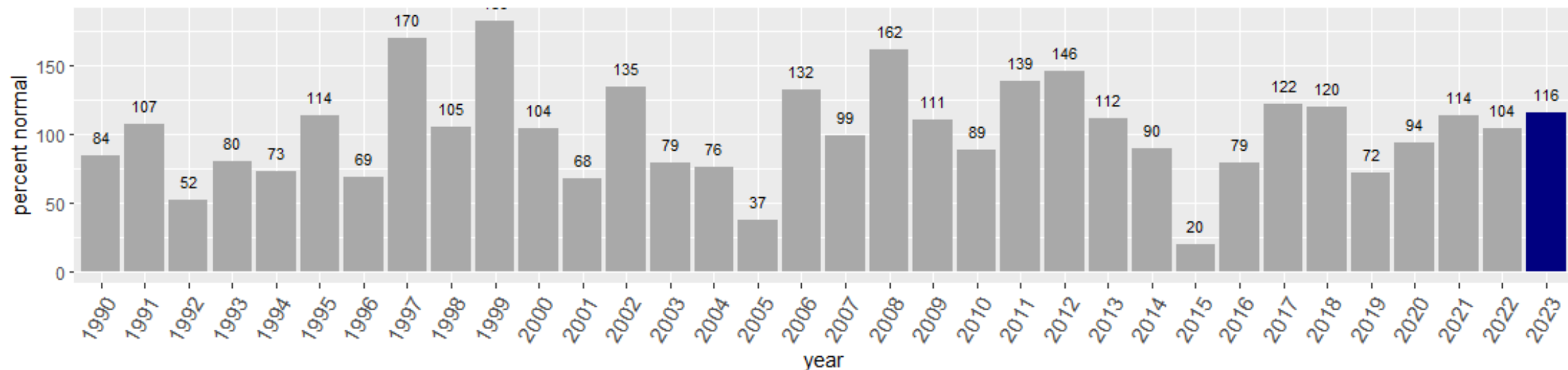


Water Supply Availability Committee

Friday, April 20

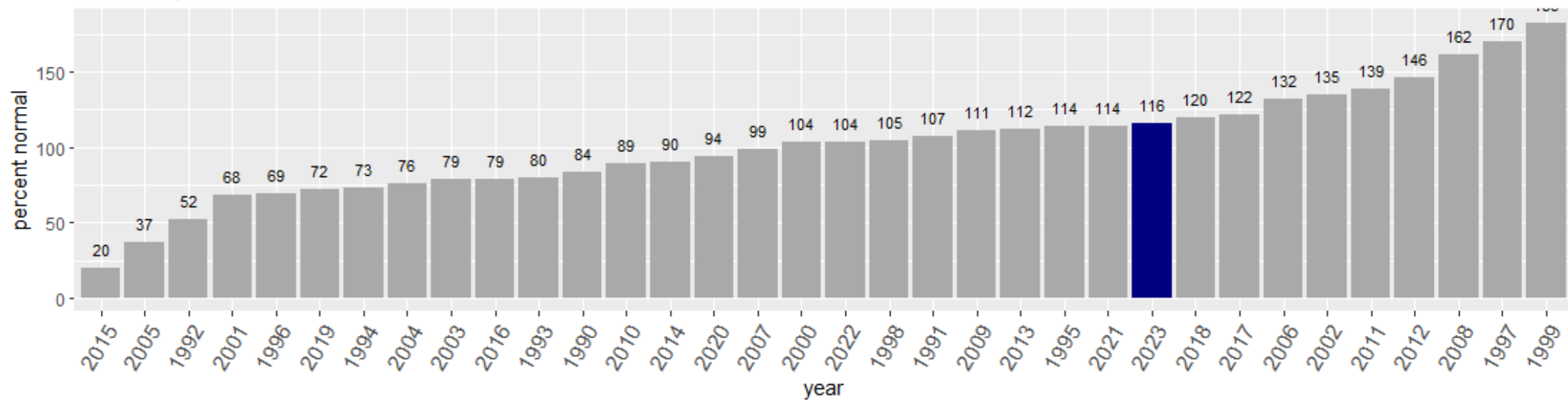
Start Time	End Time	Duration, min	Description	
10:00	10:15	15	Welcome & Introductions Mountain Conditions	Jeff Marti, Ecology
10:15	10:30	15	Regional Climate Setting/ ENSO	Nick Bond, OWSC
10:30	10:45	15	Streamflow and Groundwater	Nick Sutfin, USGS
10:45	10:55	10	Water Supply Forecasts	Amy Burke, NWRFC Robin Fox, NWS Spokane
10:55	11:10	15	Yakima Project	Chris Lynch
11:10	11:30	20	General Info Sharing	All
			Next Meeting Friday, May 21	

Washington statewide average Snow Water Equivalent on April 21 compared to previous years
sorted by year



NRCS data

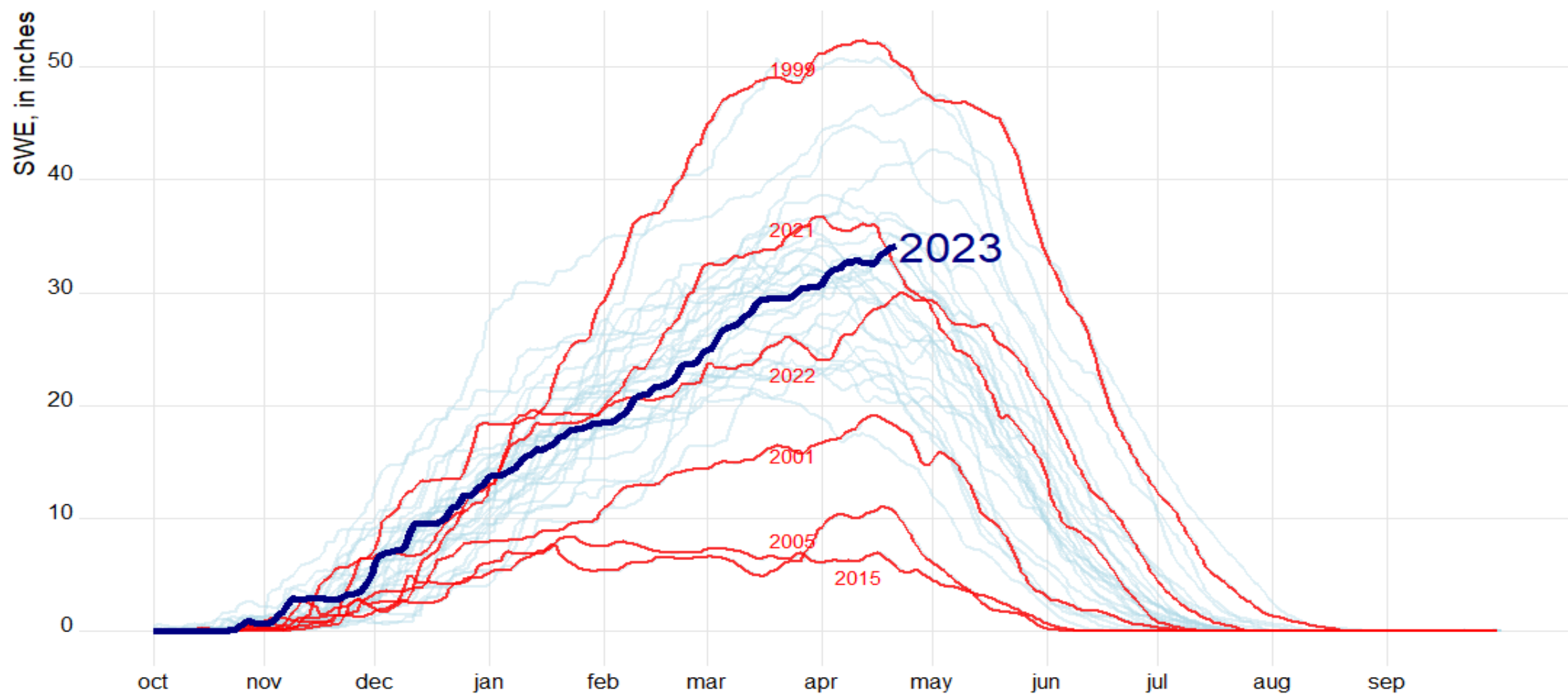
ranked by SWE



NRCS data

Average Washington State SWE (SNOTEL)

Water Years: 1990 - 2023 Created on: 2023-04-21

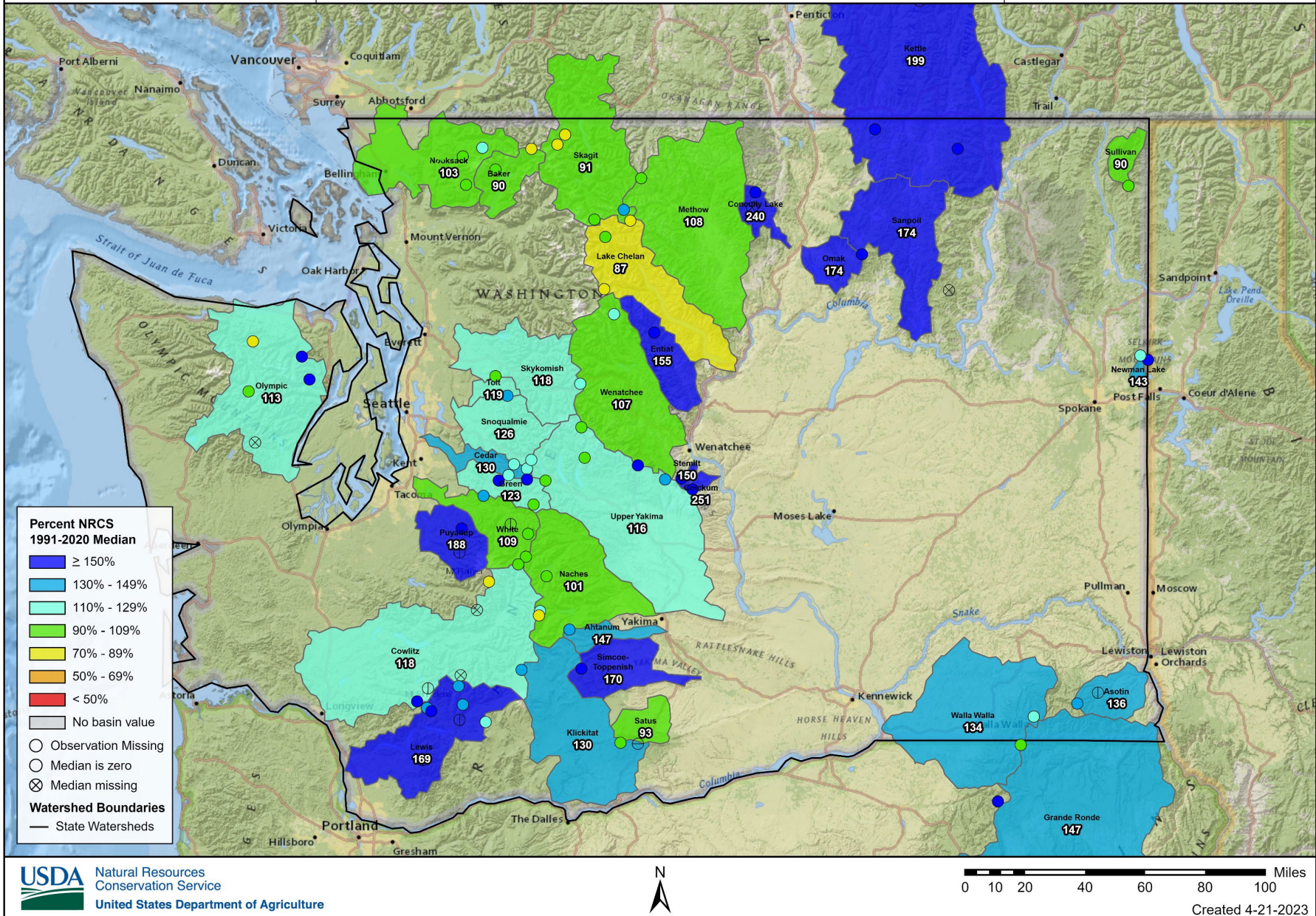


month
Data: NRCS

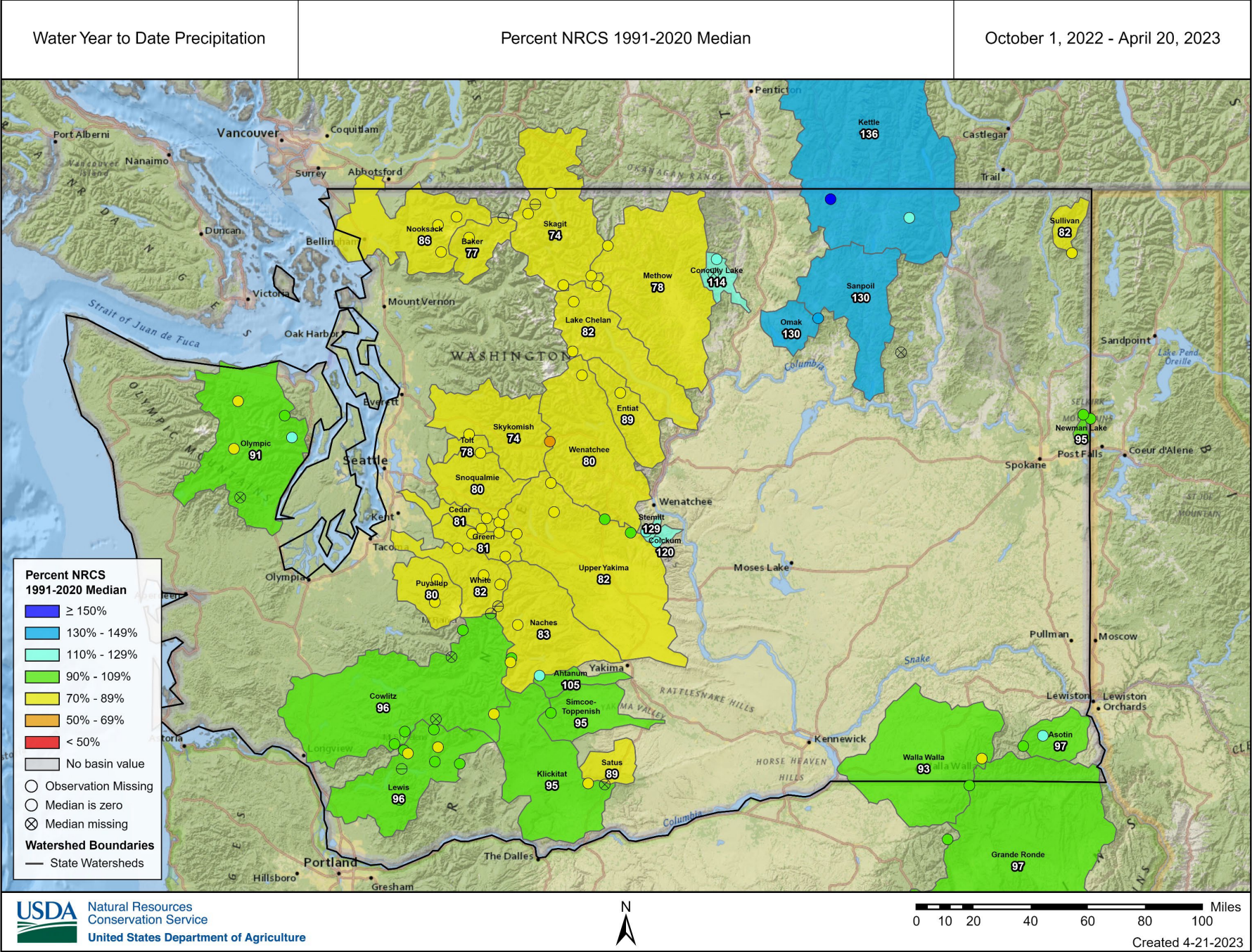
Percent NRCS 1991-2020 Median

April 21, 2023, first of day

April 21, 2023, first of day



Statewide
Average
Precipitation:
86 Percent of
Average



Snow Density

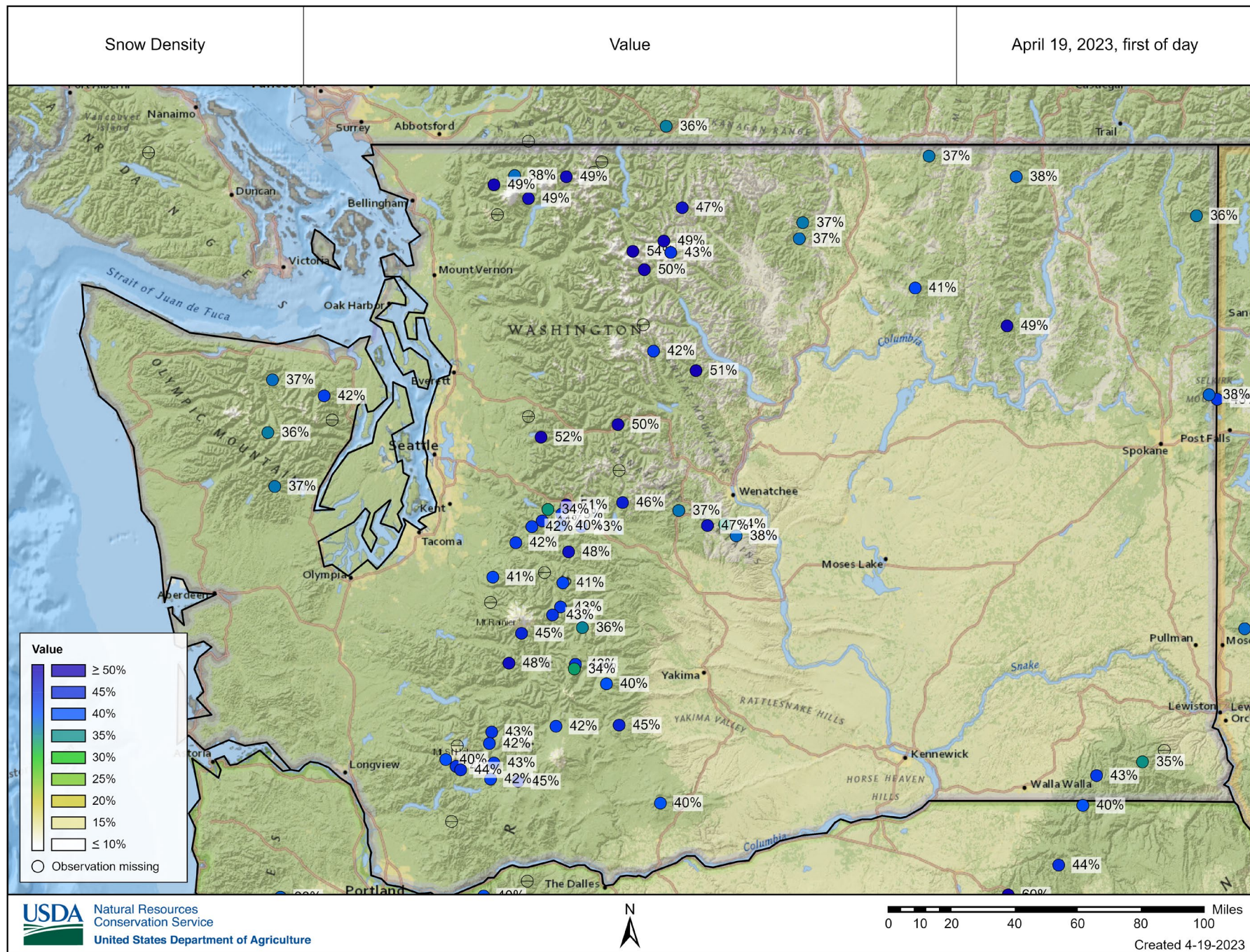
Value

April 19, 2023, first of day

Snow Density

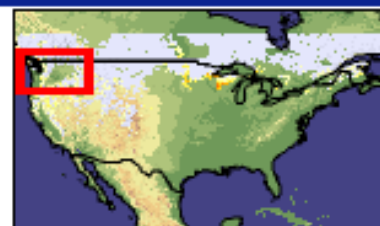
(ratio of snow water to snow depth)

> 40% means the snow is ready to move when conditions warm

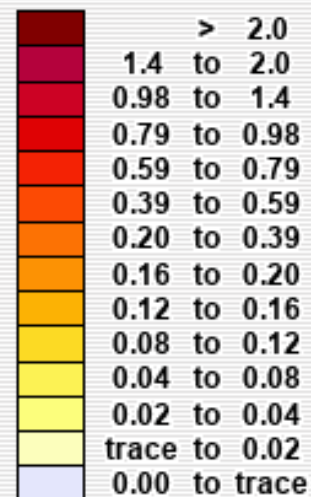


Modeled Snow Melt during hour following 2023 April 20, 20:00 UTC

544.2 mi

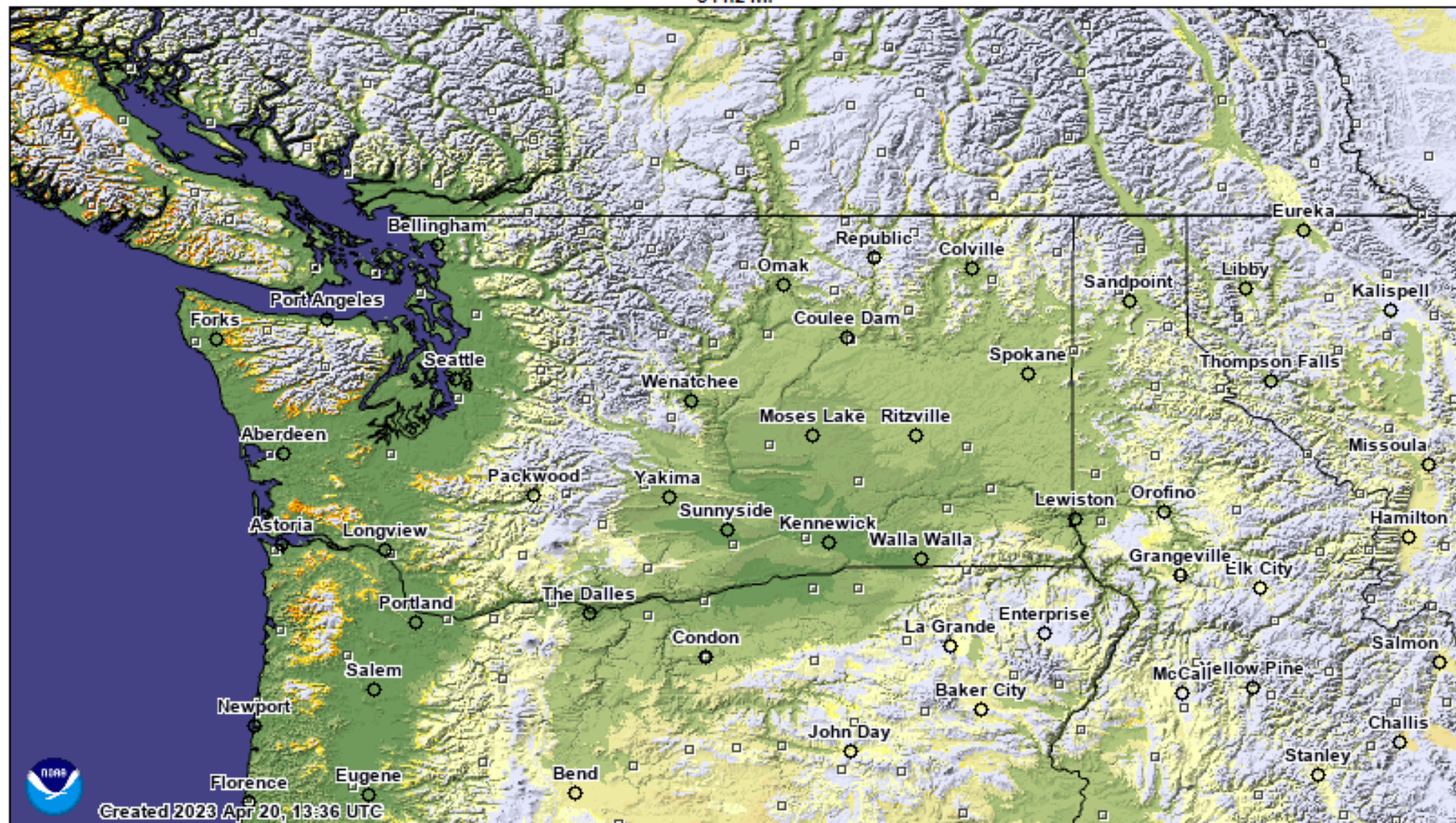


Inches of water equivalent



Not Estimated



Elevation in feet



621.2 mi



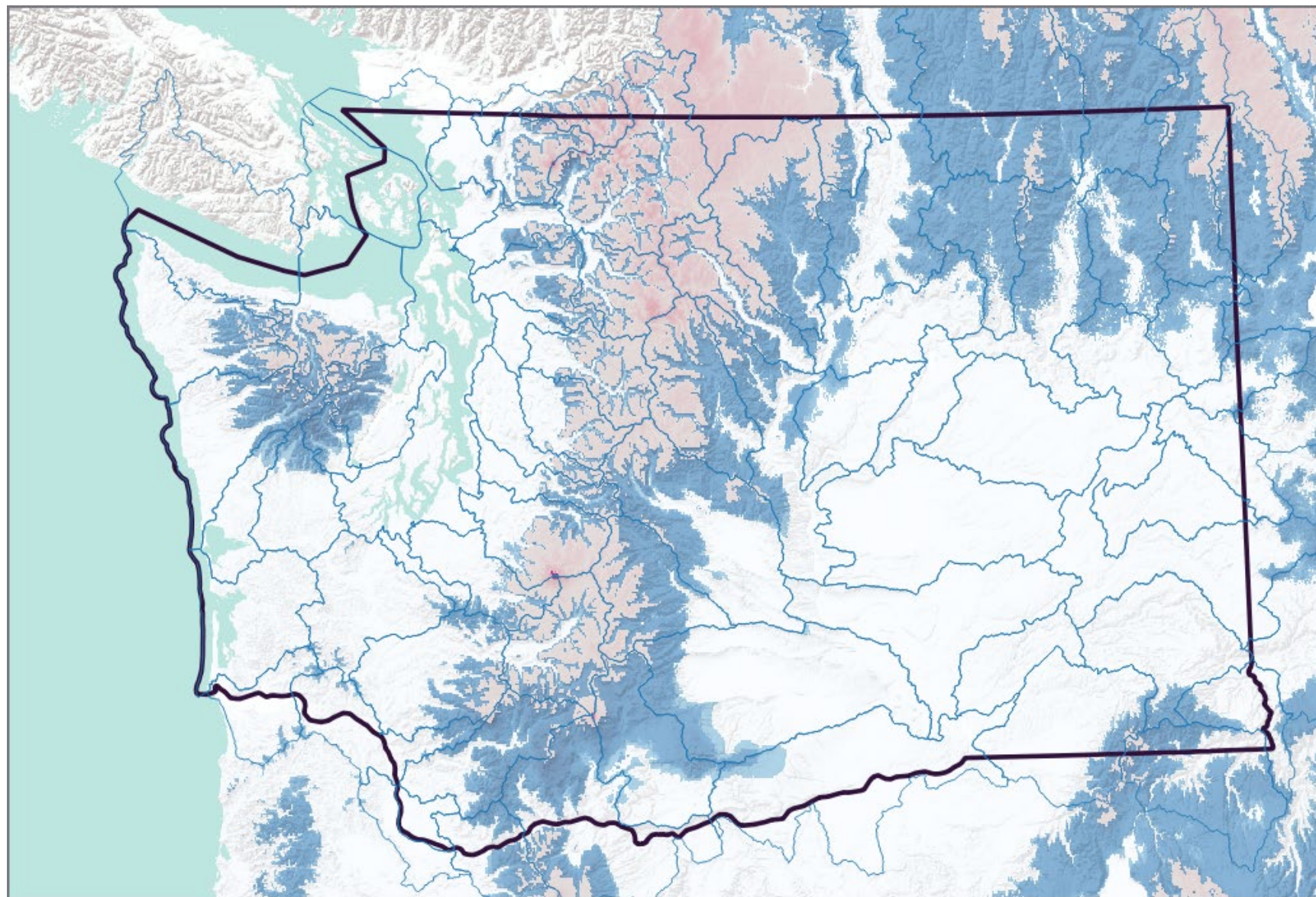
Created 2023 Apr 20, 13:36 UTC

2015	
2023	

40,004,240 af

-12,001,617 af

=28,002,623 af

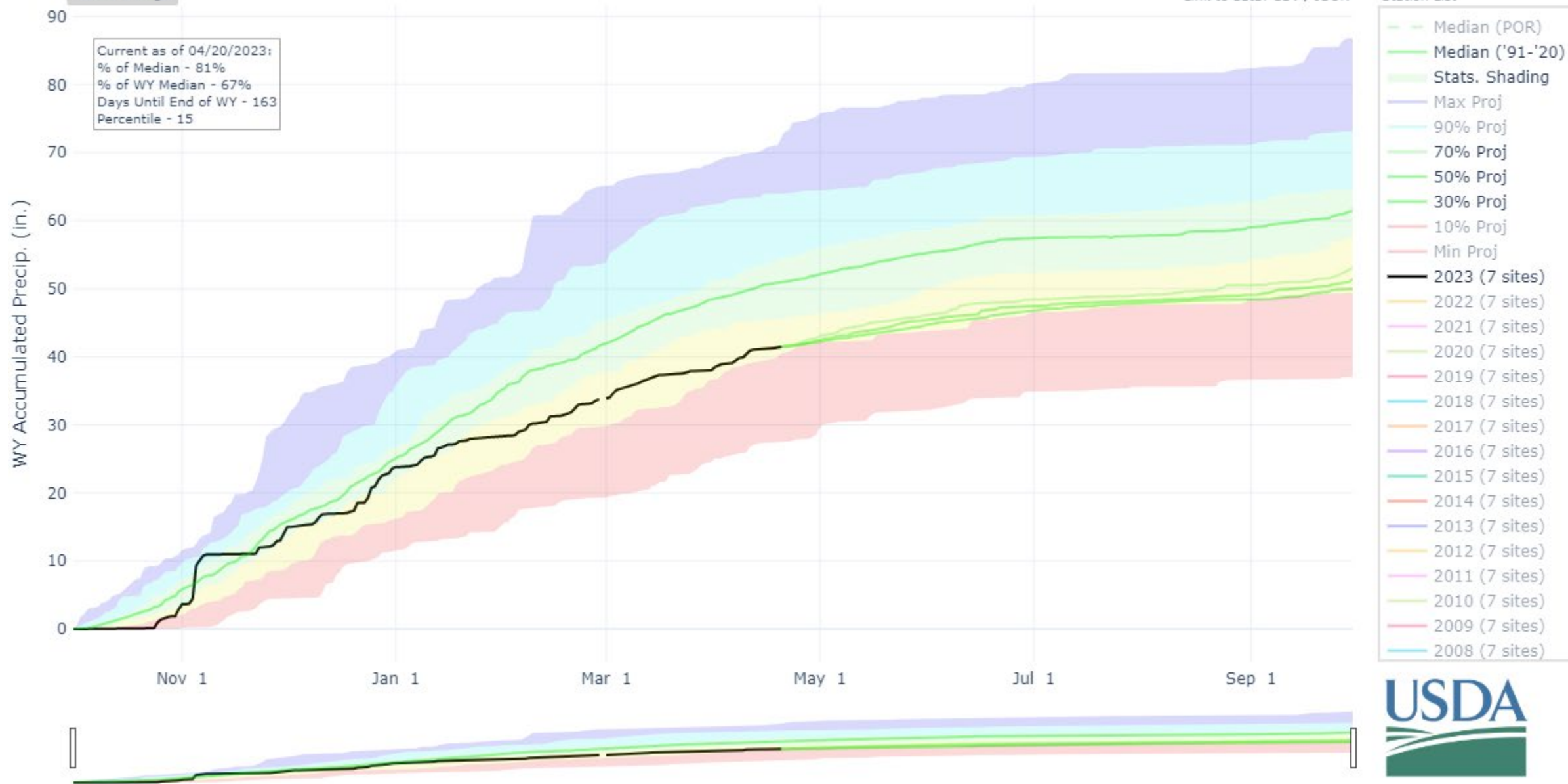


PRECIPITATION PROJECTIONS IN UPPER YAKIMA

Reset Range

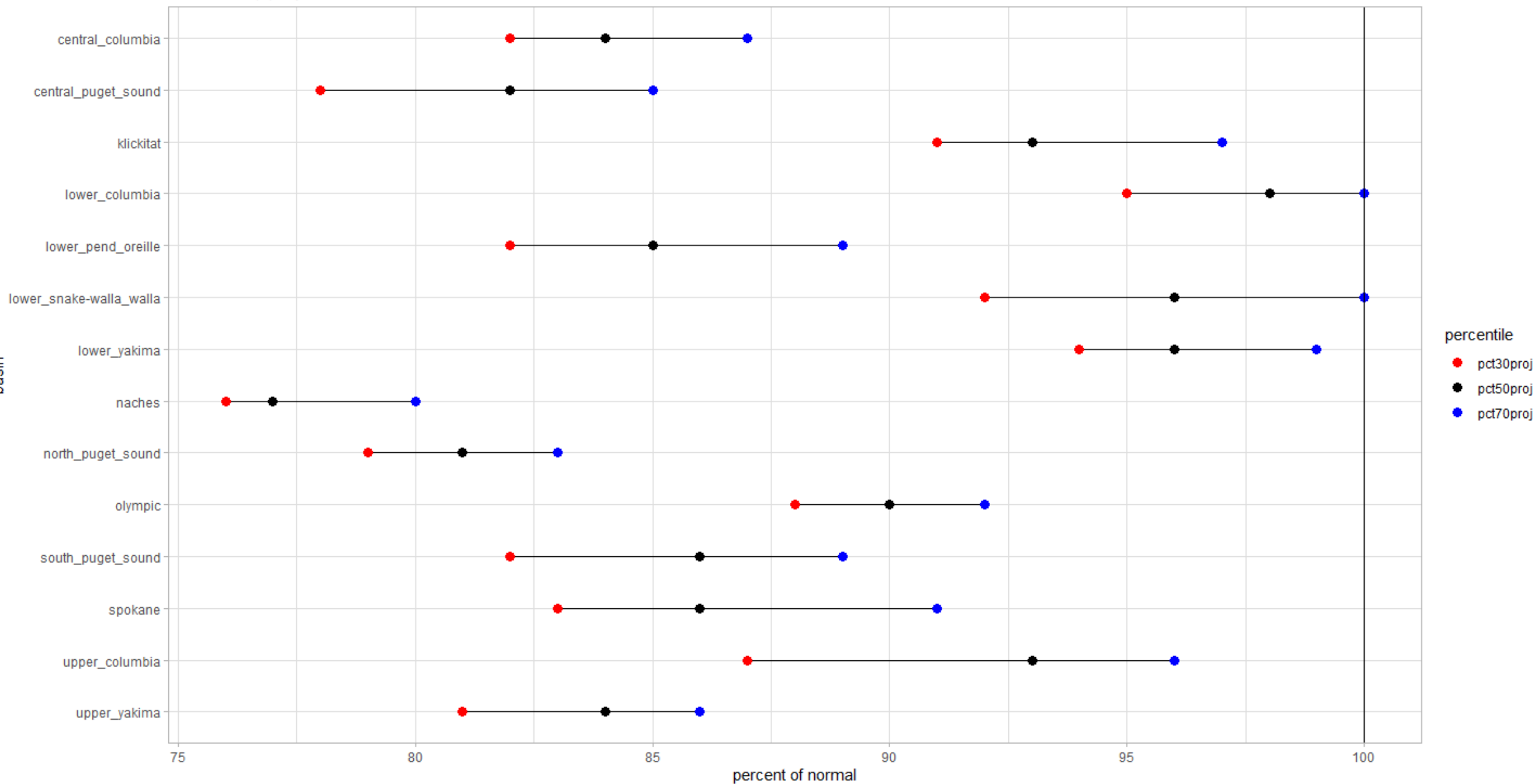
[Link to data: CSV / JSON](#)

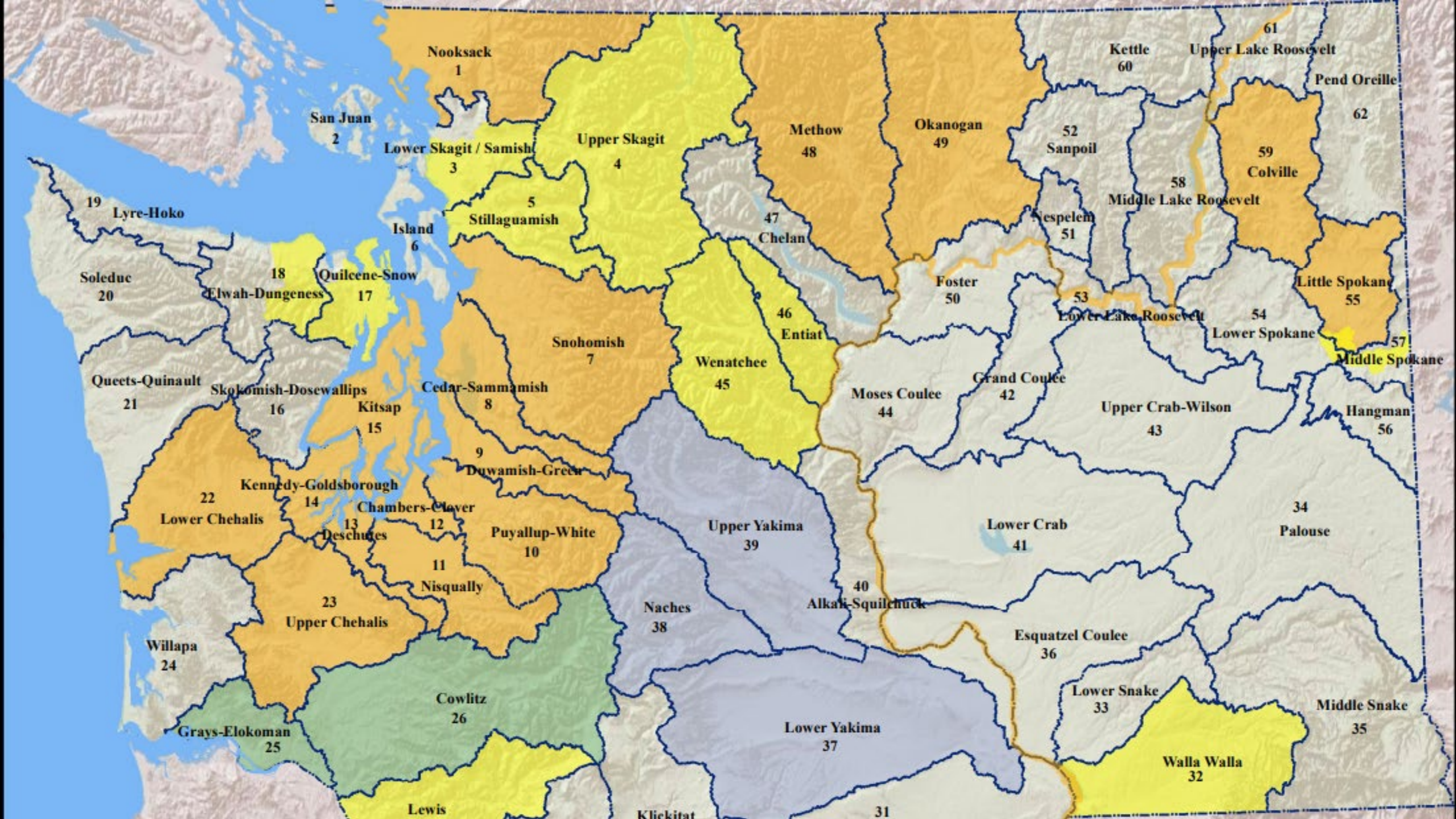
Station List

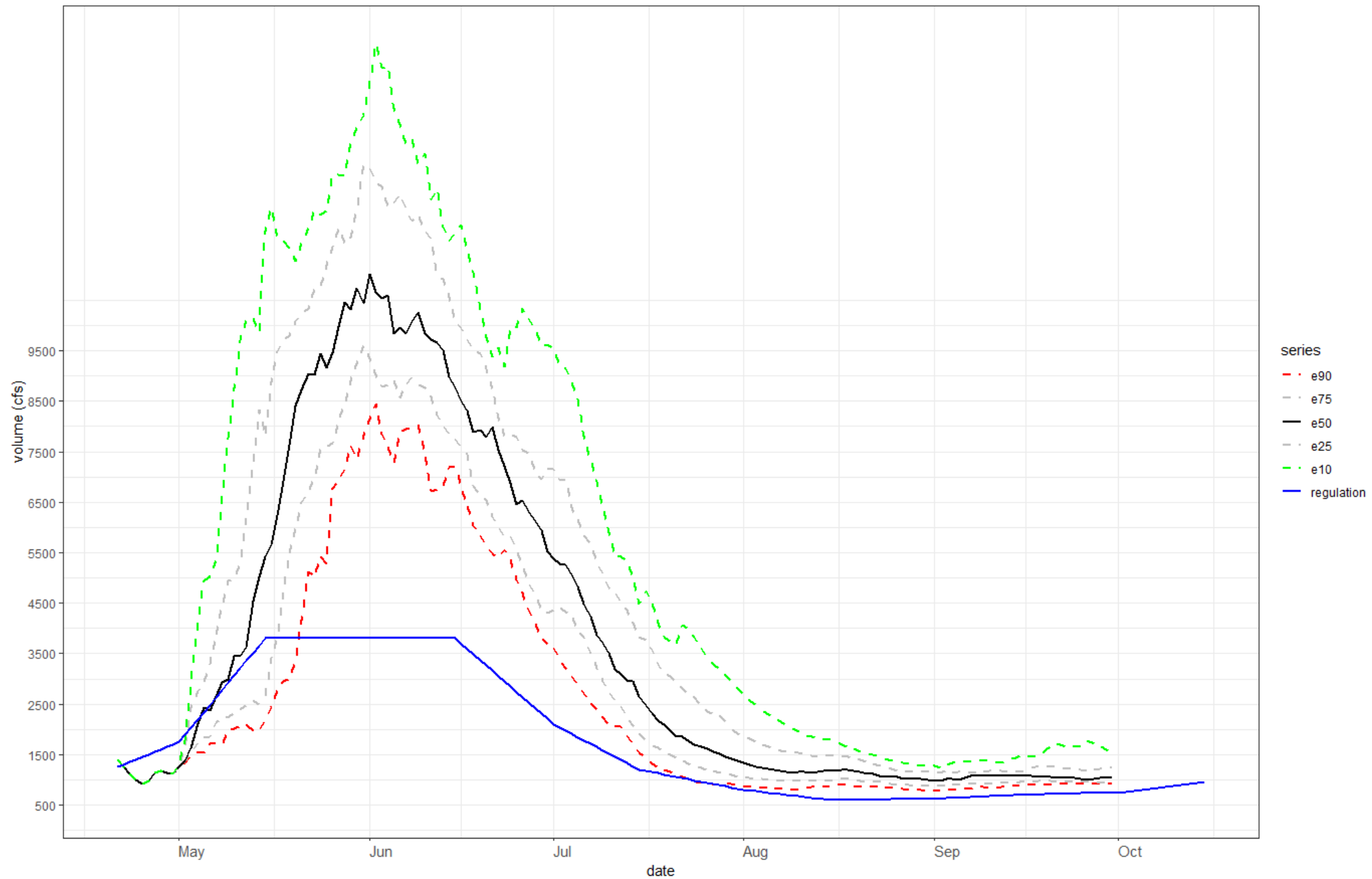


basin accumulated precipitation projections to end of water year (Sept 30)
at low (30th percentile), medium (50th percentile), and high (70th percentile) levels of accumulation

