

Topic: Washington Water Supply Availability Committee
Meeting (WSAC)

Time: Jul 22, 2022 10:00 AM Pacific Time (US and Canada)

Join Zoom Meeting

<https://waecy-wa-gov.zoom.us/j/9245850348?pwd=f9aN-GFz1TUNDKcYaaeiWxRgWM9At0.1>

Meeting ID: 924 585 0348

Passcode: lemonade

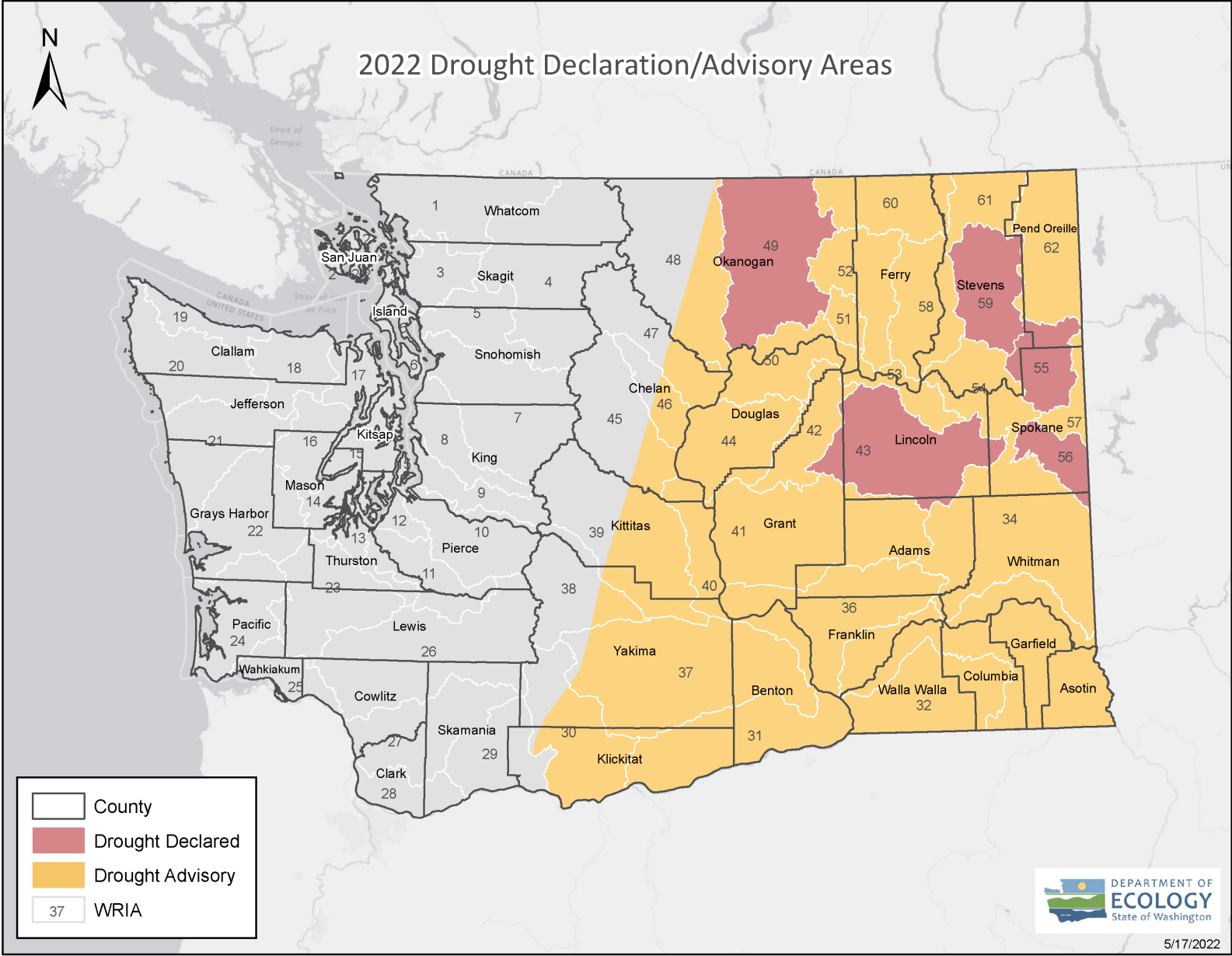
One tap mobile

+12532158782,,9245850348#,,,,*71121225# US (Tacoma)

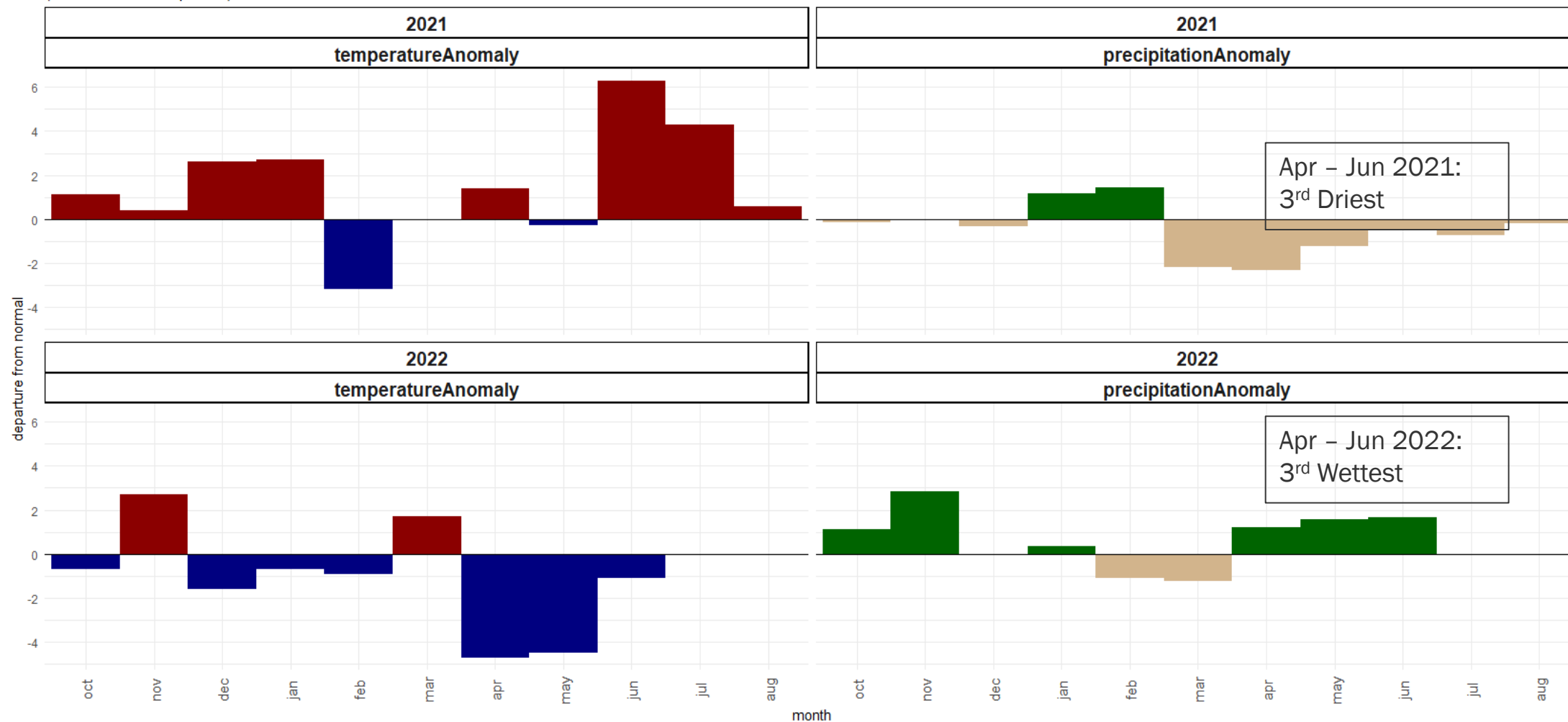
+13462487799,,9245850348#,,,,*71121225# US (Houston)

Water Supply Availability Committee

Friday, July 22, 2022				
Start Time	End Time	Duration, min	Description	
10:00	10:15	15	Welcome & Introductions	Jeff Marti
10:15	10:20	5	Mountain Report	Scott Pattee, NRCS
10:20	10:40	20	Regional Climate Setting ENSO	Karin Bumbaco, OWSC Nick Bond, OWSC
10:40	10:55	15	Streamflow and Groundwater	Nick Sutfin, USGS
10:55	11:10	15	Water Supply Forecasts	Henry Pai, NWRFC
11:10	11:30	20	Reports from other managers Insights regarding current declaration Next meeting: Friday October 14th	Jeff Marti

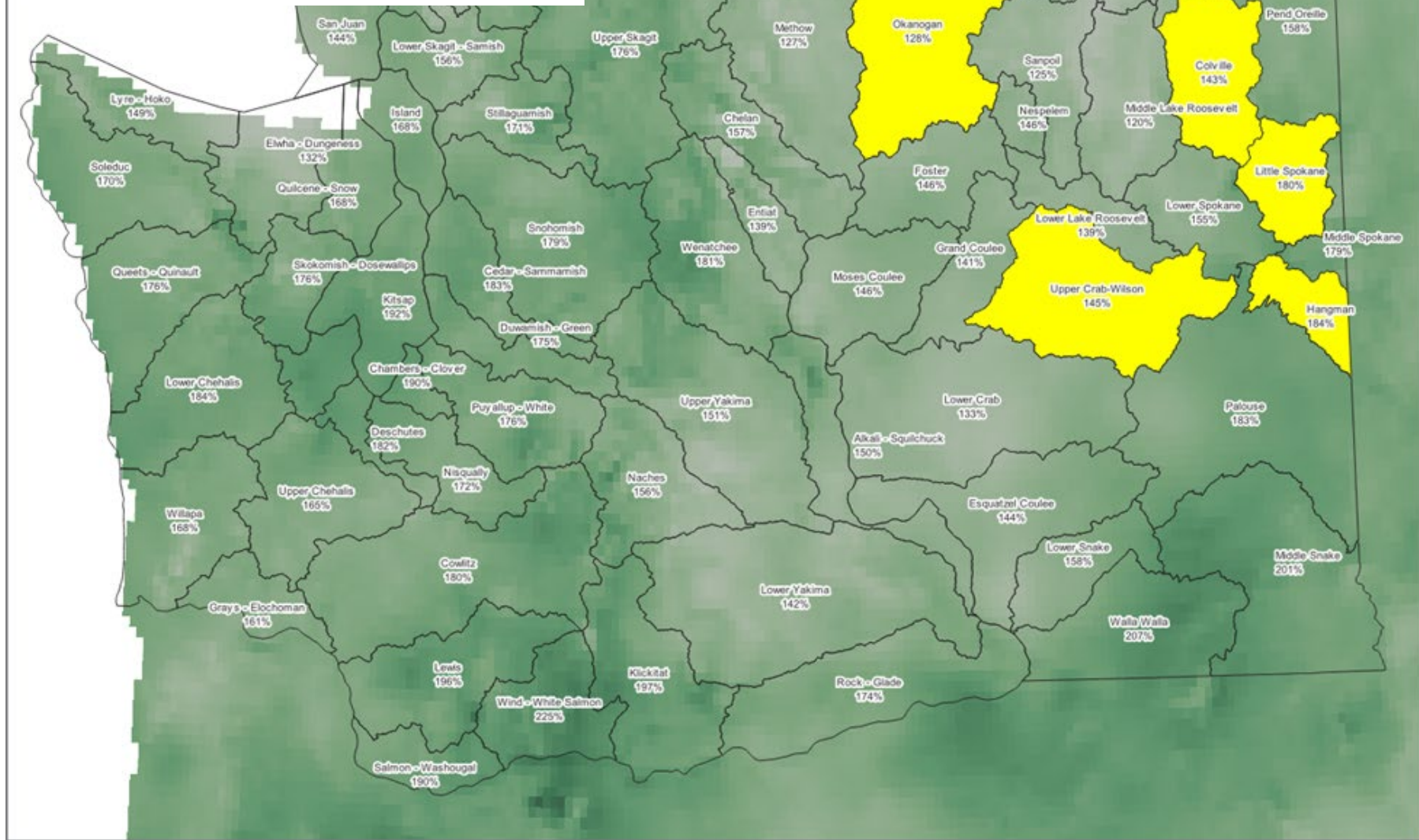


anomalies in temperature (°F), monthly precipitation (in), washington state
(1991-2020 base period)



data: NCEI; chart by Jeff Marti WDOE

Precip Pct of Normal May - June 2022
 GRIDMET_pr_2022-05-01_2022-06-30_vs_1991-2020

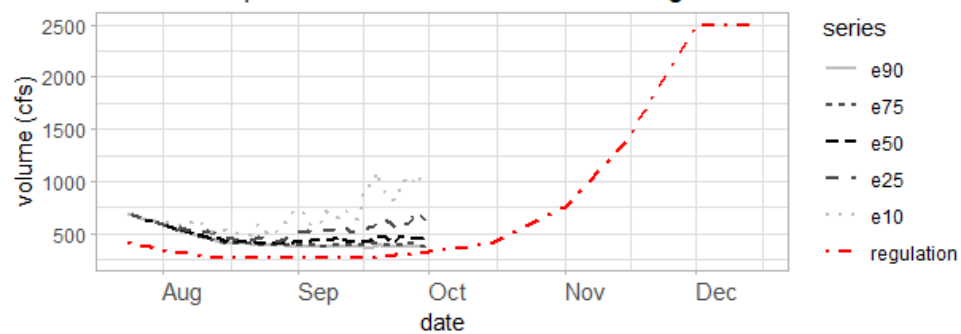


Watershed Forecast Location	Forecasted April – September Runoff (Percent of Normal) with revised streamflow forecasts	WRIA Number
Okanogan at Oroville	60 101	49
Hangman Creek at Spokane	74 161	56
Little Spokane at Dartford	69 91	55
Colville near Kettle Falls	58 86	59

NWRFC MONTHLY STREAMFLOW FORECASTS | Forecast Date: 2022-07-21

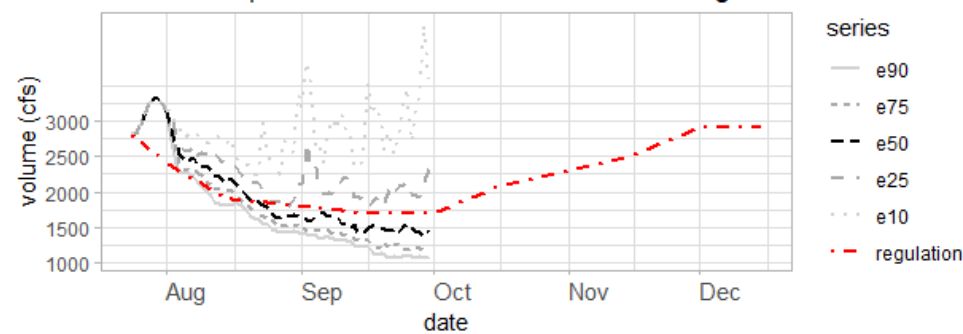
WRIA_NR	WRIA_NM	STATION	JUL	AUG	SEP
30	Klickitat	KLICKITAT - NEAR PITT	1.25	1.3	1.33
32	Walla Walla	MILL CREEK - NR WALLA WALLA	1.35	0.94	0.89
32	Walla Walla	WALLA WALLA - NEAR TOUCHET	1.9	1.67	1.51
34	Palouse	PALOUSE - AT HOOPER	2.5	1.3	0.79
34	Palouse	SF PALOUSE - AT PULLMAN	2.33	1	0.33
35	Snake River	SNAKE - NEAR ANATONE	0.93	0.88	0.97
37	Lower Yakima	YAKIMA - AT KIONA	1.17	1.06	0.94
37	Lower Yakima	YAKIMA - NEAR PARKER	1.25	1.05	0.96
38	Naches	BUMPING - BELOW BUMPING DAM	1.14	0.75	0.83
38	Naches	NACHES - NEAR CLIFFDEL	1.28	0.75	0.83
38	Naches	NACHES - NEAR NACHES	0.97	0.97	0.82
38	Naches	TIETON - AT TIETON DAM	1.24	1.16	1.12
39	Upper Yakima	CLE ELUM - NEAR ROSLYN	1.4	0.8	0.55
39	Upper Yakima	KACHESS - NEAR EASTON	1	0.71	0.49
39	Upper Yakima	TEANAWAY - BELOW FORKS	1.41	1.38	1.14
39	Upper Yakima	YAKIMA - AT EASTON	1.03	0.88	0.69
39	Upper Yakima	YAKIMA - AT UMTANUM	1.26	0.97	0.85
39	Upper Yakima	YAKIMA - NEAR MARTIN	1.31	0.79	0.79
40	Upper Yakima	YAKIMA - NEAR HORLICK	1.26	0.92	0.84
45	Wenatchee	WENATCHEE - AT PESHAISTIN	1.48	1.27	1.07
46	Entiat	ENTIAT - NEAR ARDENVOIR	1.31	1	1.05
47	Chelan	CHELAN - LAKE CHELAN DAM	1.63	1.13	0.91
47	Chelan	STEHEKIN - AT STEHEKIN	1.47	1.19	1.03
48	Methow	METHOW - AT WINTHROP	1.39	1.11	0.94
48	Methow	METHOW - NEAR PATEROS	1.51	1.18	1
49	Okanogan	OKANOGAN - AT MALOTT	1.63	1.12	1.08
49	Okanogan	OKANOGAN - AT OROVILLE	2.69	1.5	1.06
49	Okanogan	OKANOGAN - NEAR TONASKET	1.66	1.14	1.08
49	Okanogan	SIMILKAMEEN - NEAR NIGHTHAWK	1.35	0.91	0.95
54	Lower Spokane	SPOKANE - AT LONGLAKE	2.01	0.93	0.81
55	Little Spokane	LITTLE SPOKANE - AT DARTFORD	1.07	1.08	1.2
56	Hangman	HANGMAN CREEK - AT SPOKANE	1.44	1.33	1.27
57	Middle Spokane	SPOKANE - AT SPOKANE	2.11	0.9	0.76
59	Colville	COLVILLE - AT KETTLE FALLS	1.42	1.03	0.93
60	Kettle	KETTLE - AT LAURIER	1.61	1.12	0.92
60	Kettle	KETTLE - NEAR FERRY	1.56	1.24	1.07
NA	Columbia River	COLUMBIA - BLO ROCK ISLAND DAM	1.68	1.64	1.35
NA	Columbia River	COLUMBIA - CHIEF JOSEPH DAM	1.69	1.66	1.37
NA	Columbia River	COLUMBIA - GRAND COULEE DAM	1.69	1.66	1.37
NA	Columbia River	COLUMBIA - MCNARY DAM	1.57	1.51	1.27
NA	Columbia River	COLUMBIA - PRIEST RAPIDS DAM	1.68	1.64	1.35
NA	Columbia River	COLUMBIA - ROCKY REACH DAM	1.68	1.64	1.36
NA	Columbia River	COLUMBIA - THE DALLES DAM	1.56	1.49	1.26
NA	Columbia River	COLUMBIA - WANAPUM DAM	1.68	1.64	1.35
NA	Columbia River	COLUMBIA - WELLS DAM	1.69	1.65	1.36

2022-07-22| forecast vs Chehalis at Porter reg flow



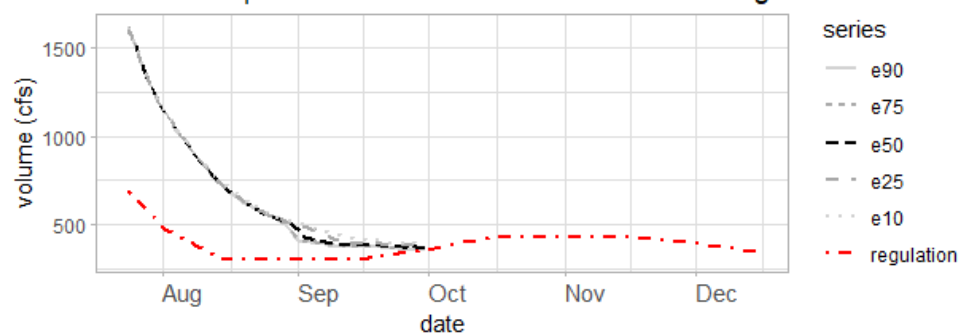
data: NWRFC (QINE file),WDOE

2022-07-22|forecast vs Nooksack at Ferndale reg flow



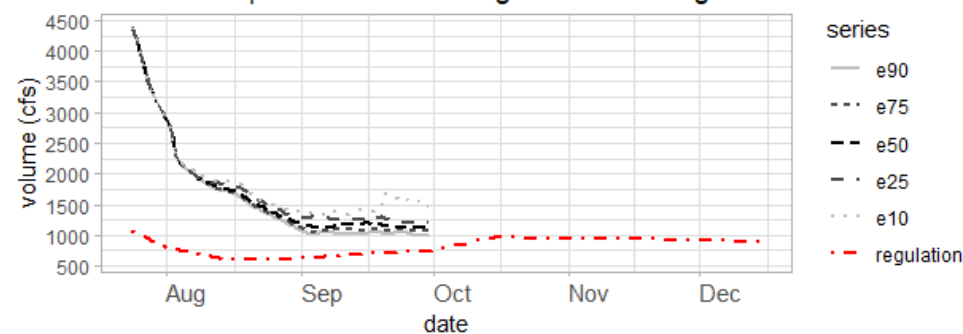
data: NWRFC (QINE file),WDOE

2022-07-22| forecast vs Methow River nr Pateros reg flow



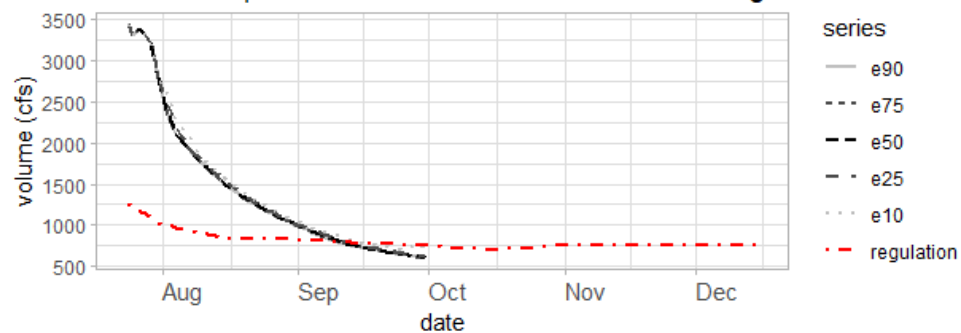
data: NWRFC (QINE file),WDOE

2022-07-22| forecast vs Okanogan at Malott reg flow



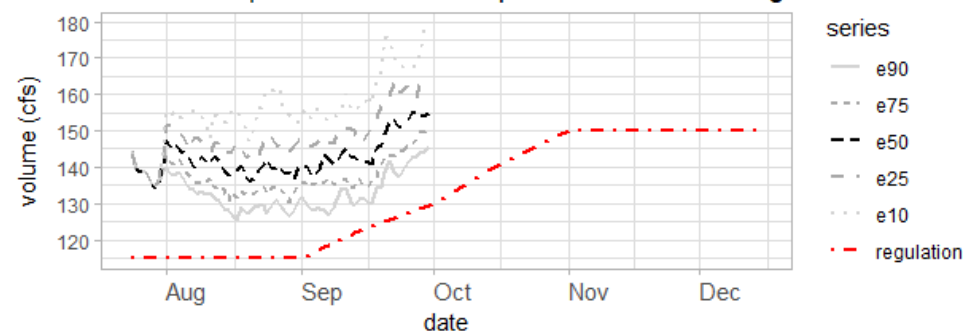
data: NWRFC (QINE file),WDOE

2022-07-22| forecast vs Wenatchee at Peshastin reg flow



data: NWRFC (QINE file),WDOE

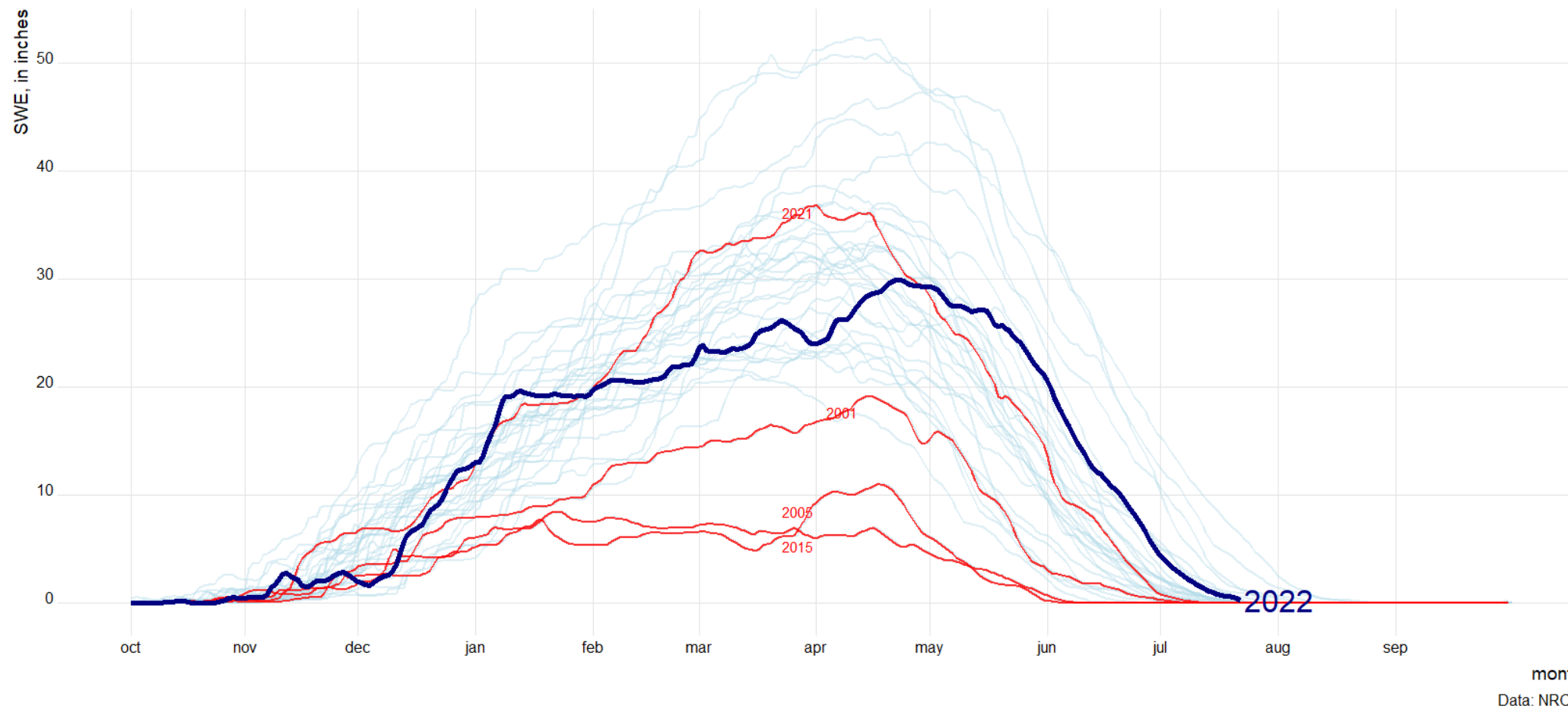
2022-07-22| forecast vs Little Spokane at Dartford reg flow

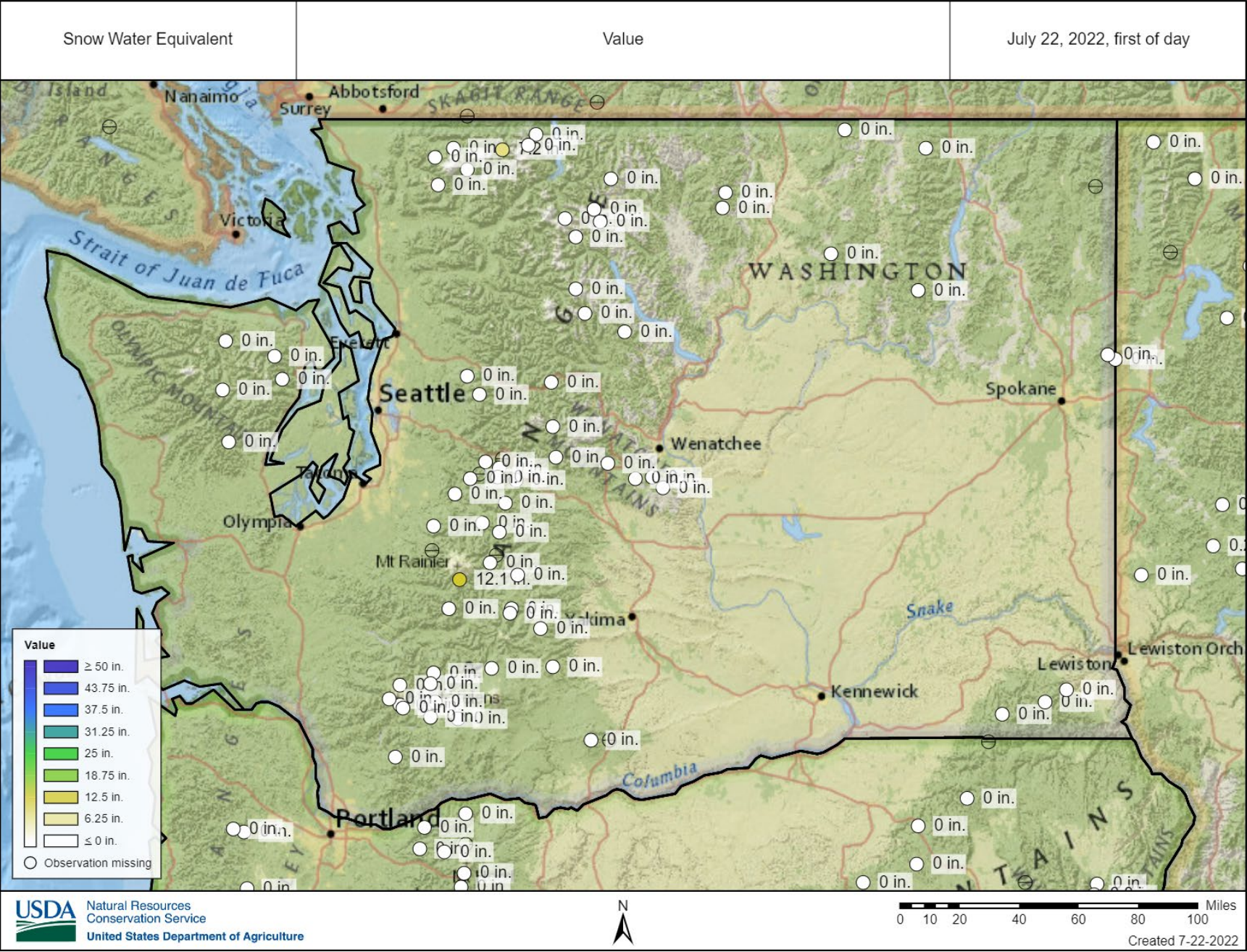


data: NWRFC (QINE file),WDOE

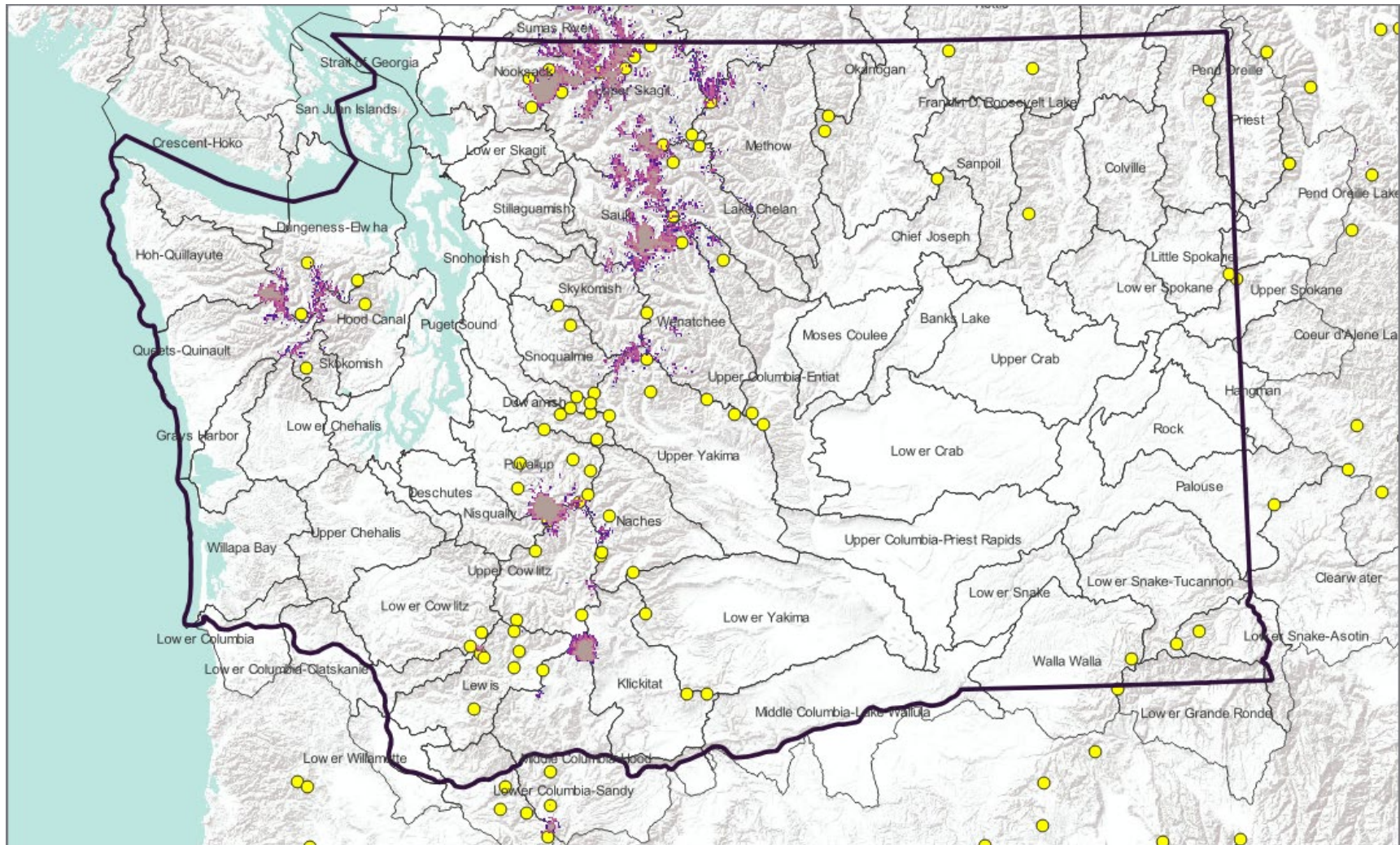
Average Washington State SWE (SNOTEL)

