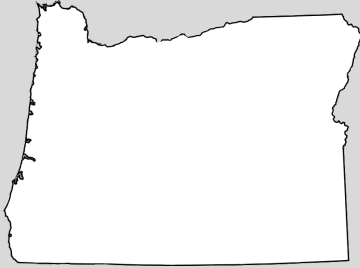




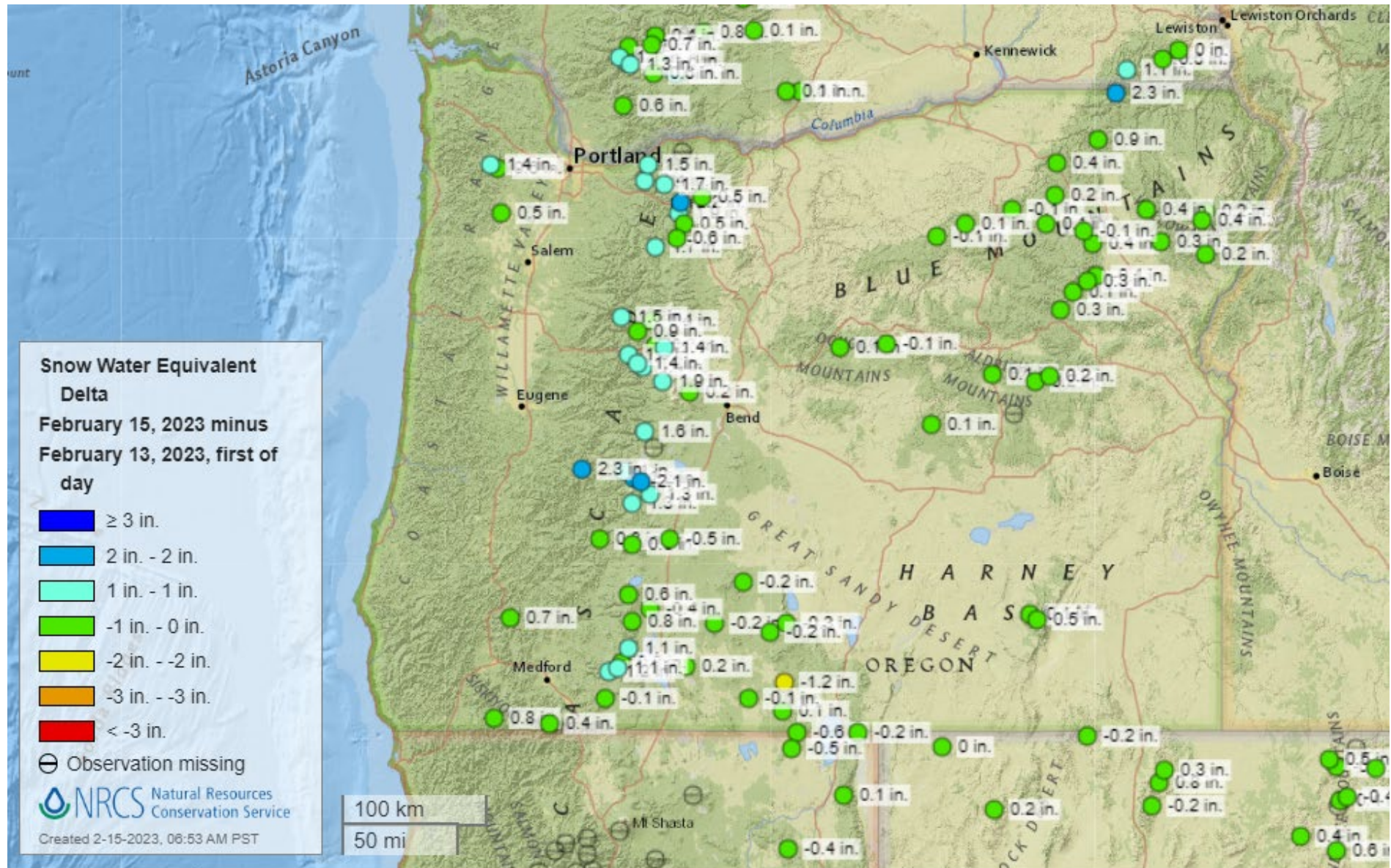
# Oregon Snow Survey

Snow Survey and Water Supply Forecasting Program



Oregon  
Water Supply Availability Committee  
February 15, 2023

Matt Warbritton  
Lead Hydrologist  
USDA NRCS Oregon Snow Survey  
[matt.warbritton@usda.gov](mailto:matt.warbritton@usda.gov)  
503-307-2829

