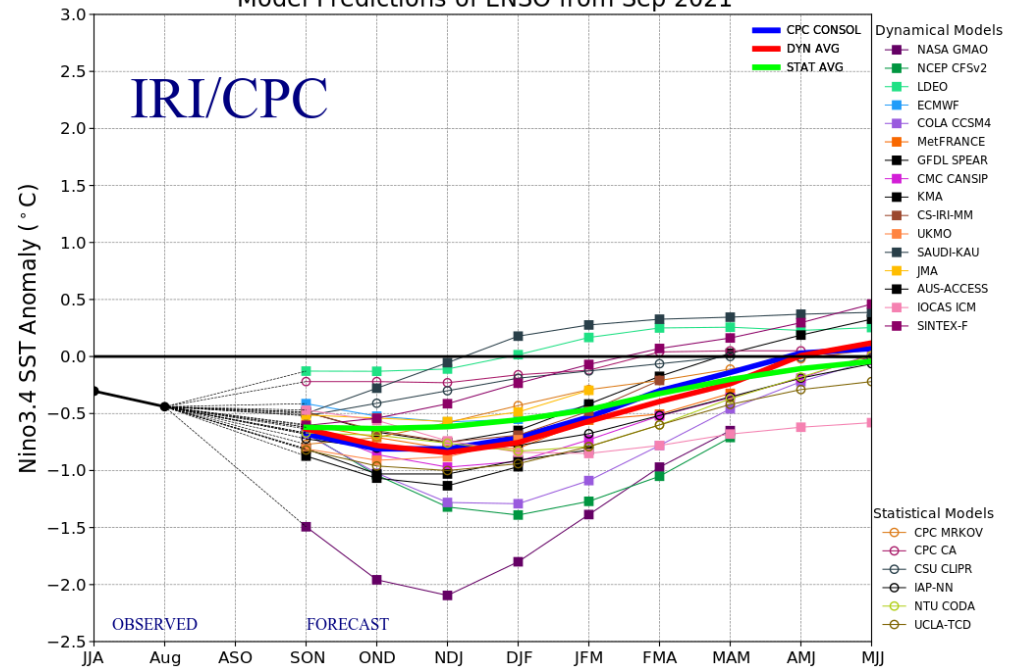
## Early-October 2021 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly  
Neutral ENSO:  $-0.5^{\circ}\text{C}$  to  $0.5^{\circ}\text{C}$

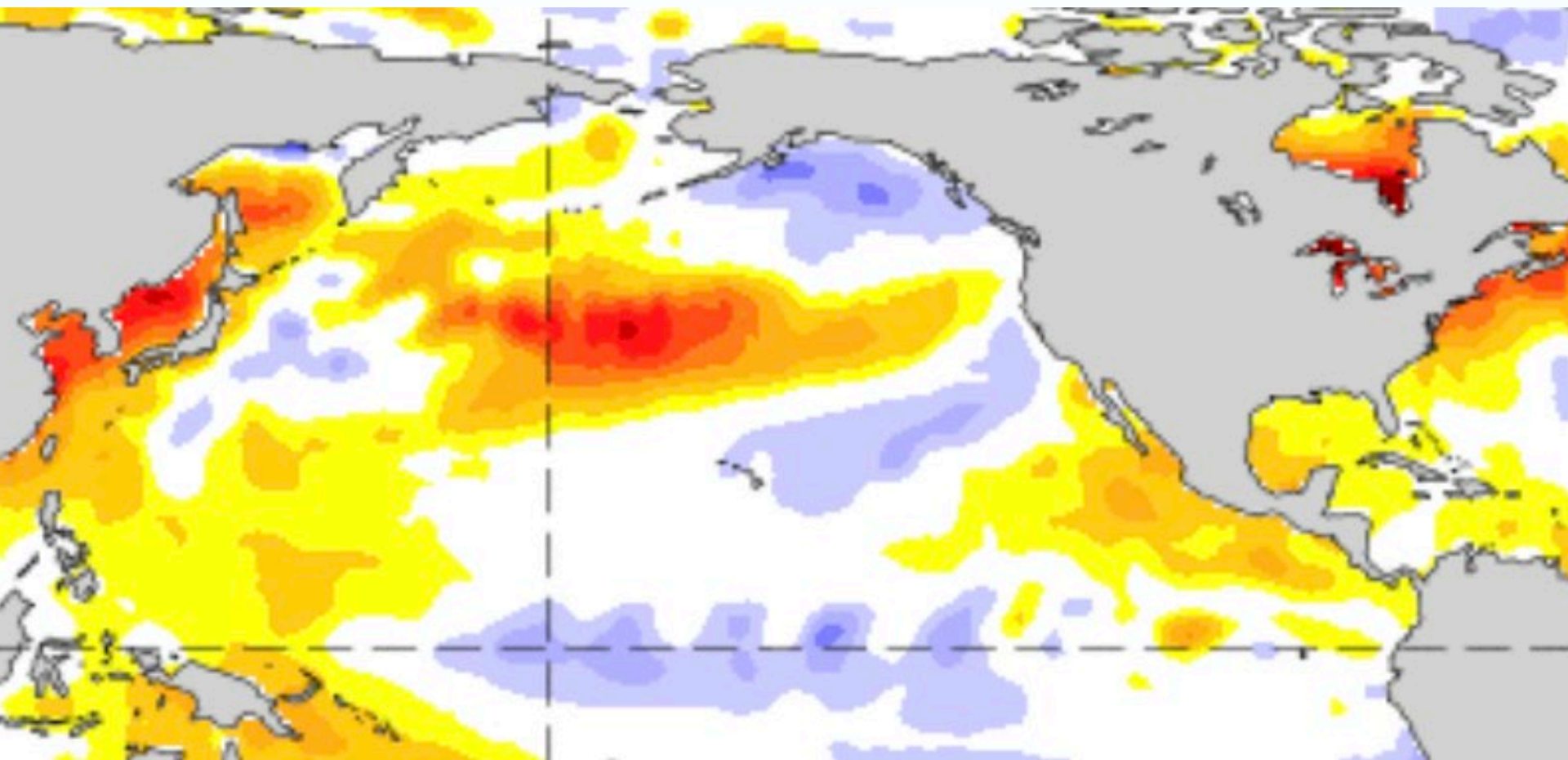


## ENSO Predictions

### Model Predictions of ENSO from Sep 2021



# SST Anomalies: 03-09 Oct 2021





## WA Statewide Temperature Anomalies (F) during Back-to-Back La Nina Years

Winter	Oct-Dec	Jan-Mar
1949-50	0.1	-9.1
1954-55	0.9	-4.8
1970-71	-1.8	-2.2
1998-99	0.3	0.6
2007-08	-1.1	-2.1
2010-11	-0.2	-1.5
2016-17	0.2	-3.7
2020-21	1.3	-0.1
Average	0.0 +/- 1.0	-2.9 +/- 3.1

Winter	Oct-Dec	Jan-Mar
1950-51	0.5	-3.9
1955-56	-4.1	-5.6
1971-72	-2.1	-2.5
1999-00	2.2	-0.5
2008-09	-0.9	-2.6
2011-12	-0.8	-1.1
2017-18	-0.7	0.1
2021-22	?	?
Average	-0.8 +/- 2.0	-2.3 +/- 2.0

## WA Statewide Precipitation Anomalies (in.) during Back-to-Back La Nina Years

Winter	Oct-Dec	Jan-Mar
1949-50	1.24	6.35
1954-55	-2.13	-3.31
1970-71	0.47	5.22
1998-99	5.94	6.83
2007-08	-0.08	-1.67
2010-11	0.85	3.29
2016-17	5.17	4.20
2020-21	-0.48	0.39
Average	1.4 +/- 2.8	2.7 +/- 3.8

Winter	Oct-Dec	Jan-Mar
1950-51	5.67	4.12
1955-56	8.14	3.43
1971-72	0.13	6.46
1999-00	1.94	-0.83
2008-09	-2.01	-2.04
2011-12	-4.28	3.84
2017-18	2.09	0.28
2021-22	?	?
Average	1.7 +/- 4.3	2.2 +/- 3.1

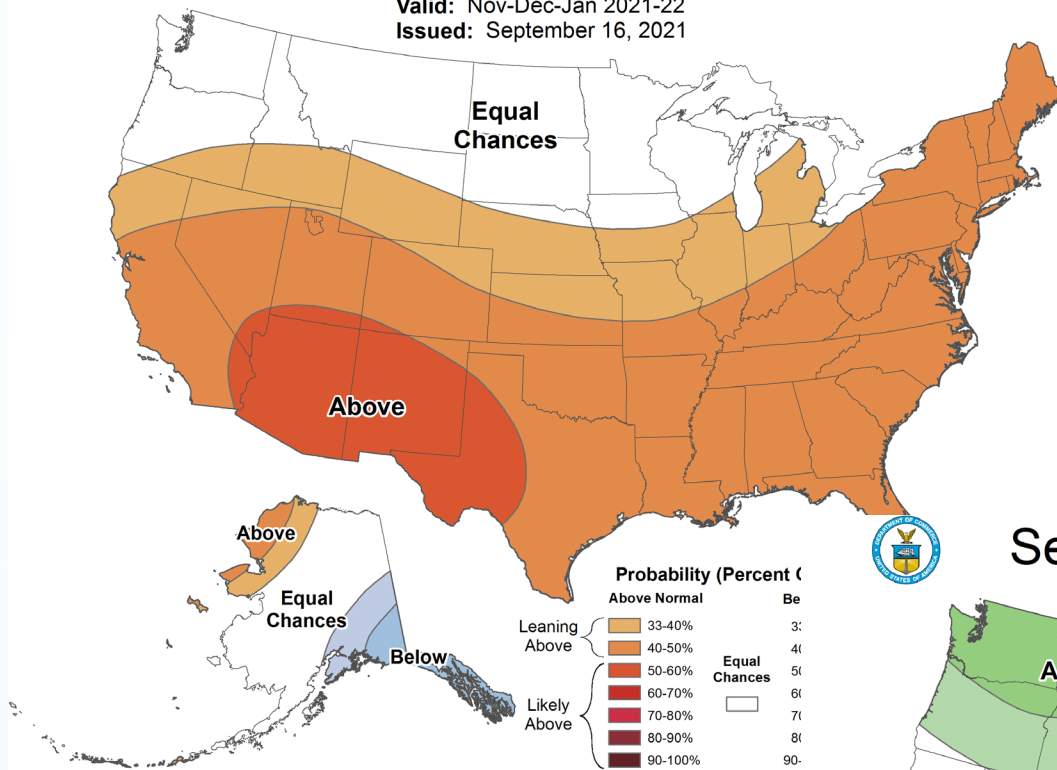


# Seasonal Temperature Outlook

Valid: Nov-Dec-Jan 2021-22  
Issued: September 16, 2021

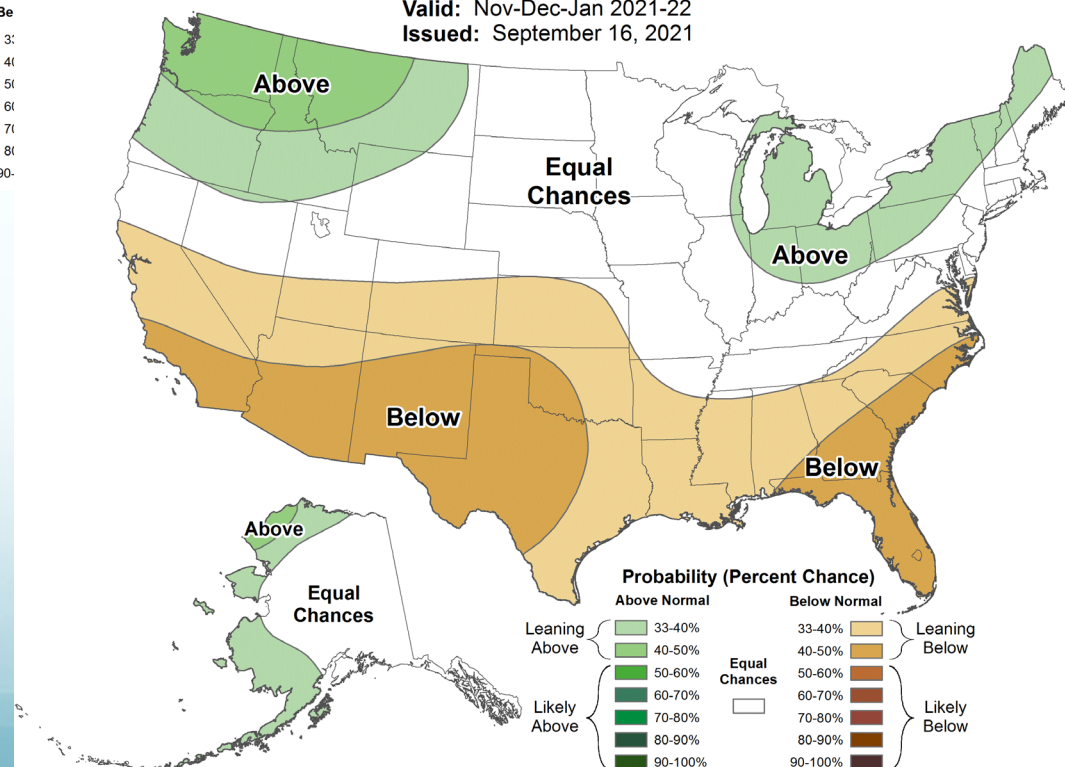


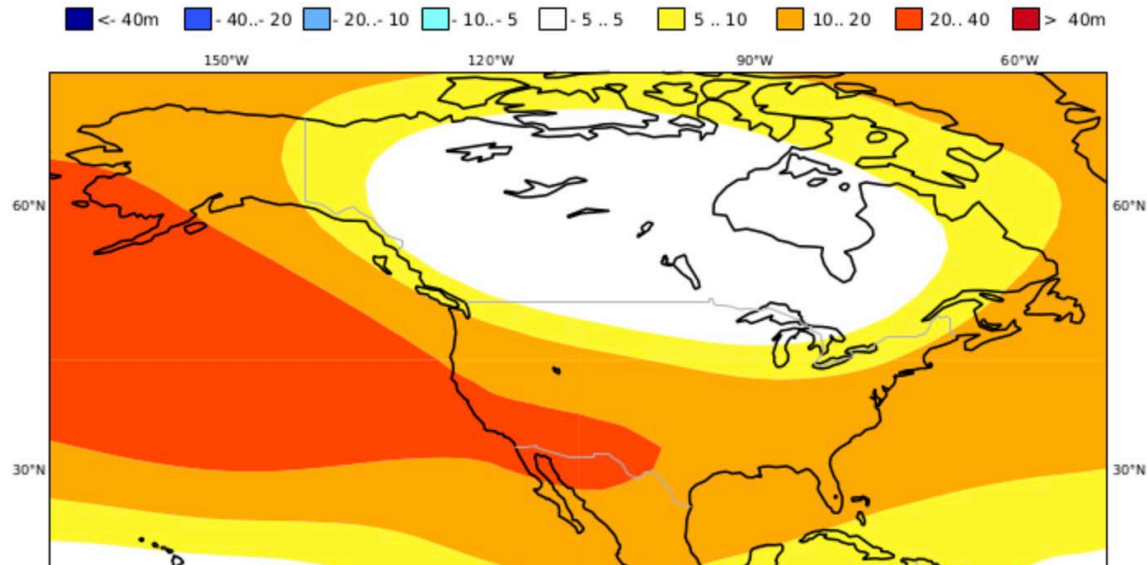
## NOAA/CPC Forecasts for Nov-Jan 2022



# Seasonal Precipitation Outlook

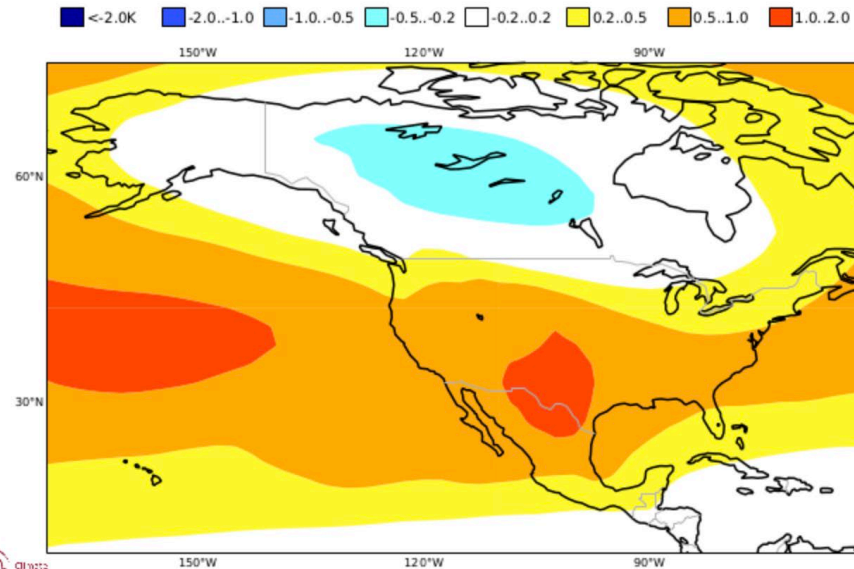
Valid: Nov-Dec-Jan 2021-22  
Issued: September 16, 2021