Water Years: 1990 - 2022 Created on: 2022-07-22





SNOTEL locations in relation to current snow extent (SNODAS) July 22, 2022





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

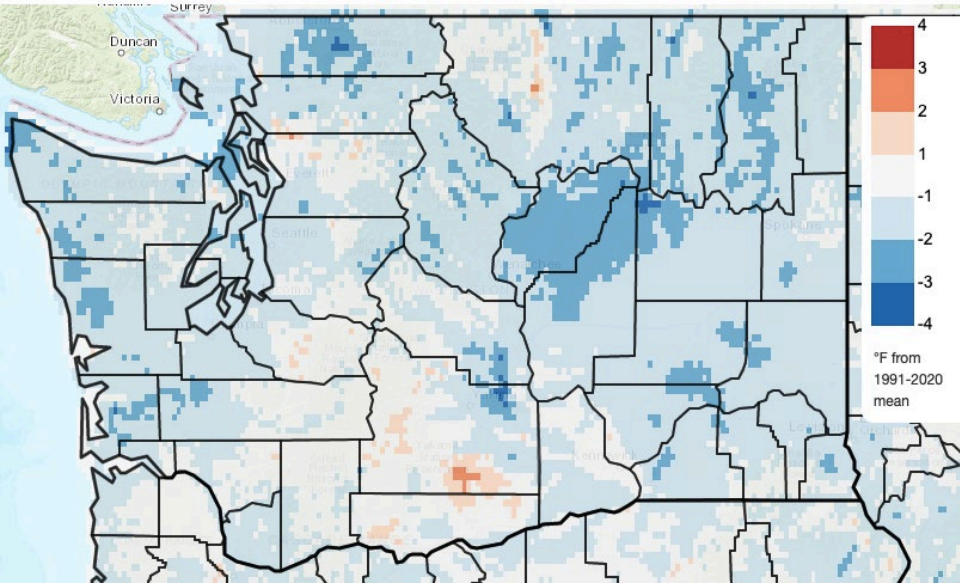
University of Washington

22 July 2022

Water Year 2022

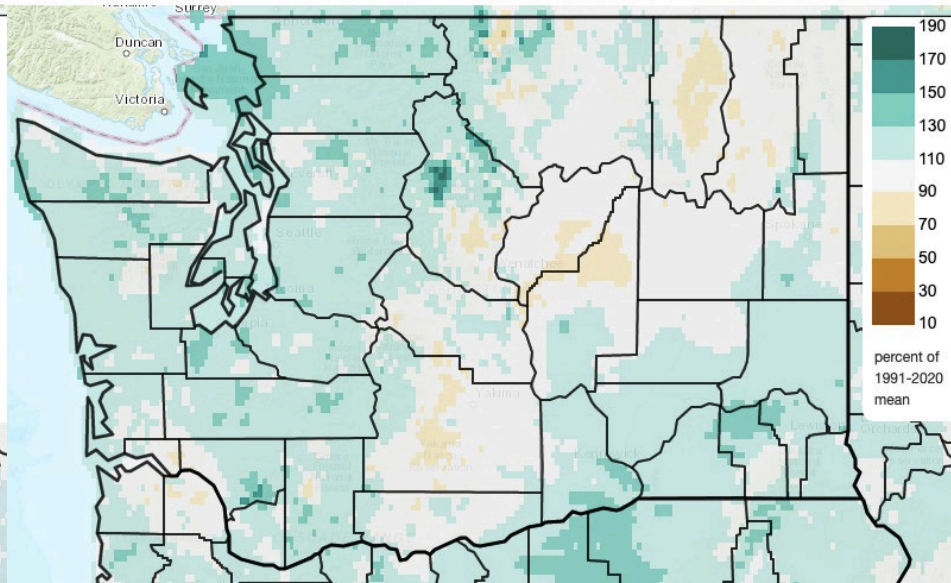
Mean Daily Temperature Anomaly, Since Oct 1st

2021/10/01 - 2022/07/19



Total Precipitation Anomaly, Since Oct 1st

2021/10/01 - 2022/07/19



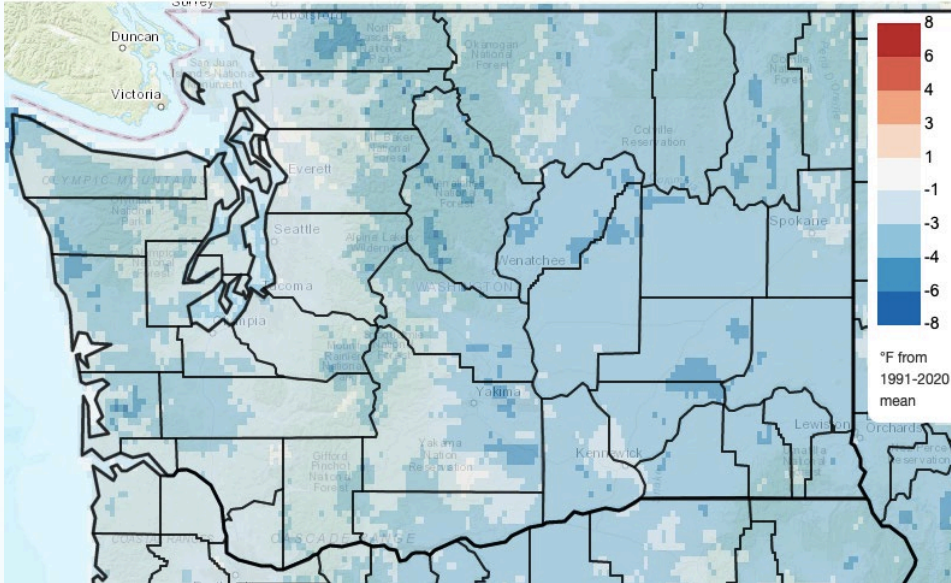
- Average WA Oct-Jun temperatures below-normal* (-1.1°F)
- Average WA Oct-Jun precipitation above normal (+6.28") ranking as the 13th wettest

*1991-2020 normal; records since 1895

April-June 2022

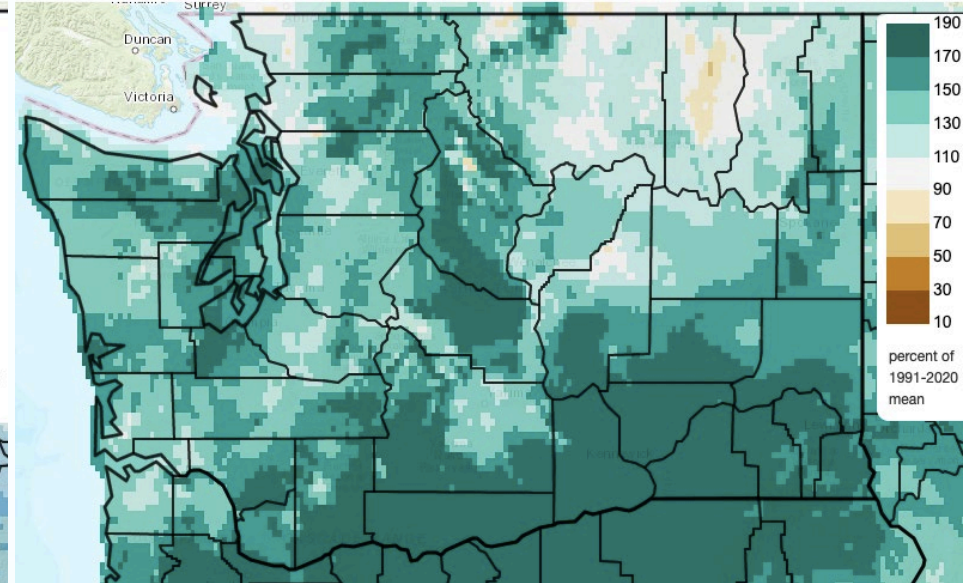
Mean Daily Temperature Anomaly, Last 3 Full Months

2022/04/01 - 2022/06/30



Total Precipitation Anomaly, Last 3 Full Months

2022/04/01 - 2022/06/30



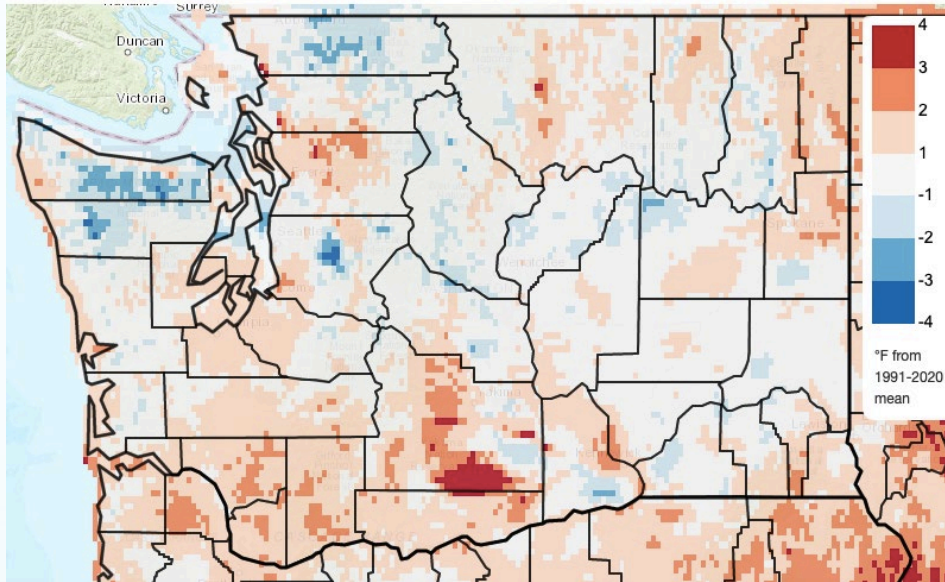
- Average WA Apr-Jun temperatures 3.4°F below normal, ranking as the 6th coldest
- Average WA Apr-Jun precipitation above normal (+4.44") ranking as the 3rd wettest

*1991-2020 normal; records since 1895

July 2022

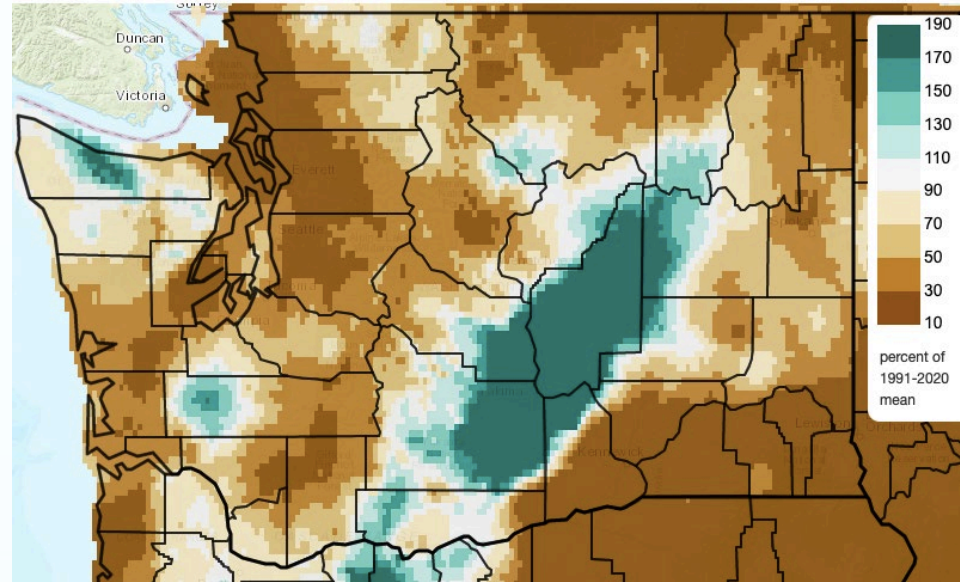
Mean Daily Temperature Anomaly, Last 15 Days

2022/07/05 - 2022/07/19



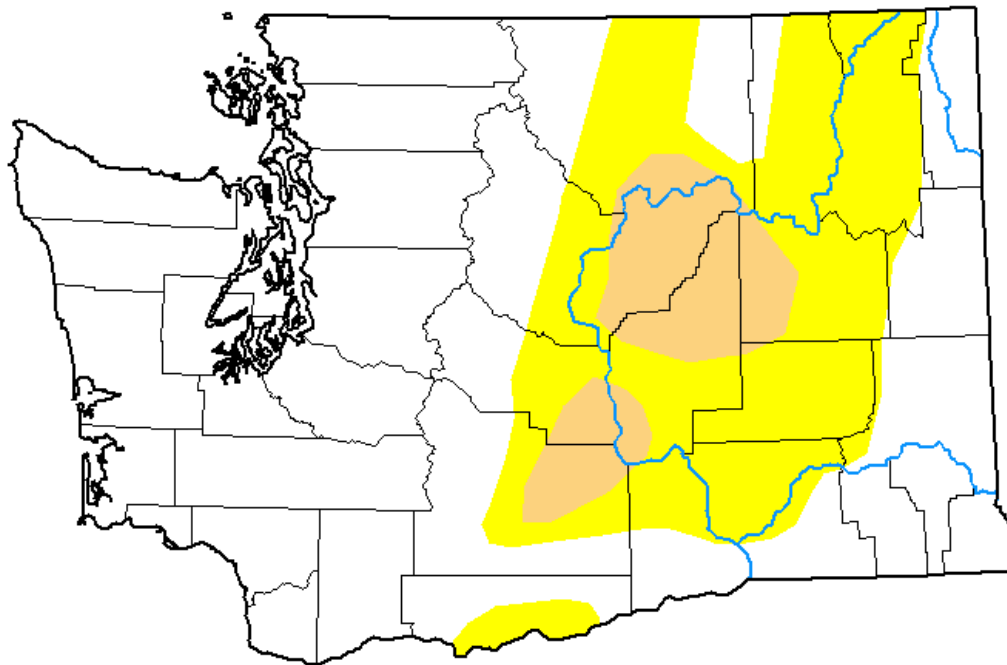
Total Precipitation Anomaly, Last 15 Days

2022/07/05 - 2022/07/19









U.S. Drought Monitor Washington

July 19, 2022
(Released Thursday, Jul. 21, 2022)
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:

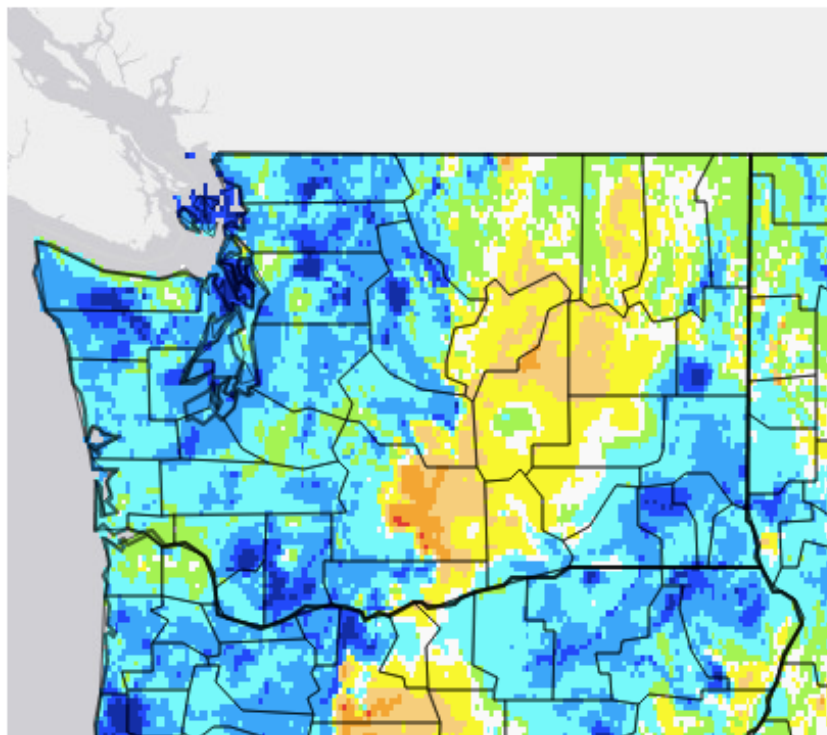
Brian Fuchs
National Drought Mitigation Center



droughtmonitor.unl.edu

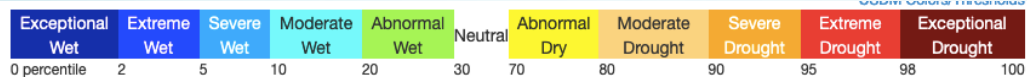
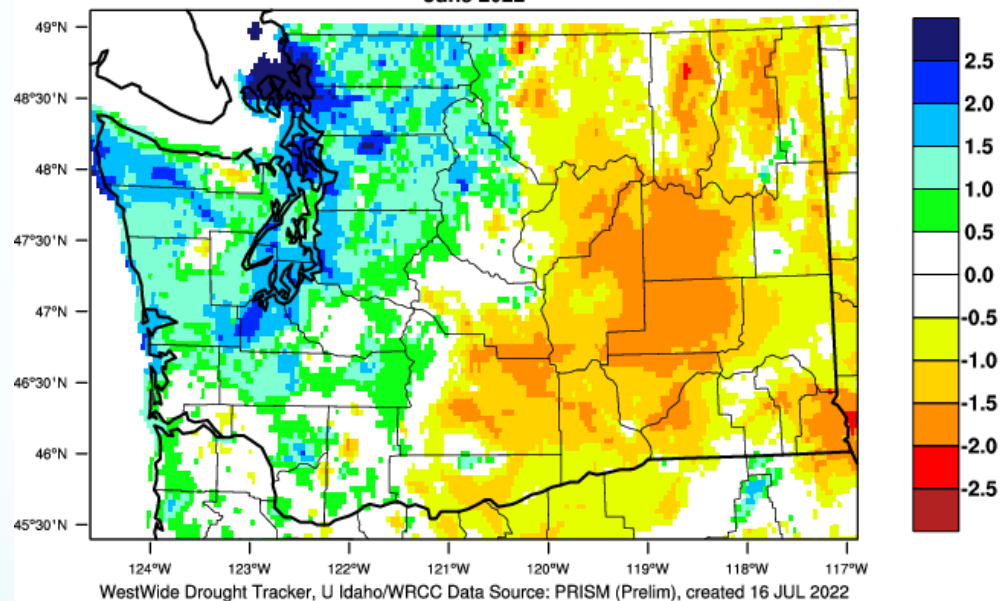
Palmer Drought Severity Index

Jul. 19, 2022



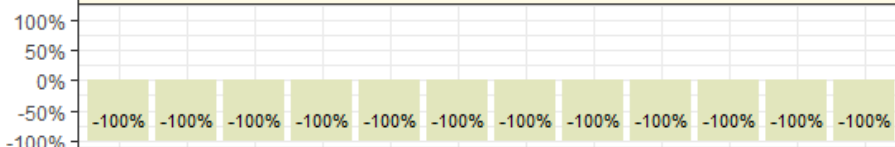
Washington - 30 month SPI

June 2022

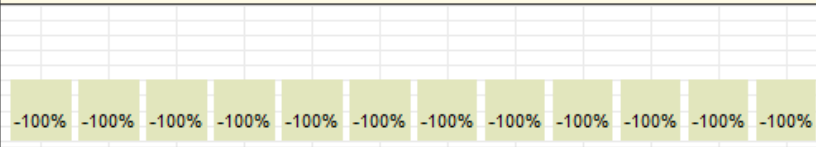


Probability of recovery from drought | 2022-07-21

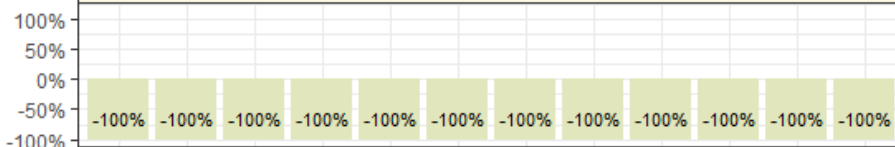
1-West Olympic Coast



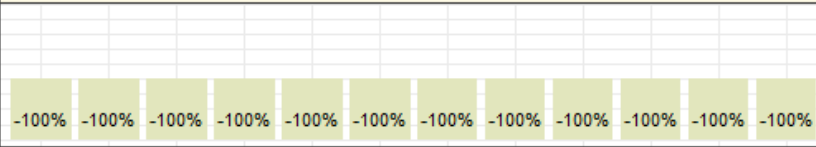
2-North East Olympic San Juan



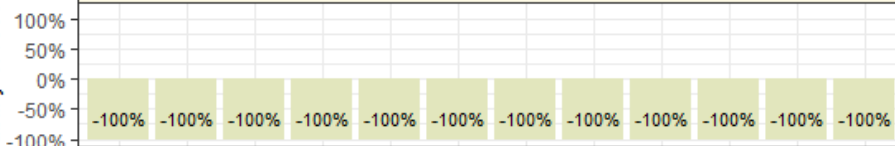
3-Puget Sound Lowlands



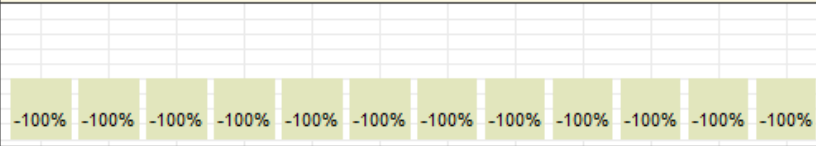
4-East Olympic Cascade Foothills



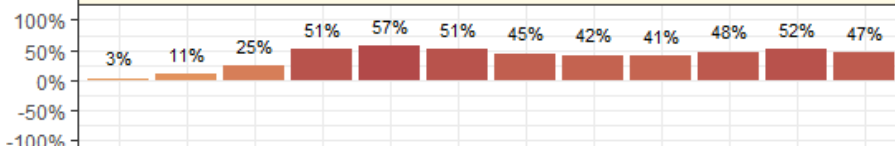
5-Cascade Mountains West



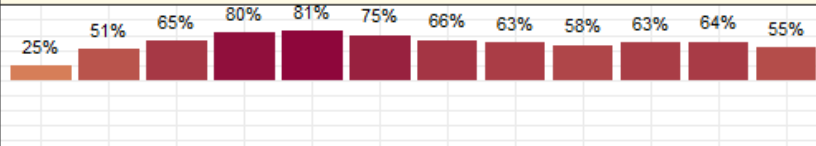
6-East Slope Cascades



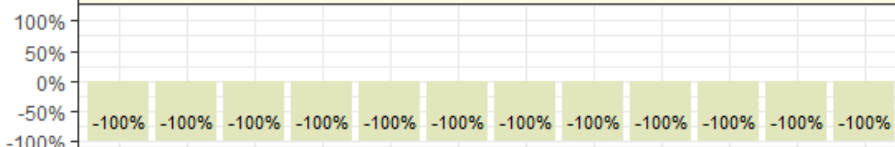
7-Okanogan Big Bend



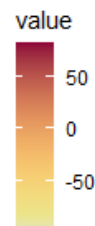
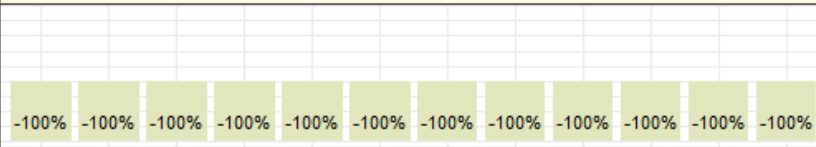
8-Central Basin



9-Northeastern



10-Palouse Blue Mountains



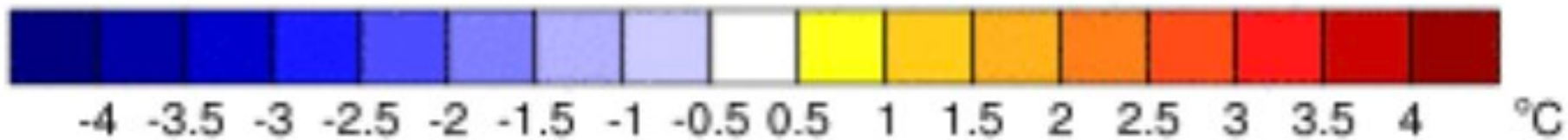
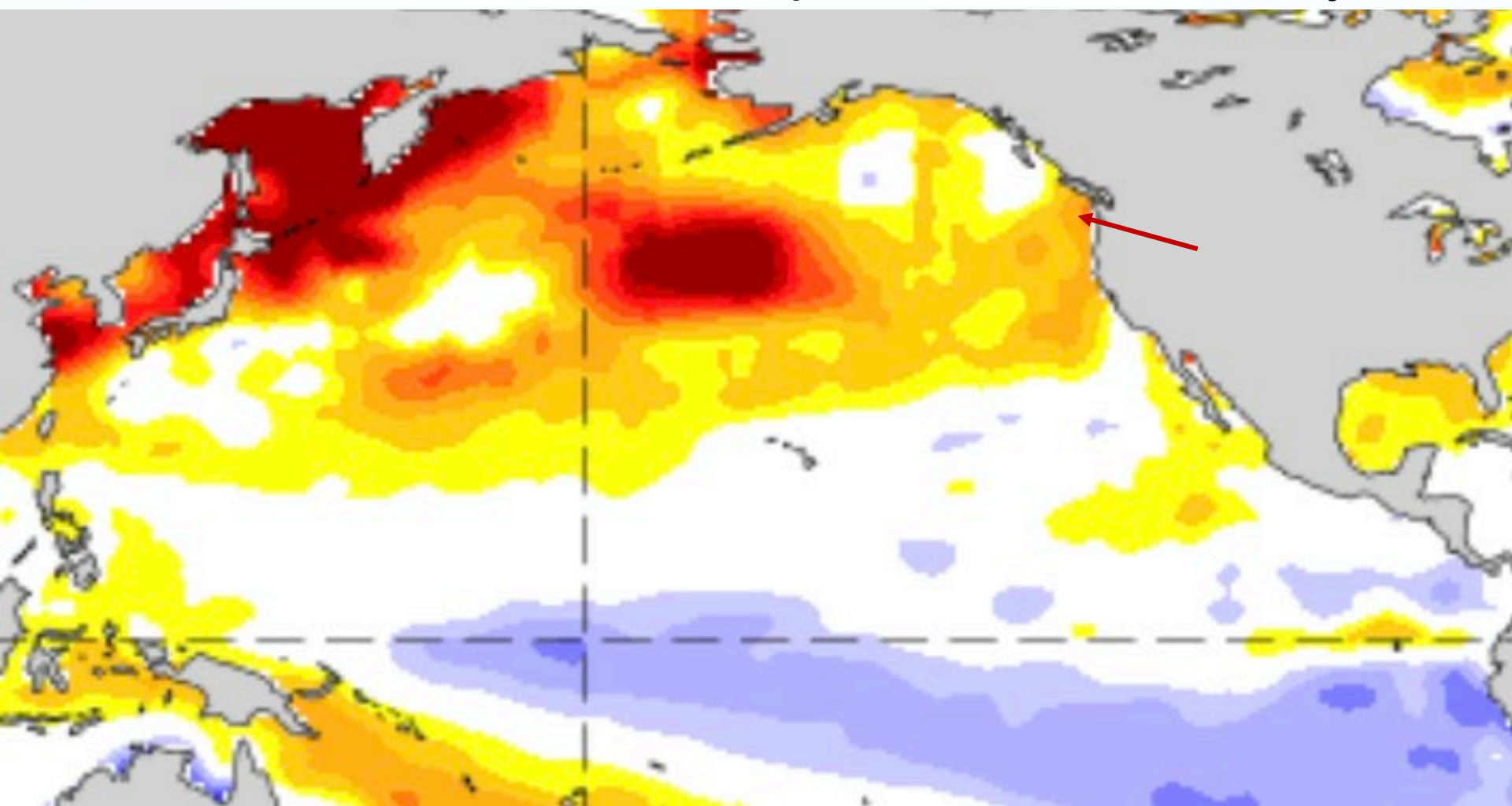
Data: NOAA Drought Termination Tool

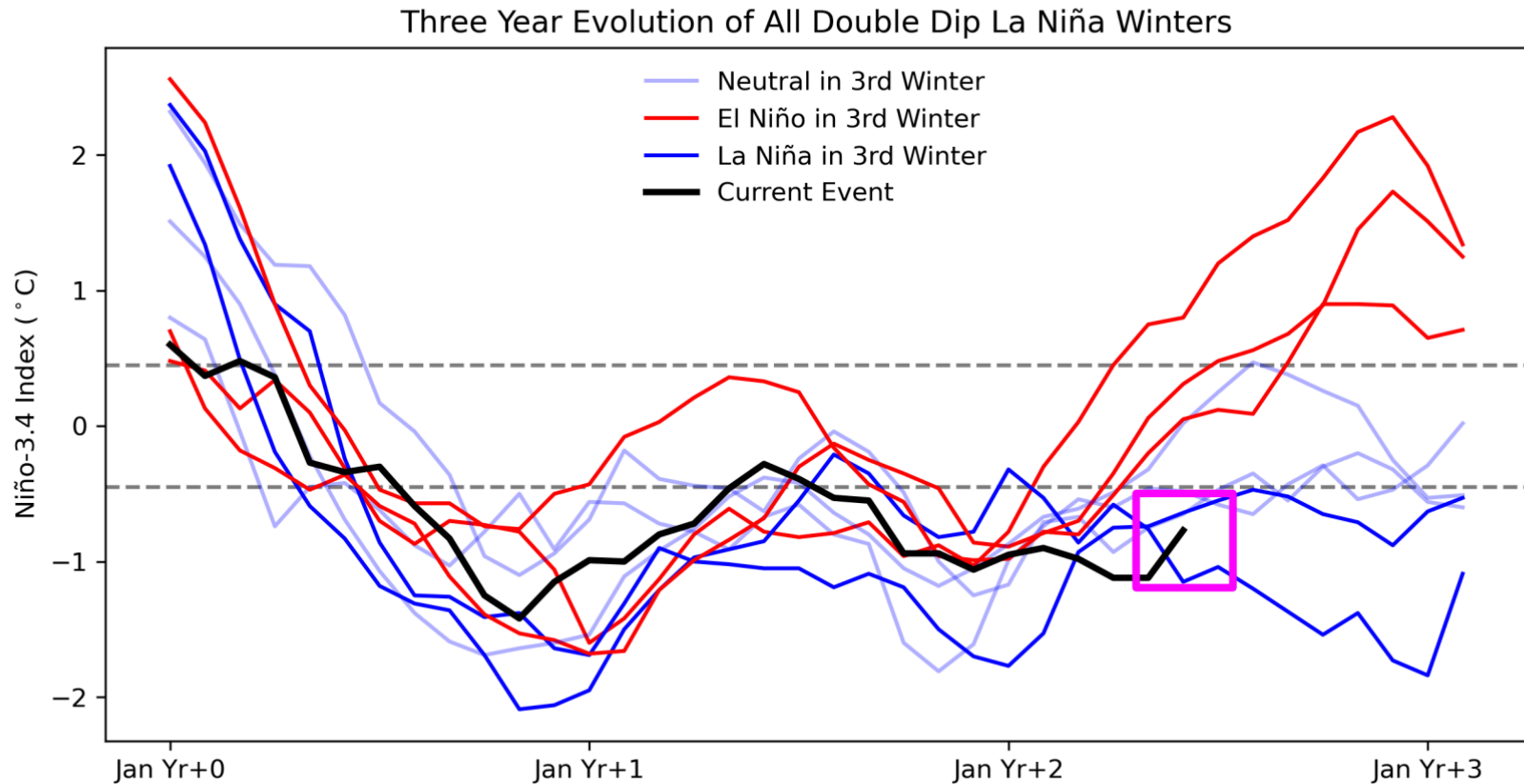
Assumes climatological conditions for the remainder of the month.

Monthly timesteps are not interdependent.

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

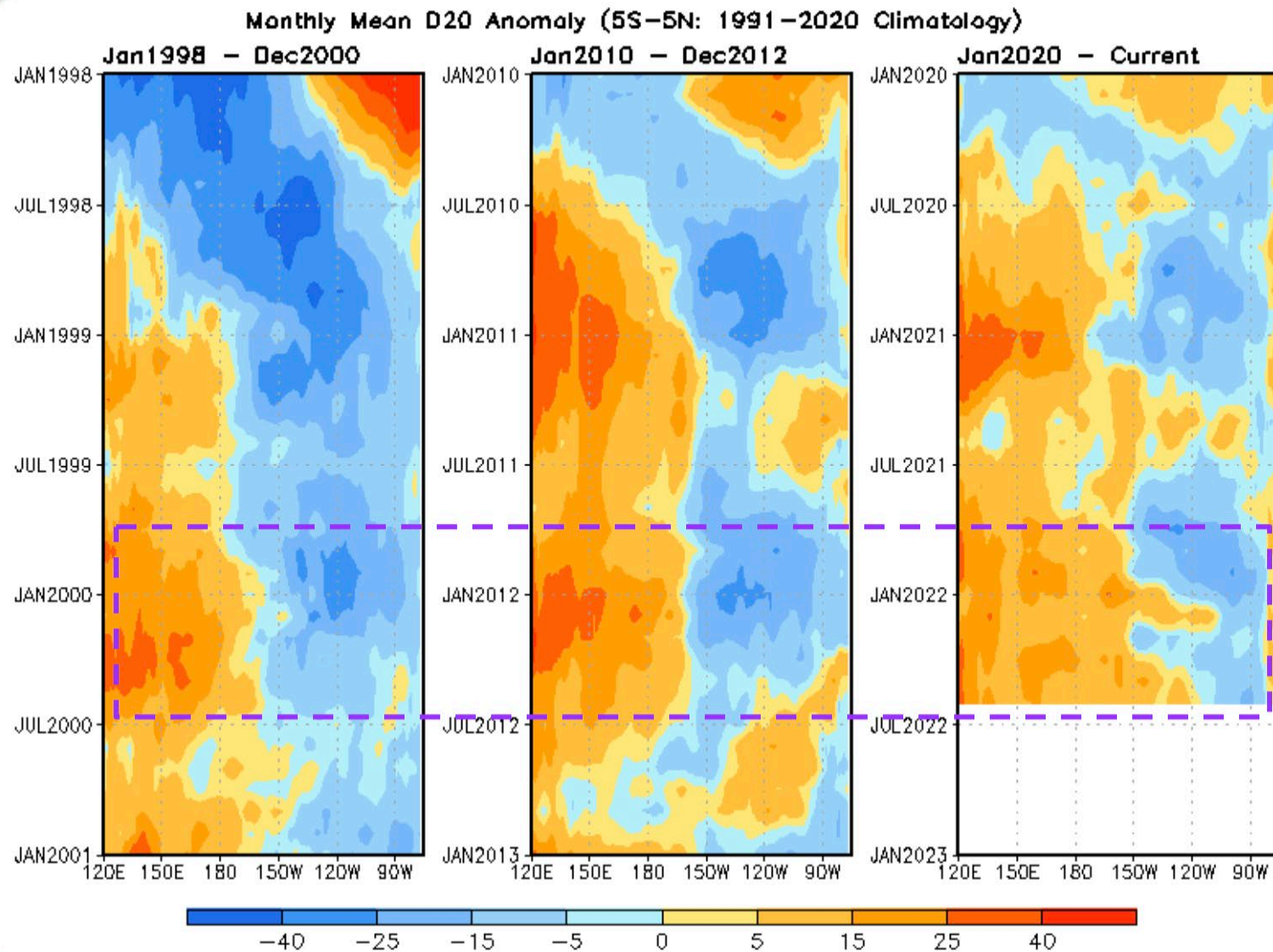
Sea Surface Temperature Anomalies: 10-16 July 2022





Three-year history of sea surface temperatures in the Niño-3.4 region of the tropical Pacific for 8 previous double-dip La Niña events. The color of the line indicates the state of ENSO for the third winter (red: El Niño, darker blue: La Niña, lighter blue: neutral). The black line shows the current event. Monthly Niño-3.4 index is from CPC using ERSSTv5.