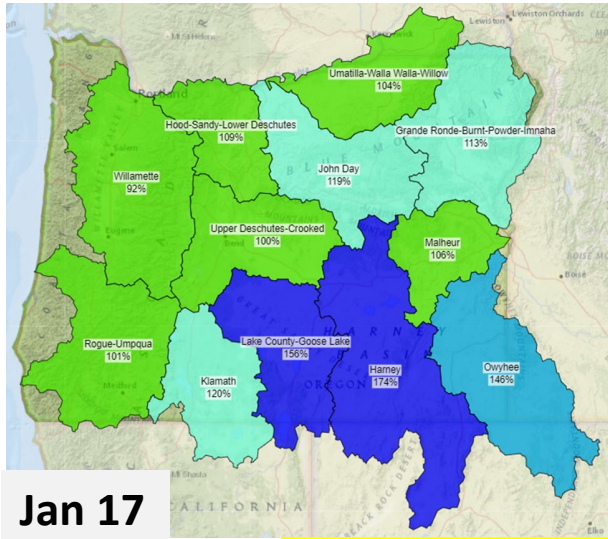




# Snowpack Conditions

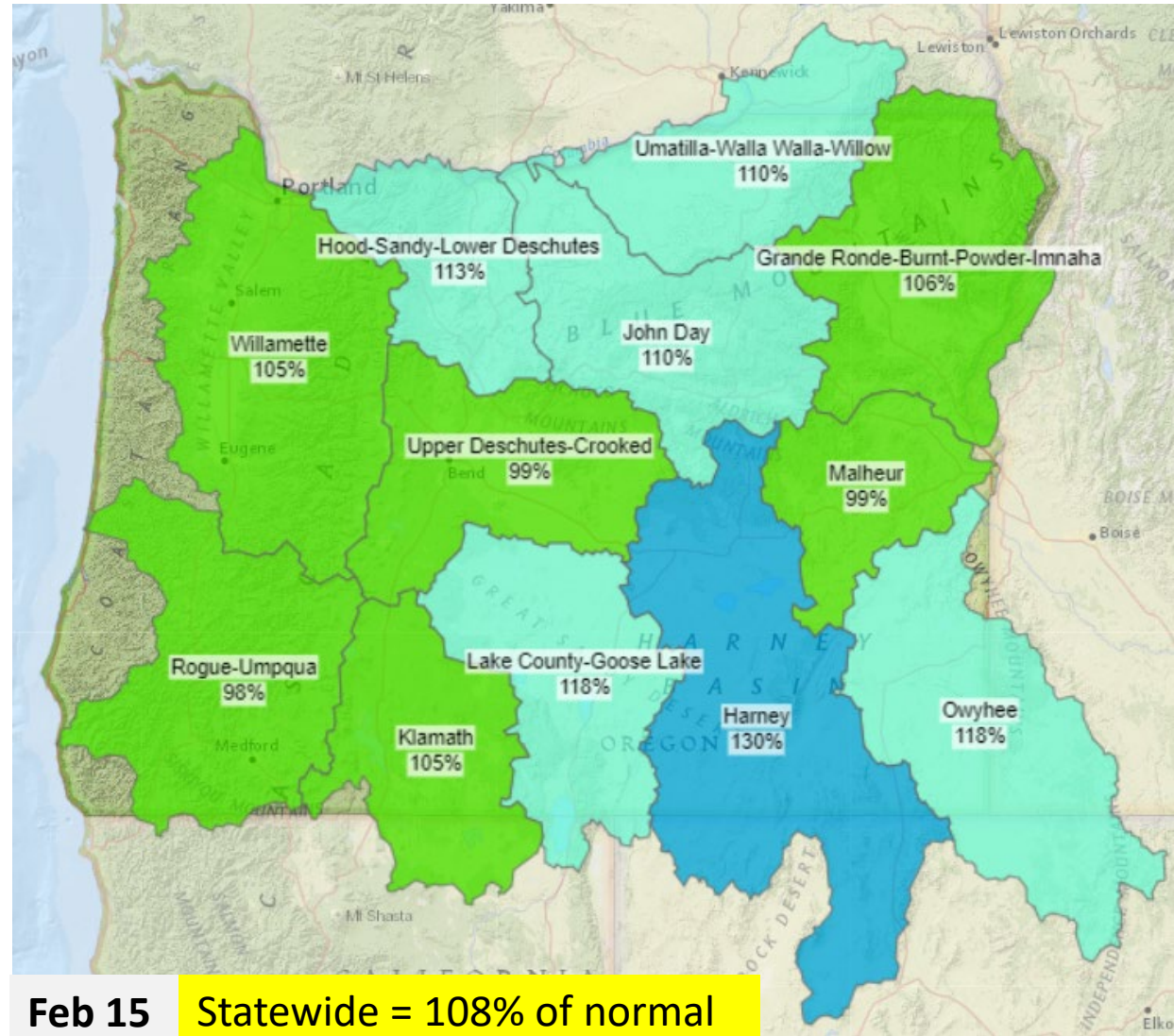


# Snow Water Equivalent Basin Map



Jan 17

Statewide = 110% of normal



Feb 15

Statewide = 108% of normal

Snow Water Equivalent  
Percent NRC S 1991-2020

Median

- ≥ 150%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- No basin value

Watershed Boundaries

— State Watersheds



# Snow Water Equivalent

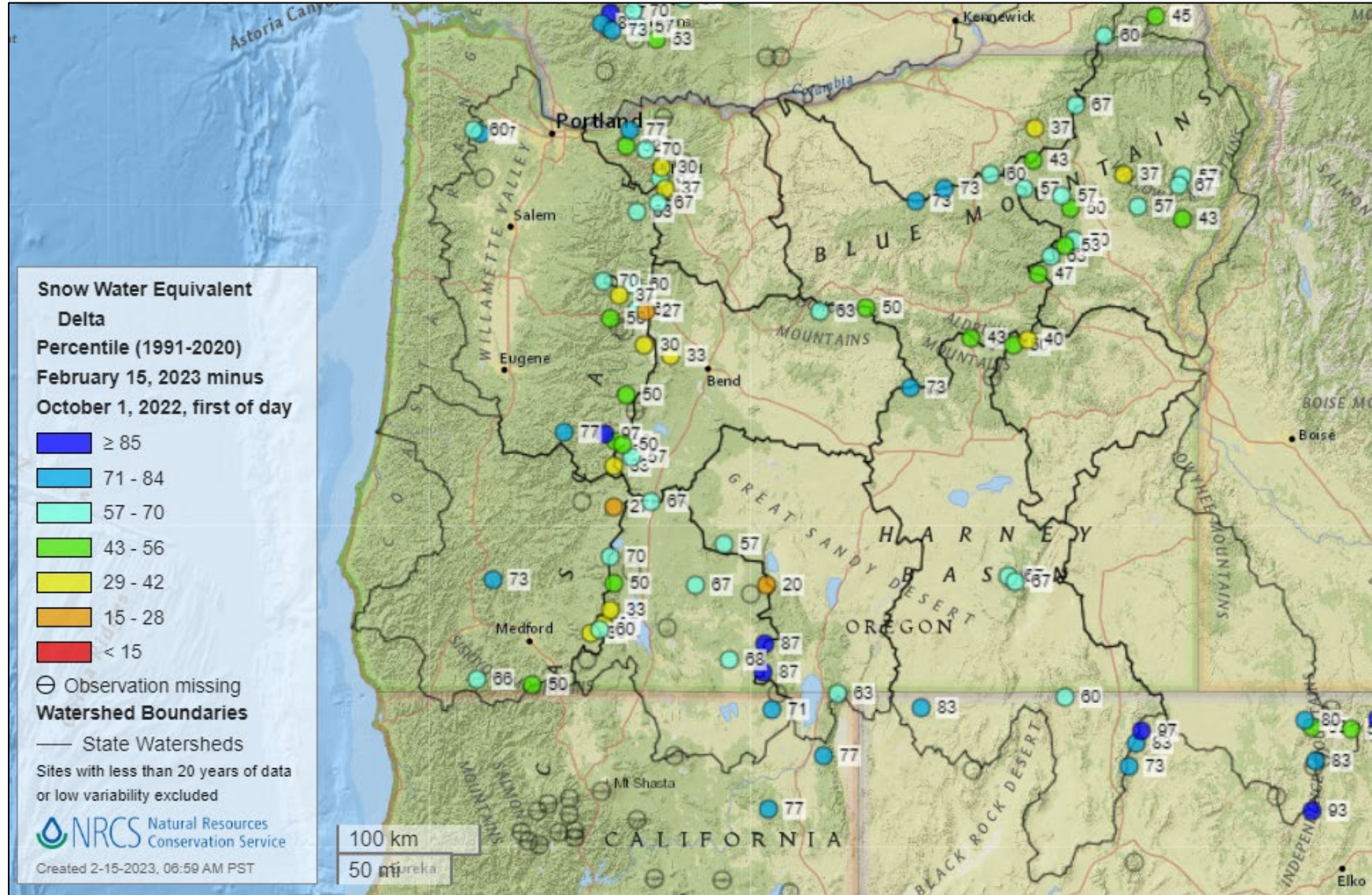
Site Percentile – Feb 1 to Feb 15





# Snow Water Equivalent

Site Percentile - WY

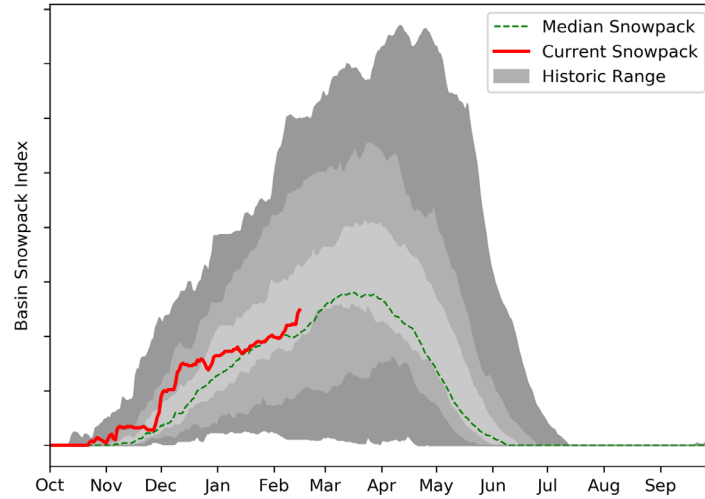




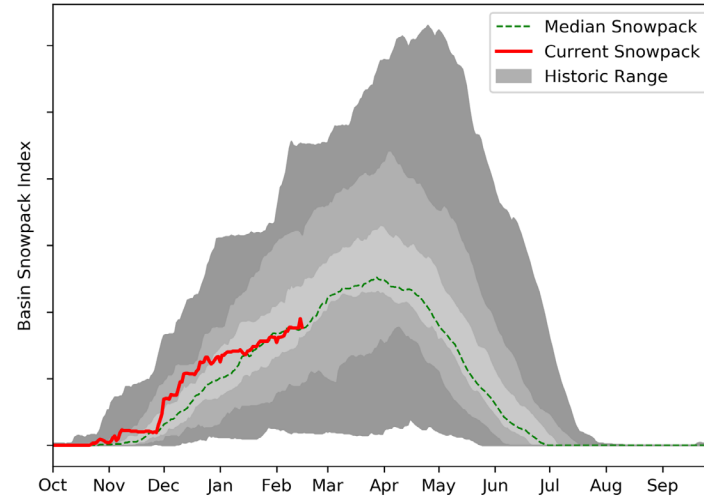
# Snow Water Equivalent

## WY 2023 Basin Charts

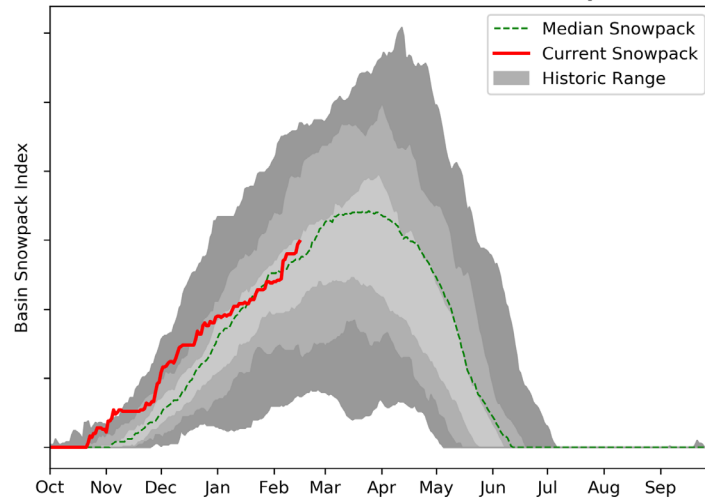
### Willamette Basin Snowpack



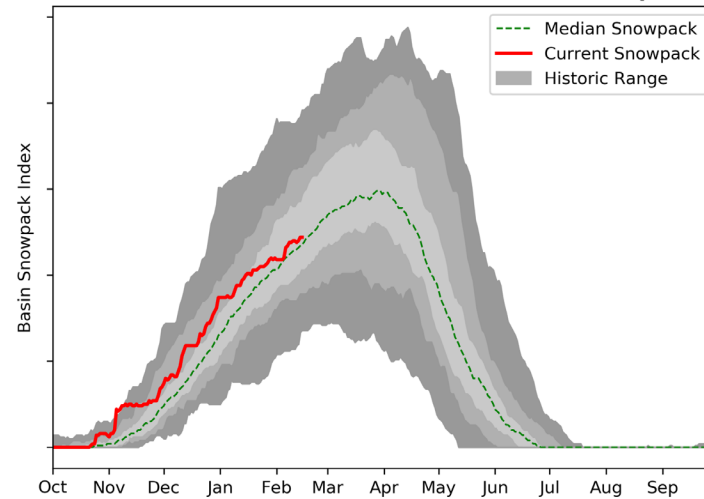
### Hood-Sandy-Lower Deschutes Basin Snowpack