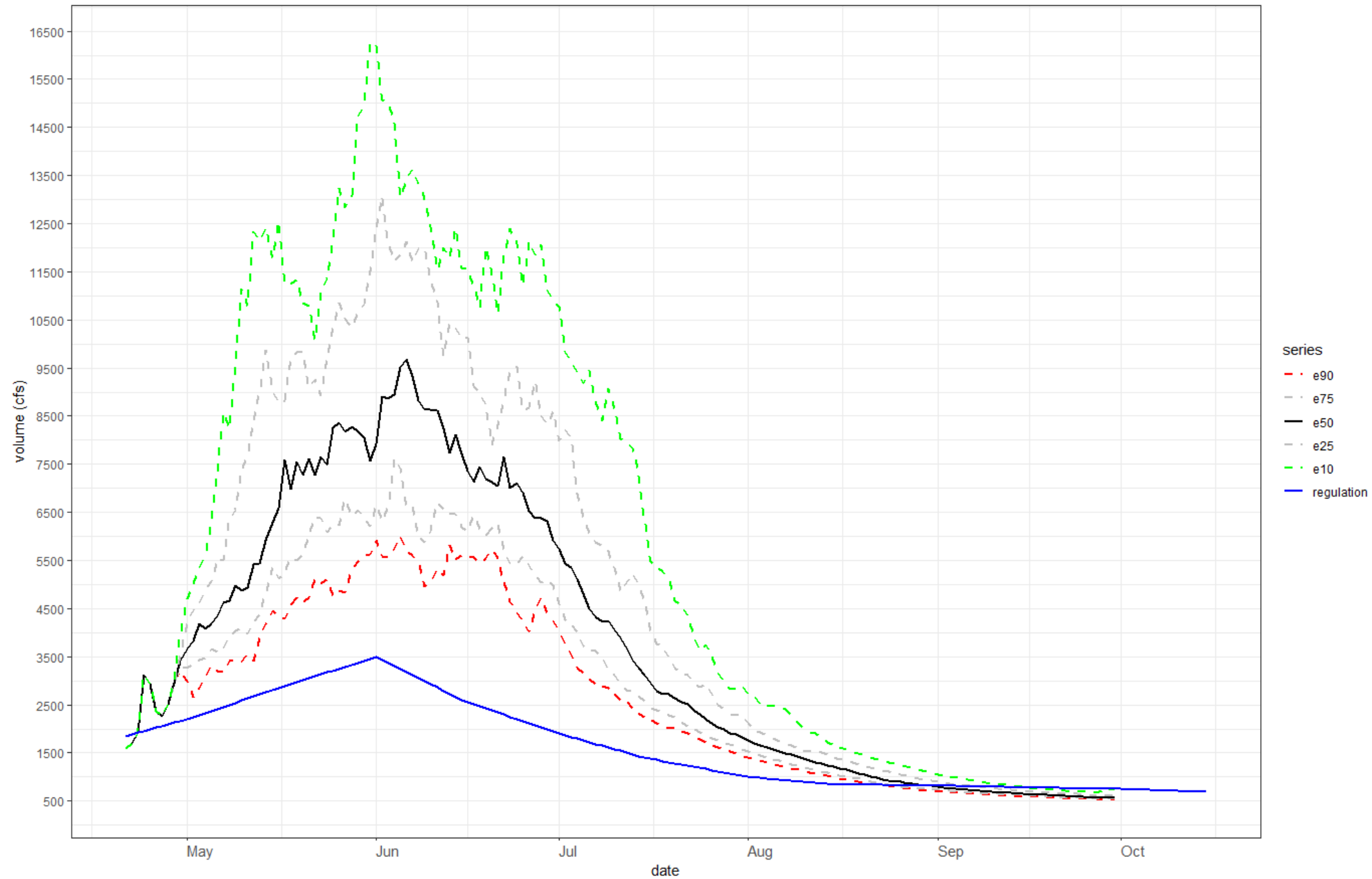
NRCS Data | query date: 04-20

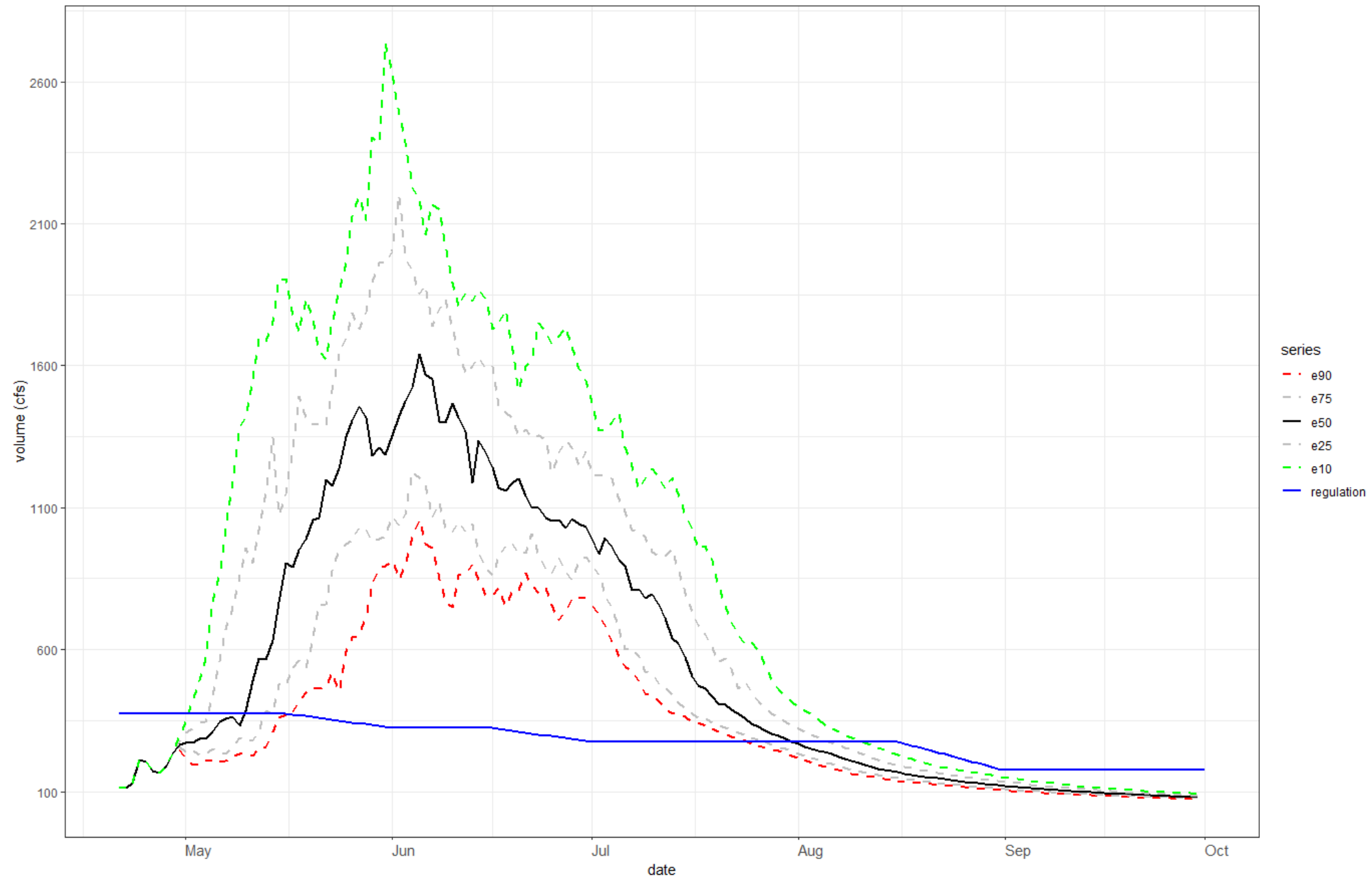


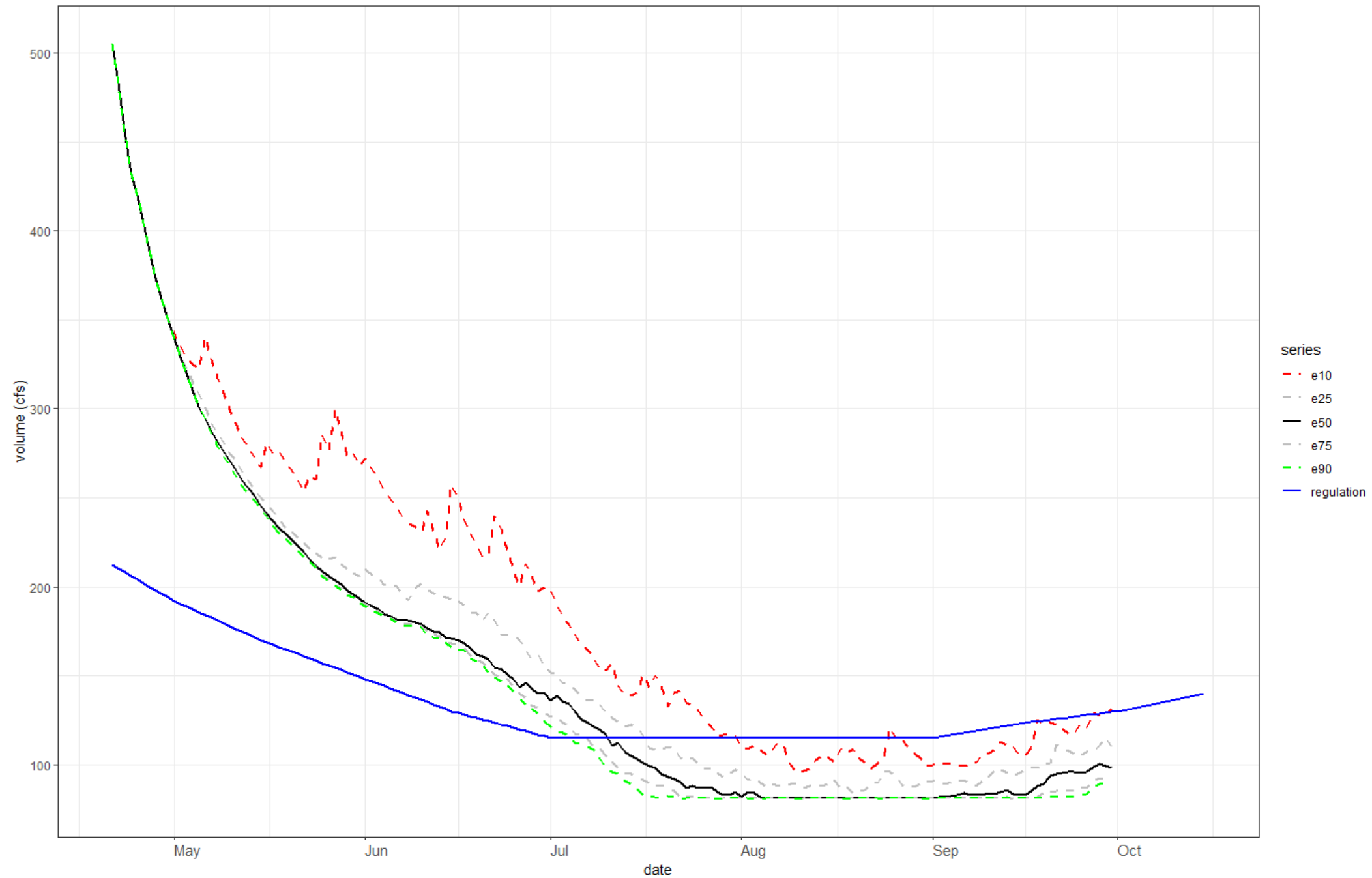




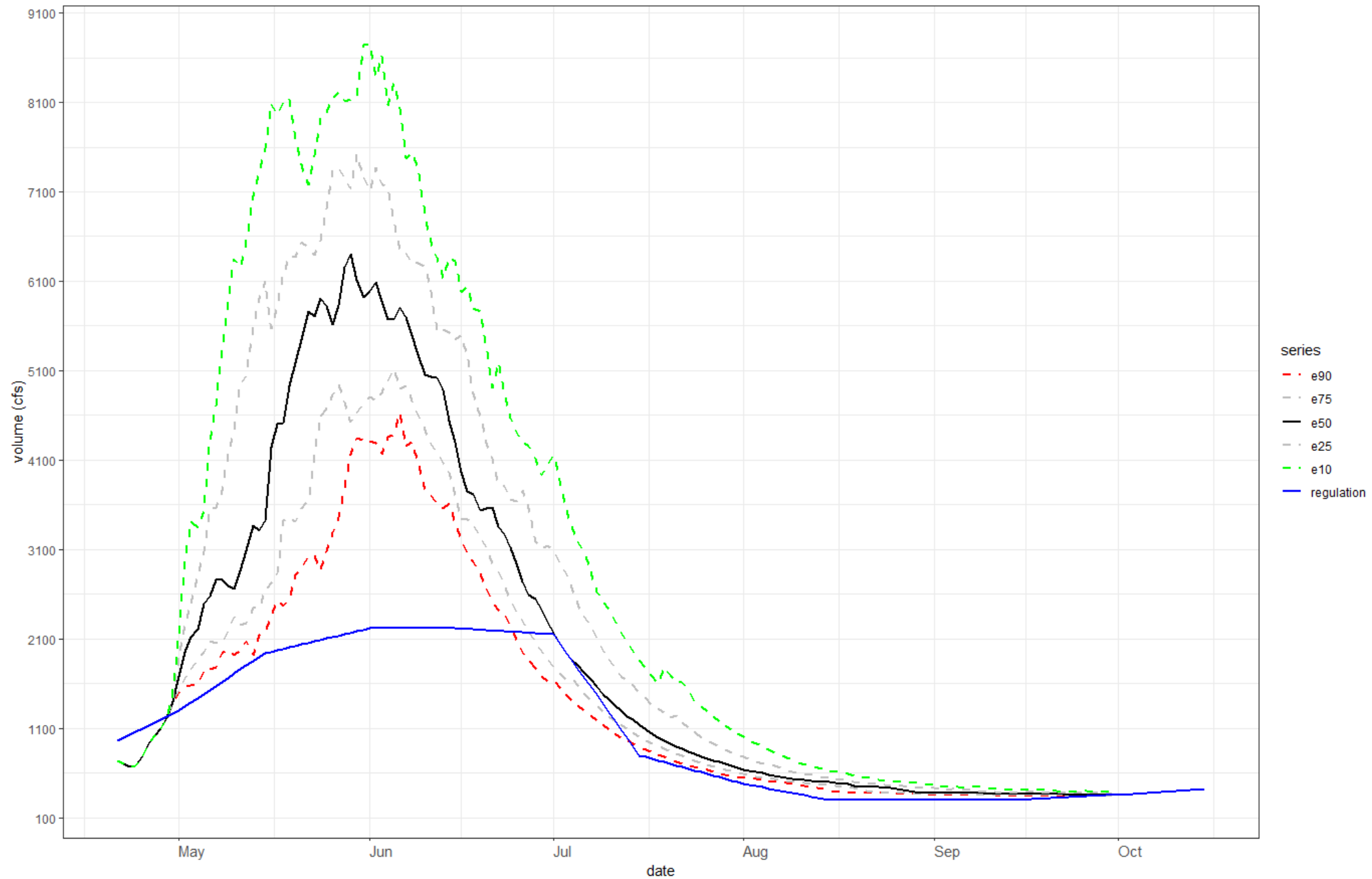
2023-04-19| forecast vs Wenatchee at Peshastin reg flow

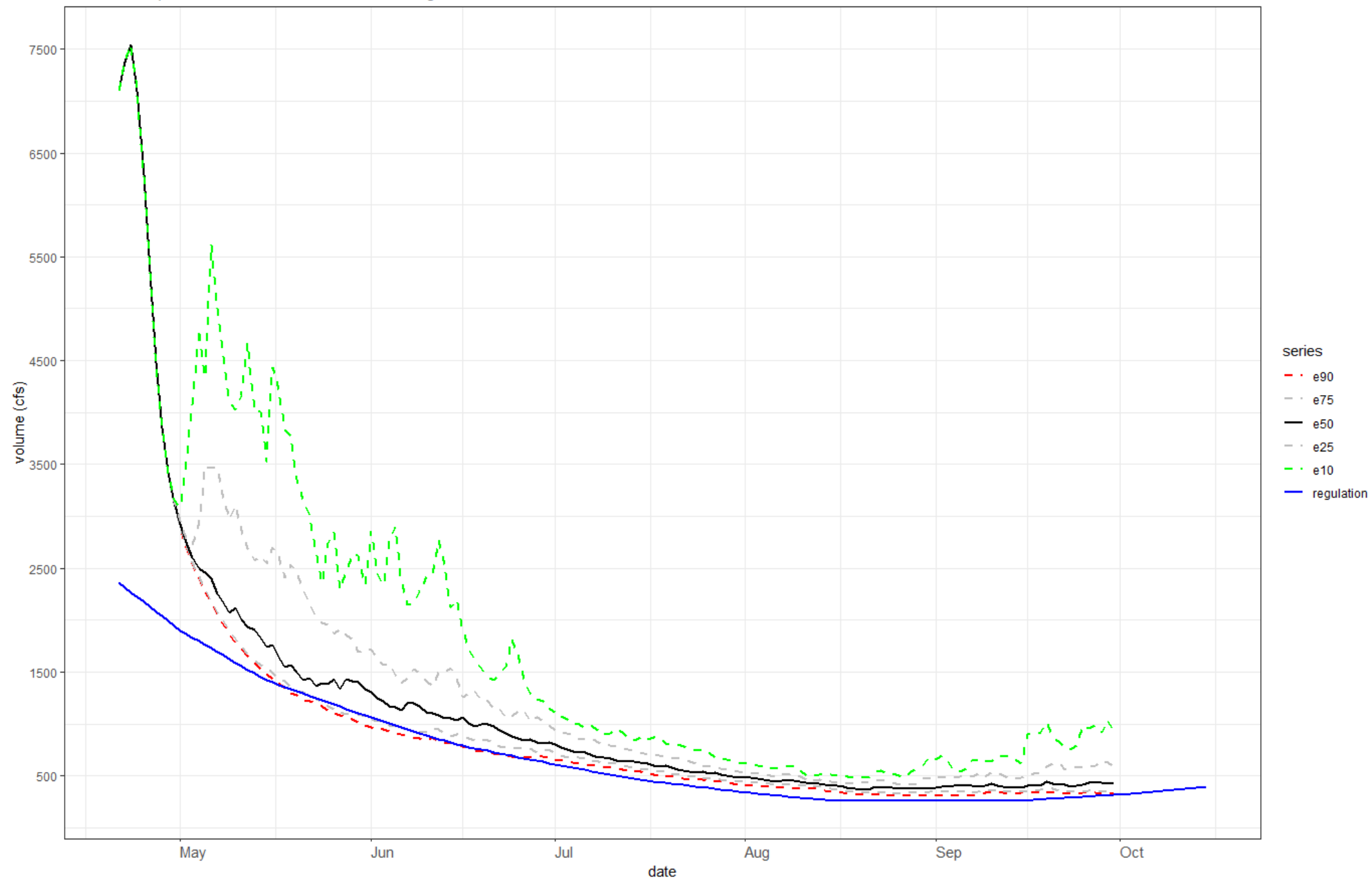


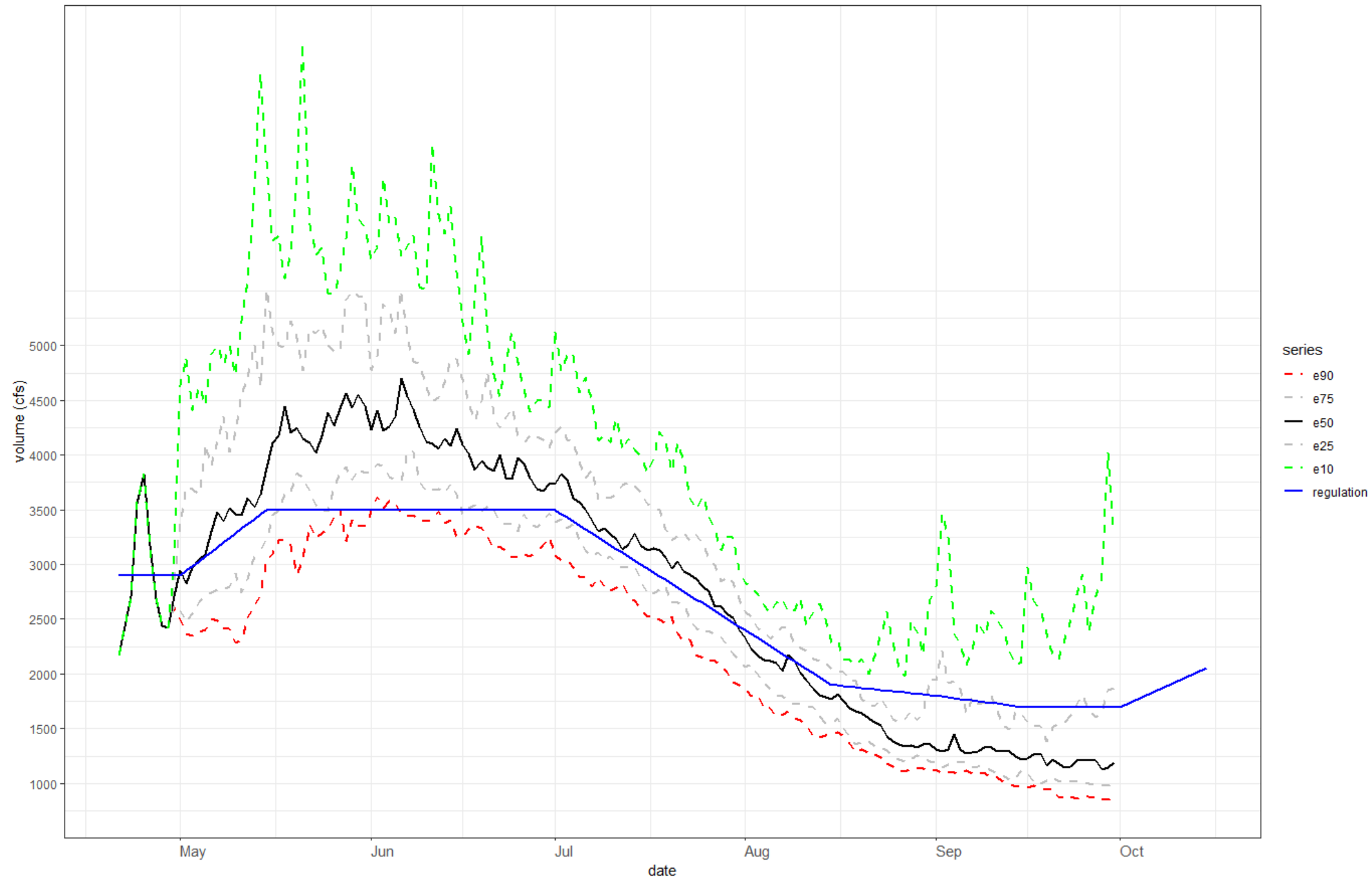




2023-04-19| forecast vs Methow River nr Pateros reg flow





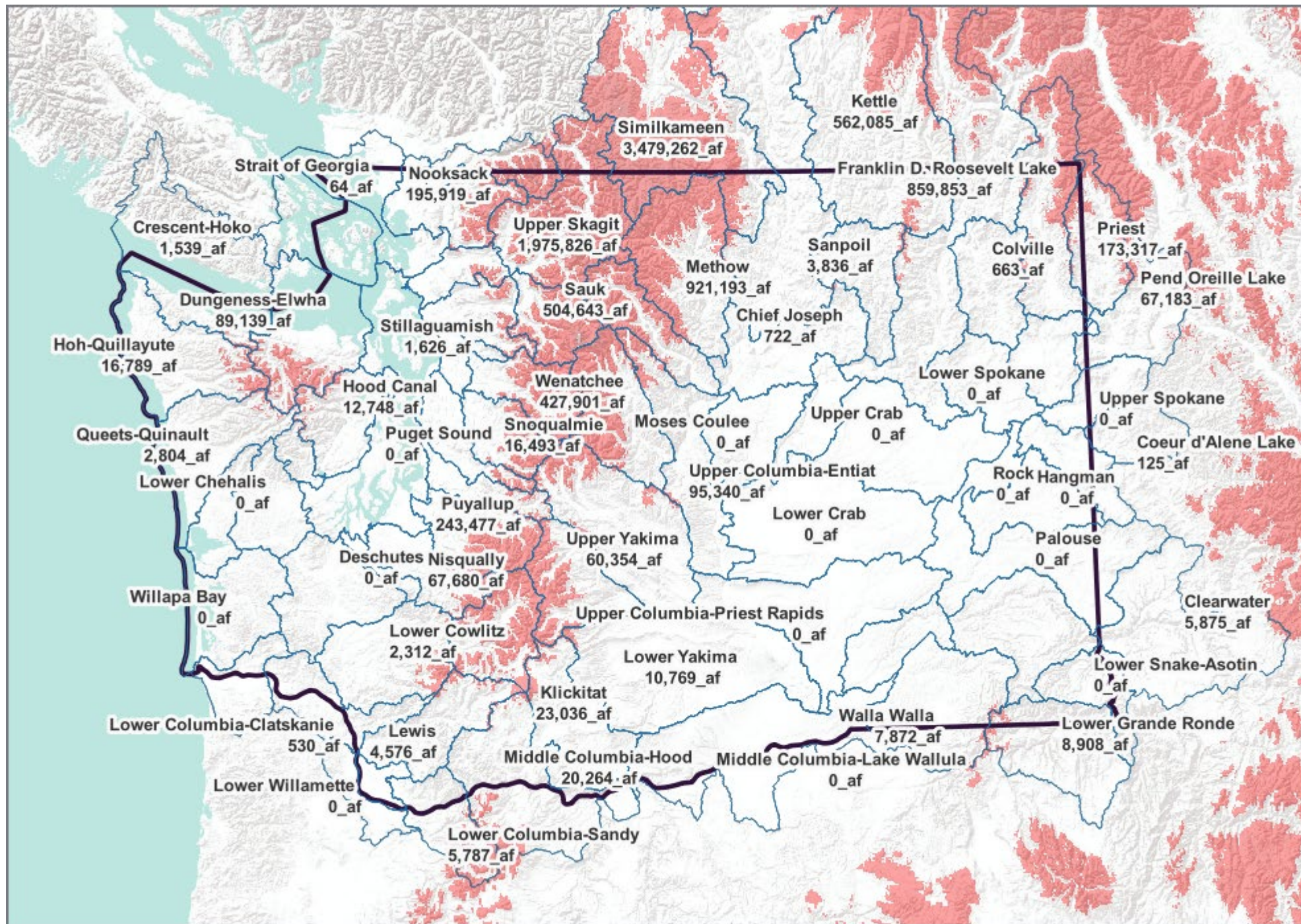


enough already

**April 01, 2015:
12,001,617 af**

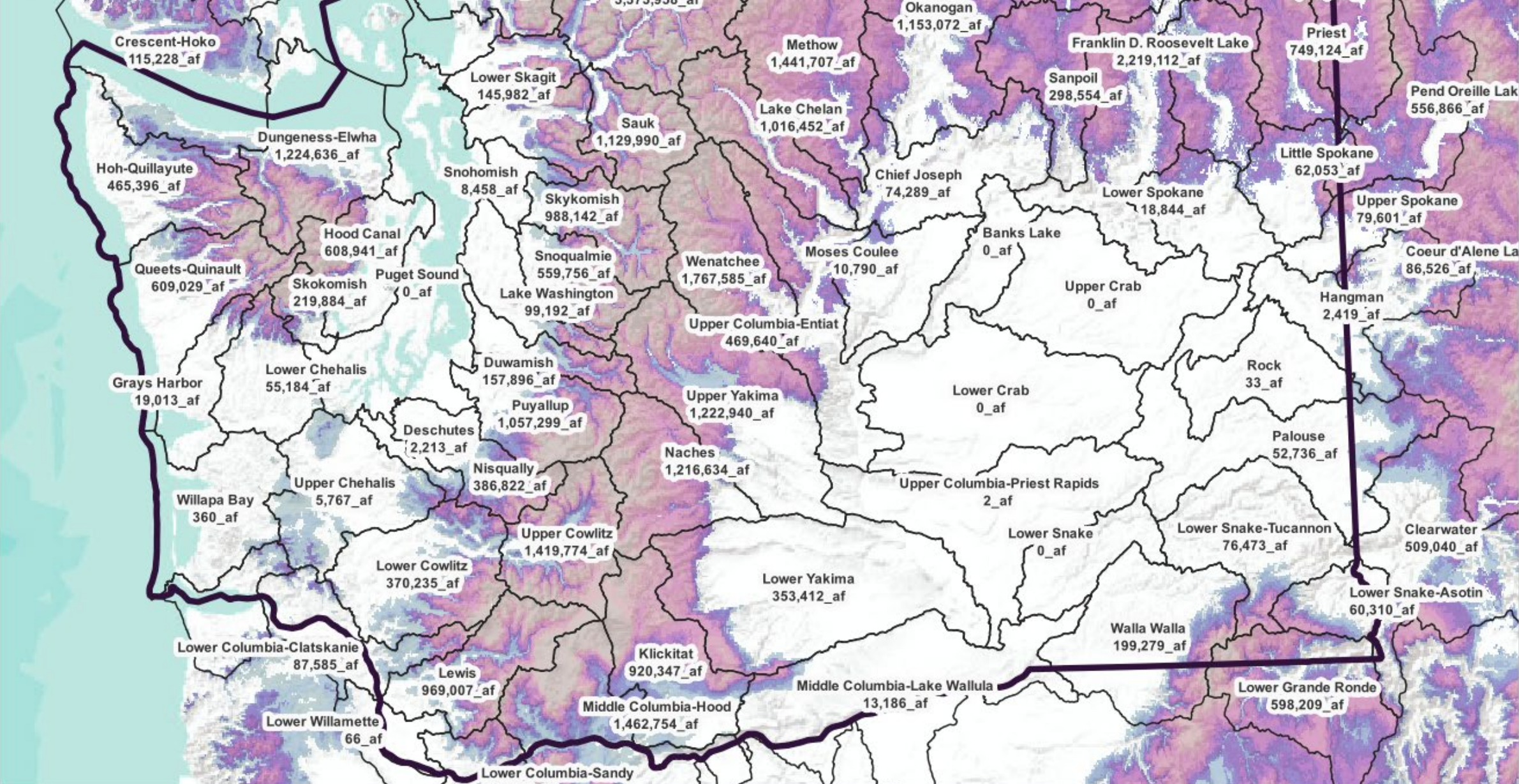
Yakima total (Upper
Yakima, Naches,
Lower Yakima):
200,640 af.

Compare Yakima
Snow storage to
this year: **~2.7
million af.**



April 1, 2023 Snow Storage all HUC8 Units	
	40,004,240 af

1,007,671_af





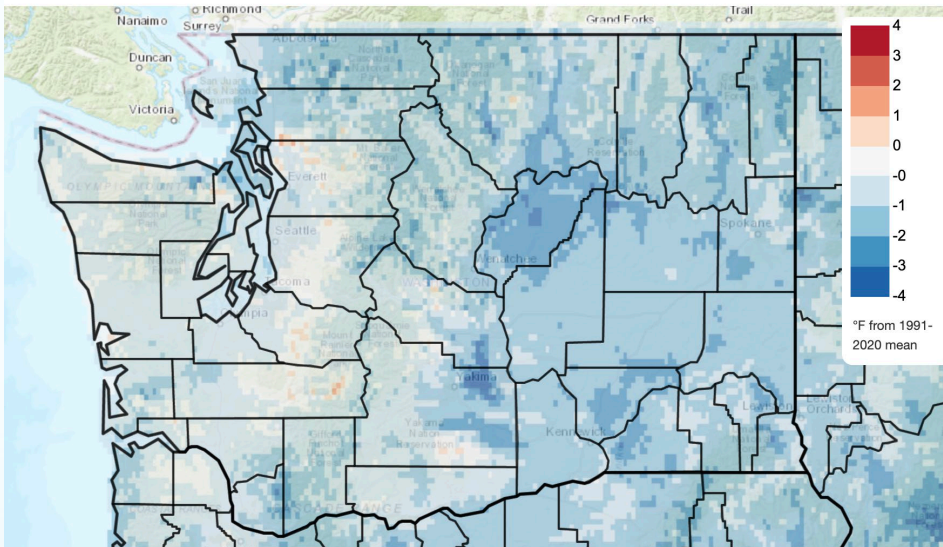
Current Conditions and Seasonal Outlook

Nick Bond & Karin Bumbaco
Office of the Washington State Climatologist
Cooperative Institute for Climate, Ocean, and Ecosystem Studies
University of Washington
21 April 2023

Water Year 2023

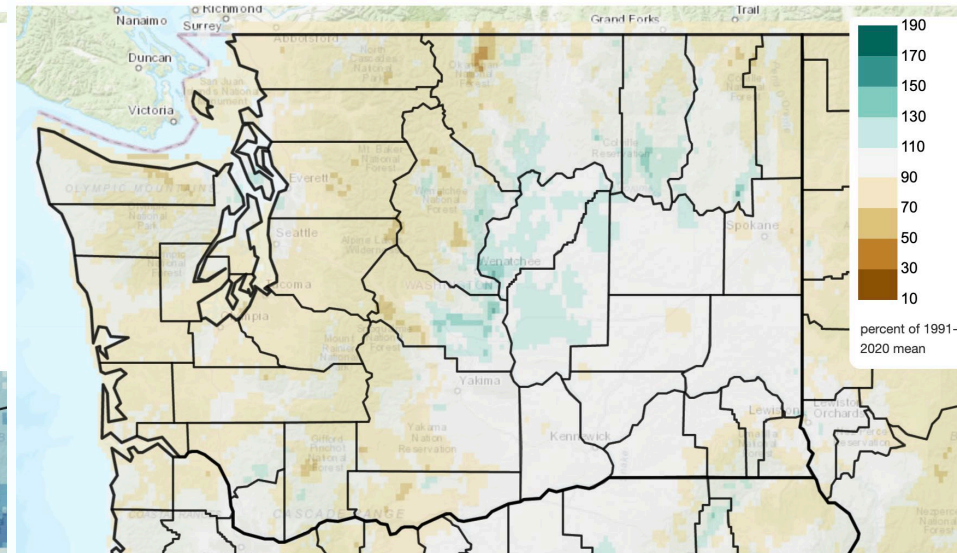
Temperature

Mean Daily Temperature Anomaly, Since Oct 1st
2022/10/01 - 2023/04/16



Precipitation

Total Precipitation Anomaly, Since Oct 1st
2022/10/01 - 2023/04/16



Climate Toolbox

- Averaged statewide, Oct-Mar temperatures were below normal (-1.1°F), ranking as 53rd coldest*
- Averaged statewide, Oct-Mar precipitation ranks as the 27th driest ($-5.55''$)*, with 83% of normal

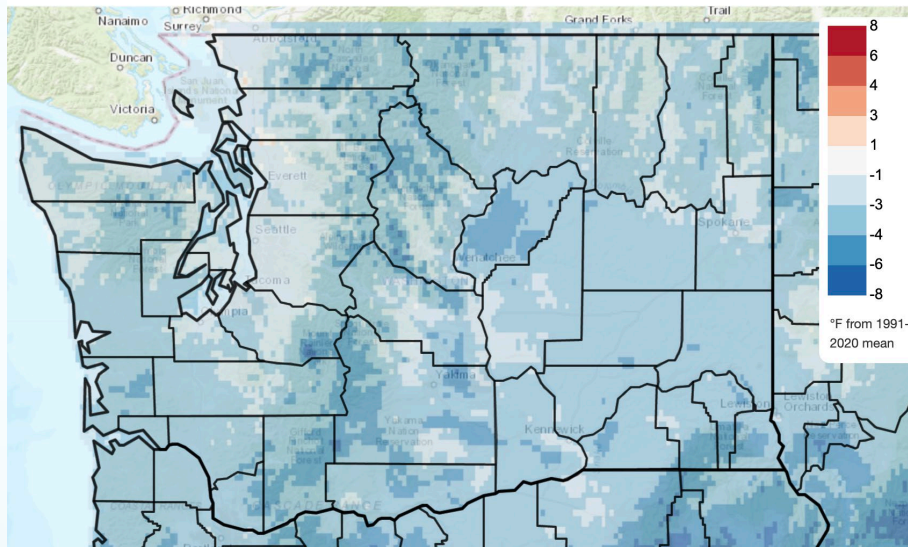
*Records since 1895; 1991-2020 normal

March 2023

Temperature

Mean Daily Temperature Anomaly, Last Full Month

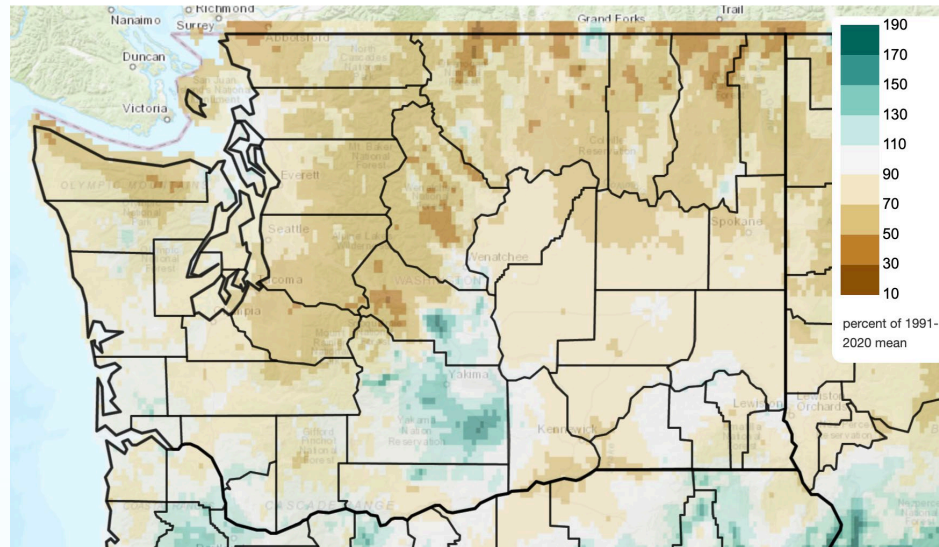
2023/03/01 - 2023/03/31



Precipitation

Total Precipitation Anomaly, Last Full Month

2023/03/01 - 2023/03/31



Climate Toolbox

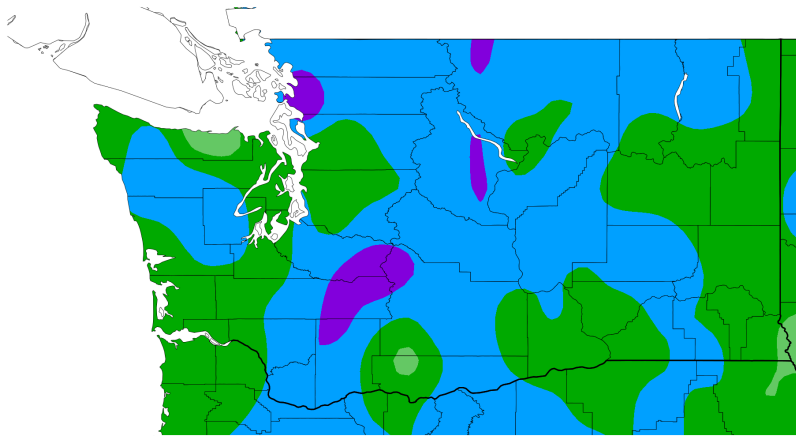
- Averaged statewide, March was the 32nd coldest on record (-2.9°F)*
- Averaged statewide, March was the 41st driest ($-1.39''$) on record, with 70% of normal precipitation*