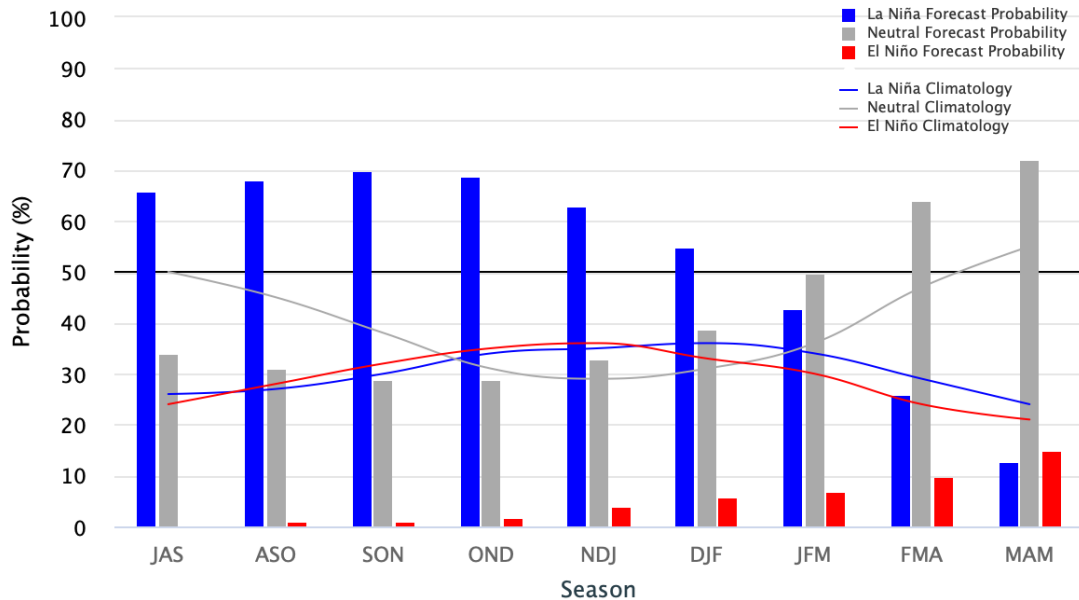
Evolution of Monthly Mean D20 Anomaly across [5S-5N]



Mid-July 2022 IRI/CPC Model-Based Probabilistic ENSO Forecasts

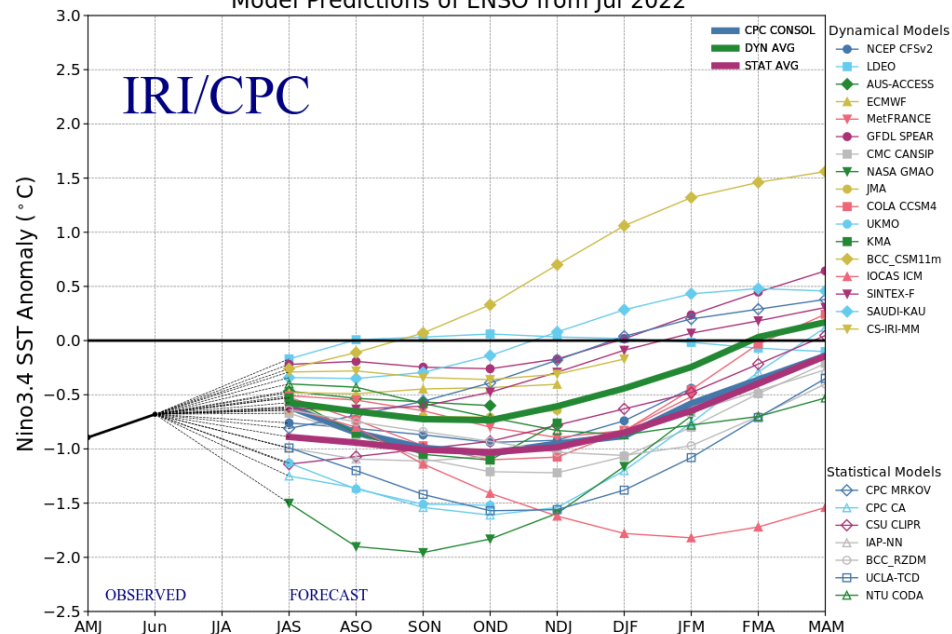
ENSO state based on NINO3.4 SST Anomaly

Neutral ENSO: -0.5°C to 0.5°C



Latest ENSO predictions indicate that La Nina is more likely than neutral conditions through the remainder of 2022

Model Predictions of ENSO from Jul 2022





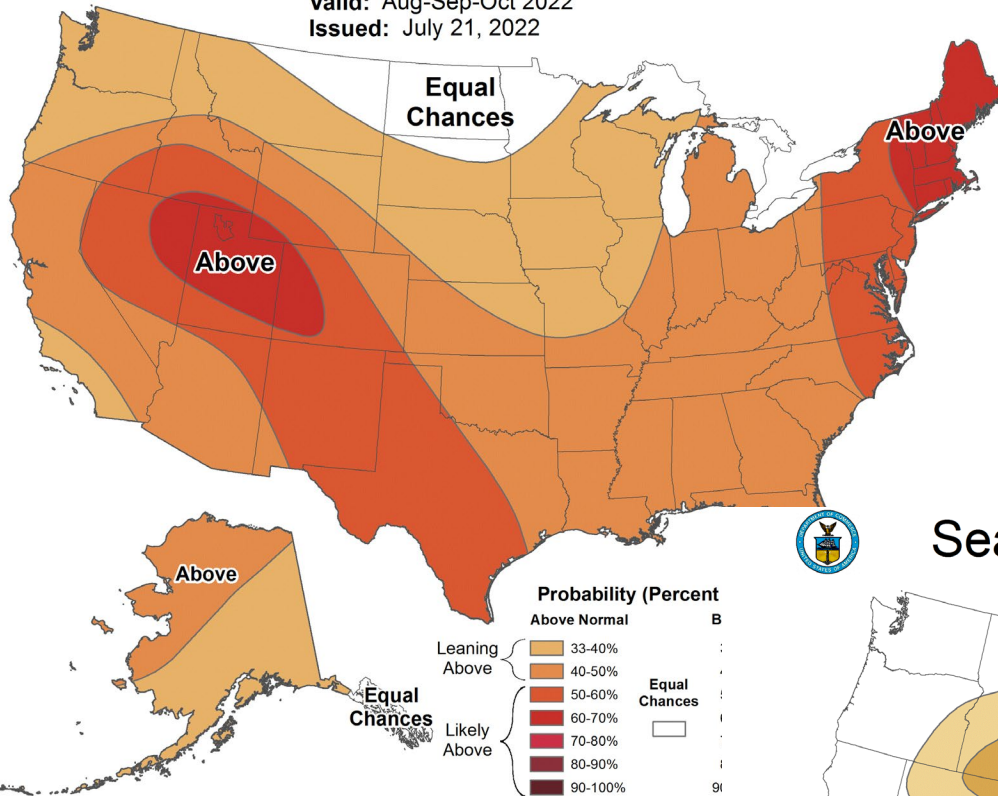
Seasonal Temperature Outlook

Valid: Aug-Sep-Oct 2022

Issued: July 21, 2022



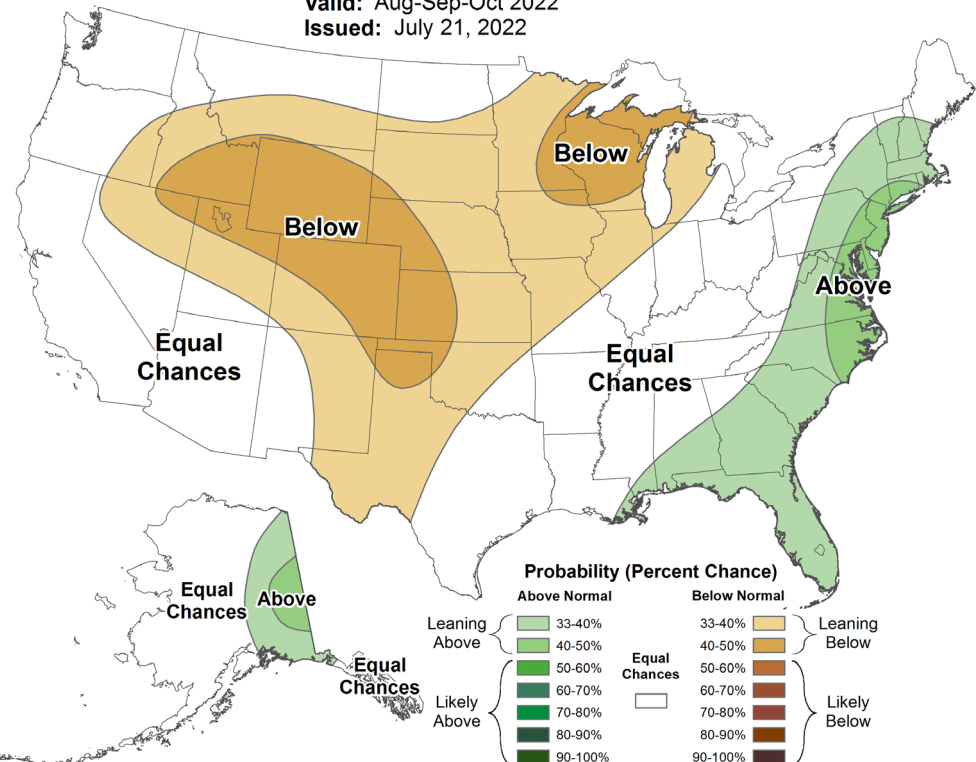
NOAA/CPC Forecasts for August-October 2022



Seasonal Precipitation Outlook

Valid: Aug-Sep-Oct 2022

Issued: July 21, 2022



The remainder of summer into fall 2022 is liable to be warm in the PNW, based on recent trends and climate model simulations

C3S multi-system seasonal forecast

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

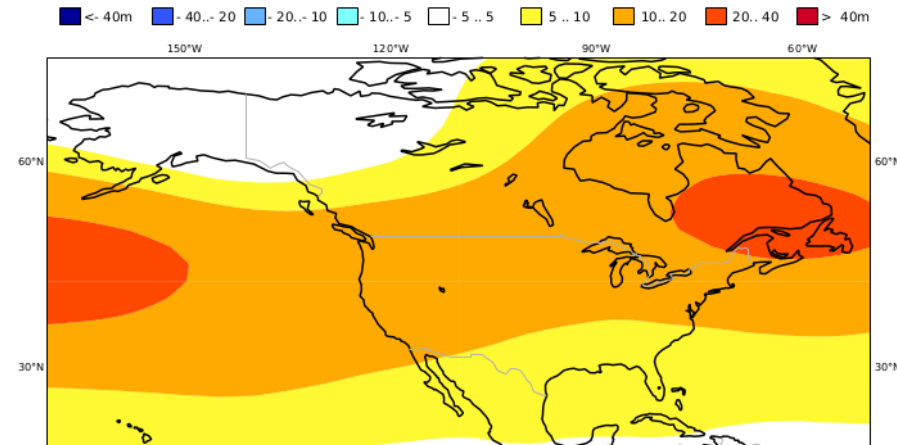
Mean Z500 anomaly

Nominal forecast start: 01/07/22

Variance-standardized mean

ASO 2022

500 mb



C3S multi-system seasonal forecast

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

C3S multi-system seasonal forecast

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

Mean 2m temperature anomaly

Nominal forecast start: 01/07/22

Variance-standardized mean

ASO 2022

Mean precipitation anomaly

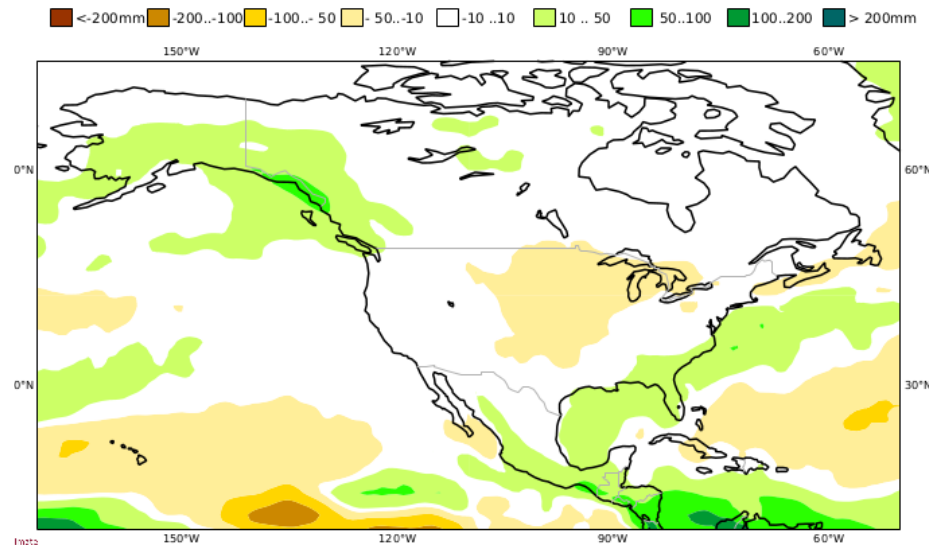
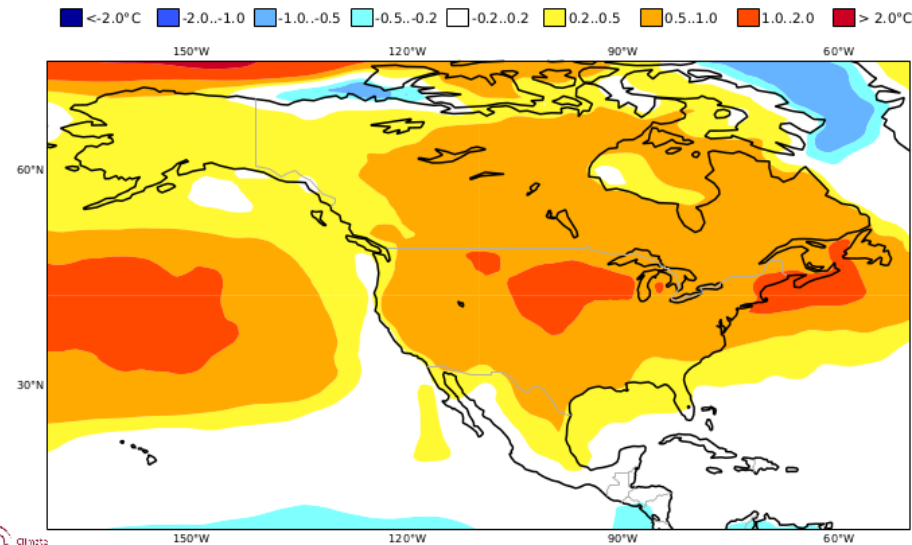
Nominal forecast start: 01/07/22

Variance-standardized mean

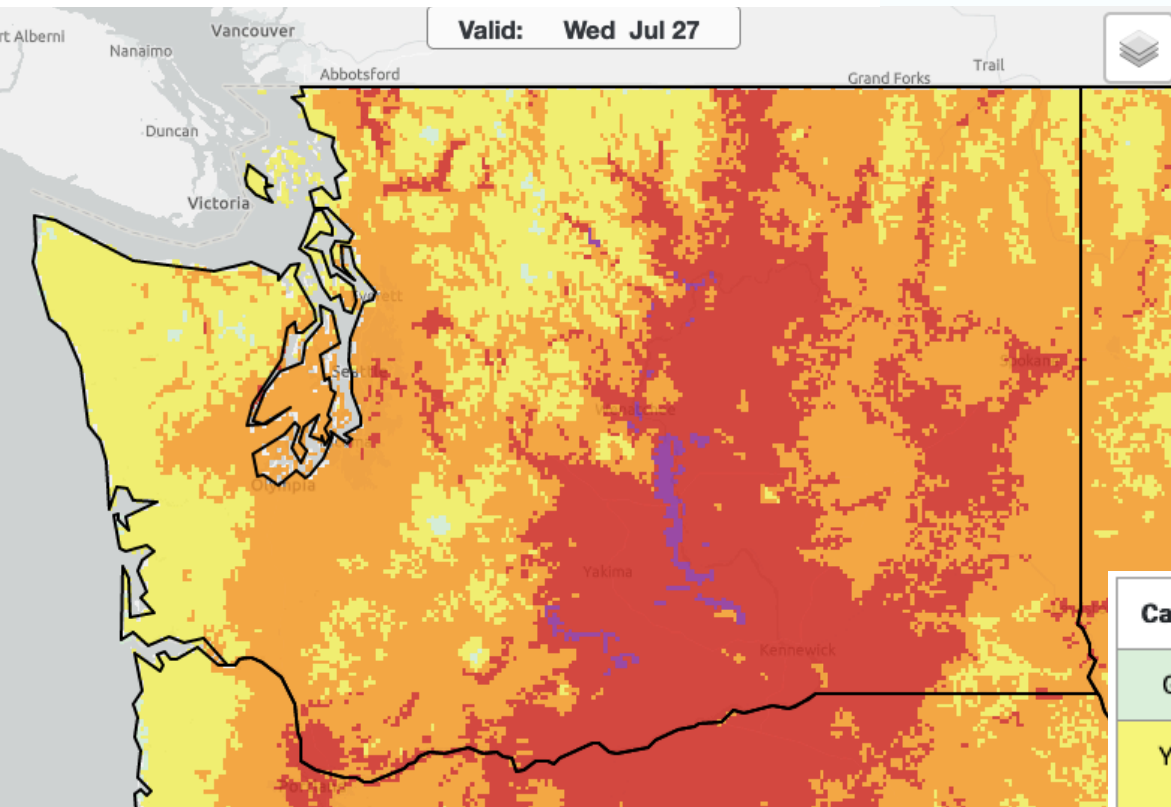
ASO 2022

Temperature

Precipitation



NWS Experimental HeatRisk



Category	Level	Meaning
Green	0	No Elevated Risk
Yellow	1	Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration
Orange	2	Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration
Red	3	High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration
Magenta	4	Very High Risk for entire population due to long duration heat, with little to no relief overnight

Summary

- Water year has been cooler and wetter than normal, with a particularly cool and wet period in April-June
- Many improvements have been made to the U.S. Drought Monitor but the remaining dry depiction represents long term precipitation deficits
- It is unclear whether ENSO will provide much if any predictability for the next few seasons
- Open questions: the severity and duration of the upcoming heat wave for the Pacific NW and its implications

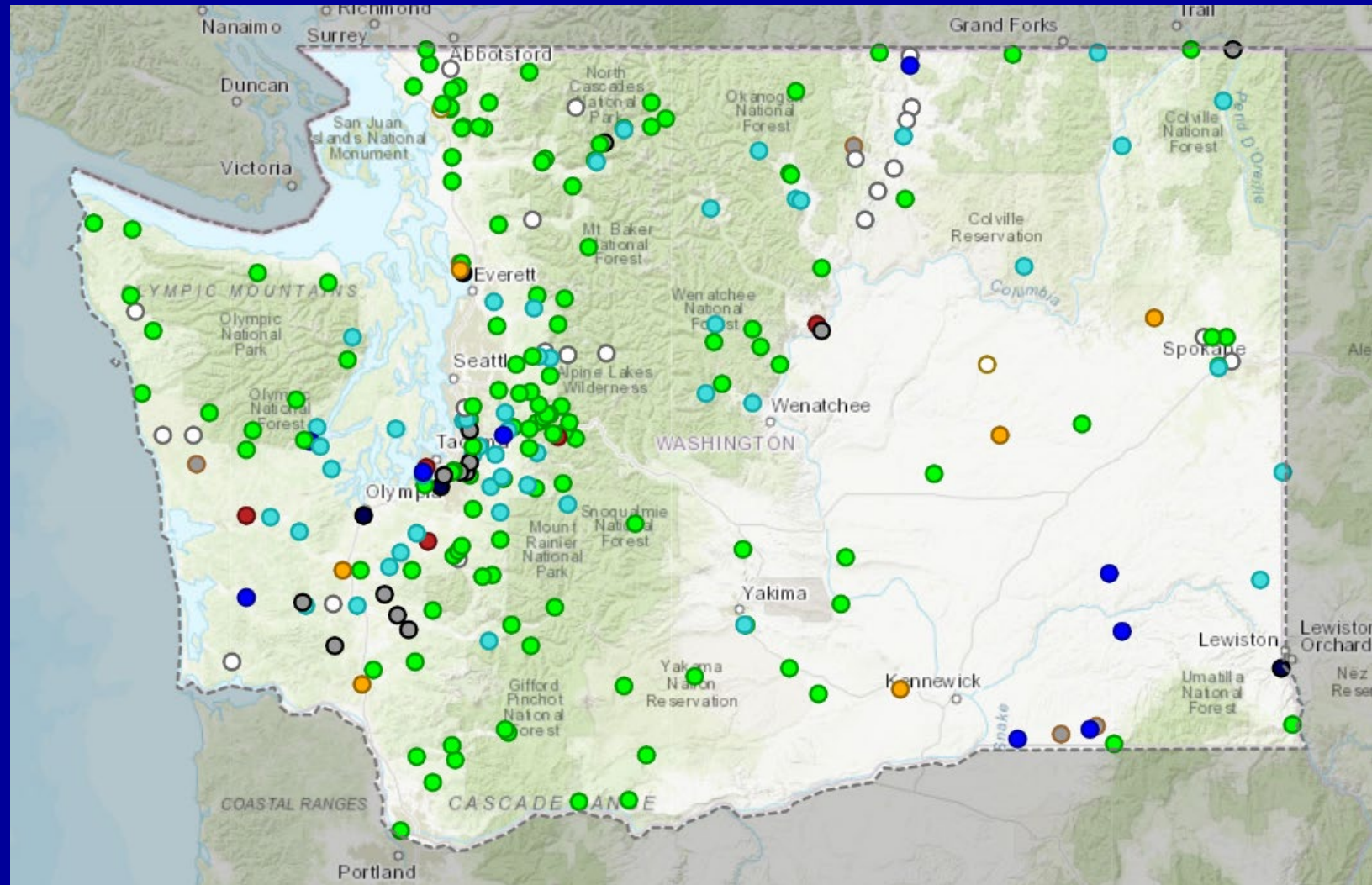
Streamflow & Groundwater Conditions in Washington State as of 21 July, 2022

Presented to
The Washington State
Water Supply Availability Committee
on 21 July, 2022

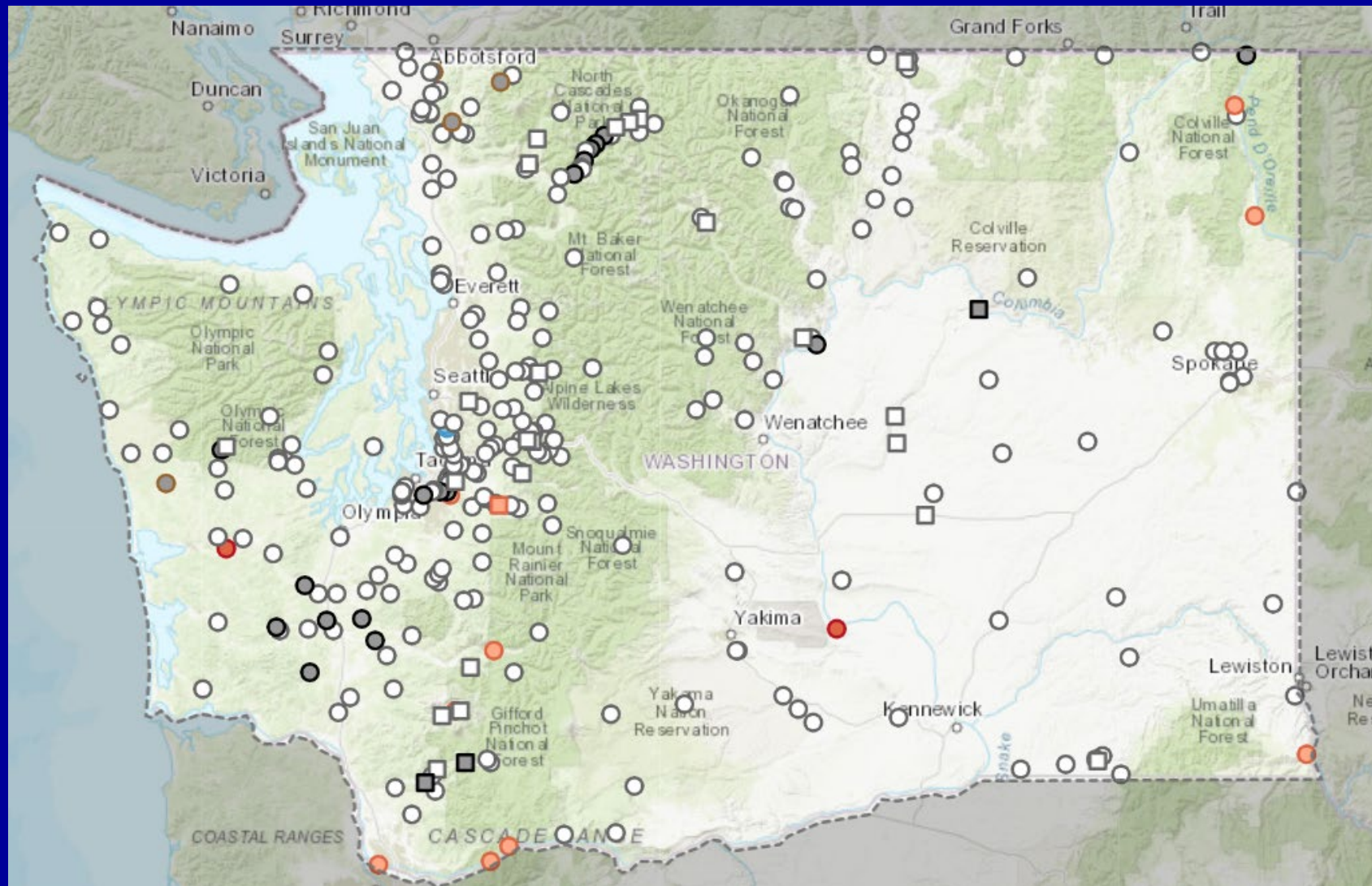
by
Nicholas Sutfin
USGS Washington Water Science Center



WA Current Streamflow Conditions, 21 July, 2022



Rising and Falling conditions of WA streams on 21 July, 2022



Surface-Water Levels: Rising and falling

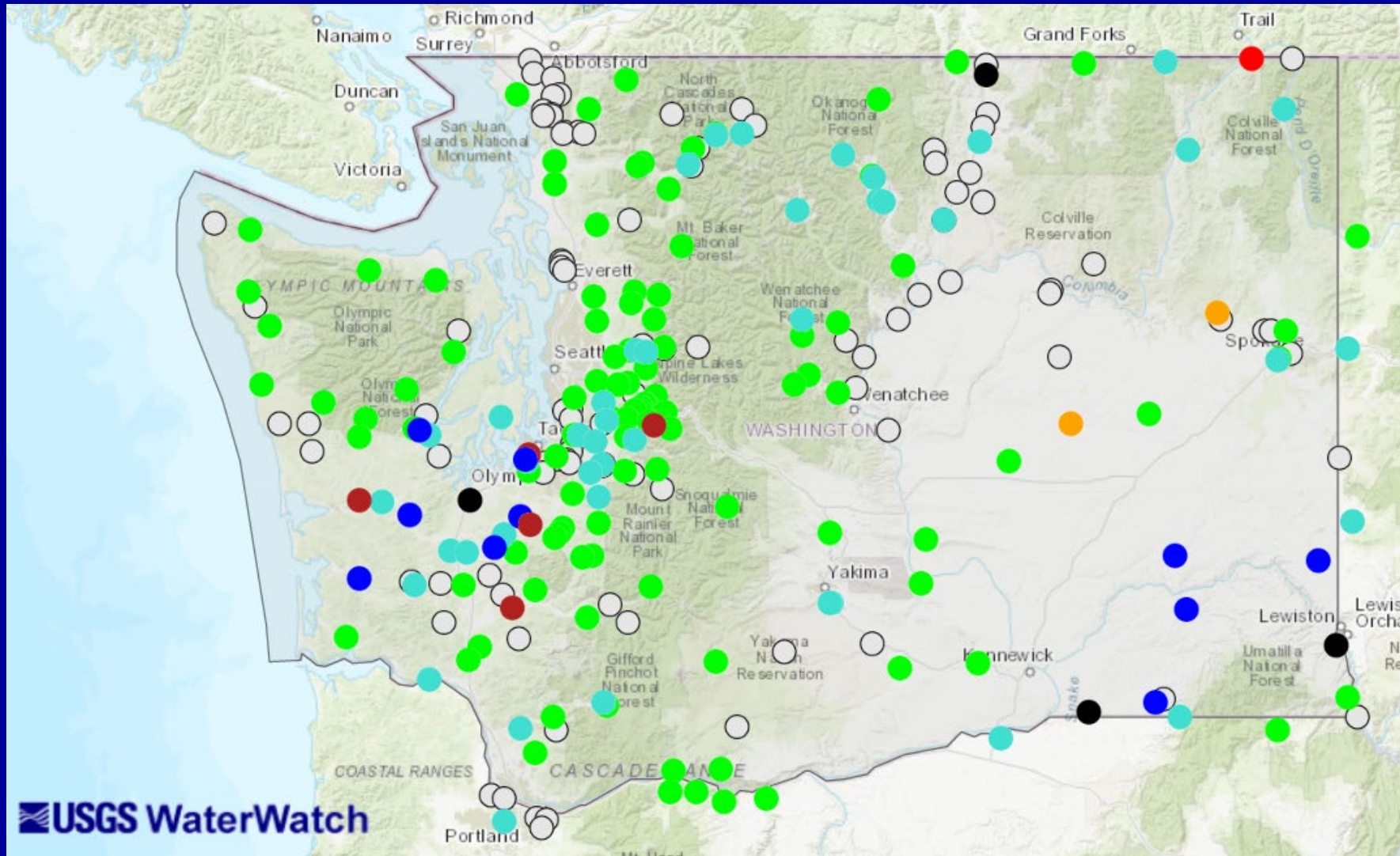
COLOR – CHANGE

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

SHAPE – SITE TYPE

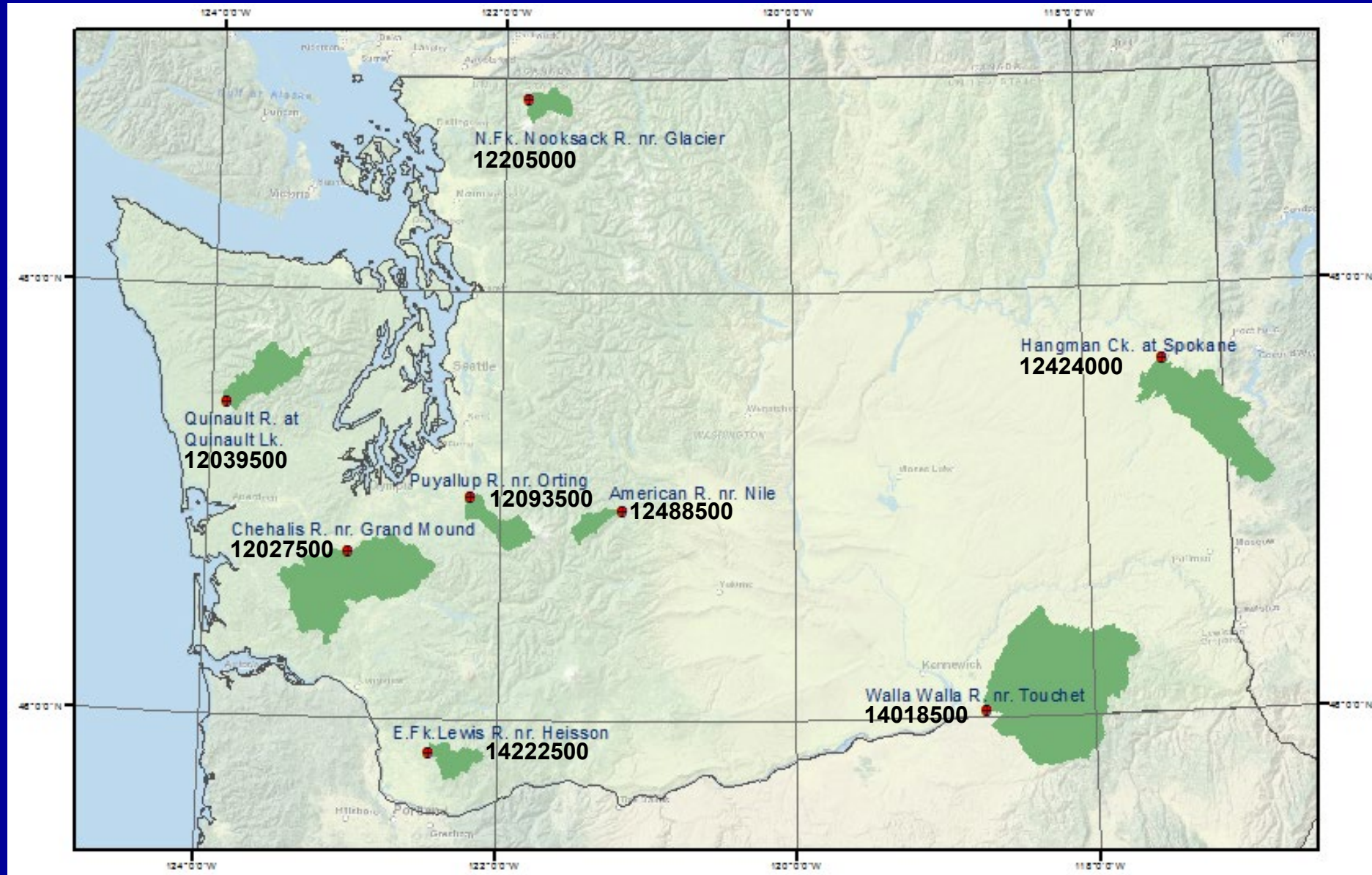
- Stream
- Lake
- Wetland
- Estuary
- Coastal