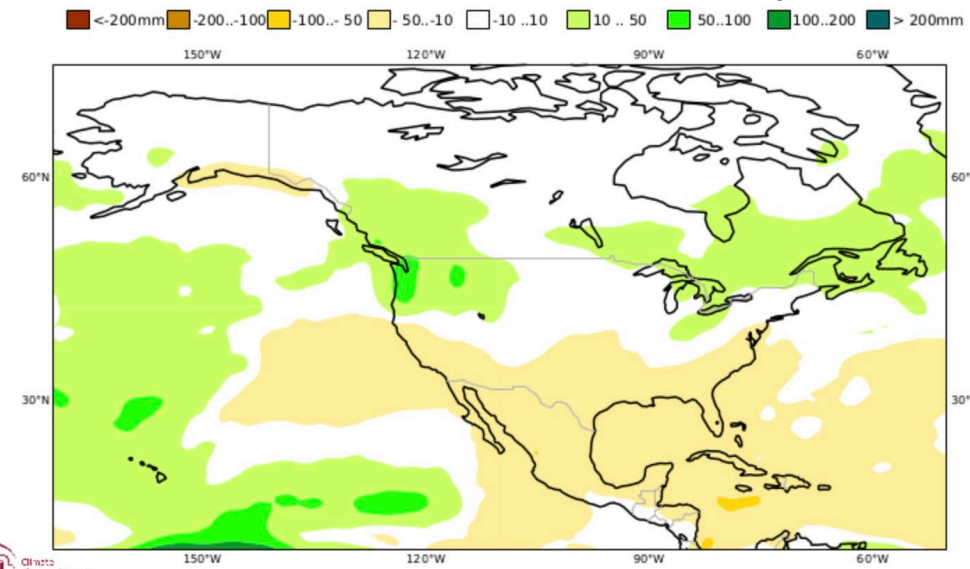


500 hPa  
Z Anomaly

850 hPa Temperature Anomaly



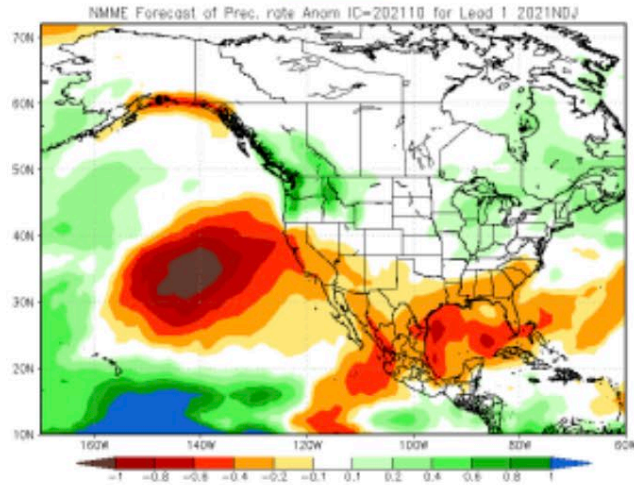
Precipitation Anomaly



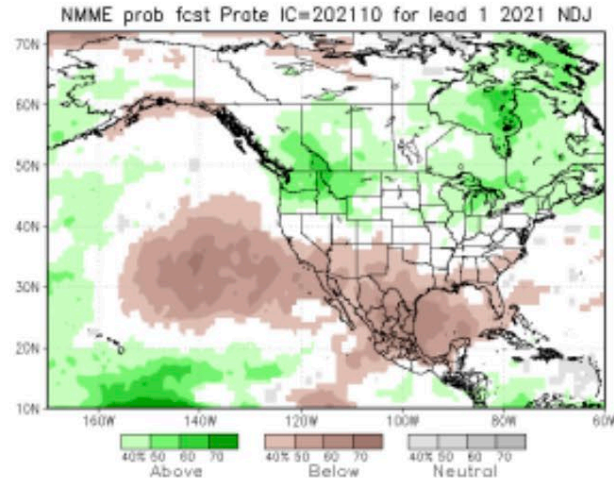


# November – January Precipitation Anomalies

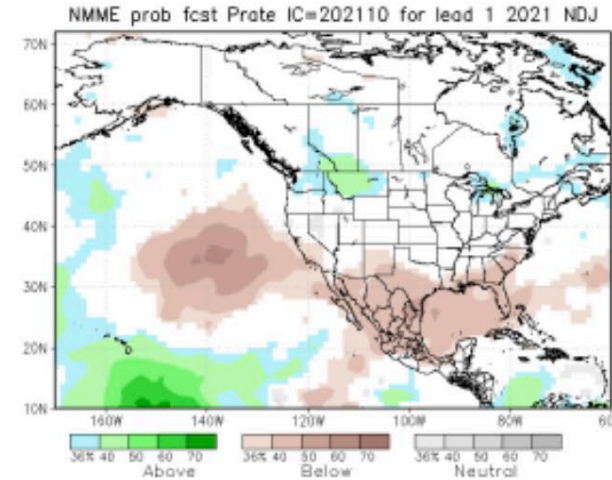
NMME



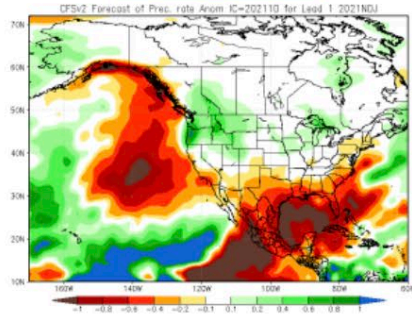
Prob fcst



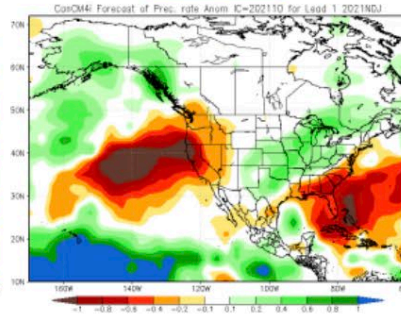
PAC calib. prob fcst



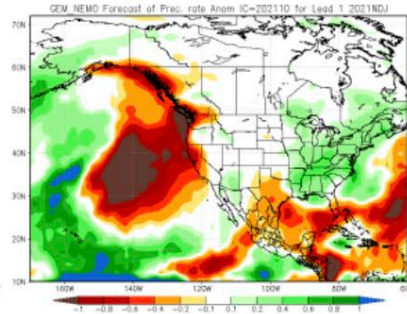
NCEP CFSv2



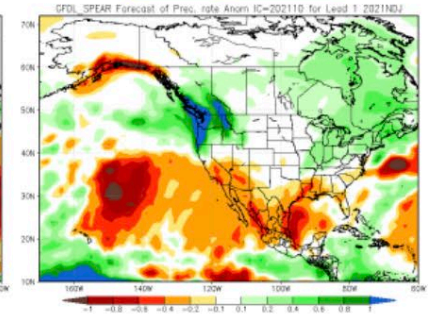
CanCM4i



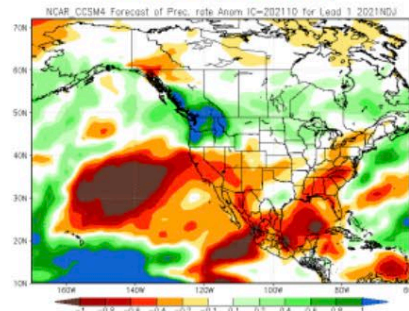
GEM NEMO



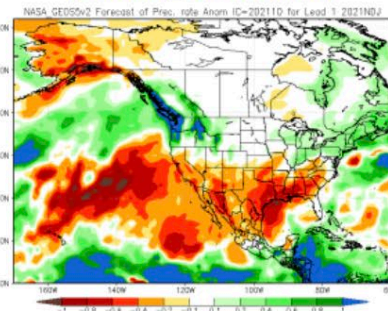
GFDL SPEAR



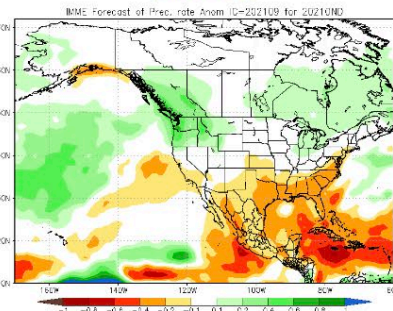
NCAR CCSM4



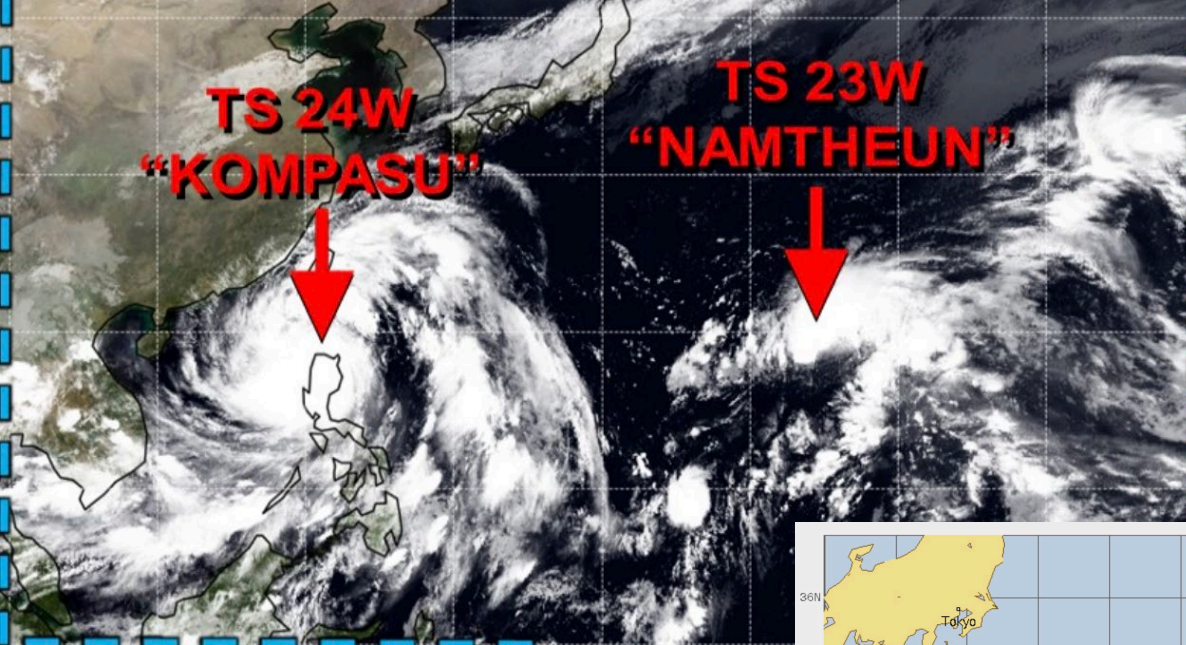
NASA GEOS5v2



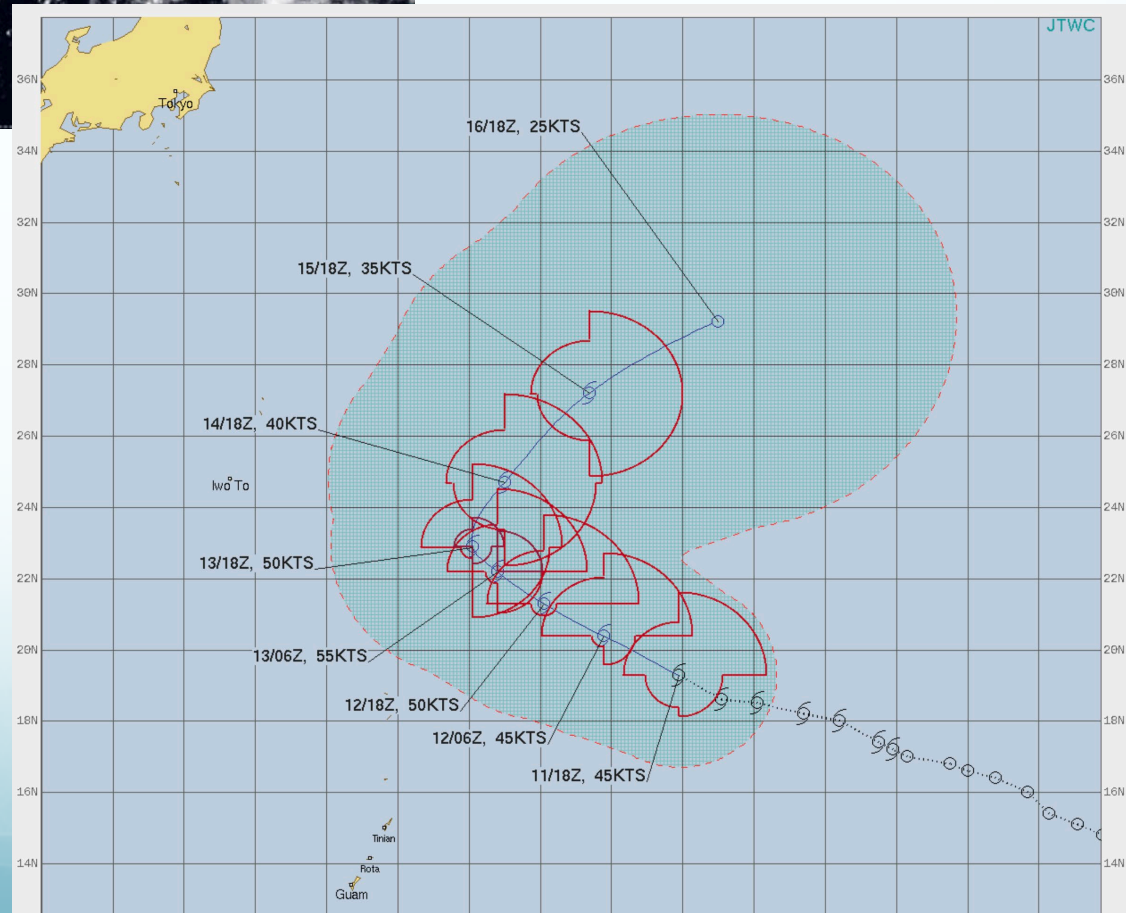
IMME







Tropical cyclones (typhoons) in the western North Pacific result in low average skill in NWP forecasts for the NE Pacific and western North America during boreal fall.



# Summary

- The wet season is getting off to a decent start
- There is a long way to go in terms catching up on precipitation, particularly east of the Cascades
- It is likely that La Nina will kick in later this calendar year; the autumn of the 2<sup>nd</sup> of back-to-back La Nina years tends to be wet. Be a hero and adopt a storm drain.
- No, the OWSC is not in the pocket of the ski resort industry...



Touchet SNOTEL 10/13/2021

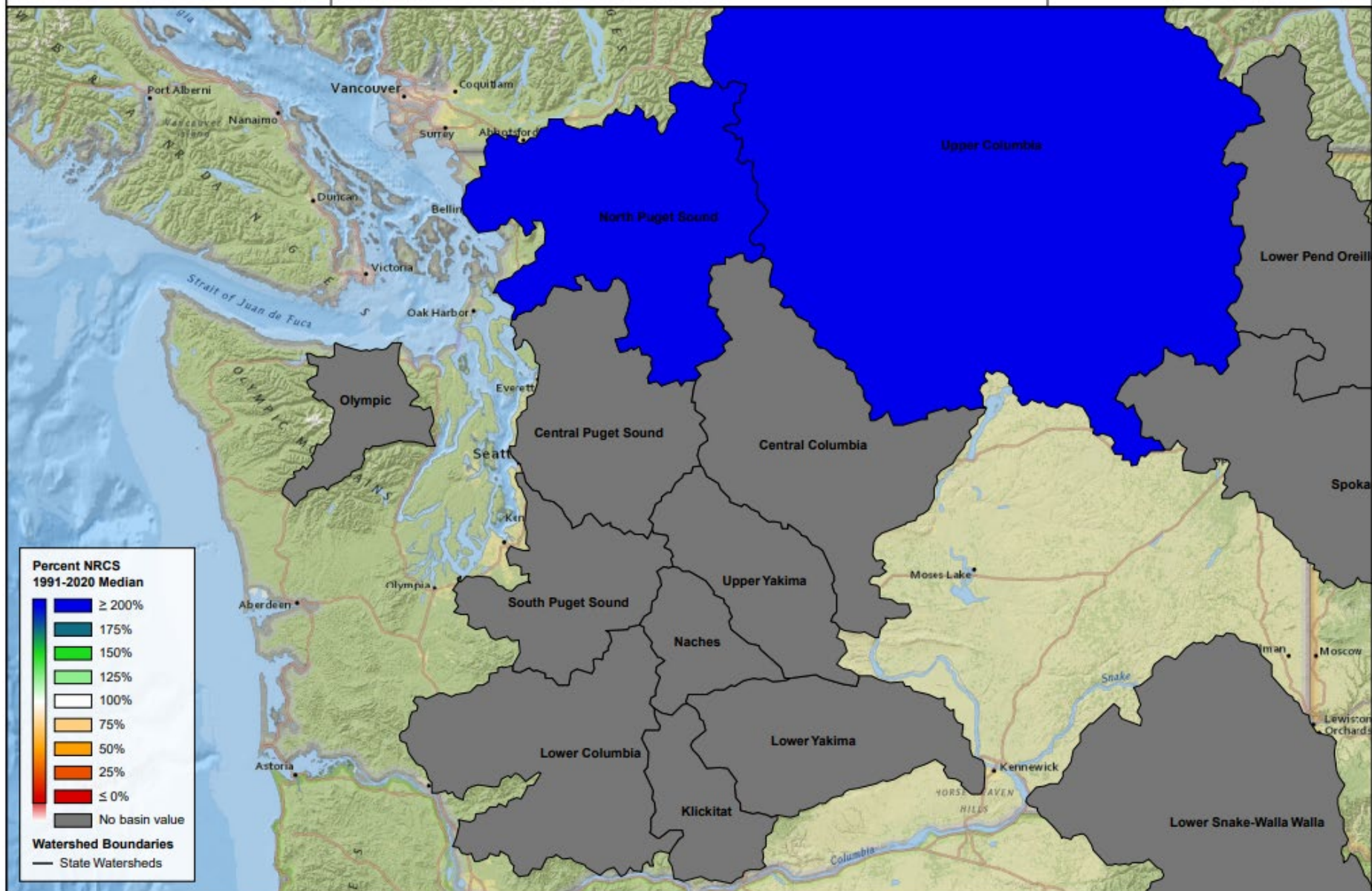




Snow Water Equivalent

Percent NRCS 1991-2020 Median

October 13, 2021, first of day





**UPPER COLUMBIA**

Swamp Creek	3930	0.2	0.0 <sub>(21)</sub>	*	0.6	1.0 <sub>(21)</sub>	60
Gold Mountain	4390	0.0	N/A	*	0.1	N/A	*
Salmon Meadows	4460	0.0	0.0	*	0.1	0.2	50
Muckamuck	4470	0.0	N/A	*	-M	N/A	*
Sentinel Butte	4680	0.2	0.0 <sub>(17)</sub>	*	-M	0.2 <sub>(17)</sub>	*
Rainy Pass	4890	0.0	0.0	*	0.4	1.1	36
Moses Mtn	5010	0.0	0.0 <sub>(29)</sub>	*	0.1	0.2 <sub>(29)</sub>	50
Gold Axe Camp	5360	0.3	0.0 <sub>(10)</sub>	*	0.0	0.2 <sub>(10)</sub>	0
Harts Pass	6490	0.4	0.1	400*	0.4	1.4	29
<b>Basin Index (%)</b>	<b>1100*</b>				<b>39</b>		

**NORTH PUGET SOUND**

Hozomeen Camp	1690	-M	N/A	*	0.6	1.0 <sub>(20)</sub>	60
Elbow Lake	3040	0.4	0.0 <sub>(25)</sub>	*	3.7	4.5 <sub>(25)</sub>	82
Marten Ridge	3520	0.3	0.0 <sub>(14)</sub>	*	4.4	4.0 <sub>(14)</sub>	110
Beaver Pass	3630	0.2	0.0 <sub>(19)</sub>	*	1.4	2.2 <sub>(19)</sub>	64
Swamp Creek	3930	0.2	0.0 <sub>(21)</sub>	*	0.6	1.0 <sub>(21)</sub>	60
Wells Creek	4030	0.2	0.0 <sub>(25)</sub>	*	2.4	2.1 <sub>(25)</sub>	114
Thunder Basin	4320	0.2	0.0	*	1.3	1.8	72
Rainy Pass	4890	0.0	0.0	*	0.4	1.1	36
MF Nooksack	4970	0.7	0.0 <sub>(18)</sub>	*	3.1	3.2 <sub>(18)</sub>	97
Easy Pass	5270	0.9	0.0 <sub>(11)</sub>	*	-M	N/A	*
Brown Top	5830	0.8	0.0 <sub>(11)</sub>	*	-M	N/A	*
Lyman Lake	5980	1.4	0.0	*	1.2	2.0	60
Harts Pass	6490	0.4	0.1	400*	0.4	1.4	29
<b>Basin Index (%)</b>	<b>5700*</b>				<b>80</b>		