### Umatilla-Walla Walla-Willow Basin Snowpack

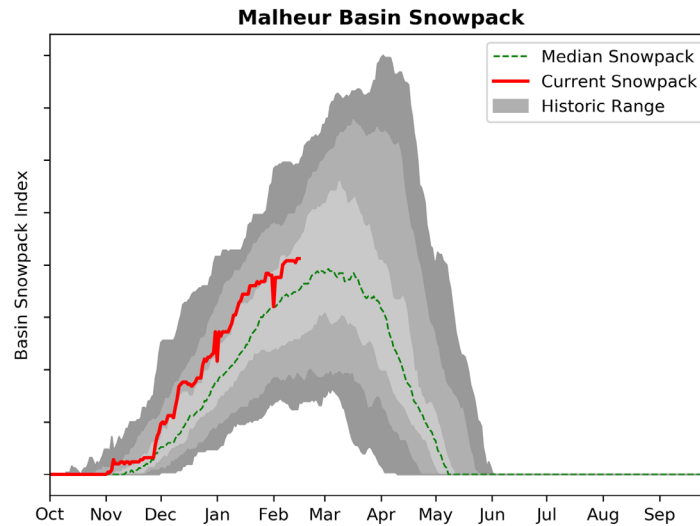
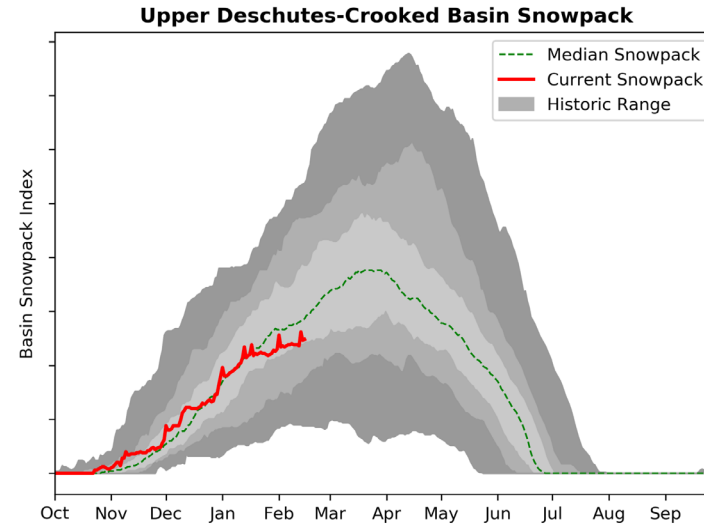
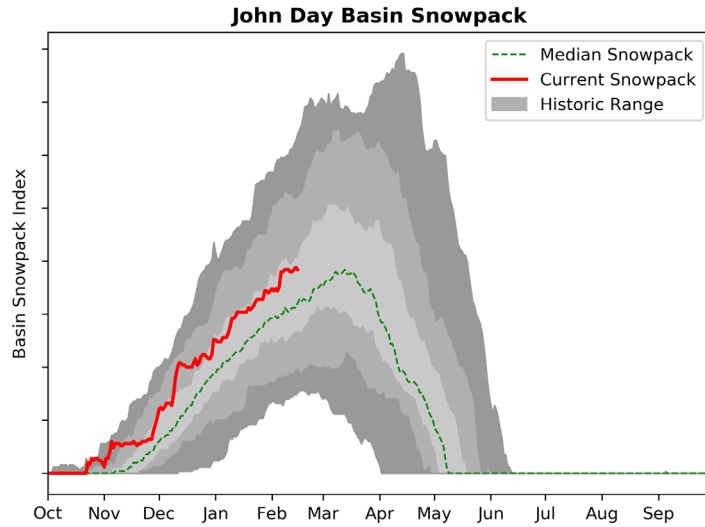