WA 7-day Average Streamflow Conditions as of 21 July, 2022

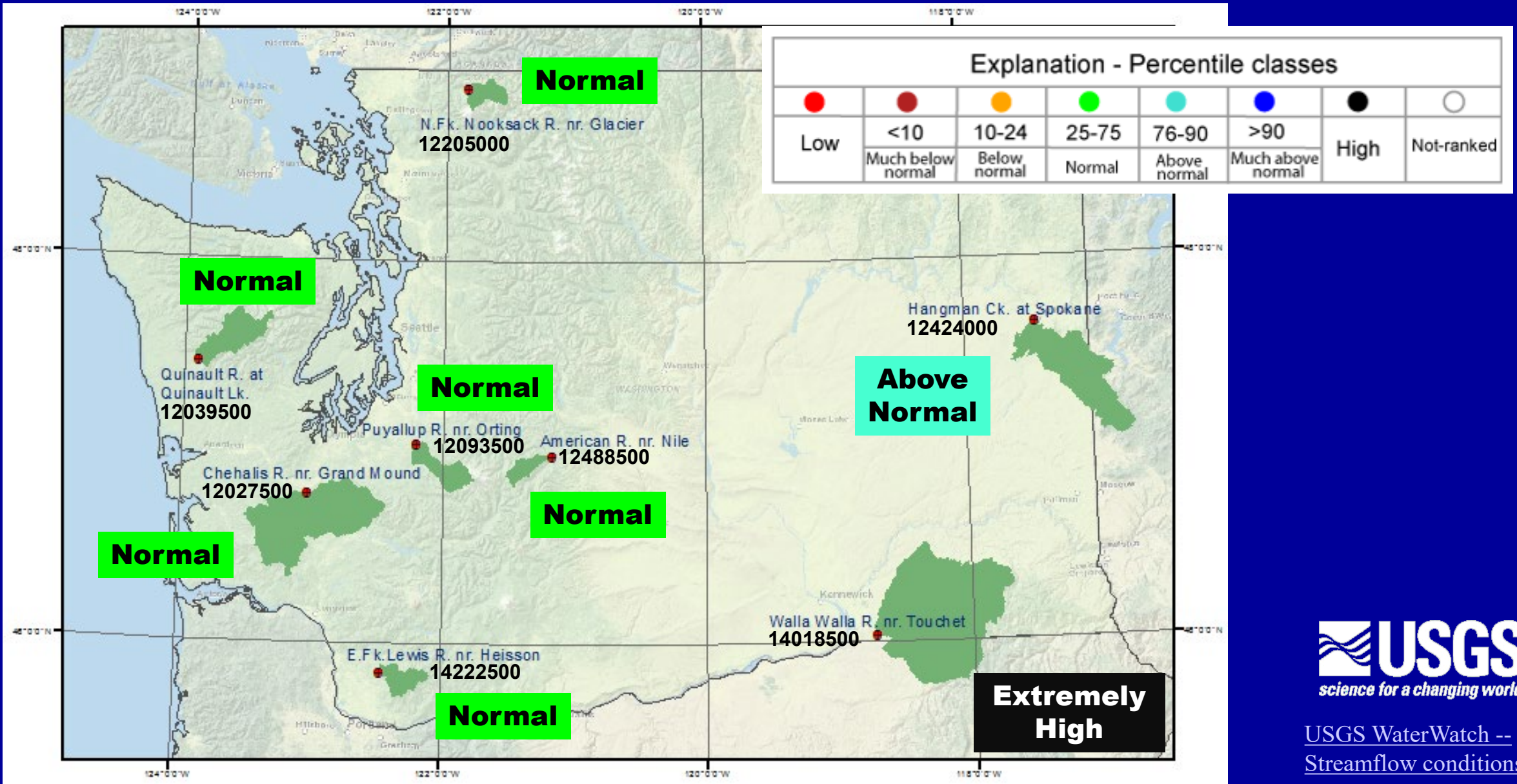


Index Gaging Stations

(Stations that measure natural or near-natural streamflow)

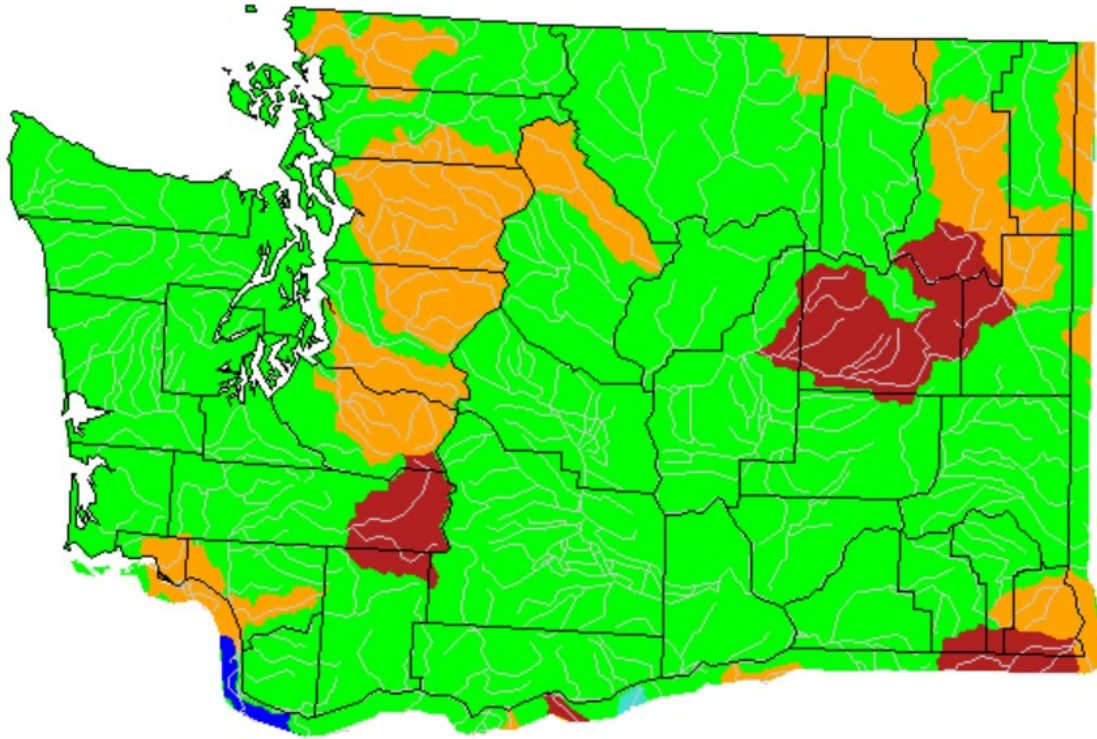


Index Gaging Stations, 7-day average streamflow (as of 21 July 2022)

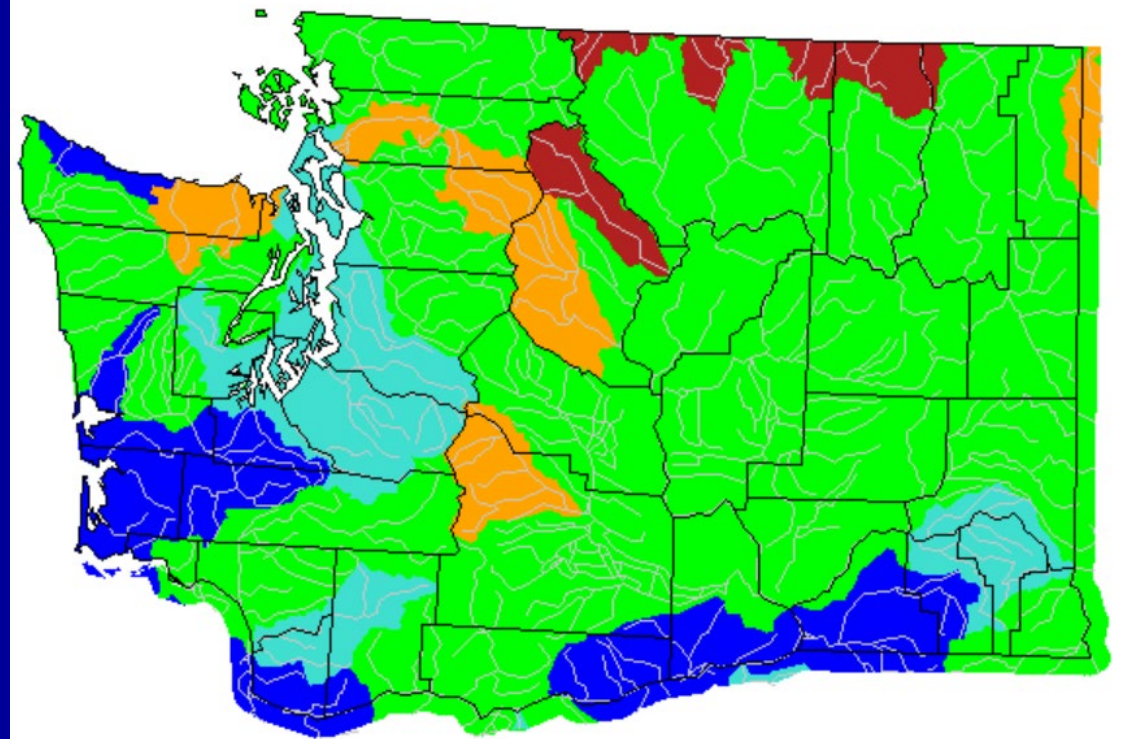


Monthly average streamflow compared to historical record for April 2022 & May 2022

April 2022

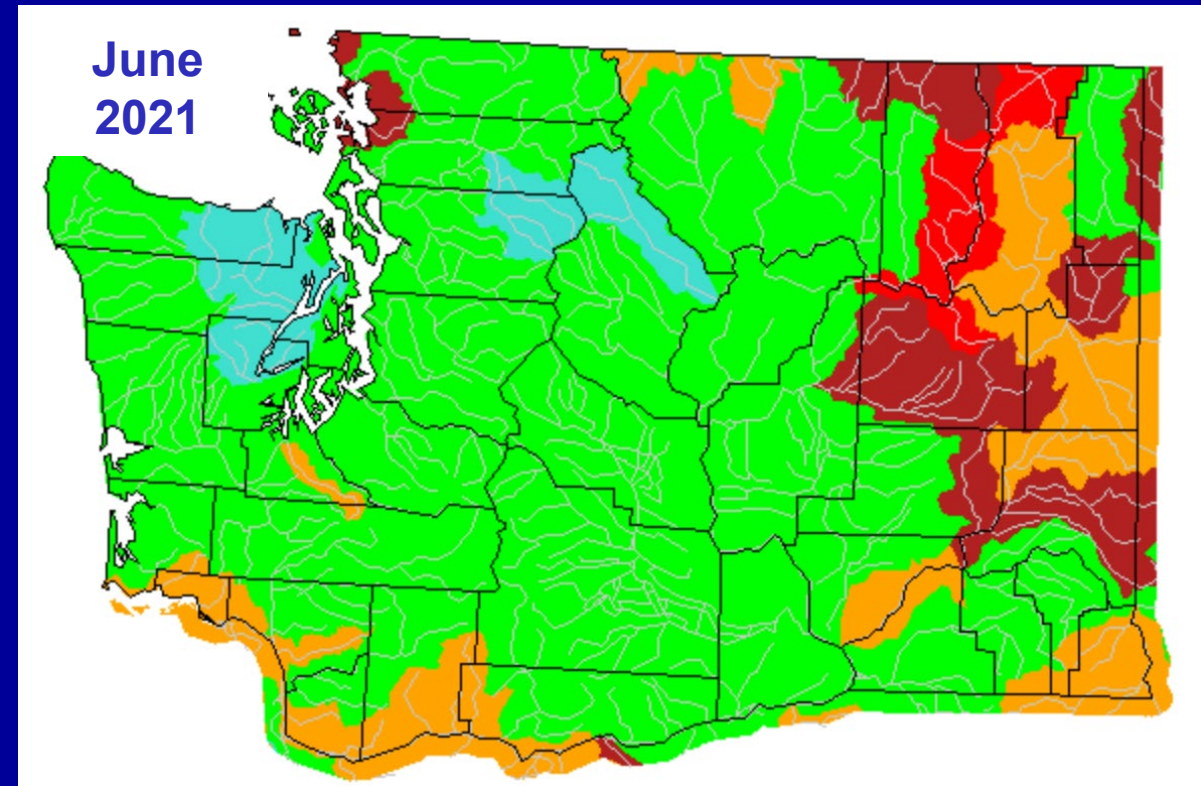
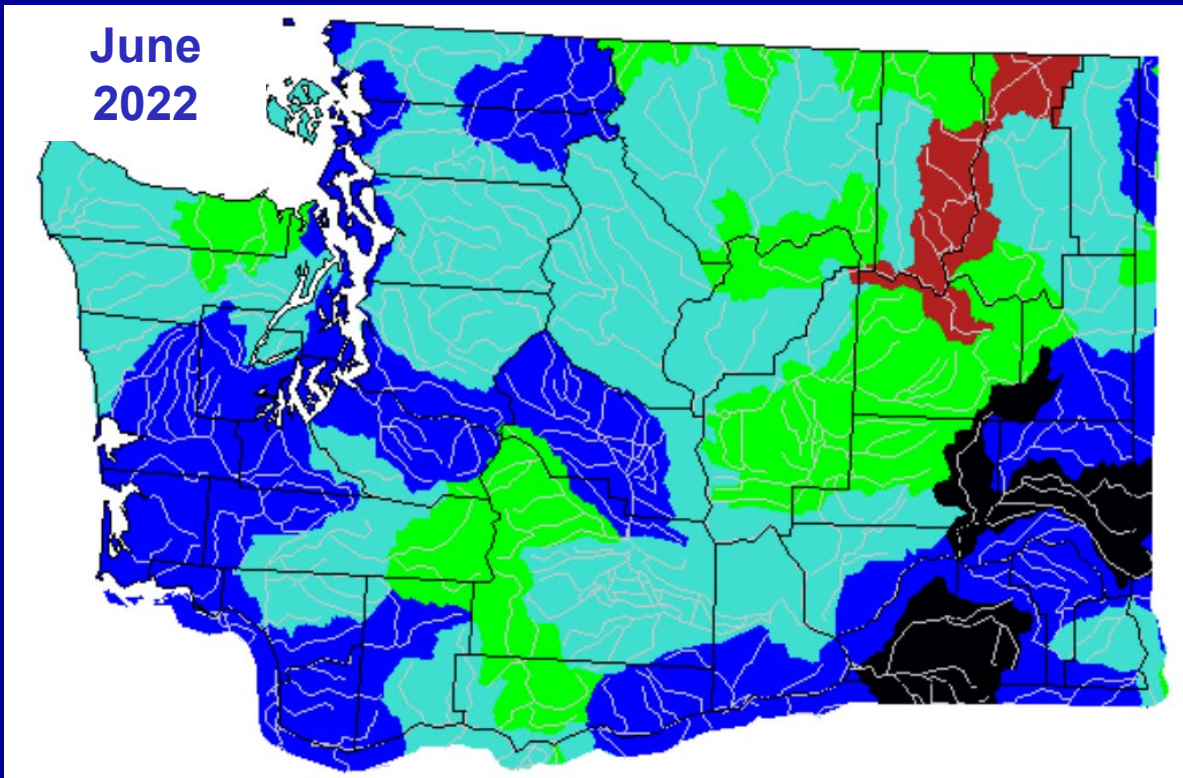


May 2022



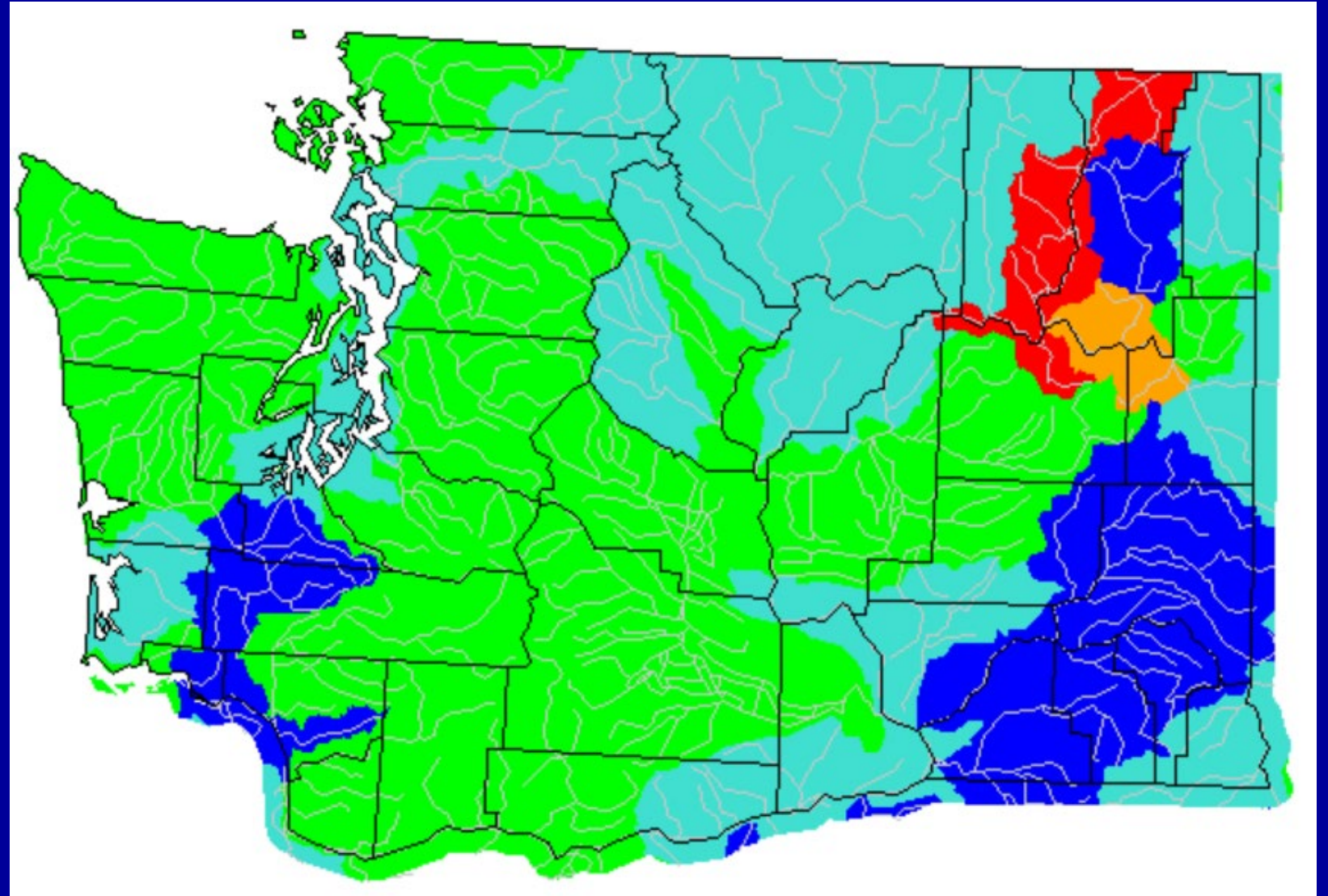
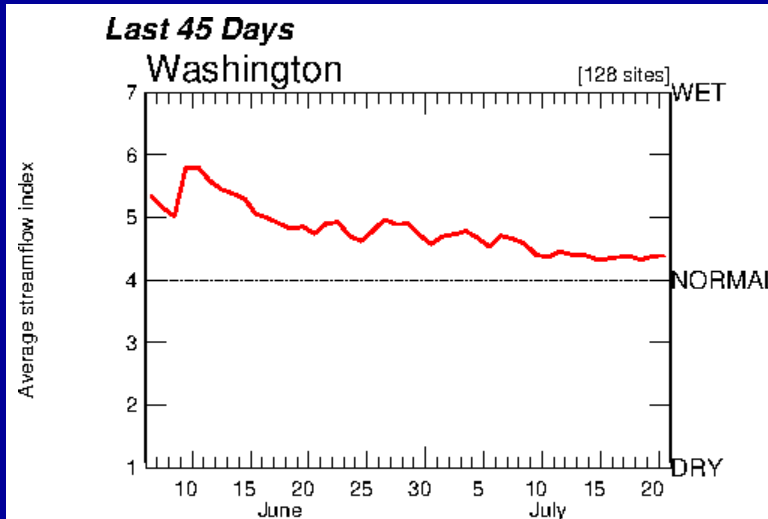
Explanation - Percentile classes						
	<10	10-24	25-75	76-90	>90	
Low	Much below normal	Below normal	Normal	Above normal	Much above normal	High

Monthly average streamflow compared to historical record for June 2022



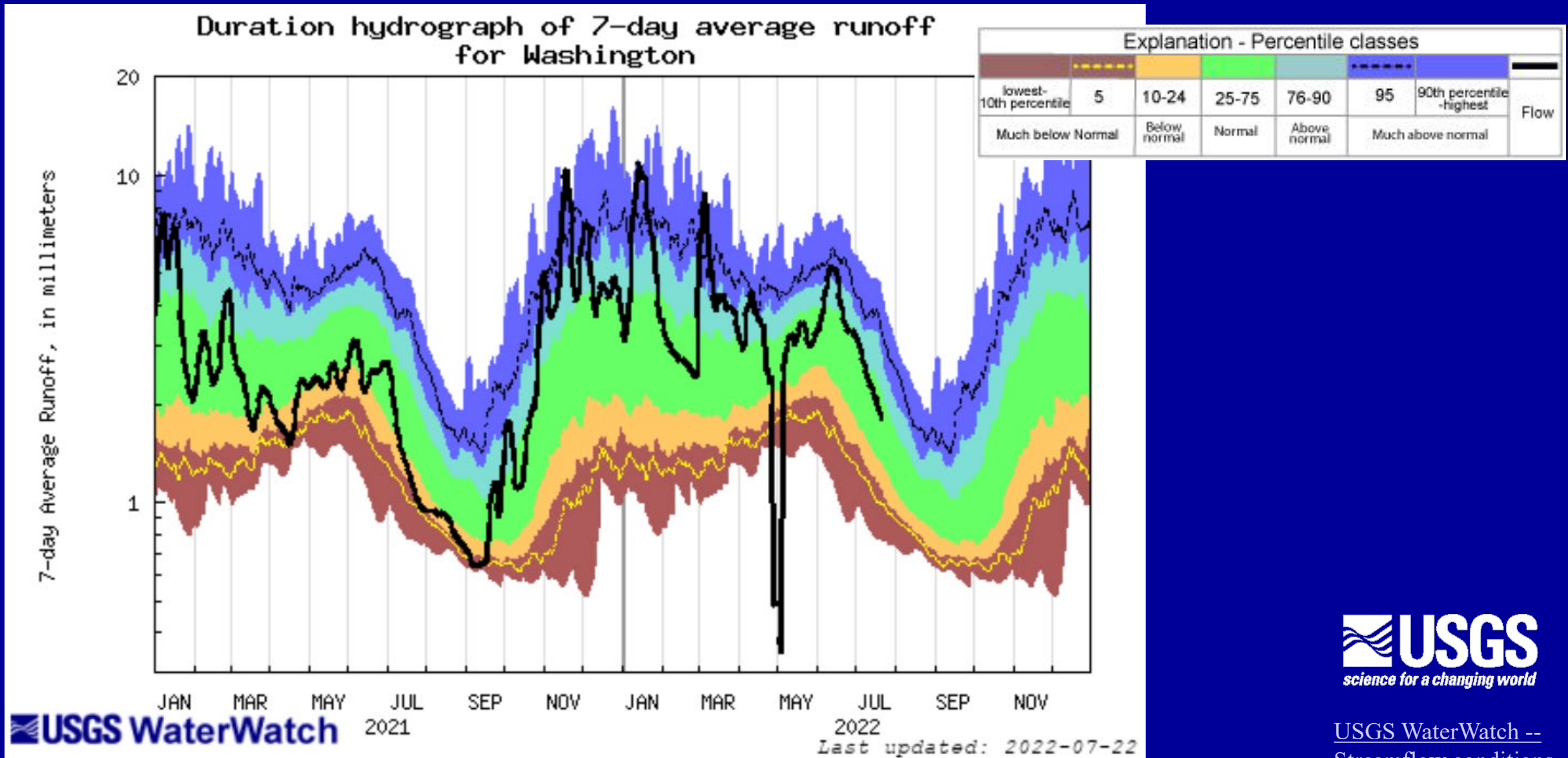
Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

WA 28-day Average Streamflow Conditions as of 22 July, 2022

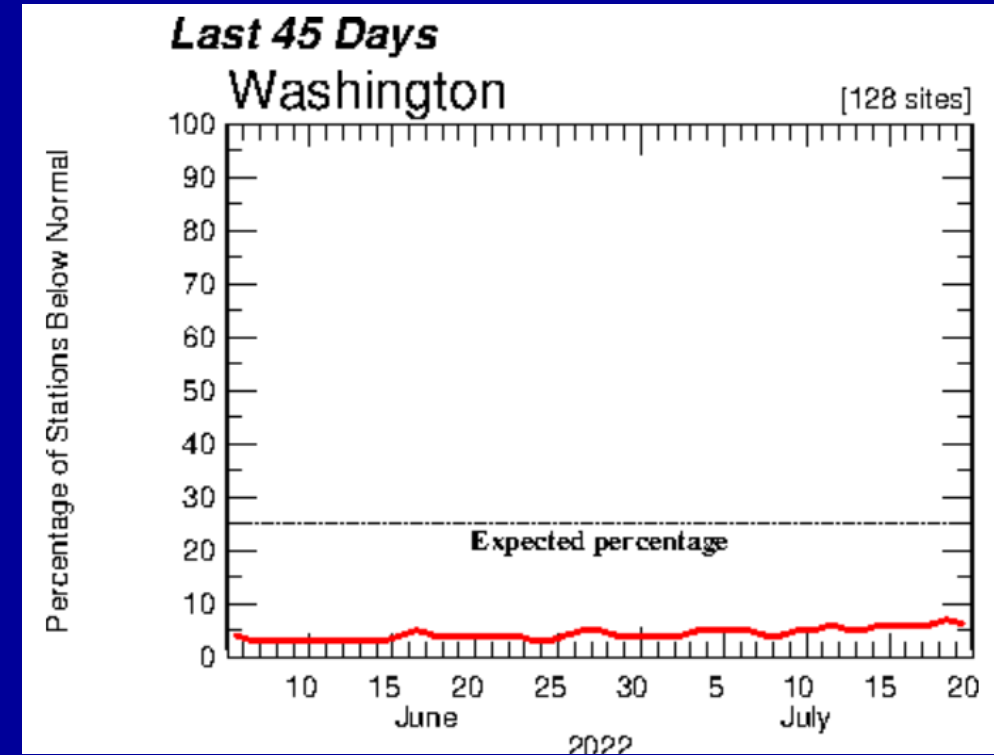
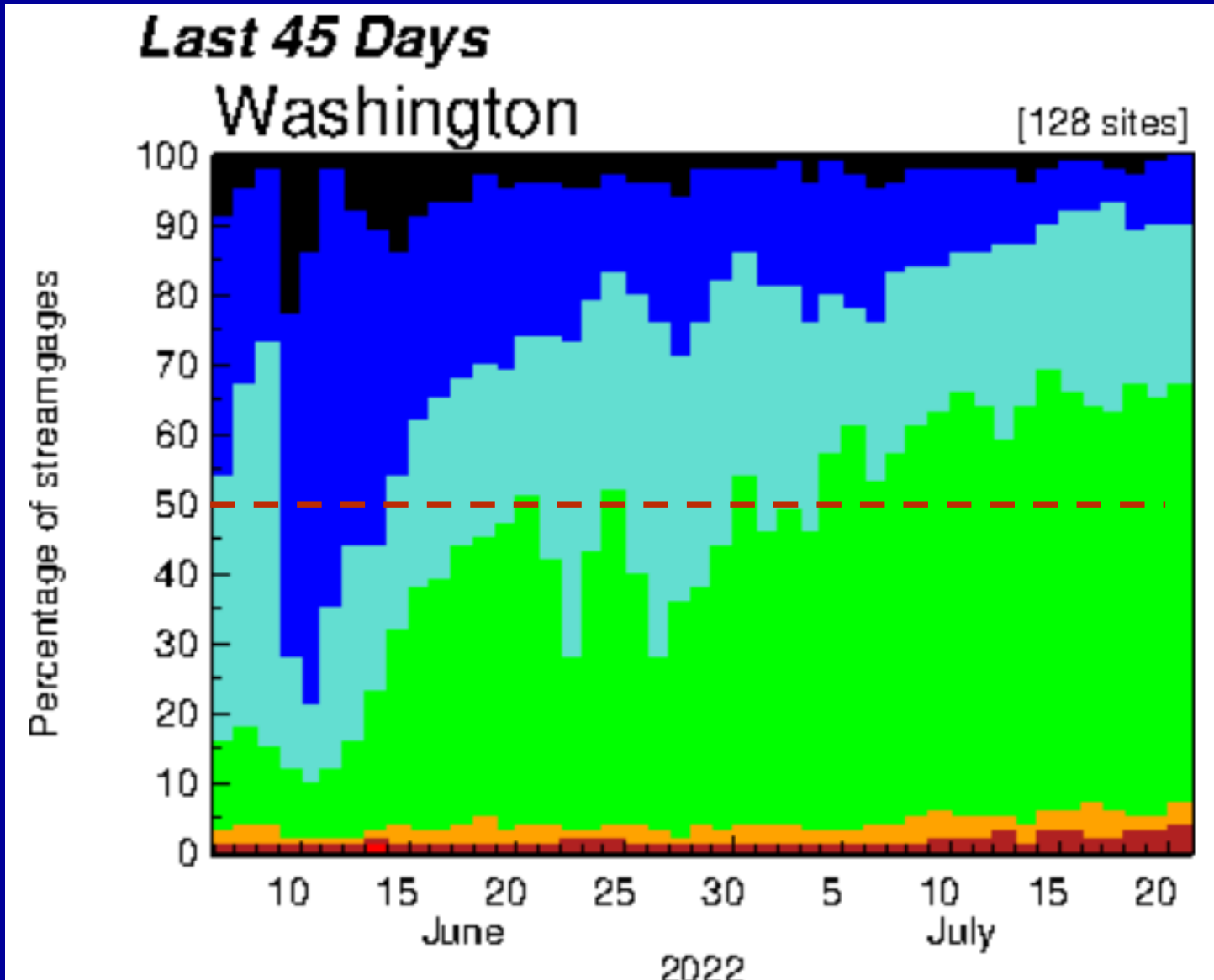


Duration Hydrograph, Washington State

7-day Average Streamflow (as of 22 July, 2022) is normal



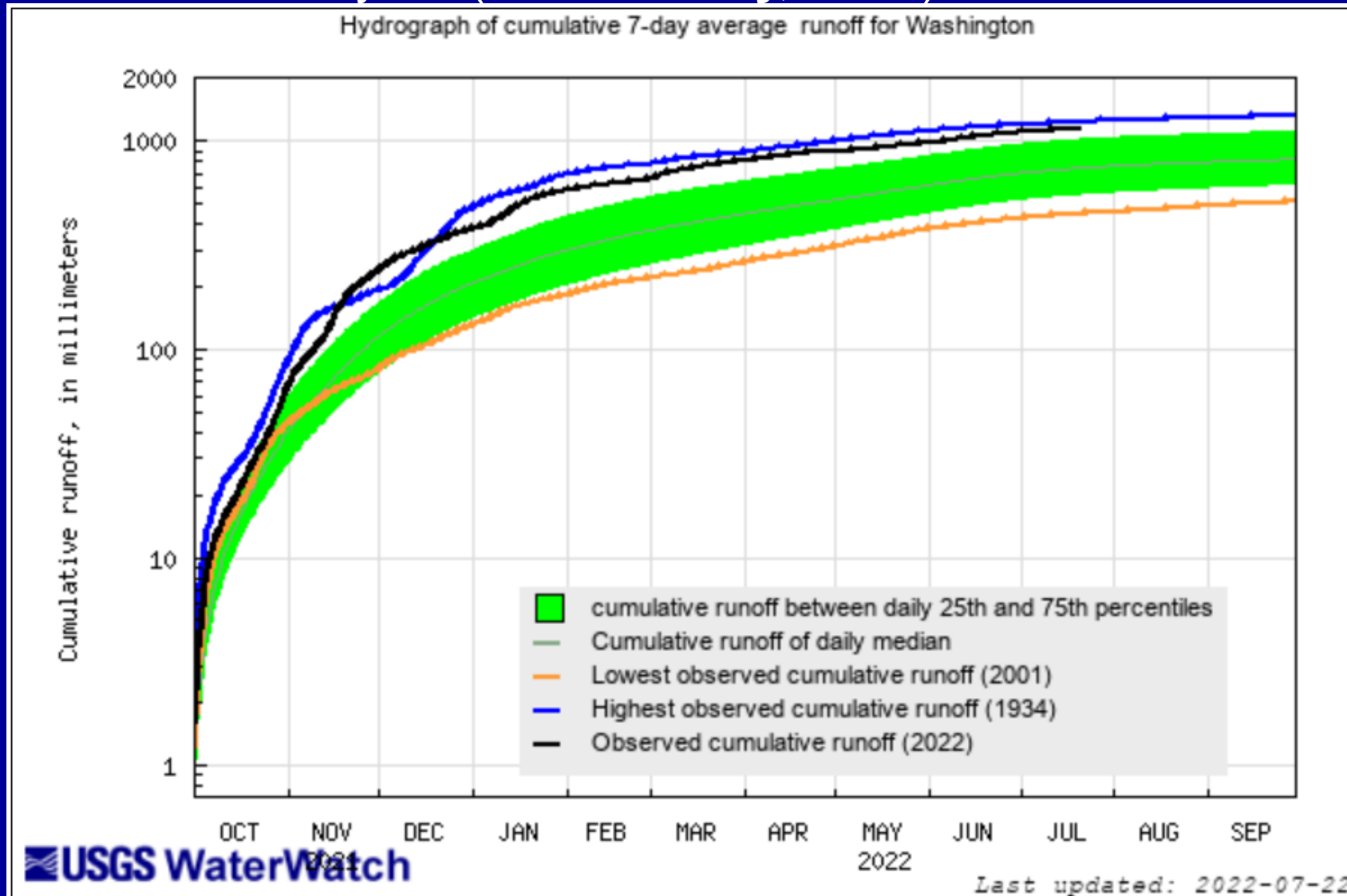
Daily streamflow in Washington Rivers compared to historical streamflow, June - July 2022