*Records since 1895; 1991-2020 normal

April 2023 so far

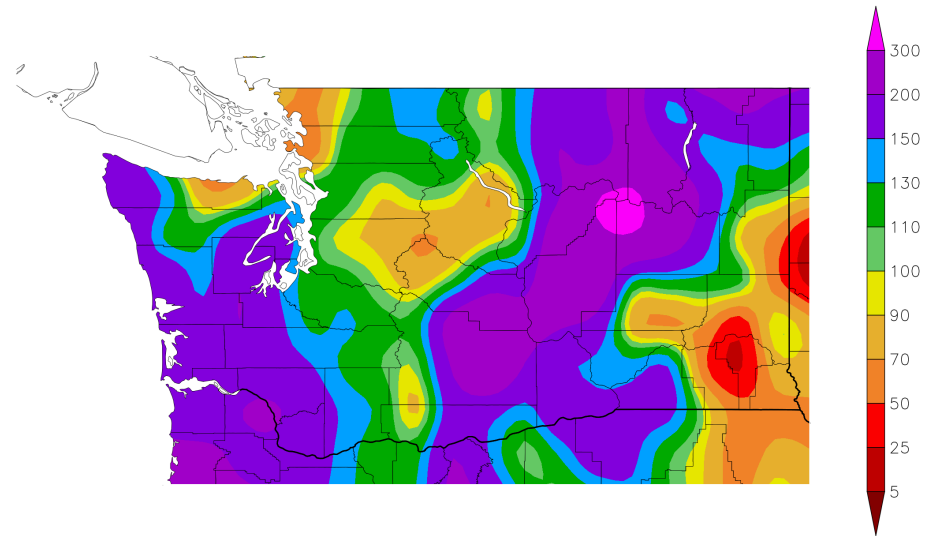
Temperature

Departure from Normal Temperature (F)
4/1/2023 – 4/19/2023



Precipitation

Percent of Normal Precipitation (%)
4/1/2023 – 4/19/2023



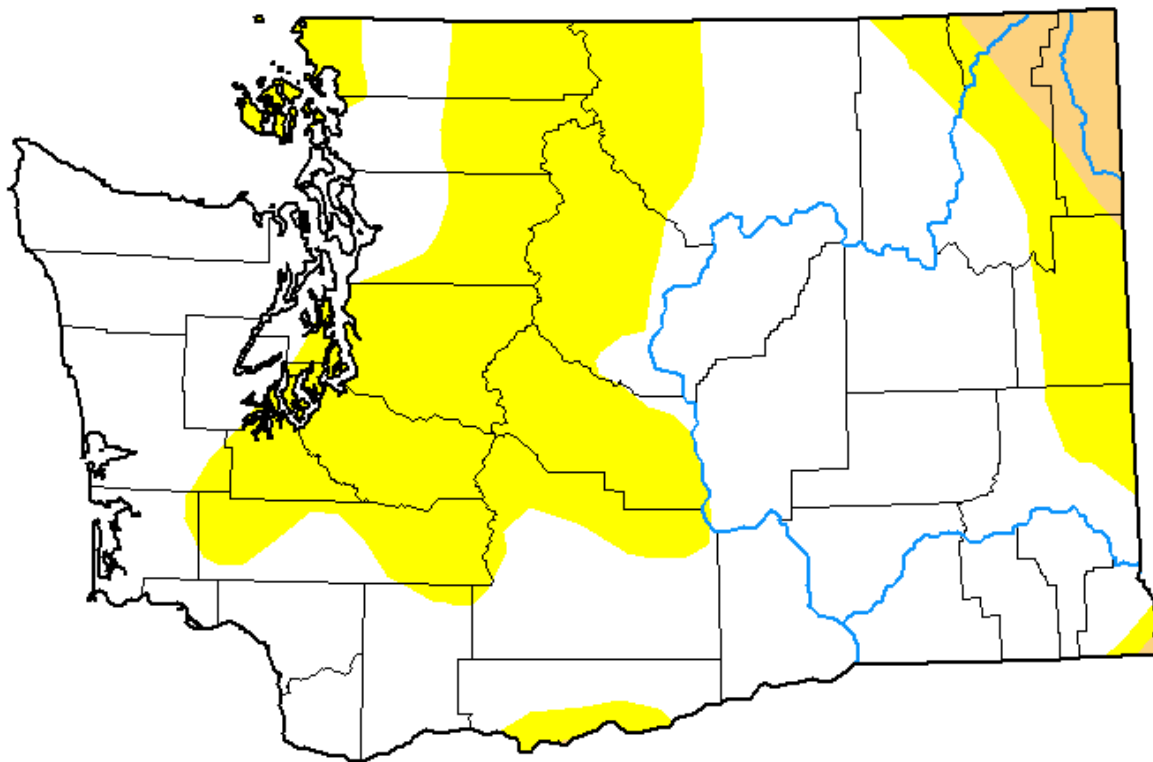
U.S. Drought Monitor Washington

April 18, 2023







(Released Thursday, Apr. 20, 2023)

Valid 8 a.m. EDT

Some improvements in southwest WA and central WA due to April precipitation



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>

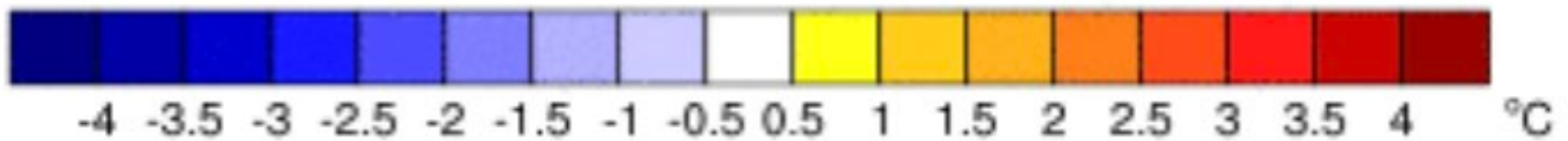
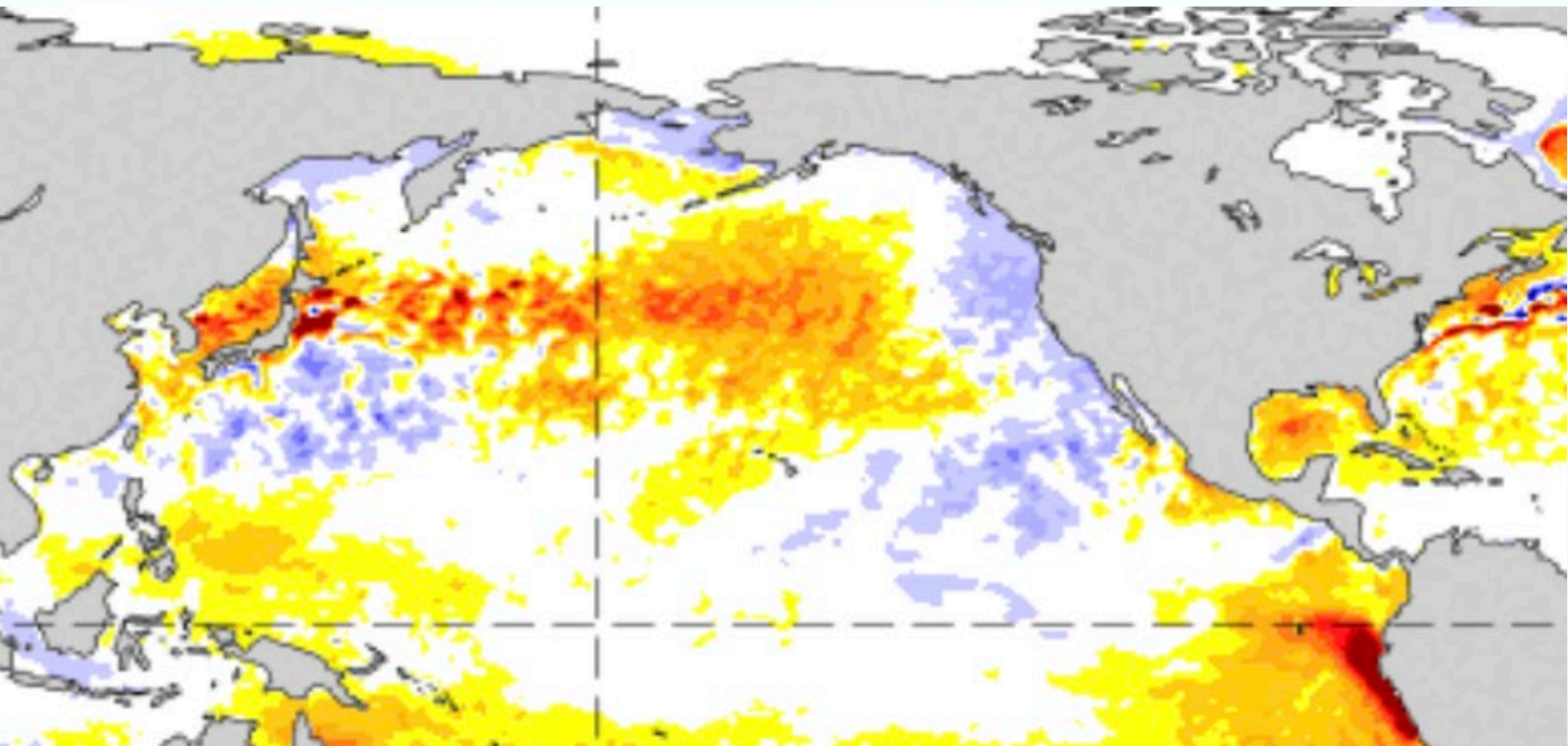
Author:

Richard Tinker
CPC/NOAA/NWS/NCEP

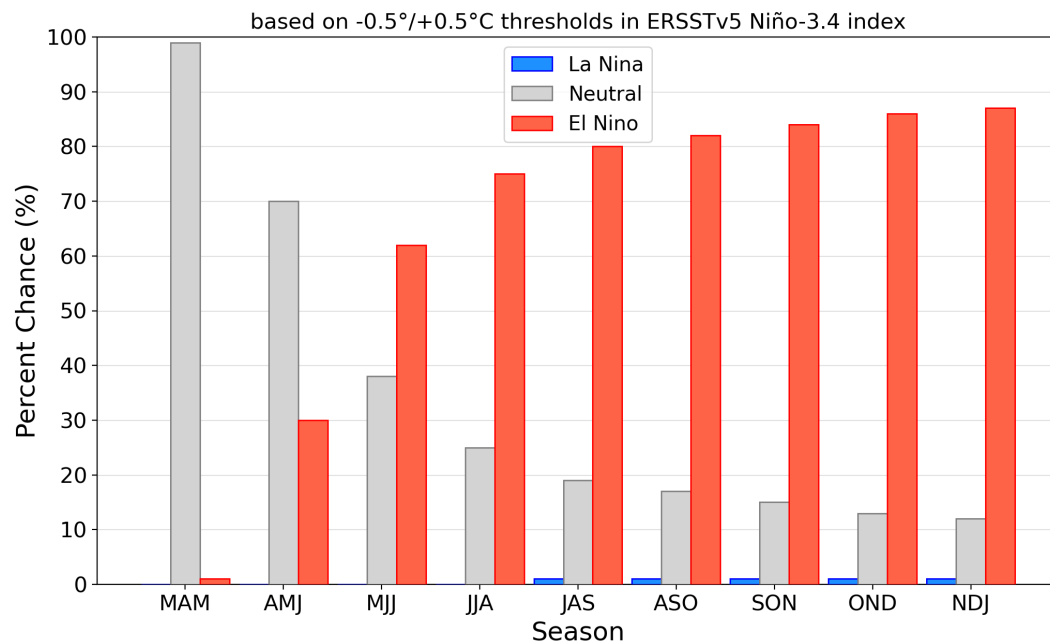


droughtmonitor.unl.edu

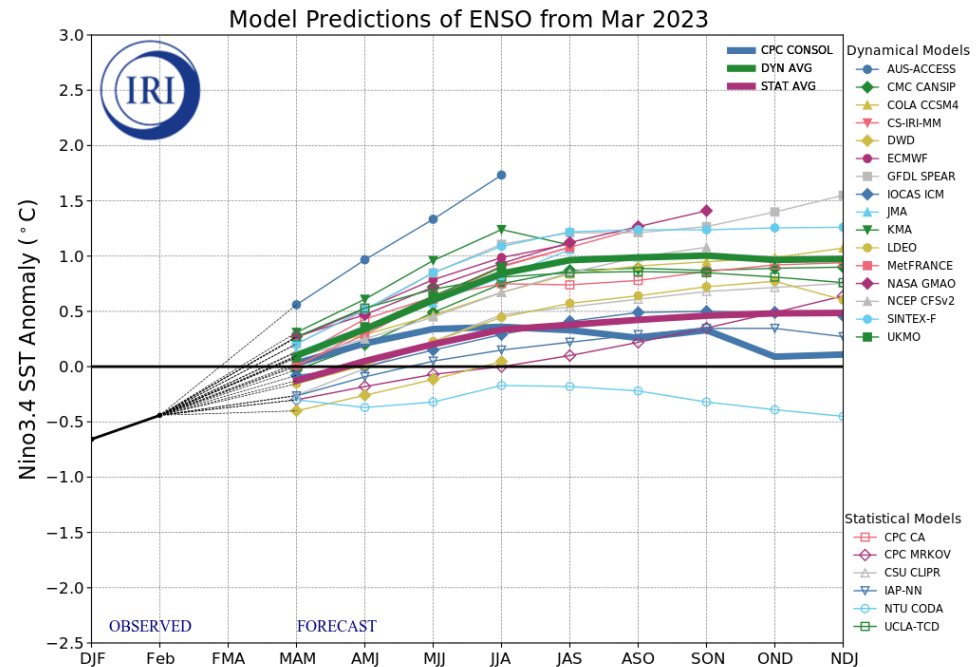
Sea Surface Temperature Anomalies: 9-15 April 2023



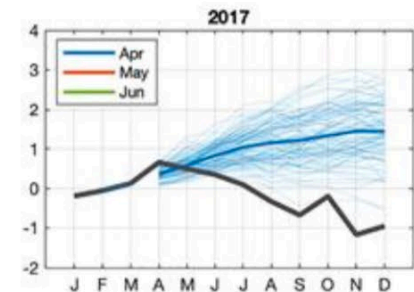
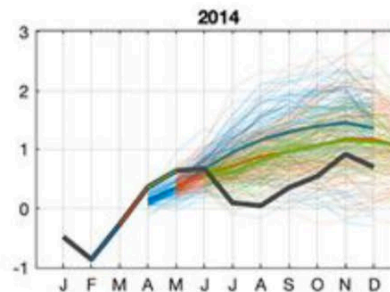
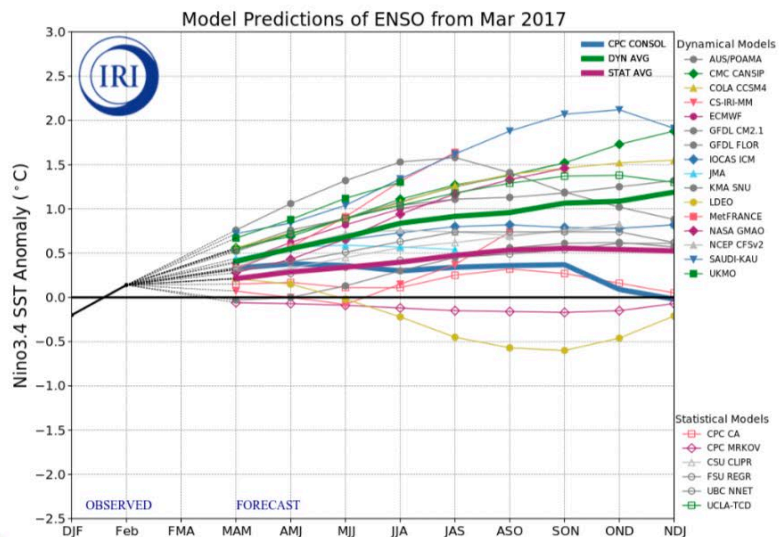
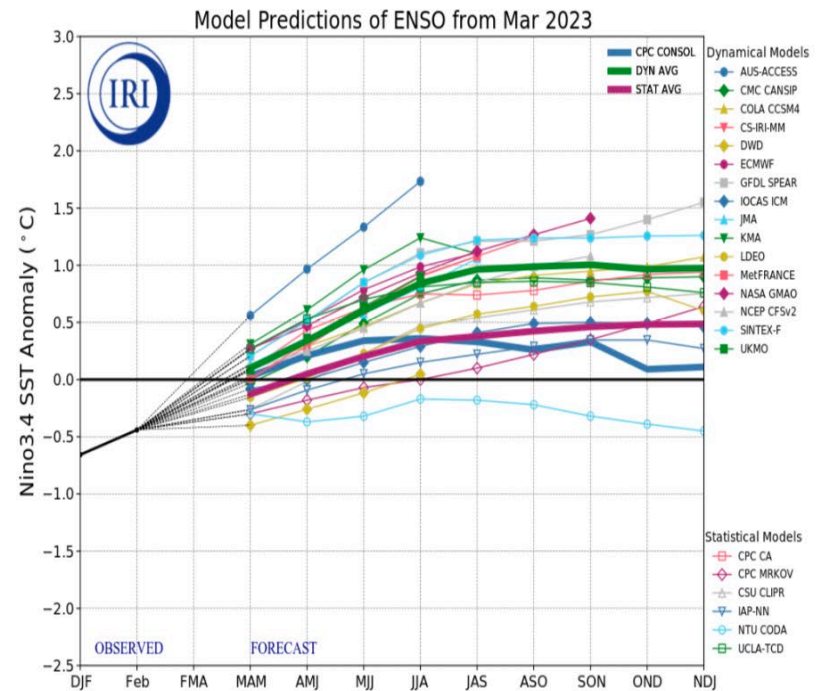
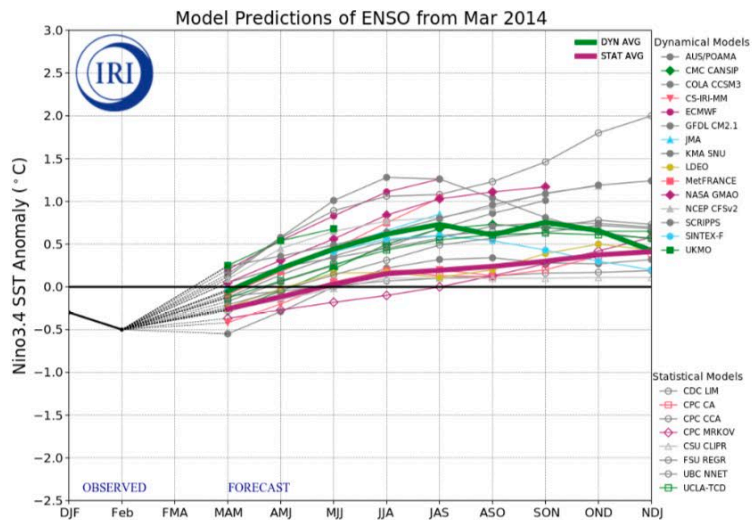
Official NOAA CPC ENSO Probabilities (issued Apr. 2023)



Latest ENSO predictions suggest that El Nino is Imminent, but...



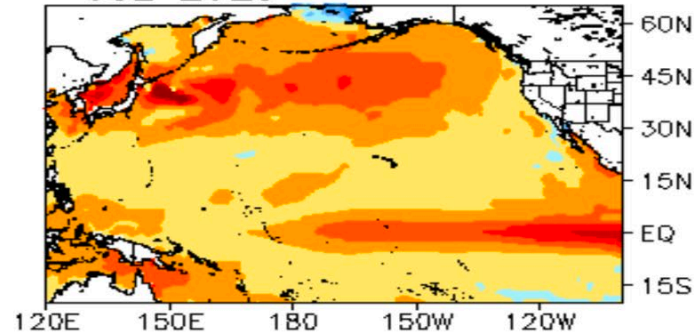
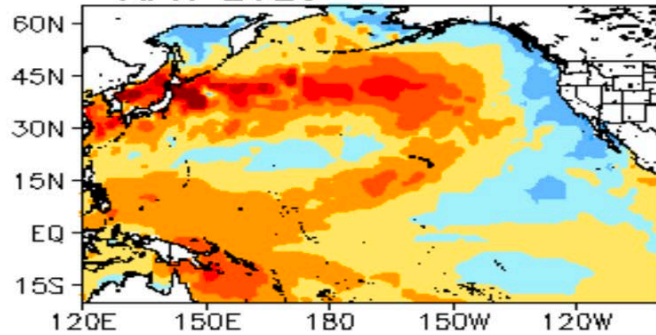
2023 ENSO Forecast, 2014 & 2017 El Niño False Alarm



CFSv2 Predicted SST Anomaly (40 Member Mean; °C)

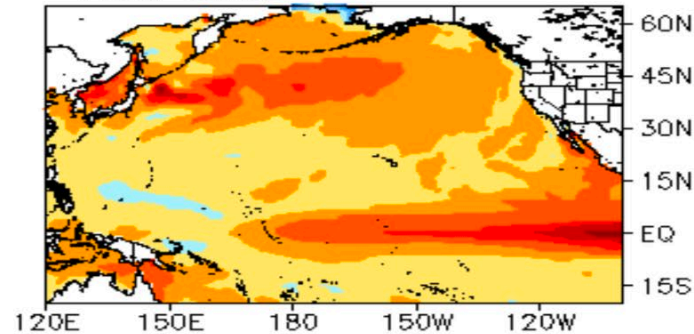
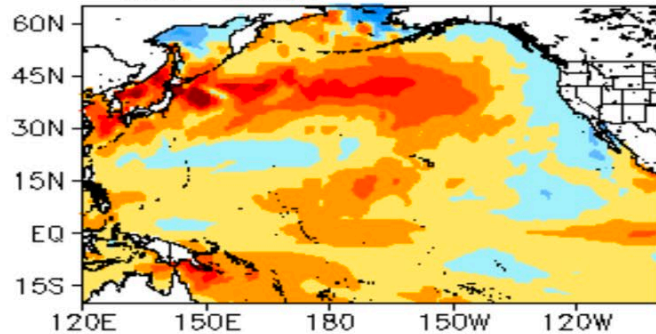
APR 2023

JUL 2023



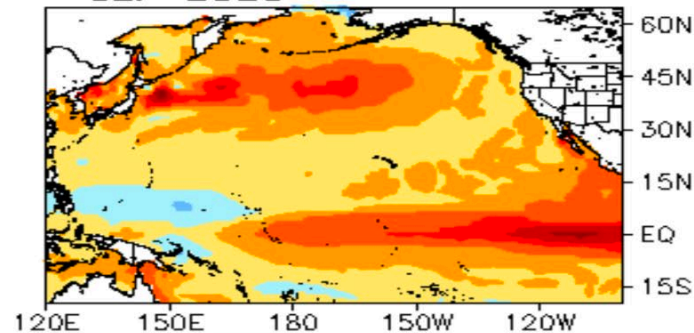
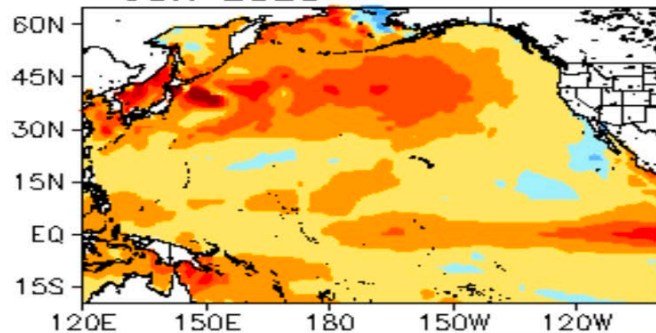
MAY 2023

AUG 2023

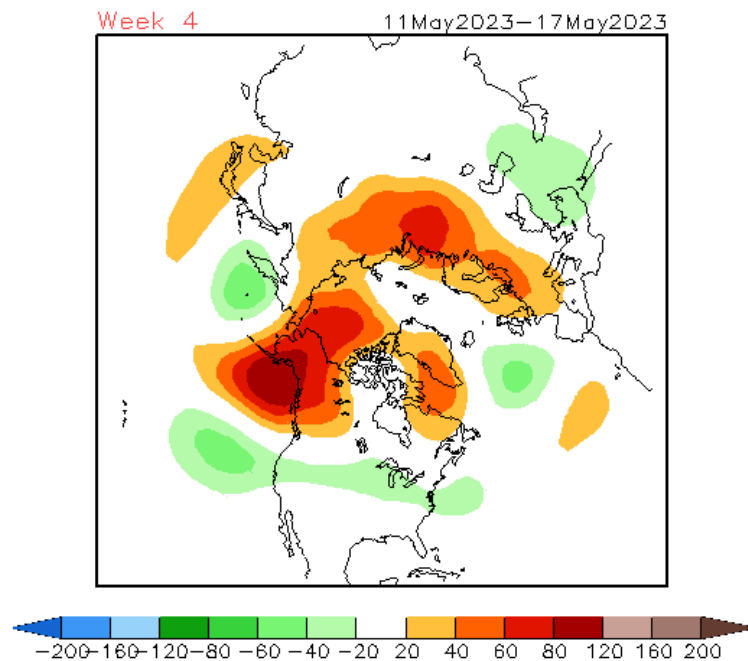
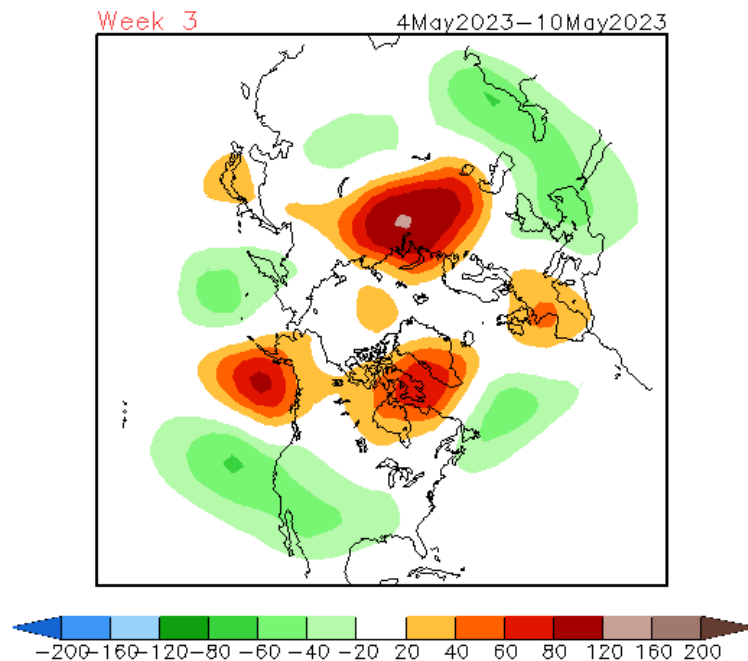


JUN 2023

SEP 2023

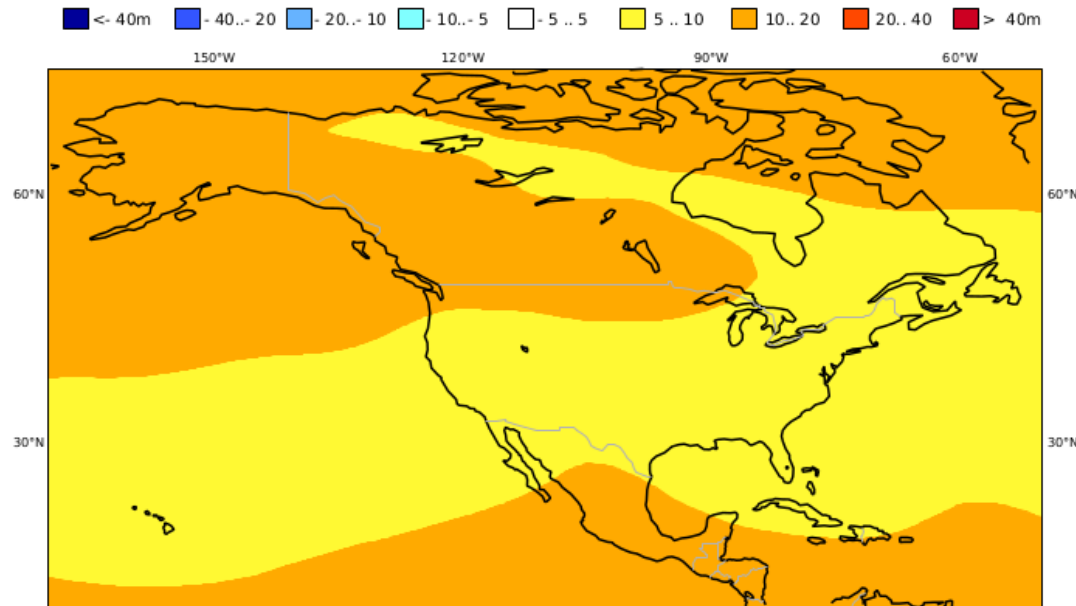


- The CFSv2 predicts above normal SSTs in the N. Pacific during spring – autumn 2023.



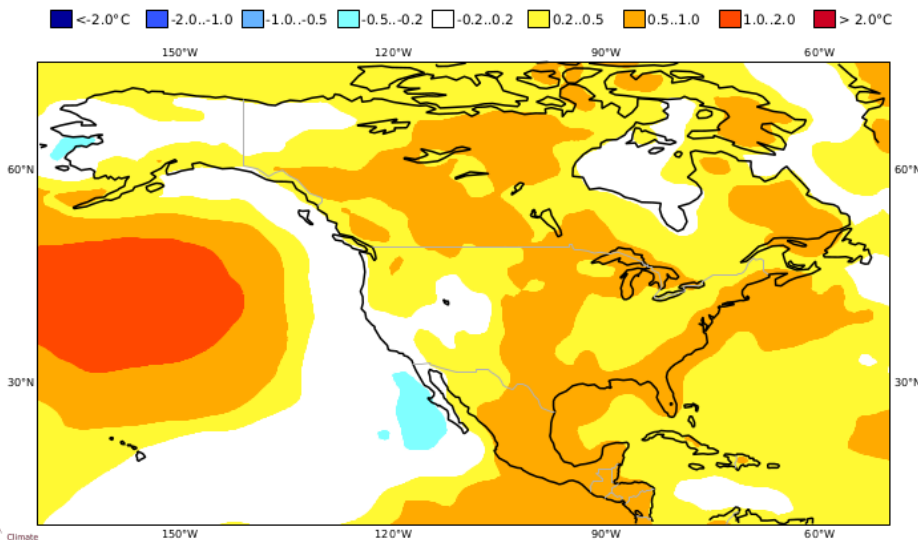
**CFS 3 & 4 Week 500 hPa
Model Projections:
Trough to the south implies
OR & CA will be joining
the fun with near-normal
precipitation and possibly,
above-normal temperatures
for WA state**

500 hPa Z

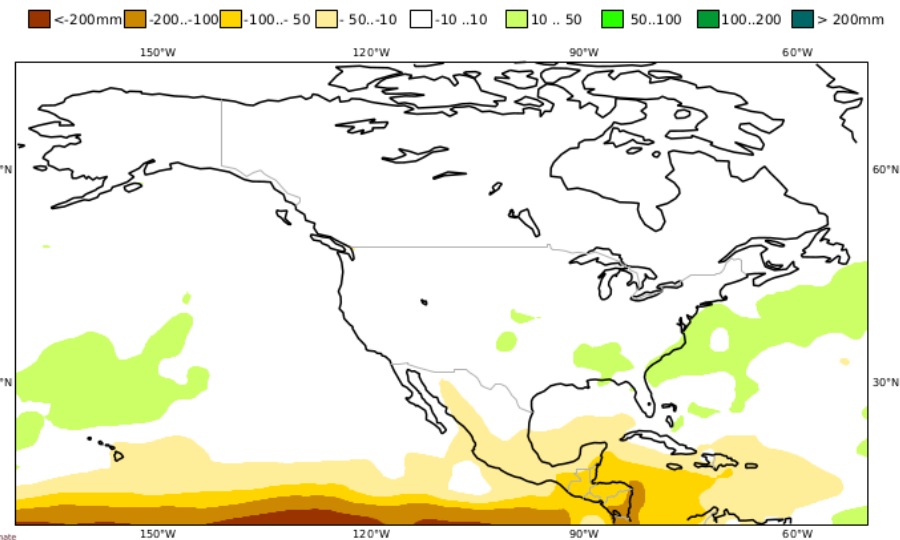


**IMME Projections
for May-Jul:
Higher 500 hPa Z
and warmer
temperatures aloft;
early summer still
expected to be warm**

Temperature at 2 meters



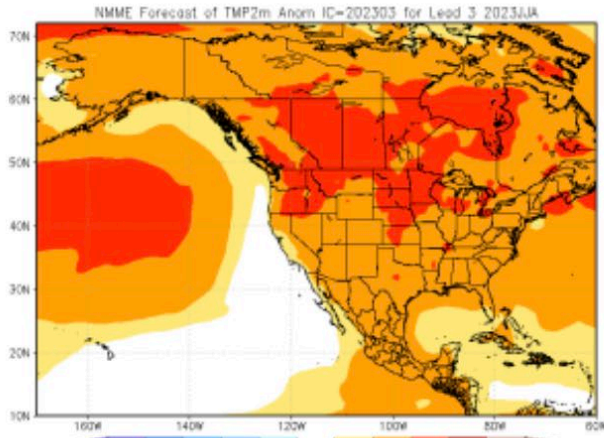
Precipitation



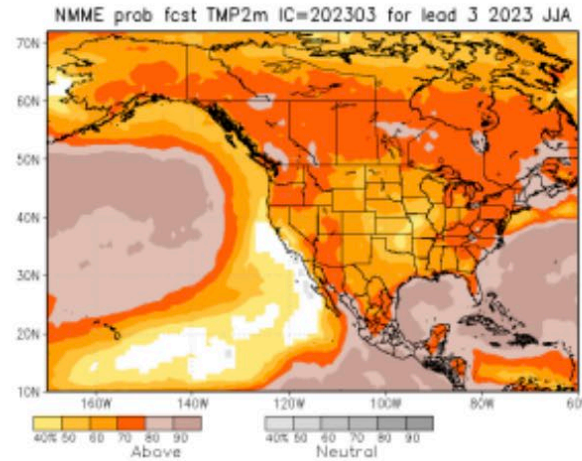
NMME Temperature Projections for Summer (JJA) 2023

From Mar 2023

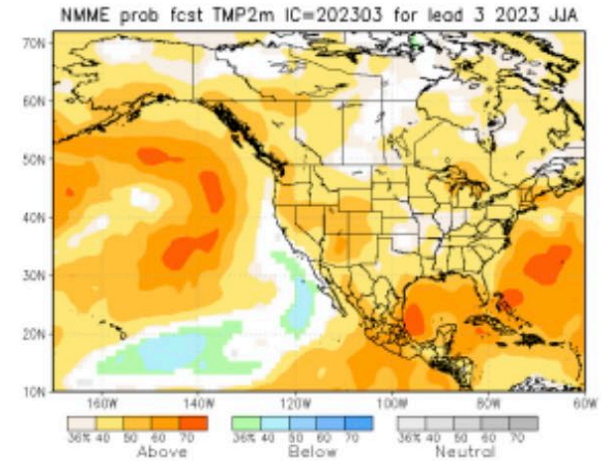
NMME



Prob fct

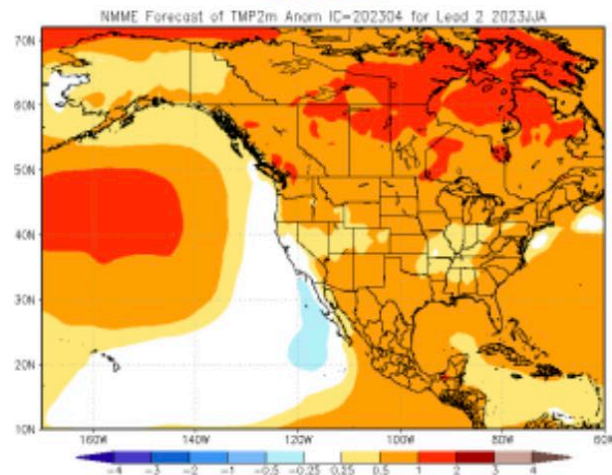


PAC calib. prob fct

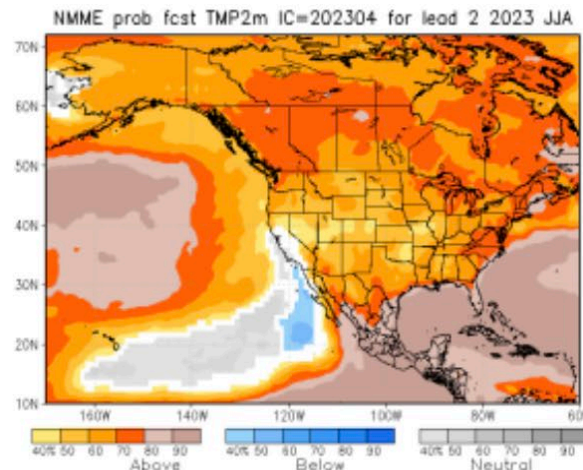


From Apr 2023

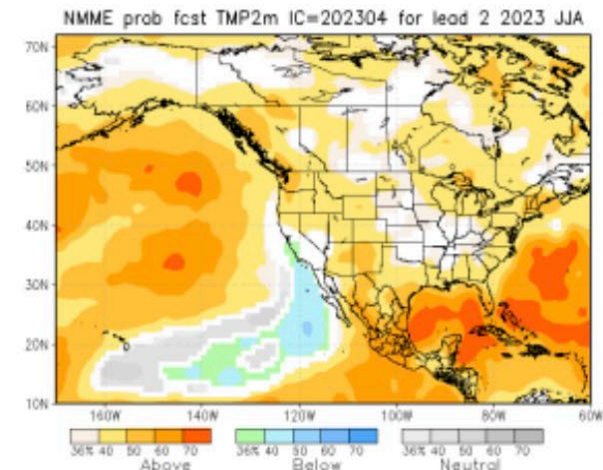
NMME



Prob fct



PAC calib. prob fct



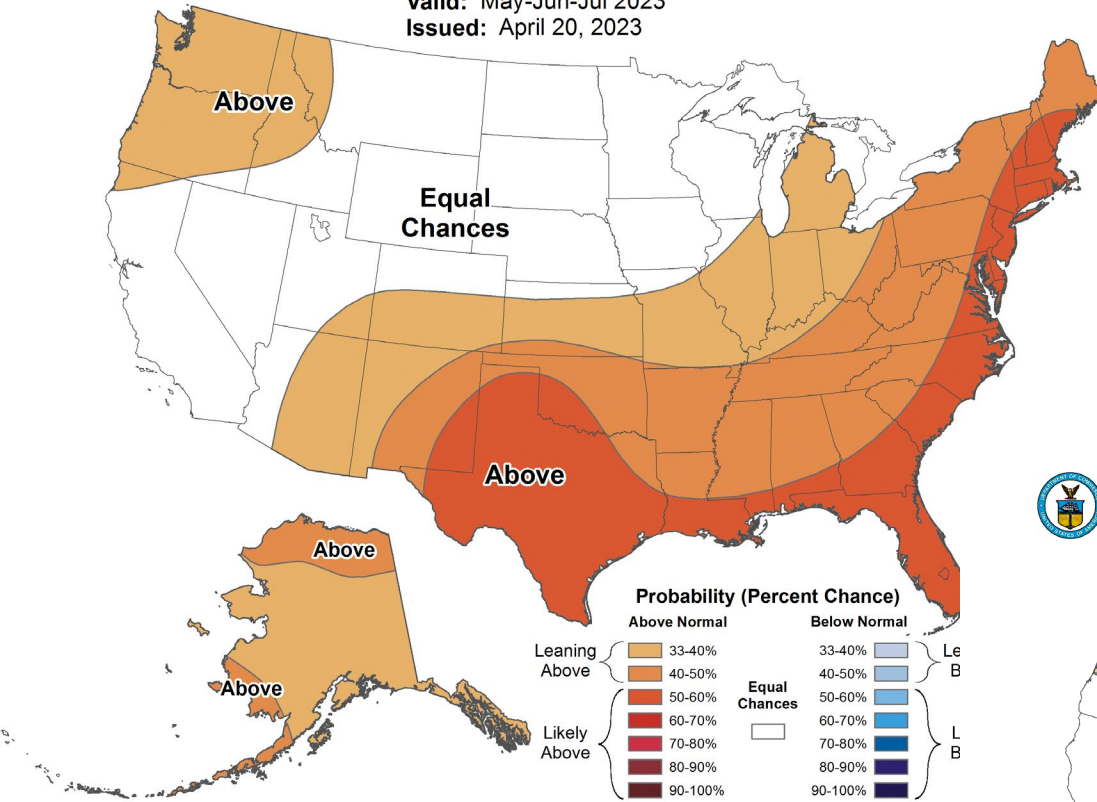


Seasonal Temperature Outlook

Valid: May-Jun-Jul 2023
Issued: April 20, 2023

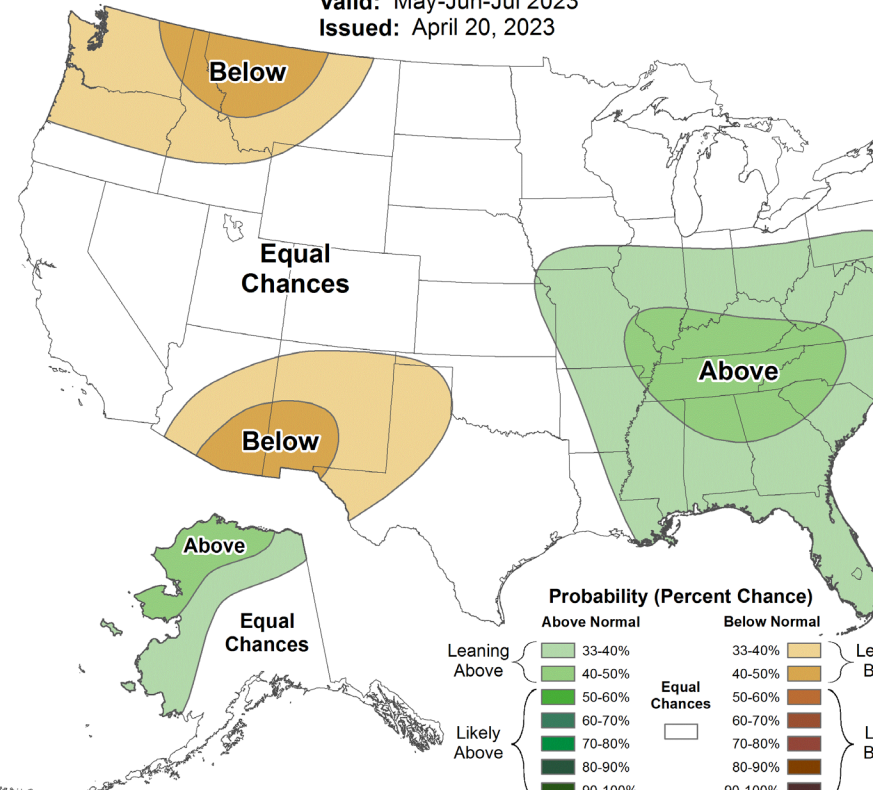


NOAA/CPC Forecasts for May-July 2023



Seasonal Precipitation Outlook

Valid: May-Jun-Jul 2023
Issued: April 20, 2023



Summary

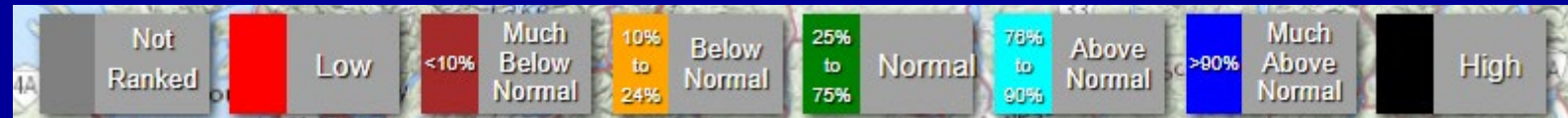
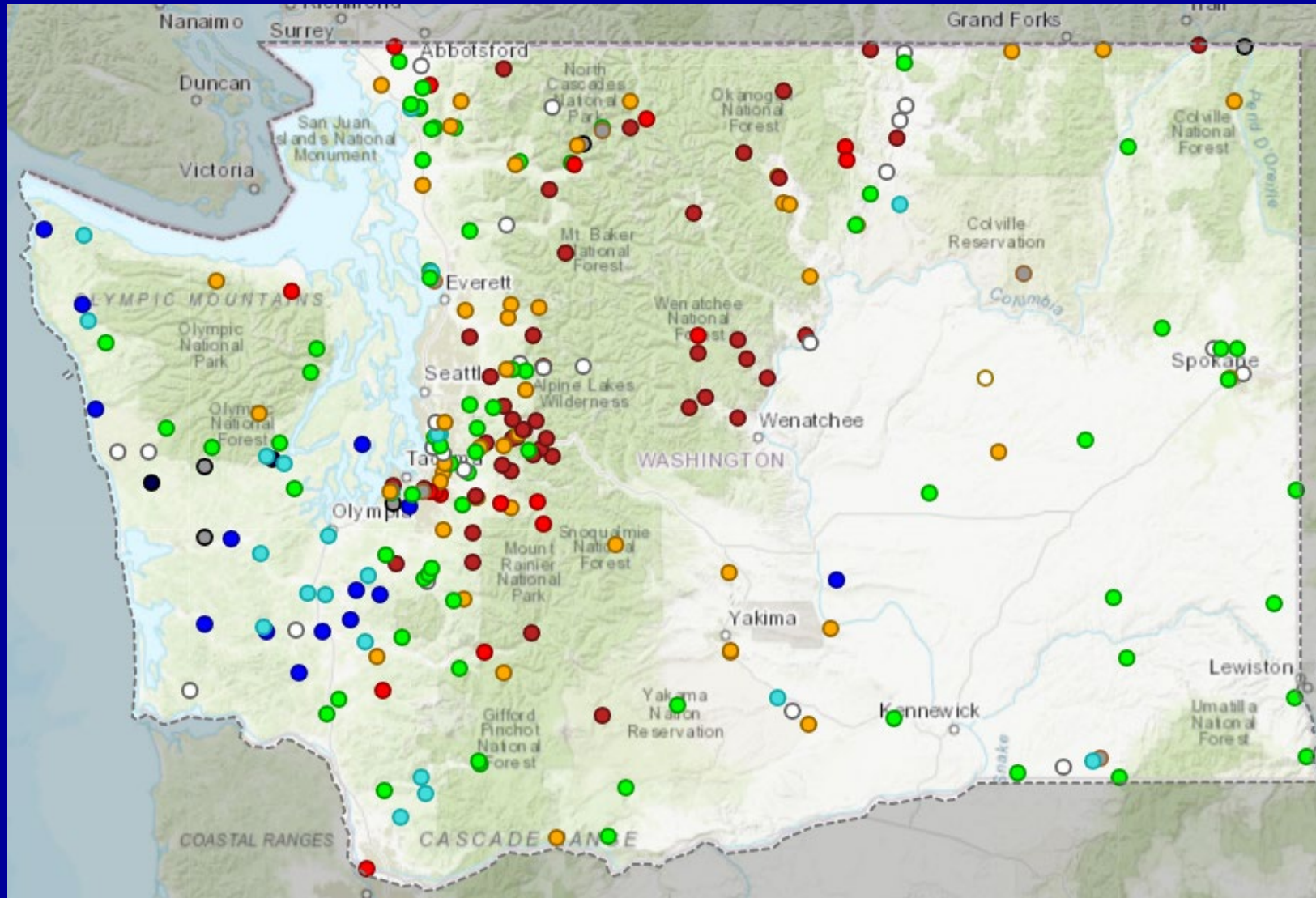
- Past 6+ months have been colder than normal statewide; precipitation between 70 and 90% of normal in western WA and near-normal to above in eastern WA
- Feb and Mar were cooler and drier than normal for most of the state
 - Above normal precipitation thus far in April, and the cool temperatures have slowed the slugs
- Should have a warm summer – have you heard that one before?
- I am not going to worry about El Nino until fall