### Grande Ronde-Burnt-Powder-Imnaha Basin Snowpack



# Snow Water Equivalent

## WY 2023 Basin Charts

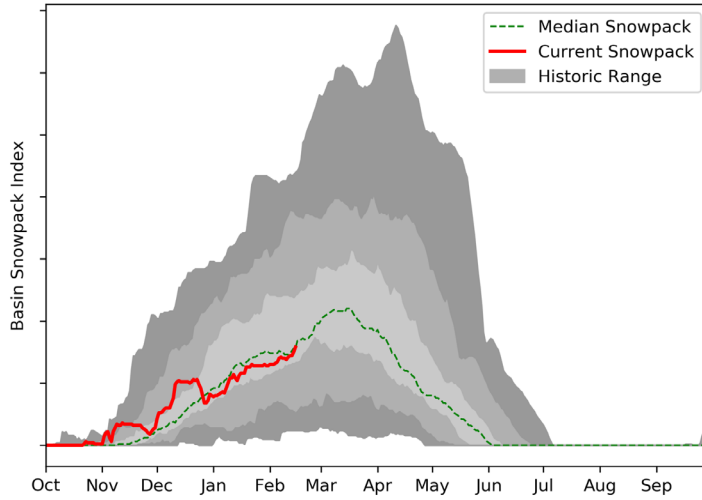




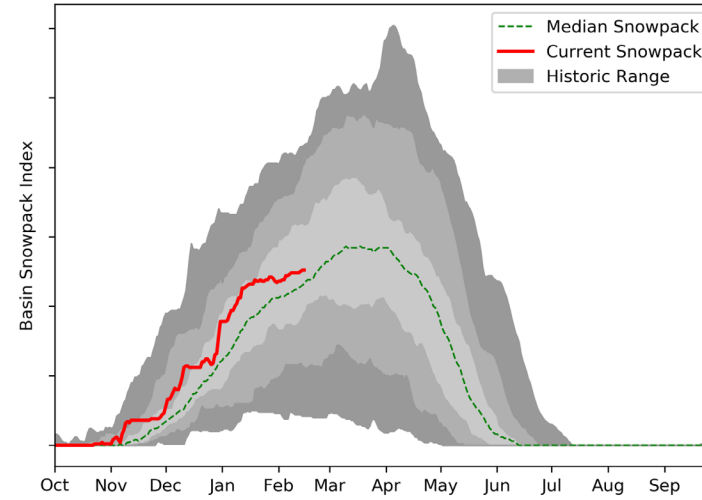
# Snow Water Equivalent

## WY 2023 Basin Charts

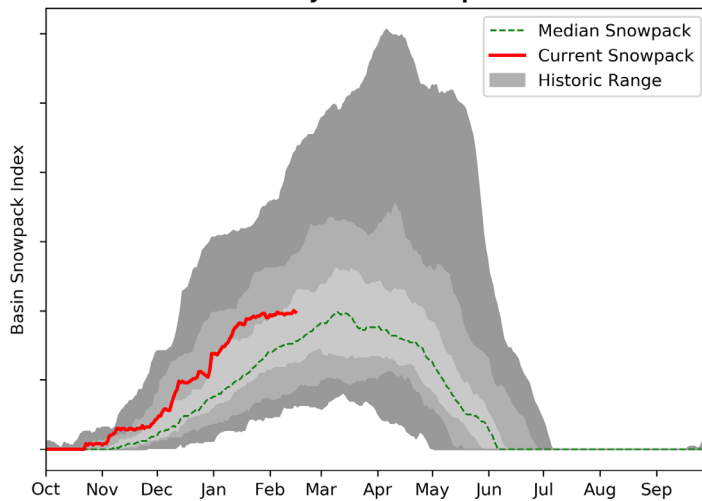
### Rogue-Umpqua Basin Snowpack



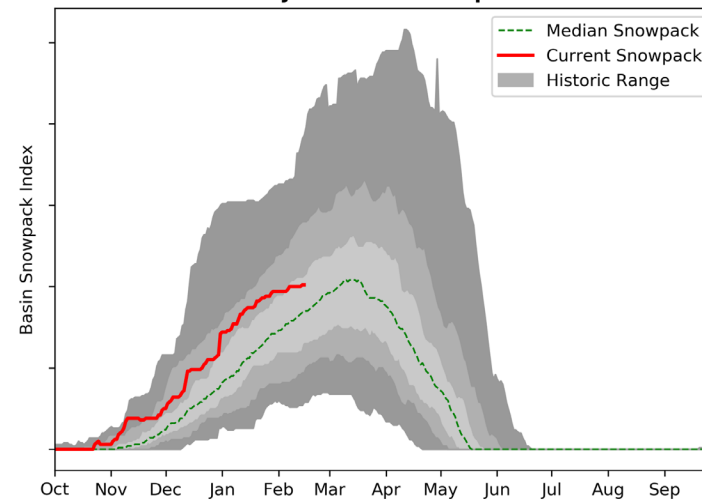
### Klamath Basin Snowpack



### Harney Basin Snowpack



### Owyhee Basin Snowpack



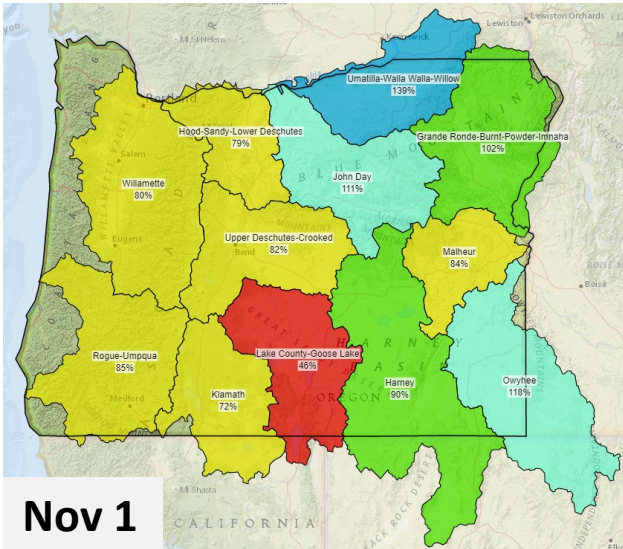


# Precipitation Conditions

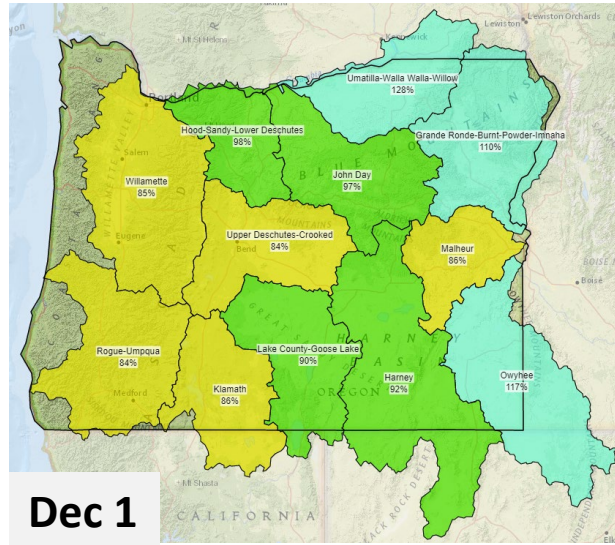


# Water Year Precipitation

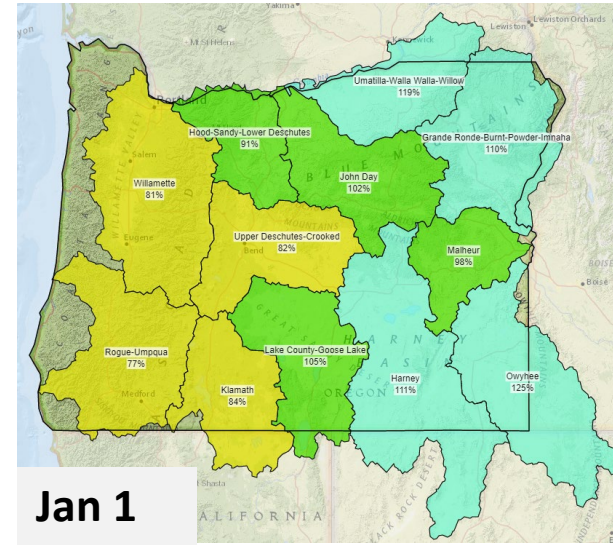
## Basin Maps



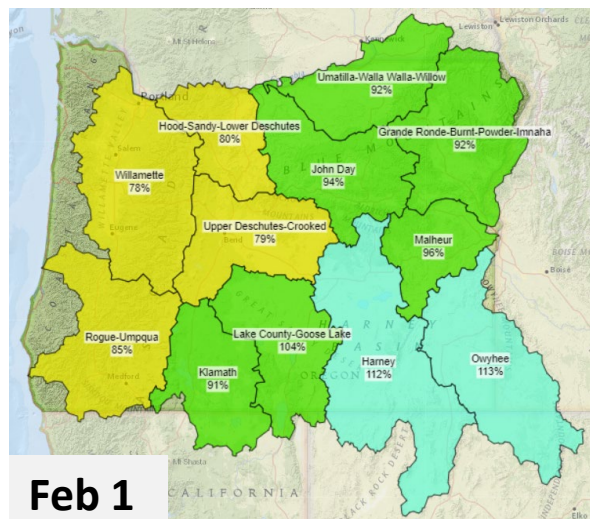
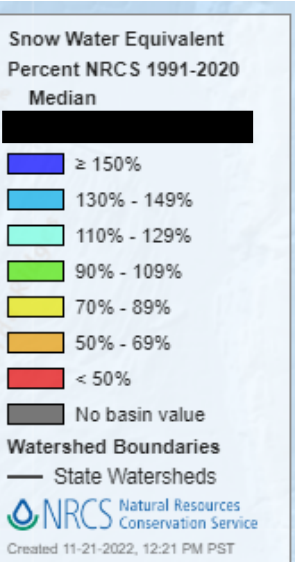
Nov 1