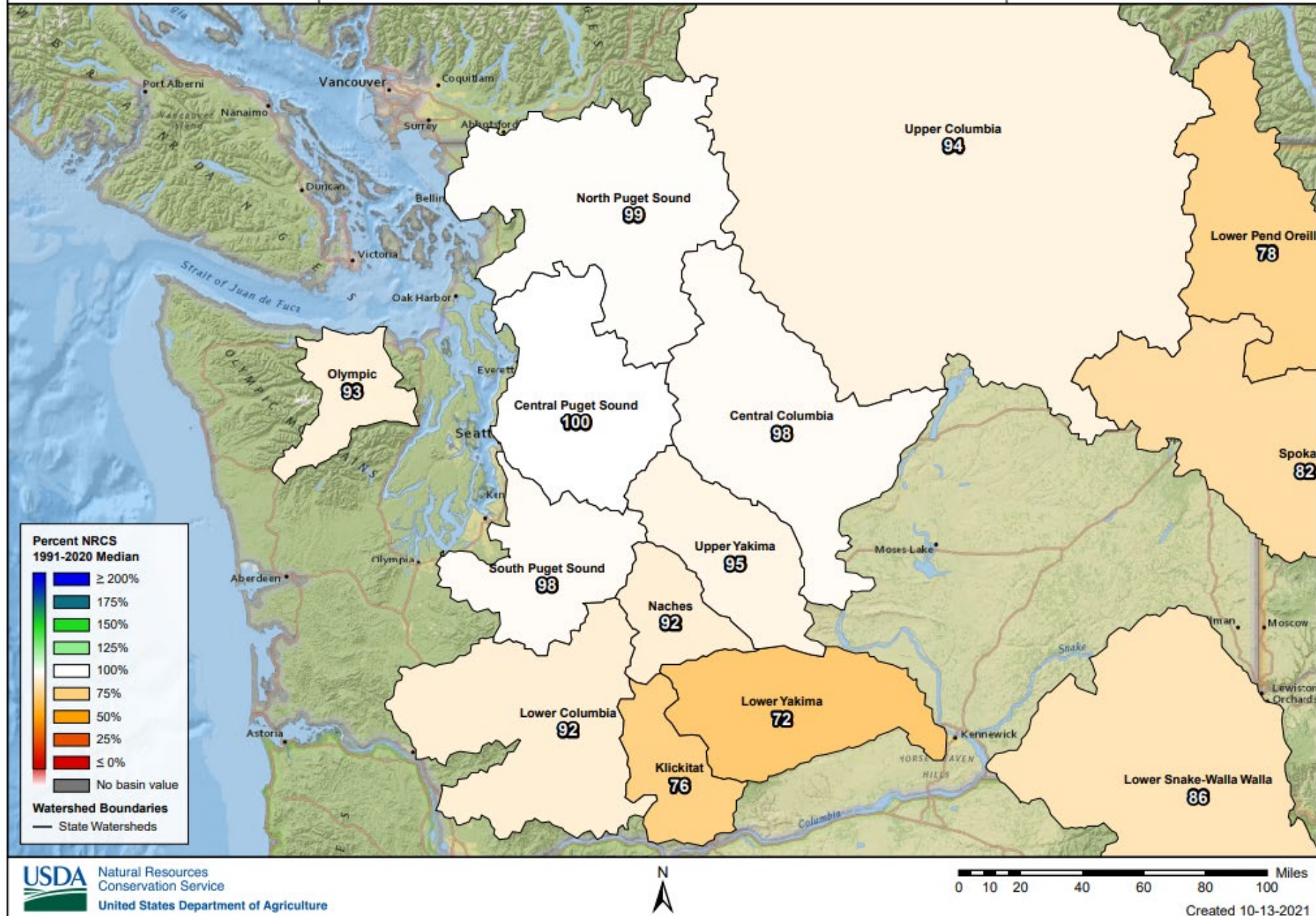


PRECIPITATION

Water Year to Date Precipitation

Percent NRCS 1991-2020 Median

October 1, 2020 - September 30, 2021

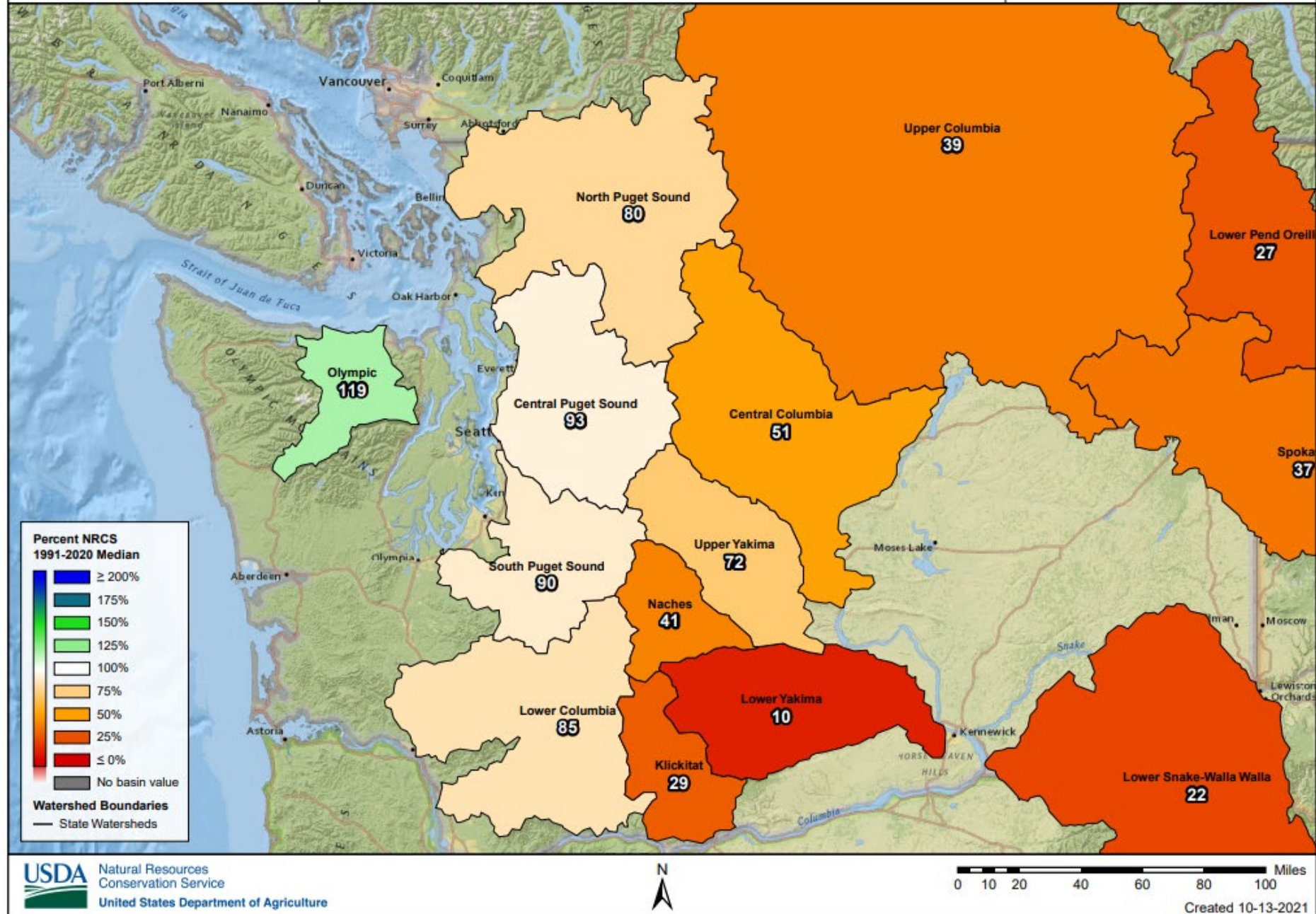




Water Year to Date Precipitation

Percent NRCS 1991-2020 Median

October 1, 2021 - October 12, 2021

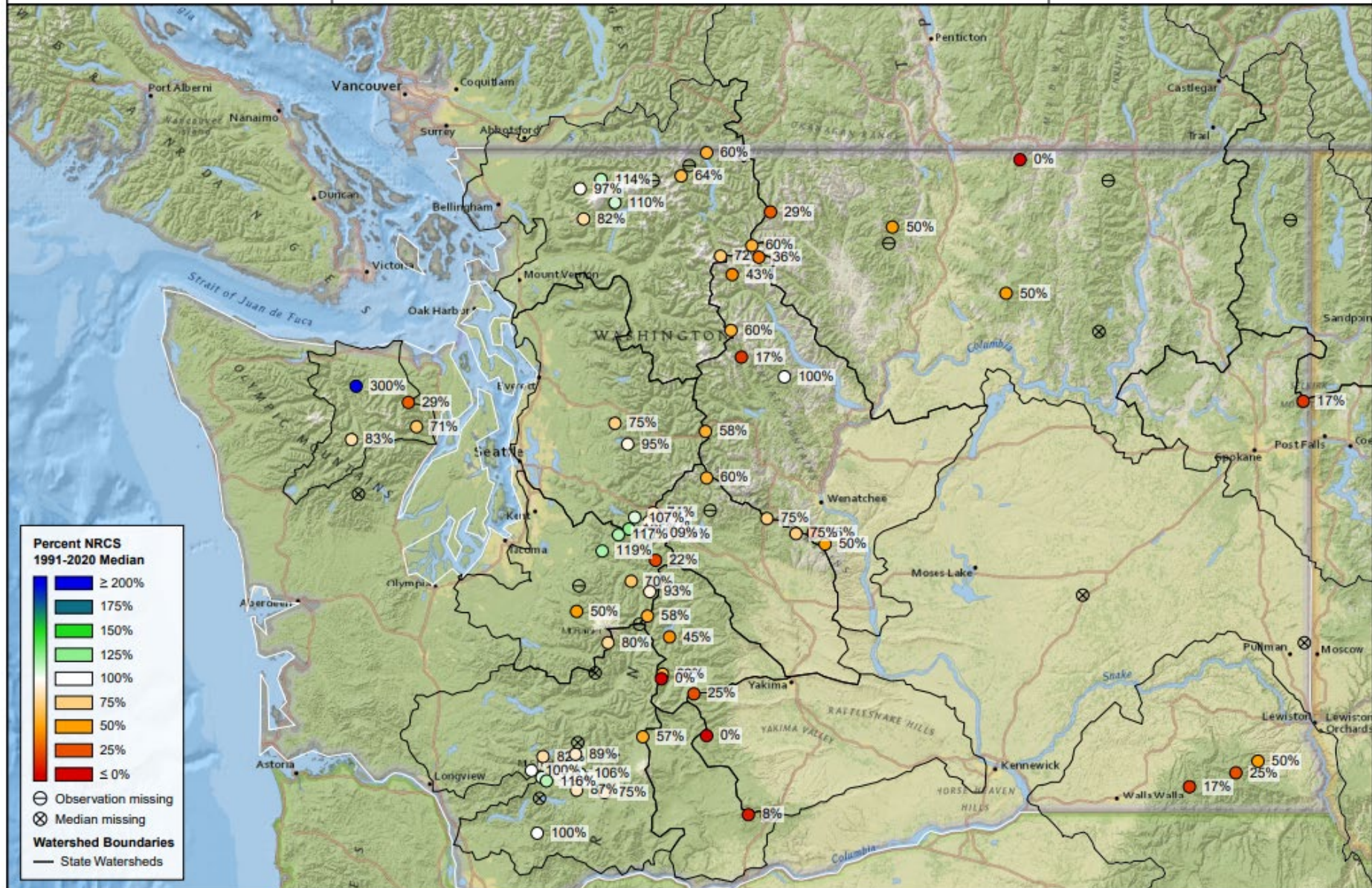




Water Year to Date Precipitation

Percent NRCS 1991-2020 Median

October 1, 2021 - October 12, 2021



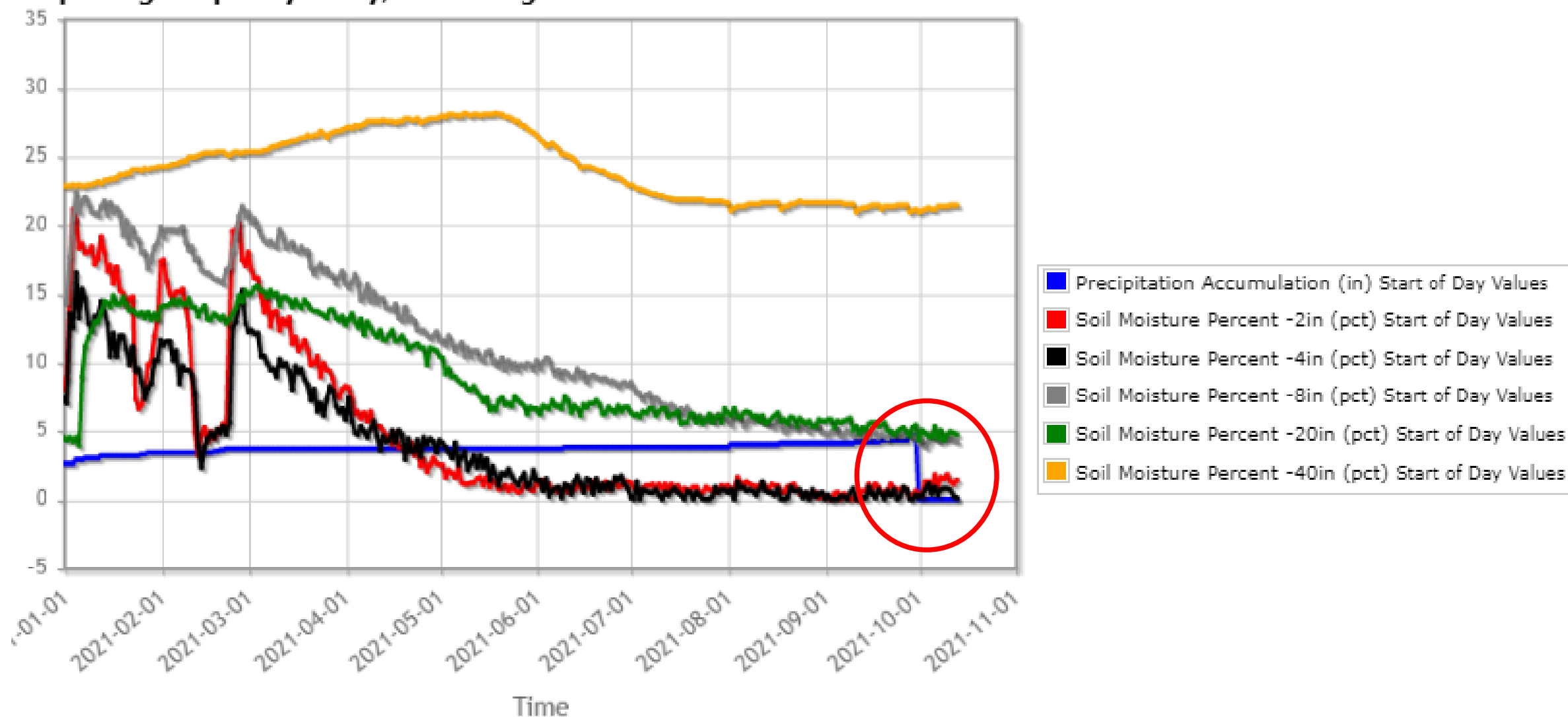




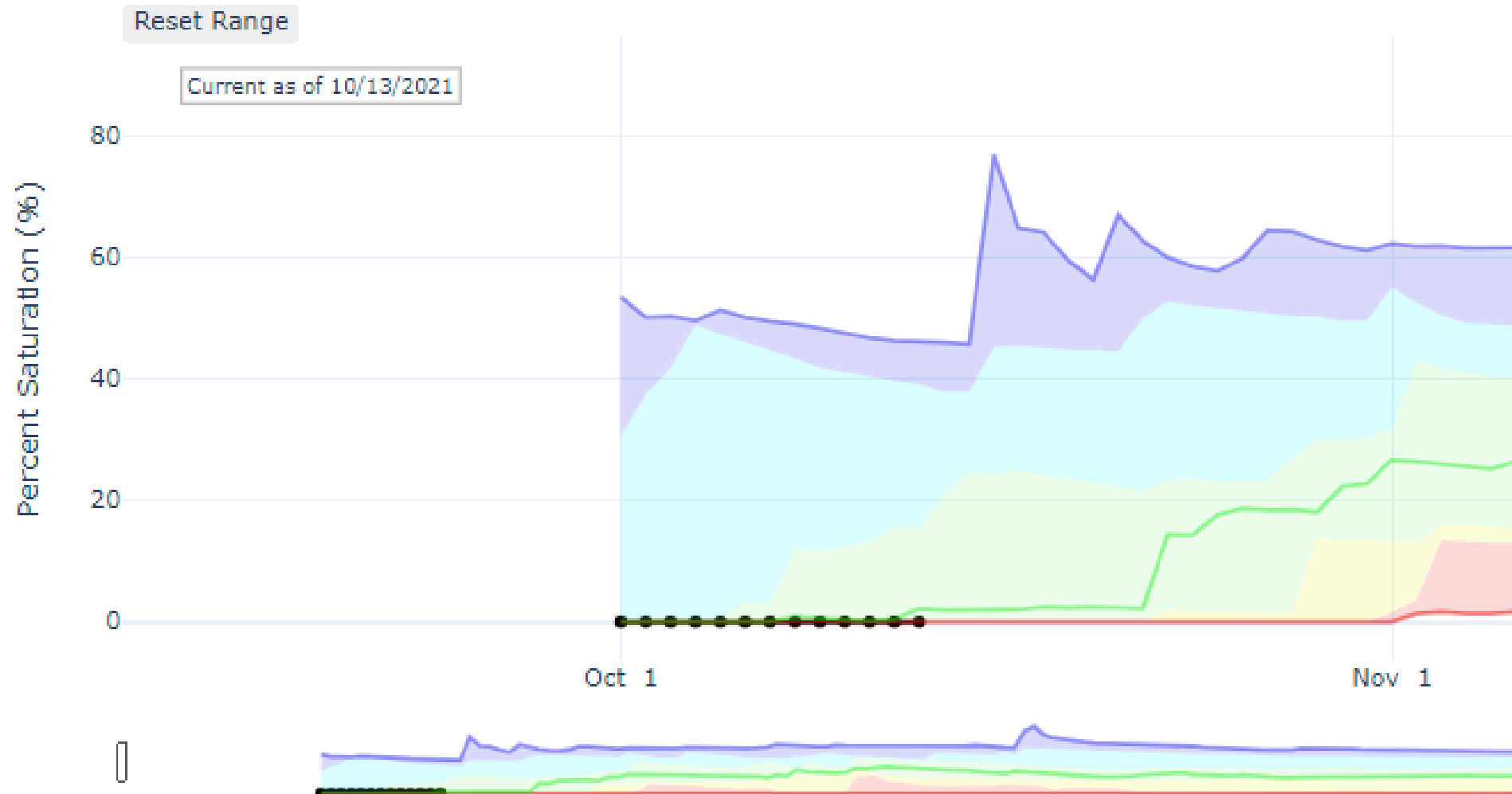
# BASIN SOIL MOISTURE

# Lind #1 (2021) Washington SCAN Site - 1640 ft

Reporting Frequency: Daily; Date Range: 2021-01-01 to 2021-12-31

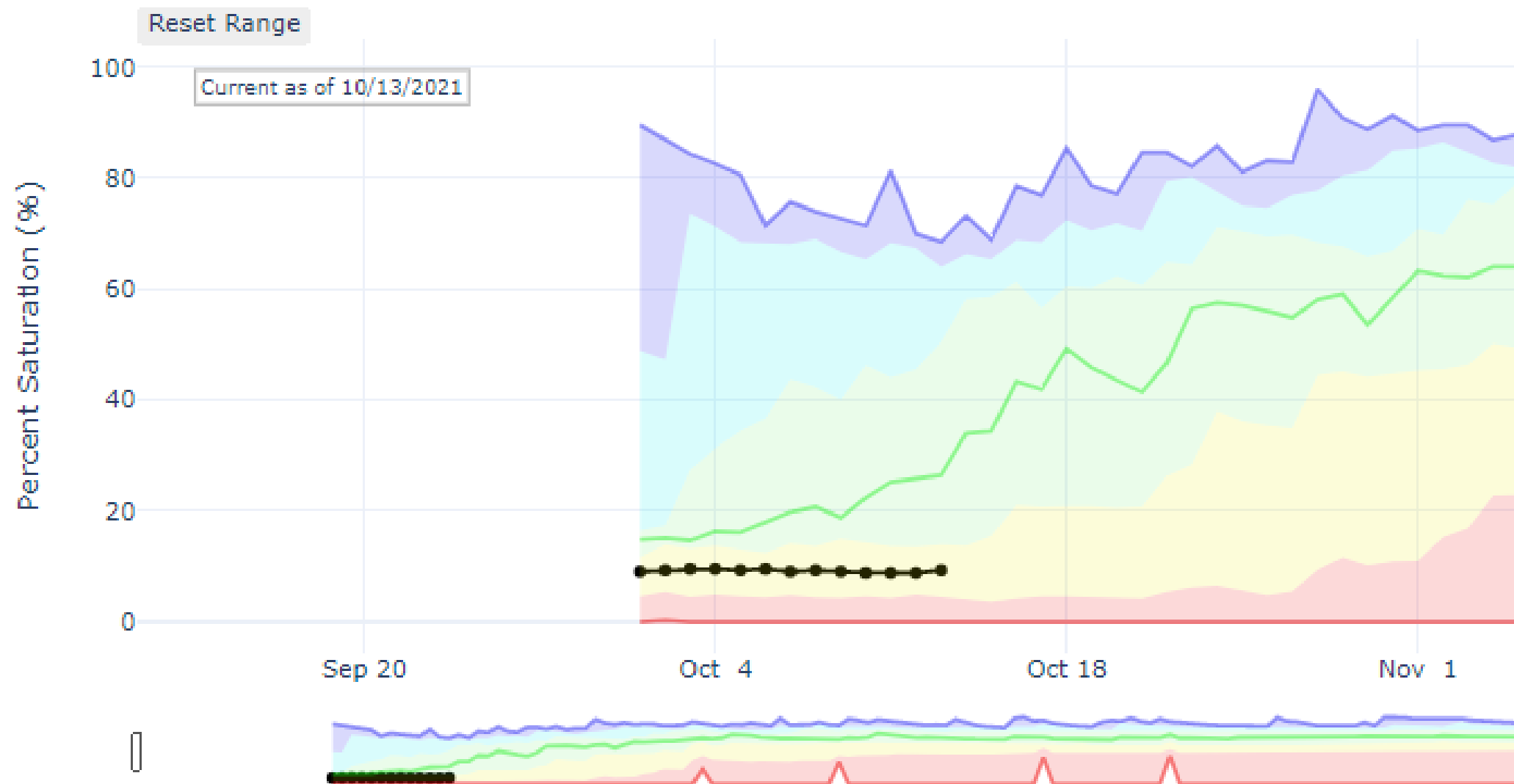


## DEPTH AVERAGED SOIL SATURATION IN CONCULLY LAKE



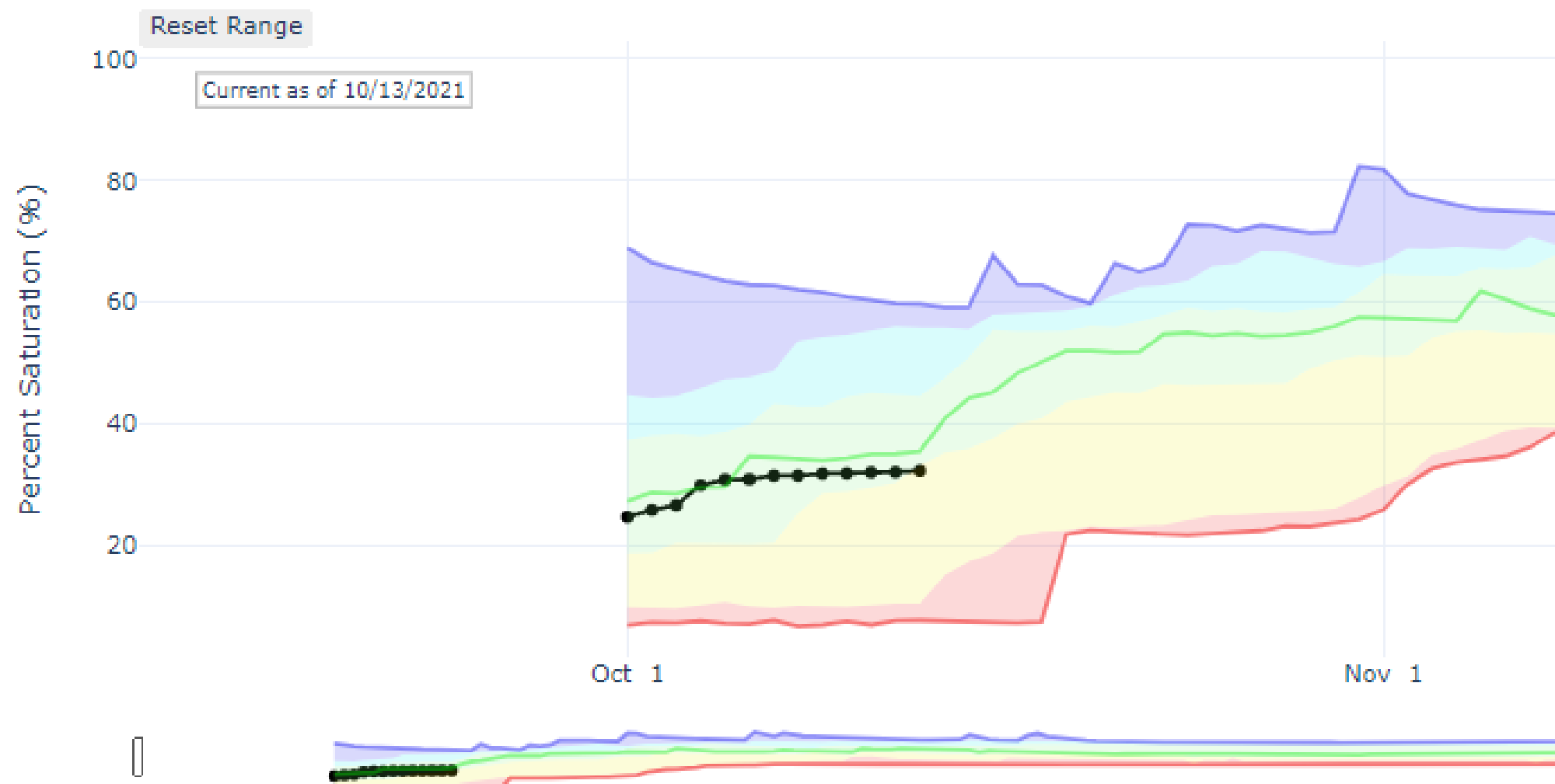
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.  
For more information visit: [30-Year Hydroclimatic Normals](#)

# 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](#)

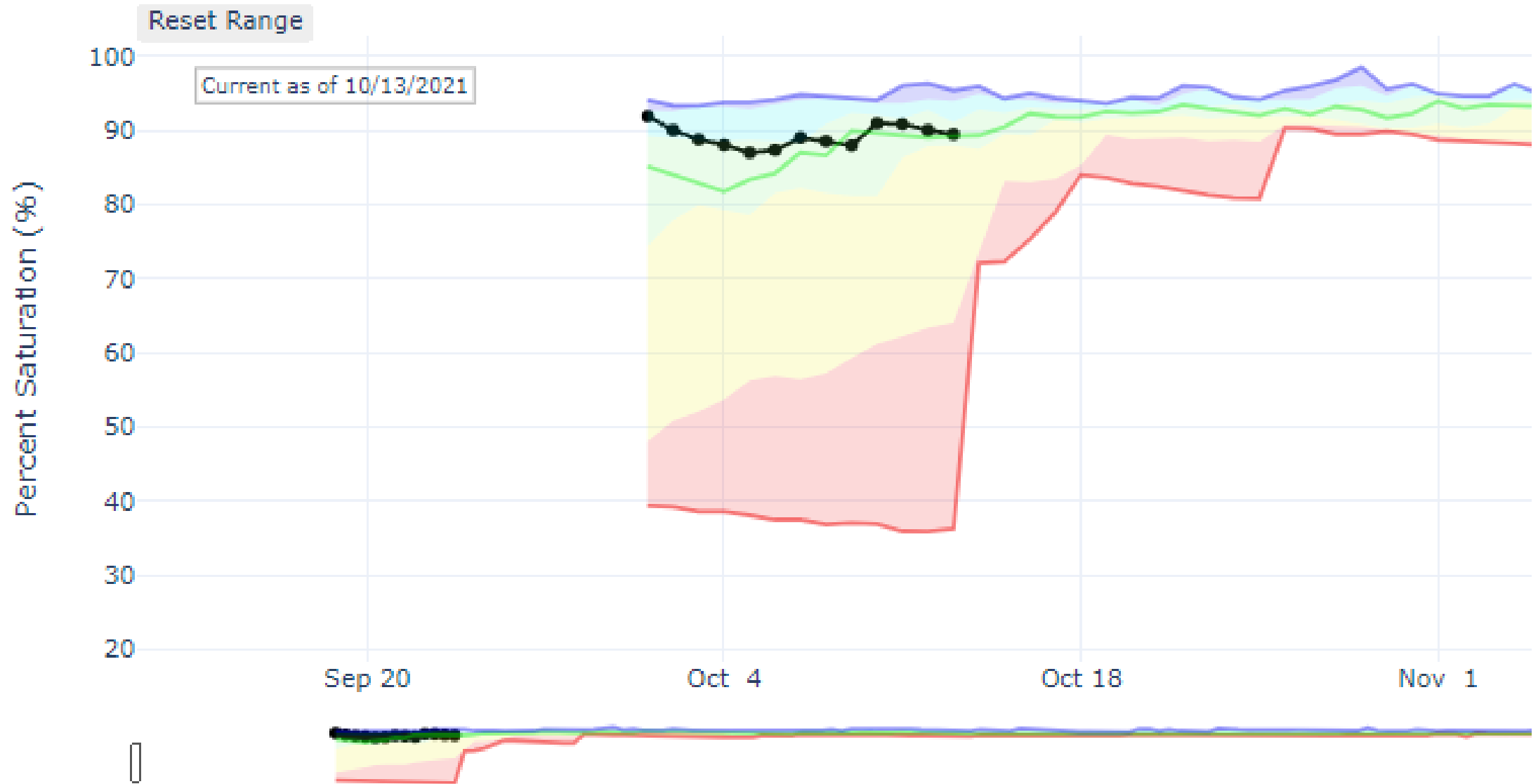
## DEPTH AVERAGED SOIL SATURATION IN METHOW



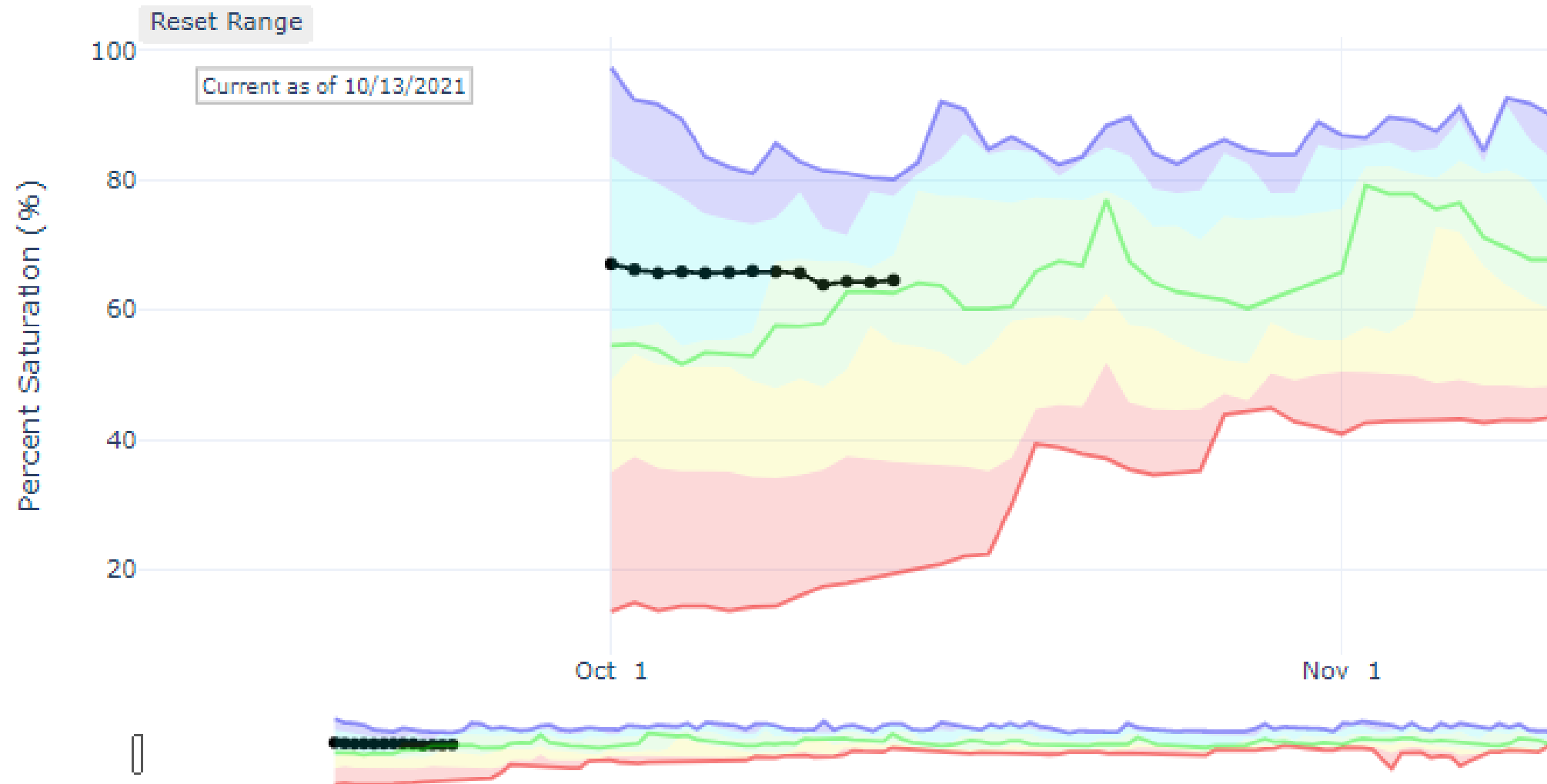
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.  
For more information visit: [30-Year Hydroclimatic Normals](#)



# DEPTH AVERAGED SOIL SATURATION IN COWLITZ



# DEPTH AVERAGED SOIL SATURATION IN BAKER



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

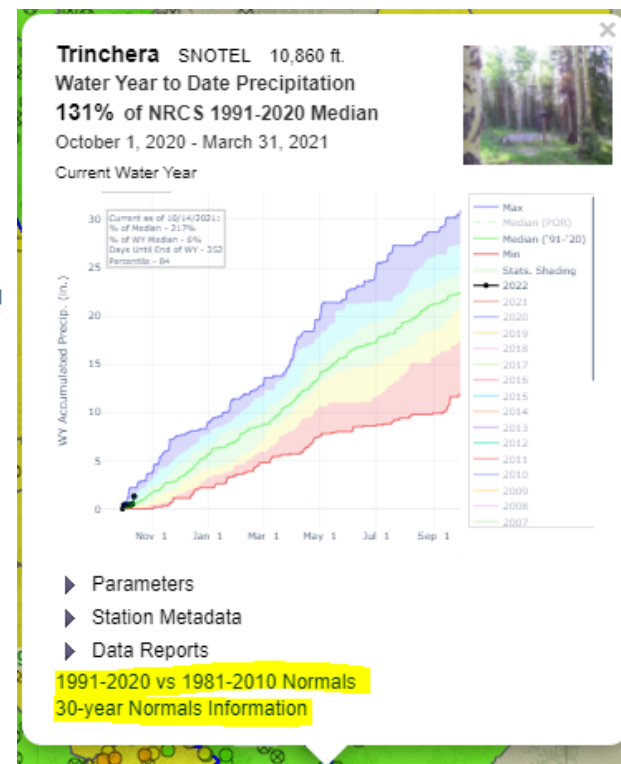
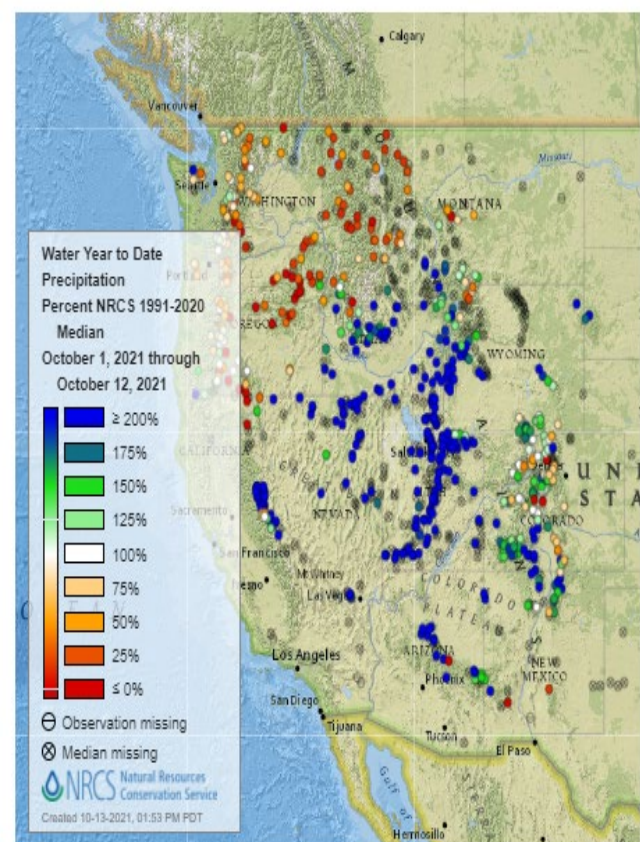


# 1991-2020 Averages/Medians

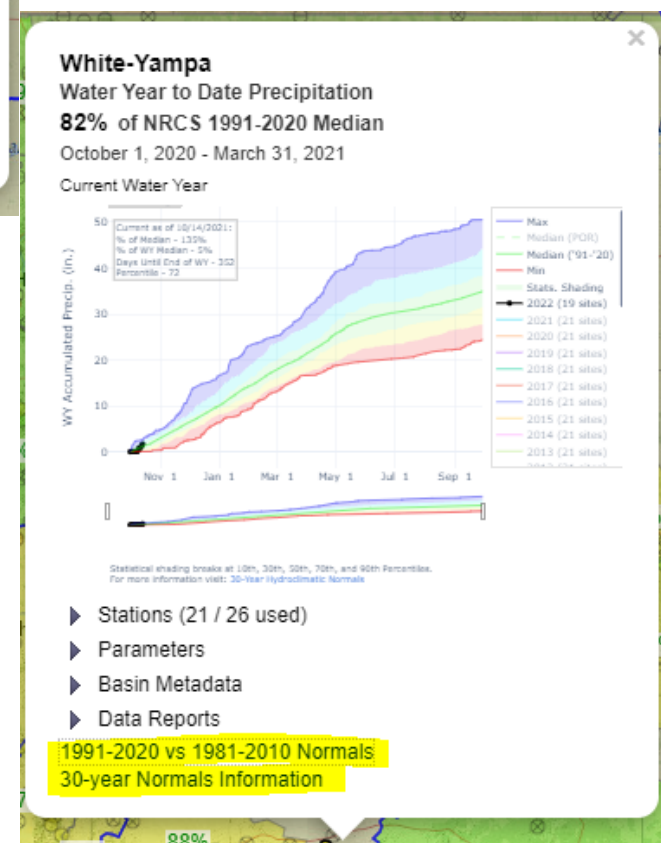
## Welcome to the National Water and Climate Center

As part of the USDA Natural Resources Conservation Service, the National Water and Climate Center supports the Snow Survey and Water Supply Forecasting Program and Soil Climate Analysis Network (SCAN) Pilot Program for the U.S.