Streamflow & Groundwater Conditions in Washington State as of 21 April 2023

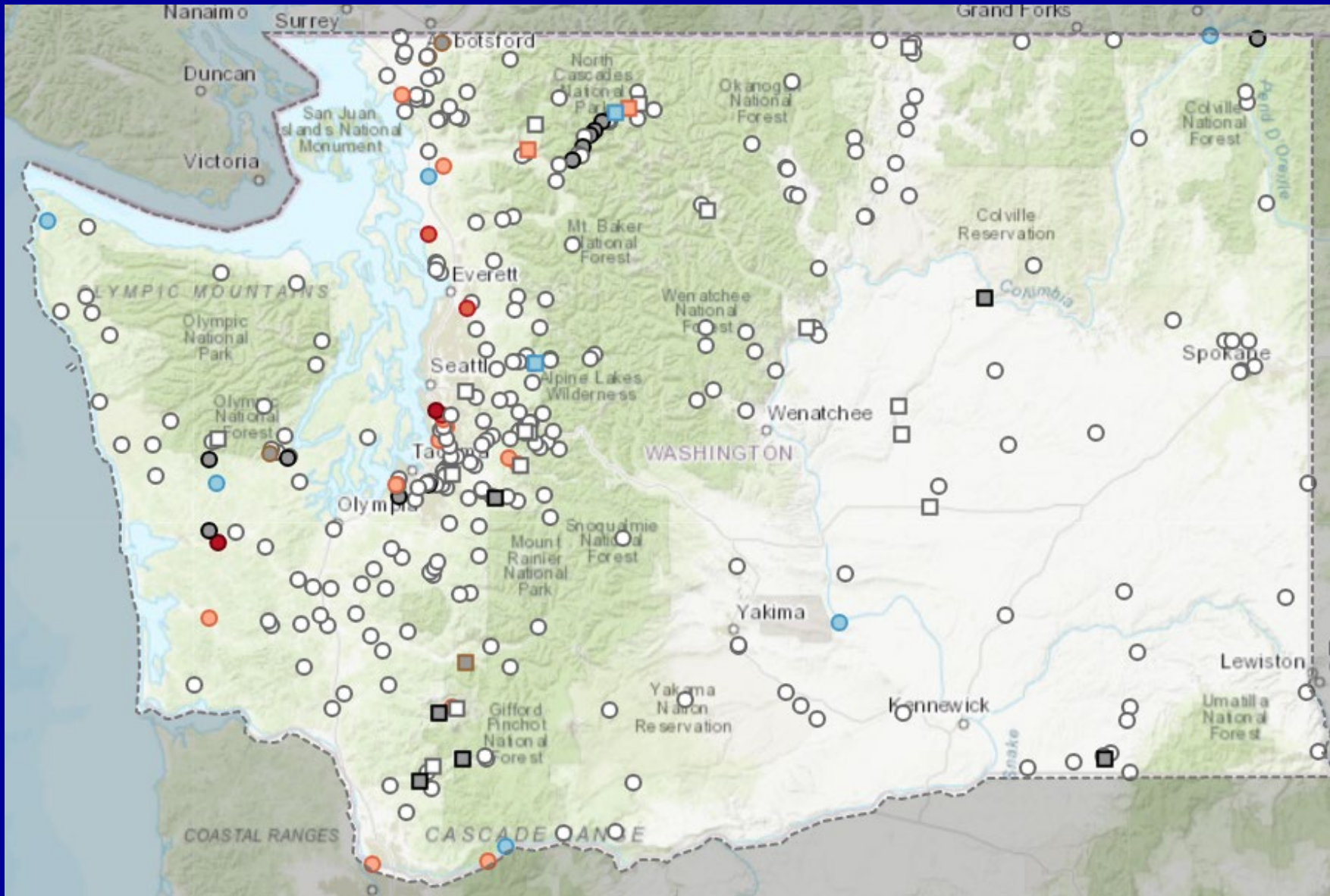


Presented to
The Washington State Water Supply Availability Committee
on 21 April 2023
by Nicholas Sutfin, USGS Washington Water Science Center

WA Current Streamflow Conditions, 21 April 2023



Rising and Falling conditions of WA streams on 21 April 2023



Surface-Water Levels: Rising and falling

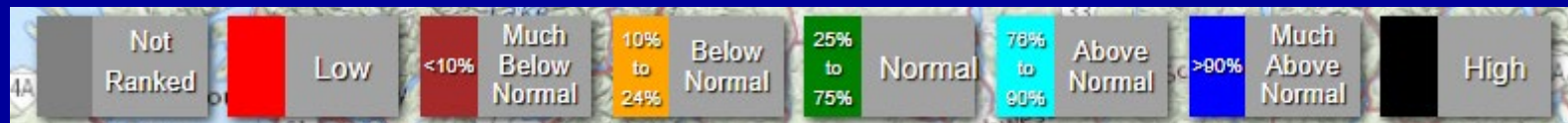
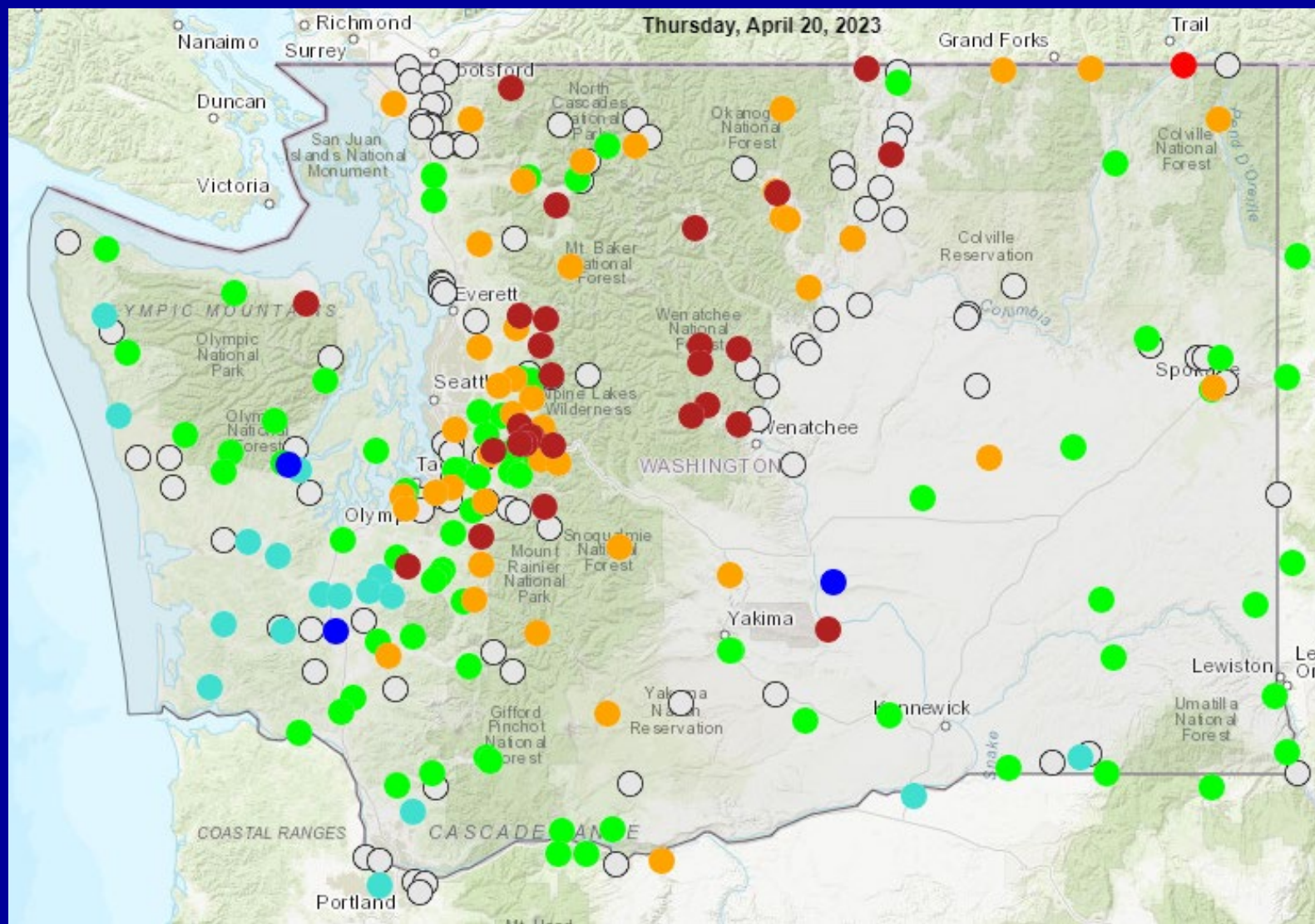
COLOR – CHANGE

- 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

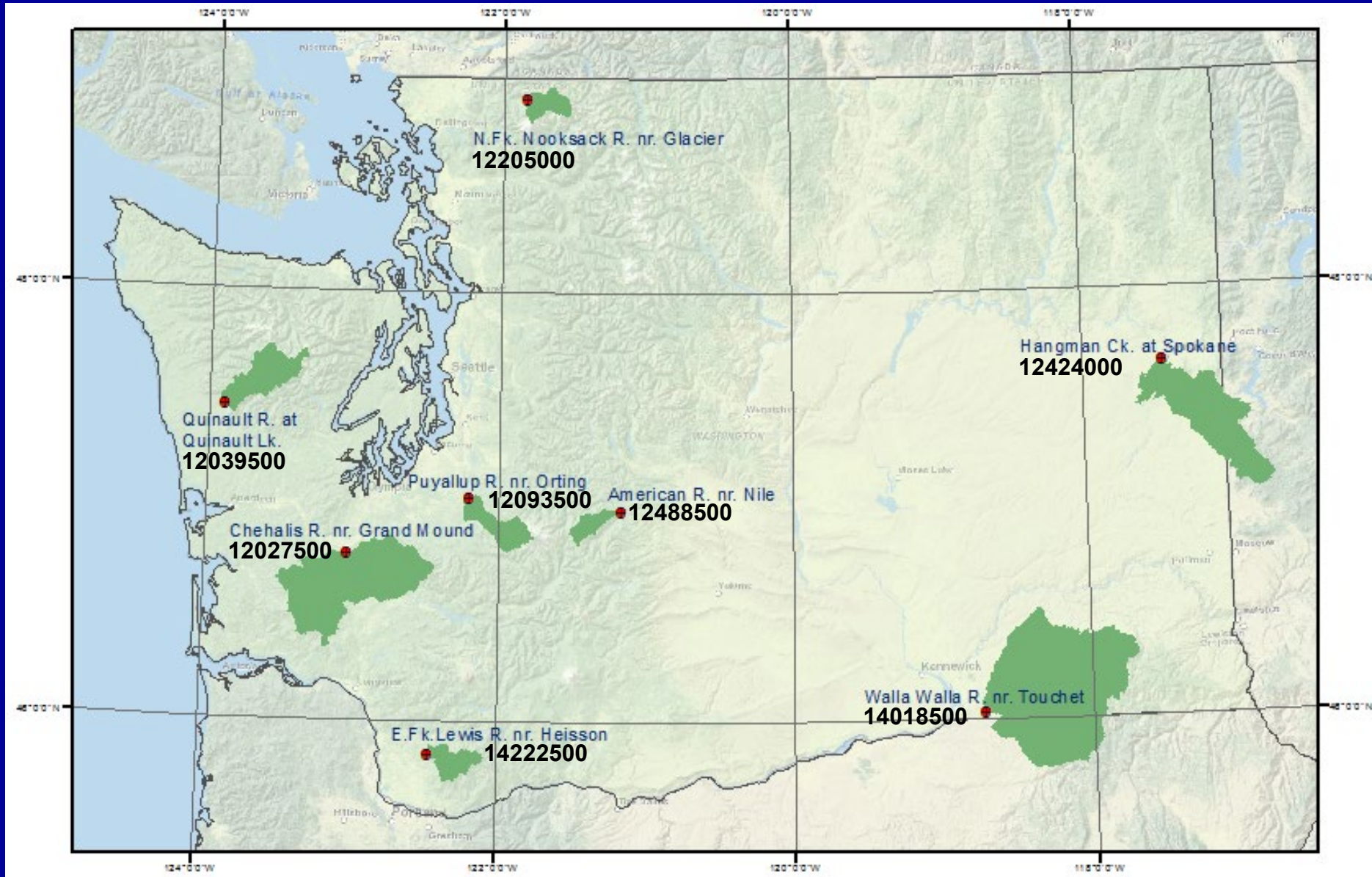
- Stream
- Lake
- Wetland
- Estuary
- Coastal

WA 7-day Average Streamflow Conditions as of 21 April 2023

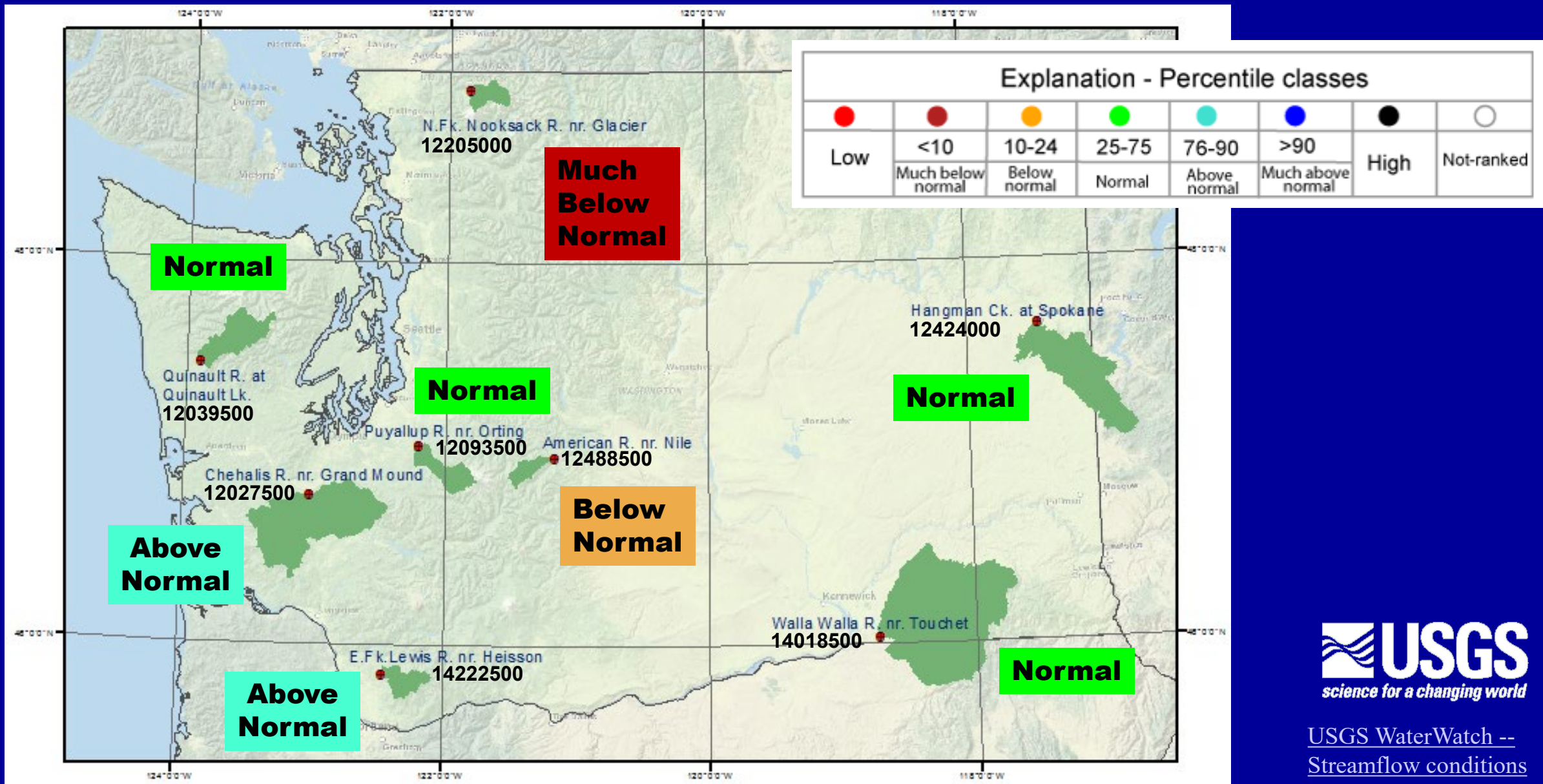


Index Gaging Stations

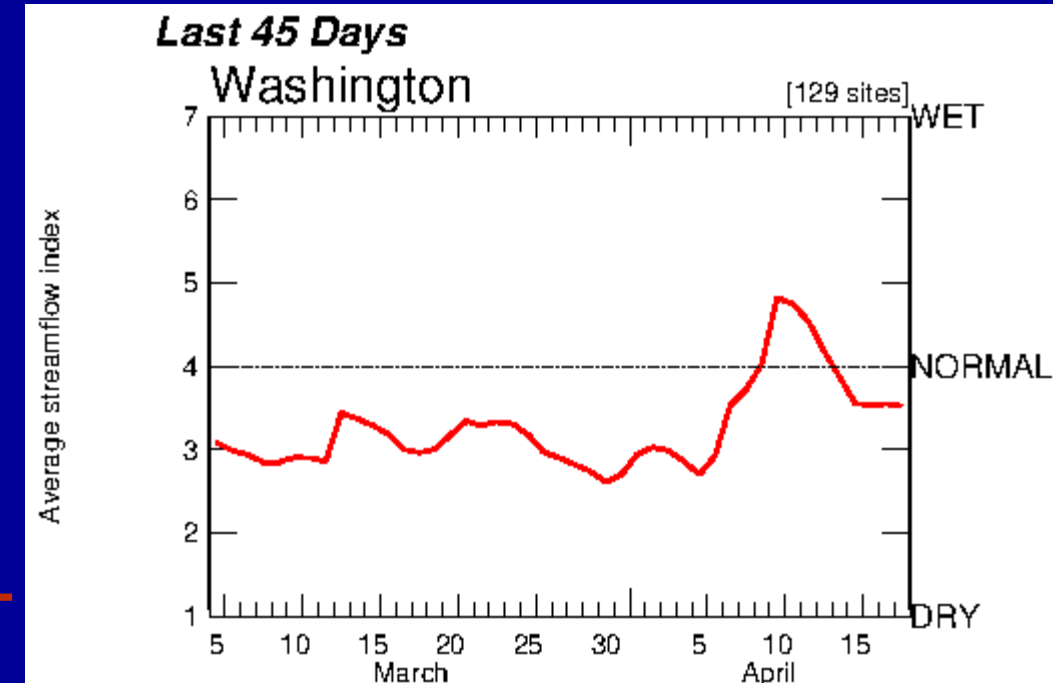
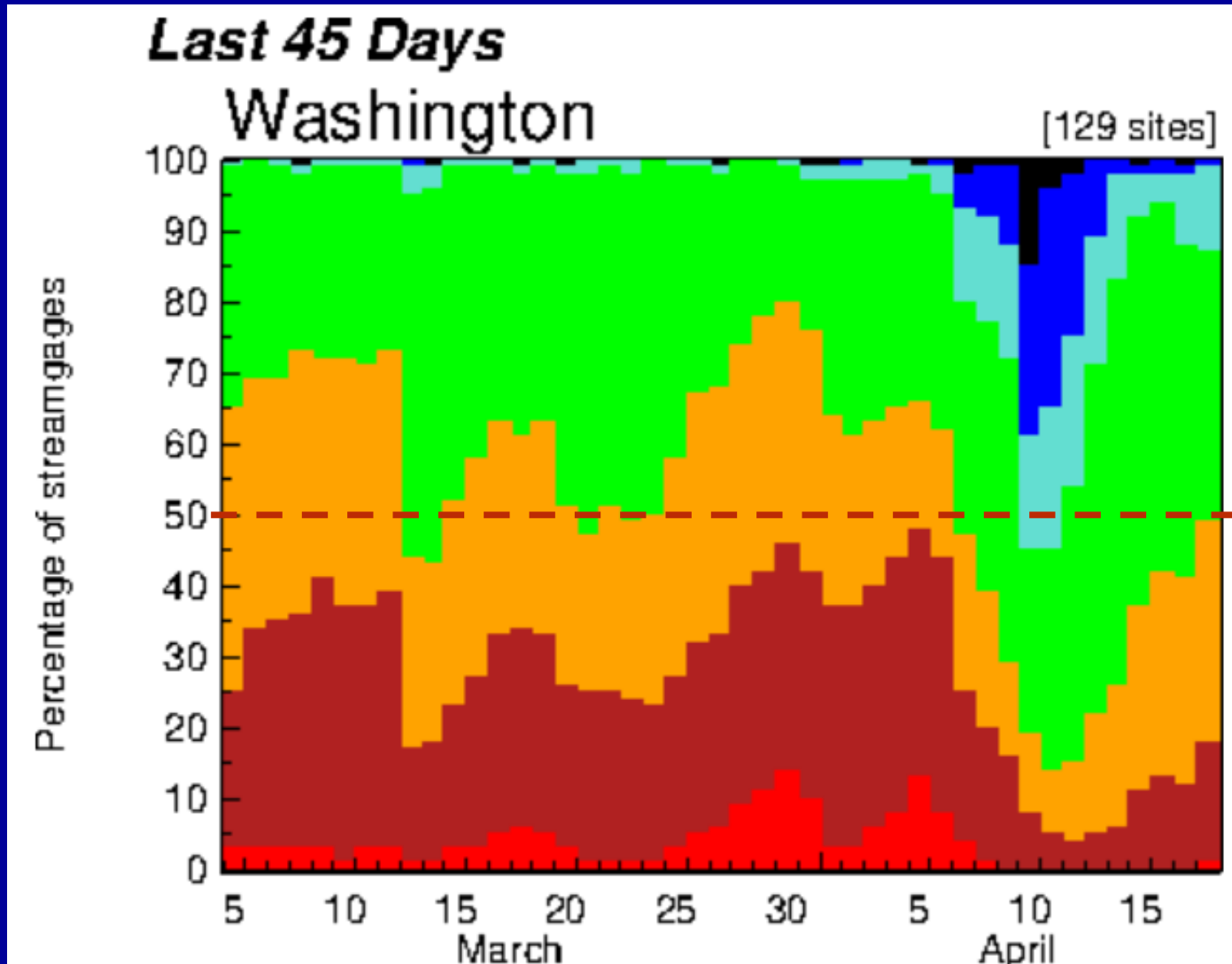
(Stations that measure natural or near-natural streamflow)



Index Gaging Stations, 7-day average streamflow (as of 21 April 2023)



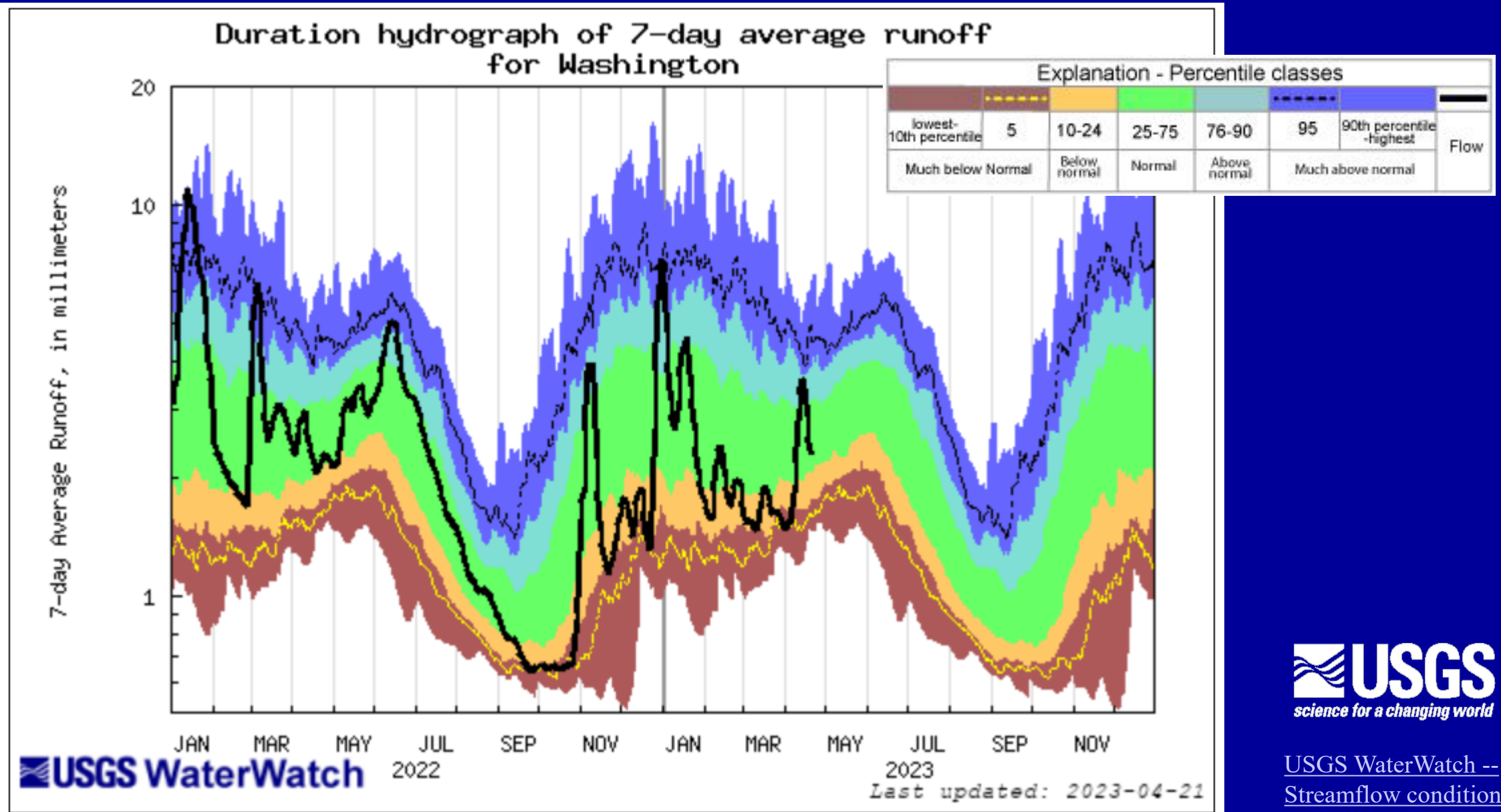
7-day average streamflow in Washington Rivers compared to historical streamflow, March 2023 to April 2023



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

Duration Hydrograph, Washington State

7-day Average Streamflow (as of 21 April 2023) is below normal

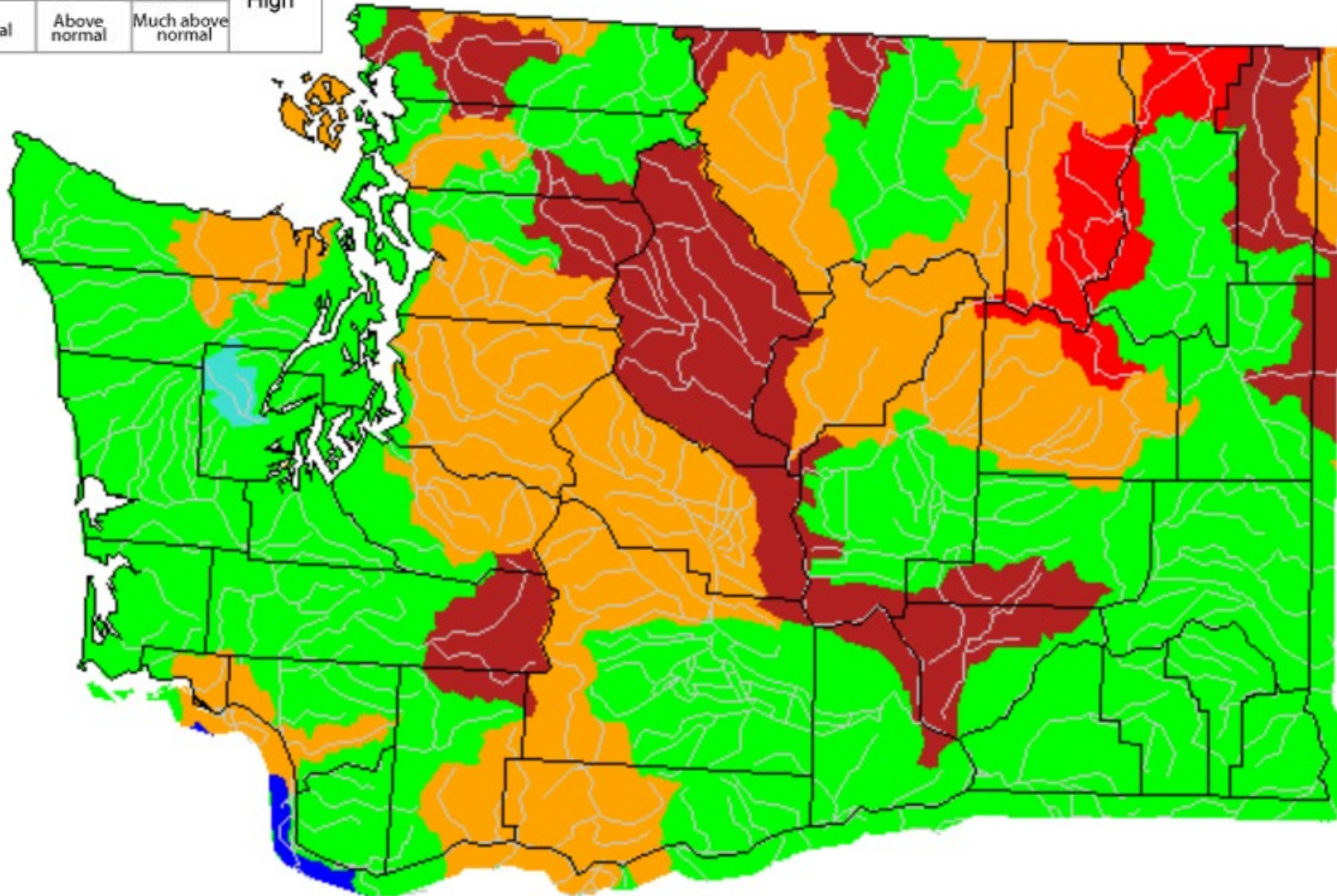


WA 28-day average streamflow

As of 20 April 2023

Explanation - Percentile classes

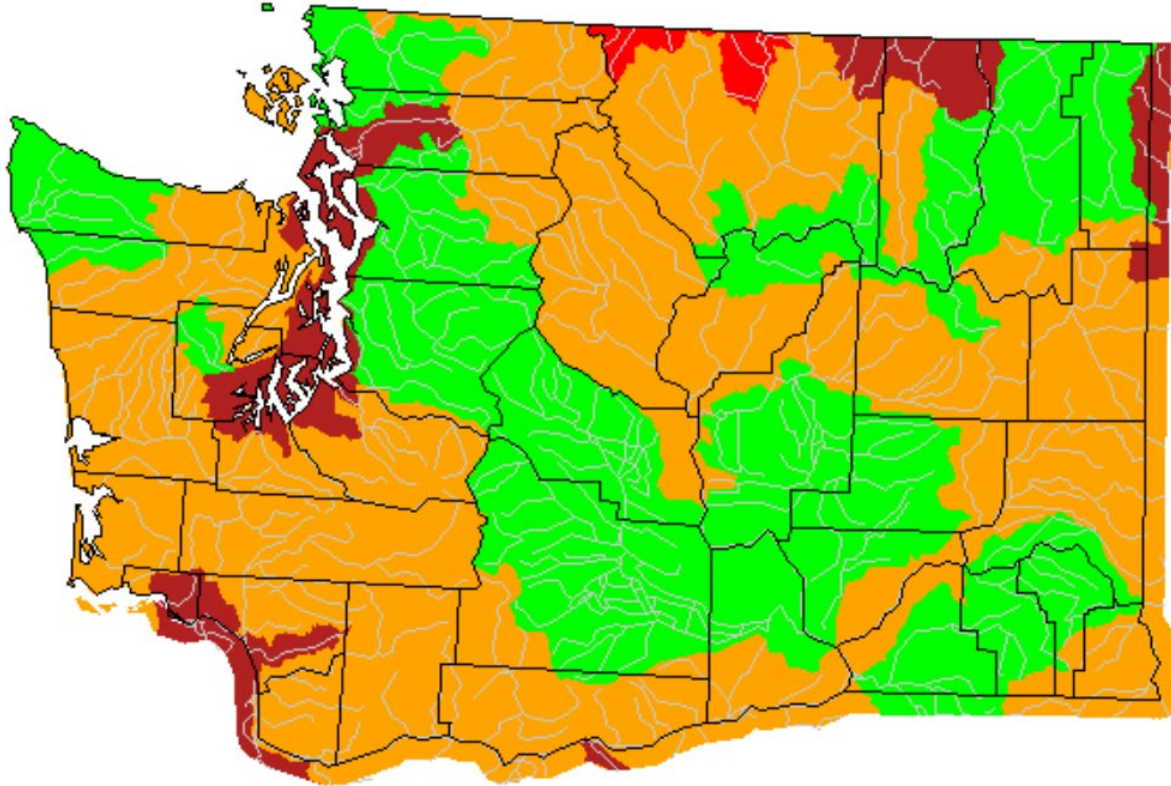
Explanation - Percentile classes					
Low	<10	10-24	25-75	76-90	>90
	Much below normal	Below normal	Normal	Above normal	Much above normal
					High



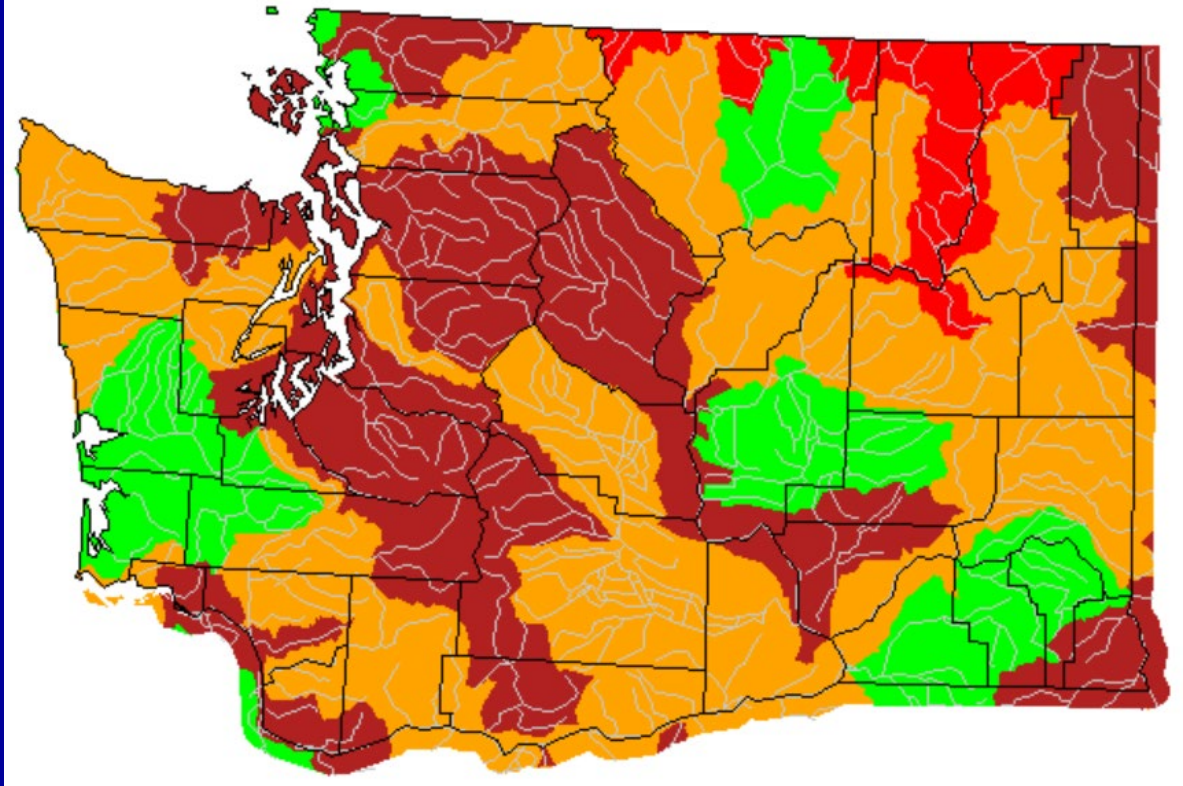
Monthly average streamflow compared to historical


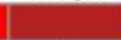




February and March 2023

February 2023



March 2023

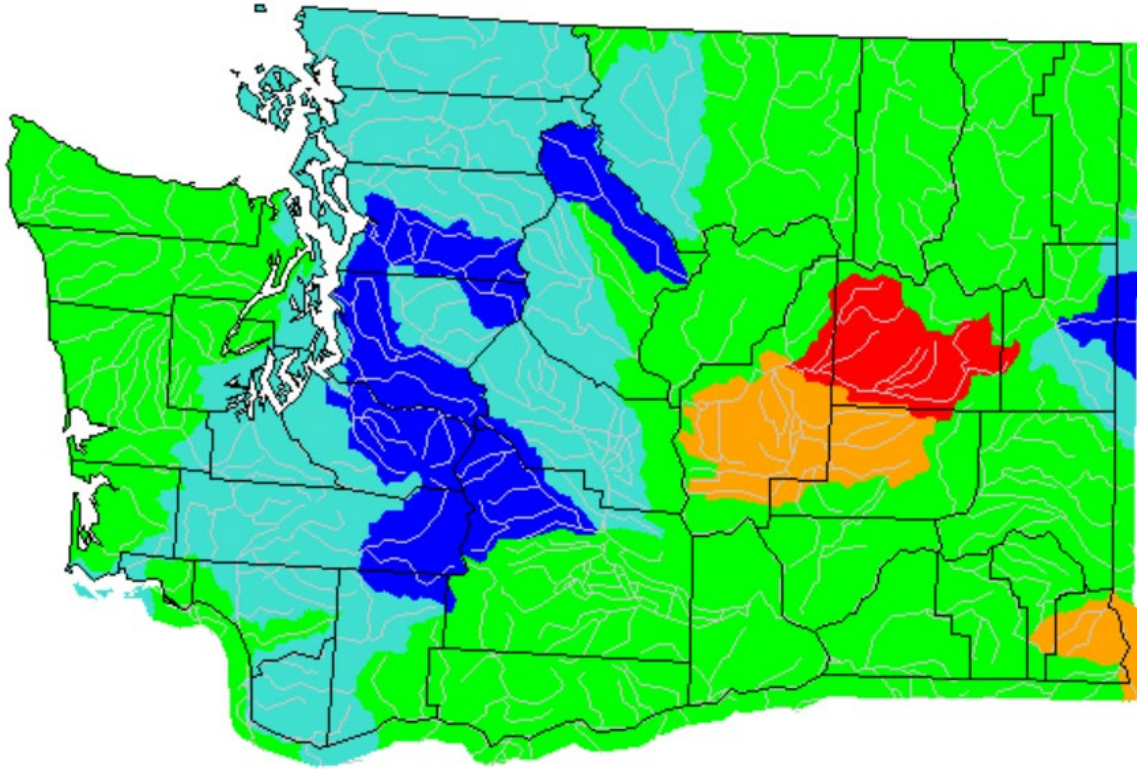


Explanation - Percentile classes						
						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