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

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

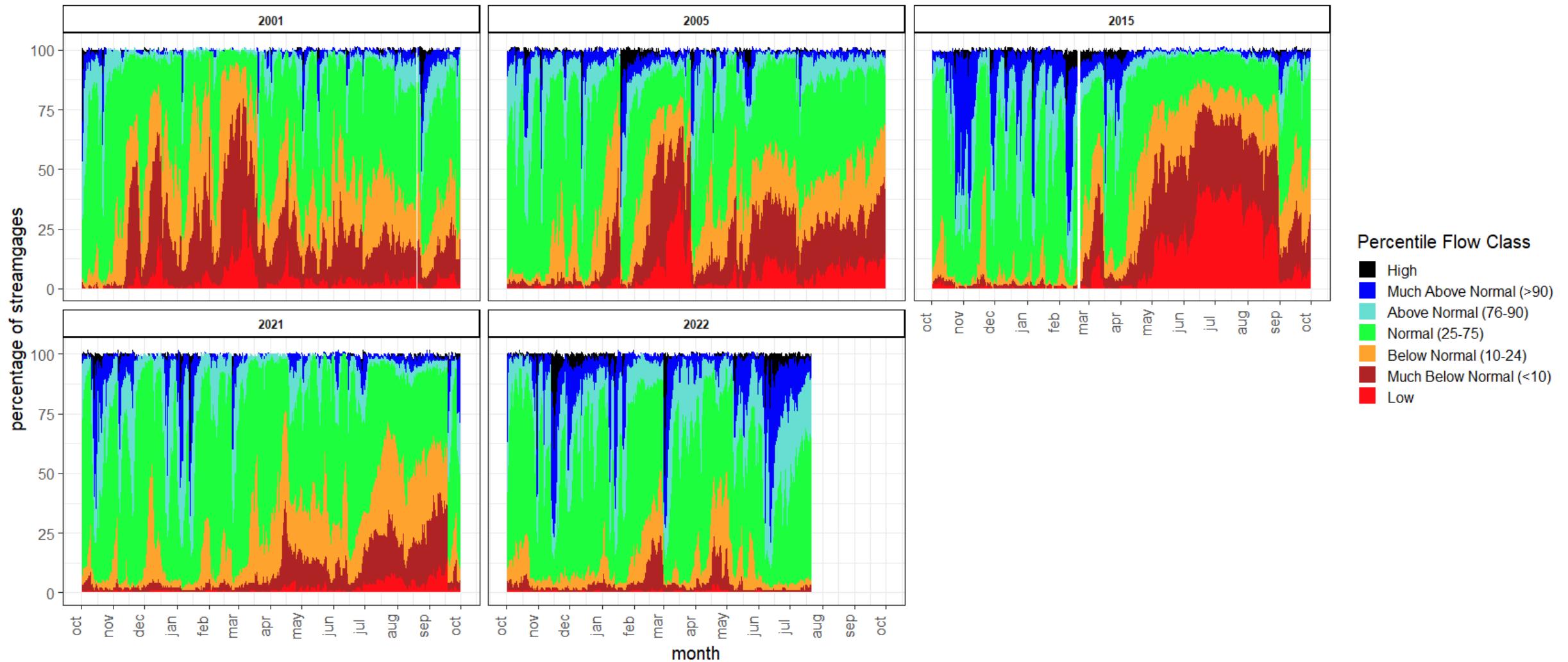
2022 Water year (as of 22 July, 2022) is above normal



USGS WaterWatch --
Streamflow conditions

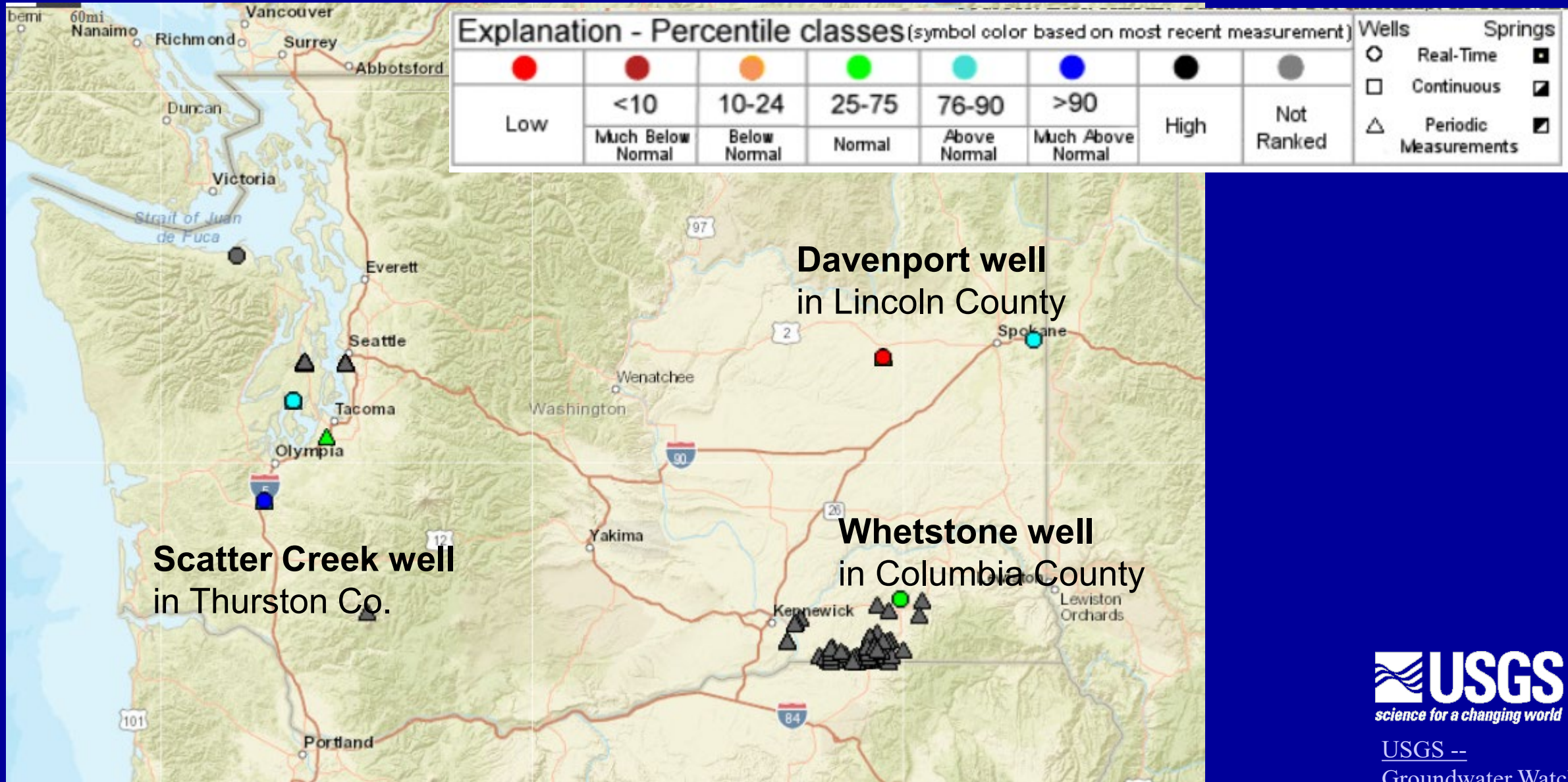
Daily streamflow in Washington Rivers compared to historical streamflow, 2001, 2005, 2015, 2021, 2022

Time series plot of daily streamflow compared to historical streamflow for the day of the water year (Washington)

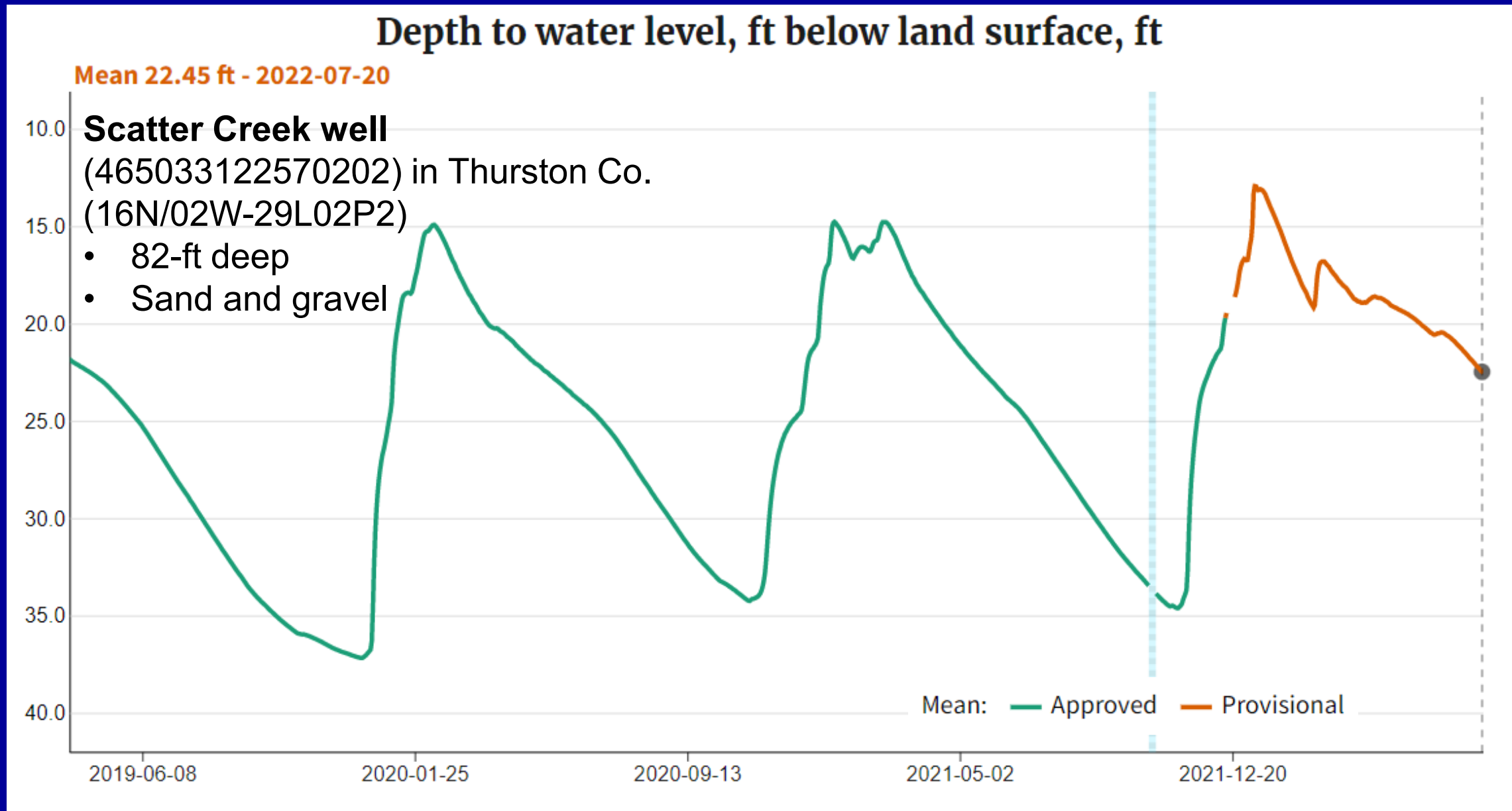


data: USGS WaterWatch

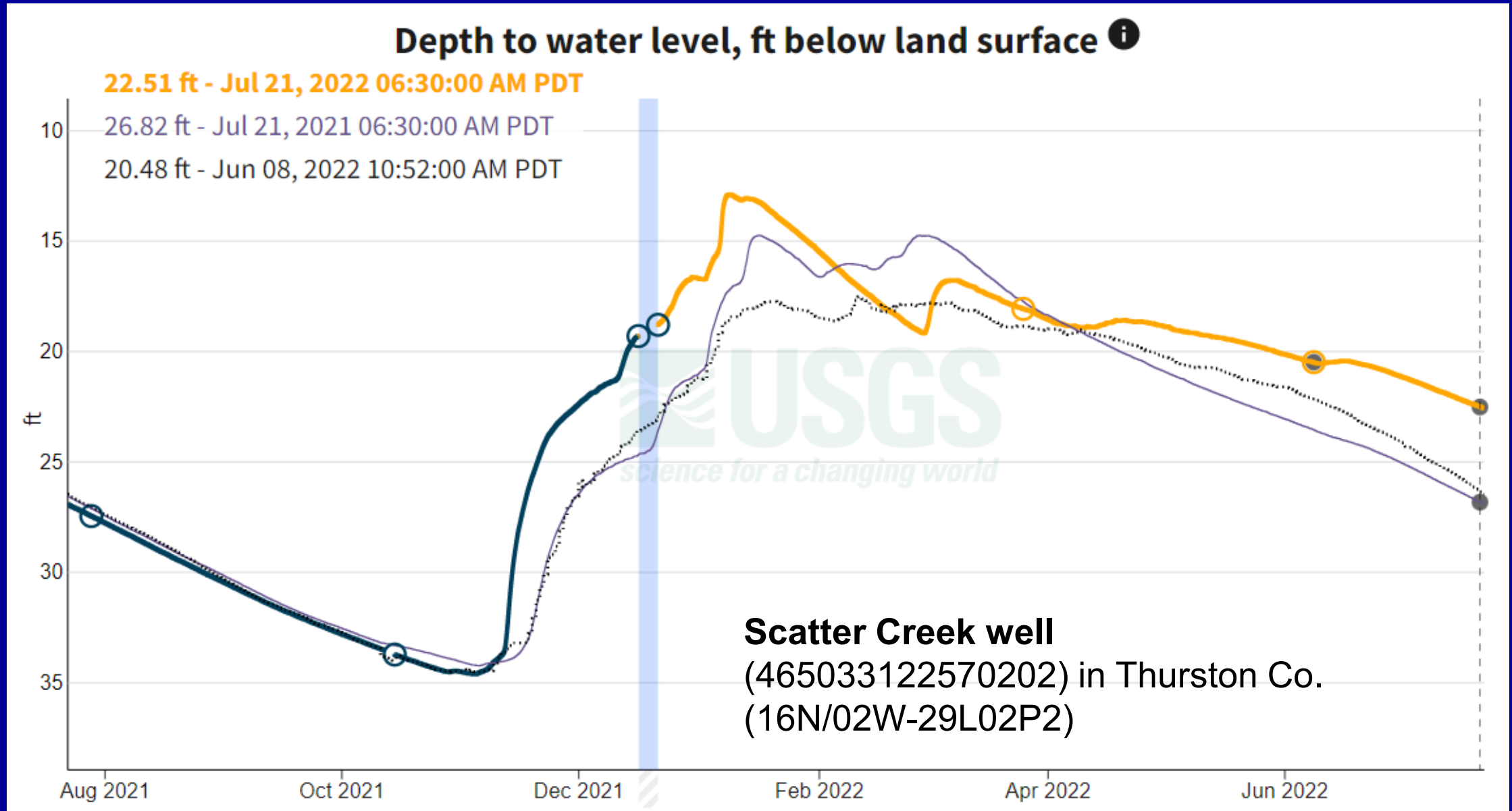
WA Current Groundwater Conditions (22 July, 2022)



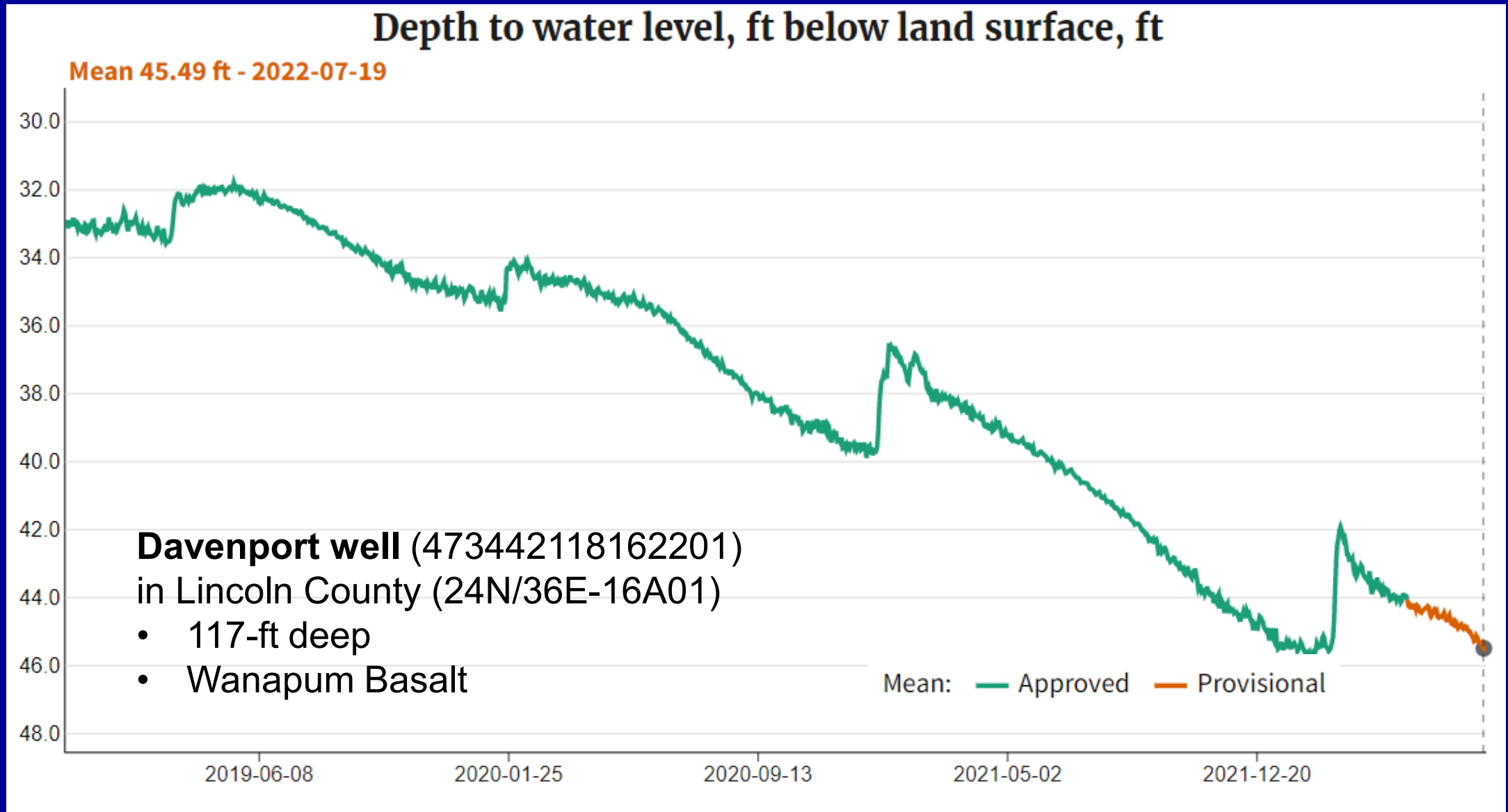
Scatter Creek Well Groundwater Conditions (22 July, 2022)



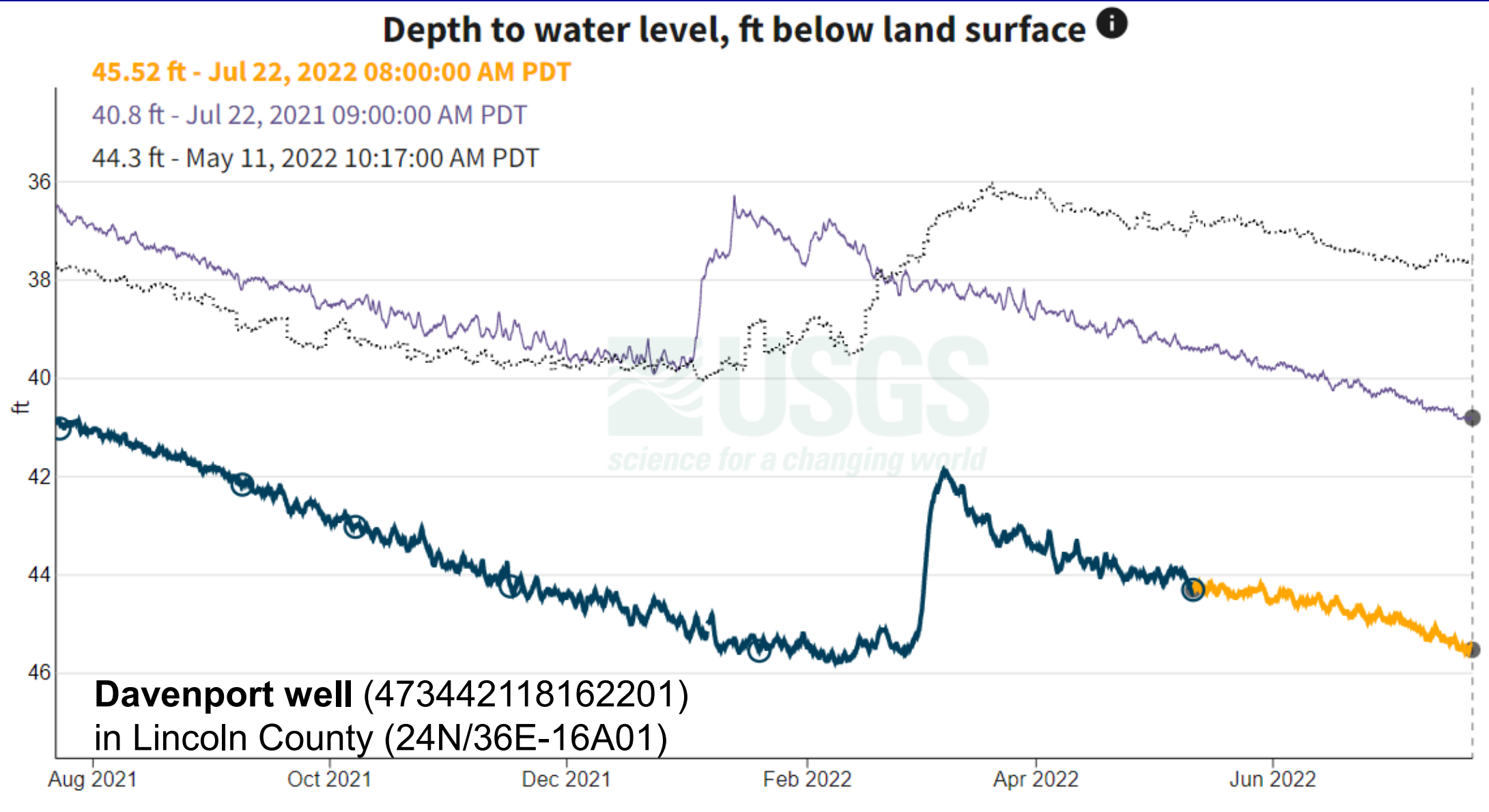
Scatter Creek Well Groundwater Conditions (22 July, 2022)



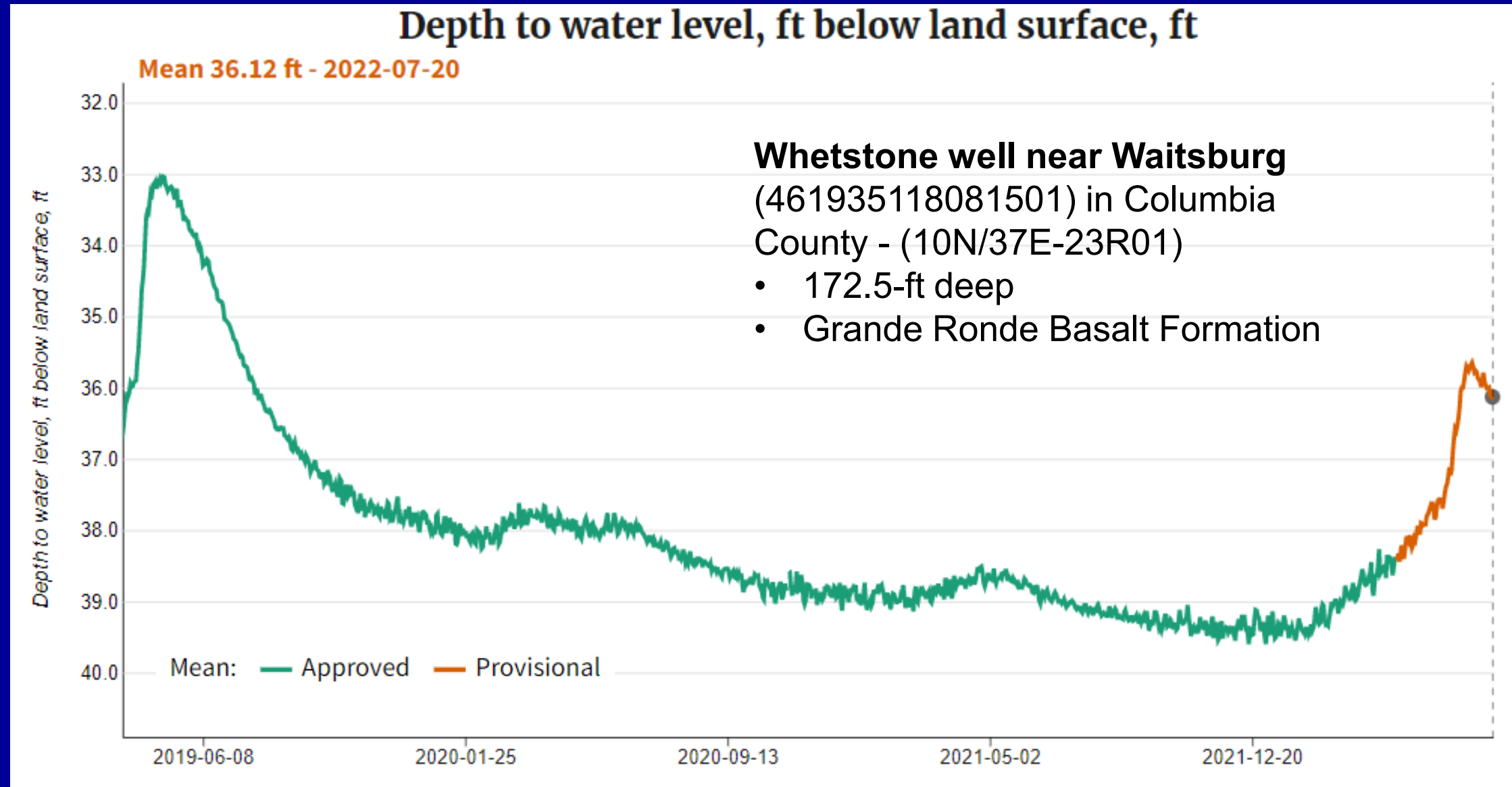
Davenport Well Groundwater Conditions (22 July, 2022)



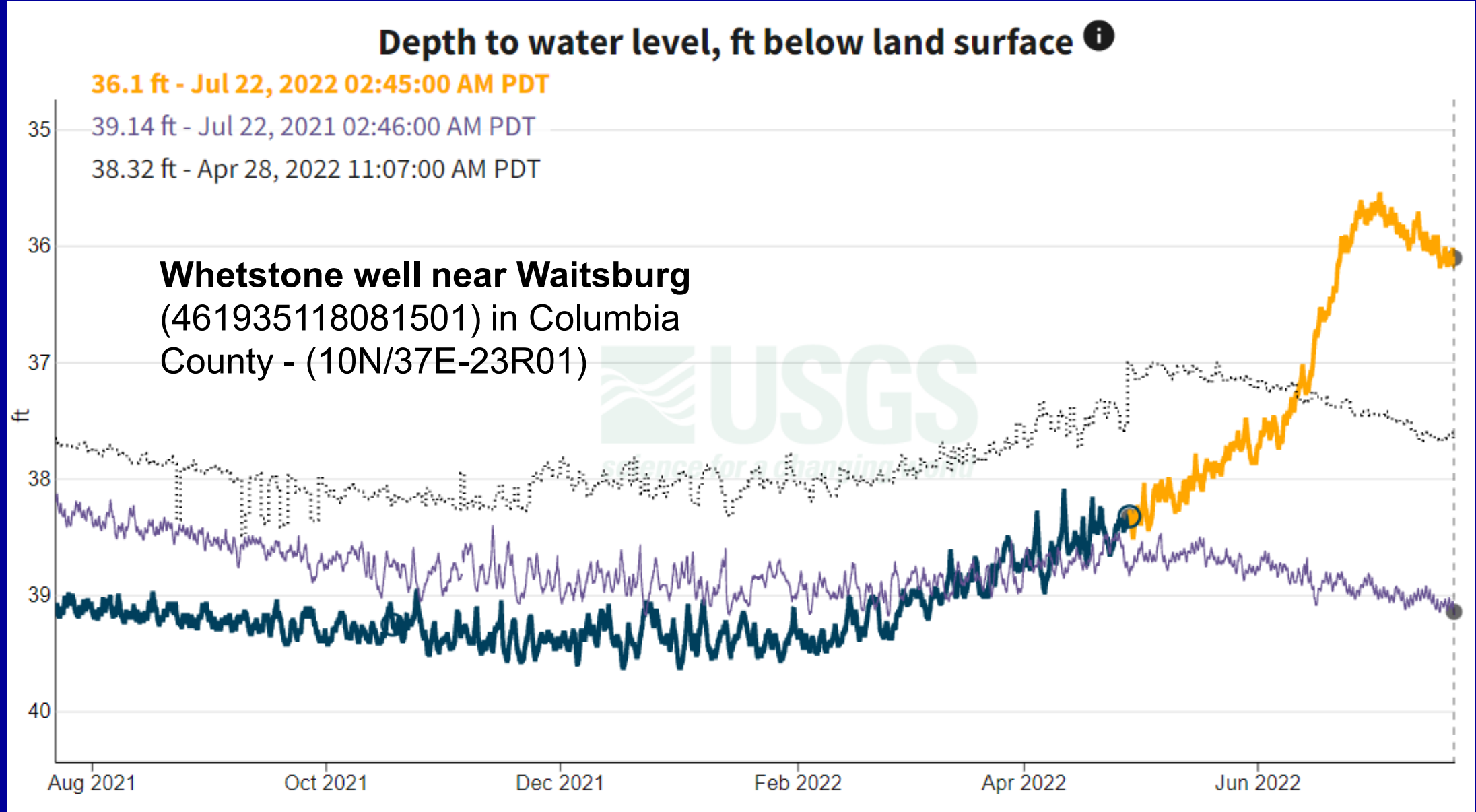
Davenport Well Groundwater Conditions (22 July, 2022)



Whetstone Well Groundwater Conditions (22 July, 2022)

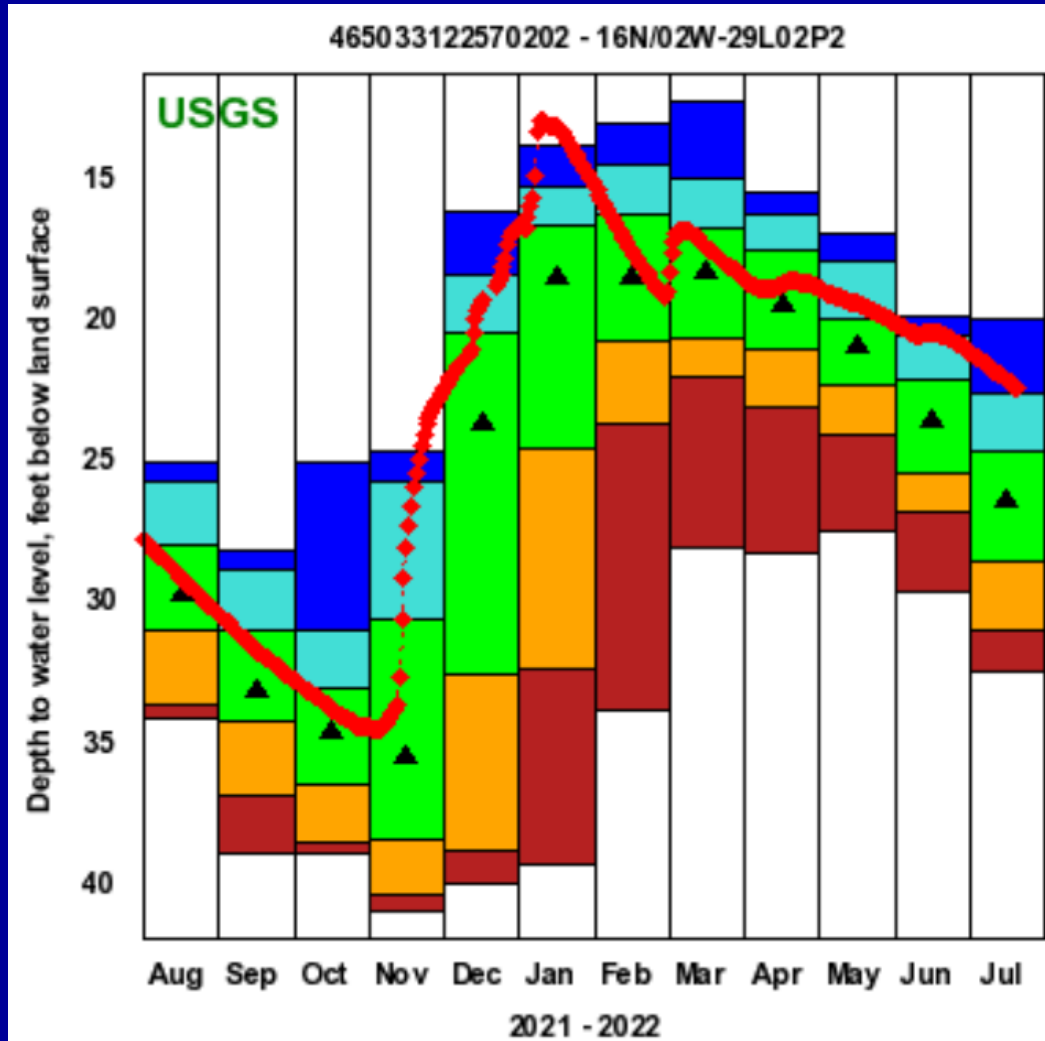


Whetstone Well Groundwater Conditions (22 July, 2022)