Current Conditions: [Precipitation](#) | [Streamflow](#) | [Snow Water Equivalent](#)



“version=155.2”



## 1991-2020 Climatic and Hydrologic Normals

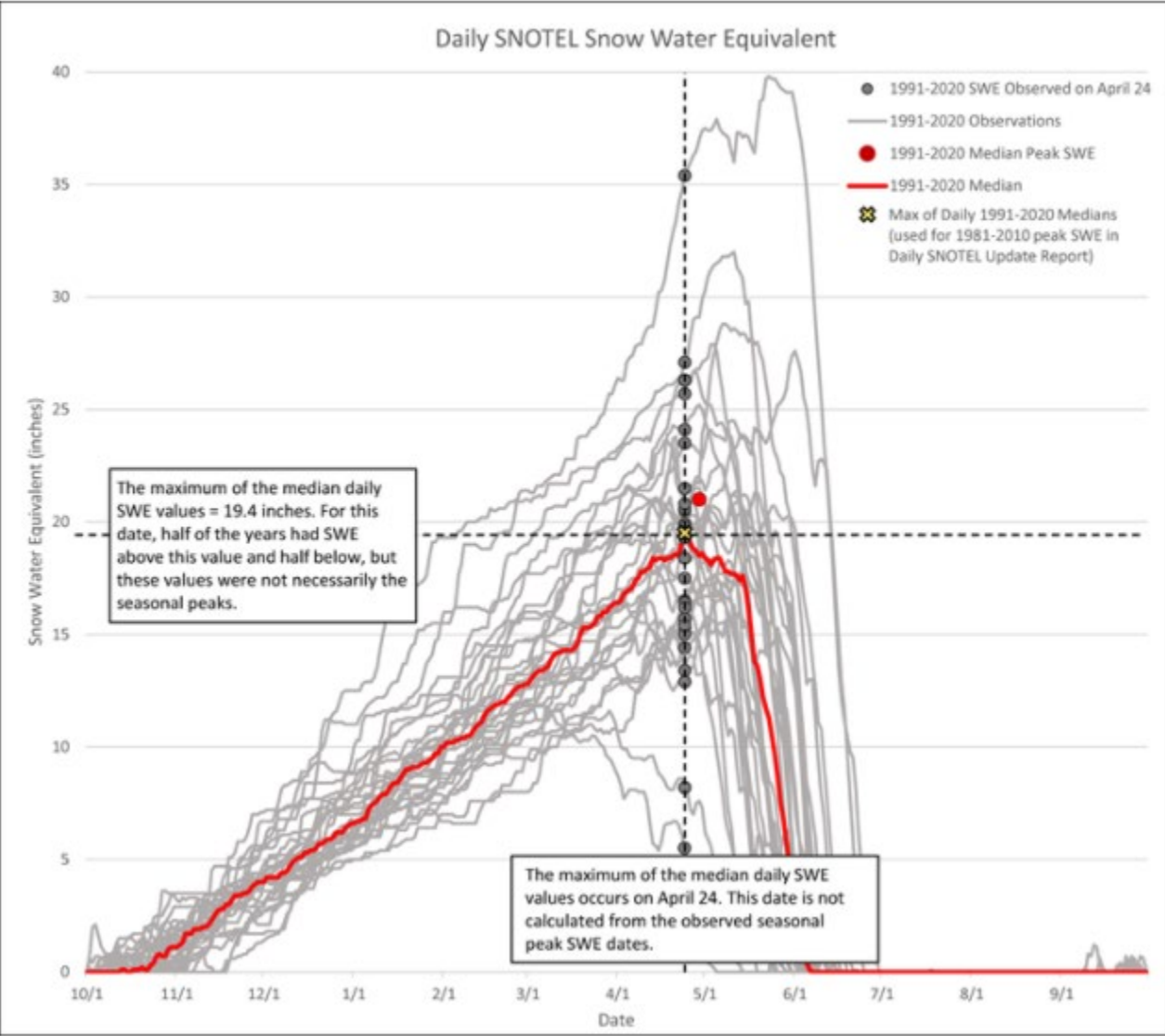
The Snow Survey and Water Supply Forecasting (SSWSF) normals are site-specific measures of central tendency (either the median or average) for a data type, such as snow water equivalent (SWE). The statistics are calculated over a 30-year period and updated each decade, in agreement with World Meteorological Organization (WMO) standards. This 30-year reference period was chosen to characterize the current hydroclimatology at each station. The most recent medians and averages have been updated to include data for the water years 1991-2020. The National Water and Climate Center (NWCC) also provides medians and averages for the 1981-2010 and 1971-2000 reference periods for stations with sufficient data.

The normals available from the NWCC include the median and average for SWE, snow depth (snow courses only), precipitation, volumetric streamflow, and reservoir storage. Values are calculated from data collected by NRCS-managed stations and external agencies such as the U.S. Geological Survey (USGS), National Weather Service (NWS), state agencies, and private organizations. Normals are calculated for various durations including daily, month-to-date, semi-monthly, monthly, seasonal, and annual based on the data type.

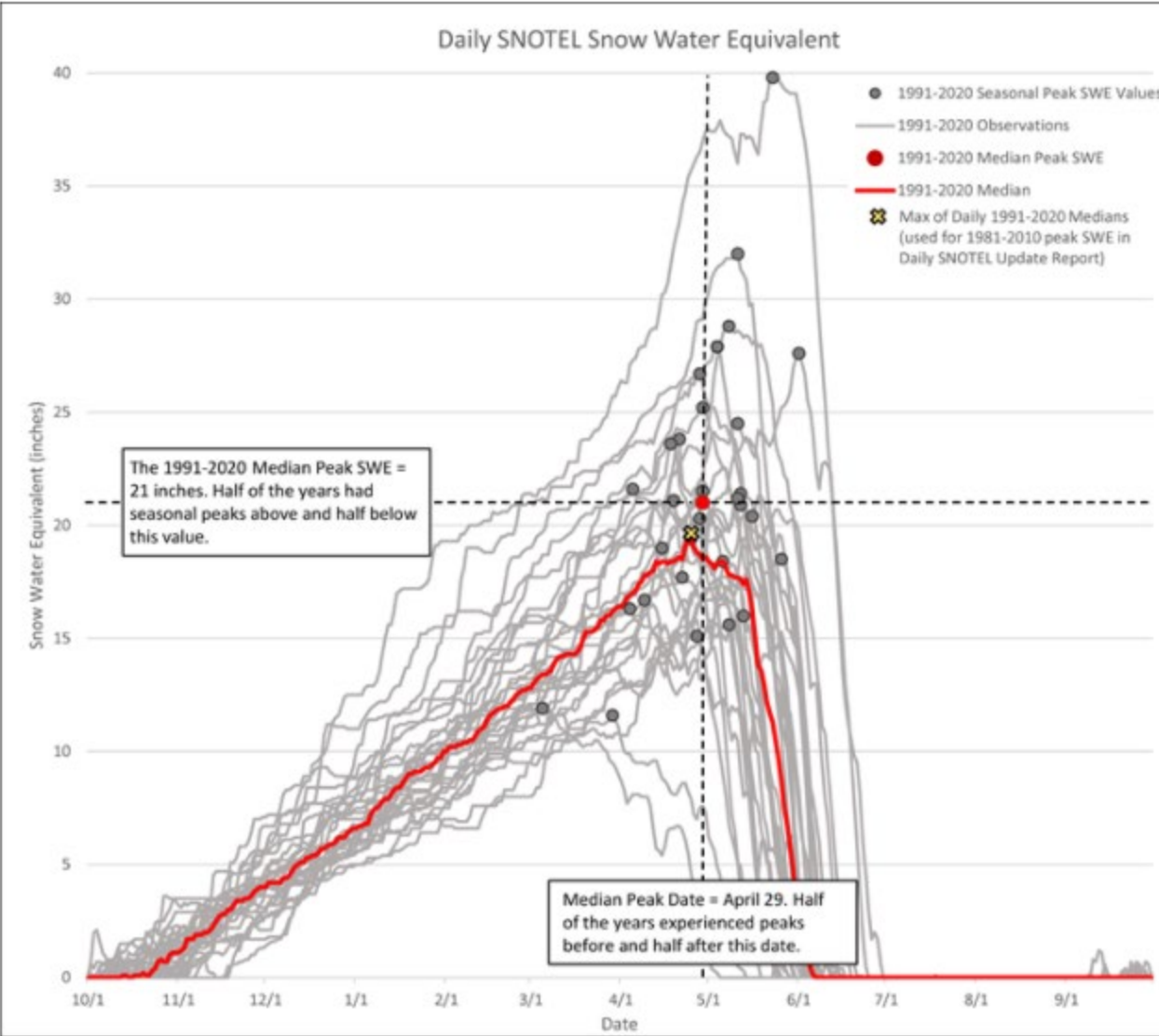
1991-2020 Normals Overview	+
Calculation Methods	+
Differences Between 1991-2020 and Previous Normals	+
Median vs. Average	+
Retrieving 1991-2020 Normals	+



Old Method for Calculating 1981-2010 Median Peak SWE



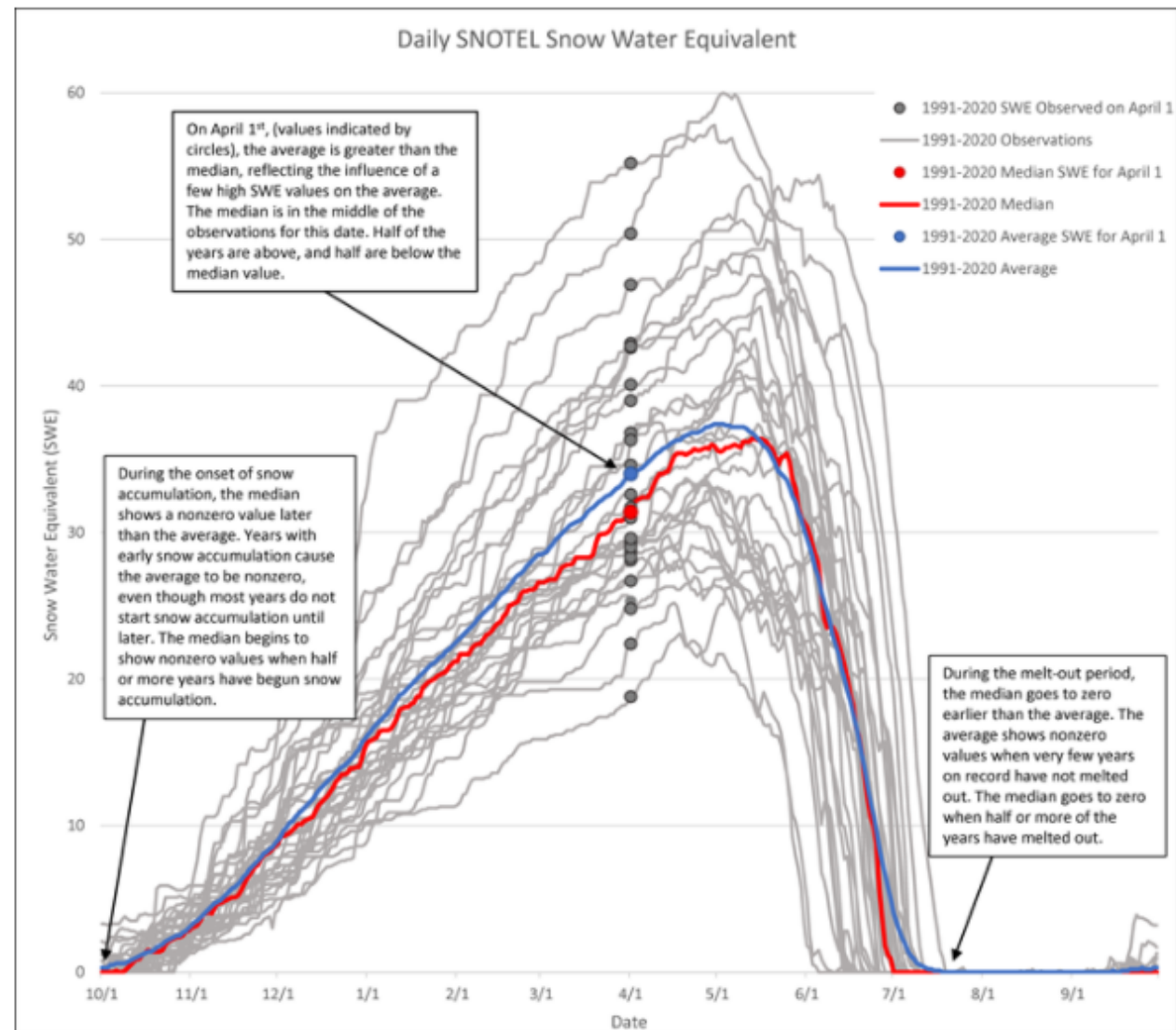
New Method for Calculating 1991-2020 Median Peak SWE



## Median vs. Average

The median is the middle point for a range of observations, and it may differ from the average for the same dataset. Because the median is less affected by extreme values, it is often used to describe the central tendency of a dataset. Many stations collecting hydroclimatic data are prone to these extreme events, where a few high values have been less during the reference period. The median also remains a valid measure of central tendency for datasets that have no

*1991-2020 Median SWE compared to the 1991-2020 Average*



## 1991-2020 Climatic and Hydrologic Normals

The Snow Survey and Water Supply Forecasting (SSWSF) normals are site-specific. The period was chosen to characterize the current hydroclimatology at each station. The

The normals available from the NWCC include the median and average for SWE, snow depth, and other hydroclimatic variables. Normals are calculated for various durations including daily, month-to-

### 1991-2020 Normals Overview

### Calculation Methods

### Differences Between 1991-2020 and Previous Normals

### Median vs. Average

### Retrieving 1991-2020 Normals

## Retrieving 1991-2020 Normals

NRCS normals are available from several NWCC applications. Following are some of the primary sources for retrieving these data interest.

Select a state and element type to display the monthly 1991-2020 Climatic and Hydrologic Medians and Averages.

### Reports

Select a state and type of Normal to display the 1991-2020 data.

#### Select State

Alaska	▲
Arizona	
California	
Colorado	
Idaho	
Montana	
Nevada	
New Mexico	
Oregon	
South Dakota	
Utah	
Washington	
Wyoming	▼

#### Select Type of Monthly Normals

Reservoir Averages	▲
Reservoir Medians	
Snow Course SWE Averages	
Snow Course SWE Medians	
Snow Course Snow Depth Averages	
Snow Course Snow Depth Medians	
SNOTEL Incremental Precipitation Averages	
SNOTEL Incremental Precipitation Medians	
SNOTEL SWE 1st of Month Averages	
SNOTEL SWE 1st of Month Medians	
SNOTEL SWE Mid-Month Averages	
SNOTEL SWE Mid-Month Medians	
Streamflow Averages	▼

View Normals

**Note:** The report contains a title with a time period of "Oct 1990 to Sept 1991" and a column labelled "Water Year" with an entry of "1991." These are artifacts of the Report Generator software and should be ignored.

# Report Generator 2.0

View Station Information

Create/Modify Report

View Report

Report Details

Output Format ▾ Layout ▾ Units ▾ Time Period ▾ Fit Table To Screen ☐

## Reporting Frequency: Semimonthly; Date Range: Oct 1990 to Sep 1991

(As of: Wed Oct 13 13:26:59 GMT-08:00 2021)

\*\*Provisional data, subject to revision\*\*

Station Id ▾	Station Name ▾	Water Year ▾	Jan 1st Half	Jan 2nd Half	Feb 1st Half	Feb 2nd Half	Mar 1st Half	Mar 2nd Half	Apr 1st Half	A
			Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	Median Snow Depth (1991-2020) (in) Start of Month Values ▾	(
21B48	Alpine Meadow	1991			70		90		92	
17A07	Baird #2	1991			25		28		20	
21A04	Beaver Creek Trail	1991	22		34		40		28	
21A01	Beaver Pass	1991	44		59		68		71	
19A24	Bonaupart South	1991							20	
17A02	Boyer Mountain	1991			52		56		57	
21A28	Brown Top Ridge AM	1991	91		119		134		145	
19A20	Browns Pass	1991			14		17		4	
21C36	Bumping Lake New	1991	24		42		46		36	
17A08	Chewelah 2	1991			44		48		50	
21B03	City Cabin	1991			18		24		12	
20A22	Cloudy Pass AM	1991			97		108		134	

Washington SNOTEL Snow/Precipitation Update Report							
Based on Mountain Data from NRCS SNOTEL Sites							
**Provisional data, subject to revision**							
Data based on the first reading of the day (typically 00:00) for Wednesday, October 13, 2021							
Basin Site Name	Elev (ft)	Snow Water Equivalent			Water Year-to-Date Precipitation		
		Current (in)	Median (in)	Pct of Median	Current (in)	Median (in)	Pct of Median
SPOKANE							
Sherwin	3200	0.0	0.0	*	-M	0.6	*
Ragged Mountain	4210	-M	0.0 <sub>(14)</sub>	*	-M	0.6 <sub>(14)</sub>	*
Humboldt Gulch	4250	0.0	0.0	*	0.5	0.8	62
Mica Creek	4510	0.0	0.0	*	0.4	0.9	44
Quartz Peak	4700	0.0	0.0	*	0.1	0.6	17
Lookout	5190	0.0	0.0	*	0.2	0.9	22
Mosquito Ridge	5260	0.2	0.0	*	0.1	0.8	12
Sunset	5540	0.0	0.0	*	0.7	1.0	70
Lost Lake	6110	0.3	0.0	*	0.2	1.0	20
Basin Index (%)		*			37		
LOWER PEND OREILLE							
Quartz Peak	4700	0.0	0.0	*	0.1	0.6	17
Bunchgrass Mdw	5000	0.4	0.0	*	-M	0.8	*
Hidden Lake	5040	0.9	0.0 <sub>(20)</sub>	*	0.7	1.5 <sub>(20)</sub>	47
Mosquito Ridge	5260	0.2	0.0	*	0.1	0.8	12
Schweitzer Basin	6090	0.0	0.0	*	0.1	0.8	12
Basin Index (%)		*			27		
UPPER COLUMBIA							
Swamp Creek	3930	0.2	0.0 <sub>(21)</sub>	*	0.6	1.0 <sub>(21)</sub>	60
Gold Mountain	4390	0.0	N/A	*	0.1	N/A	*
Salmon Meadows	4460	0.0	0.0	*	0.1	0.2	50
Muckamuck	4470	0.0	N/A	*	-M	N/A	*
Sentinel Butte	4680	0.2	0.0 <sub>(17)</sub>	*	-M	0.2 <sub>(17)</sub>	*
Rainy Pass	4890	0.0	0.0	*	0.4	1.1	36
Moses Mtn	5010	0.0	0.0 <sub>(29)</sub>	*	0.1	0.2 <sub>(29)</sub>	50
Gold Axe Camp	5360	0.3	0.0 <sub>(10)</sub>	*	0.0	0.2 <sub>(10)</sub>	0
Harts Pass	6490	0.4	0.1	400*	0.4	1.4	29
Basin Index (%)		1100*			39		

-M = Missing data.

\* = Analysis may not provide a valid measure of conditions.

N/A = Not available.

Footnotes for median and average:

(##) = If less than 30 years are available, this value specifies the number of years used for the median and average calculations.

Sites with less than 10 years available do not have medians or averages.

If the Basin Index (%) percent value is flagged as potentially invalid, care should be taken to evaluate if the value is representative of conditions in the basin.



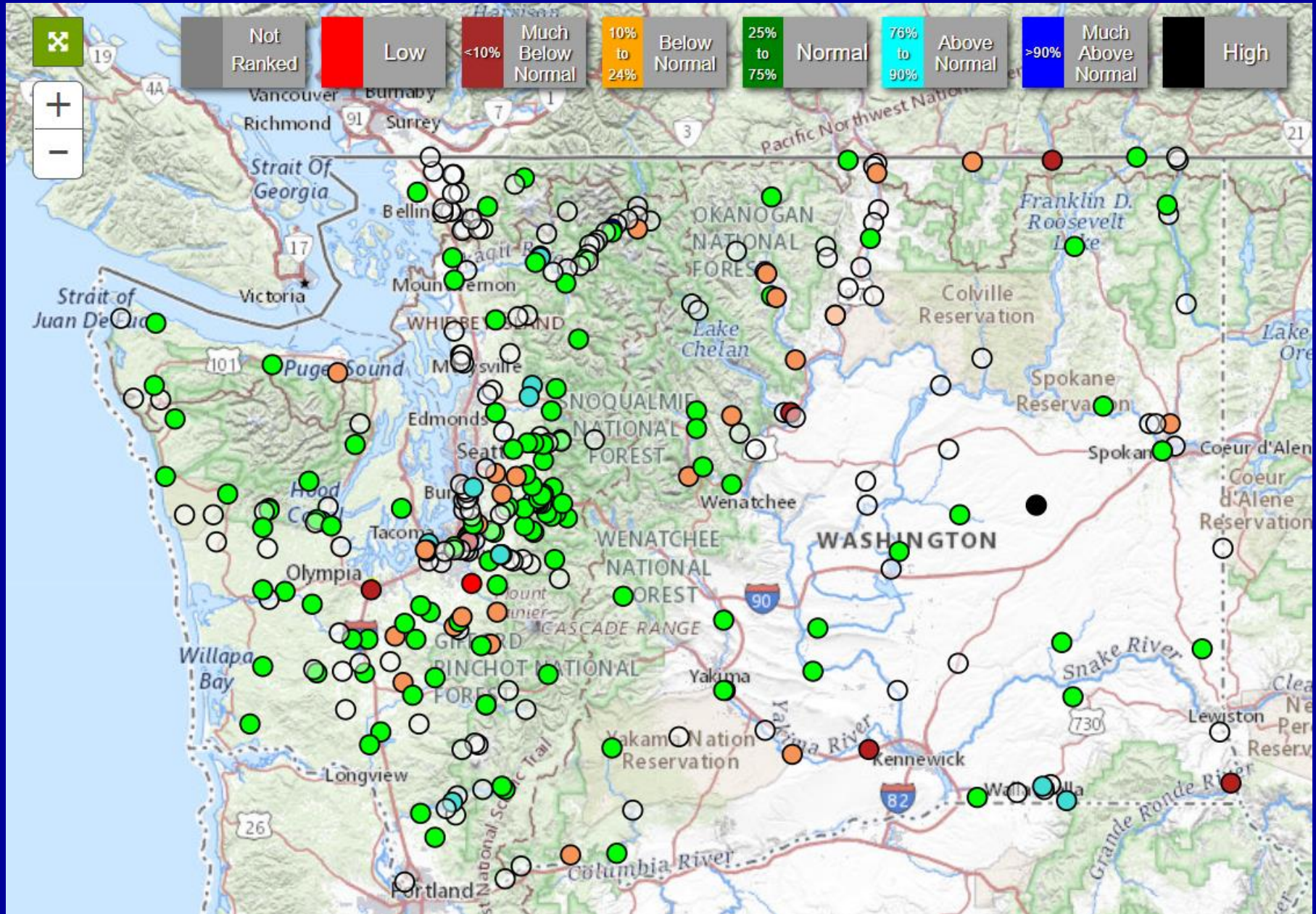
# **Streamflow Conditions in Washington State as of October 14, 2021**

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**Presented  
to  
The Washington State  
Water Supply Availability Committee  
on  
Oct 15, 2021**

**by  
Nicholas Sutfin**








# WA Current Streamflow Conditions

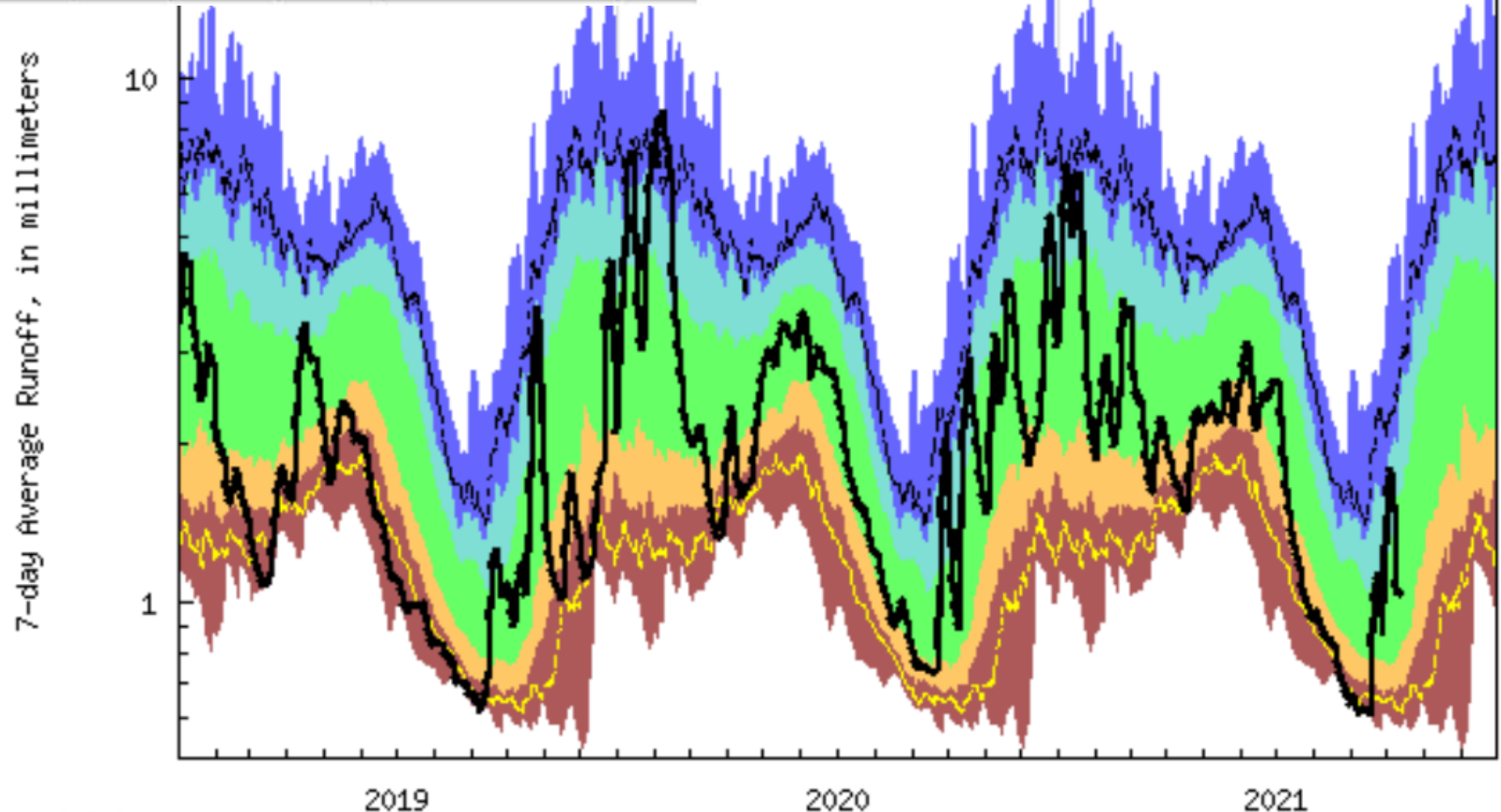


# Duration Hydrograph, Washington State

## 7-day Average Streamflow (as of Oct. 14, 2021)

is between the 25<sup>th</sup> and 75<sup>th</sup> percentile, which is normal

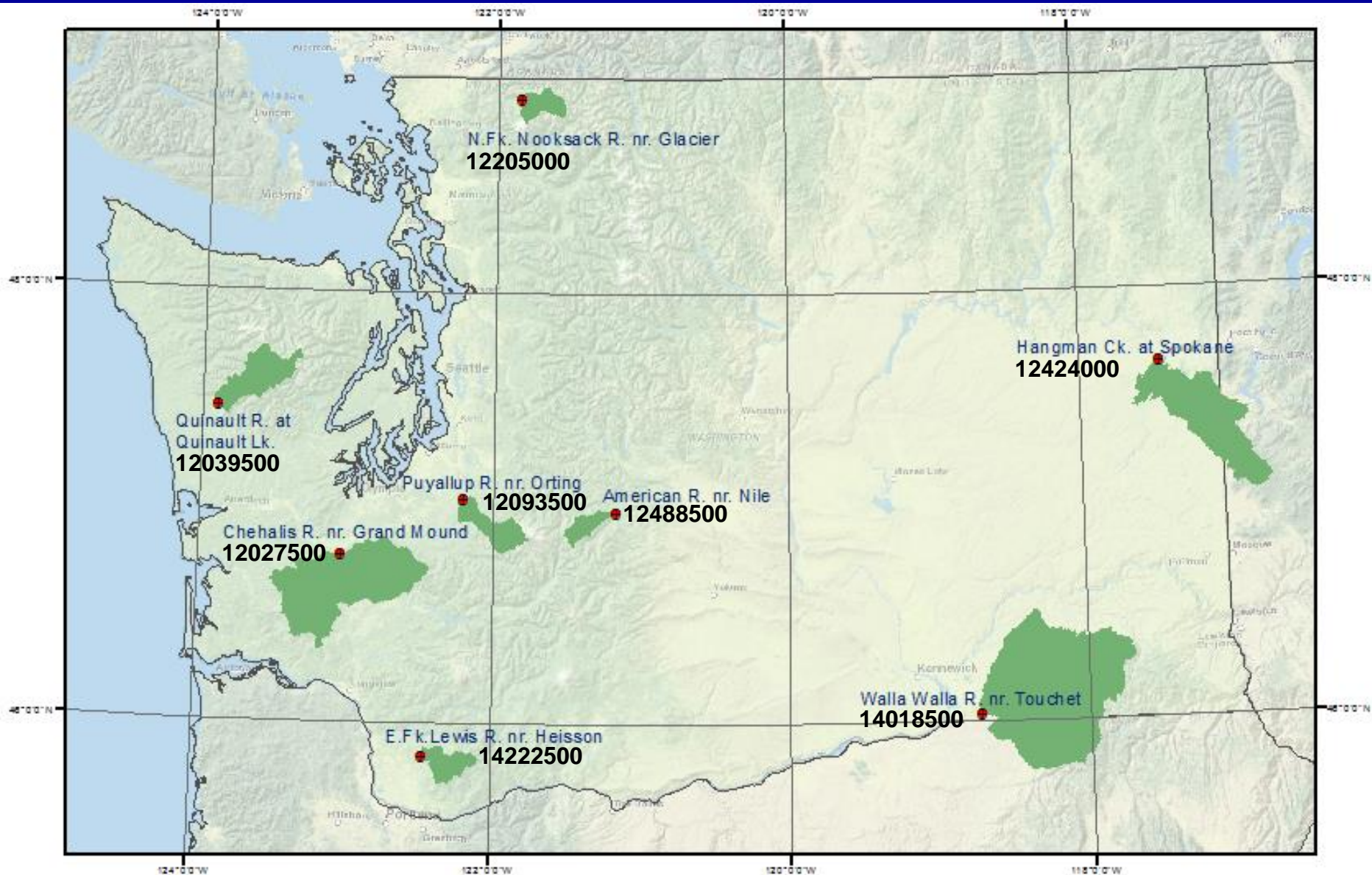
Explanation - Percentile classes						
						
lowest-10th percentile	5	10-24	25-75	76-90	95	90th percentile - highest
Much below Normal	Below normal	Normal	Above normal	Much above normal	Flow	