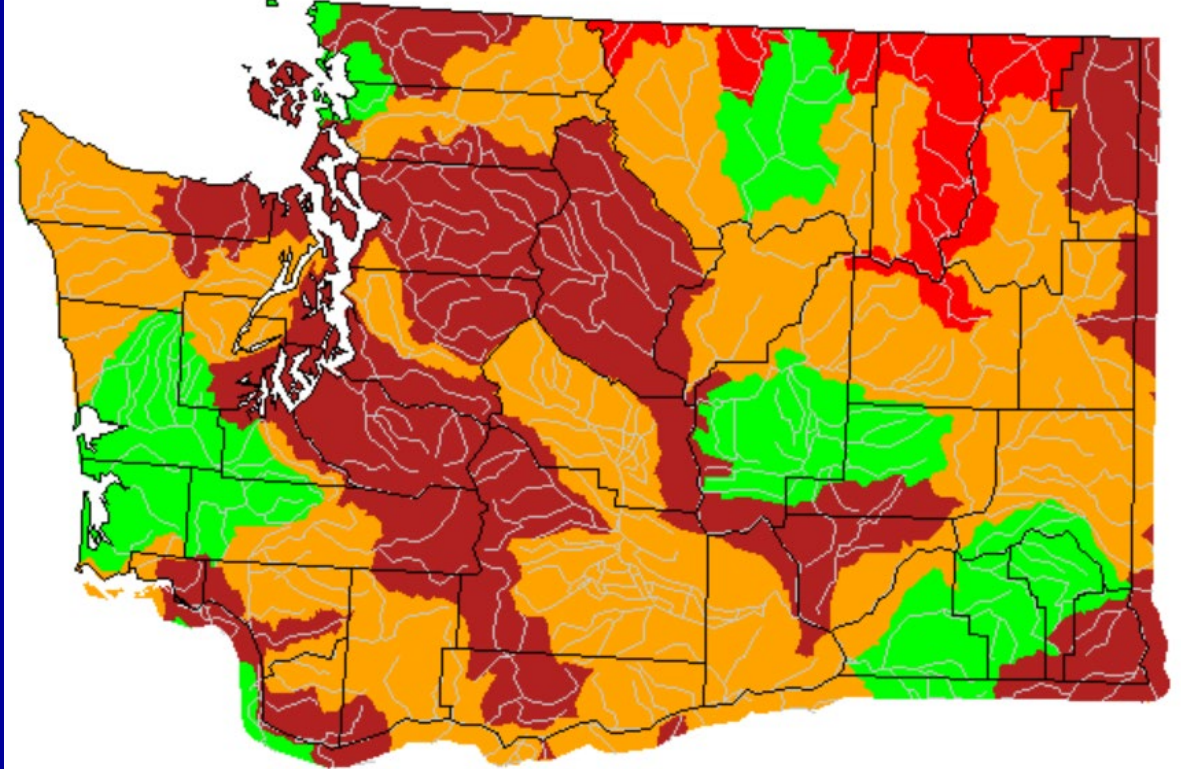
Monthly average streamflow compared to historical

March 2022 and 2023

March 2022



March 2023

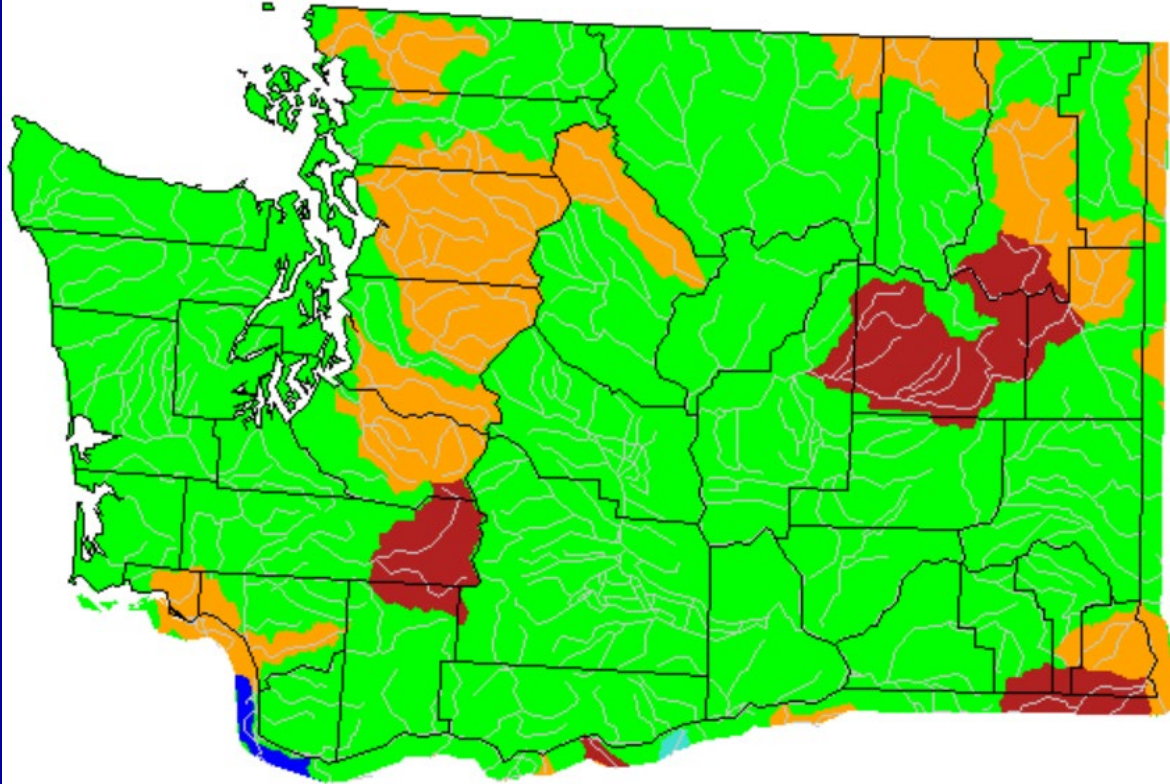


Explanation - Percentile classes						
	<10	10-24	25-75	76-90	>90	
Low	Much below normal	Below normal	Normal	Above normal	Much above normal	High

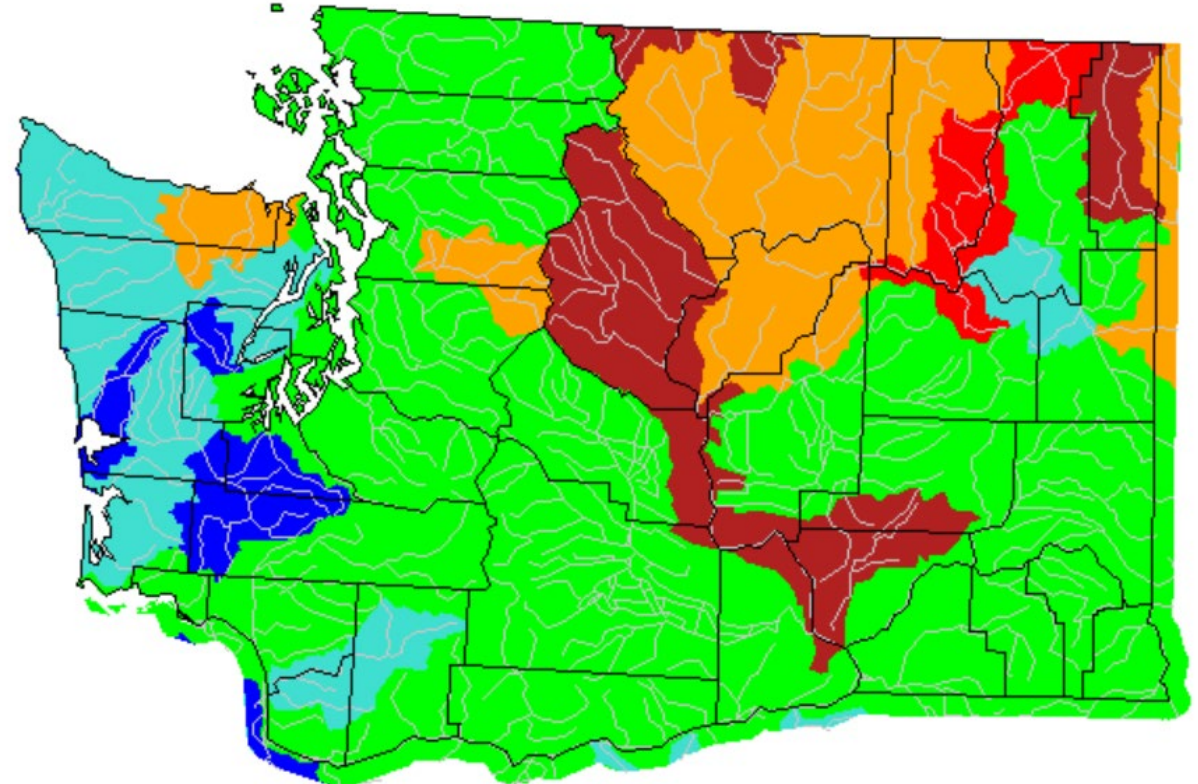
Monthly average streamflow compared to historical

April 2022 and 2023

April 2022



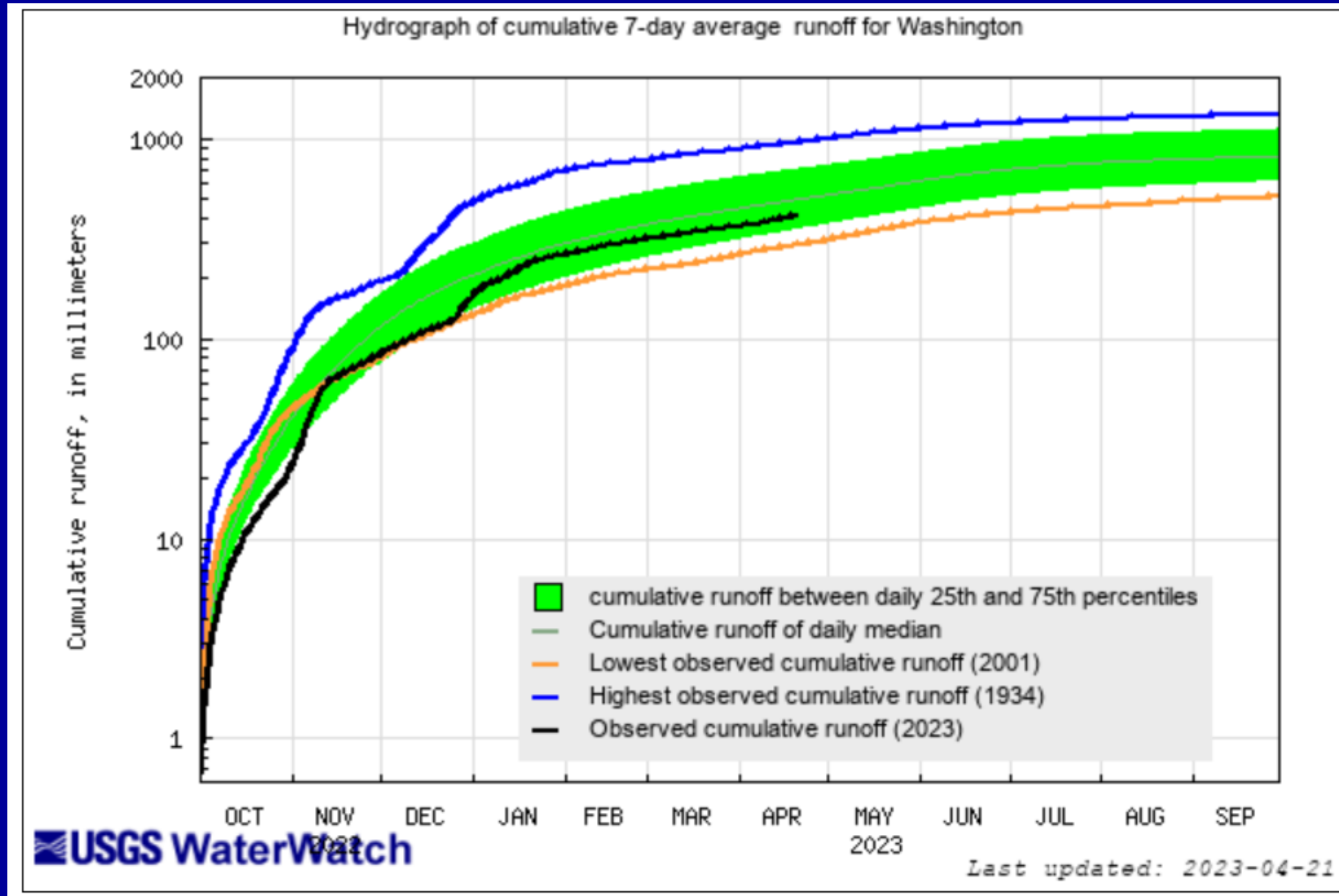
Last 14 days as of April 20th, 2023



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

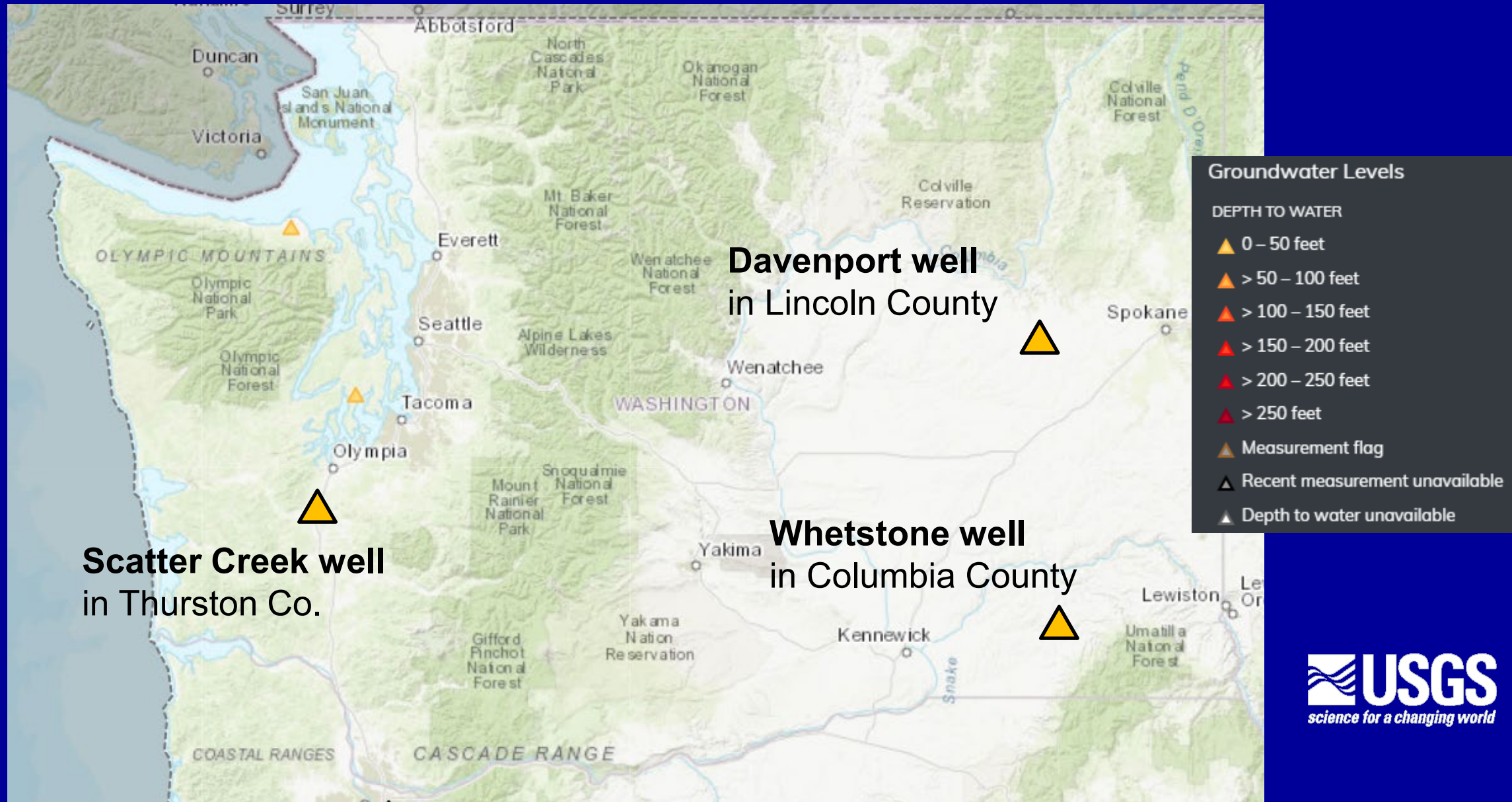
Hydrograph of cumulative 7-day average Area-based Hydrograph, Washington State

2023 Water year (as of 21 April 2023) is normal

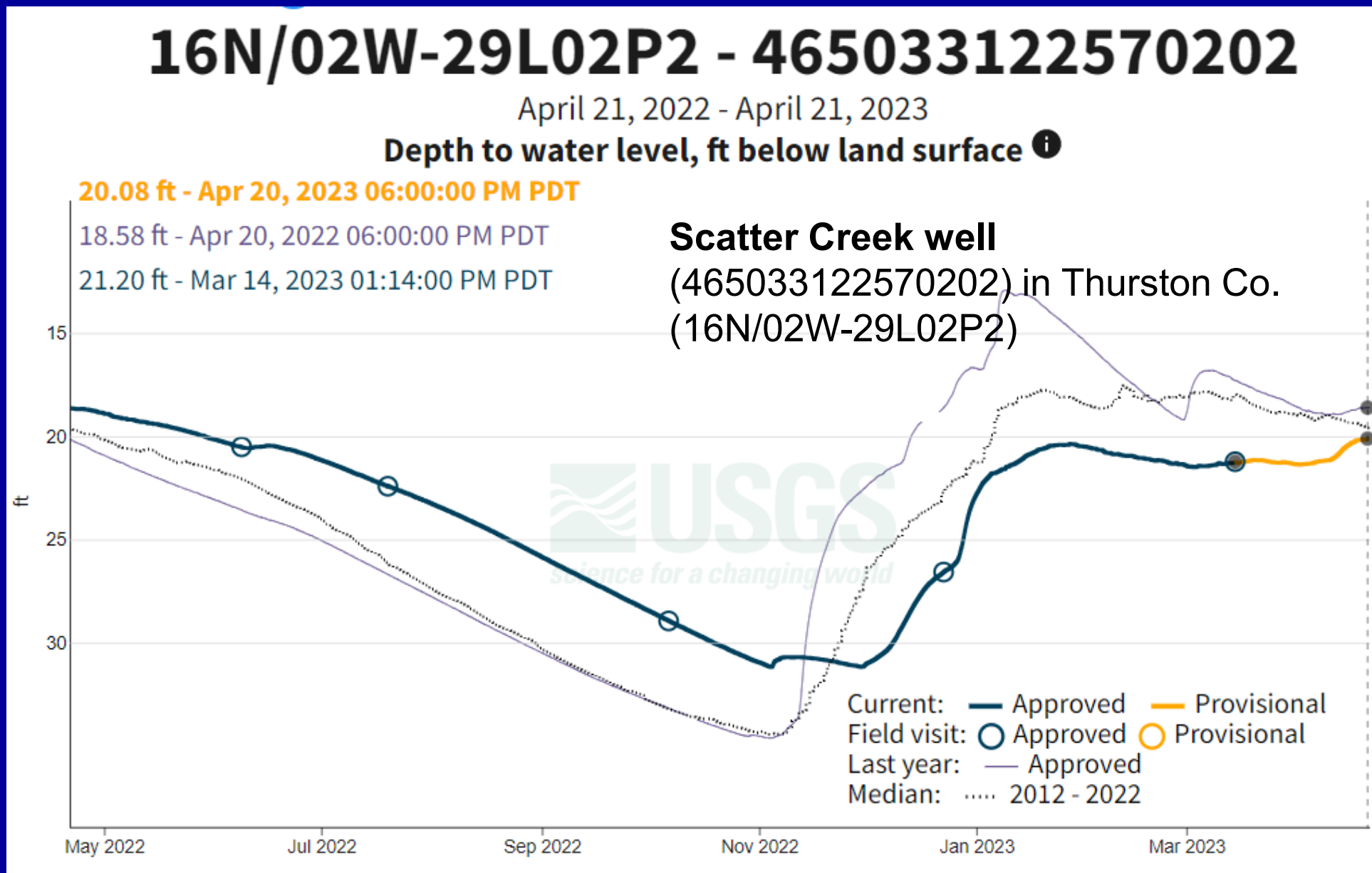


USGS WaterWatch --
Streamflow conditions

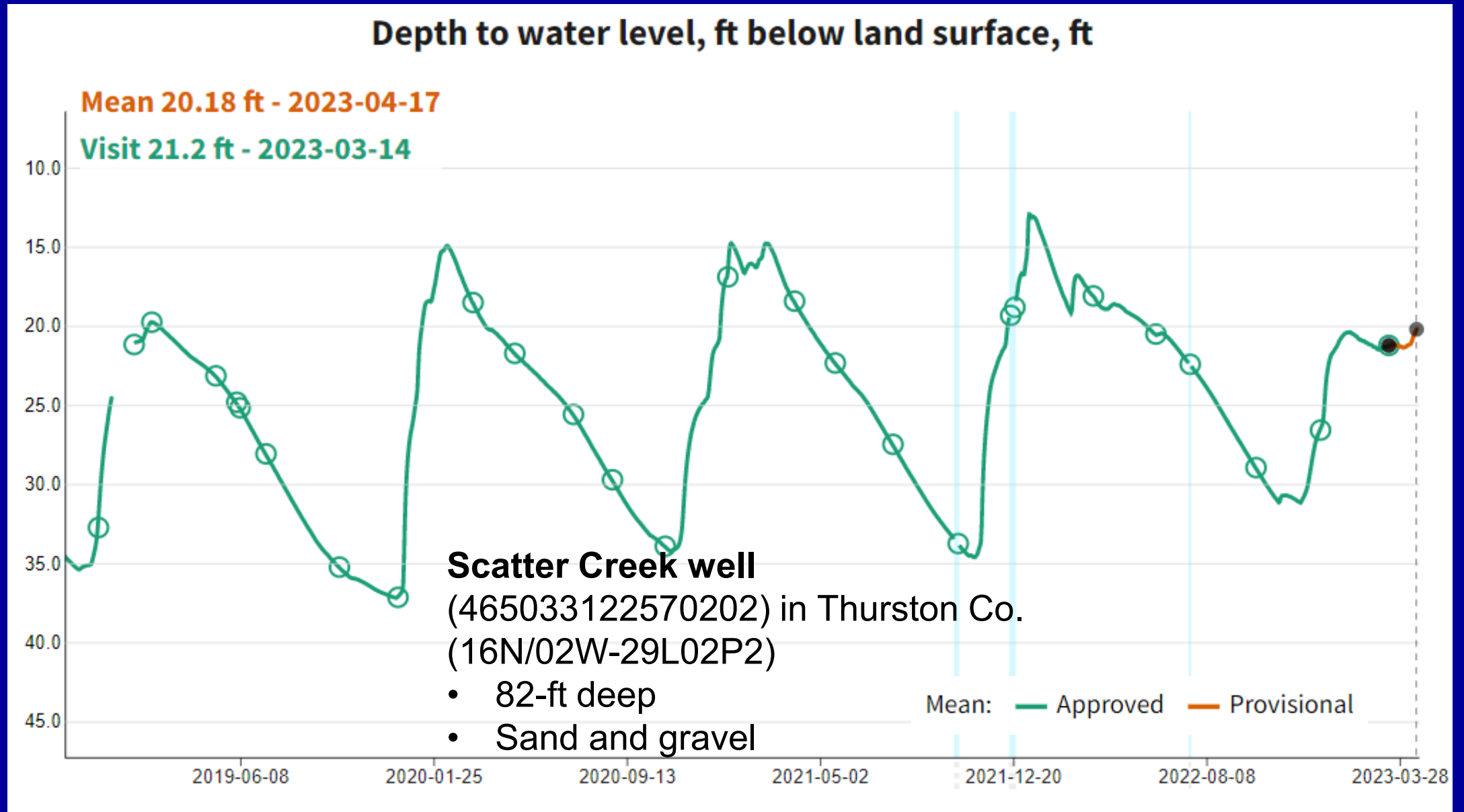
Three reference groundwater wells in Washington



Scatter Creek Well Groundwater Conditions (21 April 2023)



Scatter Creek Well Groundwater Conditions (21 April 2023)

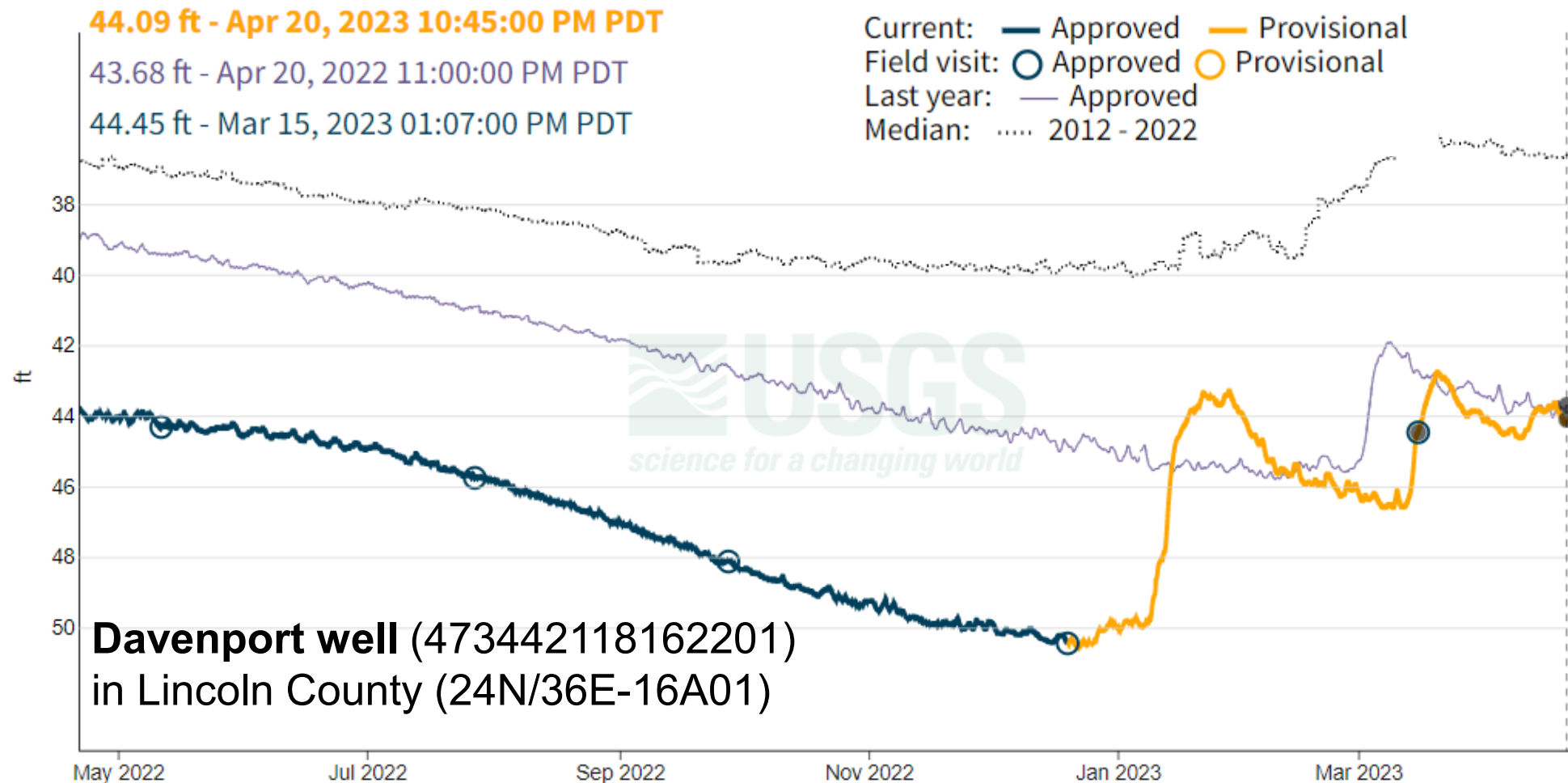


Davenport Well Groundwater Conditions (21 April 2023)

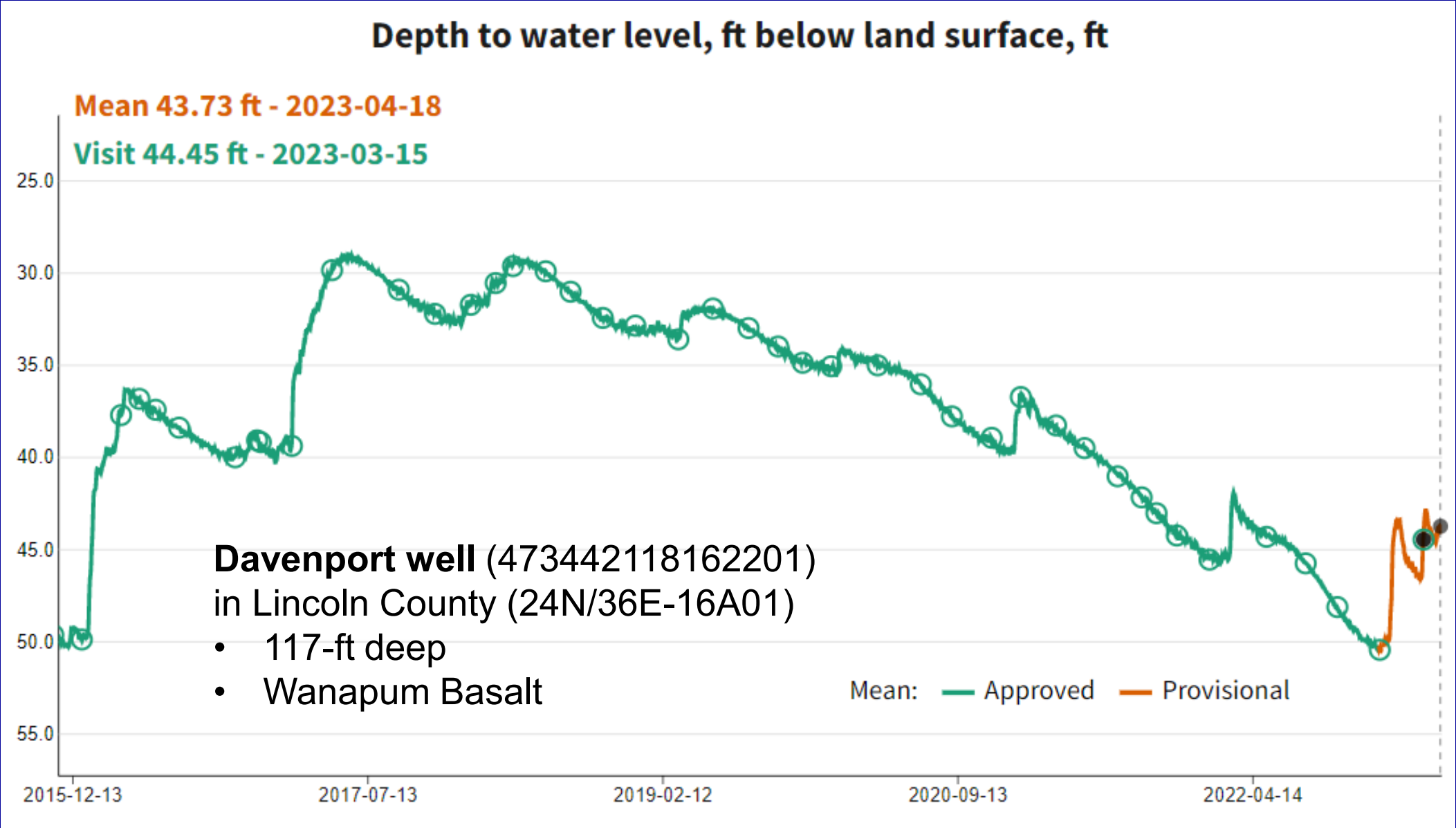
24N/36E-16A01 - 473442118162201

April 21, 2022 - April 21, 2023

Depth to water level, ft below land surface ⓘ



Davenport Well Groundwater Conditions (21 April 2023)

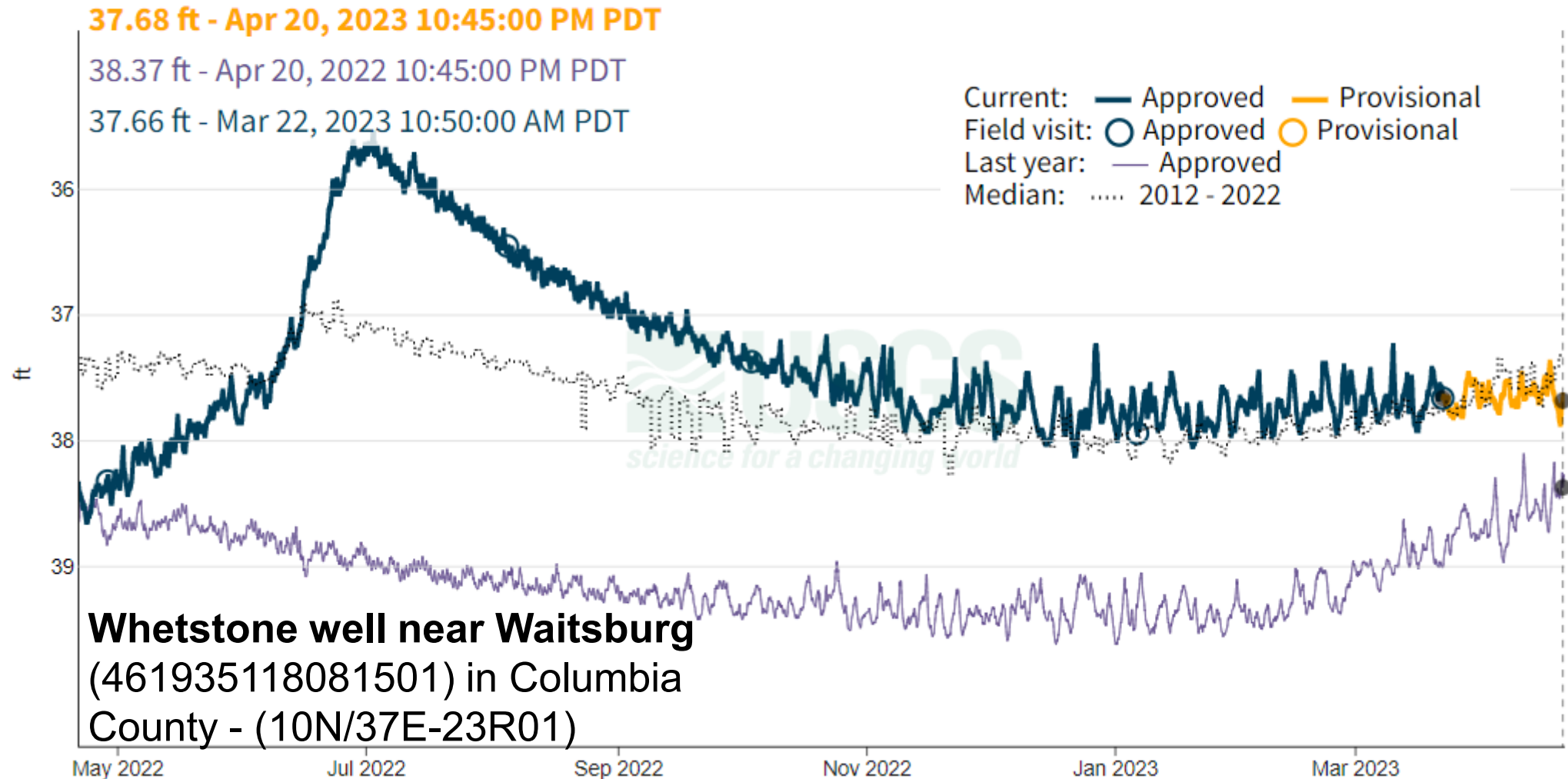


Whetstone Well Groundwater Conditions (21 April 2023)

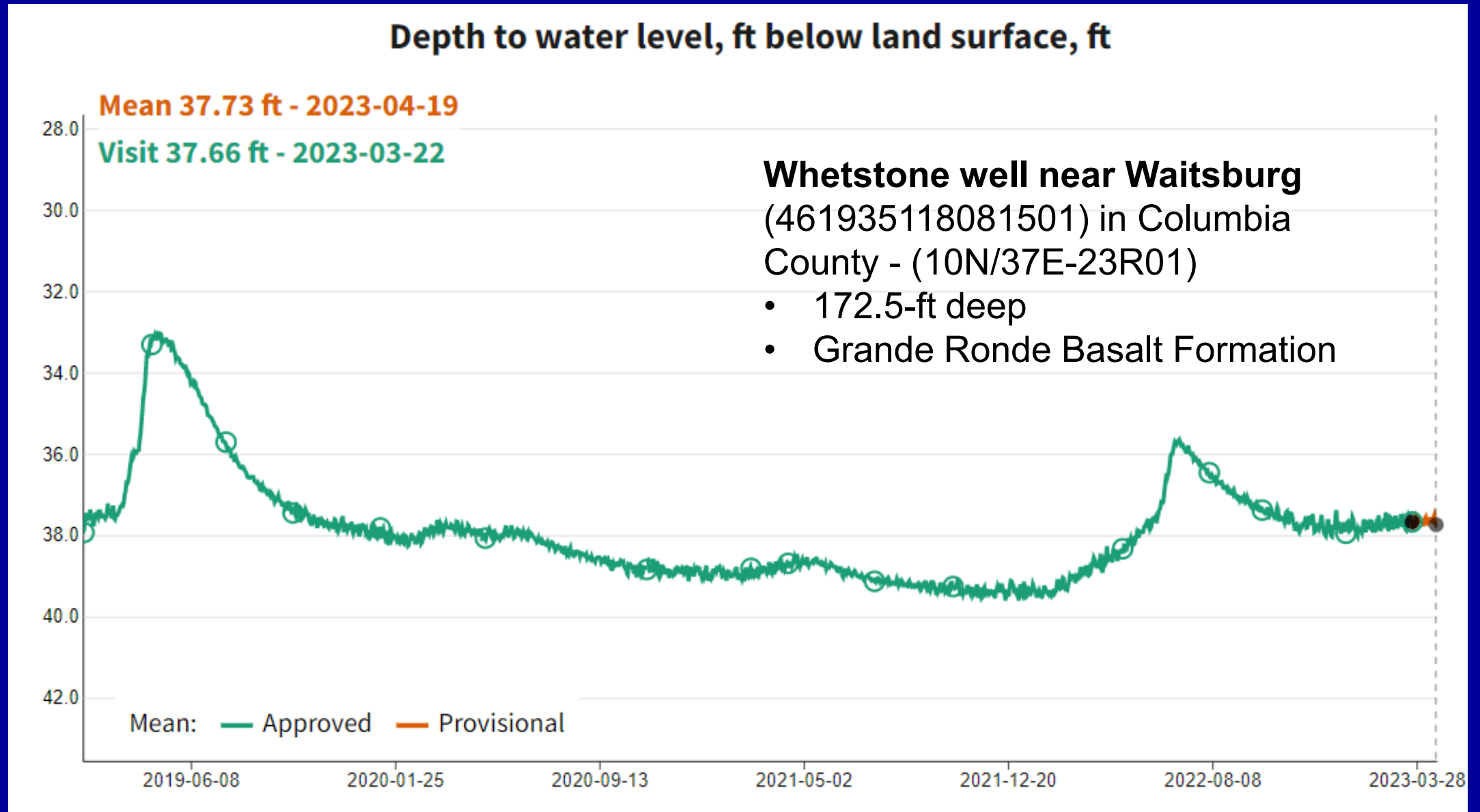
10N/37E-23R01 - 461935118081501

April 21, 2022 - April 21, 2023

Depth to water level, ft below land surface ⓘ



Whetstone Well Groundwater Conditions (21 April 2023)

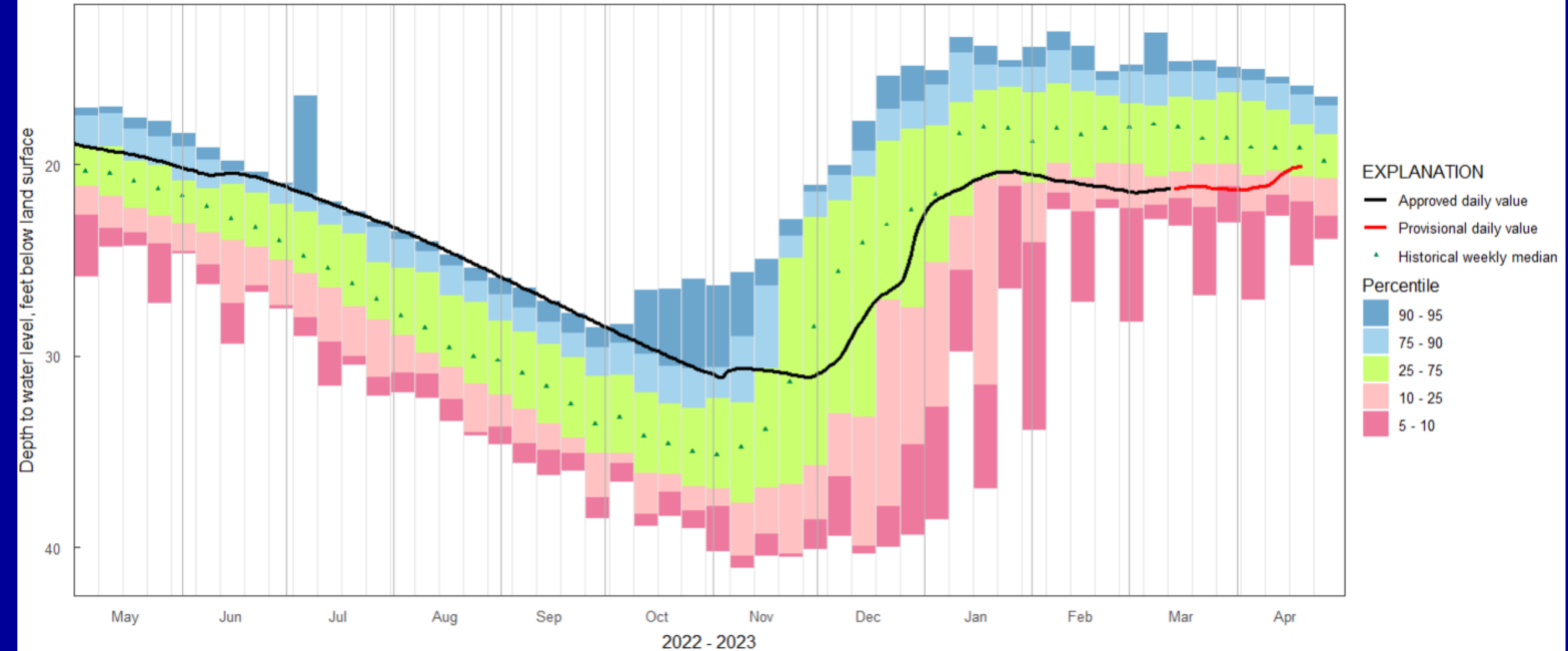


WA Current Groundwater Conditions (21 April 2023)