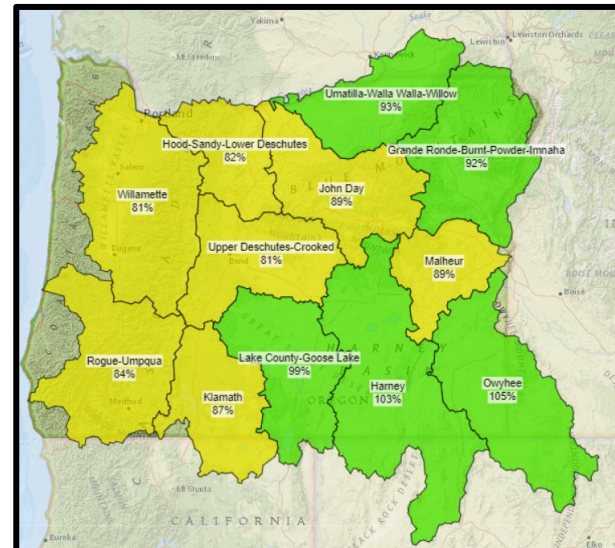
Dec 1



Jan 1



Feb 1

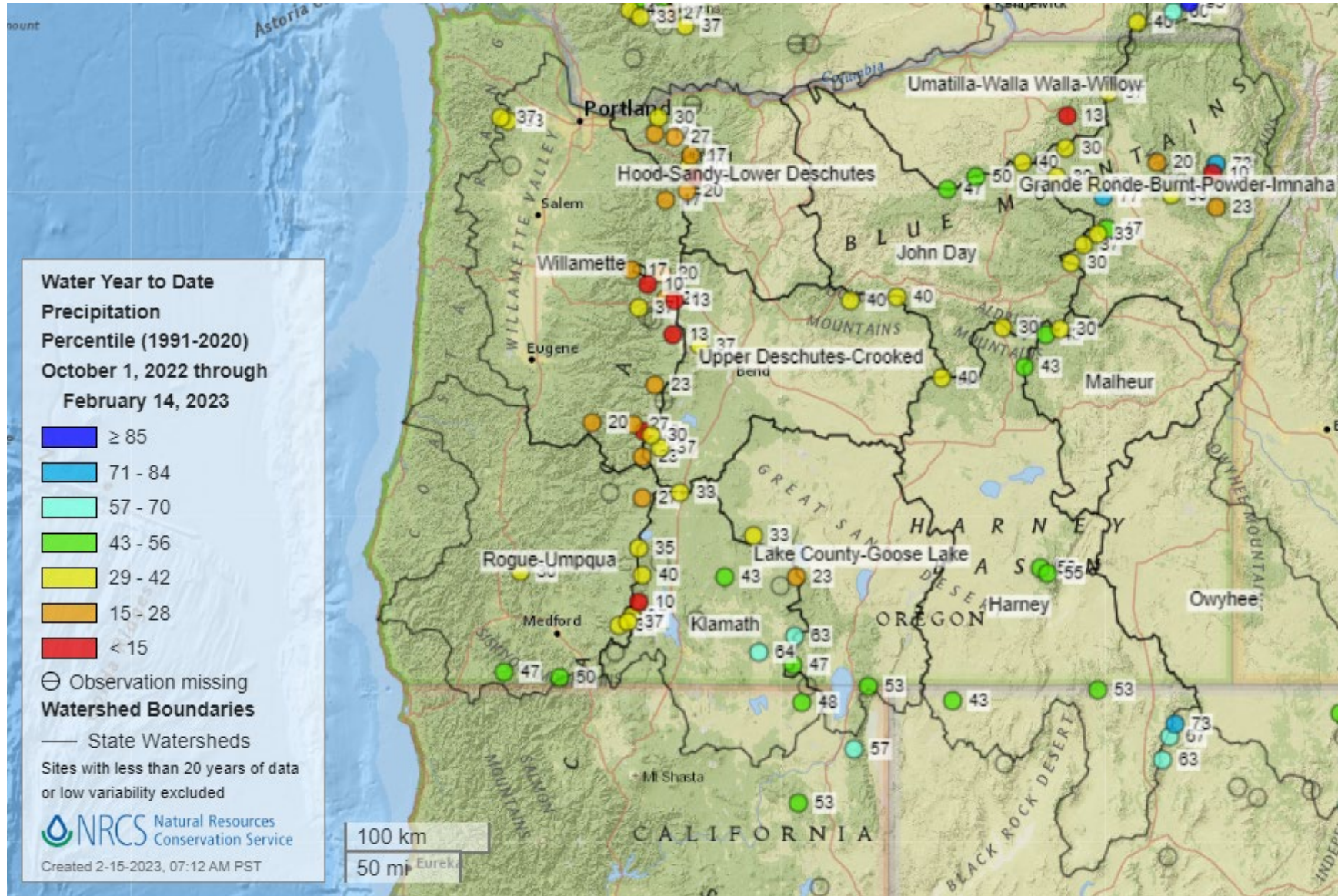


**Feb 15**  
**Statewide = 91% of normal**



# Precipitation

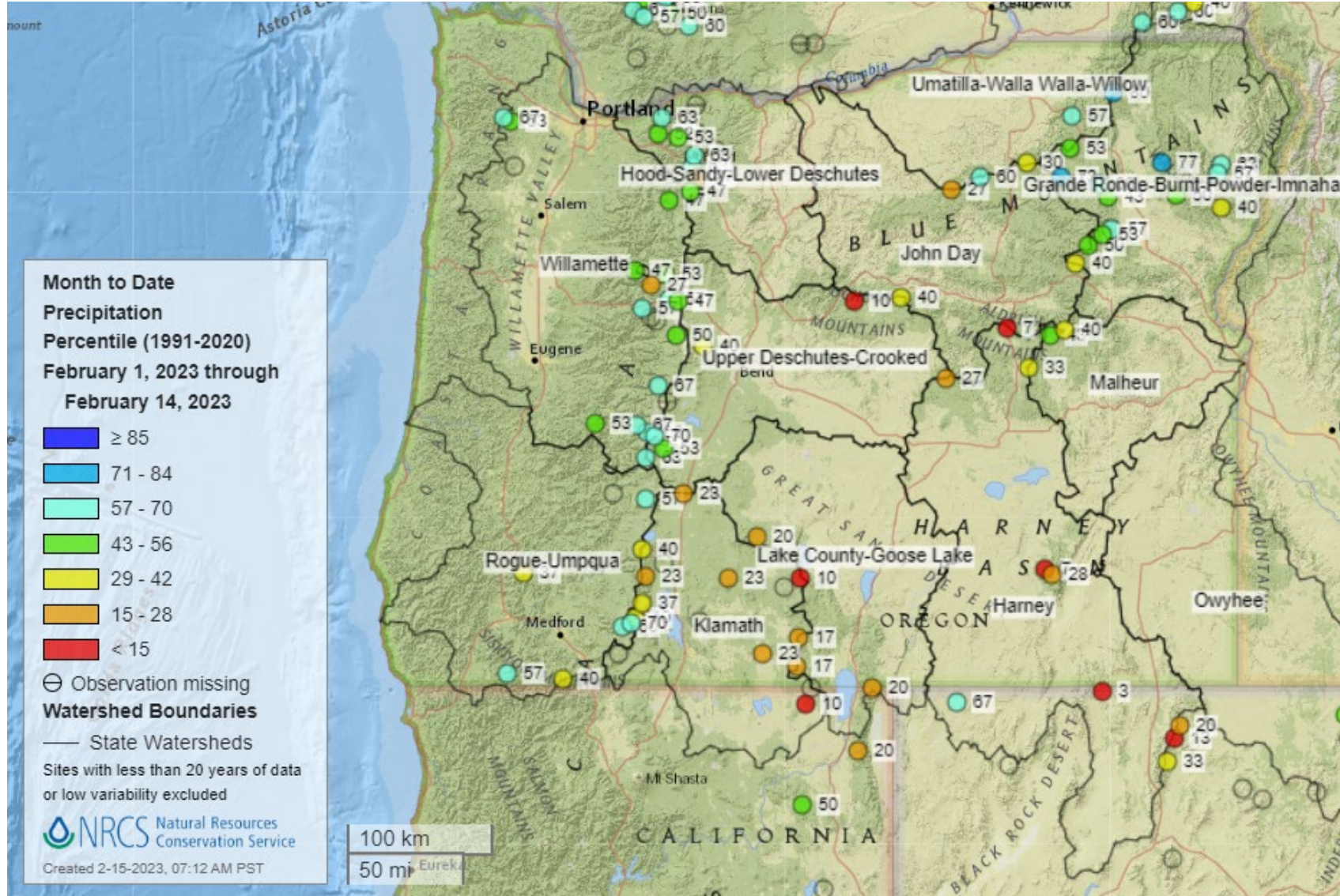
## Site Percentiles – Water Year





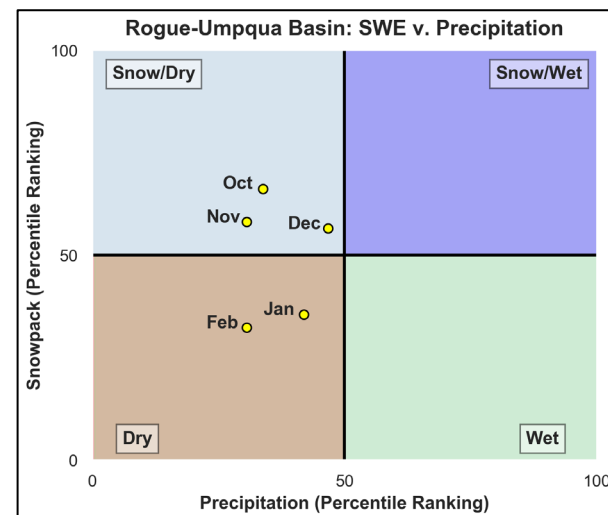
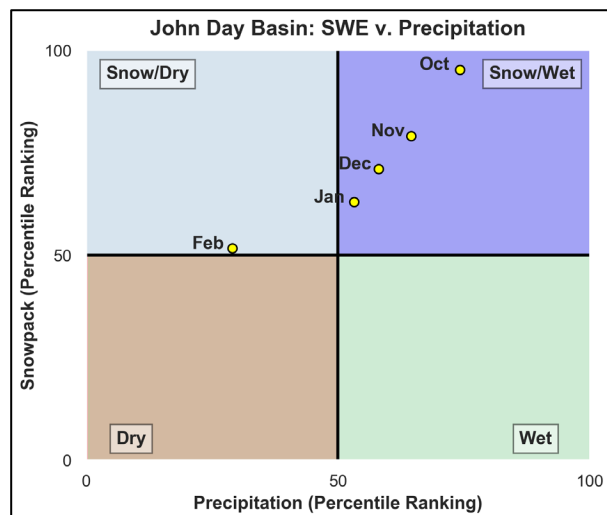
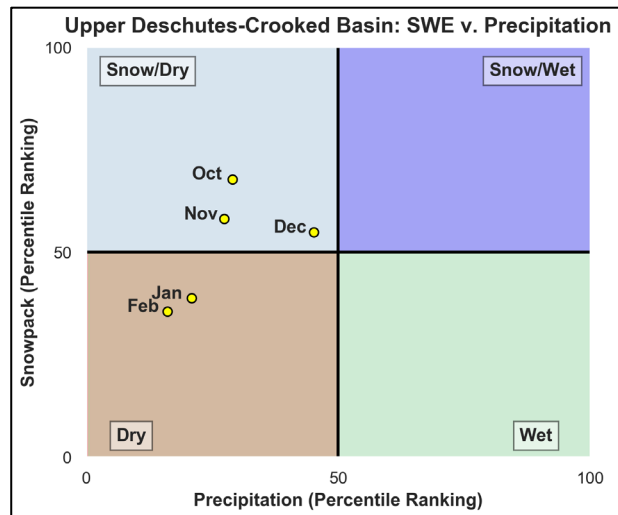
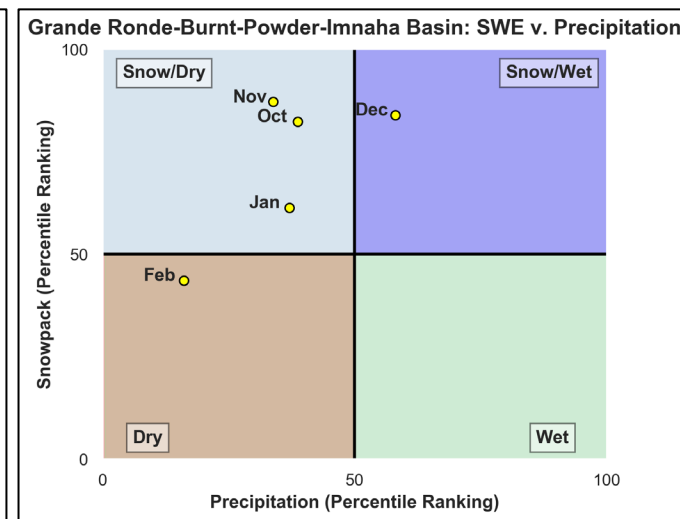