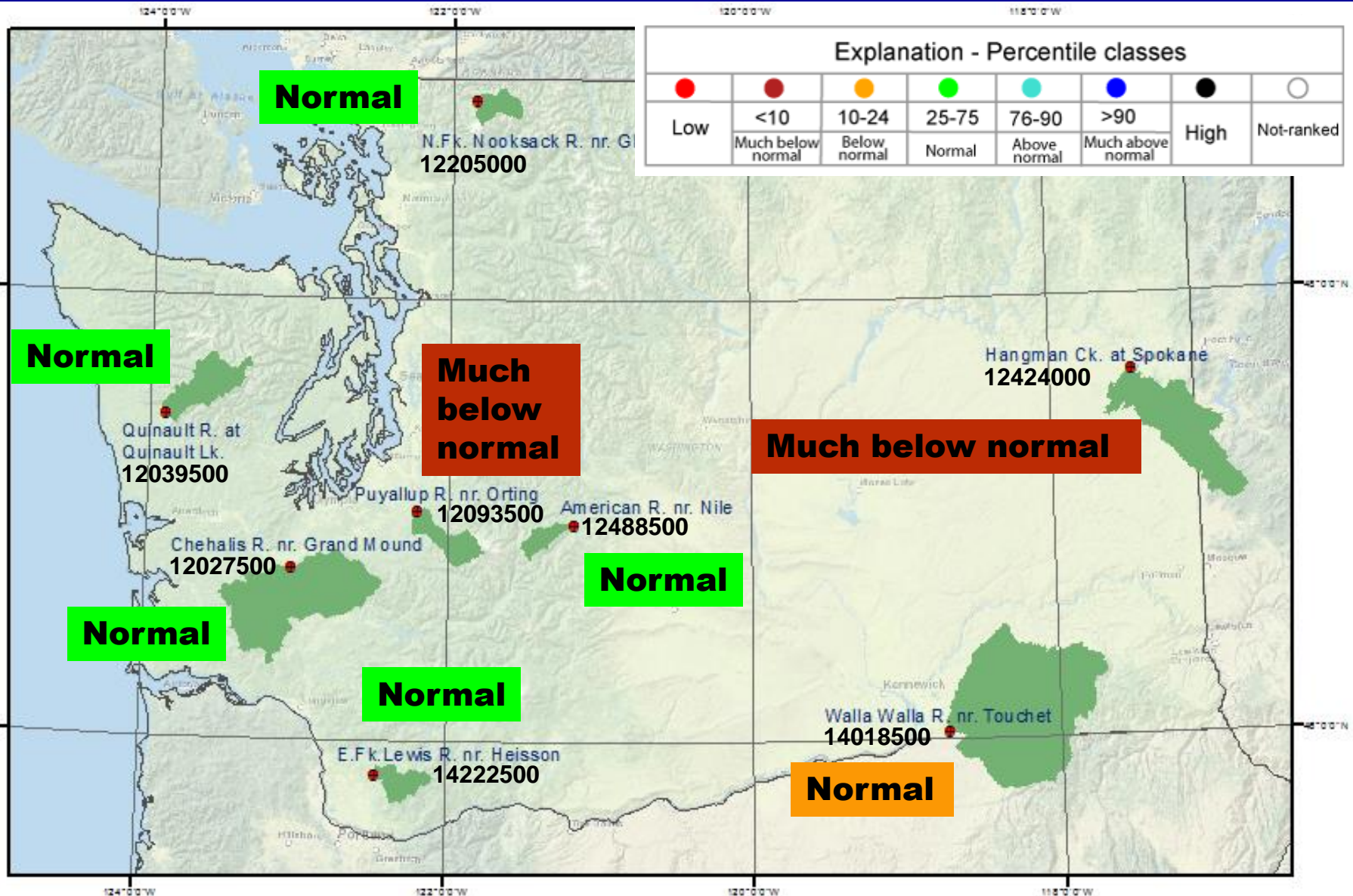
# Index Gaging Stations

(Stations that measure natural or near-natural streamflow)

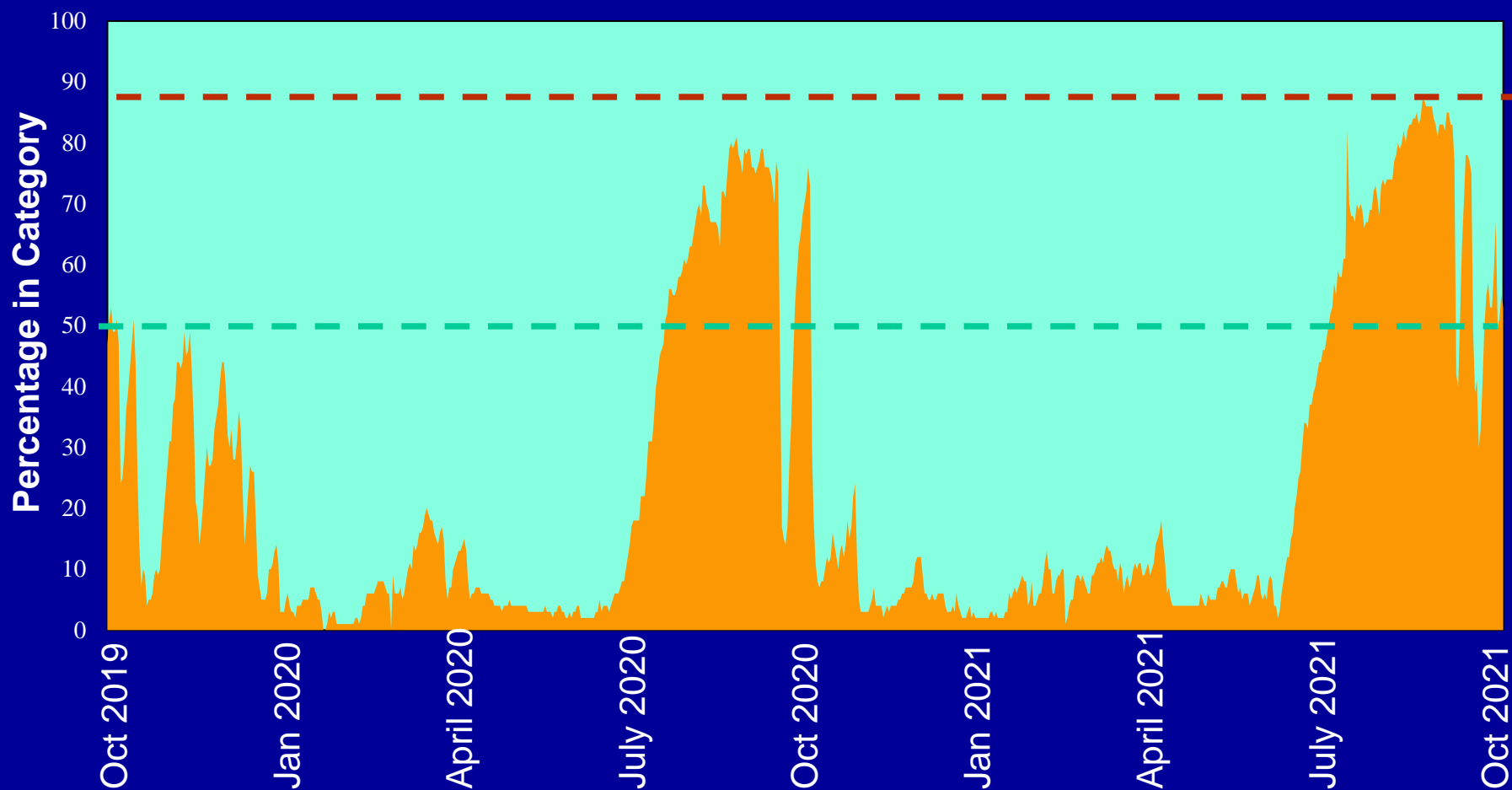




# Index Gaging Stations, 7-day average streamflow (as of Oct 14, 2021)

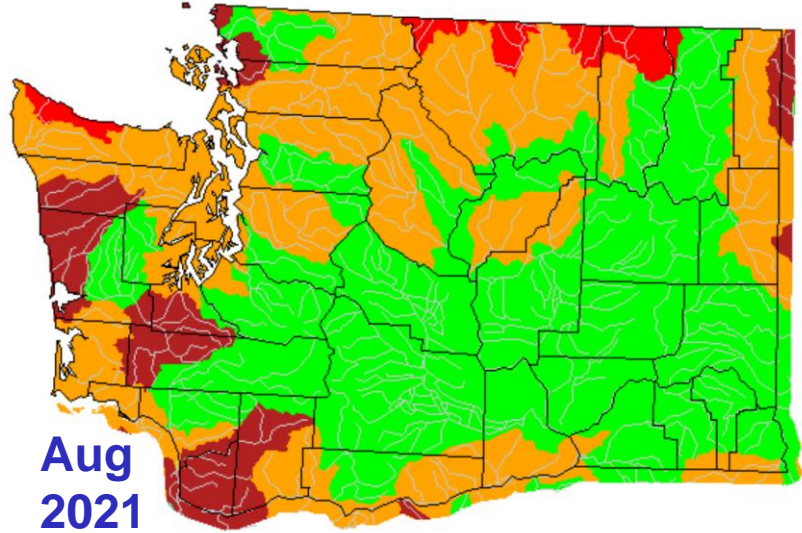
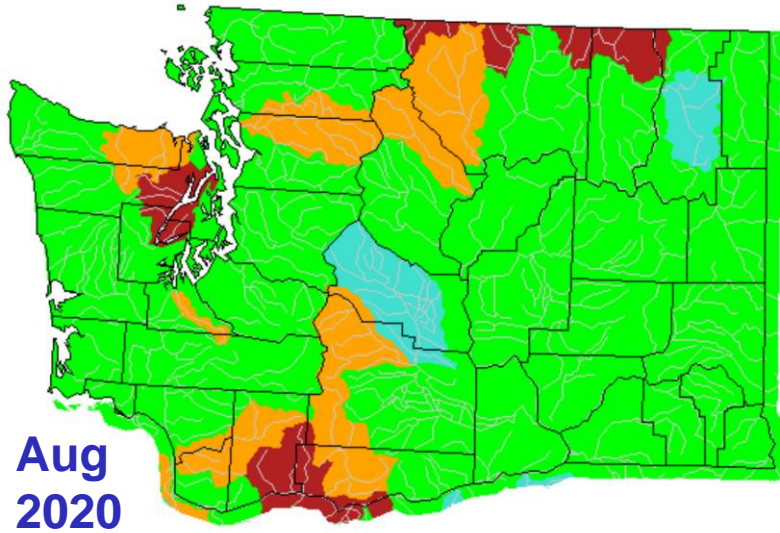
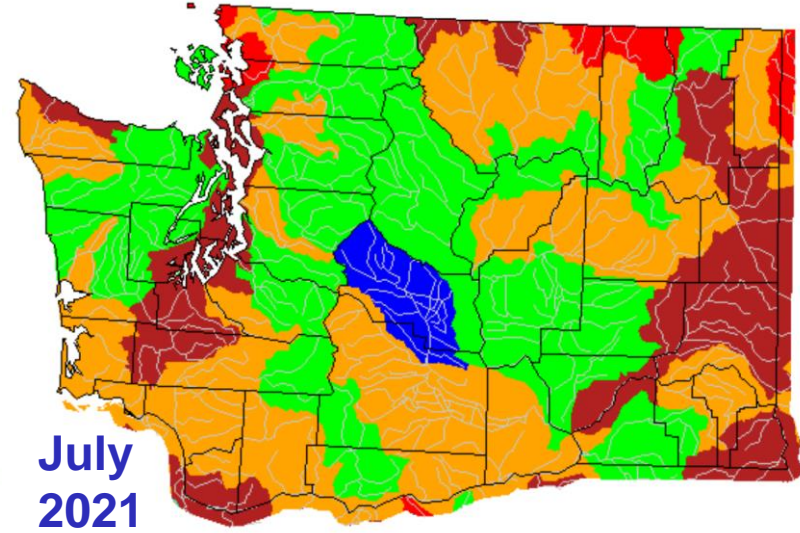
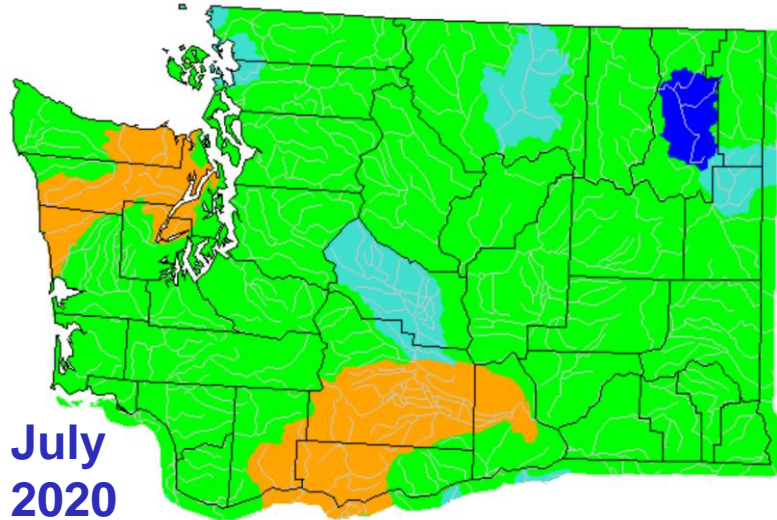


# Daily streamflow in Washington Rivers compared to historical streamflow, Oct. 01, 2019 – Oct. 14, 2021





# Average July & Aug. Streamflow 2020 & 2021

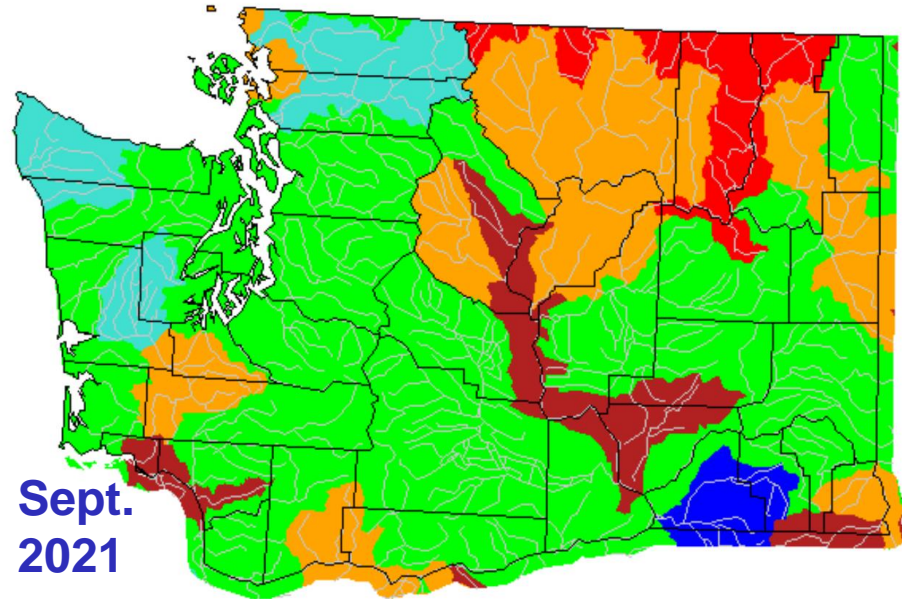
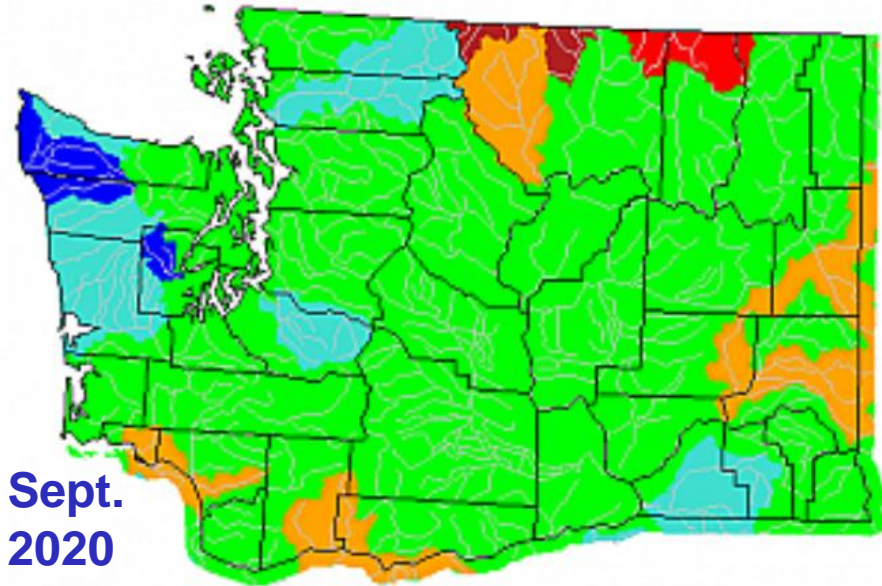


Explanation - Percentile classes

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



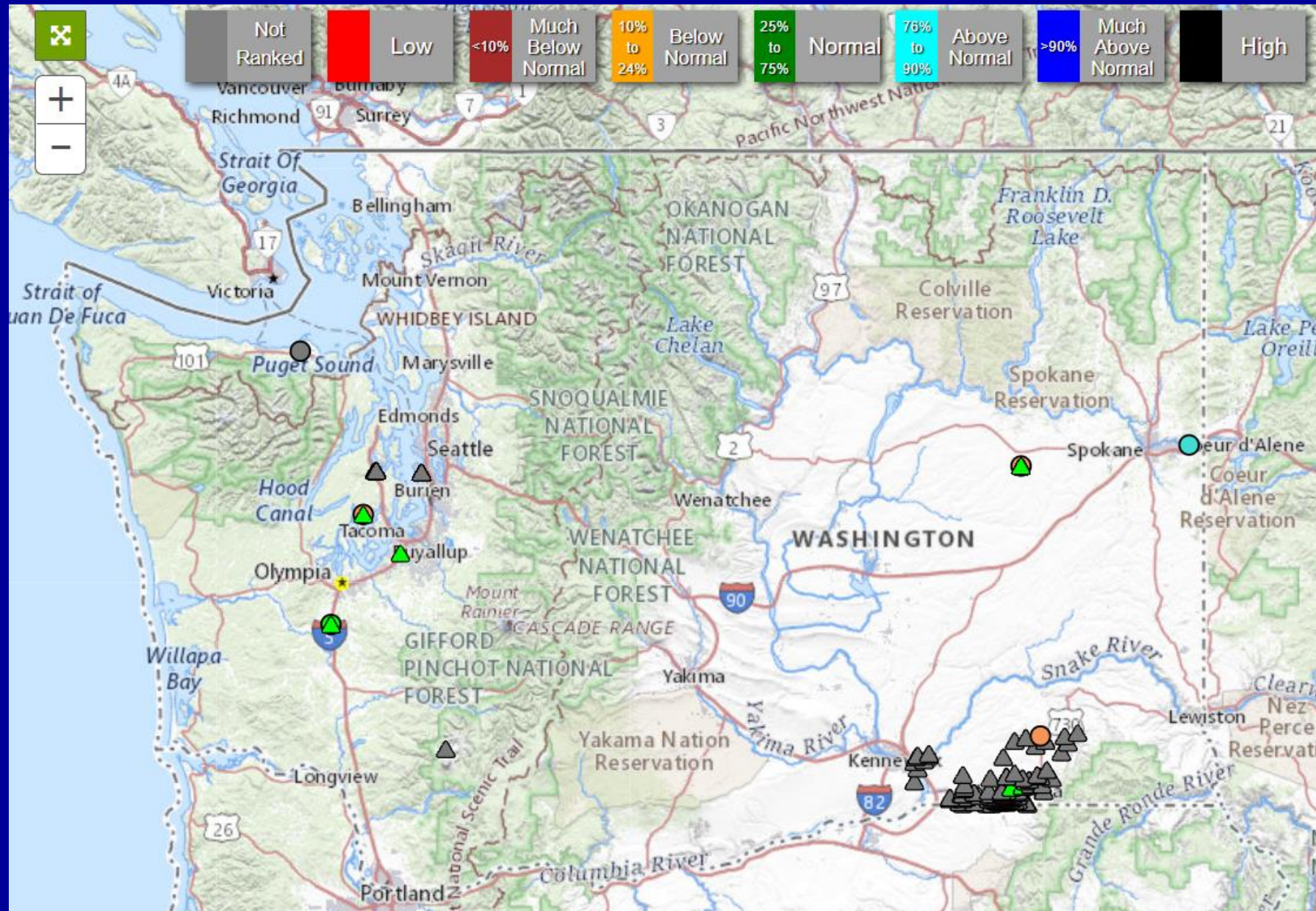
# Average Sept. Streamflow 2020 and 2021



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



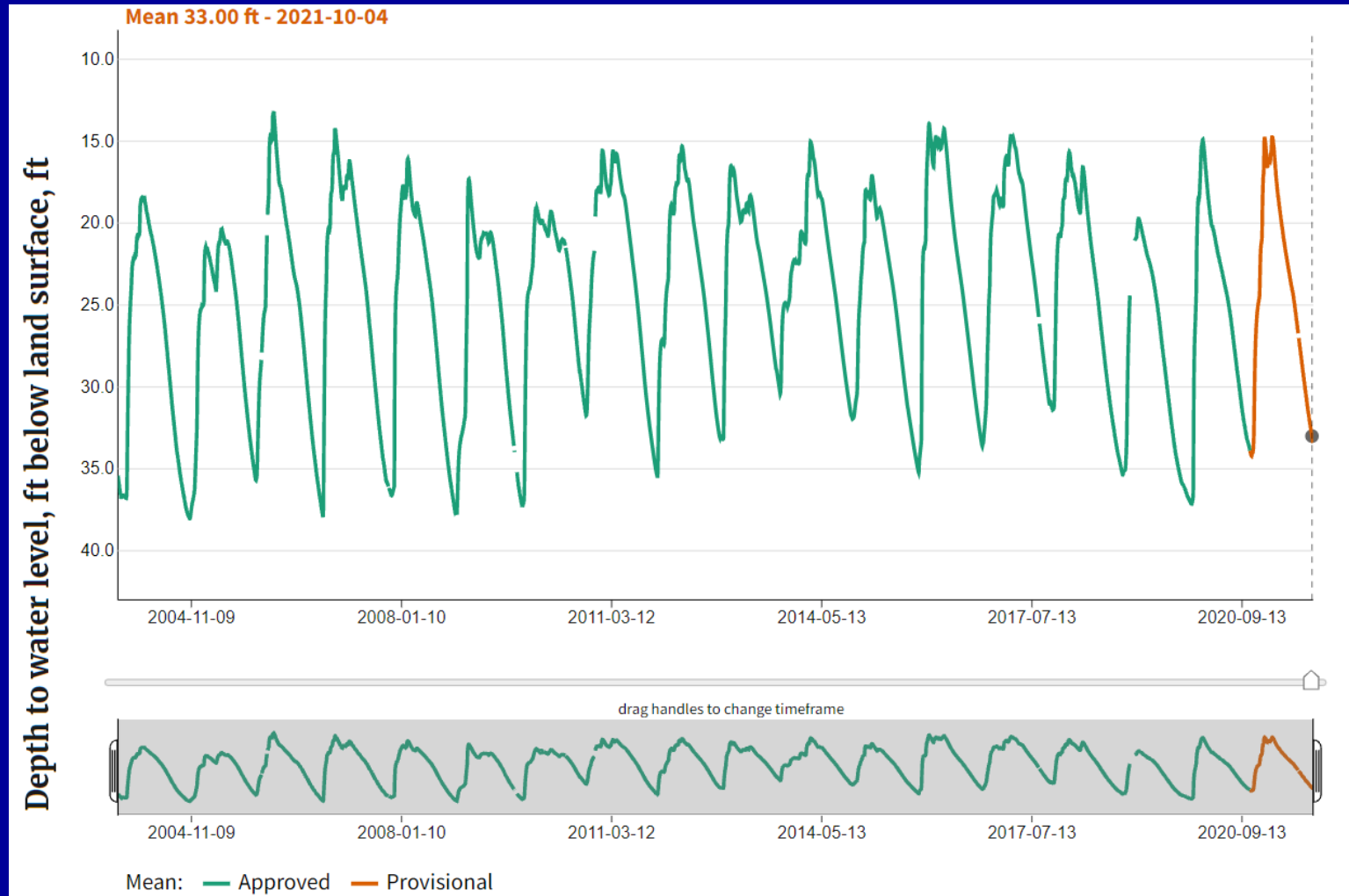
# WA Current Groundwater Conditions (Oct. 15<sup>th</sup>)