16N/02W-29L02P2

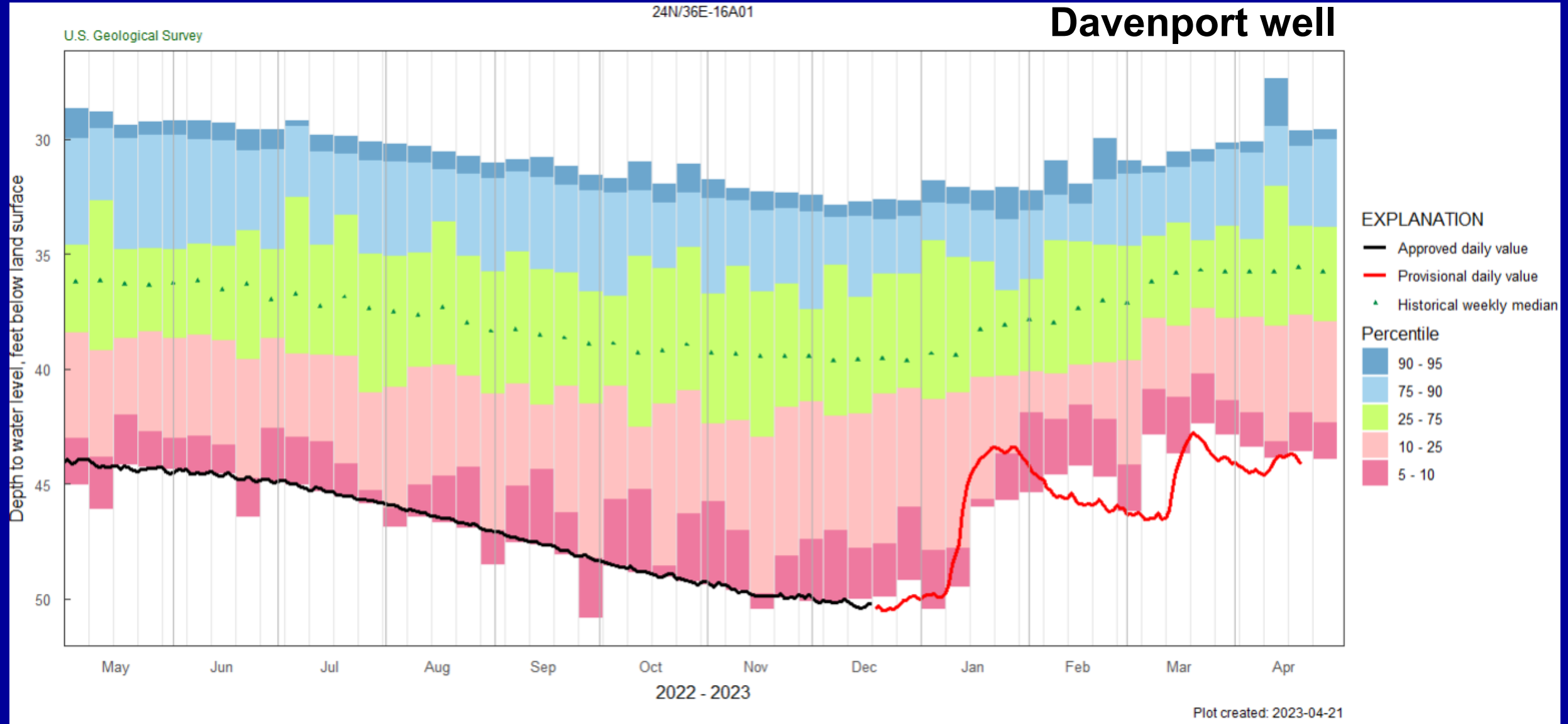
U.S. Geological Survey

Scatter Creek well

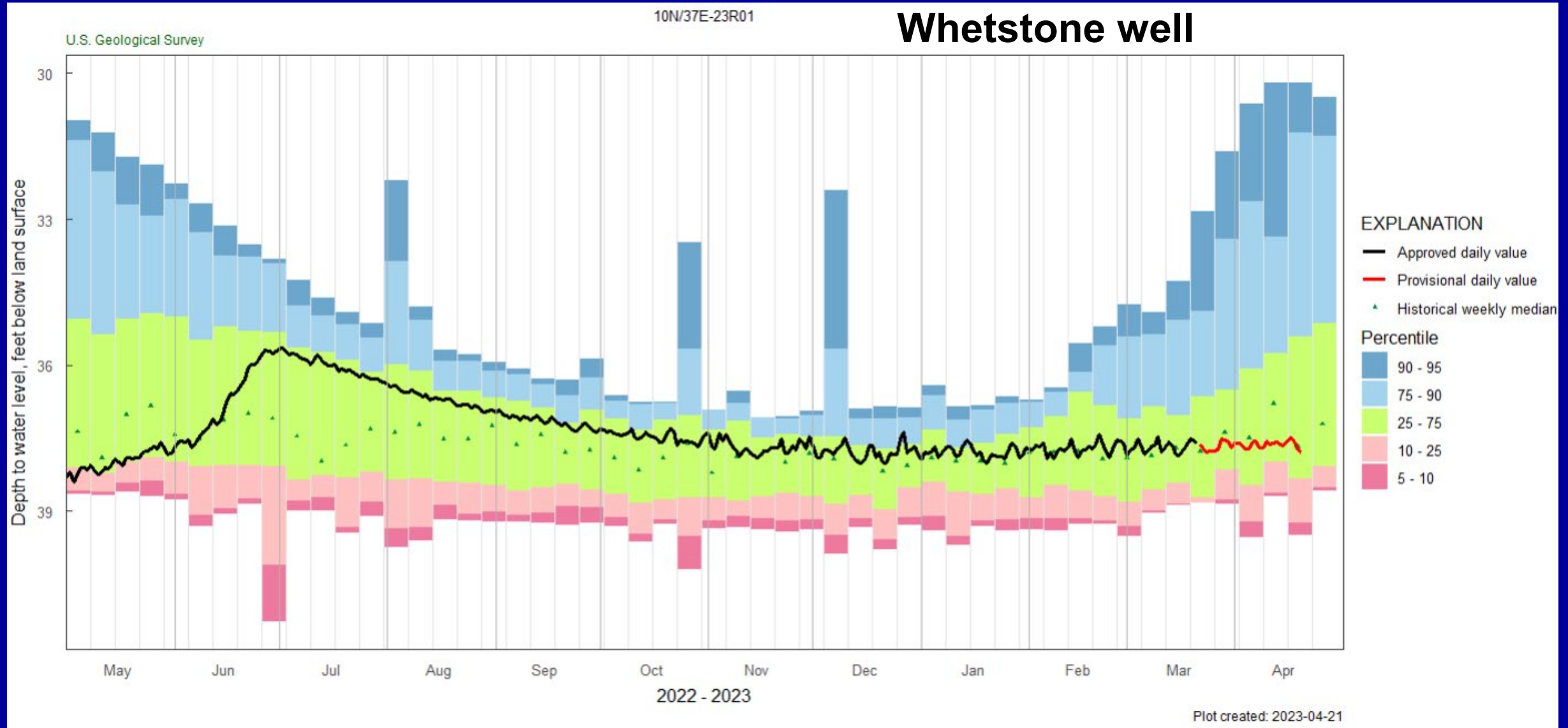


Plot created: 2023-04-21

WA Current Groundwater Conditions (21 April 2023)



WA Current Groundwater Conditions (21 April 2023)

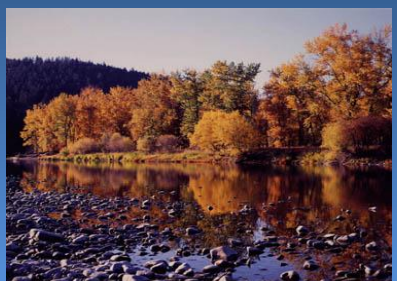


Summary of Washington Streamflow & GW conditions as of 21 April 2023

- 7-day average streamflow statewide is normal
- 7-day average streamflow at eight index gaging stations:
 - Western WA**
 - Puyallup River nr. Orting – Normal
 - Quinault River – Normal
 - Chehalis River nr. Grand Mound – Above Normal
 - EF Lewis River – Above Normal
 - Cascades:**
 - NF Nooksack River – Much below Normal
 - American River - Below Normal
 - Eastern WA**
 - Walla Walla River – Normal
 - Hangman Creek – Normal
- Reference groundwater sites: (below normal)
 - Scatter Creek well (west) – Normal
 - Davenport well (east) – Much Below normal
 - Whetstone well (southeast) - Normal



Northwest River Forecast Center



April, 2023 Washington Water Supply Availability Meeting

Amy Burke
NWRFC.watersupply@noaa.gov

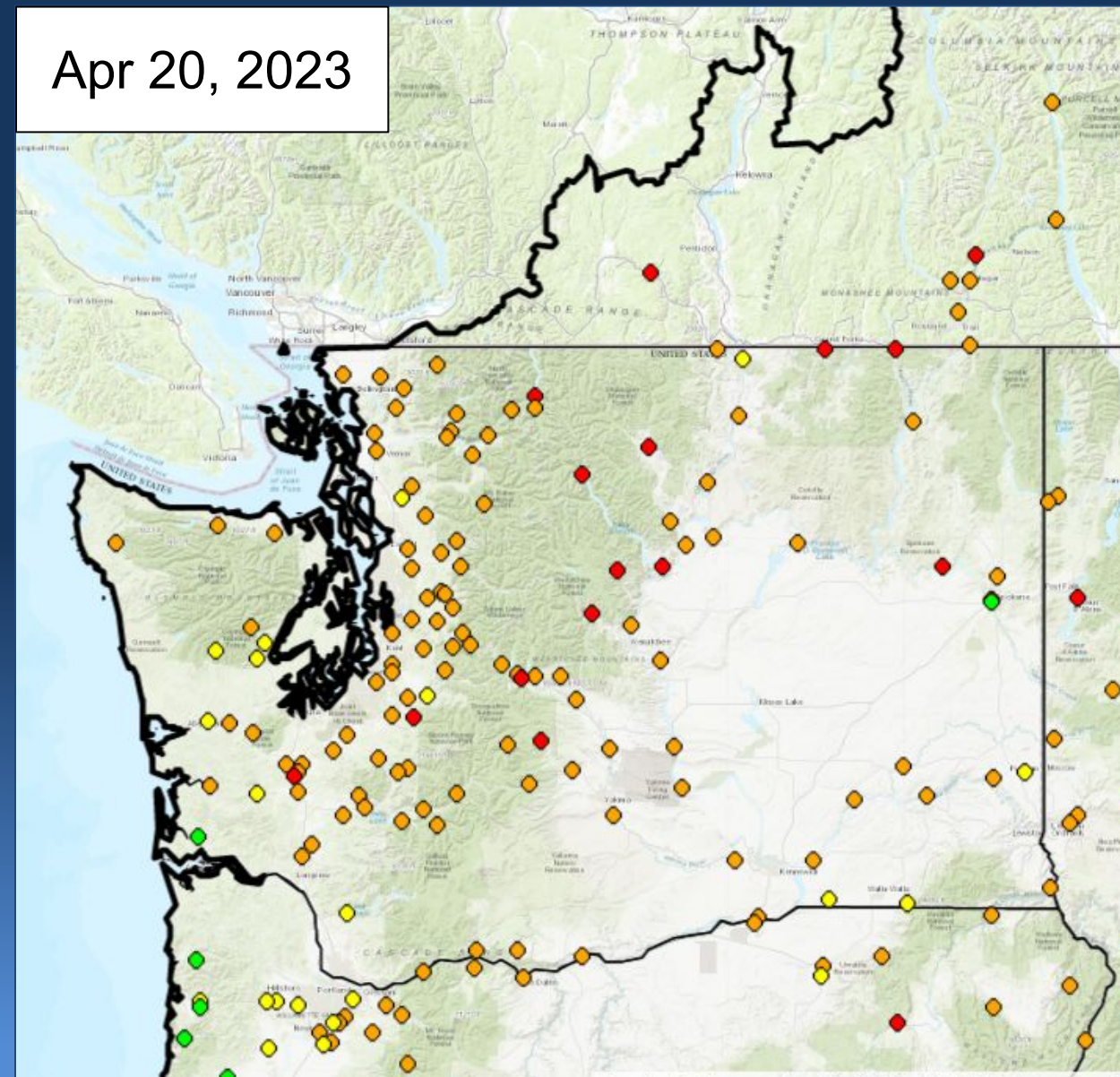
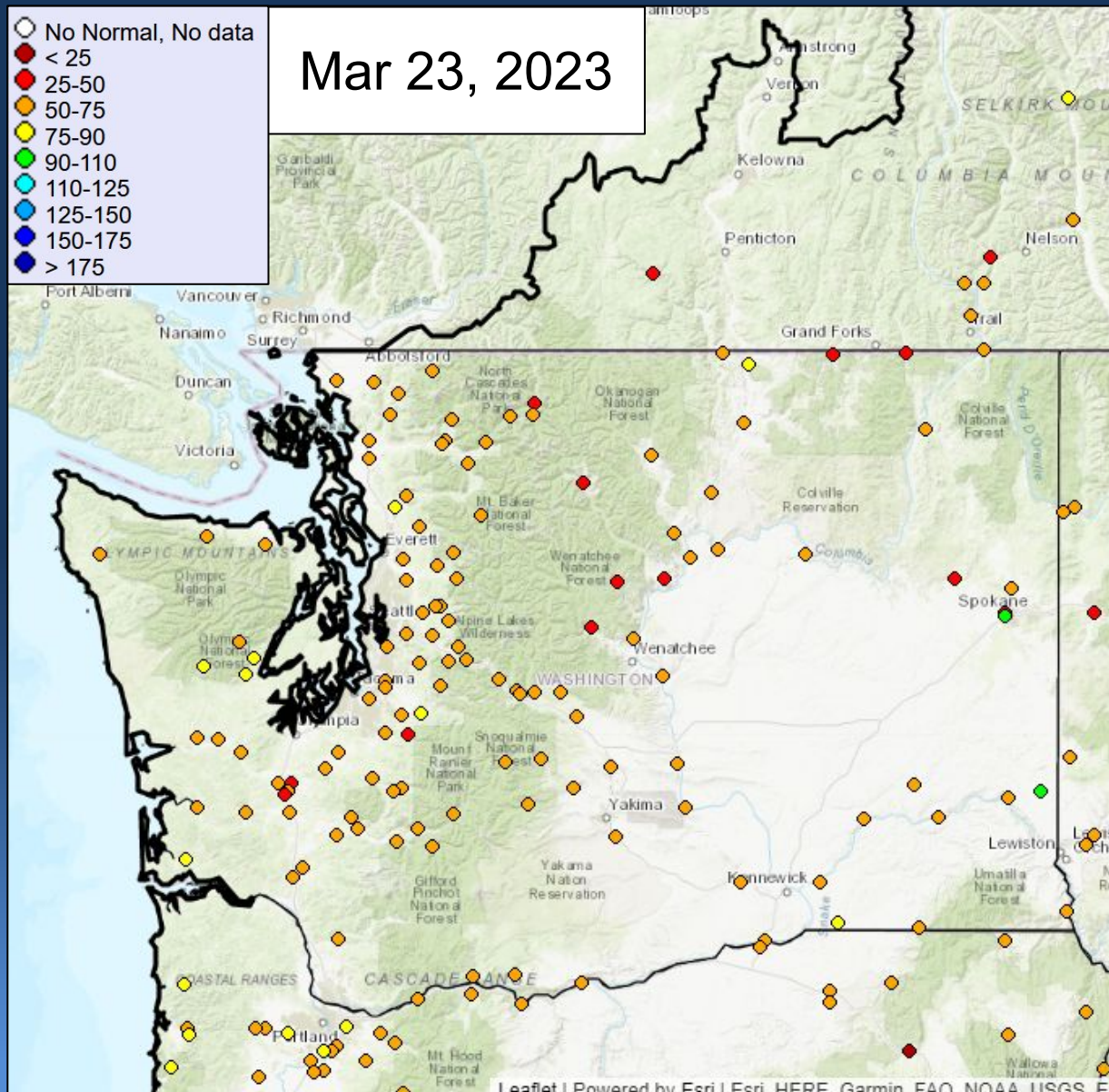


Take Home Messages

- Adjusted runoff to date remains below normal
- 10 day QPF forecast is mostly below normal
- Recent precip generally increased Apr-Sep river forecasts
- ESP10 Natural Water Supply forecasts are a mix of normal and below normal
- Continued push and pull between low runoff and high snowpack

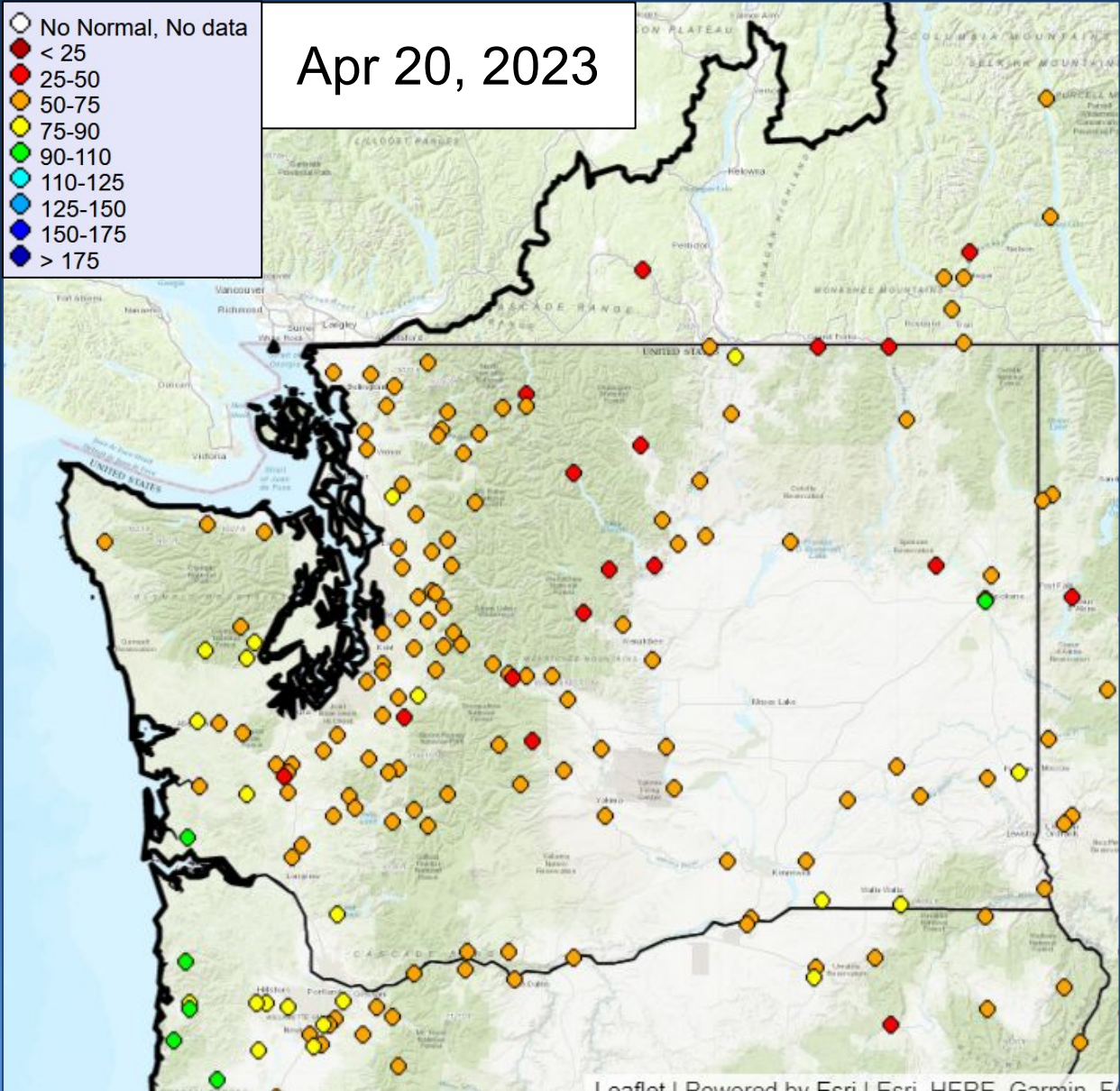


YTD Adjusted Natural Runoff





YTD Adjusted Natural Runoff



% Normal Runoff Oct 1st – Apr 20th

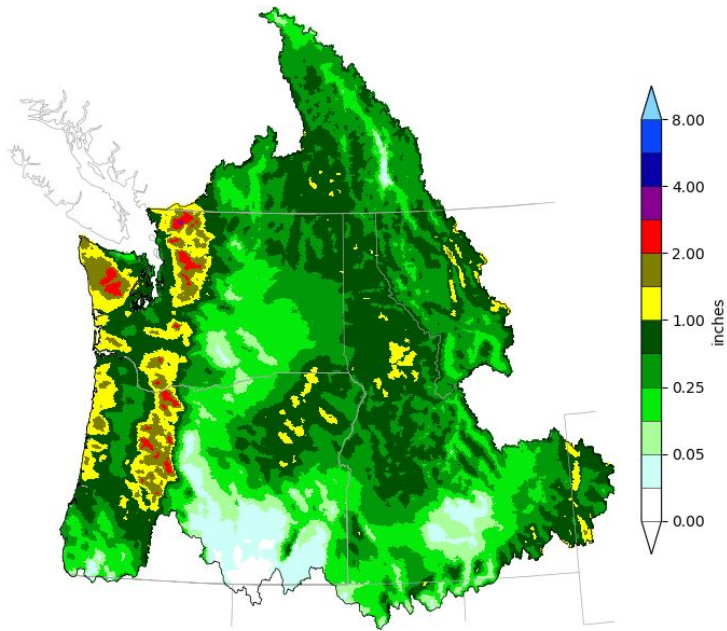
<u>Washington</u>		Δ
Skagit nr Mt Vernon	60	0
Dungeness nr Sequim	58	-1
Chehalis at Porter	69	5
Okanogan at Malott	58	-5
Methow nr Pateros	51	-9
Yakima at Parker	61	-1
Walla Walla nr Touchet	88	3



10 Day Precipitation Forecast



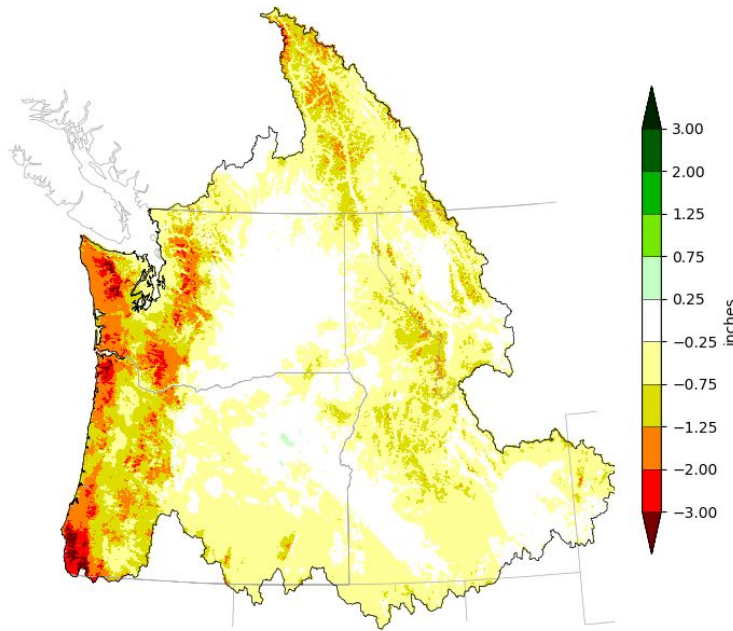
Northwest River Forecast Center
10 Day QPF, Ending 12Z, 04/30/23



Creation Time: Thu Apr 20 21:23:05 UTC 2023



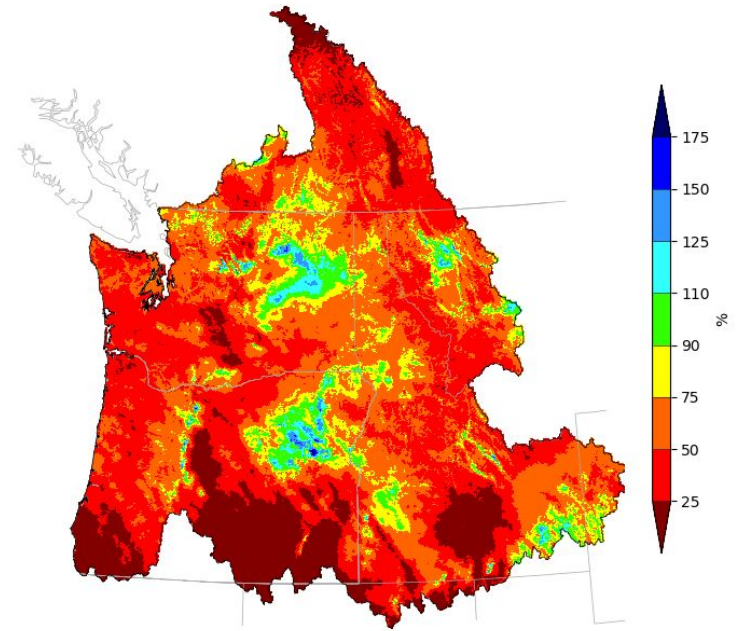
Northwest River Forecast Center
10 Day QPF (Deviation from Climatology), Ending 12Z, 04/30/23



Creation Time: Thu Apr 20 21:24:47 UTC 2023

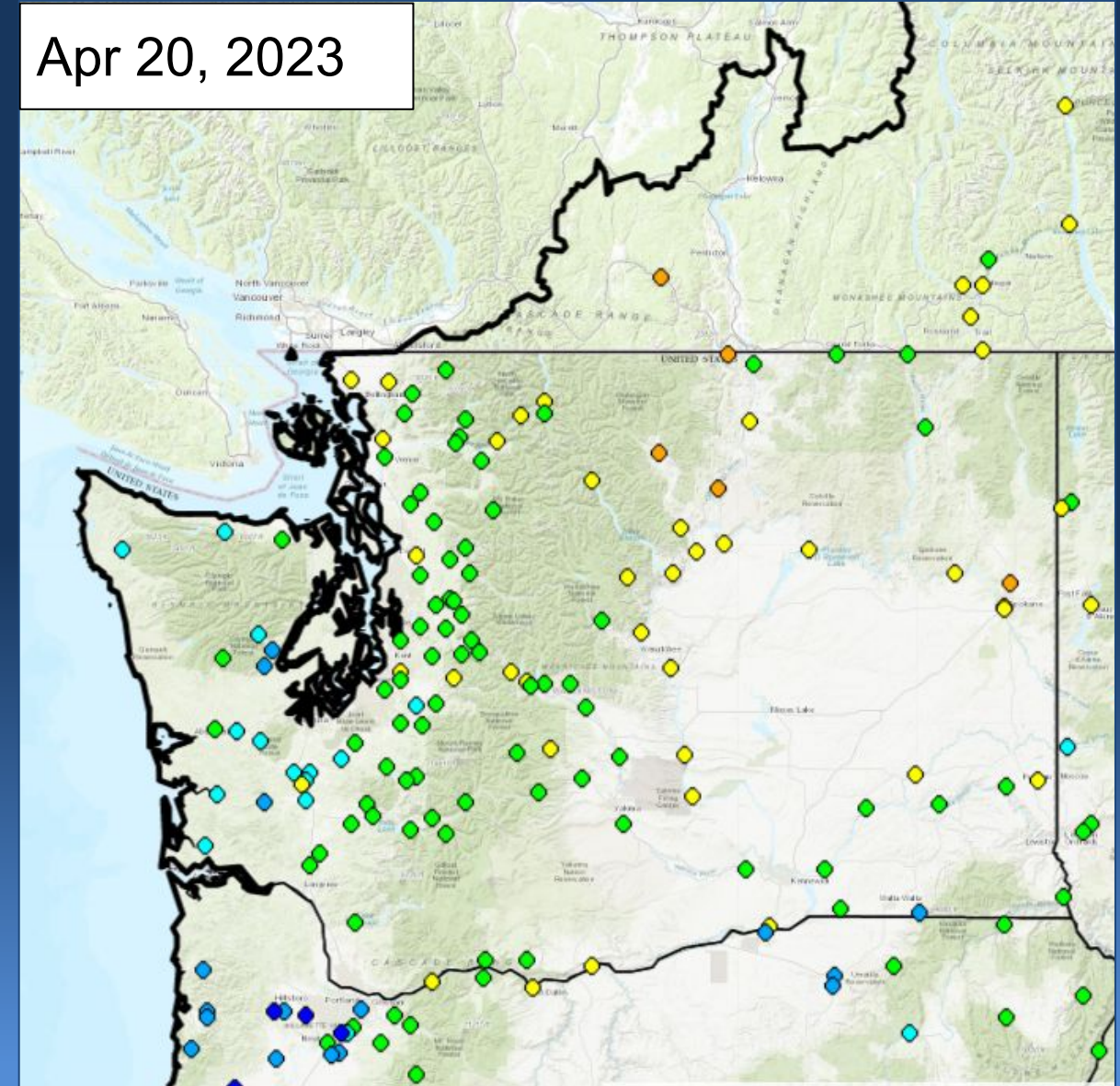
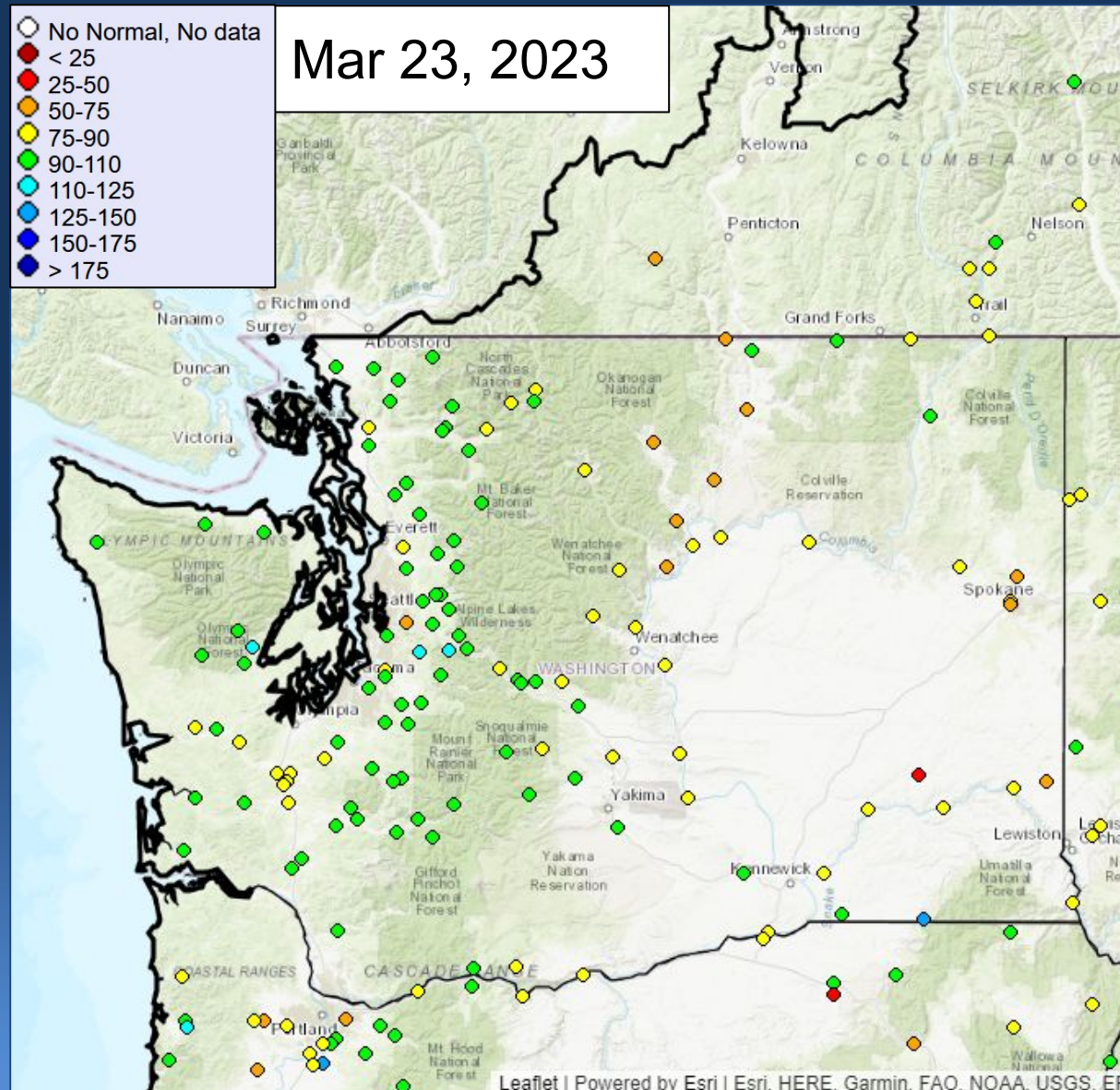


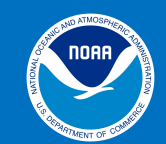
Northwest River Forecast Center
10 Day QPF (Percent of Climatology), Ending 12Z, 04/30/23



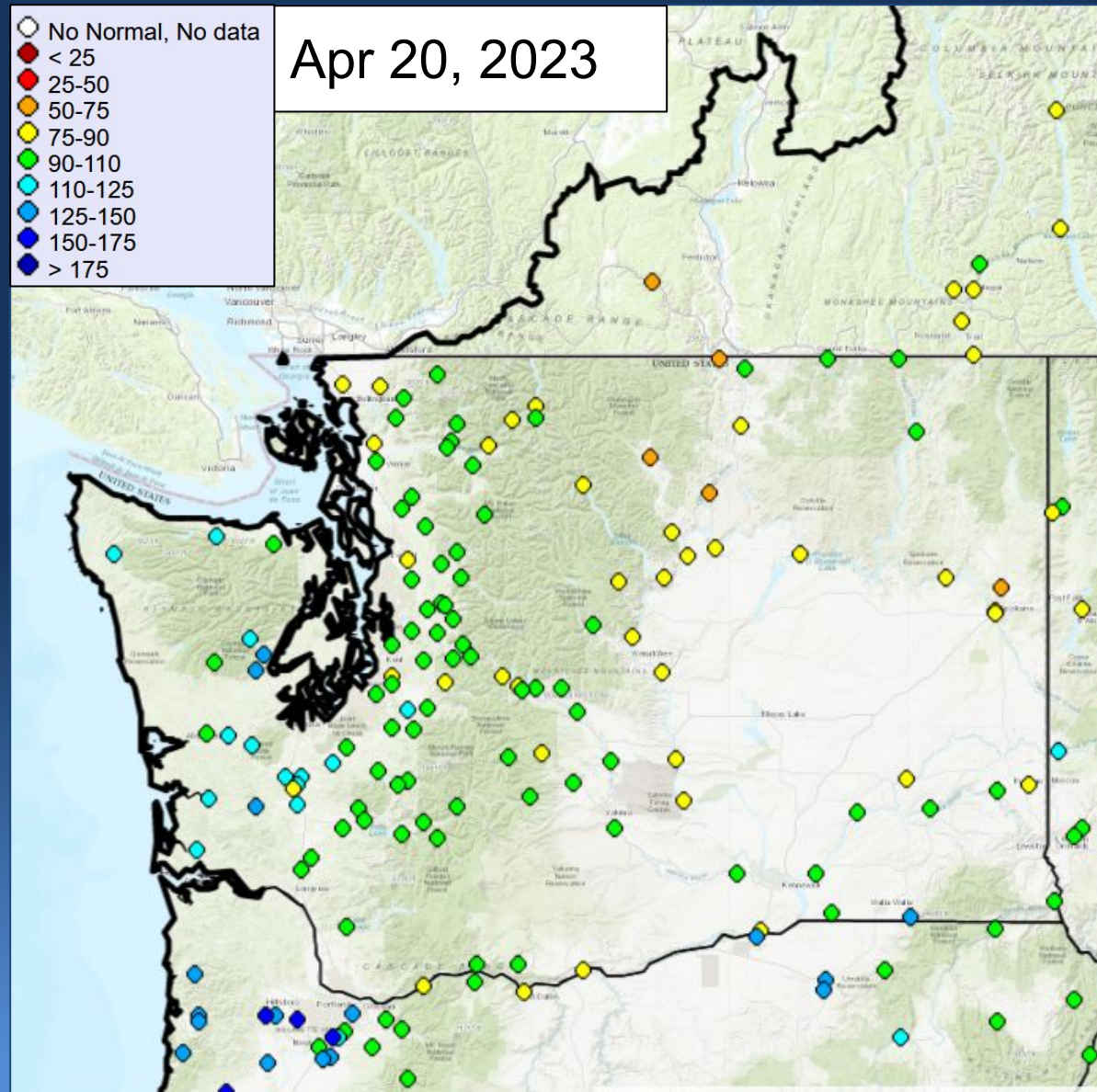
Creation Time: Thu Apr 20 21:24:15 UTC 2023

ESP10 Natural Water Supply Forecasts





ESP10 Natural Water Supply Forecasts



% Normal Apr -Sep Volume

Washington

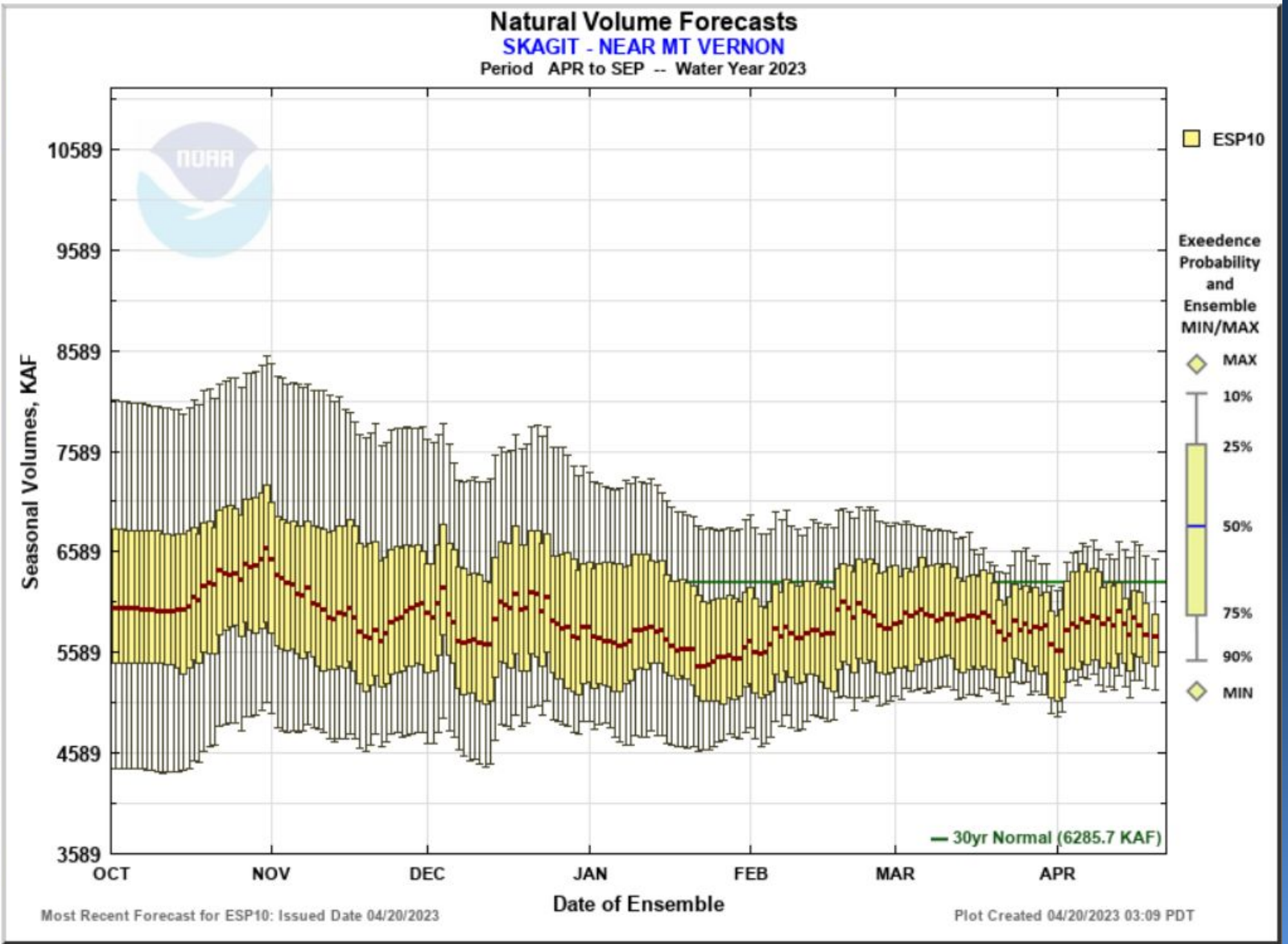


Skagit nr Mt Vernon	91	0
Dungeness nr Sequim	95	3
Chehalis at Porter	111	27
Okanogan at Malott	74	9
Methow nr Pateros	75	10
Yakima at Parker	94	2
Walla Walla nr Touchet	105	14



ESP10 Natural Water Supply Forecasts

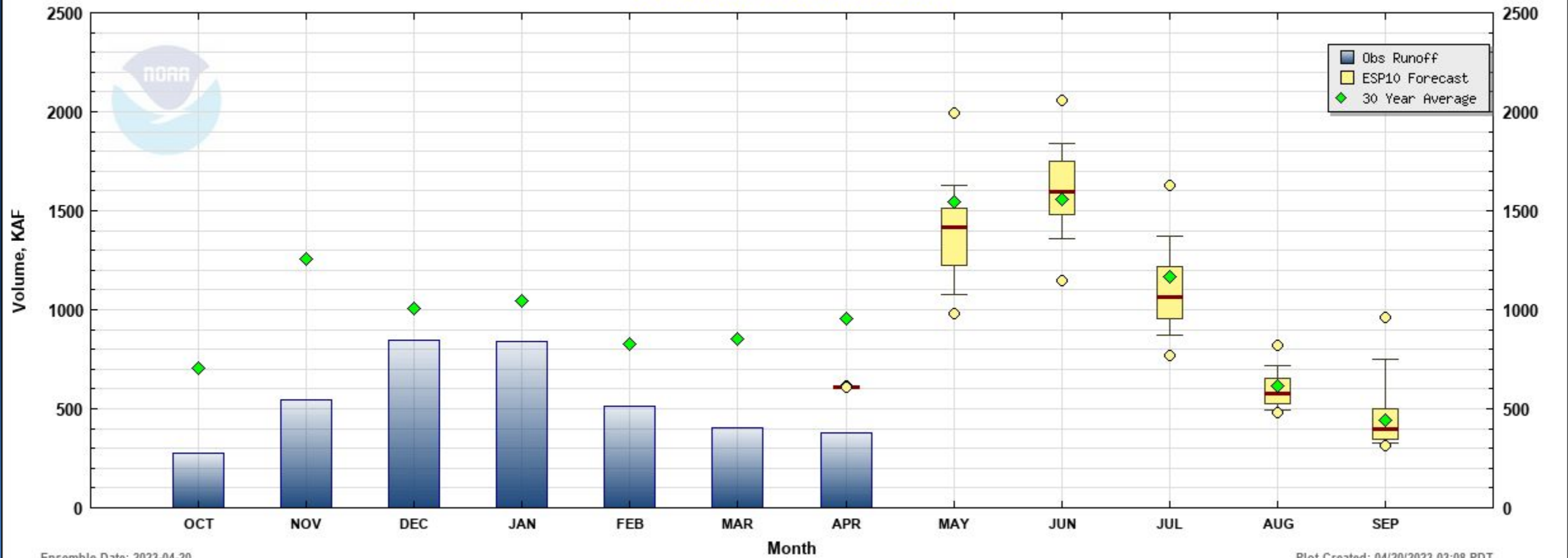
SKAGIT - NEAR MT VERNON (MVEW1) Forecasts for Water Year 2023					
Natural Forecast					
ESP with 10 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	5216	5750	91	6511	6286
APR-JUL	4266	4694	90	5230	5228
JAN-SEP	6961	7494	83	8255	9004
JAN-JUL	6010	6438	81	6975	7946
OCT-SEP	8640	9173	77	9934	11966
Experimental					
HEFS with 15 days EQPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	5252	5795	92	6575	6286
APR-JUL	4287	4755	91	5361	5228
JAN-SEP	6996	7539	84	8320	9004
JAN-JUL	6031	6499	82	7106	7946
OCT-SEP	8676	9219	77	9999	11966
Reference					
ESP with 0 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	5210	5889	94	6532	6286
APR-JUL	4268	4733	91	5464	5228
JAN-SEP	6954	7633	85	8276	9004
JAN-JUL	6012	6478	82	7208	7946
OCT-SEP	8633	9312	78	9956	11966
Move the mouse over the desired "Forecast Period" to display a graph.					