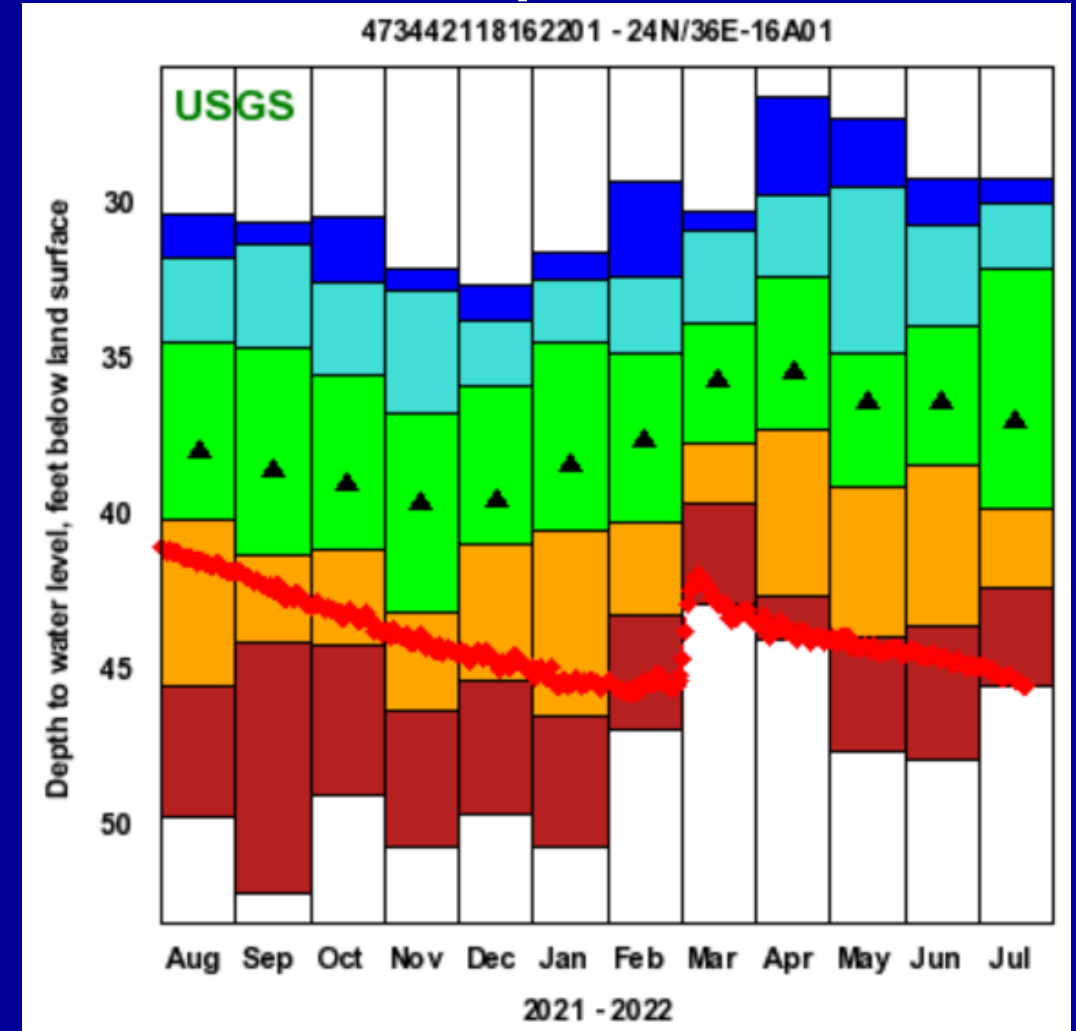


WA Current Groundwater Conditions (22 July, 2022)

Scatter Creek well



Davenport well



WA Current Groundwater Conditions (22 July, 2022)

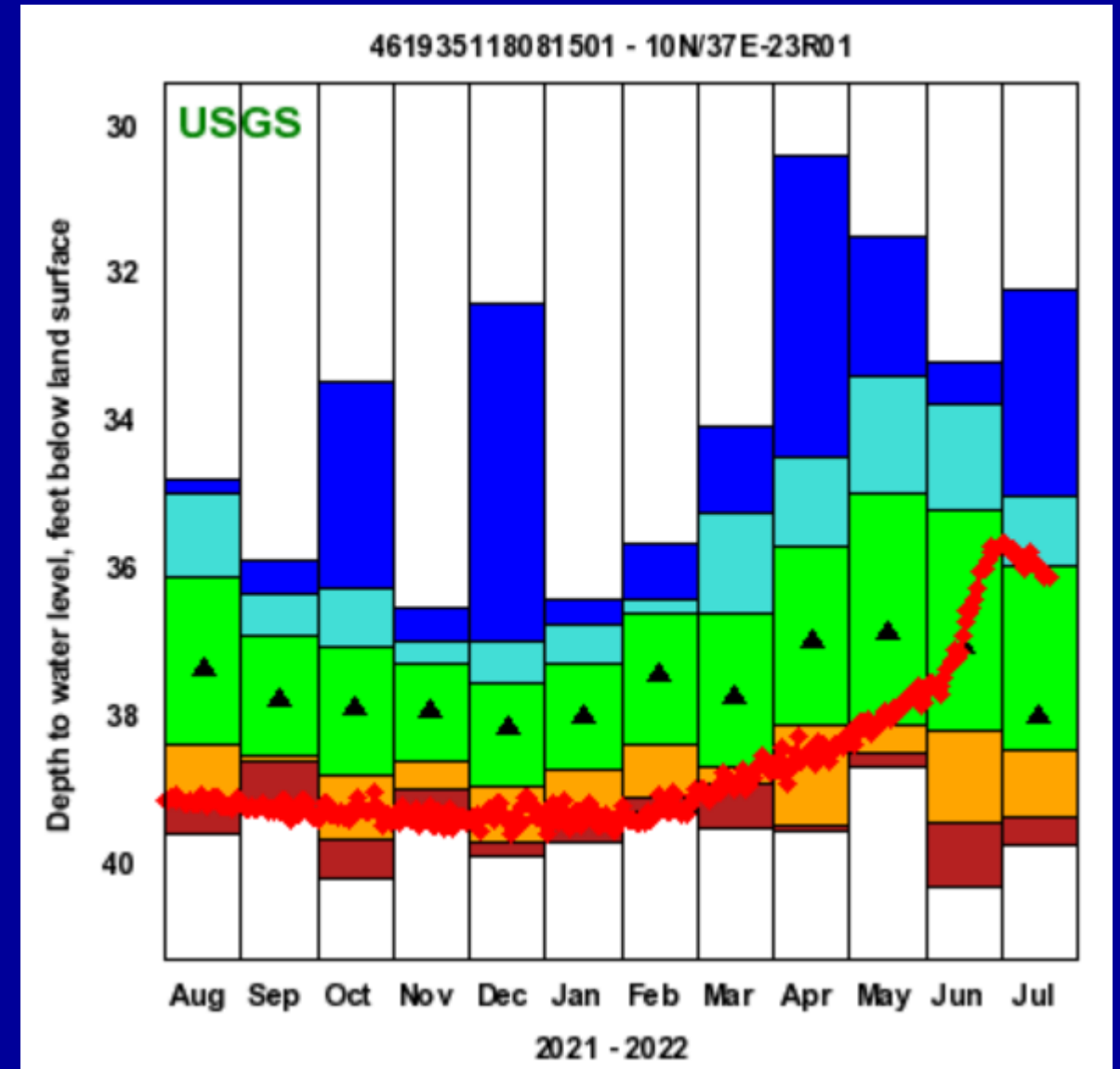
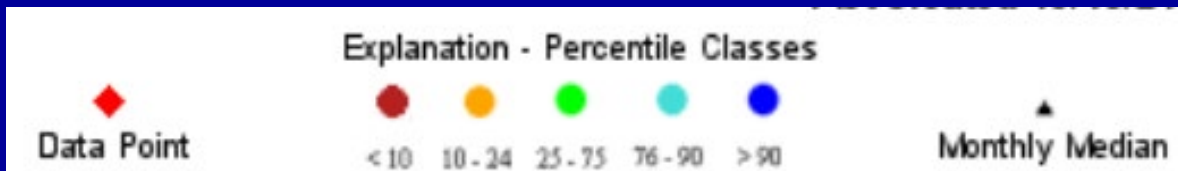
Whetstone well near Waitsburg

(461935118081501)

in Columbia County

(10N/37E-23R01)

- 172.5-ft deep
- Grande Ronde Basalt Formation



Summary of Washington Streamflow & GW conditions as of 22 July, 2022

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

Western WA

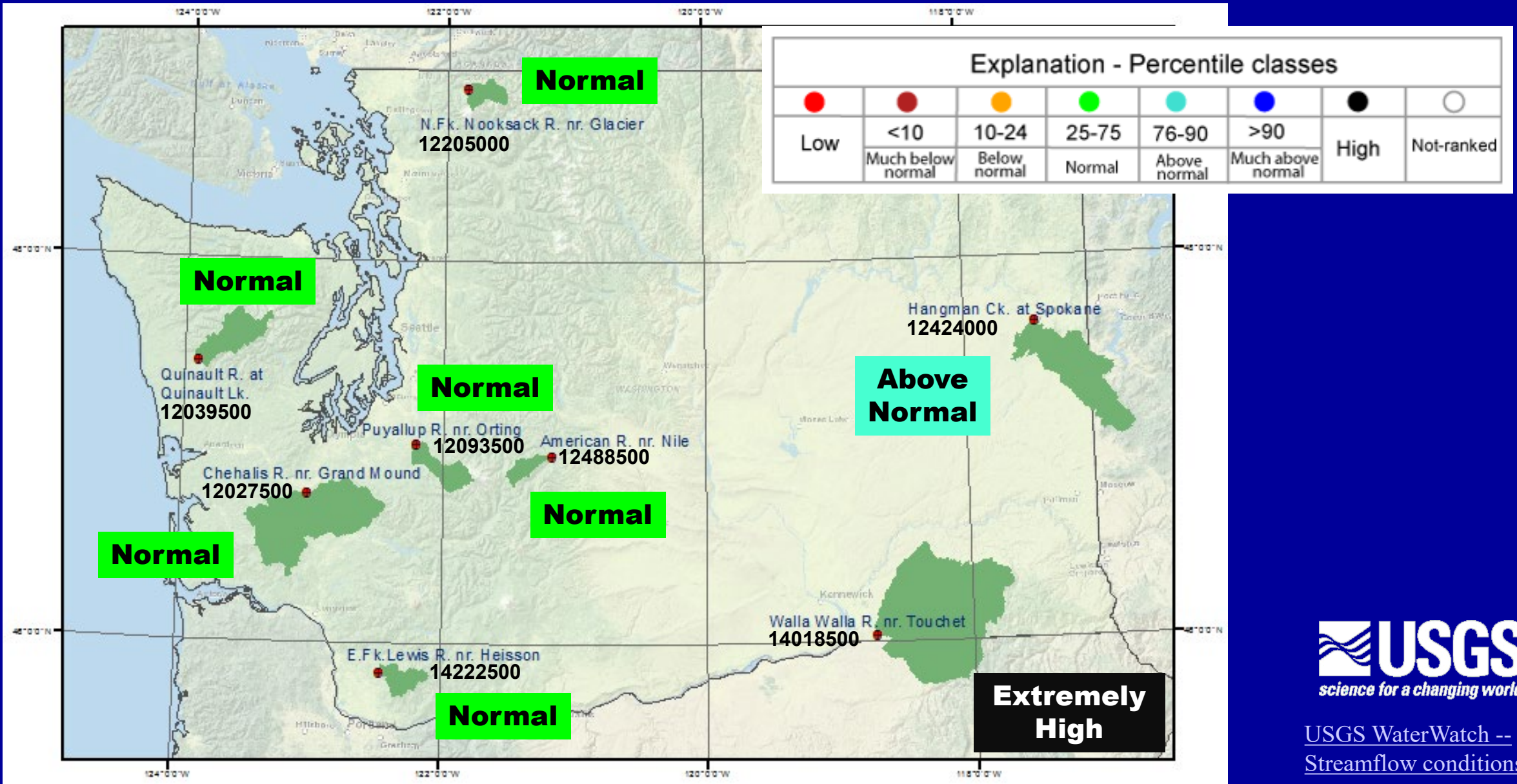
- Puyallup River nr. Orting – Normal
- American River - Normal
- Quinault River –Normal
- EF Lewis River – Normal
- Chehalis River nr. Grand Mound – Normal
- NF Nooksack River – Normal

Eastern WA

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

- Index groundwater sites: **(below normal)**
 - Scatter Creek well (west) – Much above normal
 - Davenport well (east) – Much below normal
 - Waitsburg well - Normal

Index Gaging Stations, 7-day average streamflow (as of 21 July 2022)



USGS WaterWatch --
Streamflow conditions



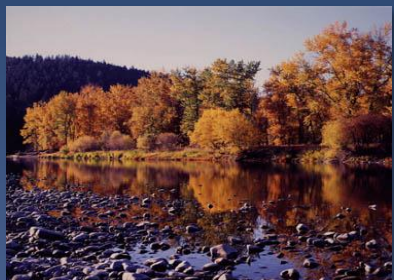
NWS NWRFC and WFO



Washington Water Supply Availability Committee Meeting July 22, 2022

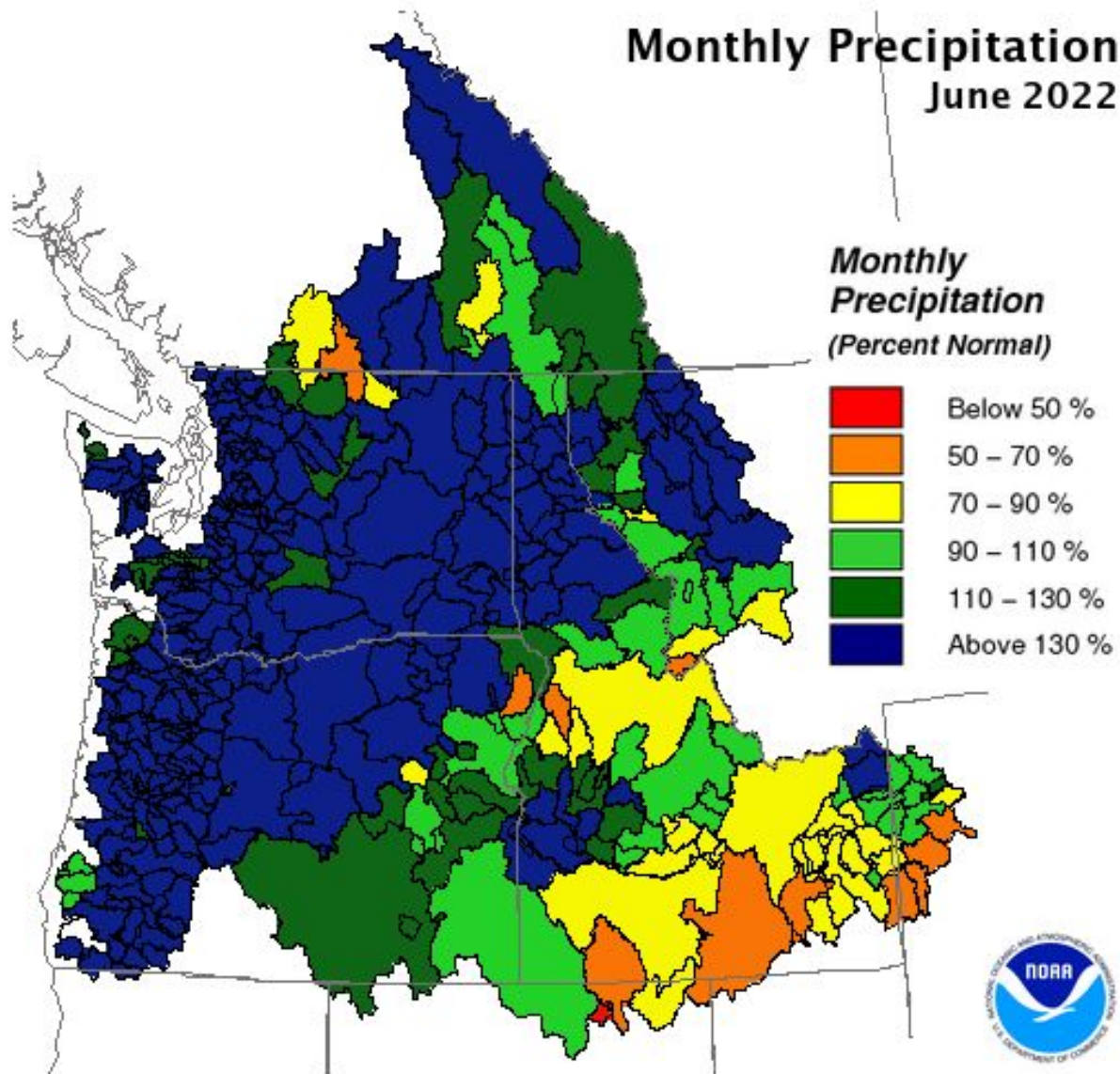


Henry Pai
NWRFC.watersupply@noaa.gov



Monthly Precipitation

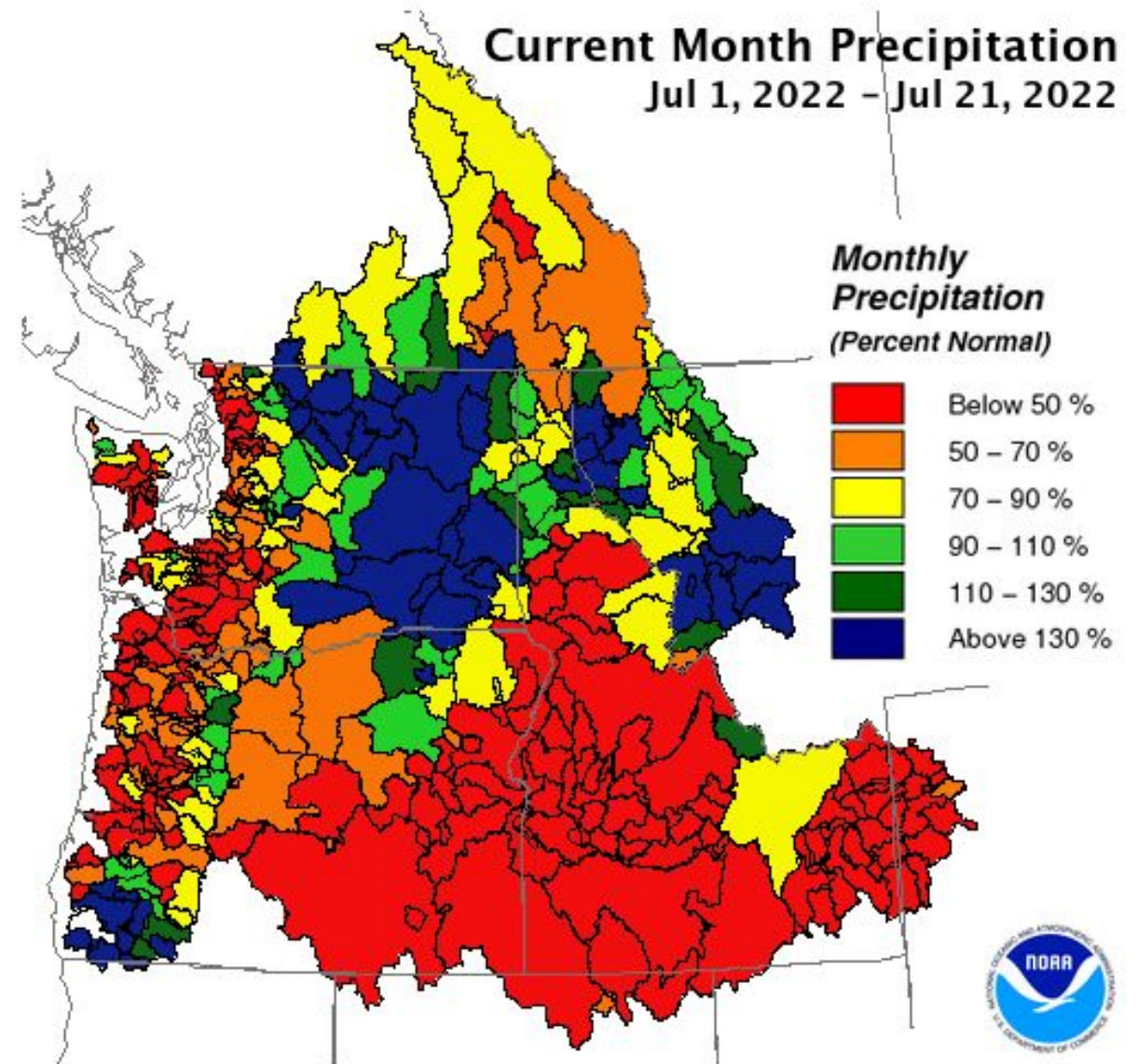
Monthly Precipitation
June 2022



Creation Time: Friday, Jul 1, 2022

Northwest River Forecast Center

Current Month Precipitation
Jul 1, 2022 – Jul 21, 2022



Creation Time: Friday, Jul 22, 2022

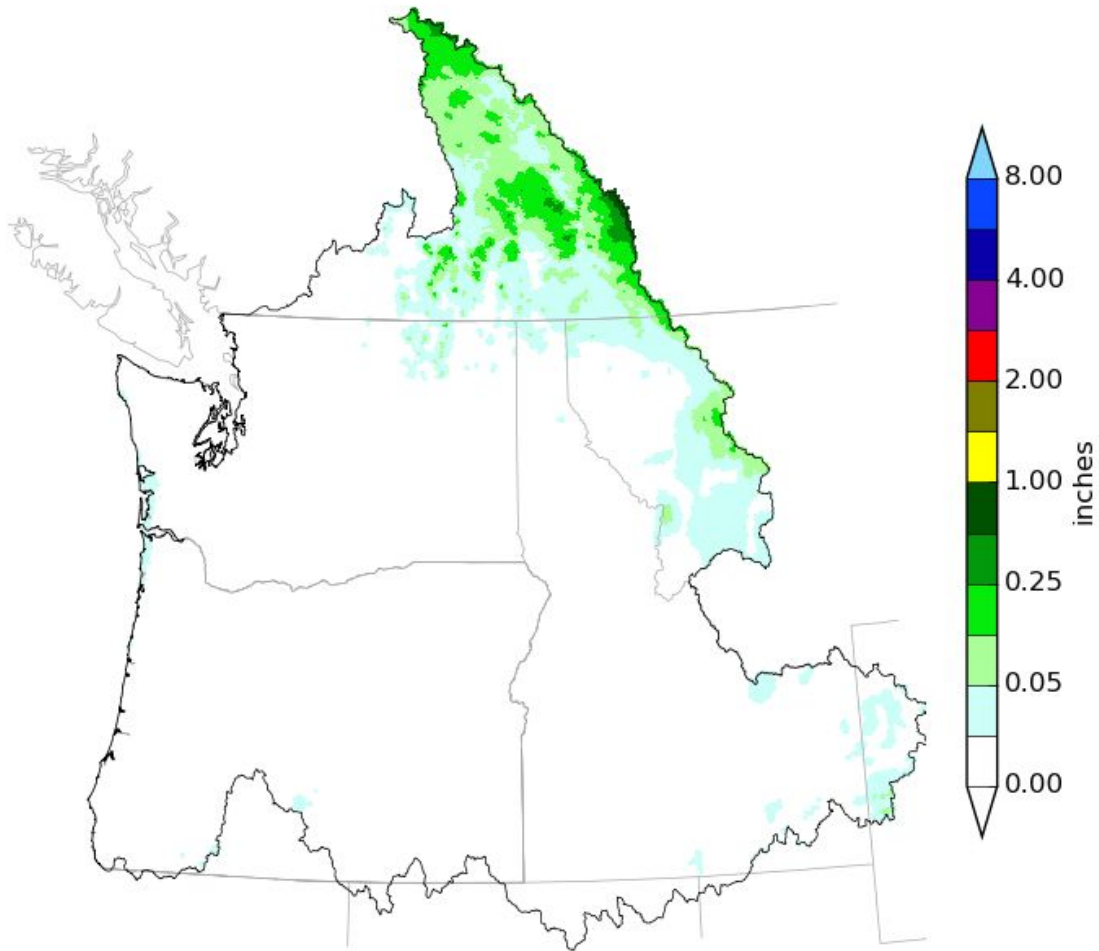
Northwest River Forecast Center



Precipitation Forecast (July 23 - August 1)



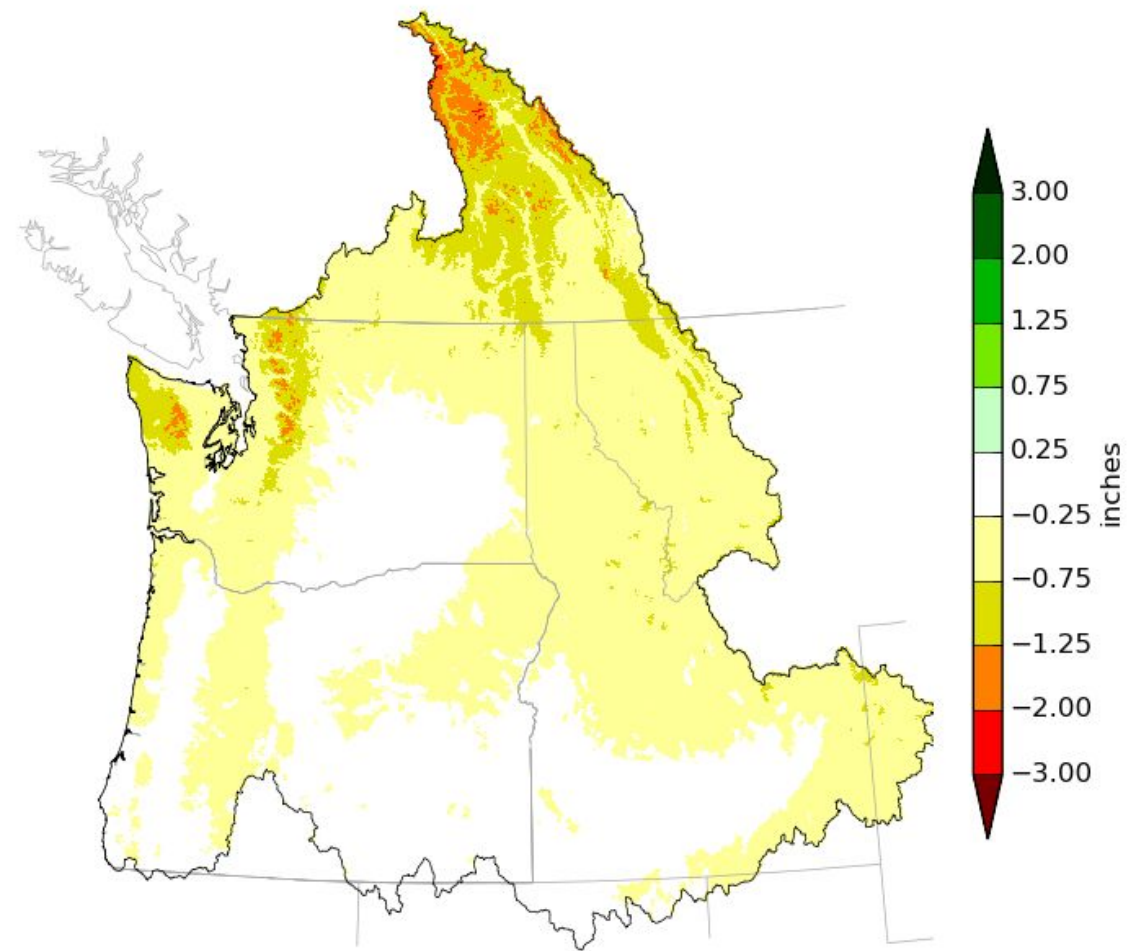
Northwest River Forecast Center
10 Day QPF, Ending 12Z, 08/01/22



Creation Time: Fri Jul 22 14:23:01 UTC 2022

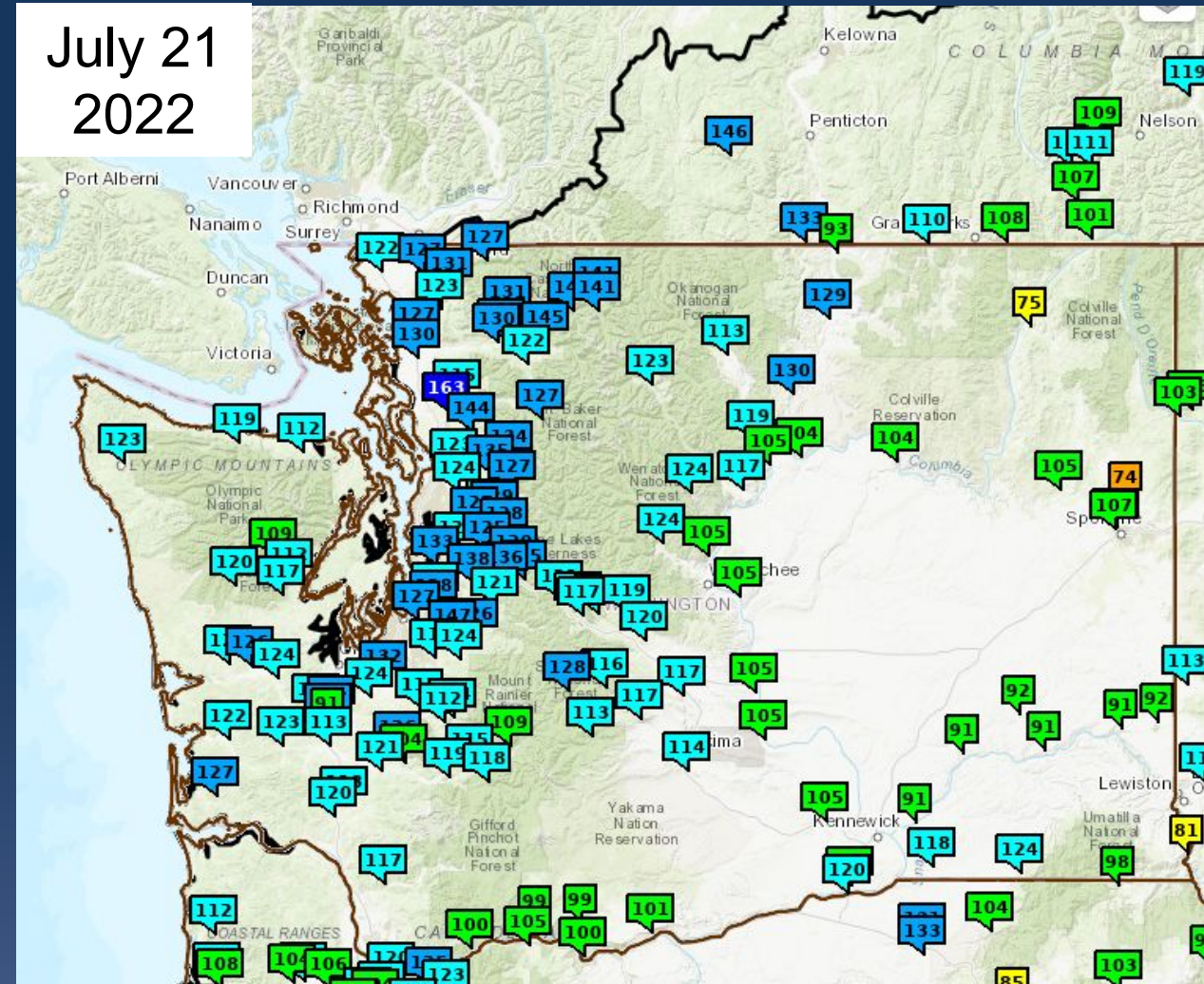
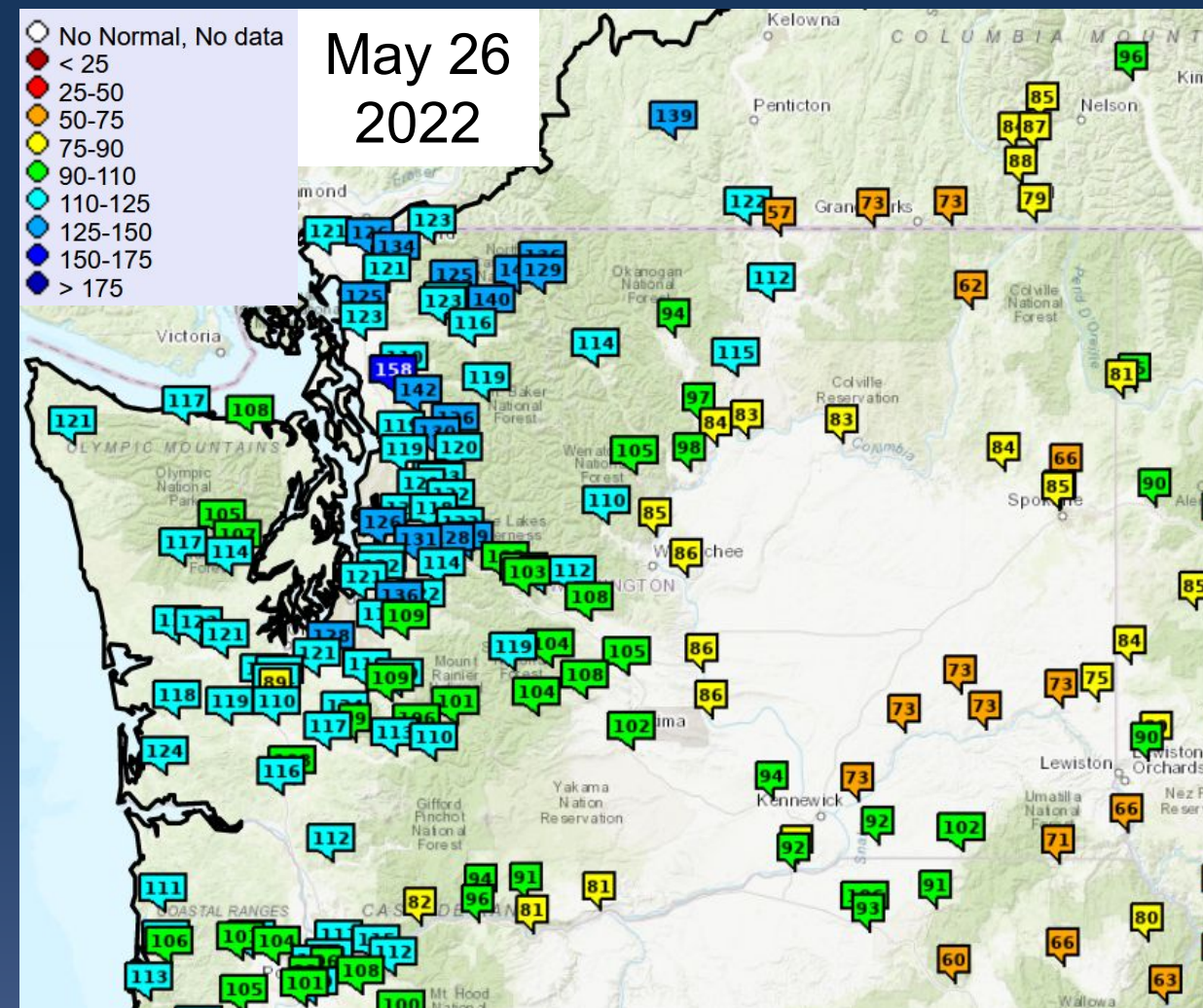


Northwest River Forecast Center
10 Day QPF (Deviation from Climatology), Ending 12Z, 08/01/22



Creation Time: Fri Jul 22 14:24:15 UTC 2022

Year to Date Adjusted Natural Runoff





Natural Apr-Sep Forecast (observed + forecast)