# WA Current Groundwater Conditions (Oct. 15<sup>th</sup>)

**Scatter Creek well (465033122570202)** in Thurston Co. (16N/02W-29L02P2)

- 82-ft deep
- Sand and gravel

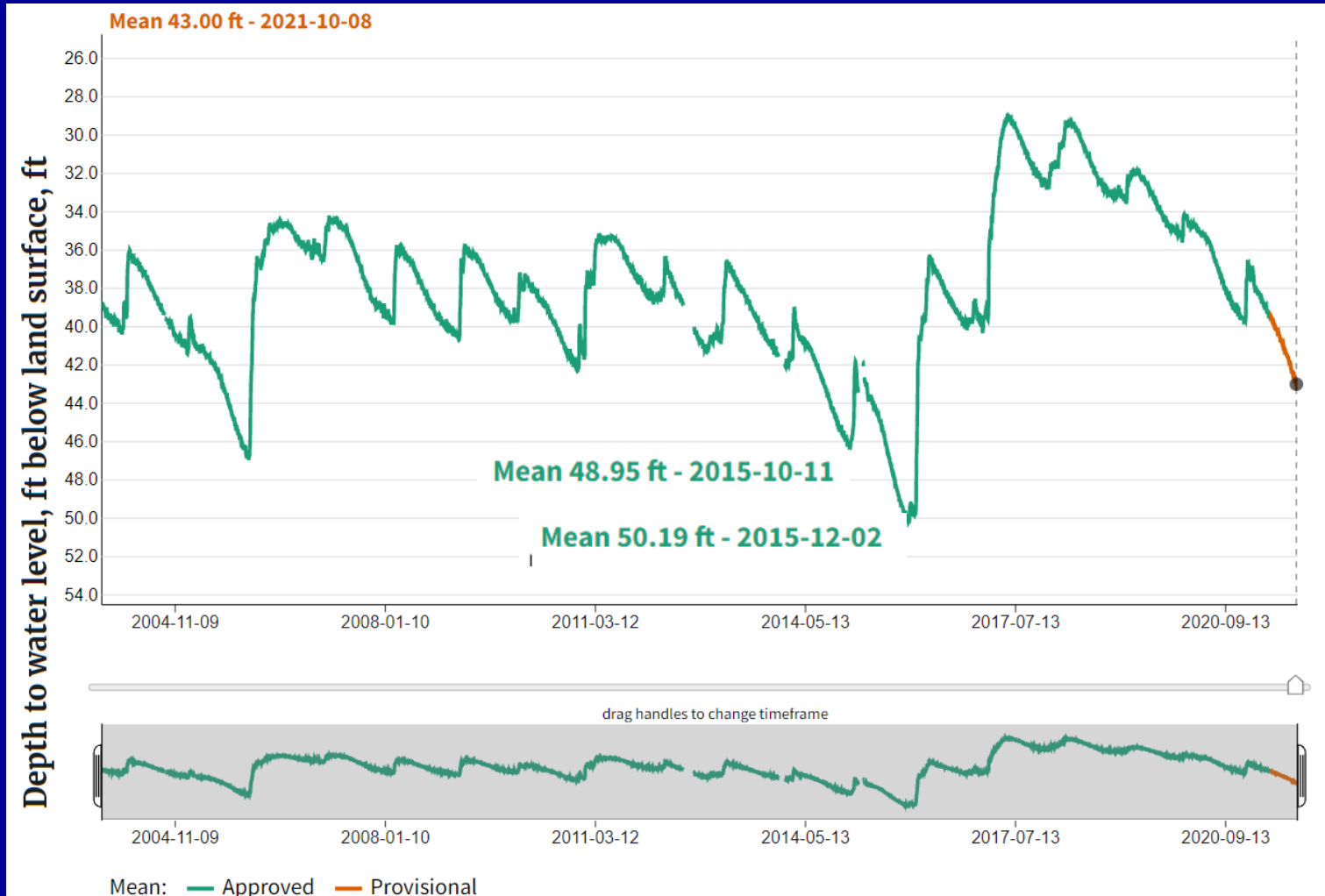




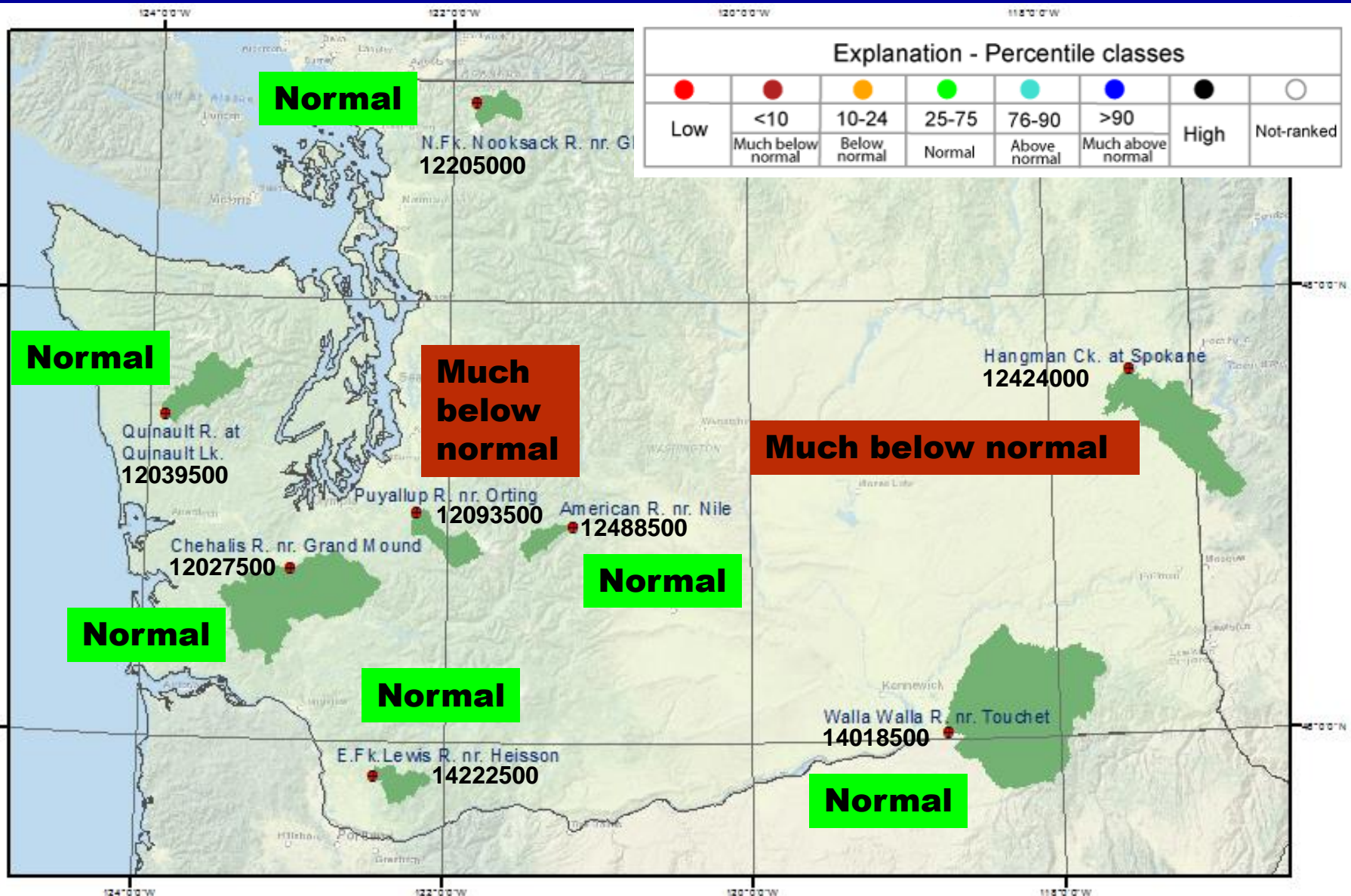
# WA Current Groundwater Conditions (Oct. 15<sup>th</sup>)

**Davenport well (473442118162201) in Thurston Co. (24N/36E-16A01)**

- 117-ft deep
- Wanapum Basalt



# Index Gaging Stations, 7-day average streamflow (as of Oct 14, 2021)



# Summary

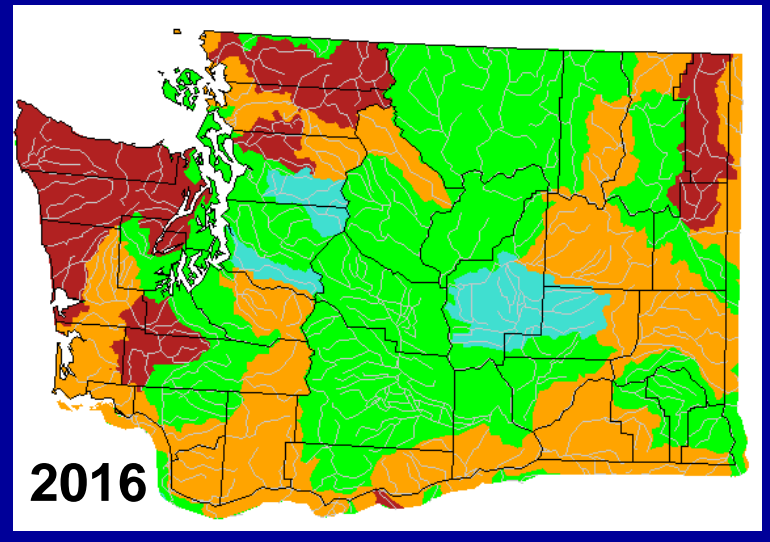
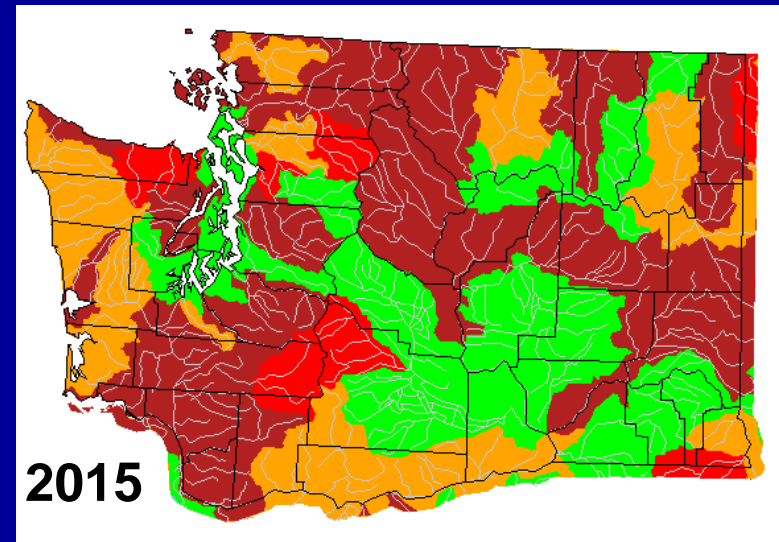
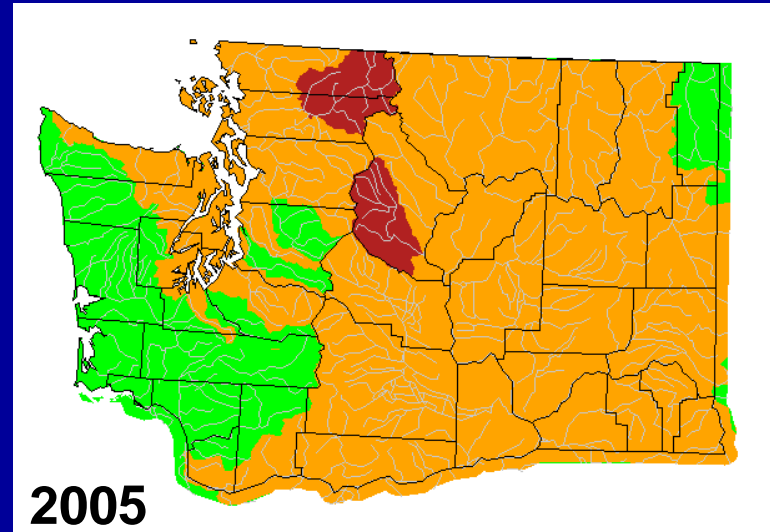
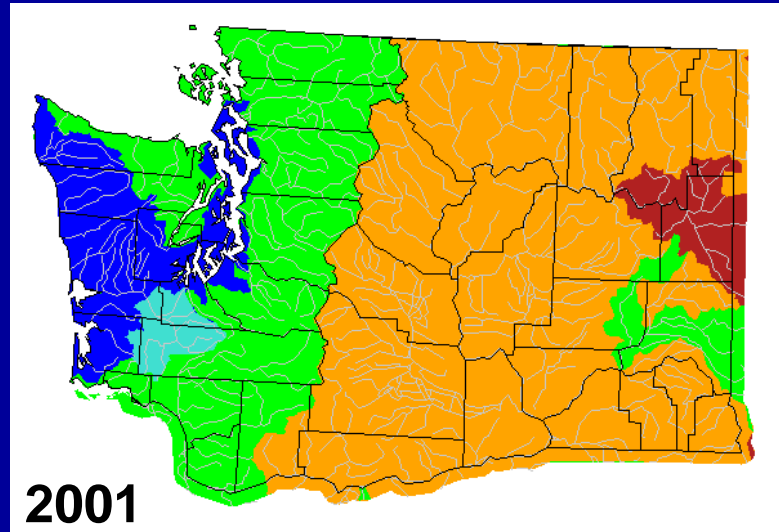
## Streamflow Conditions as of October 14, 2021







- **7-day average streamflow statewide is normal (between the 25<sup>th</sup> and 75<sup>th</sup> percentile). Much below normal (<10<sup>th</sup> percentile) conditions are present in parts of the central and eastern WA.**
- 7-day average streamflow at eight index gaging stations:
  - West side:
    - Chehalis River nr. Grand Mound and EF Lewis River – **Normal**
    - Quinault River – **Normal**
    - Puyallup River nr. Orting and NF Nooksack River - **Much below normal**
  - East side:
    - Hangman Creek – **Much below normal**
    - Walla Walla River and American River – **Normal**
- Index groundwater sites:
  - Davenport well (east) – **Normal**
  - Scatter Creek well (west) – **Normal**



# Average August 2001, 05, 15 & 16 Streamflow

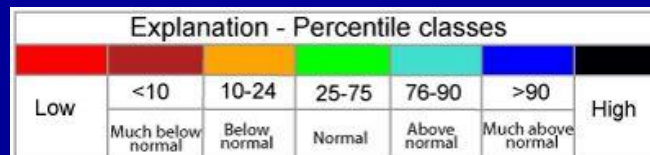
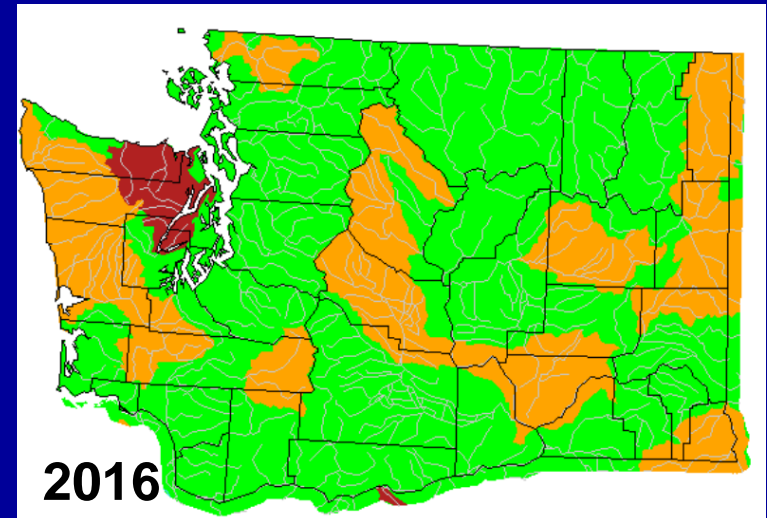
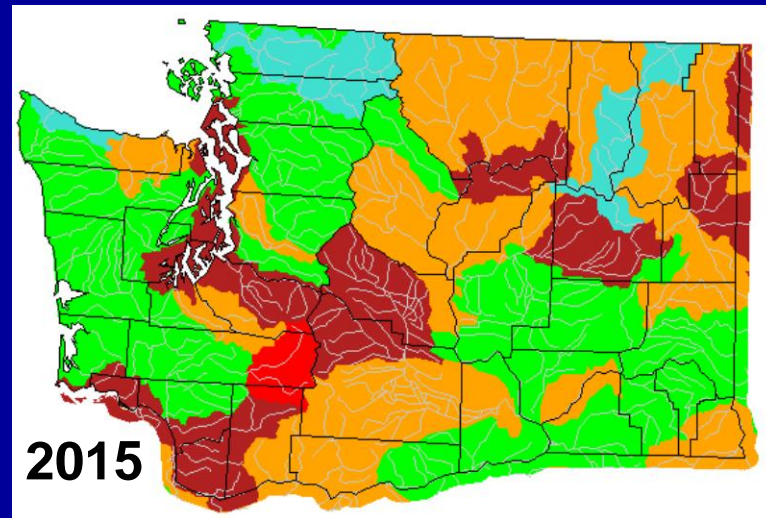
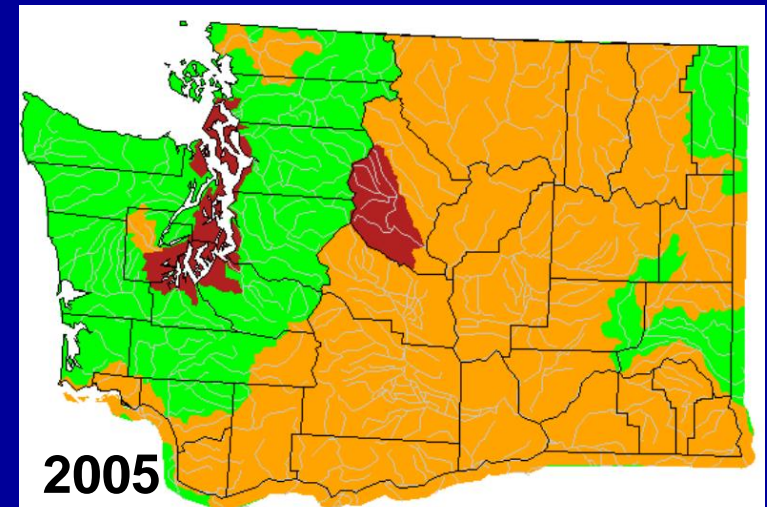
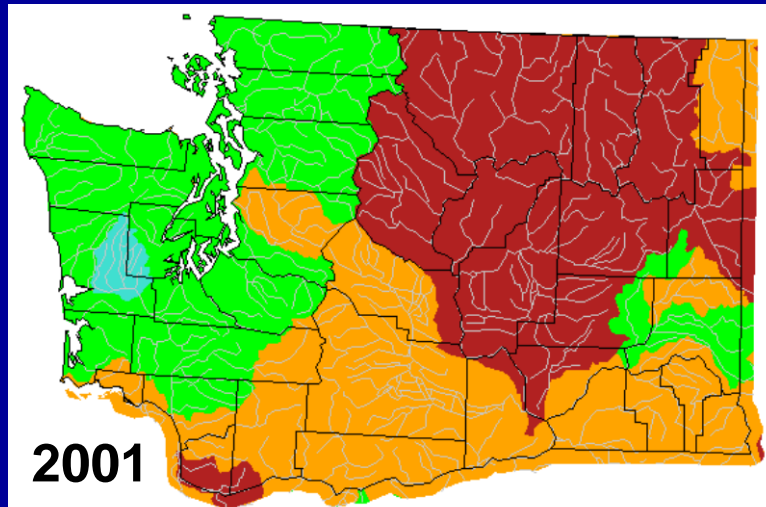
(2001, 05 & 15 were years of statewide drought in Washington)



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

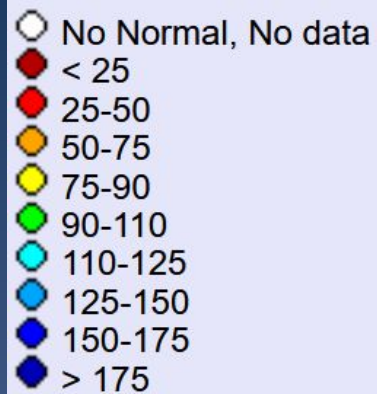
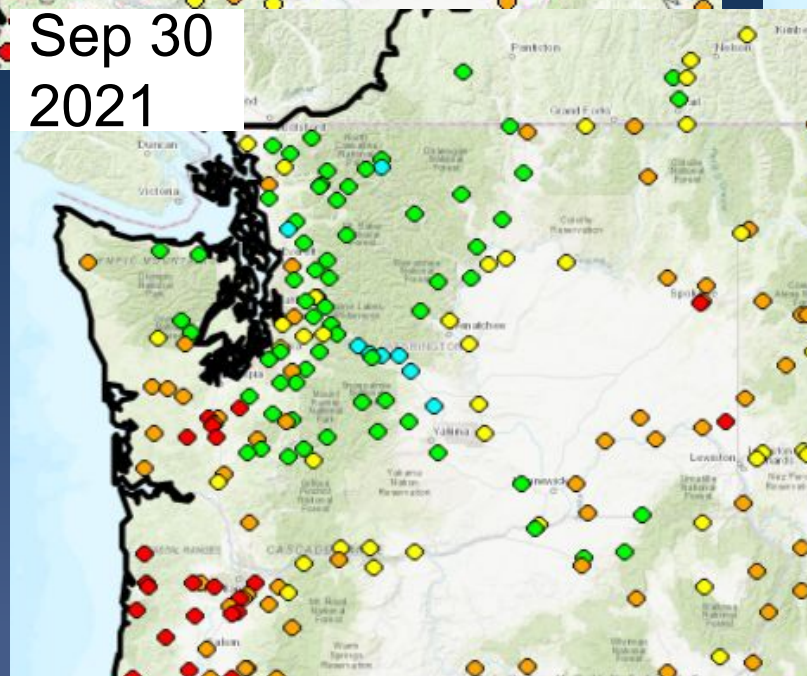
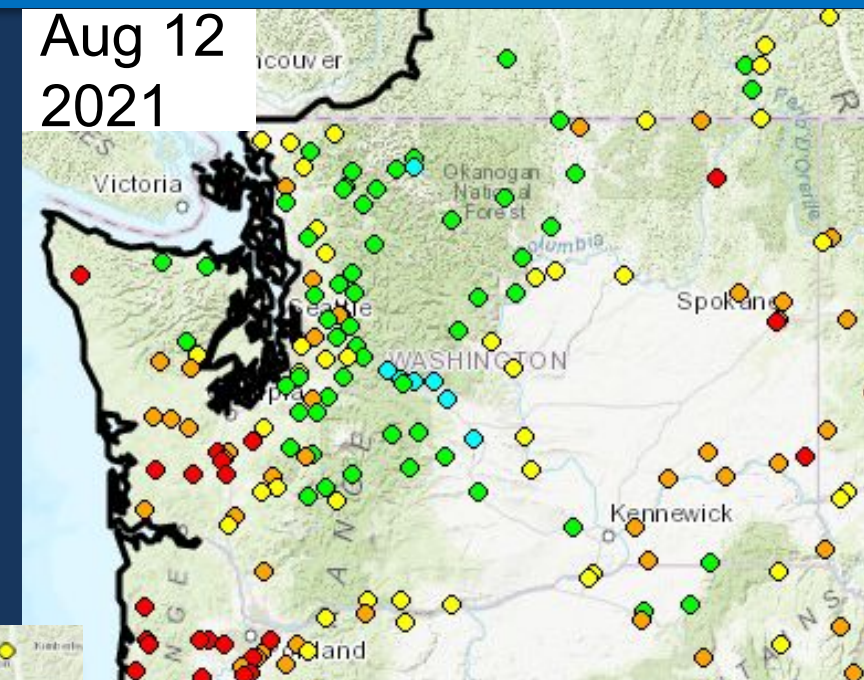
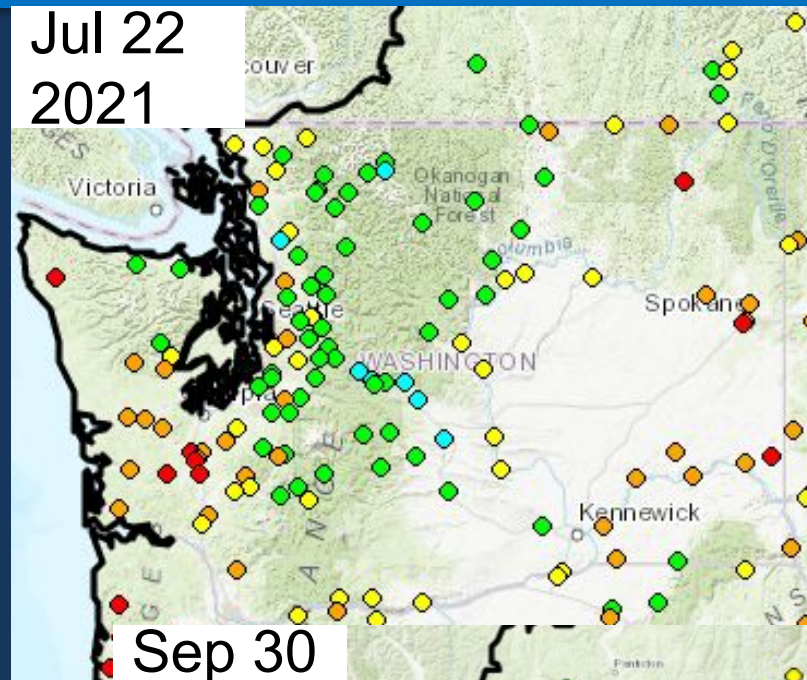
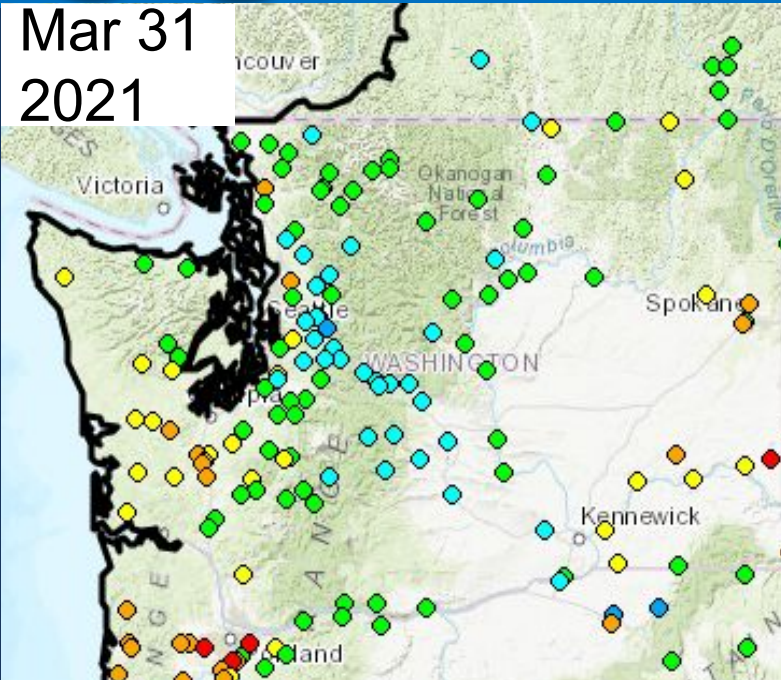
# Average September Streamflow 2001, 05, 15 & 16