ESP10 Natural Water Supply Forecasts

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023
(MVEW1) SKAGIT - NEAR MT VERNON





ESP10 Natural Water Supply Forecasts

NF SKOKOMISH - CUSHMAN DAM (CSHW1) Forecasts for Water Year 2023

Natural Forecast

ESP with 10 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	206	231	126	258	183
APR-JUL	182	200	127	222	157
JAN-SEP	380	406	103	432	393
JAN-JUL	357	374	102	396	367
OCT-SEP	518	544	90	570	601

Experimental

HEFS with 15 days EQPF Ensemble: 2023-04-20 Issued: 2023-04-20

APR-SEP	202	231	126	259	183
APR-JUL	179	203	129	225	157
JAN-SEP	377	406	103	434	393
JAN-JUL	354	377	103	400	367
OCT-SEP	515	544	90	572	601

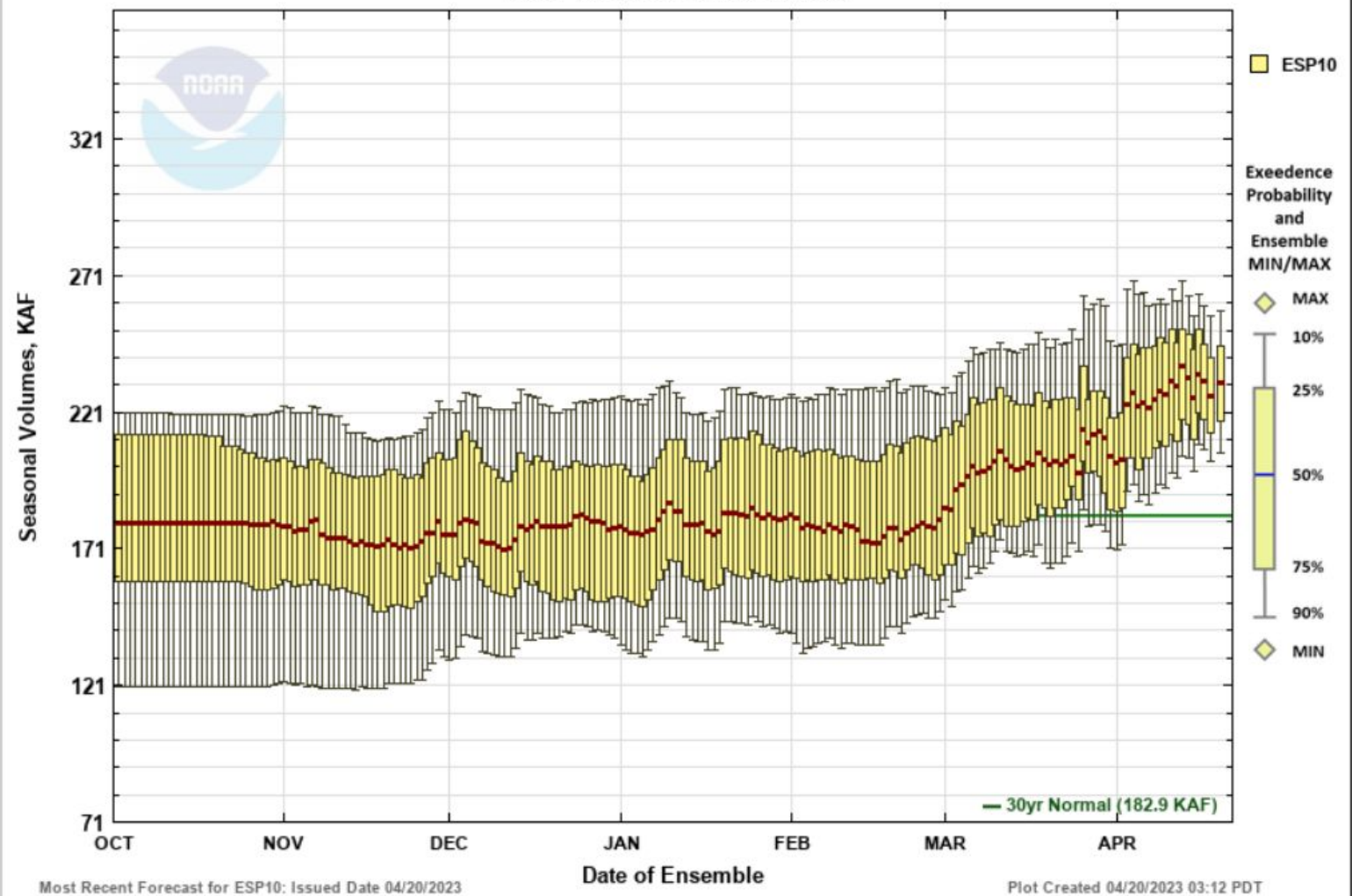
Reference

ESP with 0 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20

APR-SEP	200	234	128	267	183
APR-JUL	179	205	131	236	157
JAN-SEP	375	409	104	442	393
JAN-JUL	353	380	104	410	367
OCT-SEP	513	547	91	580	601

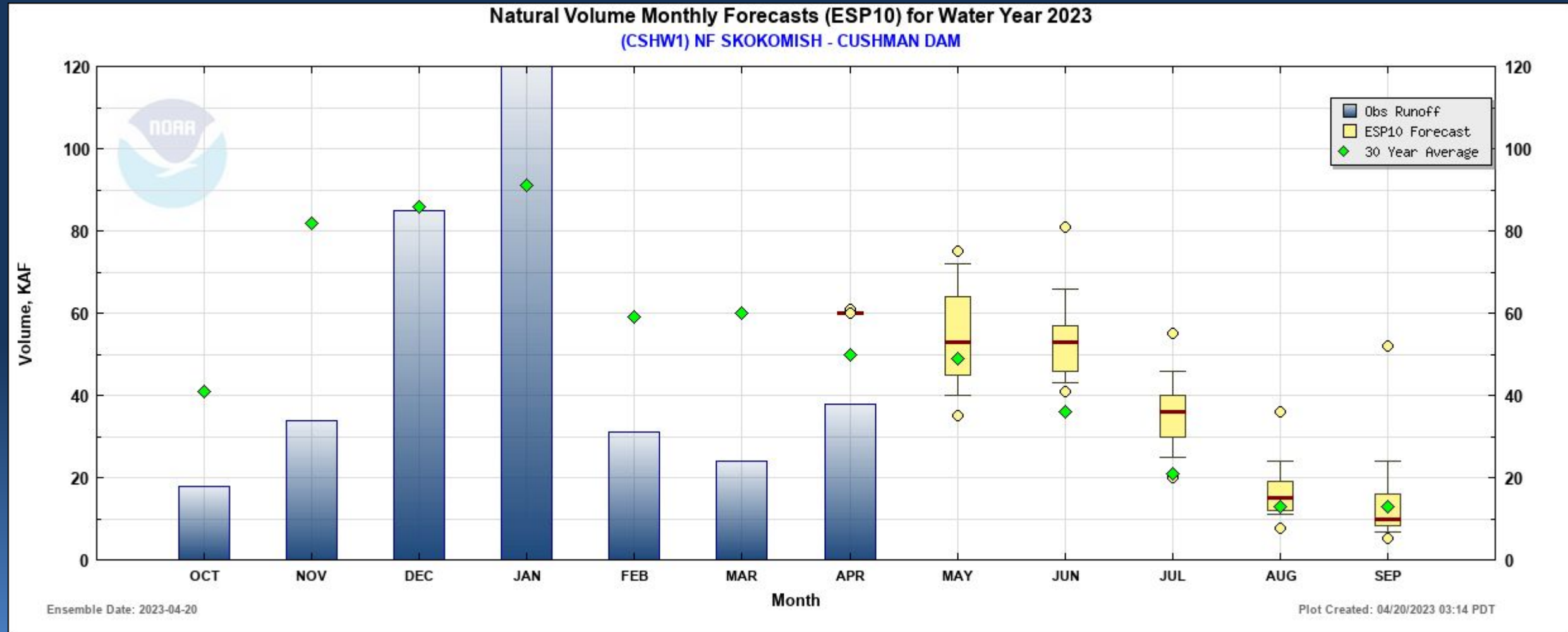
Move the mouse over the desired "Forecast Period" to display a graph.

Natural Volume Forecasts NF SKOKOMISH - CUSHMAN DAM Period APR to SEP -- Water Year 2023





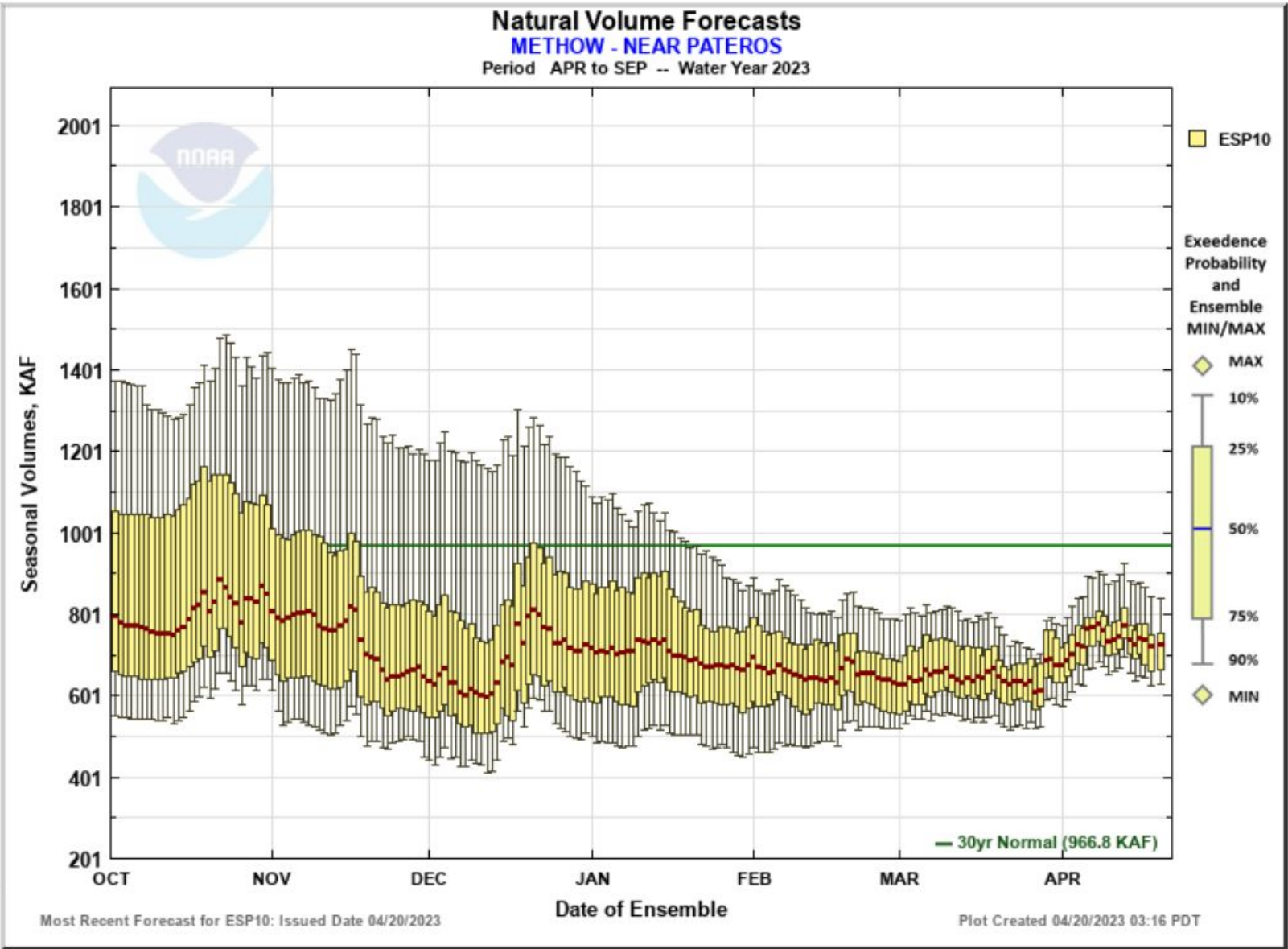
ESP10 Natural Water Supply Forecasts





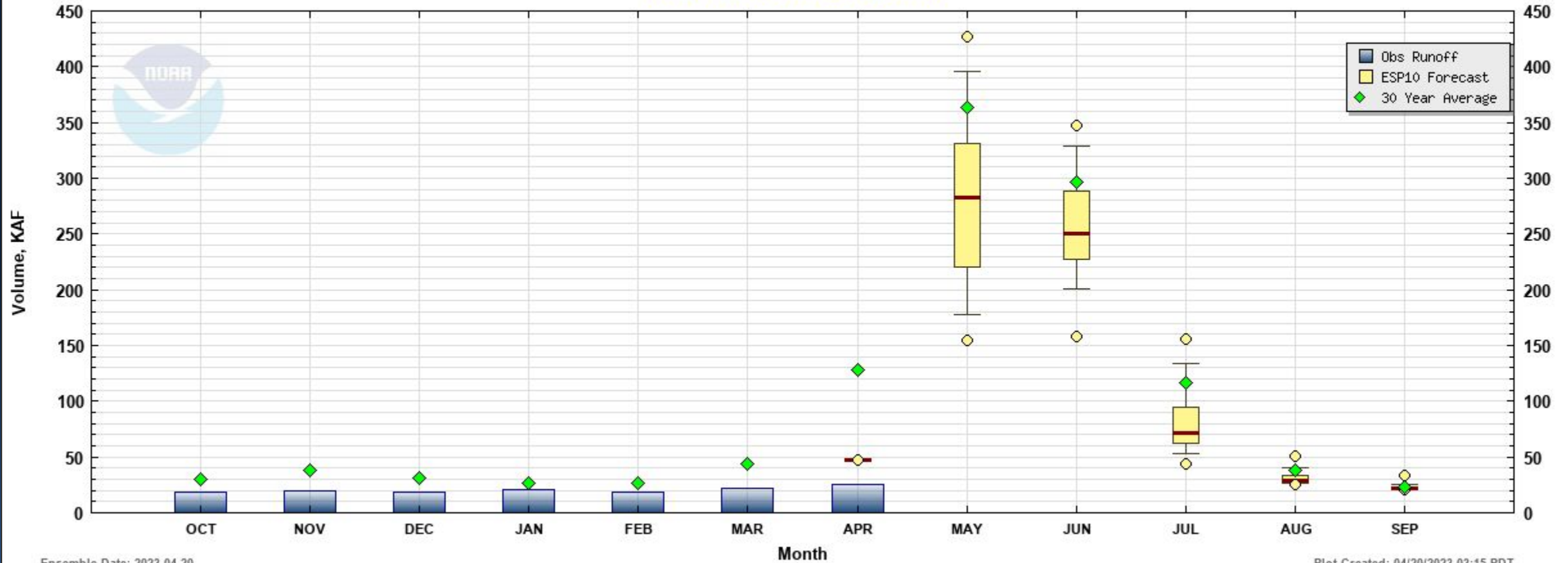
ESP10 Natural Water Supply Forecasts

METHOW - NEAR PATEROS (PATW1) Forecasts for Water Year 2023					
Natural Forecast					
ESP with 10 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	630	729	75	839	967
APR-JUL	579	670	74	784	905
JAN-SEP	691	790	74	901	1063
JAN-JUL	640	731	73	845	1002
OCT-SEP	749	848	73	959	1163
Experimental					
HEFS with 15 days EQPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	644	732	76	863	967
APR-JUL	596	681	75	807	905
JAN-SEP	705	793	75	925	1063
JAN-JUL	657	743	74	868	1002
OCT-SEP	763	851	73	983	1163
Reference					
ESP with 0 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	641	725	75	862	967
APR-JUL	588	670	74	803	905
JAN-SEP	702	787	74	924	1063
JAN-JUL	649	731	73	864	1002
OCT-SEP	760	845	73	982	1163
Move the mouse over the desired "Forecast Period" to display a graph.					



ESP10 Natural Water Supply Forecasts

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023
(PATW1) METHOW - NEAR PATEROS



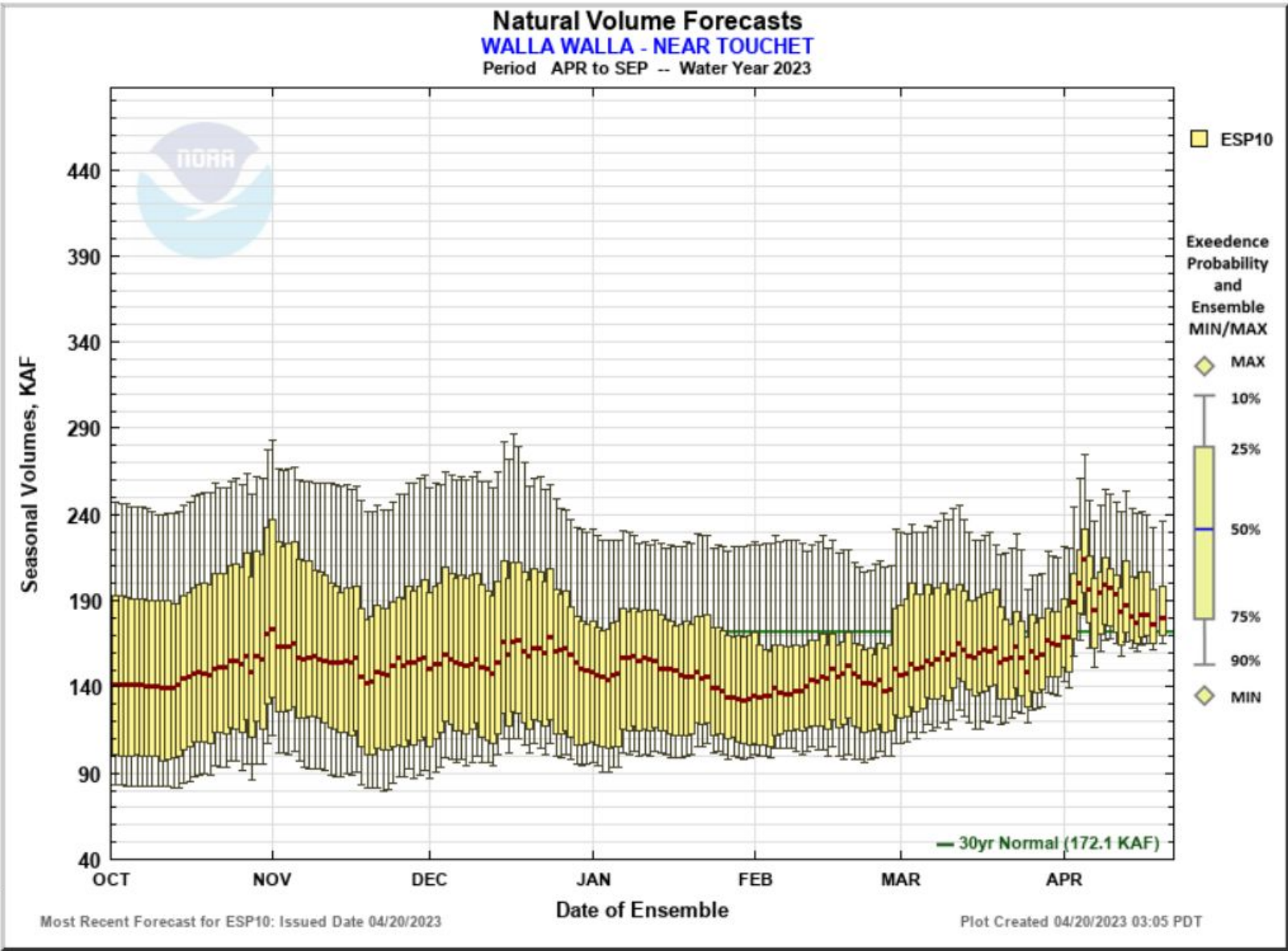
Ensemble Date: 2023-04-20

Plot Created: 04/20/2023 03:15 PDT



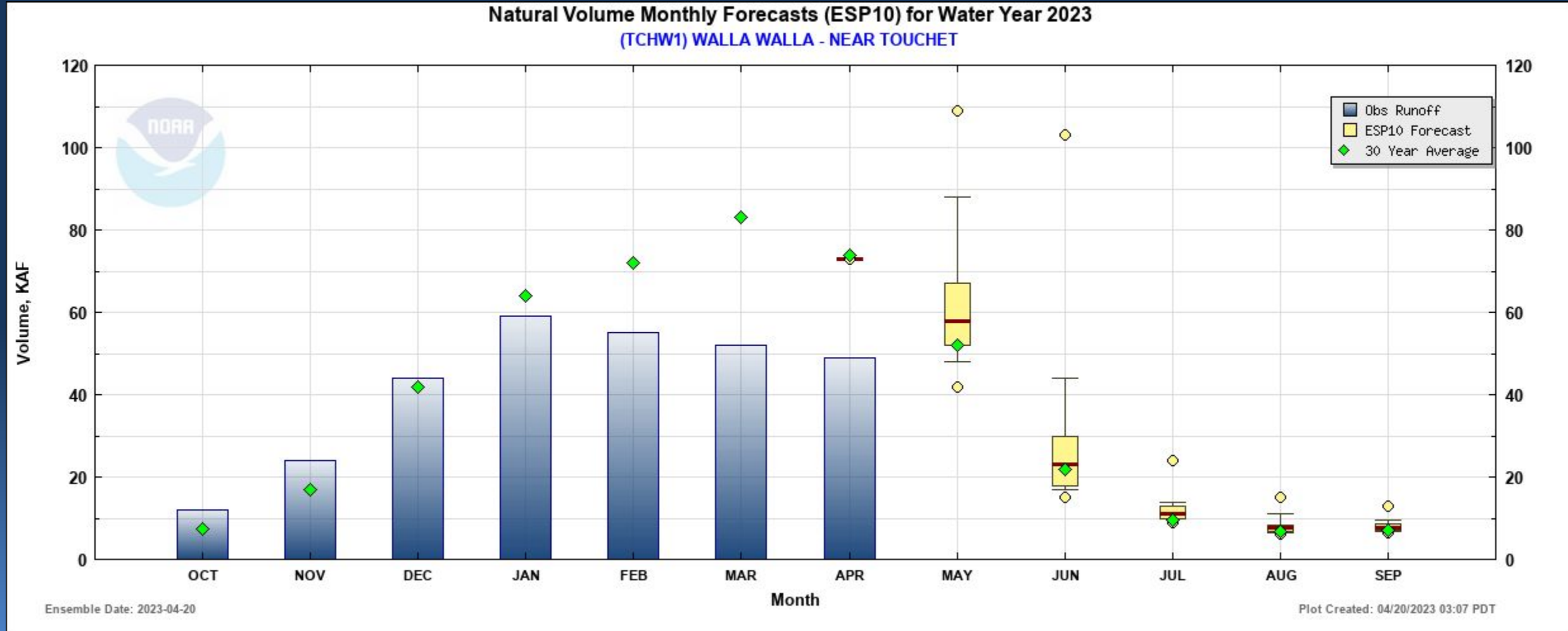
ESP10 Natural Water Supply Forecasts

WALLA WALLA - NEAR TOUCHET (TCHW1) Forecasts for Water Year 2023					
Natural Forecast					
ESP with 10 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	166	180	105	237	172
APR-JUL	150	165	104	217	158
JAN-SEP	332	346	88	402	391
JAN-JUL	315	331	88	383	377
OCT-SEP	413	427	93	484	458
Experimental					
HEFS with 15 days EQPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	164	190	110	246	172
APR-JUL	148	173	109	226	158
JAN-SEP	329	355	91	412	391
JAN-JUL	314	339	90	392	377
OCT-SEP	411	437	95	493	458
Reference					
ESP with 0 Days QPF Ensemble: 2023-04-20 Issued: 2023-04-20					
APR-SEP	162	192	112	251	172
APR-JUL	147	175	111	231	158
JAN-SEP	328	358	91	417	391
JAN-JUL	313	341	90	397	377
OCT-SEP	409	439	96	498	458
Move the mouse over the desired "Forecast Period" to display a graph.					



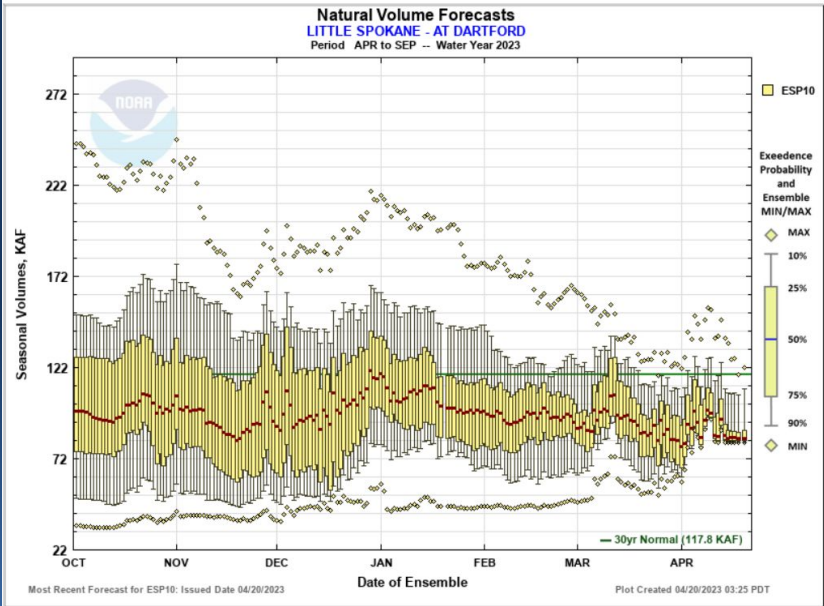
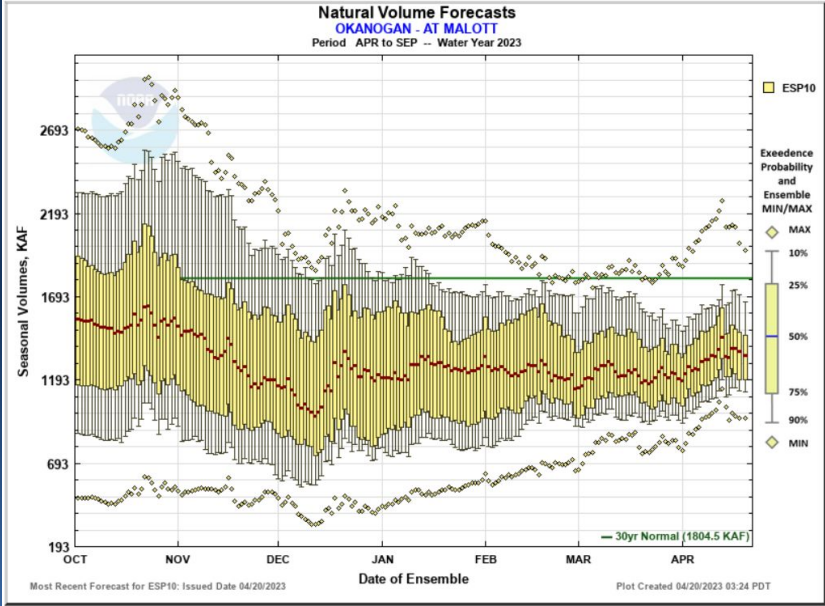
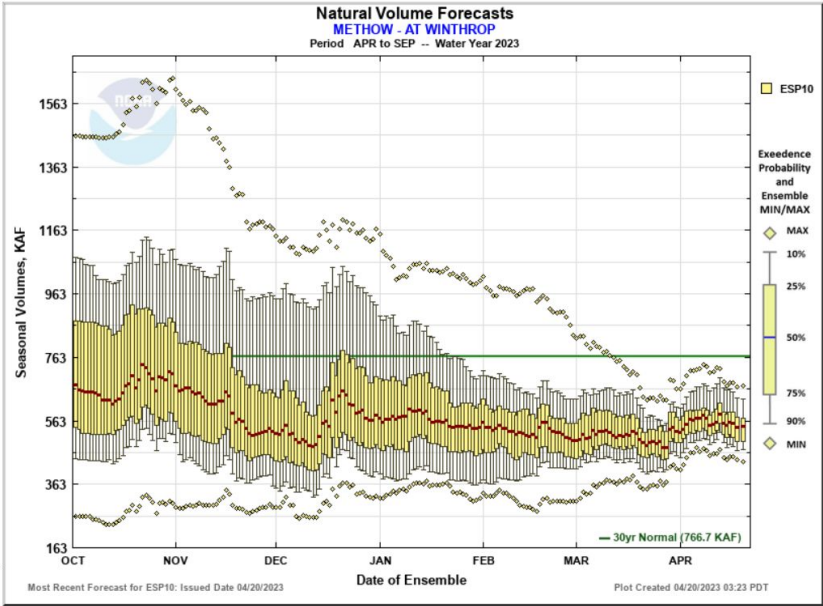


ESP10 Natural Water Supply Forecasts





ESP10 Natural Water Supply Forecasts





Take Home Messages

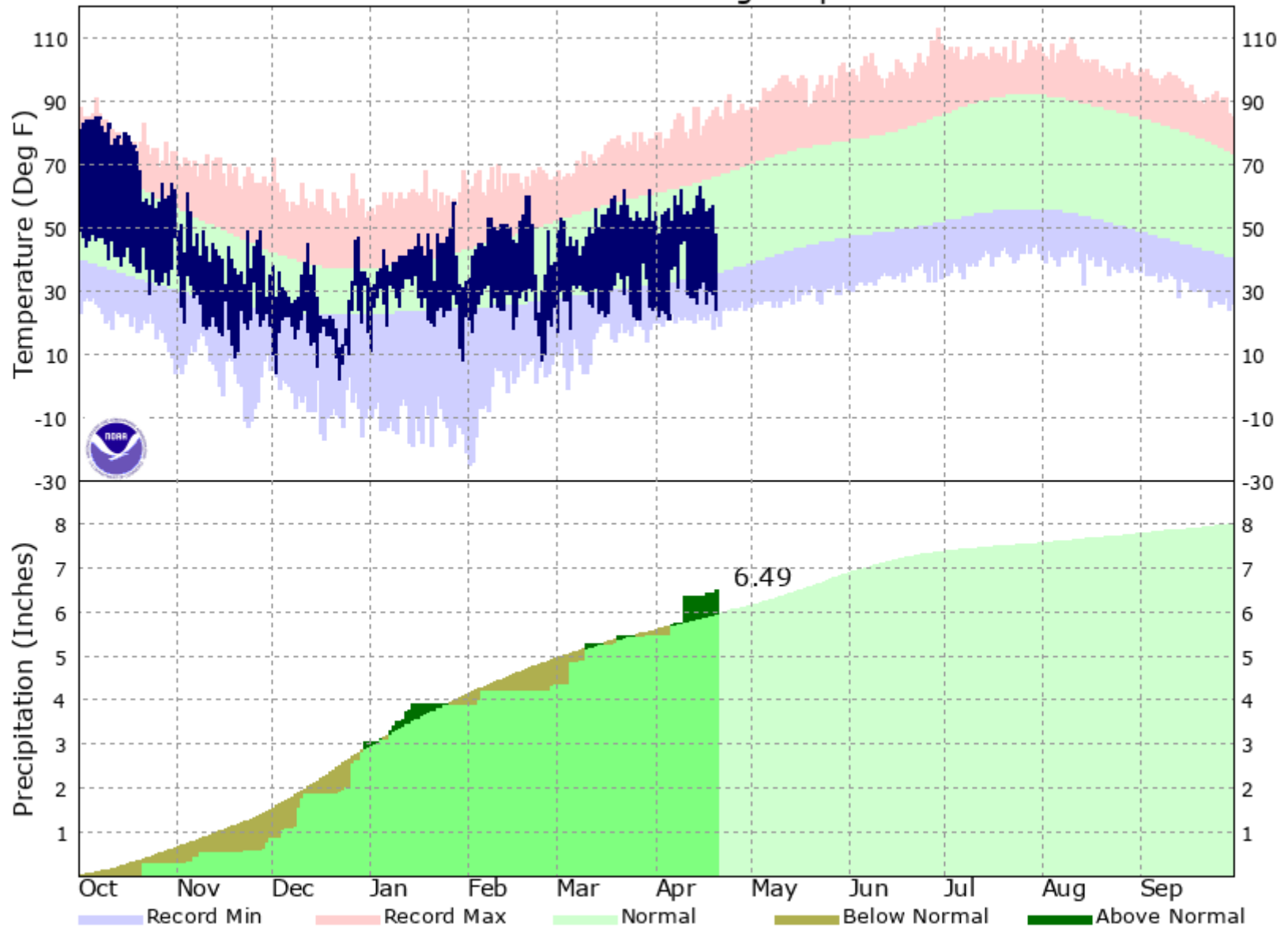
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- ESP10 Natural Water Supply forecasts are a mix of normal and below normal
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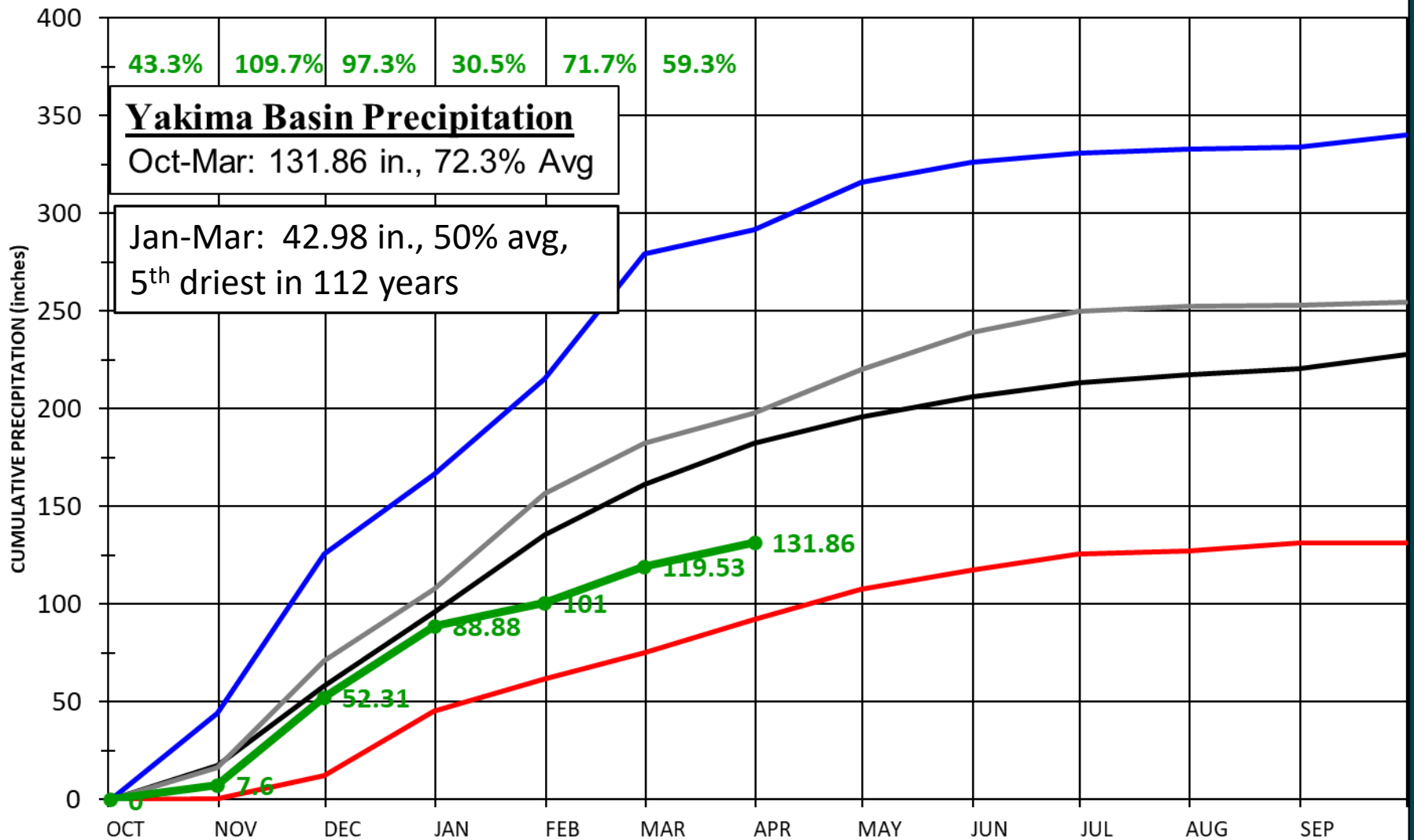


Yakima River Operations & Water Supply for WaWSAC

Yakima Basin, Washington
Mar 9, 2023, WY 2023

KYKM - Oct 2022 Through Sep 2023

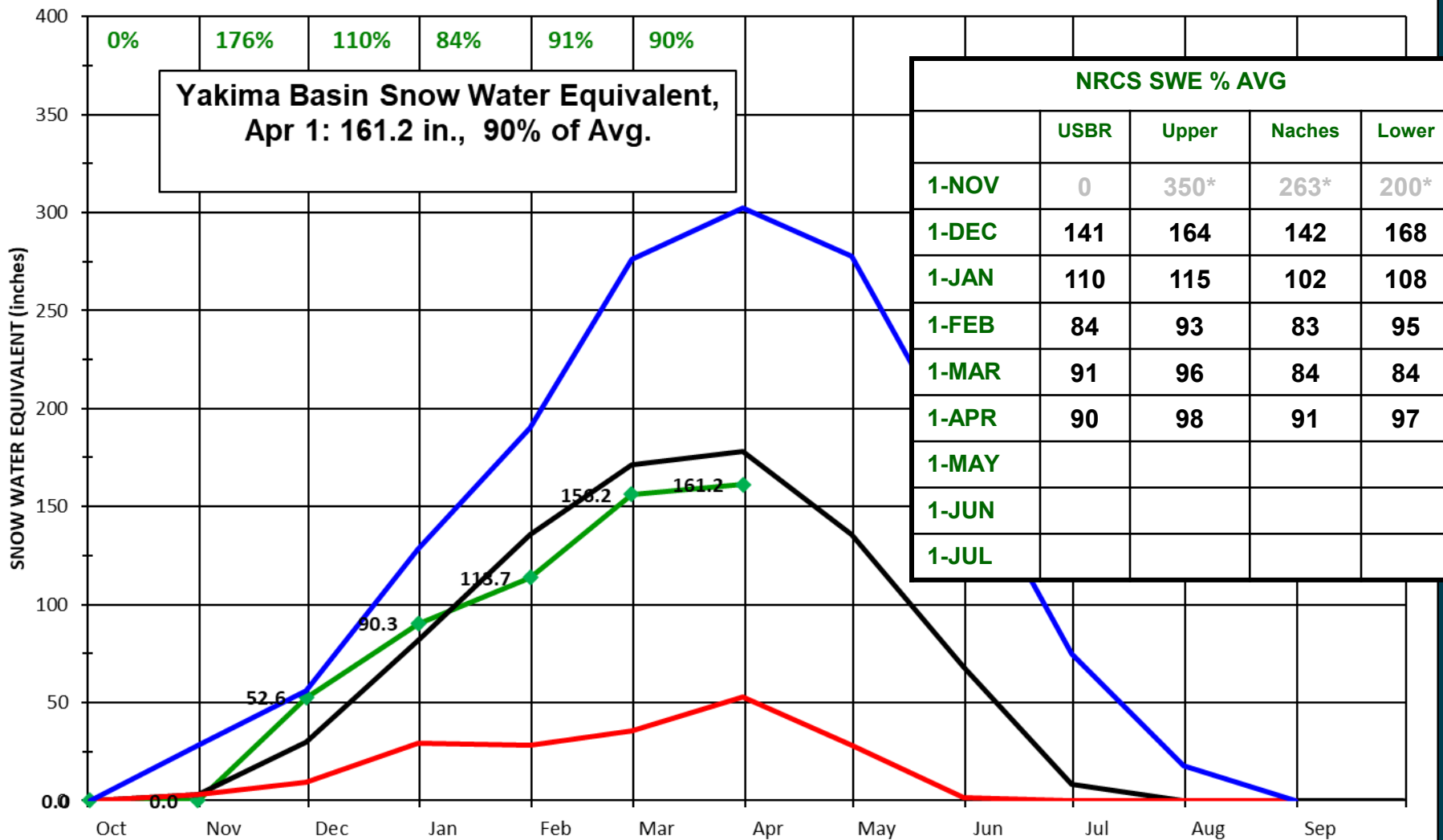




— Maximum — Average
 — Minimum — WY2022
 ● WY 2023

YAKIMA BASIN
 Combined Cumulative Precipitation
 5 Reservoir Sites
 WATER YEARS 1981-2010

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



<ul style="list-style-type: none"> ◆ Water Year 2023 — Average — Low Year (2005) — High Year (1999) 	<p align="center">YAKIMA BASIN WATER YEAR SNOW WATER EQUIVALENT</p> <p align="center">Average based on greater of 1981-2010 or POR-1995 Totals derived from 8 Yakima forecast sites Corral, Stampede, Olallie, Fish, Bumping, Domerie, & Tunnel Avenue</p>	<p align="center">UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION YAKIMA FIELD OFFICE 1917 MARSH ROAD YAKIMA, WA 98901</p>
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SNOW WATER EQUIVALENT IN YAKIMA