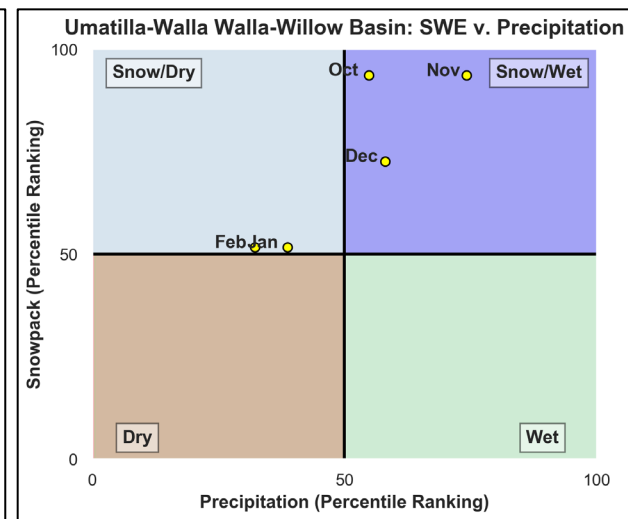
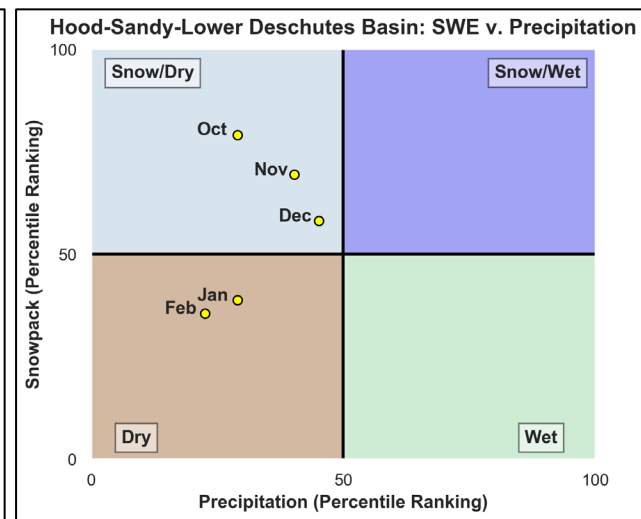
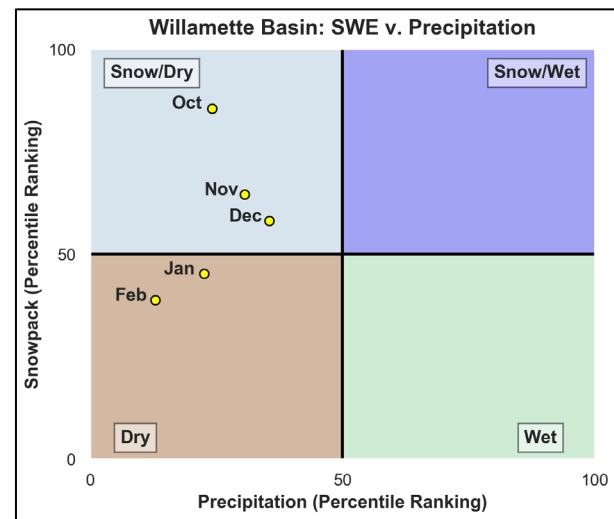
# Precipitation

## Site Percentiles – ½ Month



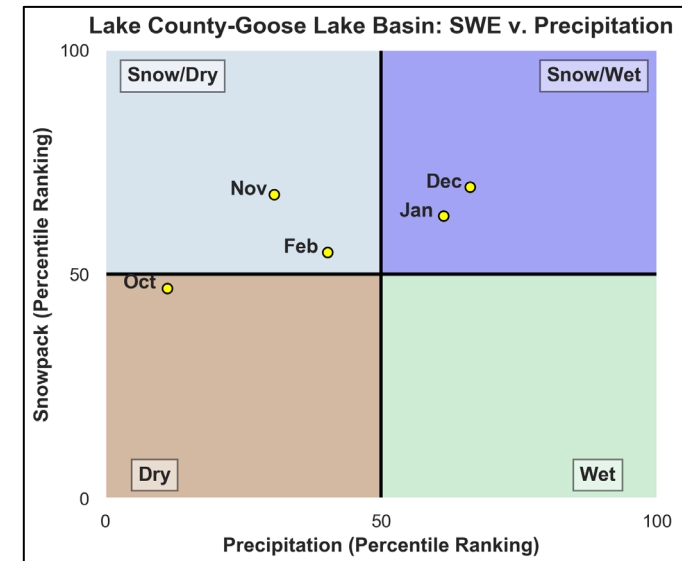
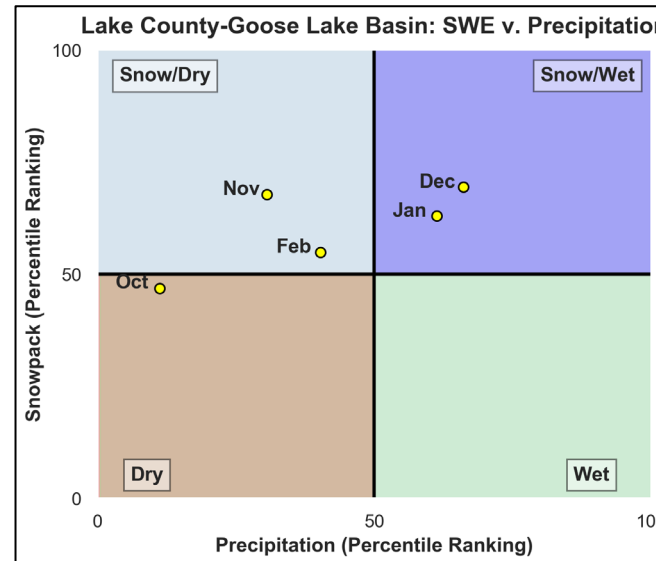
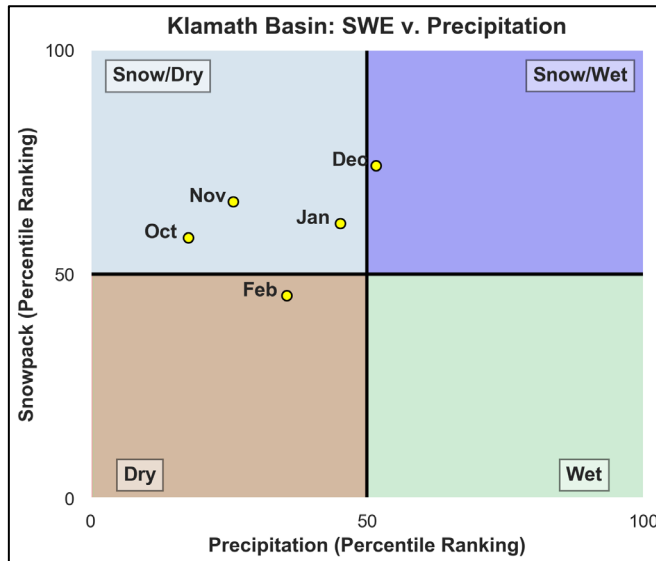
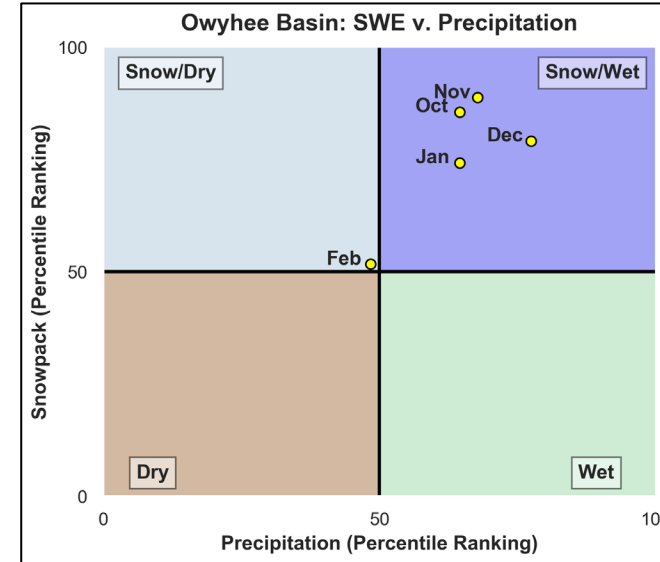
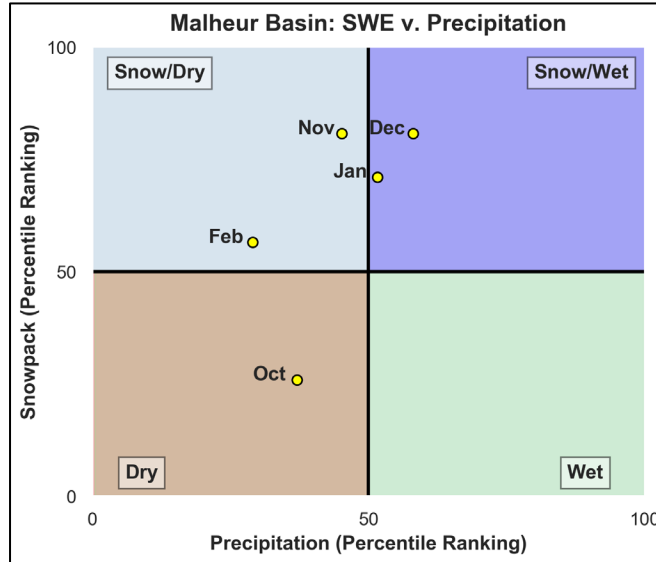
# Percentile Ranking: SWE v. WY Precipitation