(2001, 05 & 15 were years of statewide drought in Washington)





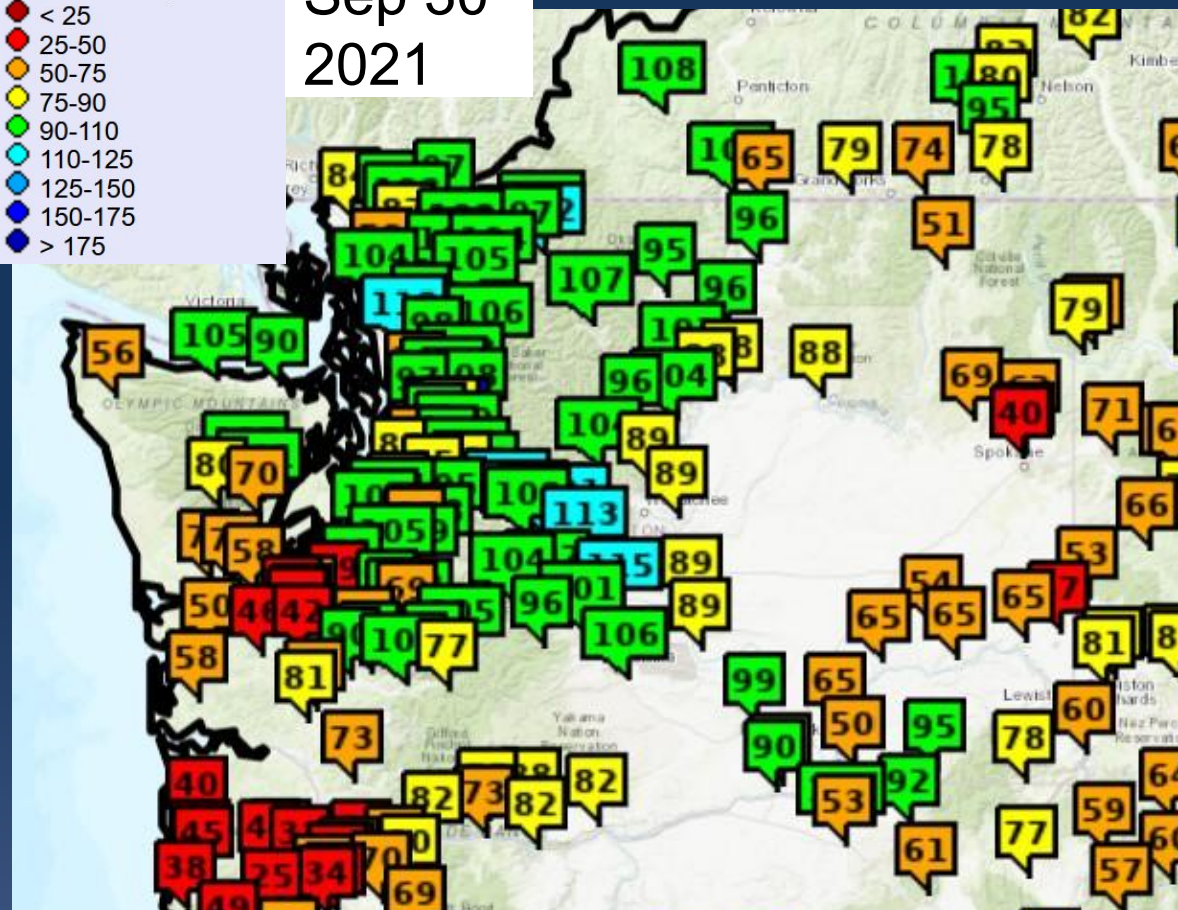
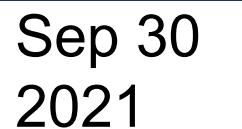
# ESP10 Natural Forecasts - WA







# ESP10 Natural Forecasts - WA

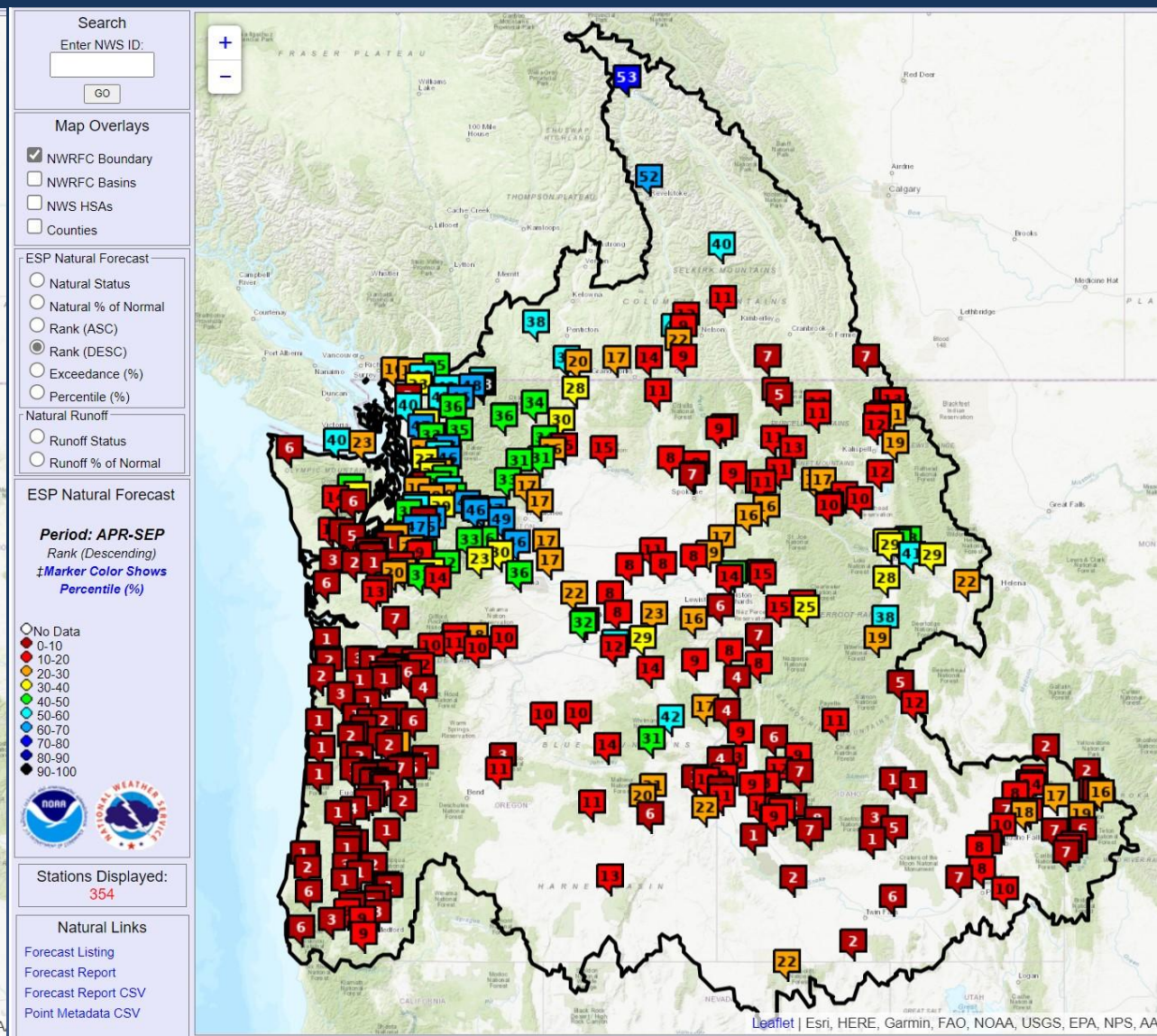
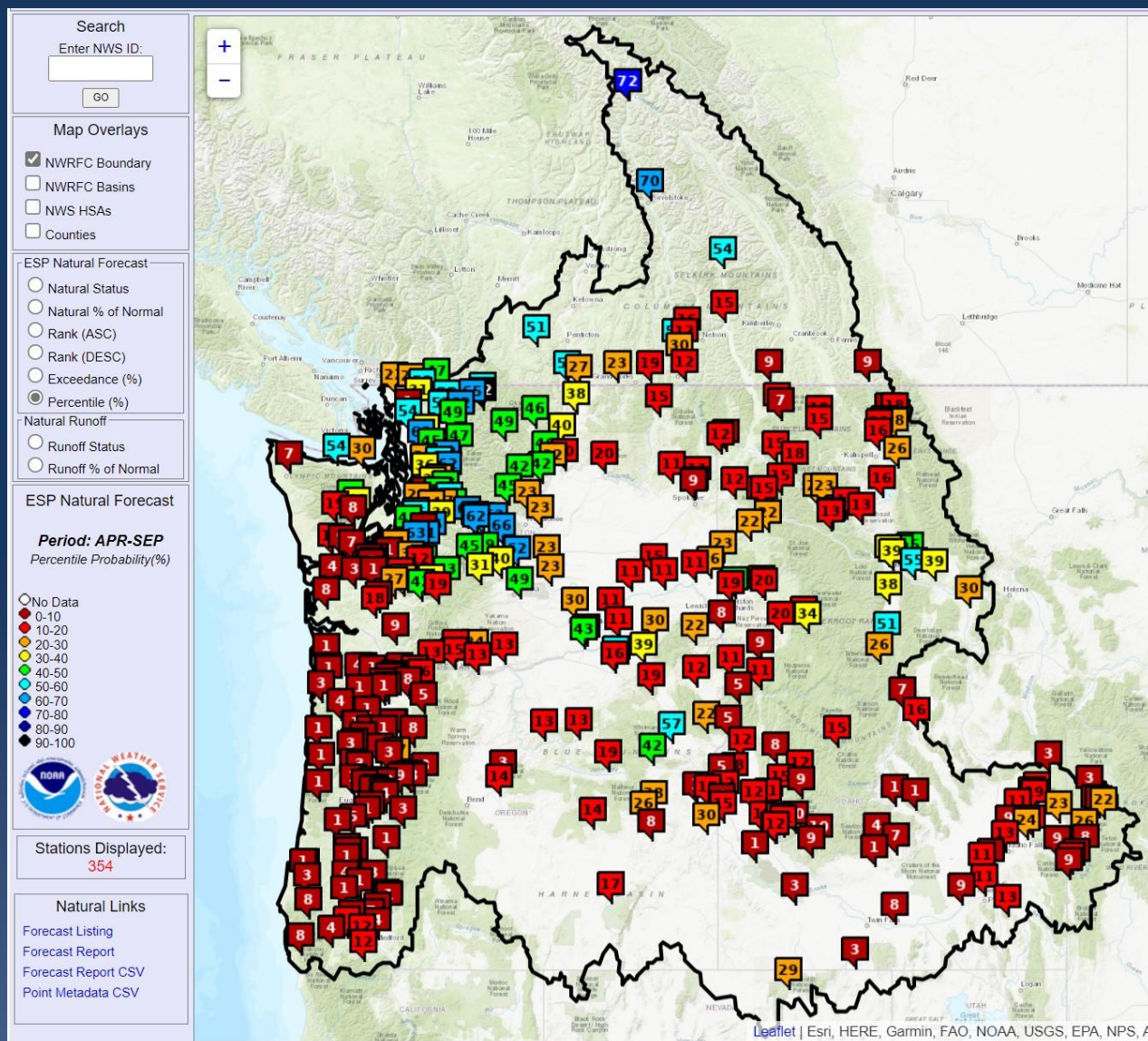


% Normal Apr -Sep Vol	Apr 1	Sep 30	Δ
Skagit nr Mt Vernon	106	105	-1
Dungeness nr Sequim	96	90	-6
Chehalis at Porter	68	56	-12
Okanogan at Malott	96	88	-8
Methow nr Pateros	102	94	-8
Yakima at Parker	108	102	-6
Walla Walla nr Touchet	85	45	-40





# ESP10 Natural Forecasts - WA





— BUREAU OF —  
RECLAMATION

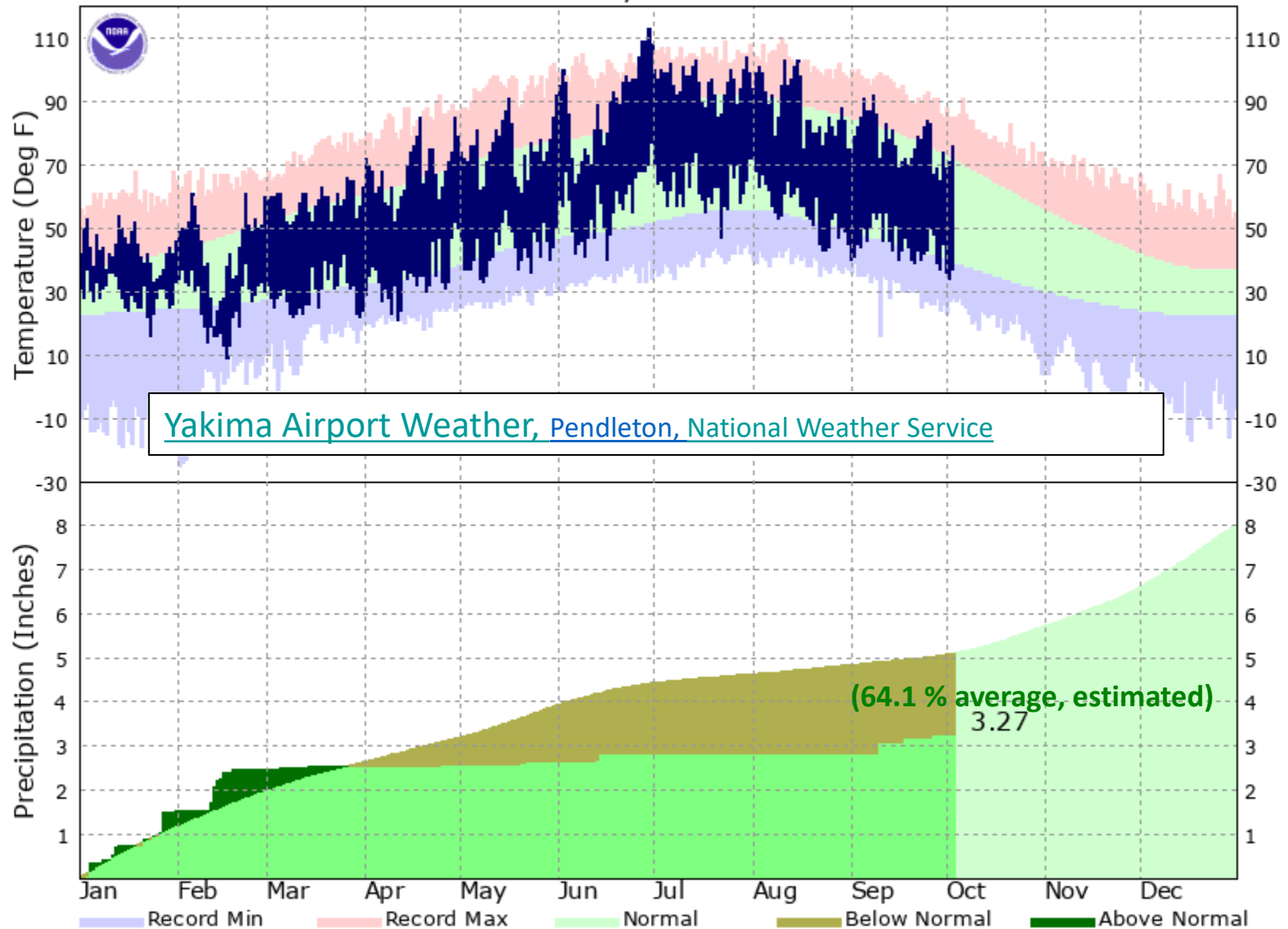
# Yakima River Basin Hydrologic conditions, for WaSAC