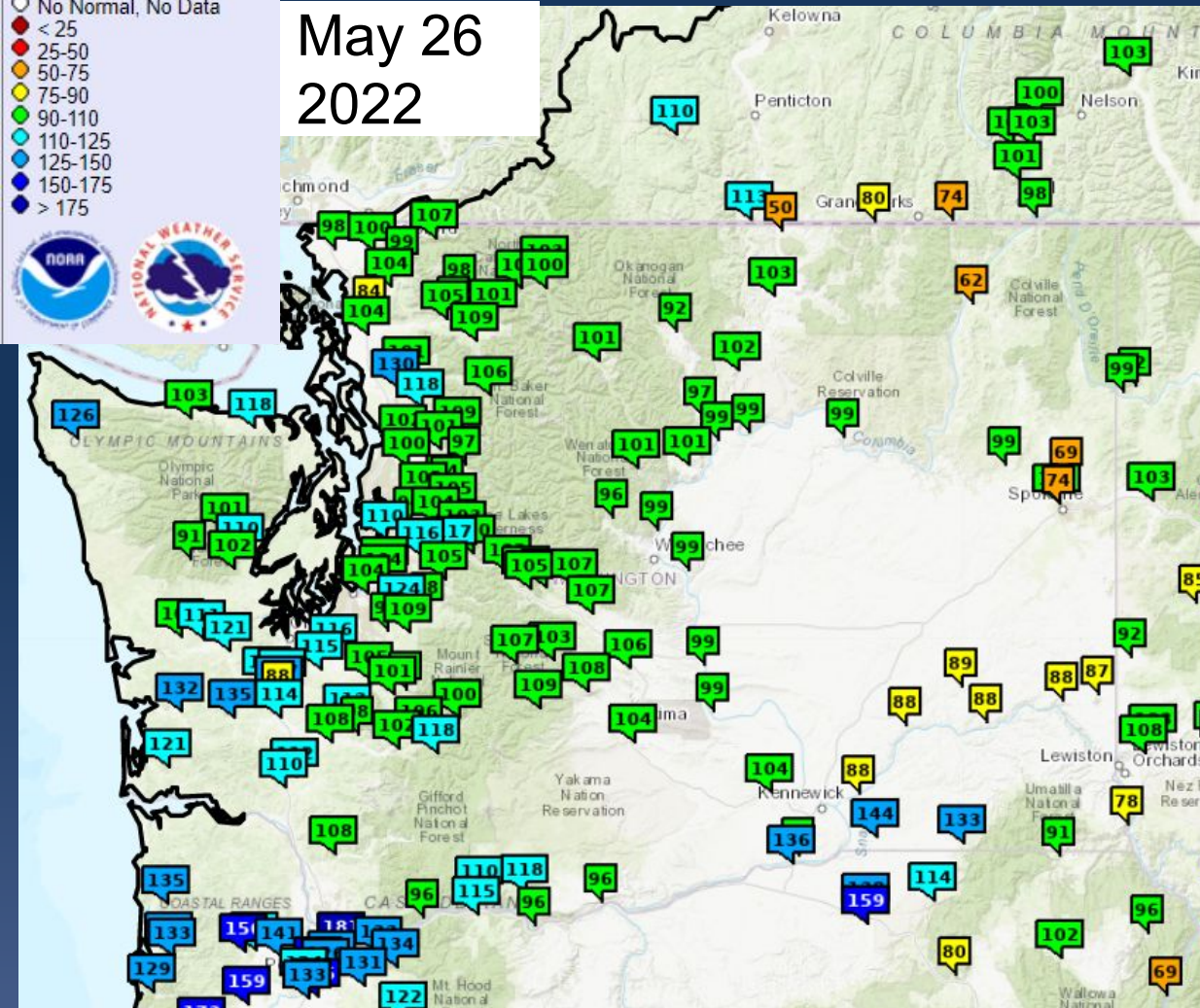
ESP Natural Forecast

Period: APR-SEP
Forecast (% Normal)

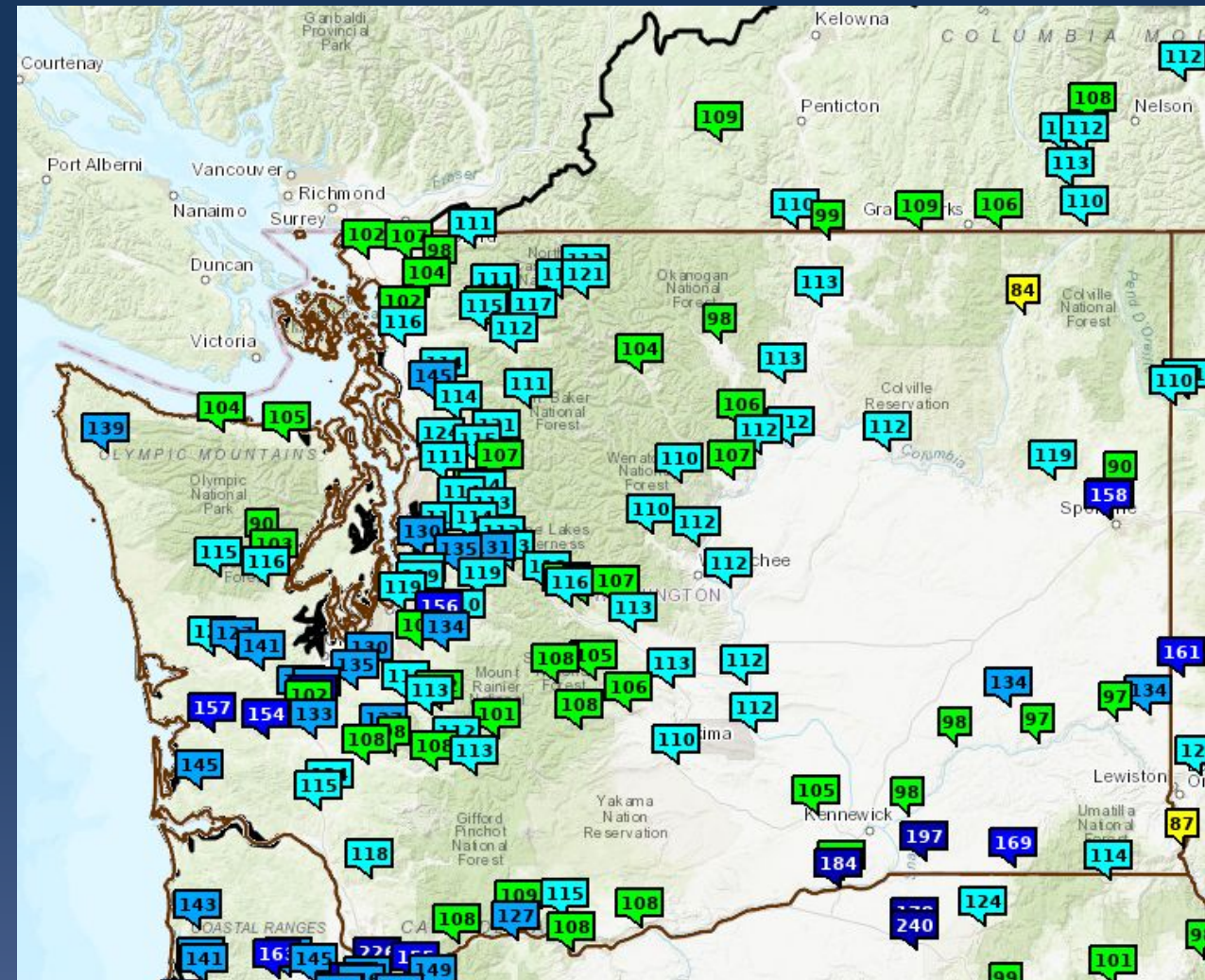
- No Normal, No Data
- < 25
- 25-50
- 50-75
- 75-90
- 90-110
- 110-125
- 125-150
- 150-175
- > 175



May 26
2022



We are almost 4 months into this forecast period





Natural Runoff and Forecast Changes

% Normal Runoff Oct 1- July 21

Washington

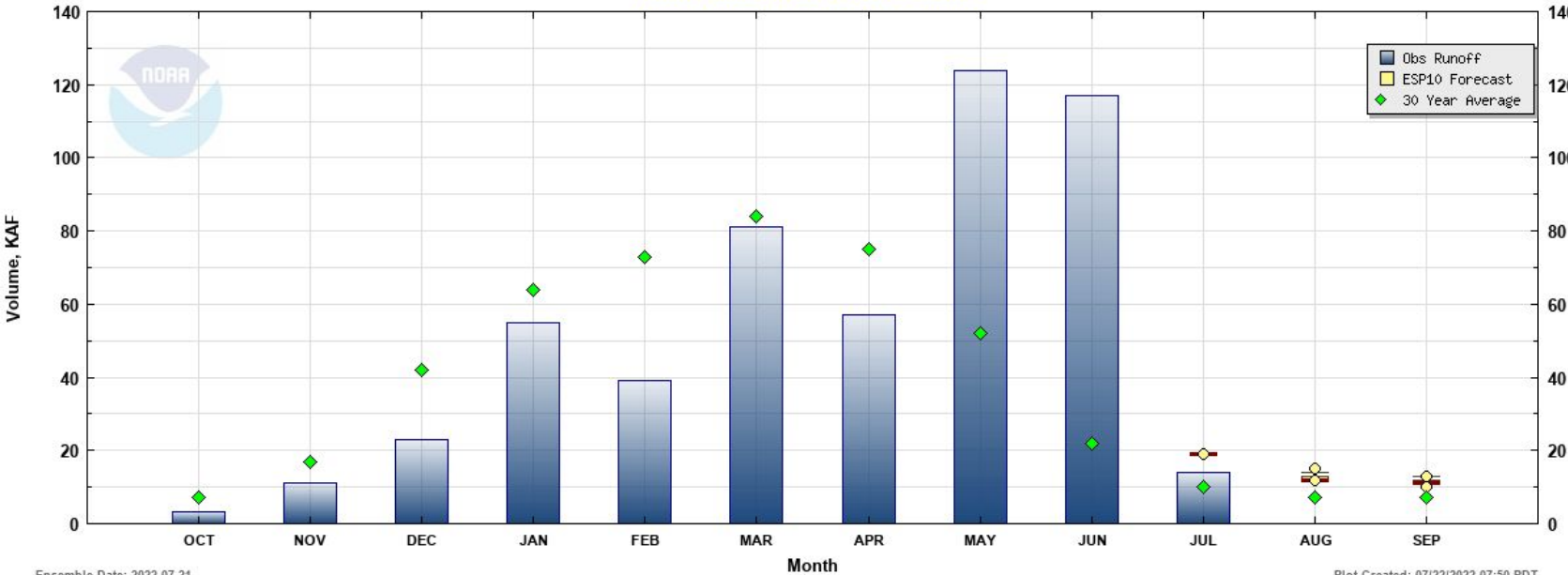
		<u>Δ since Apr 6</u>		<u>Δ since Apr 6</u>
Skagit nr Mt Vernon	130	-9	116	17
Dungeness nr Sequim	112	-7	105	19
Calawah nr Forks	123	2	123	-3
Chehalis at Porter	124	6	141	62
Okanogan at Malott	130	-42	113	7
Methow nr Pateros	119	-44	106	8
Yakima at Parker	114	-1	110	18
Hangman Creek	107	17*	158	103
Walla Walla nr Touchet	118	46	197	134

* Approximate value ~Apr 1st at Hangman Creek



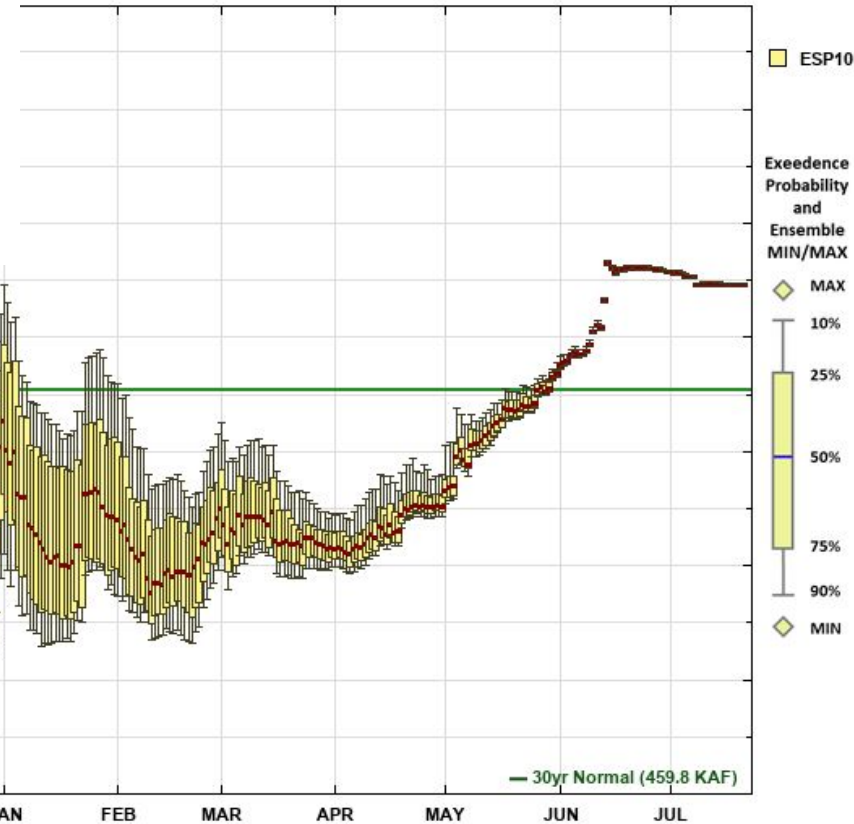
Walla Walla R near Touchet

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(TCHW1) WALLA WALLA - NEAR TOUCHET

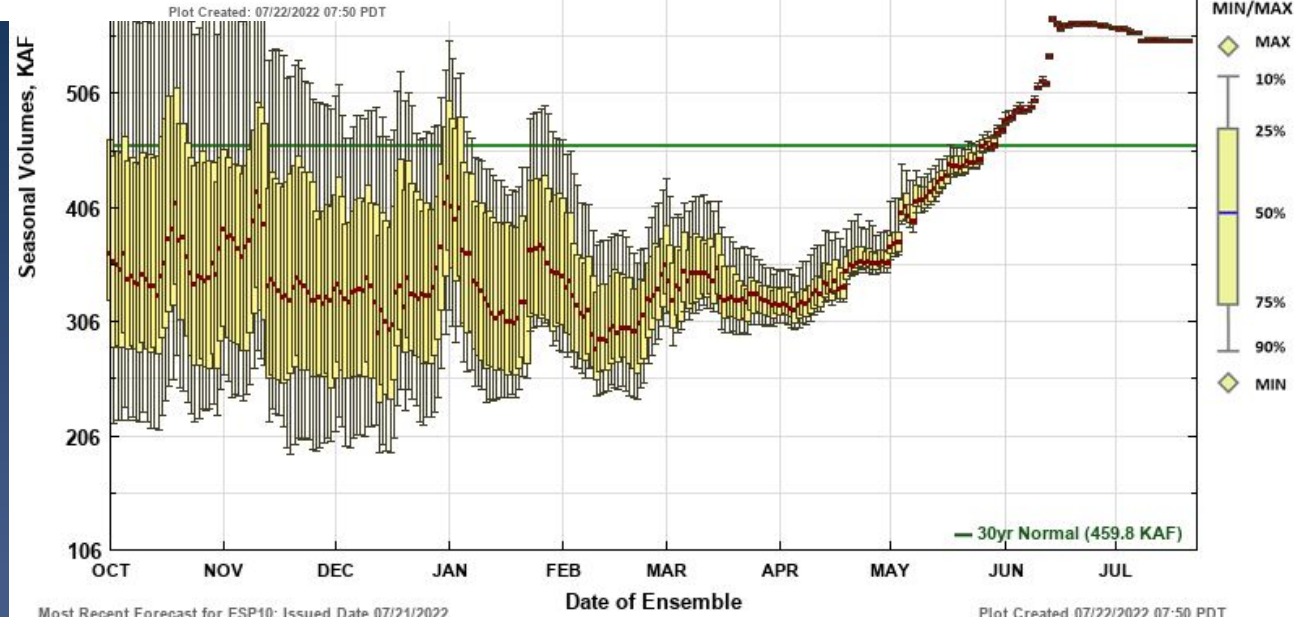


Ensemble Date: 2022-07-21

Natural Volume Forecasts
WALLA WALLA - NEAR TOUCHET
Period OCT to SEP -- Water Year 2022



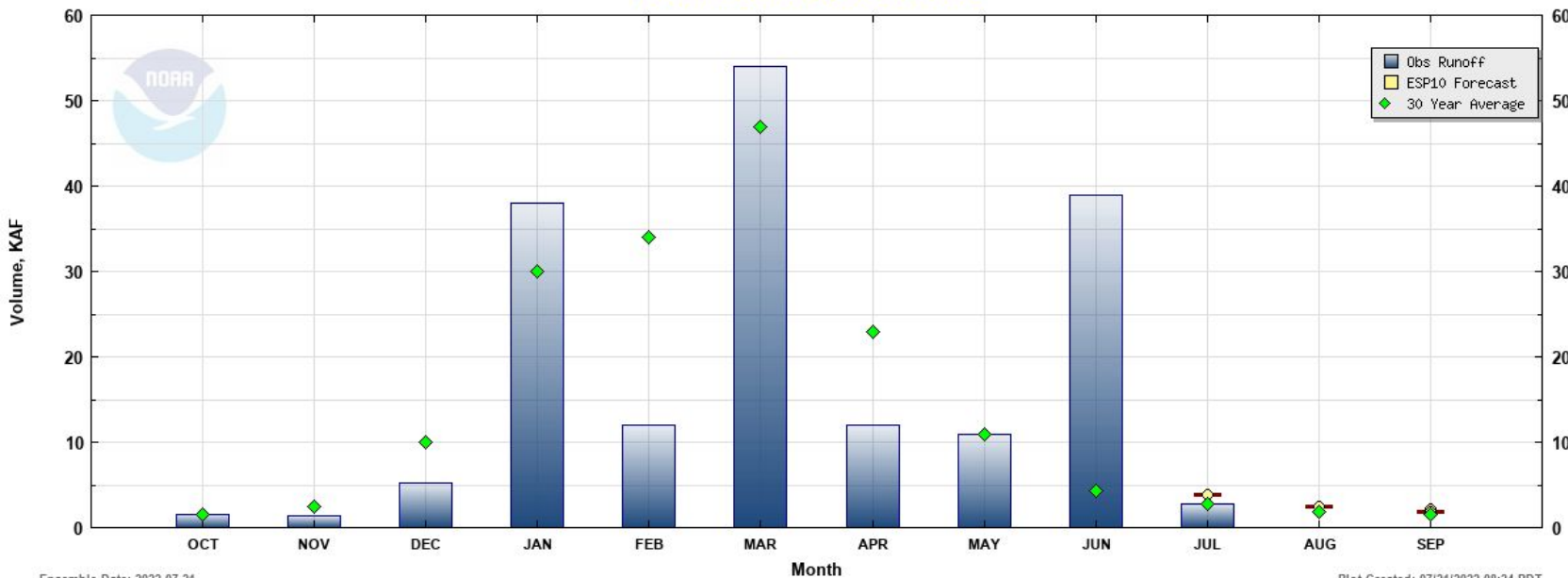
WALLA WALLA - NEAR TOUCHET (TCHW1) Forecasts for Water Year 2022					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	340	341	197	343	173
APR-JUL	317	317	200	317	158
JAN-SEP	514	515	131	518	393
JAN-JUL	491	491	130	491	379
OCT-SEP	551	552	120	554	460





Hangman Creek at Spokane

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(HAGW1) HANGMAN CREEK - AT SPOKANE



Ensemble Date: 2022-07-21

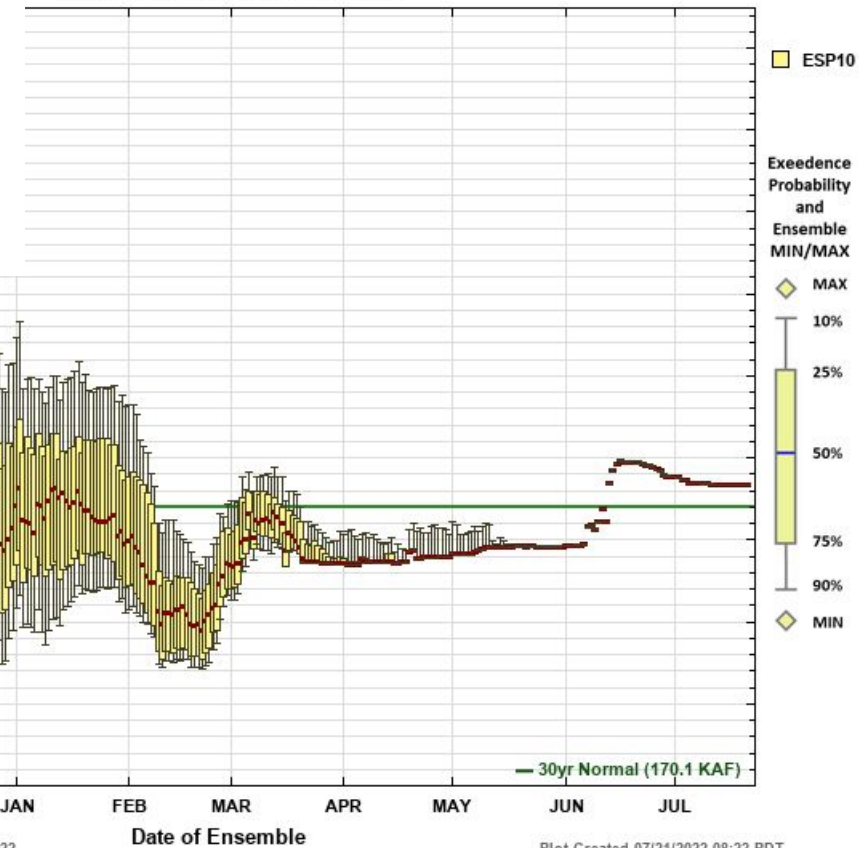
HANGMAN CREEK - AT SPOKANE (HAGW1) Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	70	71	158	71	45
APR-JUL	66	66	160	66	41
JAN-SEP	175	175	112	175	156
JAN-JUL	170	170	112	170	153
OCT-SEP	183	183	108	183	170

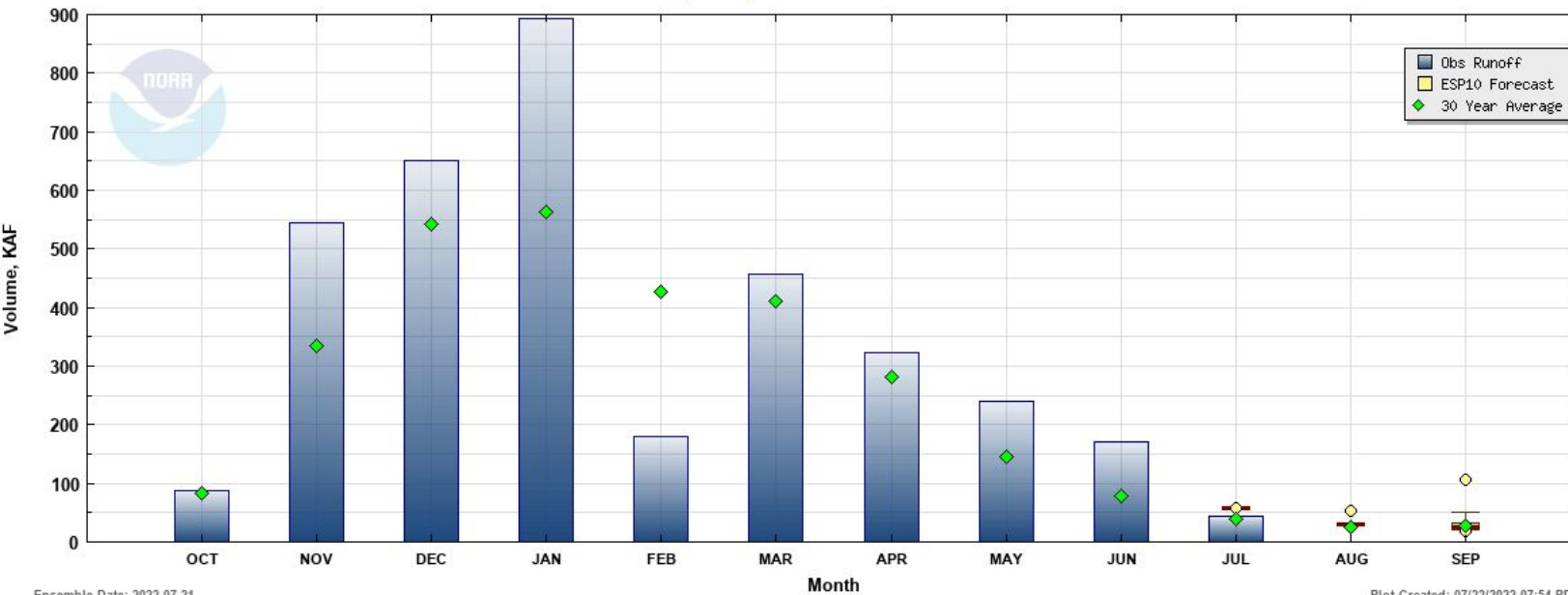
Natural Volume Forecasts
HANGMAN CREEK - AT SPOKANE
Period OCT to SEP -- Water Year 2022





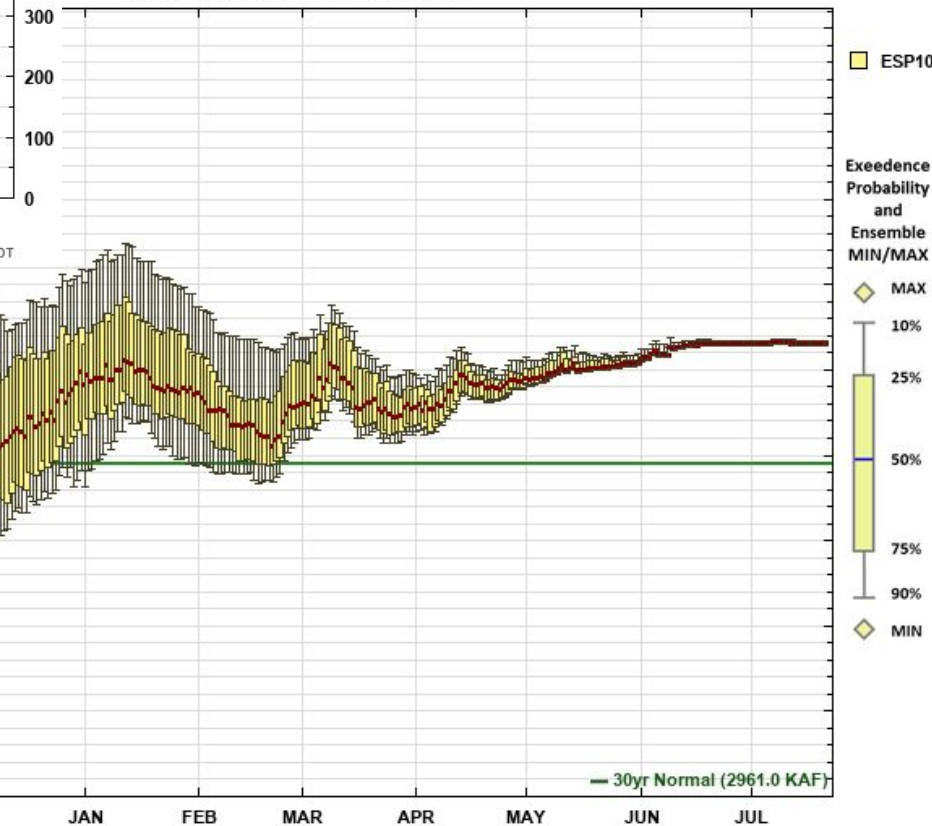
Chehalis R at Porter

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(CRPW1) CHEHALIS - AT PORTER



Ensemble Date: 2022-07-21

Natural Volume Forecasts
CHEHALIS - AT PORTER
Period OCT to SEP -- Water Year 2022



Most Recent Forecast for ESP10: Issued Date 07/21/2022

Plot Created 07/22/2022 07:57 PDT

CHEHALIS - AT PORTER (CRPW1)
Forecasts for Water Year 2022

Official Water Supply

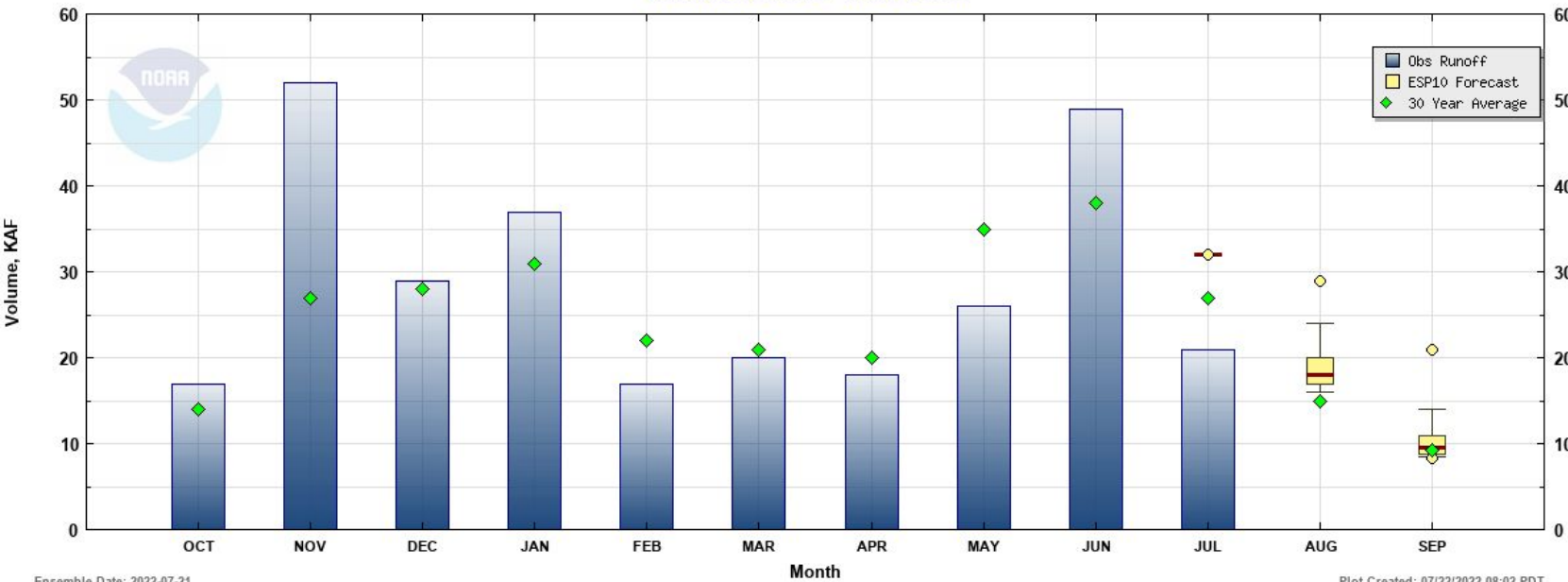
ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	838	846	141	866	598
APR-JUL	789	789	145	789	545
JAN-SEP	2365	2373	119	2394	2001
JAN-JUL	2316	2316	119	2316	1948
OCT-SEP	3652	3661	124	3681	2961

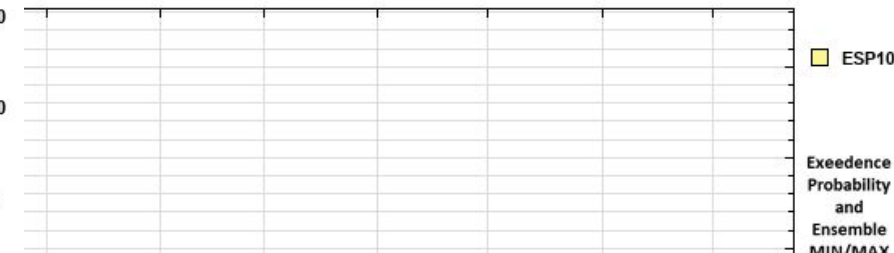


Dungeness R near Sequim

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(DRSW1) DUNGENESS - NEAR SEQUIM



Natural Volume Forecasts
DUNGENESS - NEAR SEQUIM
Period OCT to SEP -- Water Year 2022

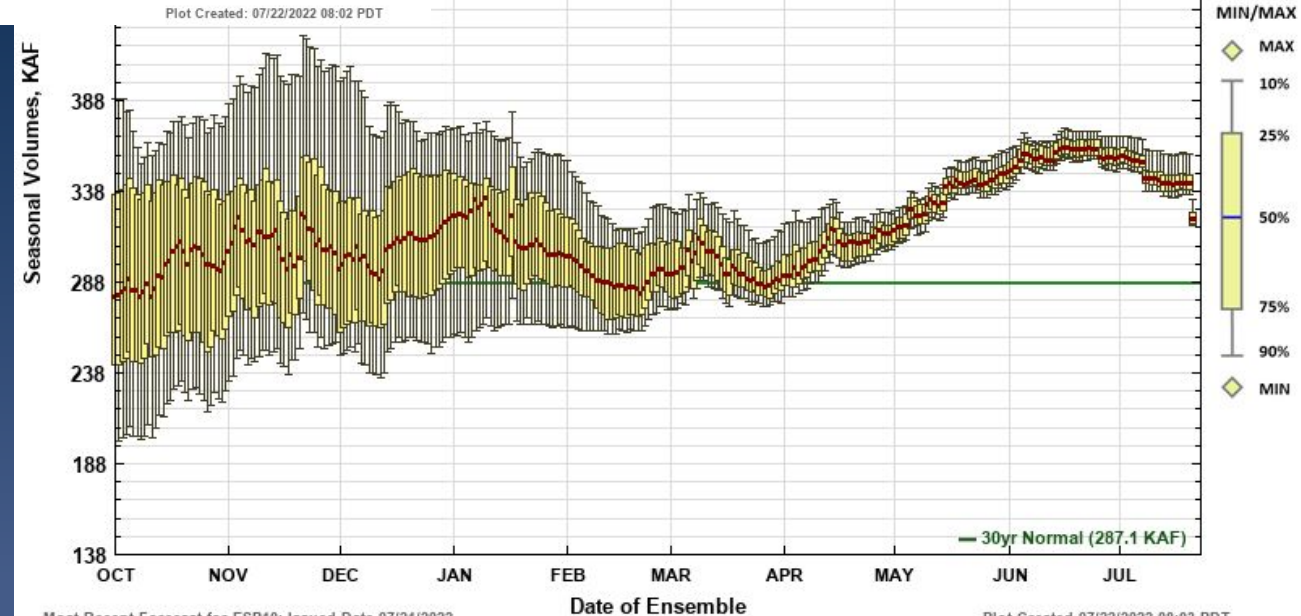


DUNGENESS - NEAR SEQUIM (DRSW1)
Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21