WY 2023



# Percentile Ranking: SWE v. WY Precipitation

WY 2023



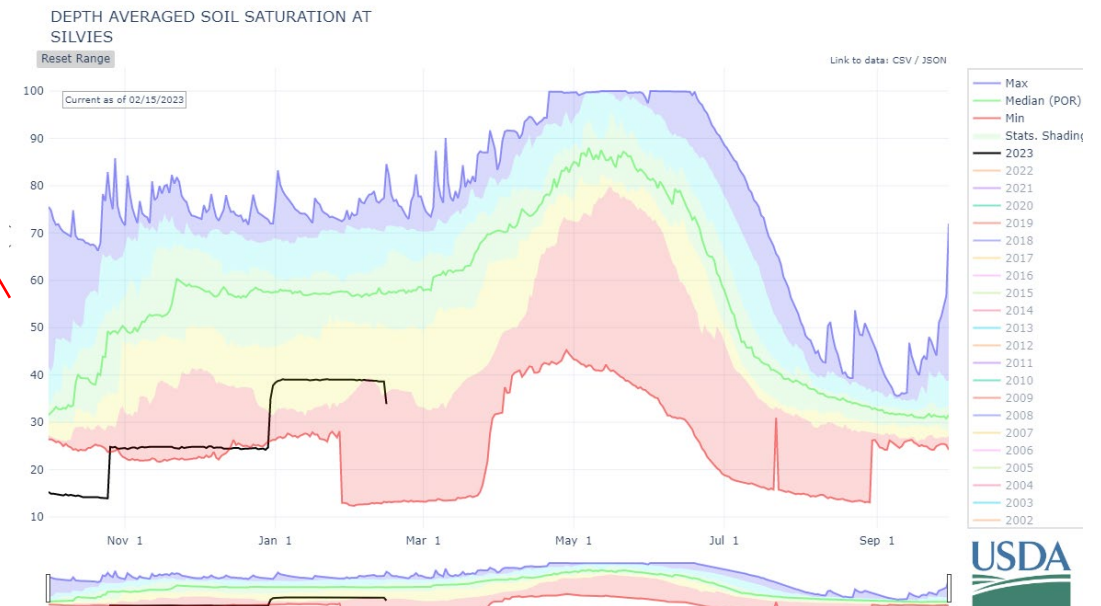
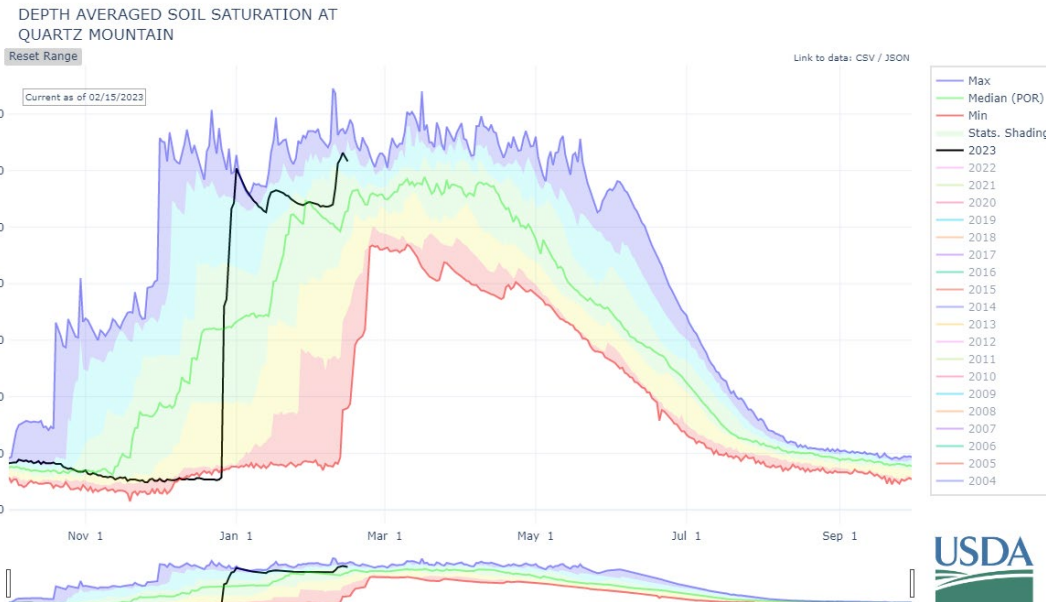
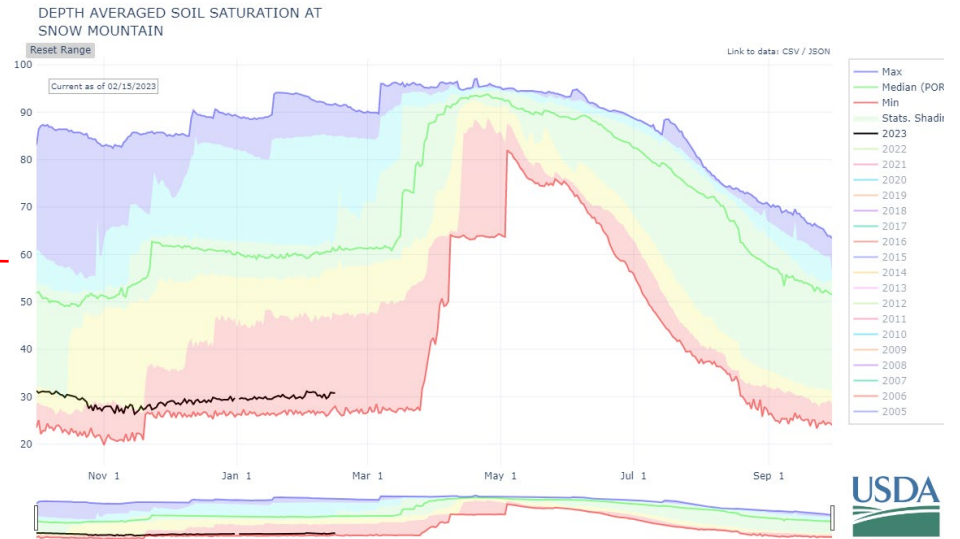
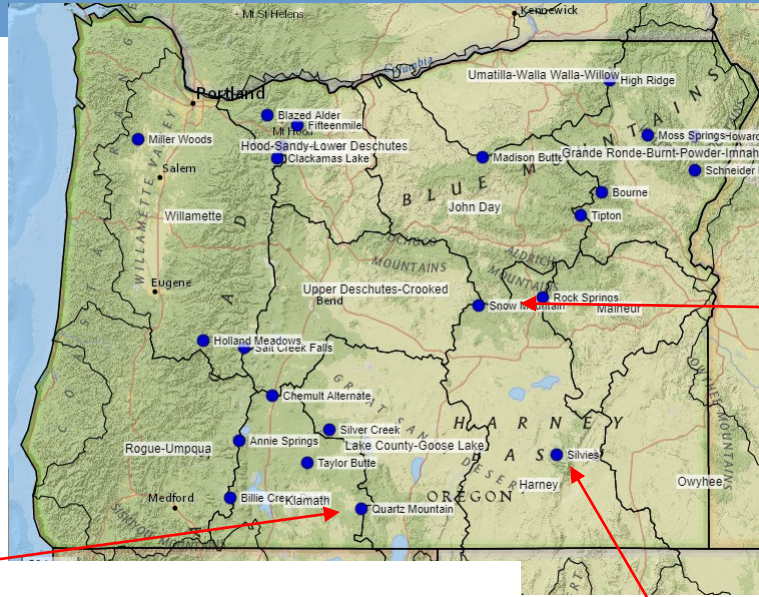