Reset Range

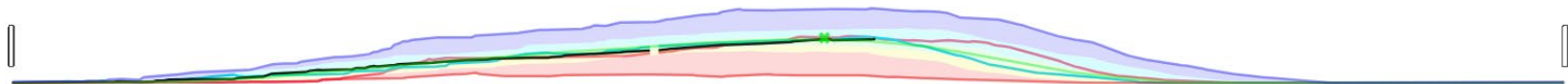
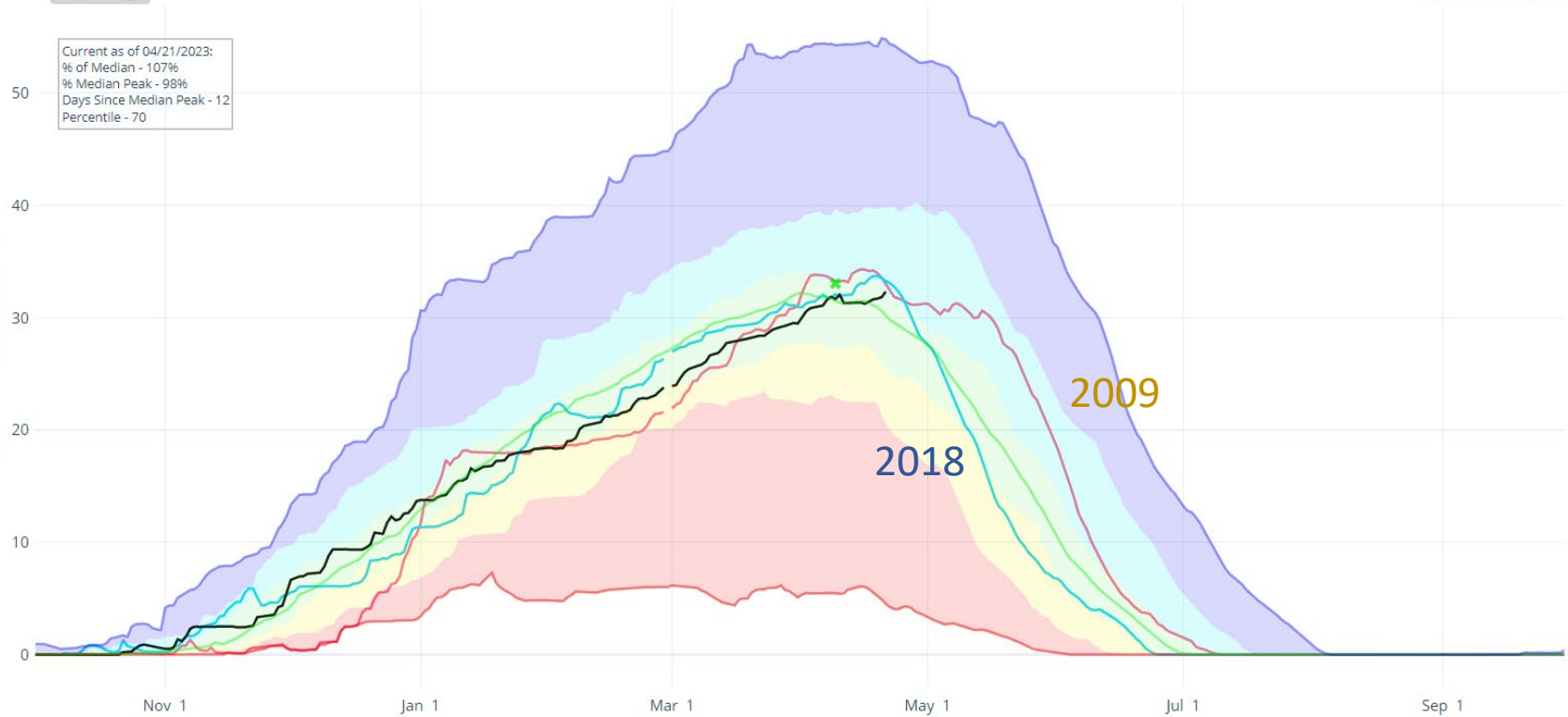
Link to data: CSV / JSON

Station List

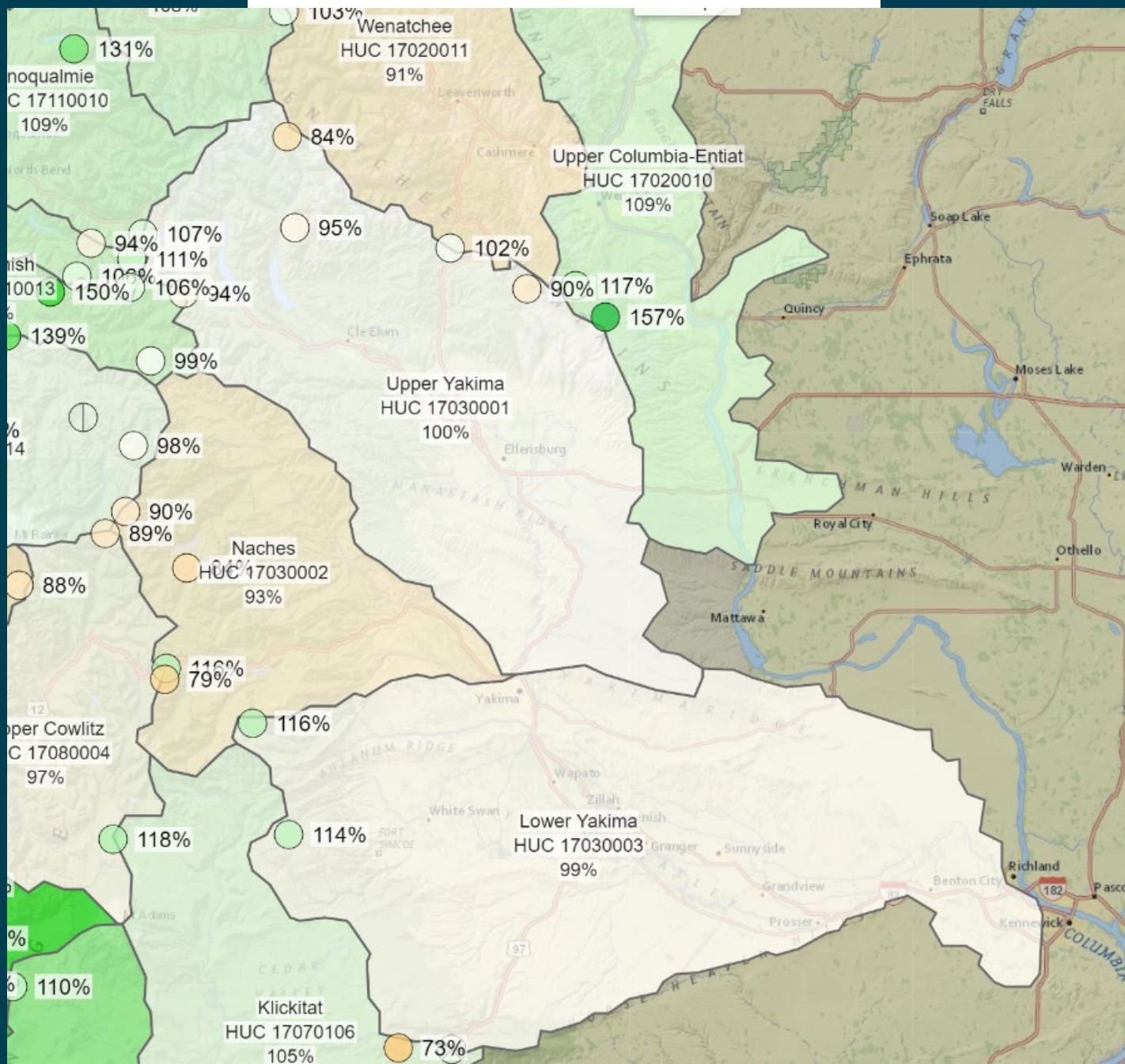
Current as of 04/21/2023:
% of Median - 107%
% Median Peak - 98%
Days Since Median Peak - 12
Percentile - 70

- * Median Peak SV
- Max
- Median (POR)
- Median ('91-'20)
- Min
- Stats. Shading
- 2023 (17 sites)
- 2022 (17 sites)
- 2021 (16 sites)
- 2020 (17 sites)
- 2019 (17 sites)
- 2018 (16 sites)
- 2017 (17 sites)
- 2016 (17 sites)
- 2015 (17 sites)
- 2014 (17 sites)
- 2013 (17 sites)
- 2012 (17 sites)
- 2011 (17 sites)
- 2010 (17 sites)
- 2009 (16 sites)
- 2008 (16 sites)
- 2007 (16 sites)
- 2006 (14 sites)
- 2005 (14 sites)
- 2004 (14 sites)
- 2003 (14 sites)
- 2002 (14 sites)

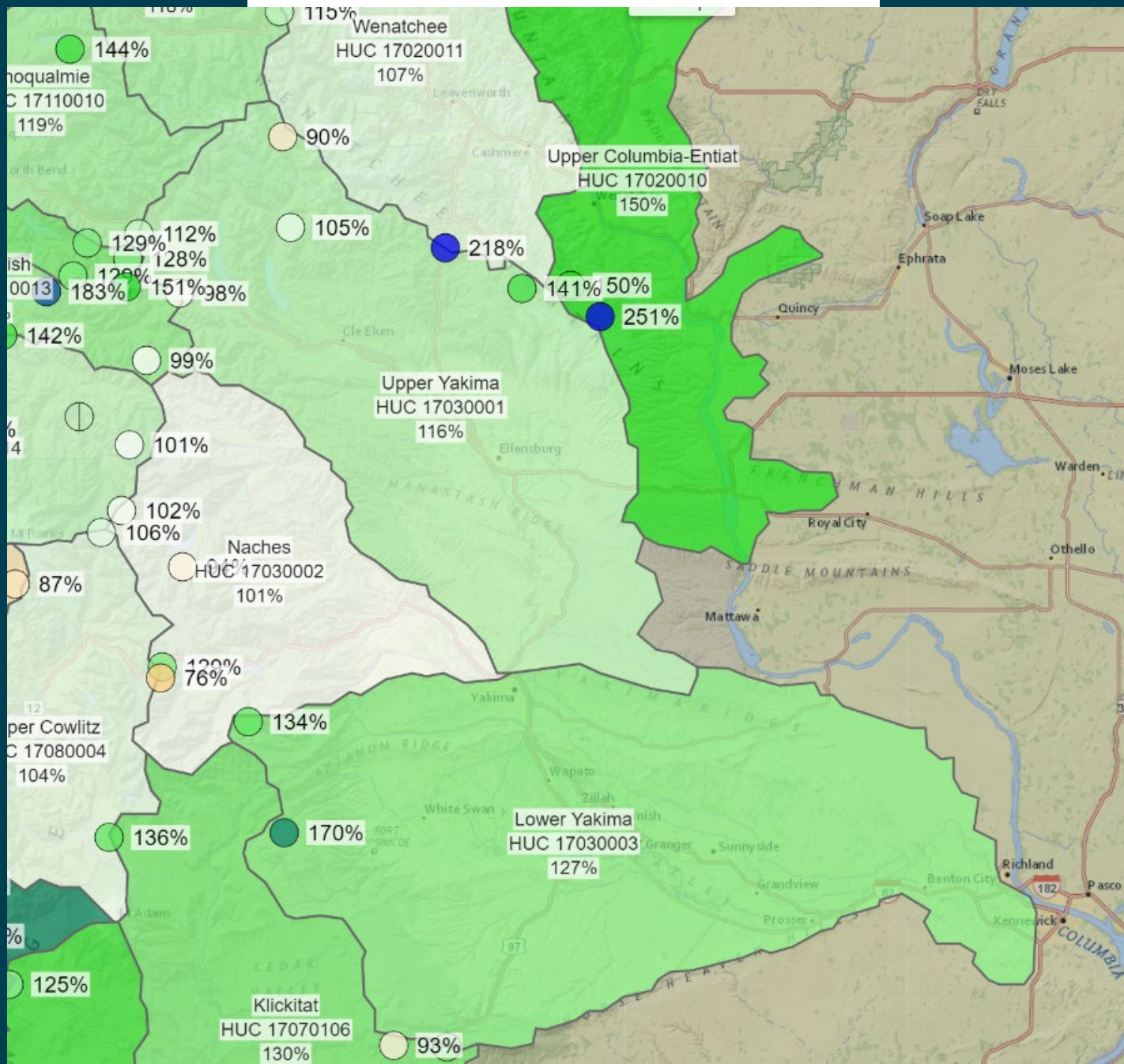
Snow Water Equivalent (in.)

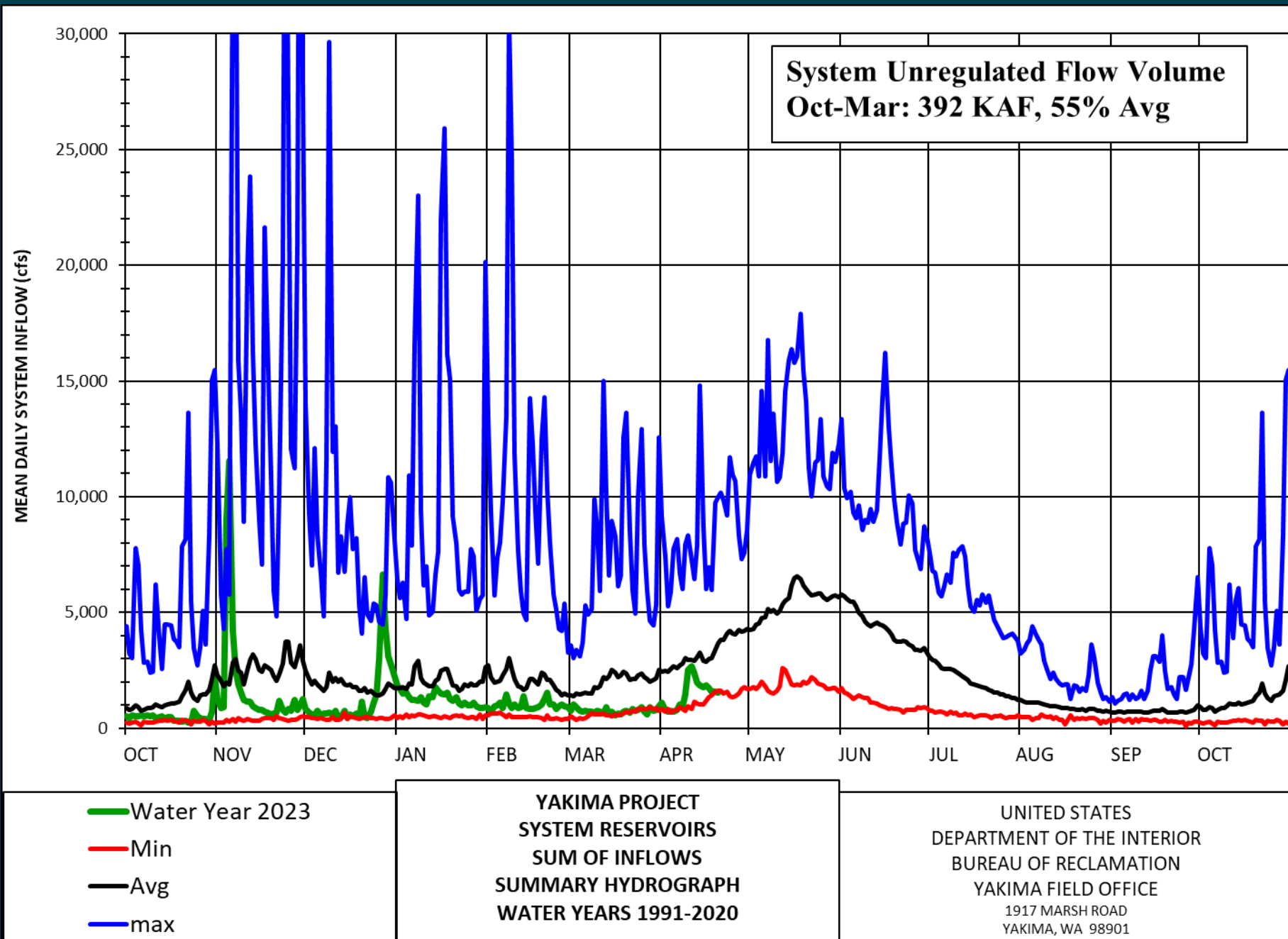


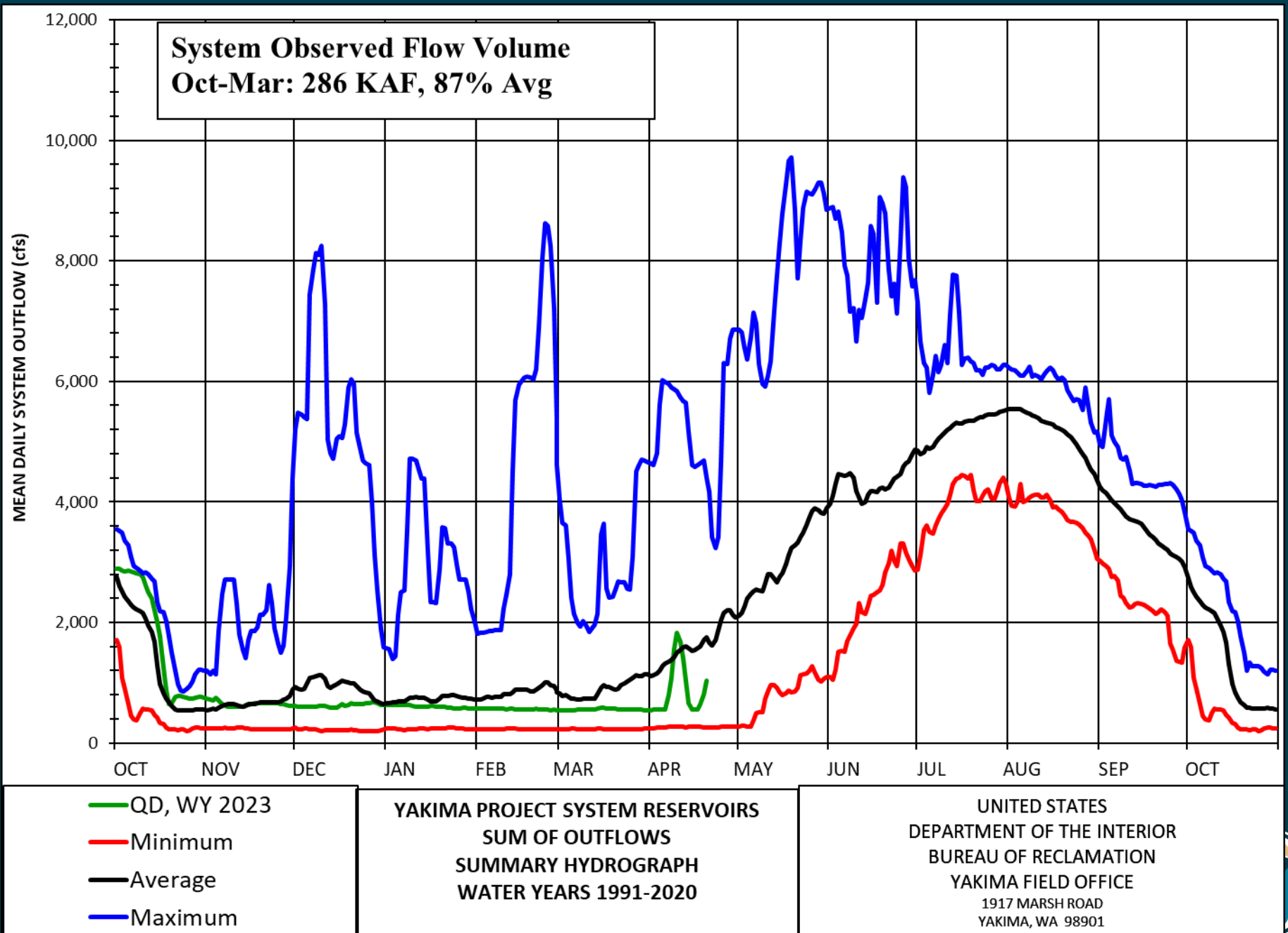
Yakima SNOTEL SWE, Apr 1, 2023

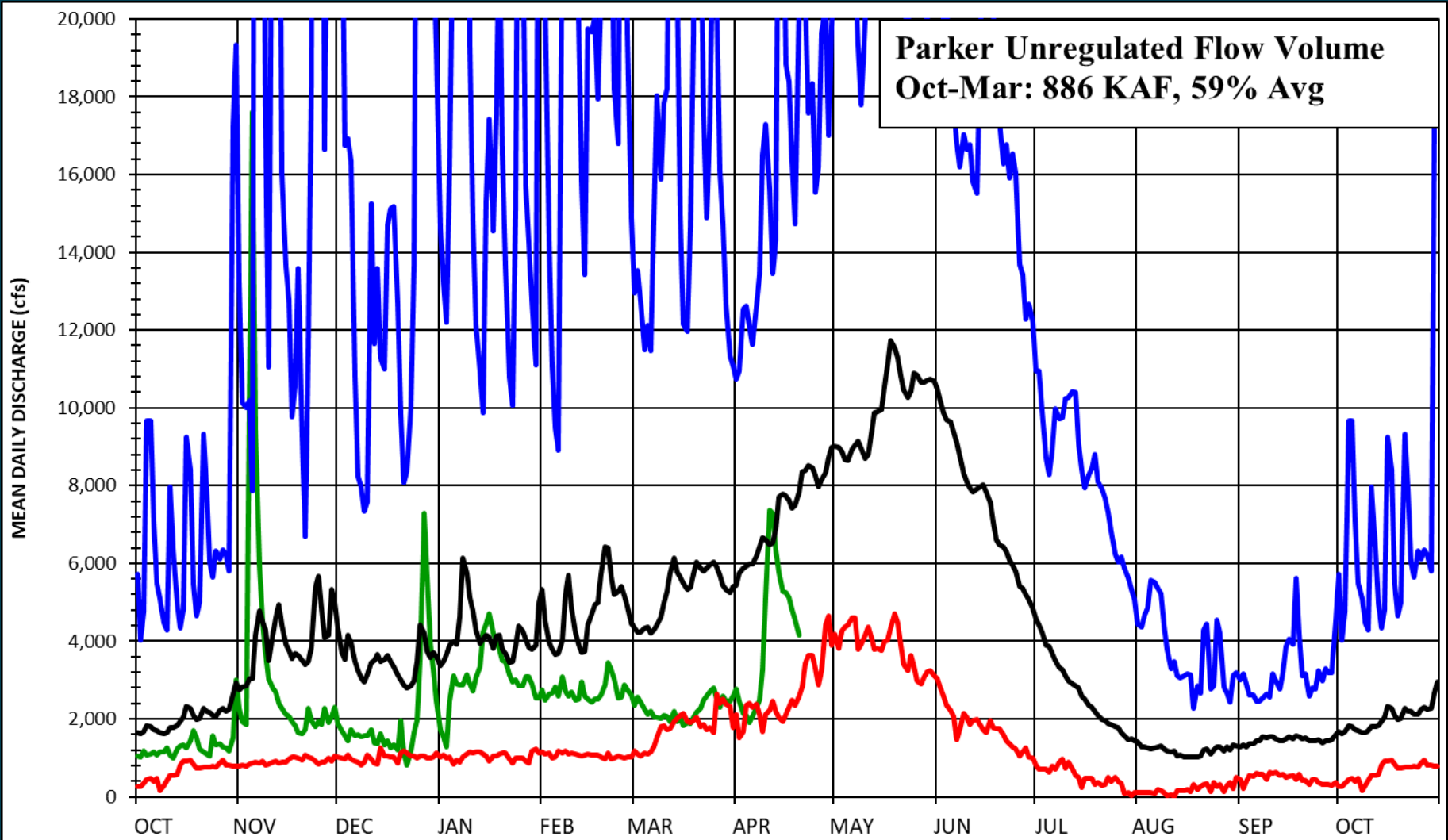


Yakima SNOTEL SWE, Apr 20, 2023





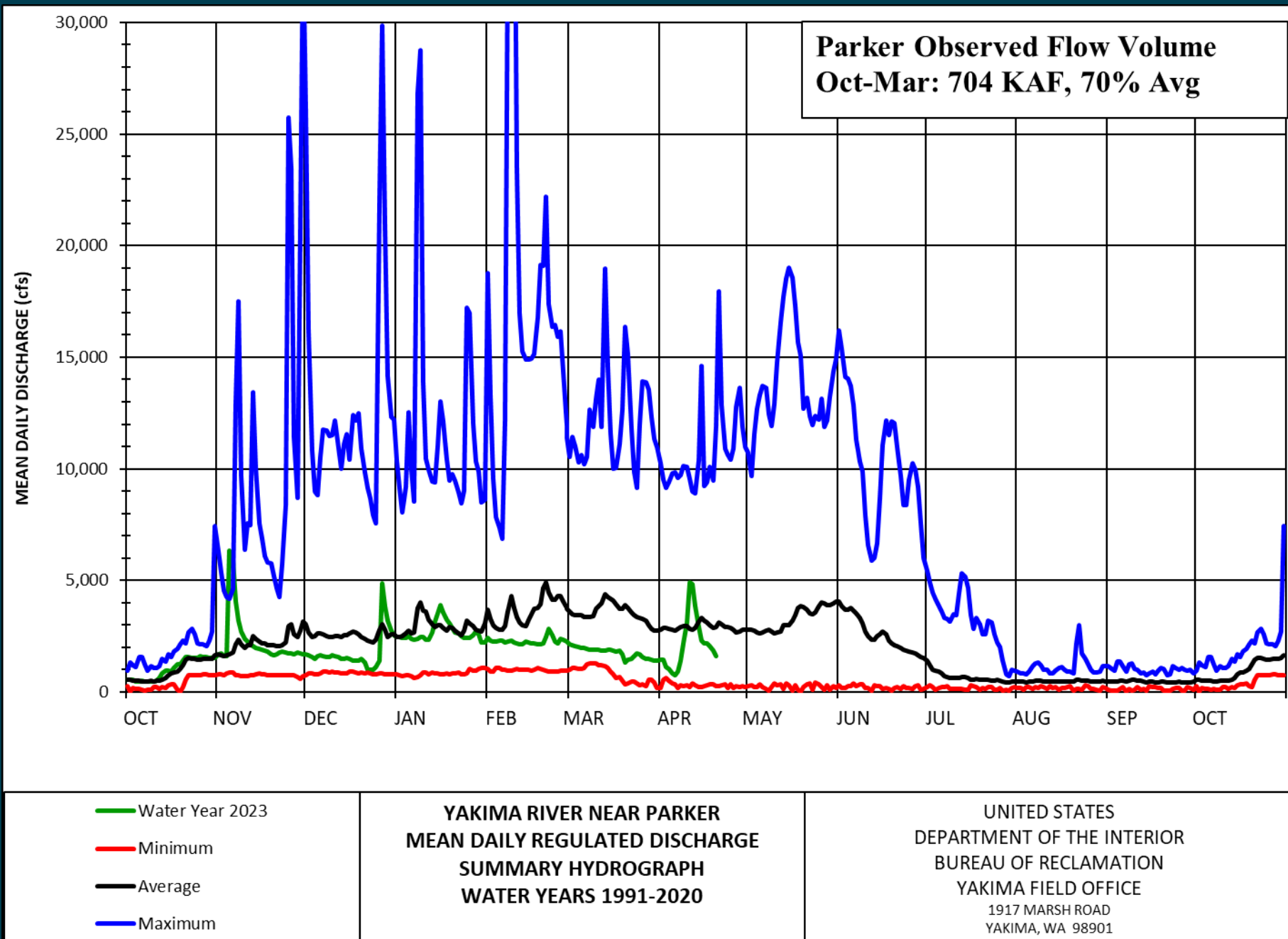


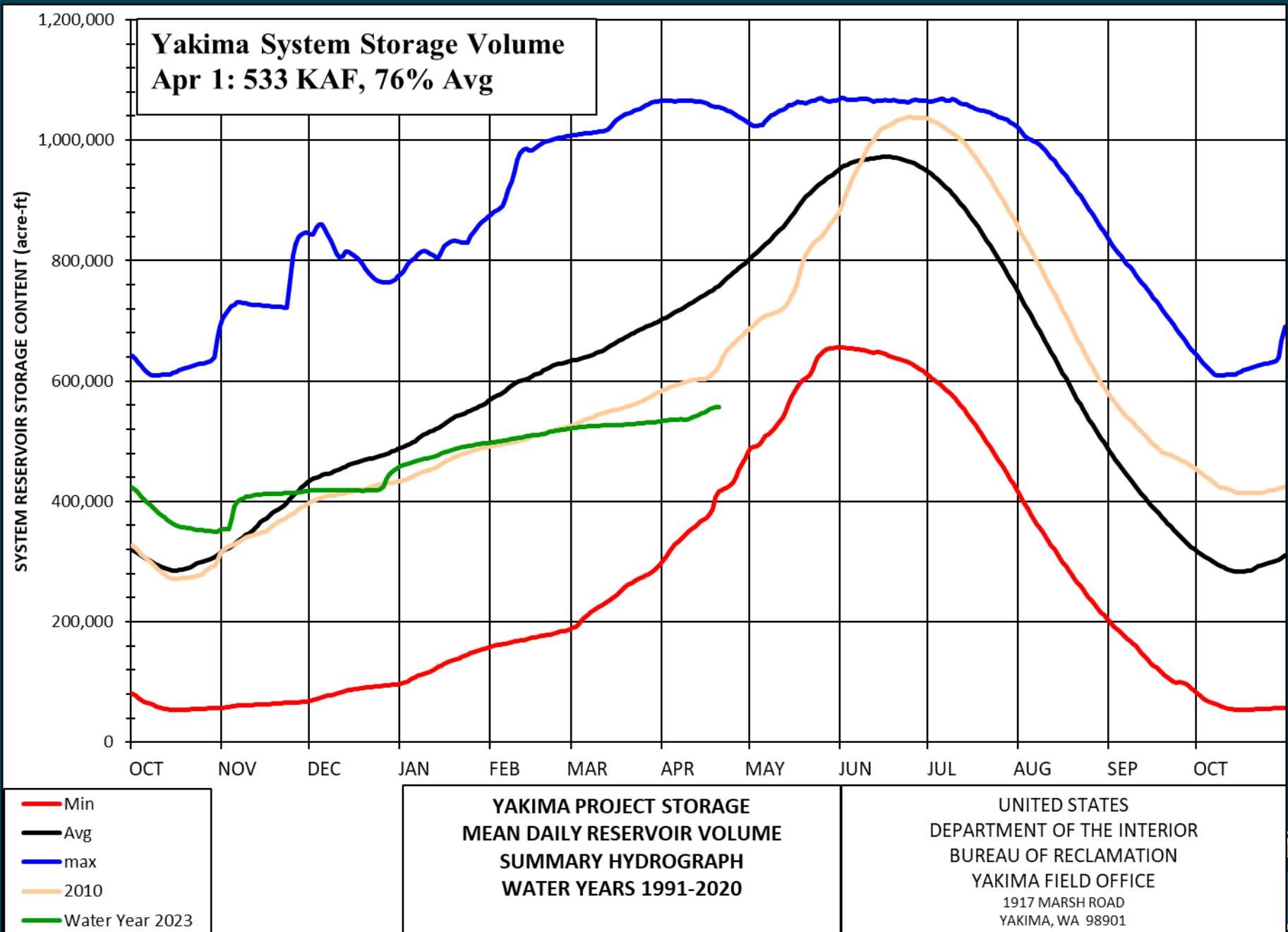


- Water Year 2023
- Minimum
- Average
- Maximum

**YAKIMA RIVER NEAR PARKER
MEAN DAILY UNREGULATED 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



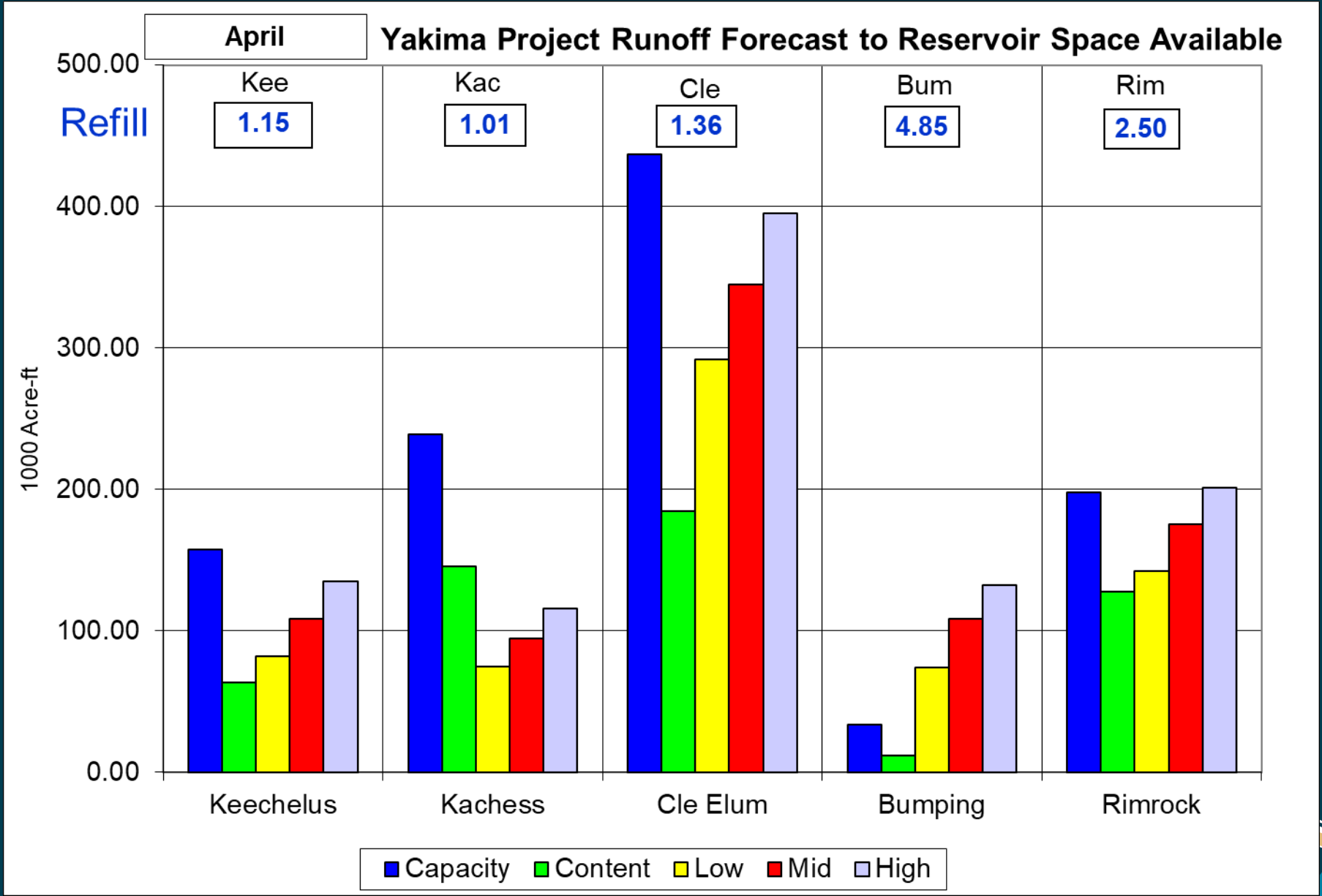


Yakima Subbasin forecasts

Yakima Basin Forecasts, Apr-Jul, AF

Apr, 2023	Low	Adopted	High	Low	Adopted	High
Parw	1160800	1536020	1865000	71%	91%	111%
kee	82000	108440	135300	71%	91%	112%
kac	75000	94620	115800	72%	88%	105%
cle	292000	344520	395000	78%	91%	103%
bum	74000	108400	132000	65%	84%	102%
rim	142000	175580	201000	76%	91%	106%
Yumw	565916	678088	804704	75%	91%	106%
Nacw	455000	637700	780000	65%	88%	111%
System	719000	820000	951000	70%	84%	98%





Reservoir Refill (March, 2023 outlook)

- Cle spillway+2': 60 to 80 % chance and not until after May 24 but likely in June.
- Cle: <5% chance of filling
- Kee: very unlikely to fill
- Kac: 10%- chance of filling
- Bum: 90%+ chance of filling
- Rim: 60%+ chance of filling



April 1, 2022 TWSA ESTIMATE

April 1 - September 30

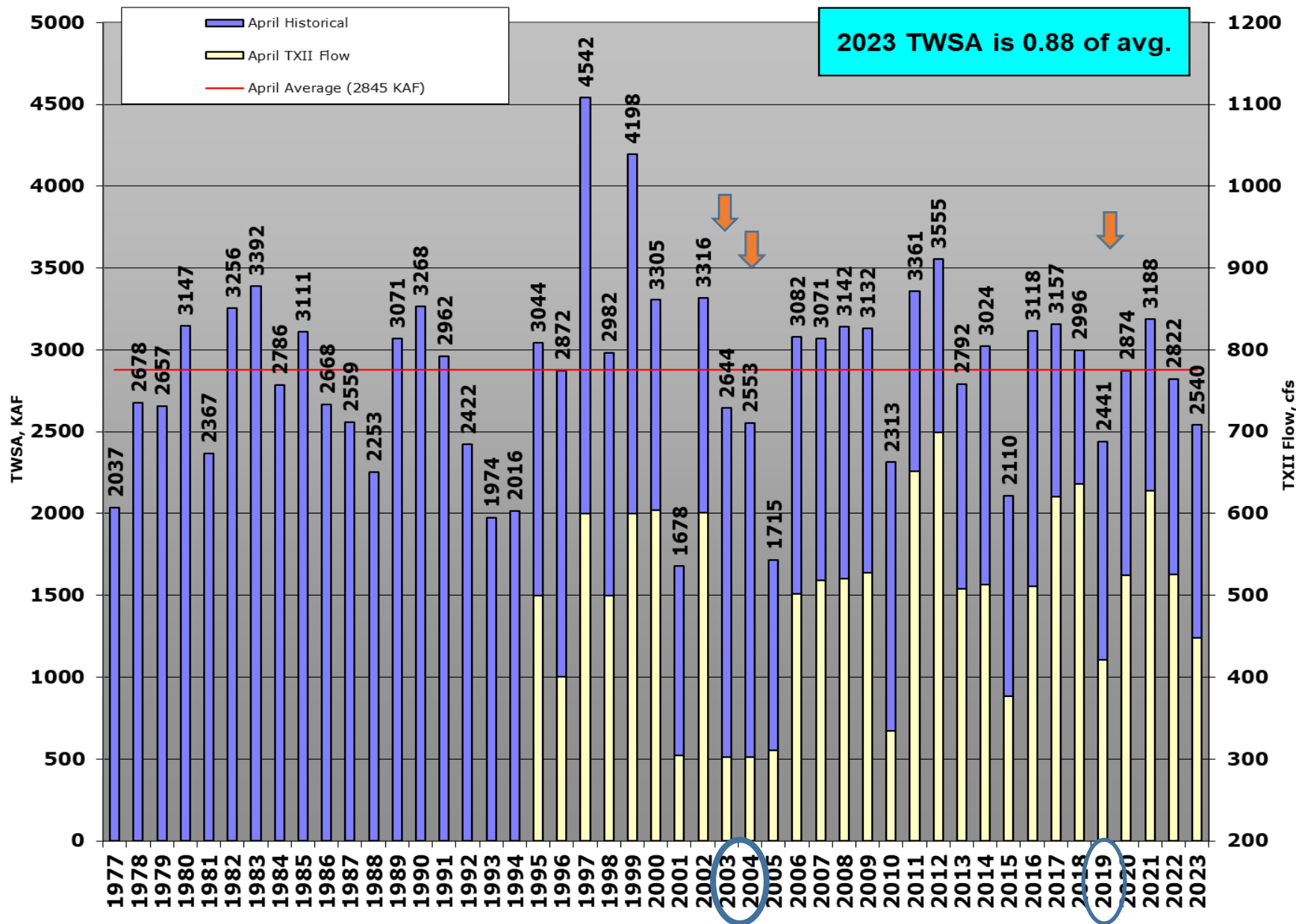
Parameter*	+/-/=	Low	Adopted	High
Apr 1-Sep 30 Natural Flow at Parker est.	+	1272	1672	2022
Return Flow Estimate, est	+	335	335	345
April 1, Reservoir Content, est	+	533	533	533
TWSA	=	2140	2540	2900
SEP 30 EST RESERVOIR CONTENT	-	76	76	111
FLOW OVER SUNNYSIDE DAM	-	233	378	485
TWSA FOR IRRIGATION	=	1832	2086	2304
NONPRORATABLE ENTITLEMENT	-	1070	1070	1070
REMAINING TWSA	=	762	1016	1234
PRORATABLE ENTITLEMENT		1239	1239	1239
% RATIO= REMAINING TWSA/PRORATABLE ENTITLEMENT		61%	82%	100%
TITLE XII FLOW TARGET, cfs	April	300	300	400
Added flow available, cfs *##		142	148	153
Non-storeable Portion of added flow, cfs		39	39	39
Storable portion of added flow, cfs		102	109	113
BA May Pulse Flow Volume		Low-BA	Mid-BA	Mid-BA

*Values are in 1,000 ac-ft unless otherwise specified.

*## State & YRBWEP Trust, Acquisition, & Conservation additions to Title XII flow range from 142 to 153 cfs.



Yakima Basin Historical TWSA's



Yakima Basin Outmigration Flows

Table 2-14. Minimum volume of water (acre-feet) that will be available in April and May during years when water prorationing levels are equal to or greater than 70% to provide outmigration flows. Outmigration flows are measured at Tieton Dam (RIM), Cle Elum Dam (CLE), and Yakima River at Easton gage (EASW).

	Monthly Min. acre-feet for Outmigration Flows		
April TWSA (MAF)	< 2.36	2.36 - 3.13	> 3.13
May TWSA (MAF)	< 2.20	2.20 – 2.61	> 2.61
RIM	4,500	8,400	14,800
CLE	4,200	9,900	18,800
EASW	3,700	4,800	9,900

WY23 Apr TWSA=2.540 MAF

Easton (EASW) can be met from unregulated local inflow below Kee and Kac.

Hydrologic Summary

- Jan-Mar Precip was 50% avg, 5th driest.
- Snowpack is hanging in at 91%.
- System storage has not kept up with average.
 - Nov 7, 2022: 120% average.
 - Apr 1, 2023: 76% average. (only 50% full).
- Natural stream flows have been 30 to 40% avg.
- Adopted forecasts are mostly 91% avg.
- TWSA is 2.540 MAF or 88% of average
- Title XII is 300 +148 or +39 cfs
- Prorationing: 82%
- Movable conservation est (Jun20-Oct18): 26 KAF