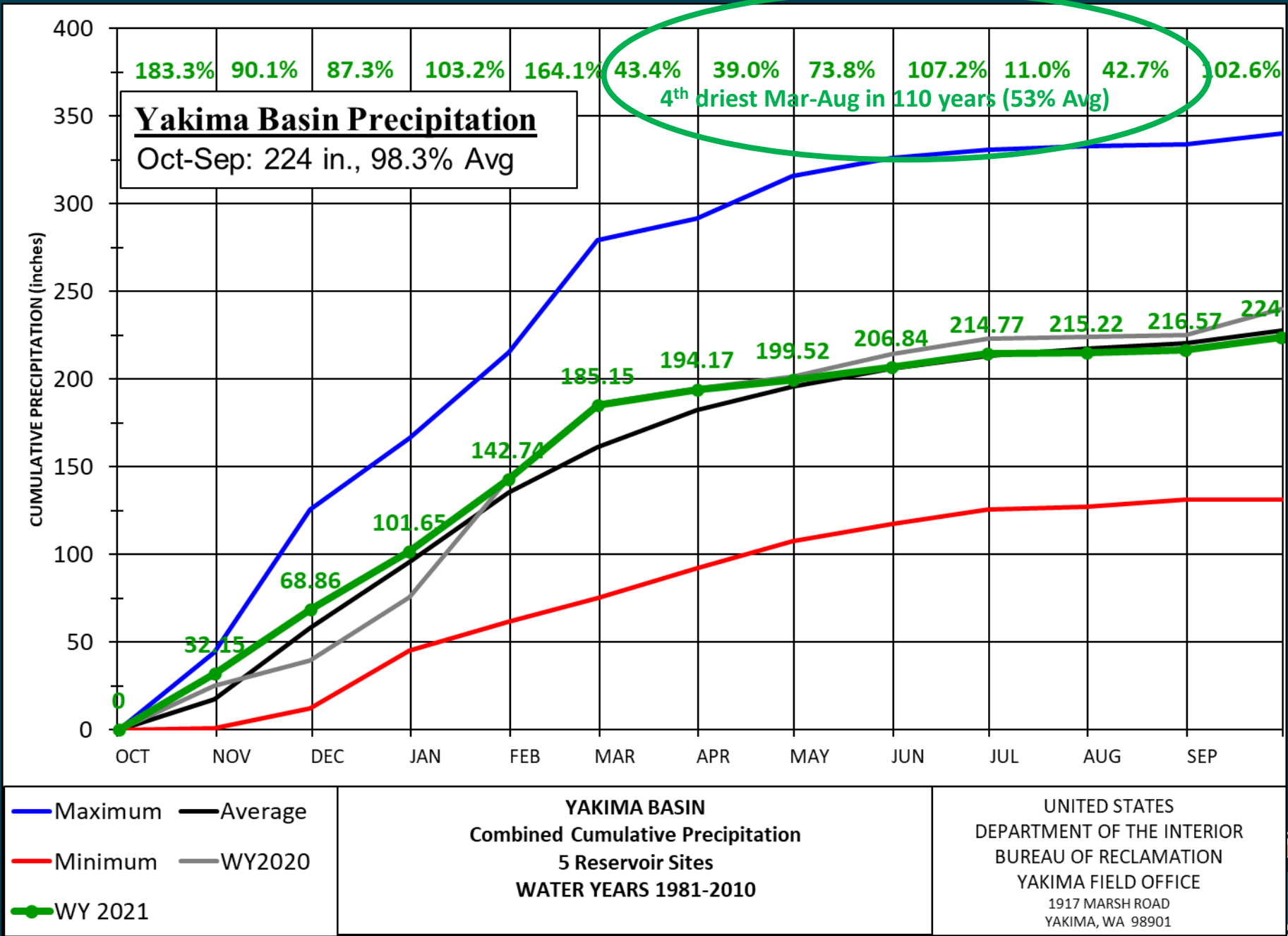
Yakima Basin, Washington

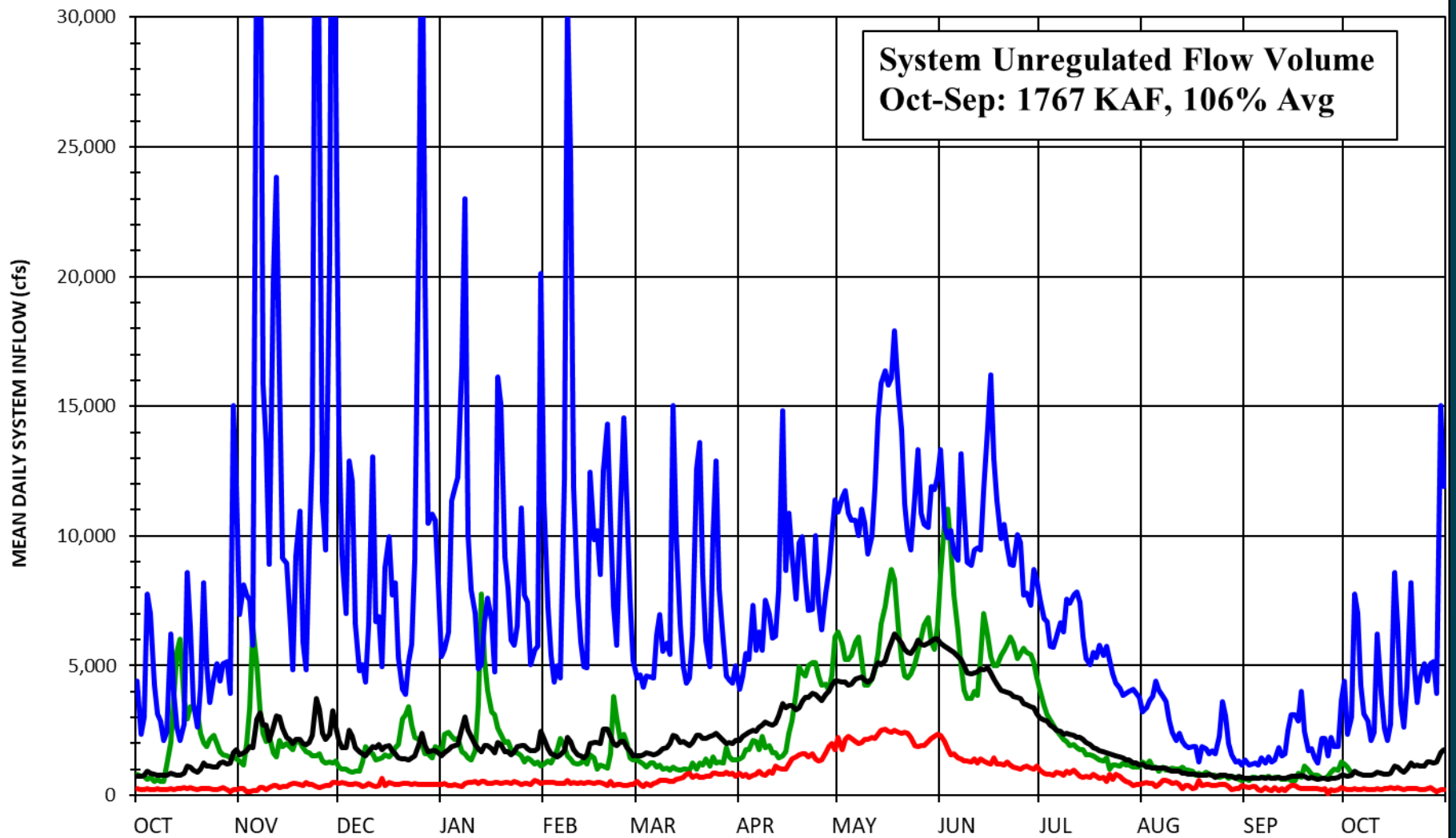
Oct 15, 2021, WY 2021



## YAKIMA, WA - 2021





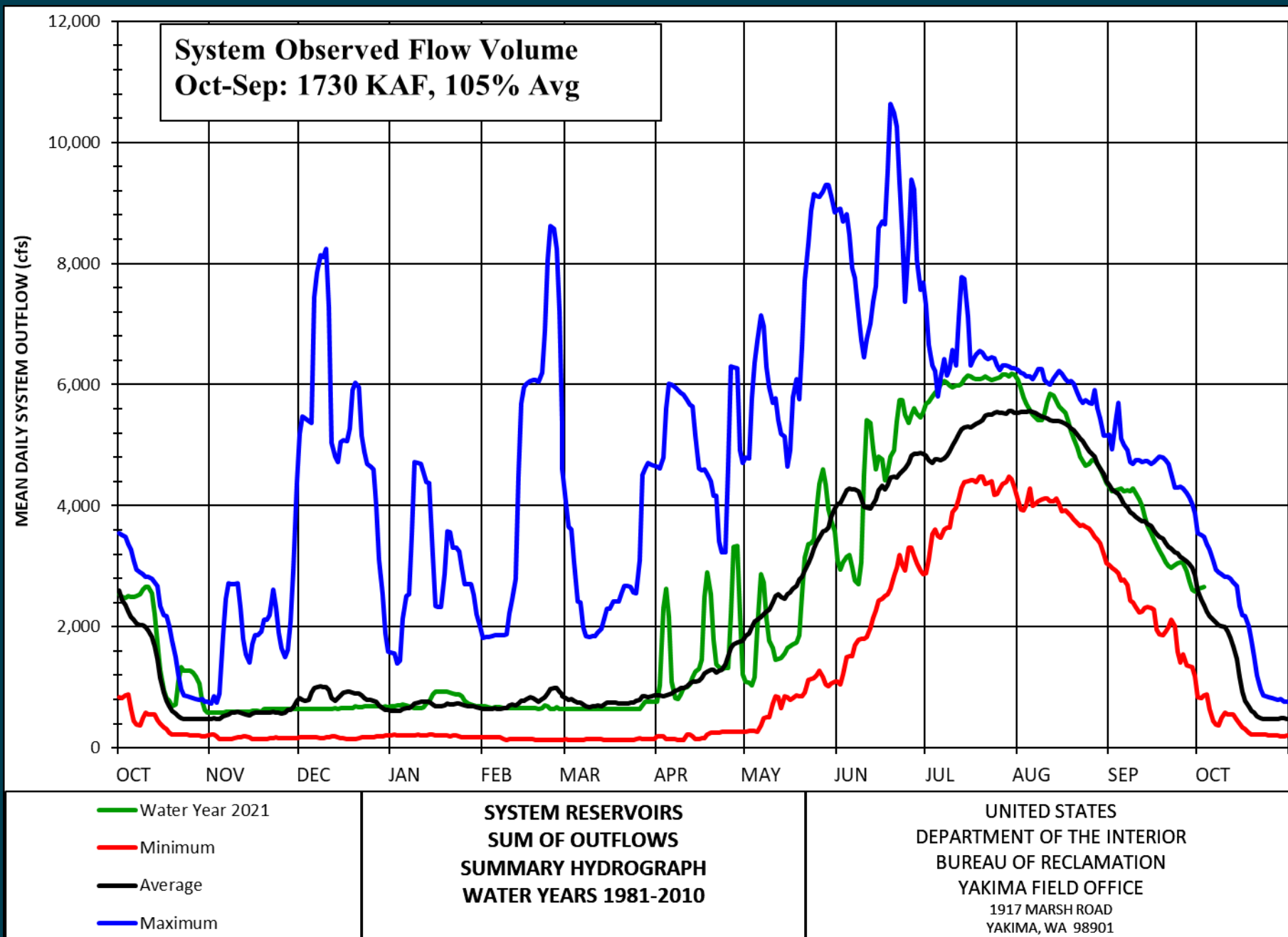


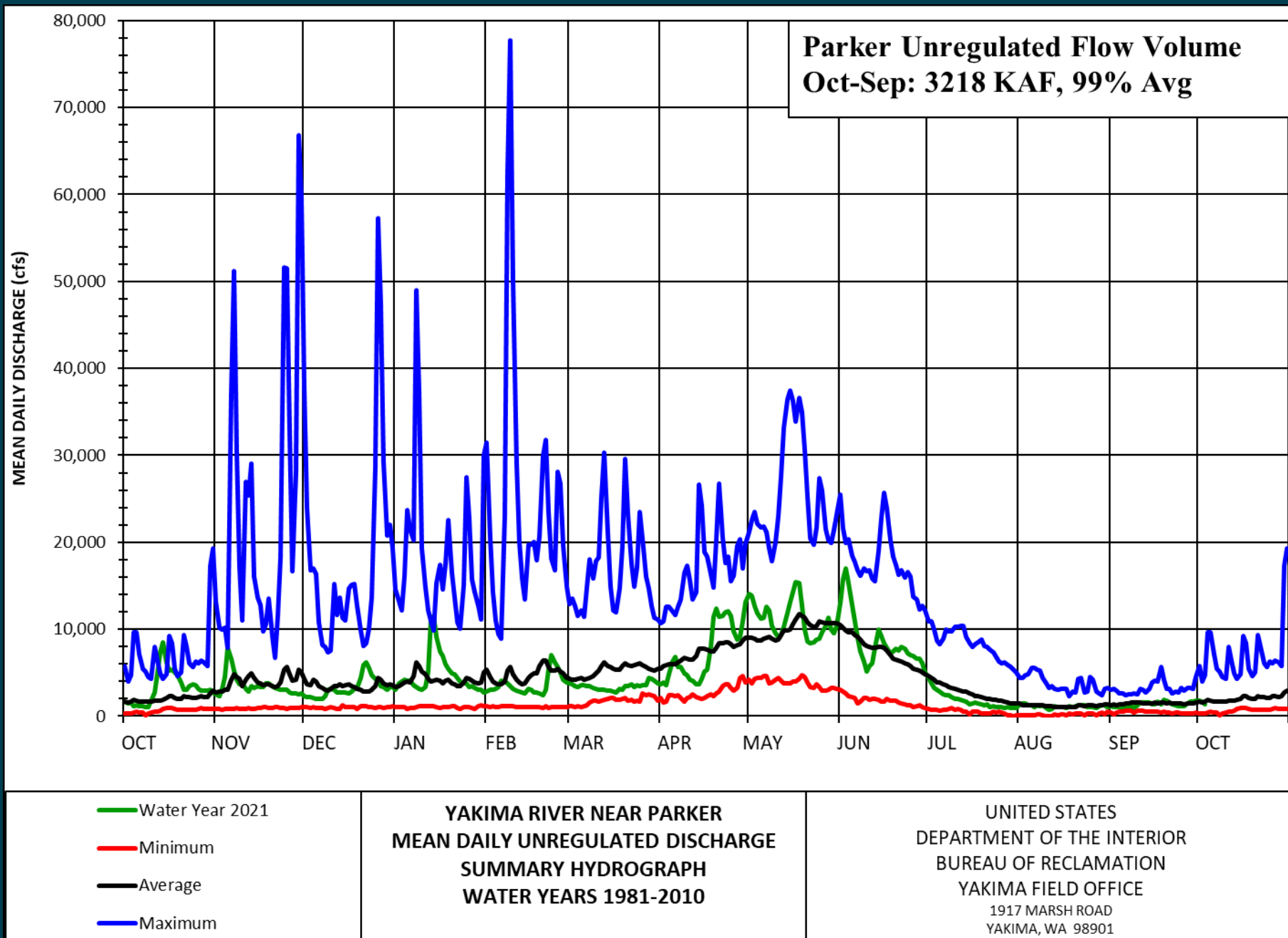
— Water Year 2021    — Minimum  
— Average            — Maximum

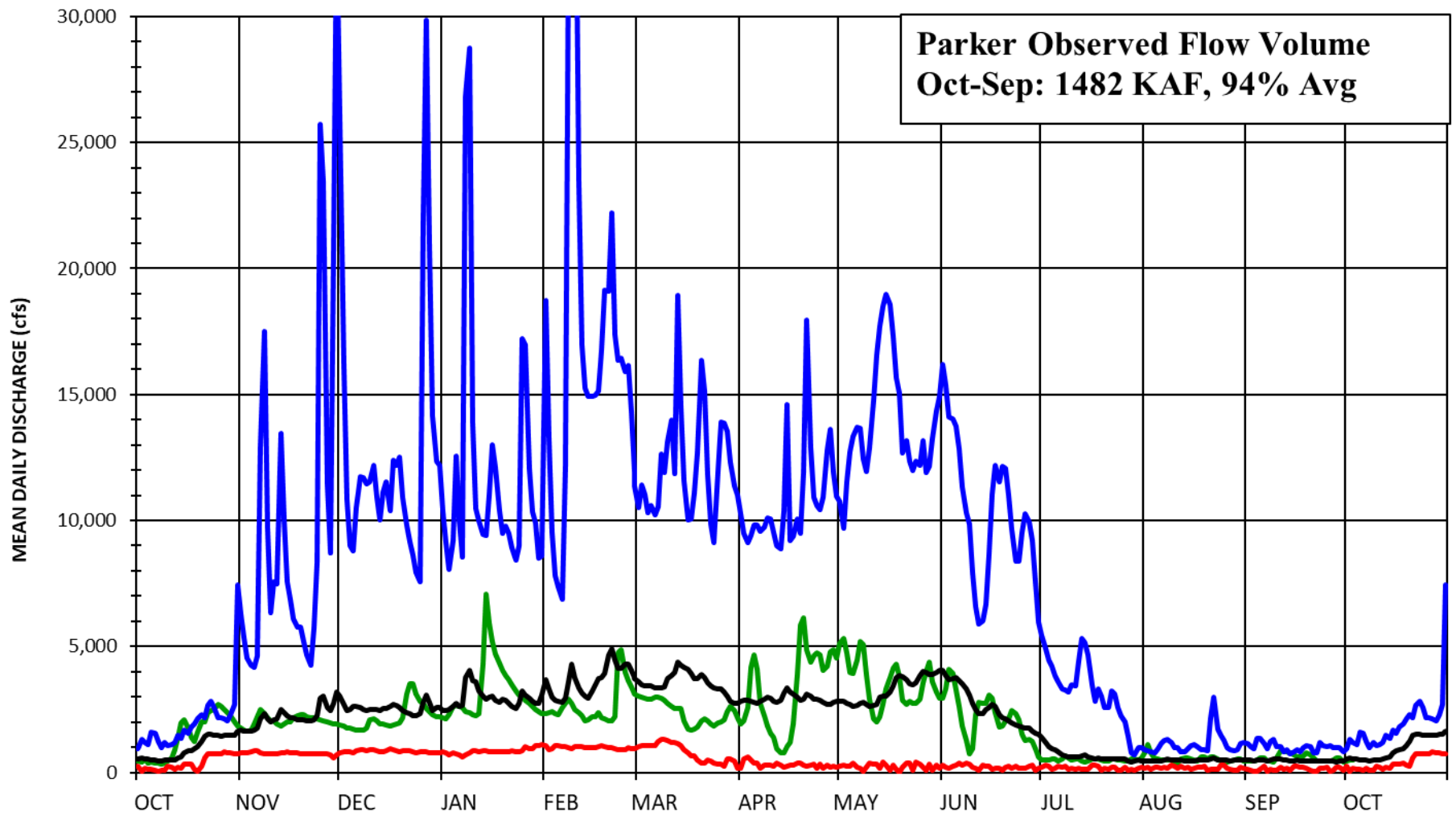
**YAKIMA PROJECT  
SYSTEM RESERVOIRS  
SUM OF INFLOWS  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901









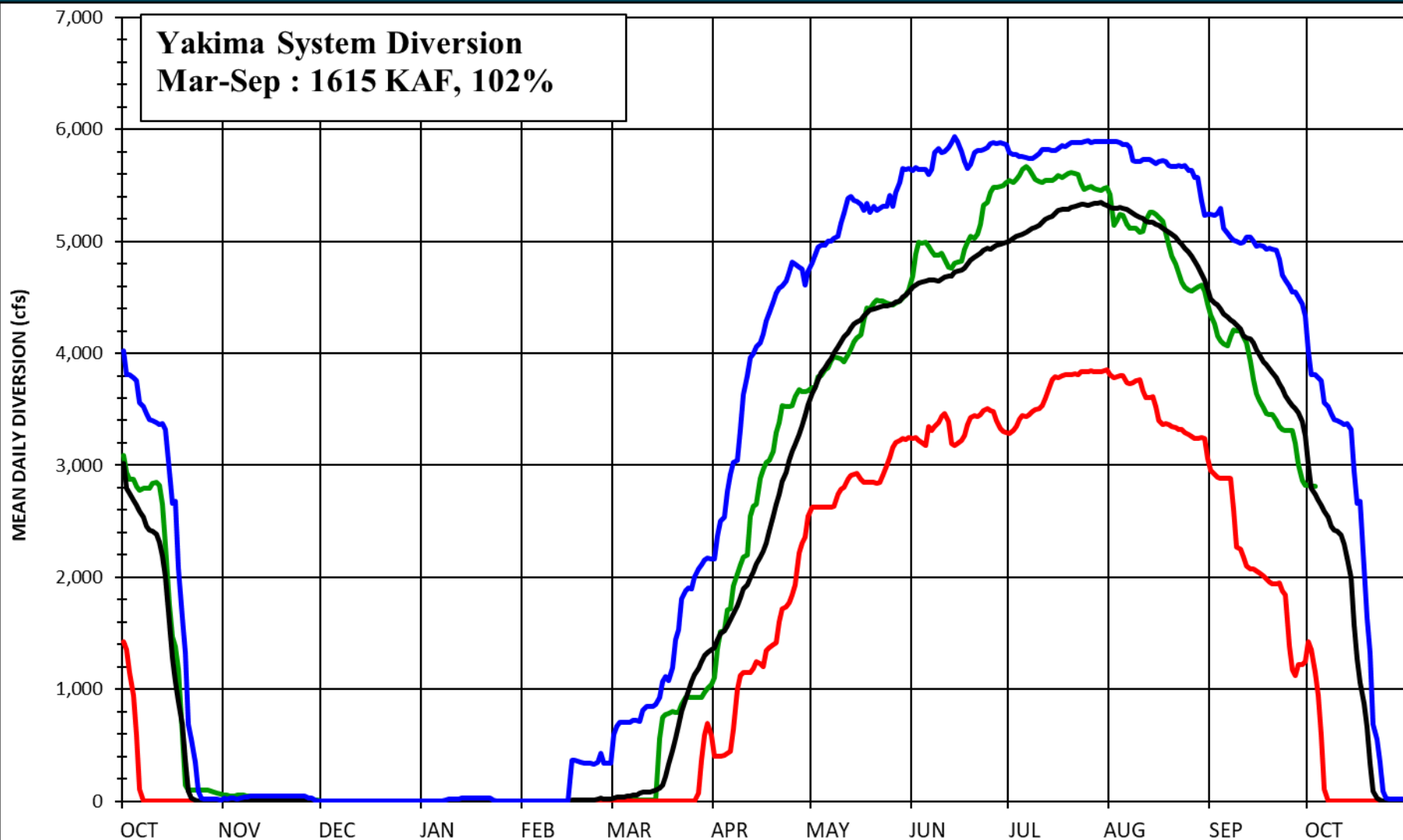
— Water Year 2021  
— Minimum  
— Average  
— Maximum

**YAKIMA RIVER NEAR PARKER  
MEAN DAILY REGULATED DISCHARGE  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901



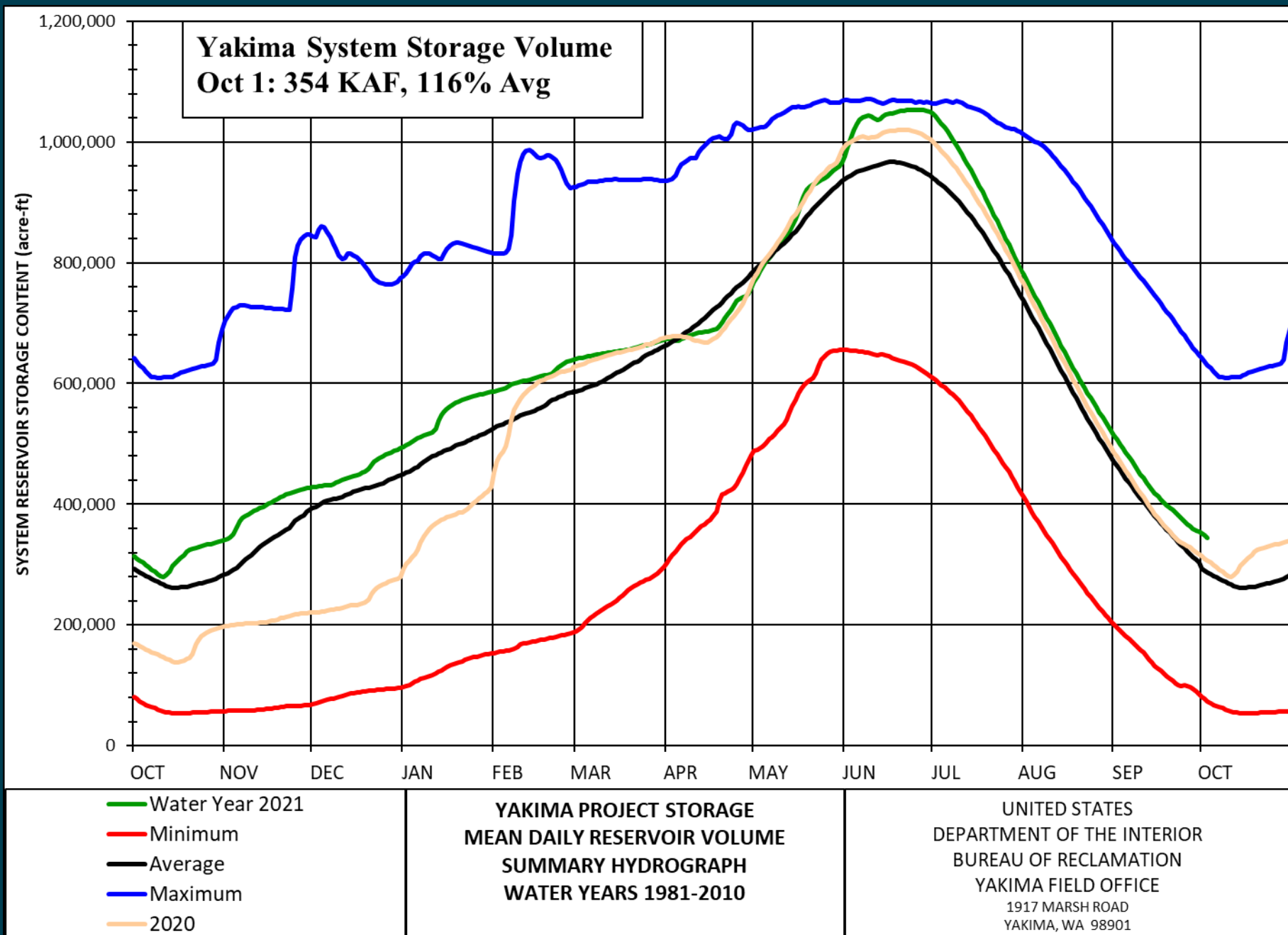
**Yakima System Diversion  
Mar-Sep : 1615 KAF, 102%**

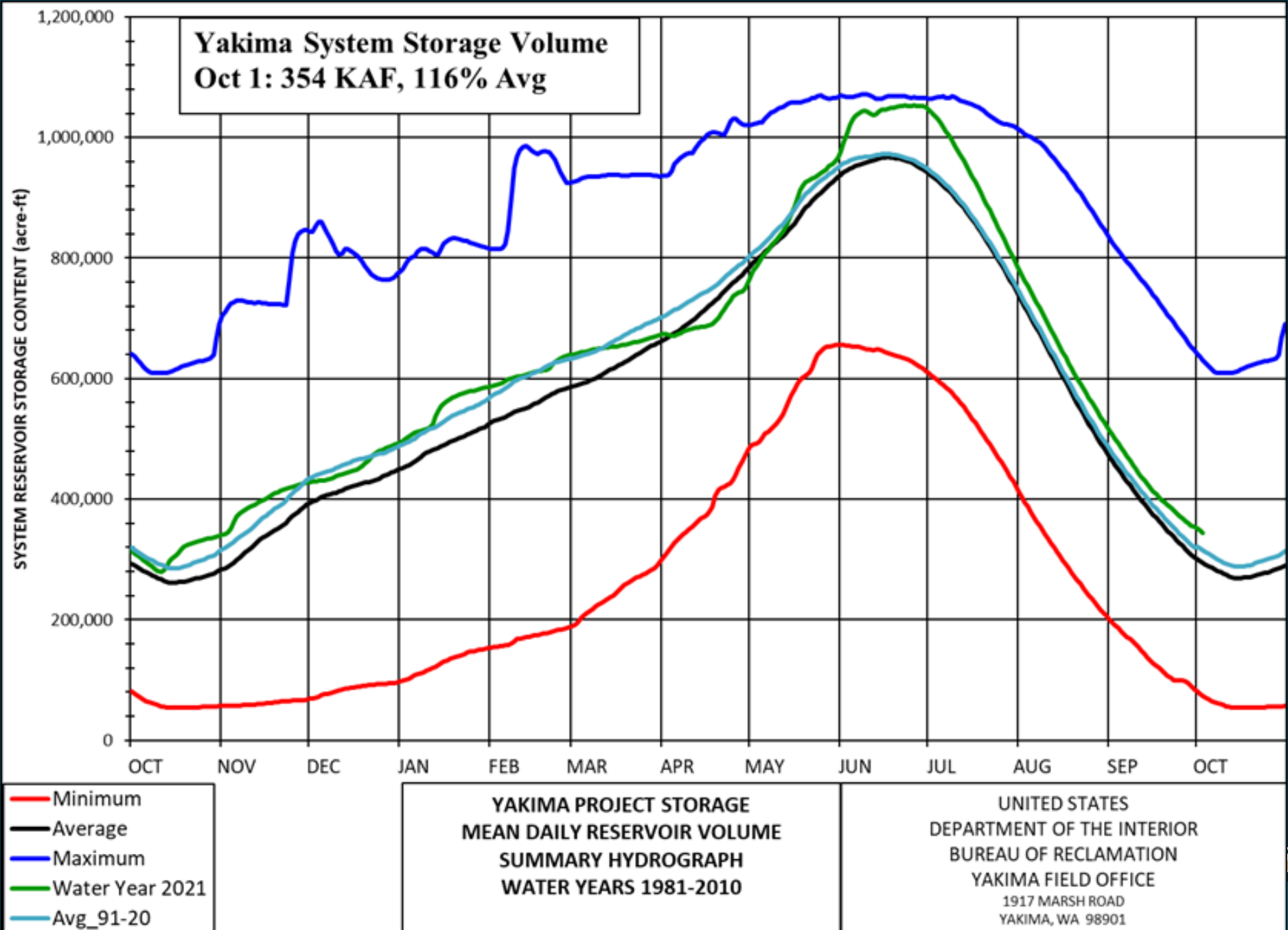


— Water Year 2021    — Minimum  
— Average            — Maximum

**5 MAJOR IRRIGATION DIVERSIONS  
YAKIMA R. ABOVE PARKER  
SUMMARY HYDROGRAPH  
WATER YEARS 1981-2010**

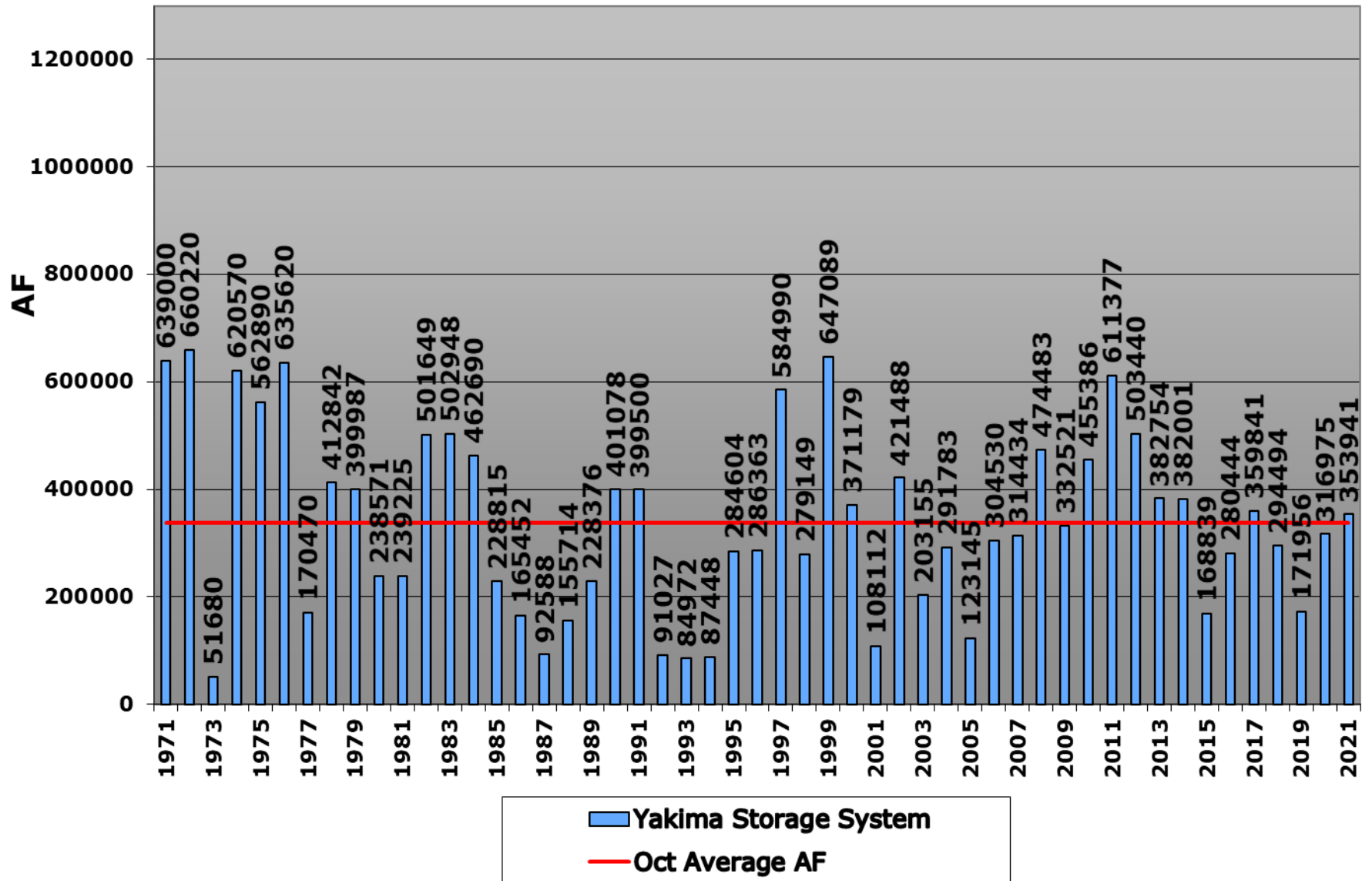
UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
YAKIMA FIELD OFFICE  
1917 MARSH ROAD  
YAKIMA, WA 98901







# Yakima Basin Storage, Historical Comparison



# Yakima Basin Forecasts

## Seasonal retrospective

### Yakima Basin Forecast Analysis, 2021

Period	Average	Actual	Adopted	RFC	NRCS
Mar's Apr-Sep	2033	<b>1902</b>	<i>2231</i>	2243	2300
Apr-Sep	2033	<b>1902</b>	<i>2166</i>	2149	2170
May-Sep	1411	<b>1461</b>	<i>1568</i>	1648	1470
Jun-Sep	755	<b>775</b>	<i>835</i>	1001	735
Jul-Sep	294	<b>261</b>	<i>278</i>	385	221

### Yakima Basin Forecast Analysis, 2021

Period	Average	Actual	Adopted	RFC	NRCS
Mar's Apr-Sep	2033	<b>94%</b>	<i>110%</i>	110%	113%
Apr-Sep	2033	<b>94%</b>	<i>107%</i>	106%	107%
May-Sep	1411	<b>104%</b>	<i>111%</i>	117%	104%
Jun-Sep	755	<b>103%</b>	<i>111%</i>	133%	97%
Jul-Sep	294	<b>89%</b>	<i>94%</i>	131%	75%

# Yakima Basin Forecasts

## Seasonal retrospective

Yakima Basin Parker Forecast