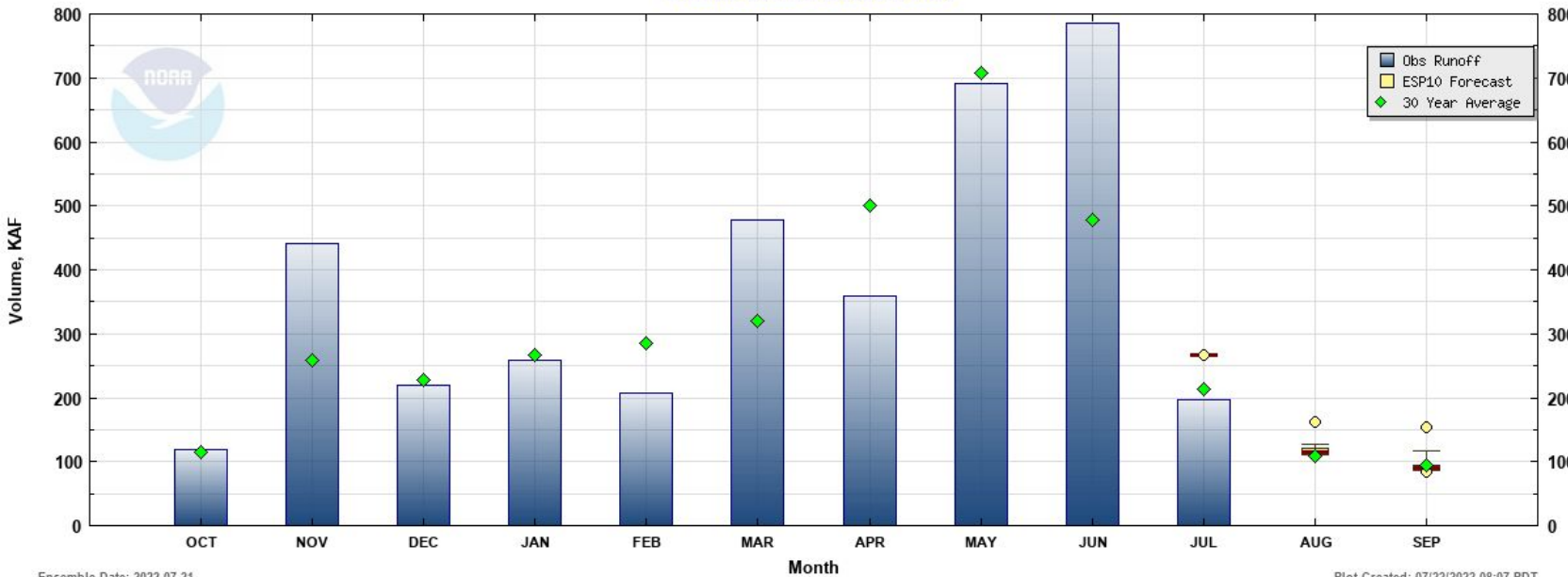
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	148	151	105	162	145
APR-JUL	123	123	102	123	121
JAN-SEP	221	225	103	235	219
JAN-JUL	196	196	101	196	195
OCT-SEP	319	323	112	333	287





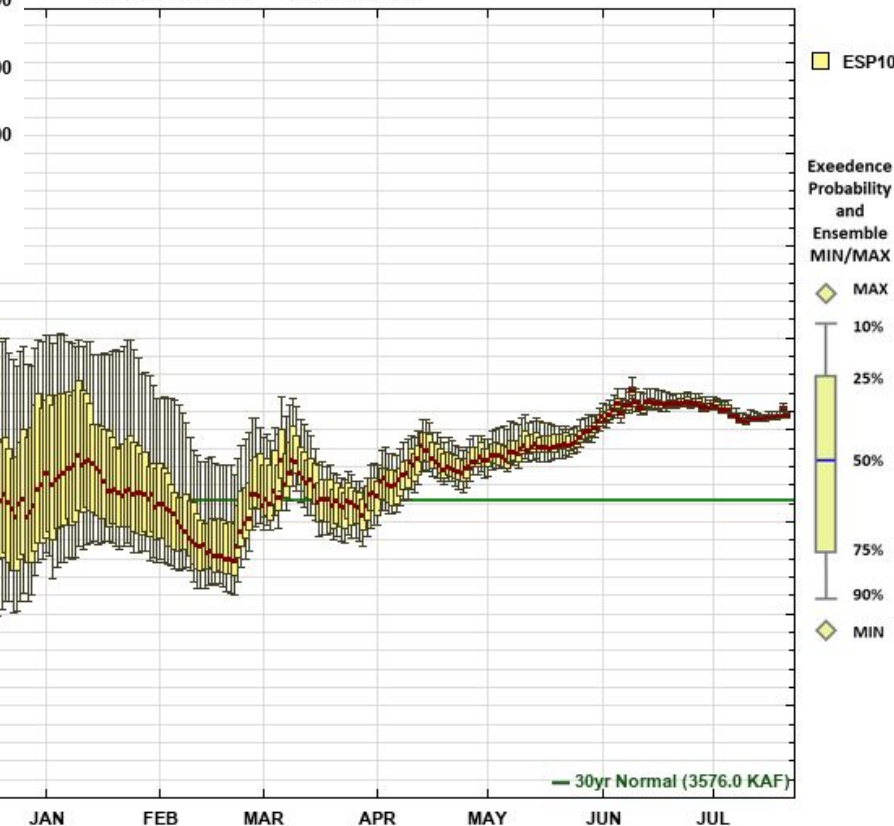
Yakima R near Parker

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(PARW1) YAKIMA - NEAR PARKER

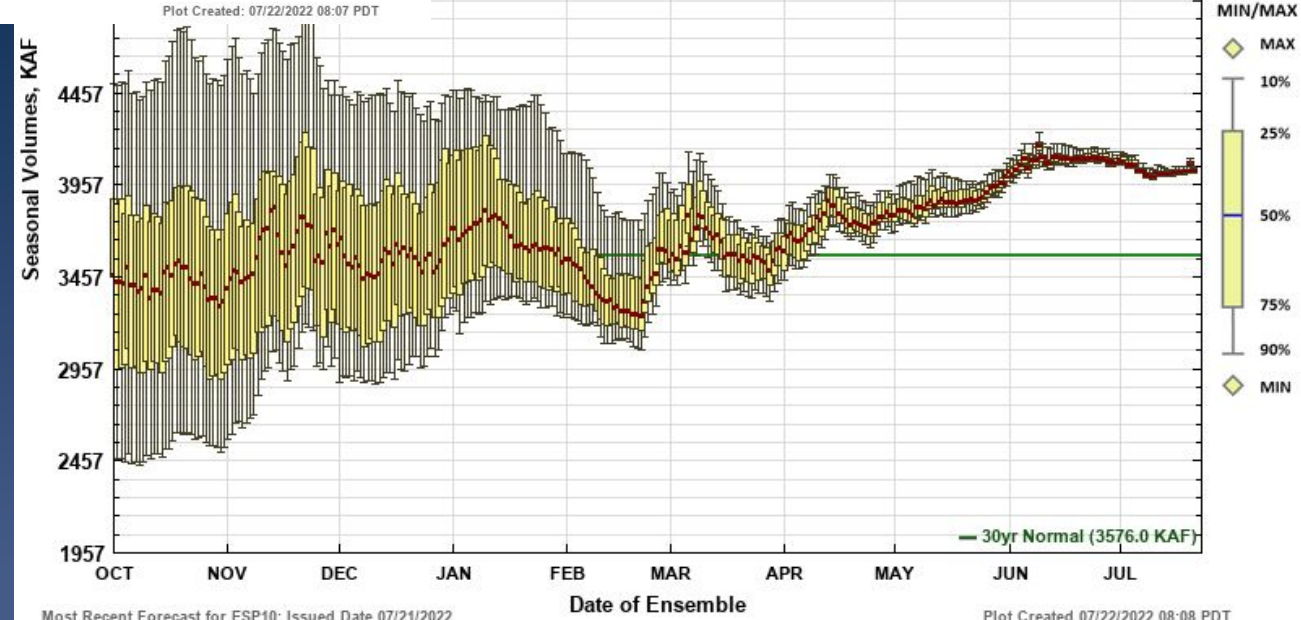


Ensemble Date: 2022-07-21

Natural Volume Forecasts
YAKIMA - NEAR PARKER
Period OCT to SEP -- Water Year 2022



YAKIMA - NEAR PARKER (PARW1) Forecasts for Water Year 2022					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	2295	2303	110	2332	2102
APR-JUL	2098	2098	110	2098	1899
JAN-SEP	3241	3249	109	3279	2974
JAN-JUL	3044	3044	110	3044	2770
OCT-SEP	4022	4030	113	4060	3576

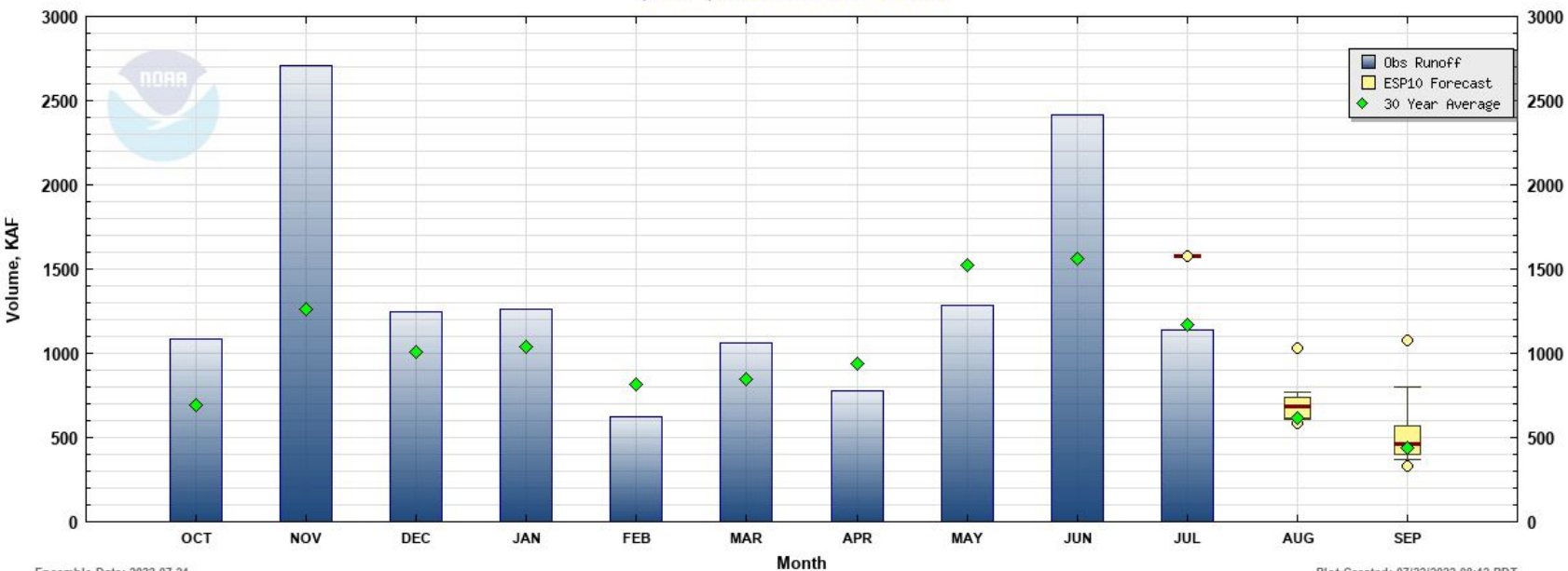


Most Recent Forecast for ESP10: Issued Date 07/21/2022



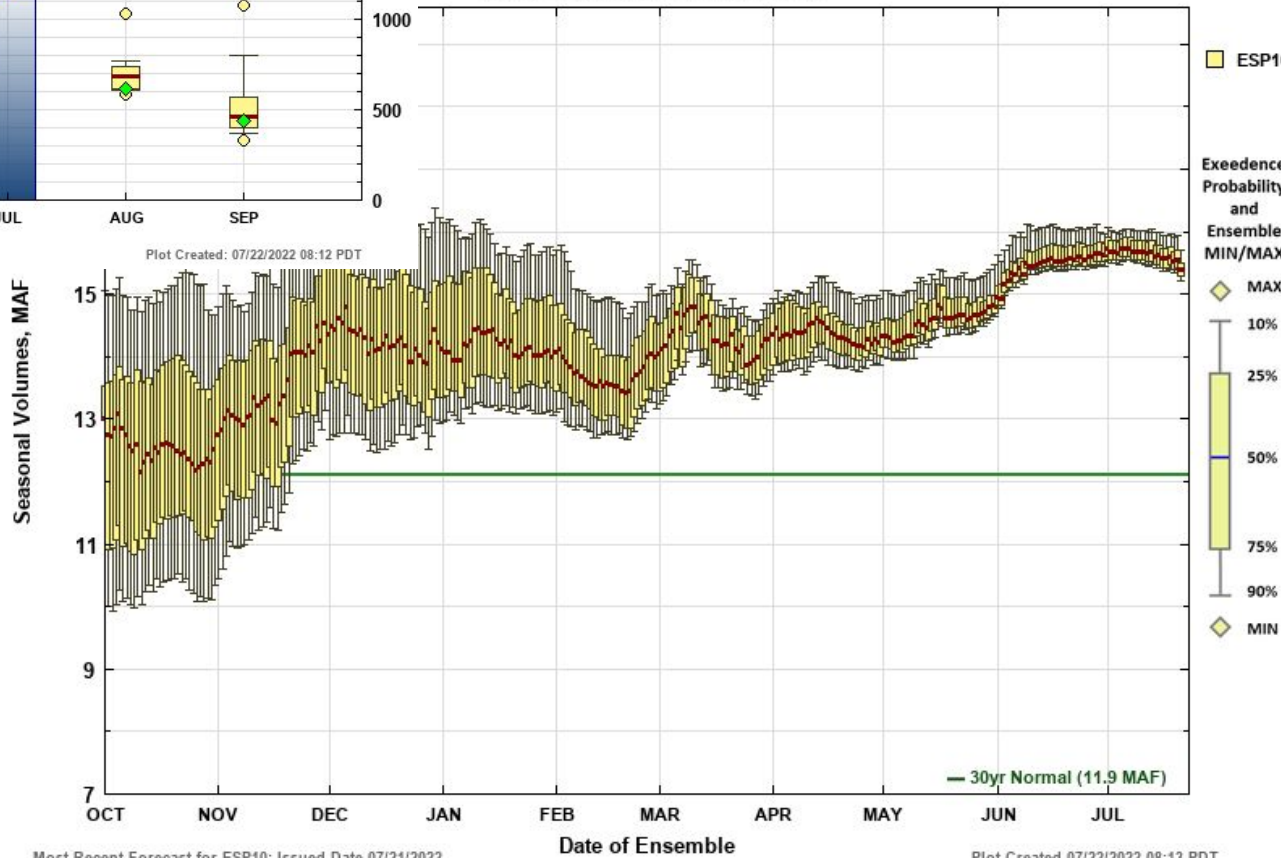
Skagit R near Mount Vernon

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(MVEW1) SKAGIT - NEAR MT VERNON



Ensemble Date: 2022-07-21

Natural Volume Forecasts
SKAGIT - NEAR MT VERNON
Period OCT to SEP -- Water Year 2022

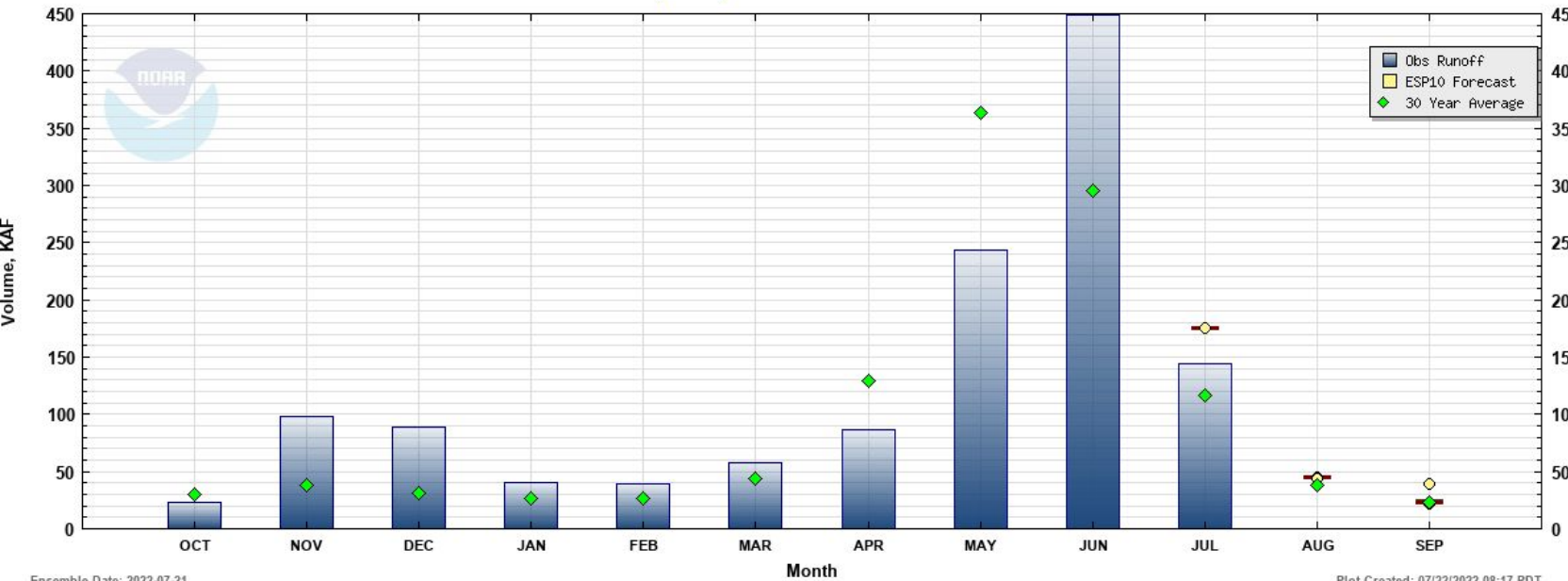


SKAGIT - NEAR MT VERNON (MVEW1) Forecasts for Water Year 2022					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	7029	7222	116	7530	6245
APR-JUL	6040	6041	116	6041	5188
JAN-SEP	9972	10165	114	10473	8949
JAN-JUL	8983	8983	114	8983	7893
OCT-SEP	14996	15189	128	15497	11909



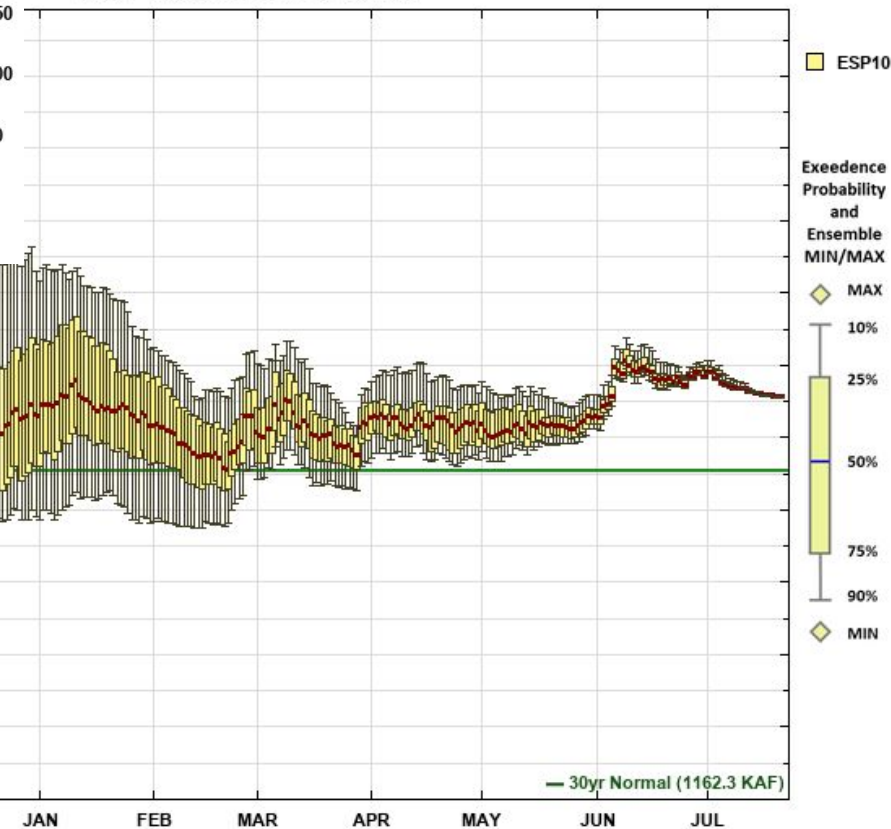
Methow R near Pateros

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(PATW1) METHOW - NEAR PATEROS



Ensemble Date: 2022-07-21

Natural Volume Forecasts
METHOW - NEAR PATEROS
Period OCT to SEP -- Water Year 2022



Plot Created: 07/22/2022 08:17 PDT

METHOW - NEAR PATEROS (PATW1)
Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	1020	1021	106	1023	965
APR-JUL	953	953	105	953	904
JAN-SEP	1156	1158	109	1160	1063
JAN-JUL	1090	1090	109	1090	1001
OCT-SEP	1366	1368	118	1370	1162

Seasonal Volumes, KAF

Most Recent Forecast for ESP10: Issued Date 07/21/2022

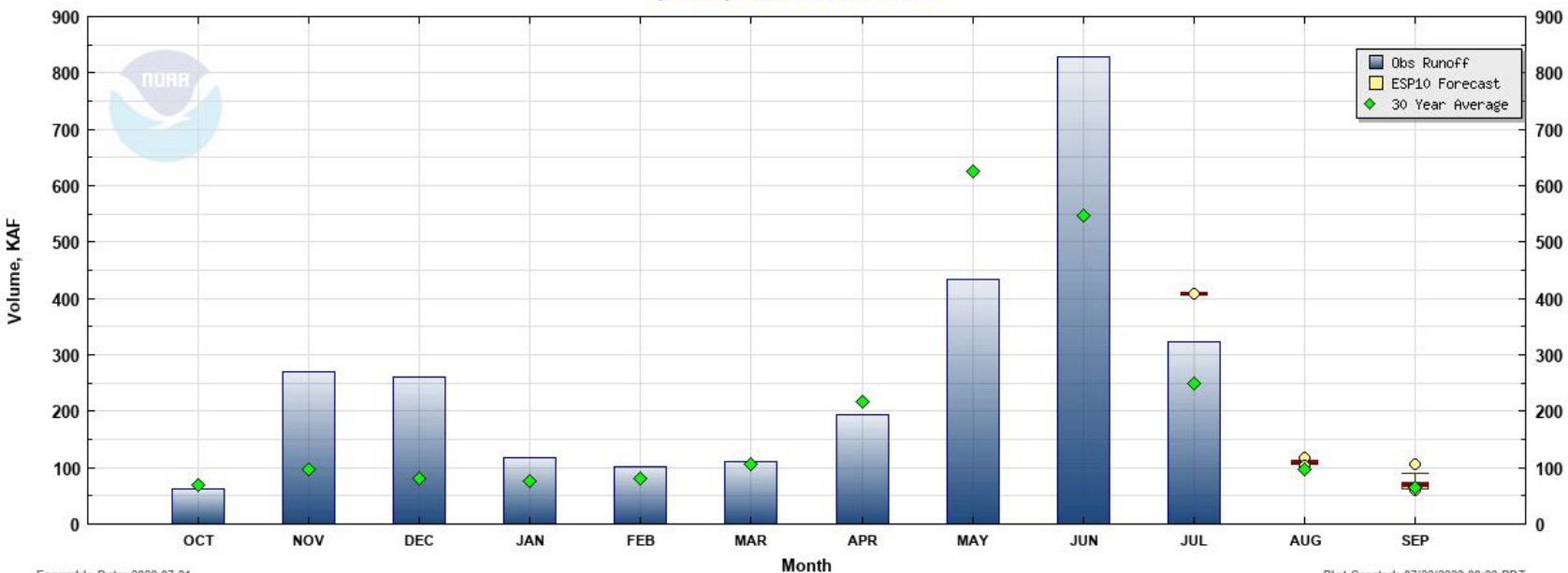
Date of Ensemble

Plot Created 07/22/2022 08:18 PDT



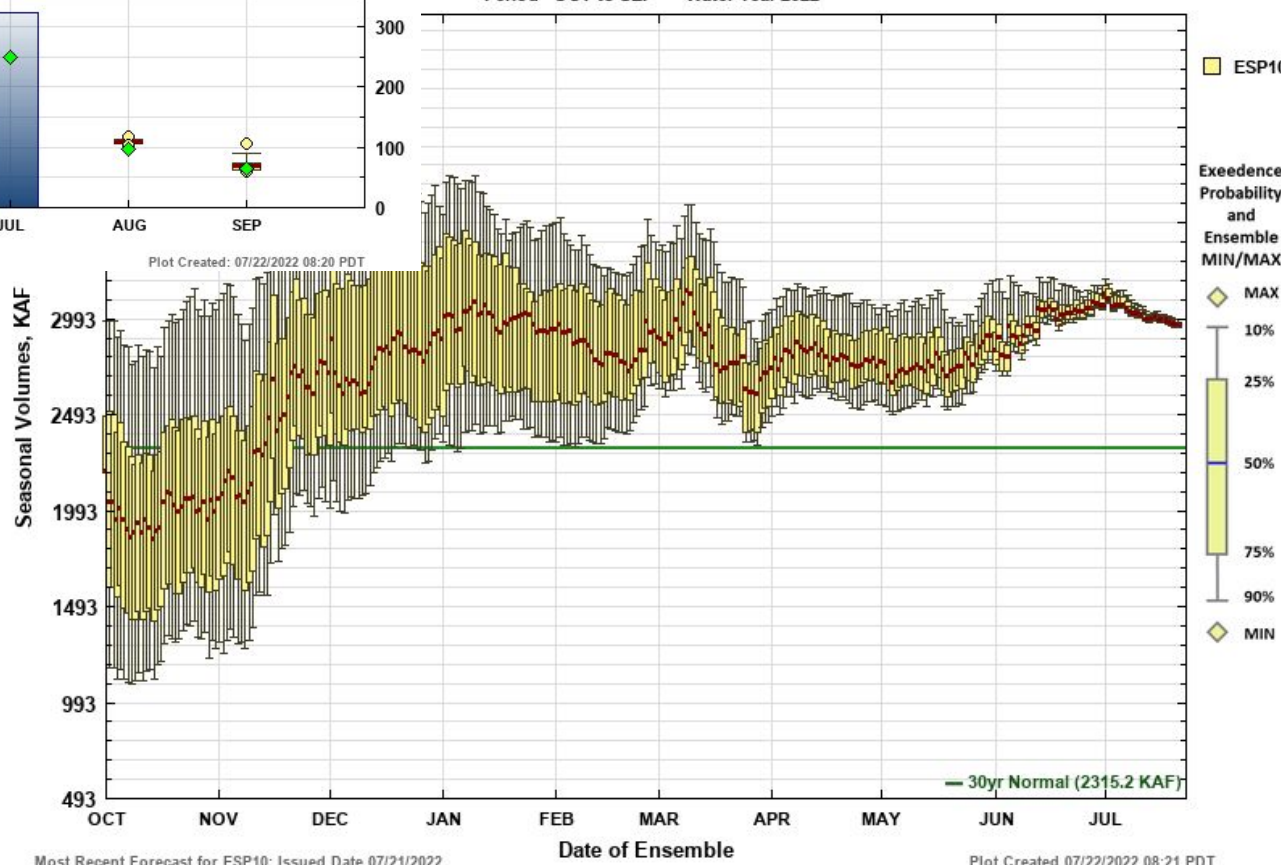
Okanogan R at Malott

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(OKMW1) OKANOGAN - AT MALOTT



Ensemble Date: 2022-07-21

Natural Volume Forecasts
OKANOGAN - AT MALOTT
Period OCT to SEP -- Water Year 2022

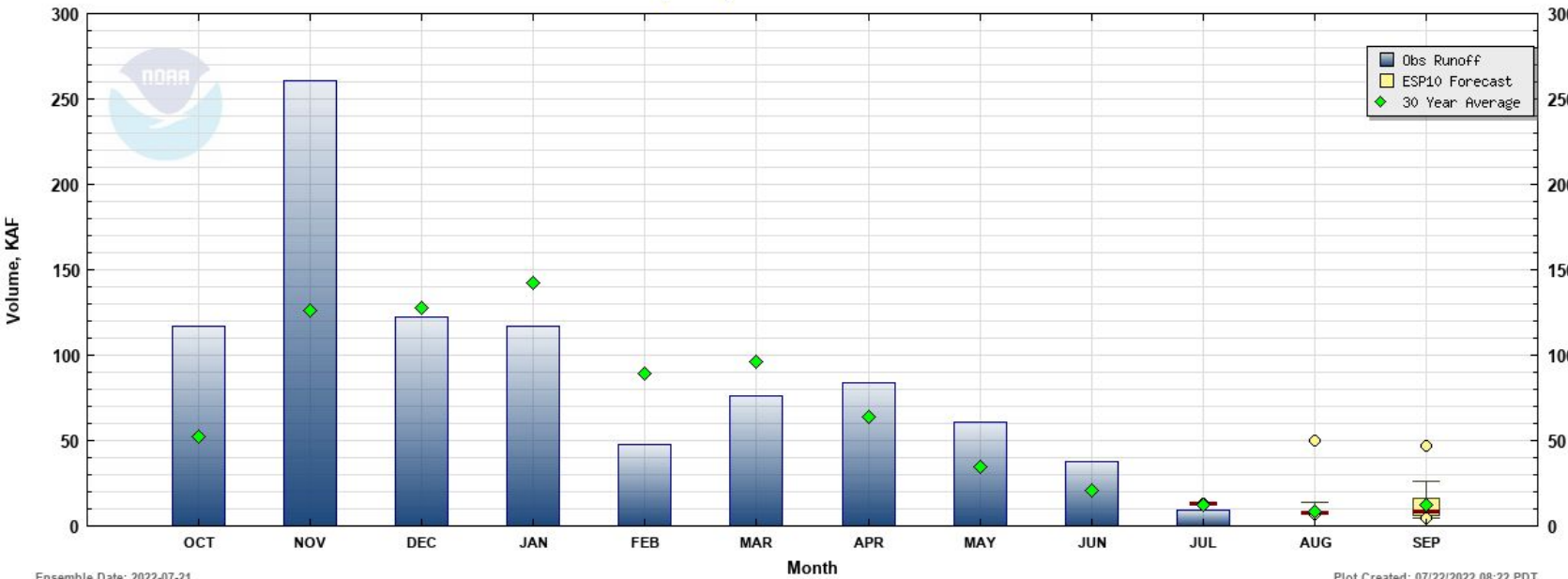


OKANOGAN - AT MALOTT (OKMW1) Forecasts for Water Year 2022					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	2029	2042	113	2068	1802
APR-JUL	1861	1861	113	1861	1640
JAN-SEP	2359	2372	115	2399	2067
JAN-JUL	2192	2192	115	2192	1905
OCT-SEP	2951	2964	128	2991	2315



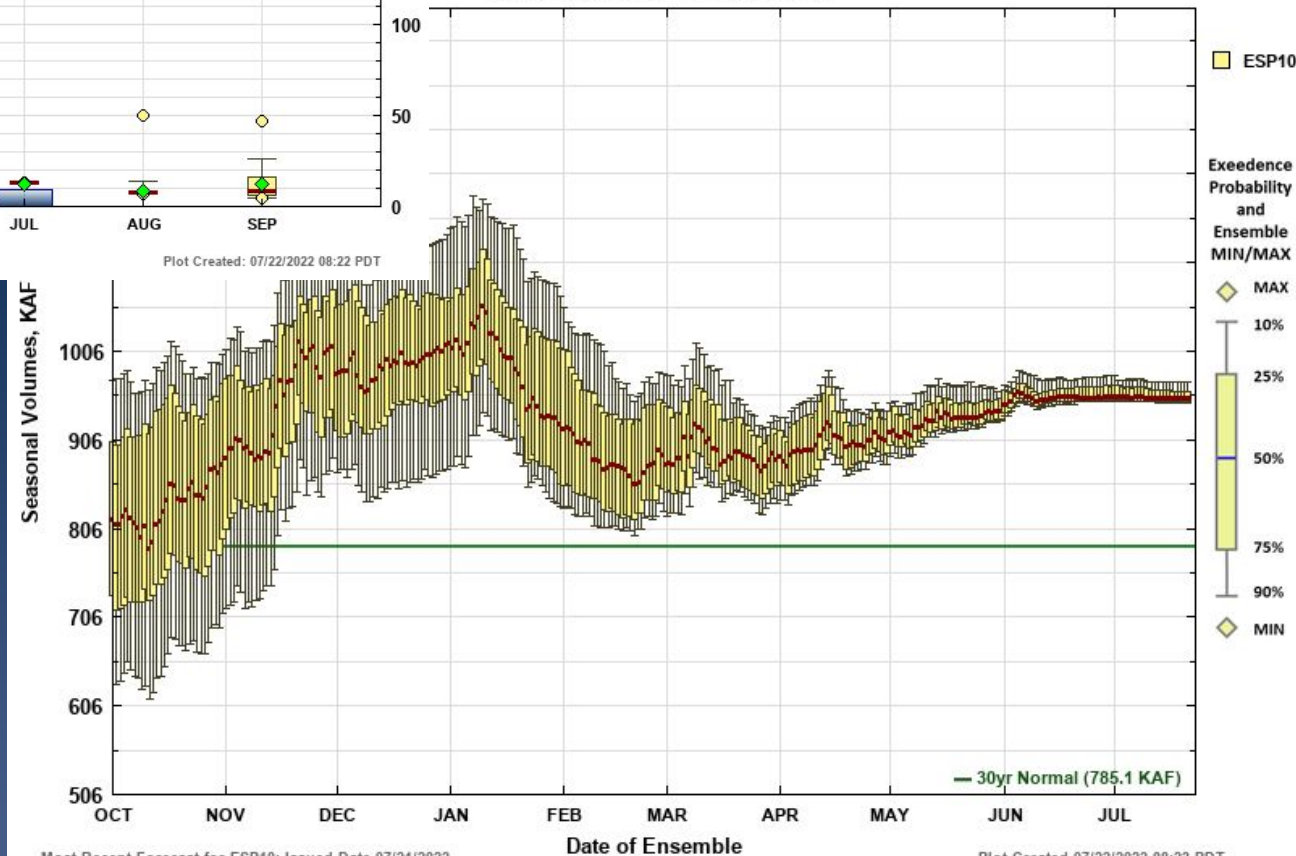
Calawah R near Forks

Natural Volume Monthly Forecasts (ESP10) for Water Year 2022
(CALW1) CALAWAH - NEAR FORKS



Ensemble Date: 2022-07-21

Natural Volume Forecasts
CALAWAH - NEAR FORKS
Period OCT to SEP -- Water Year 2022



CALAWAH - NEAR FORKS (CALW1)
Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF Ensemble: 2022-07-21 Issued: 2022-07-21

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	208	213	139	232	153
APR-JUL	196	196	148	196	132
JAN-SEP	448	453	95	472	479
JAN-JUL	436	436	95	436	458
OCT-SEP	947	952	121	971	785