# Soil Moisture Conditions

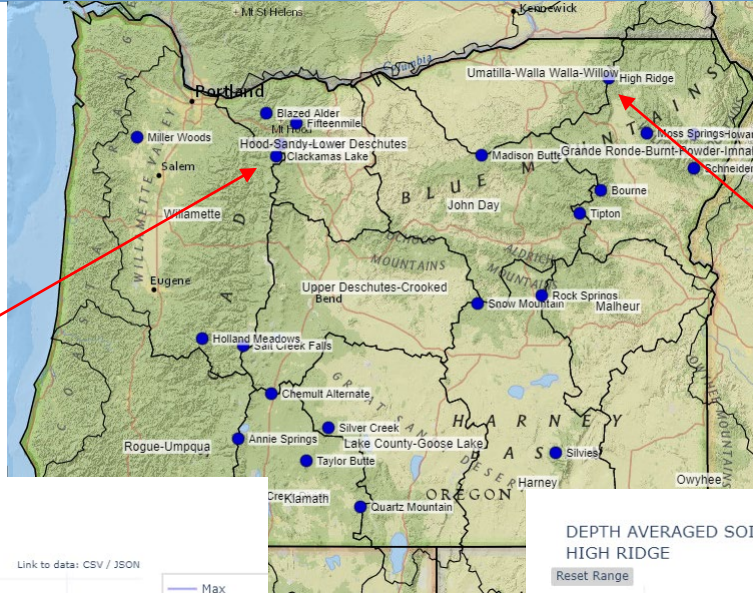
# Soil Moisture

## WY 2023 – Select Site Charts

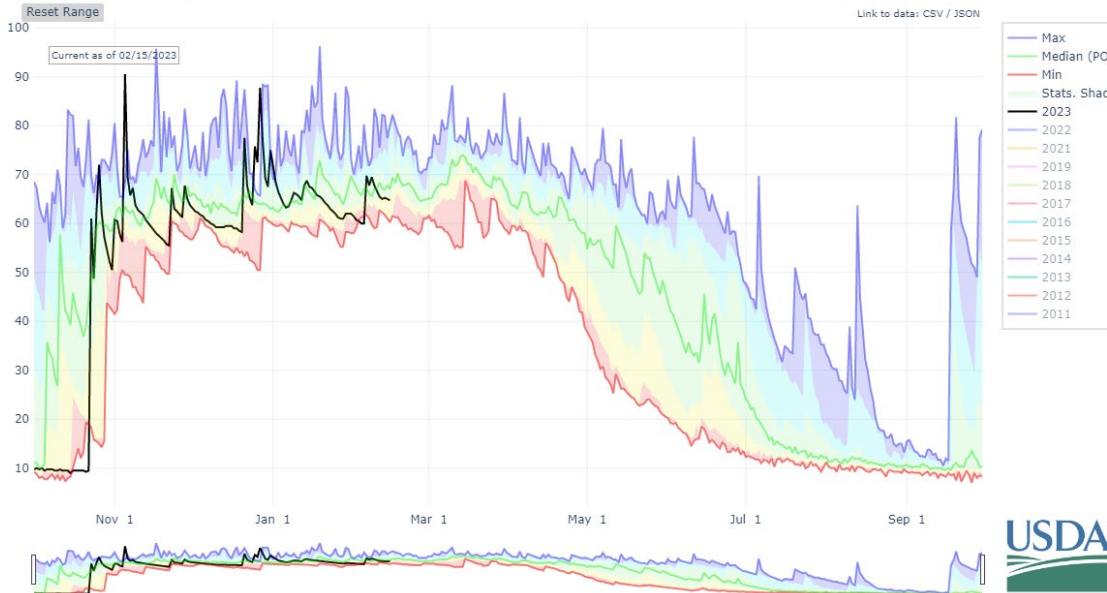


# Soil Moisture

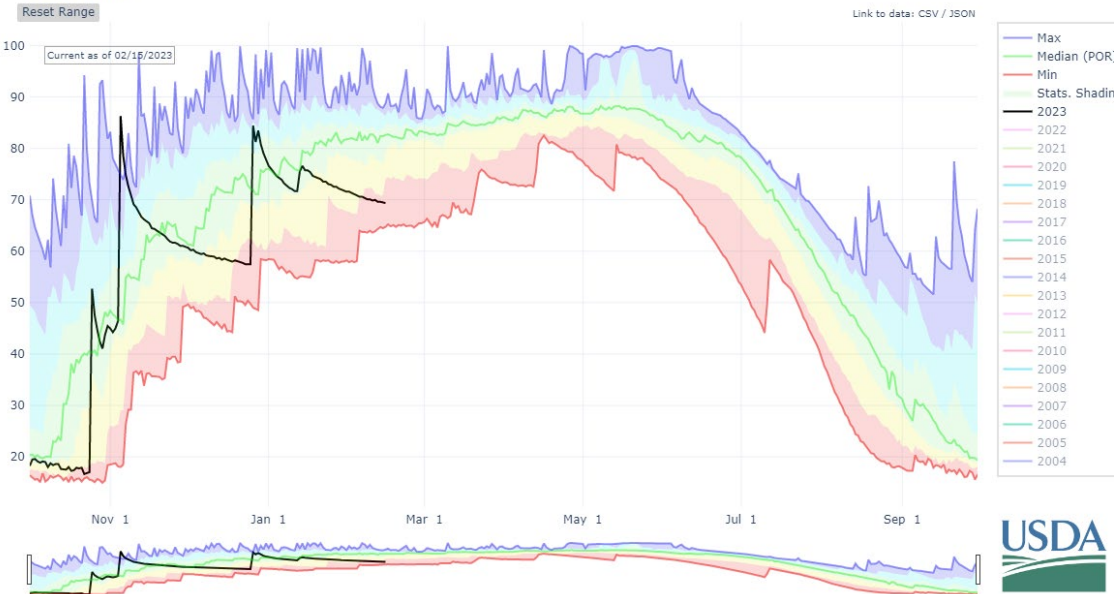
## WY 2023 – Select Site Charts



DEPTH AVERAGED SOIL SATURATION AT  
CLACKAMAS LAKE



DEPTH AVERAGED SOIL SATURATION AT  
HIGH RIDGE



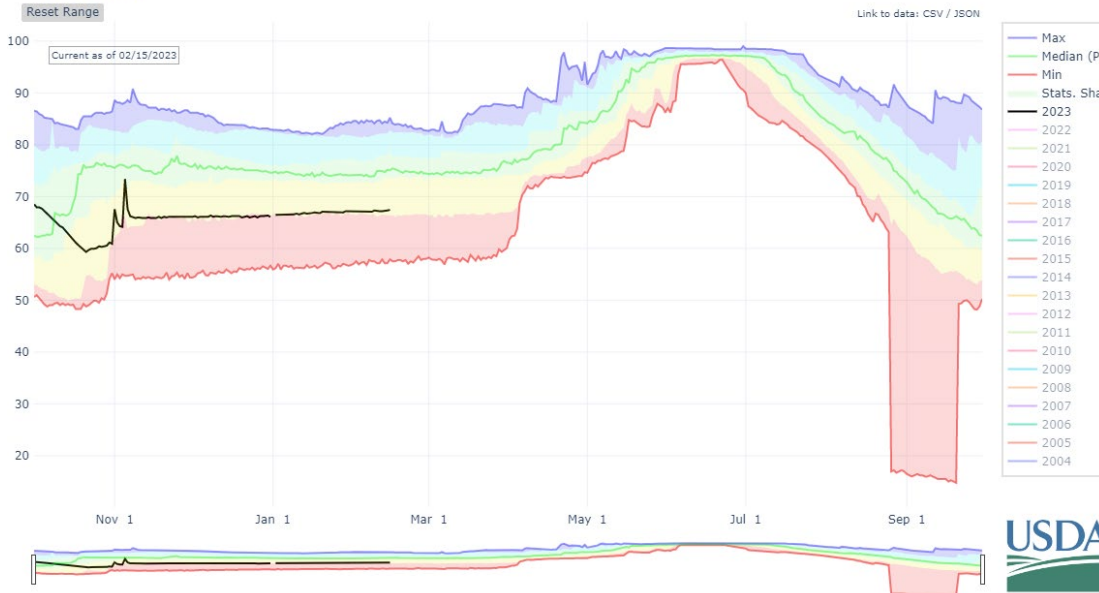


# Soil Moisture

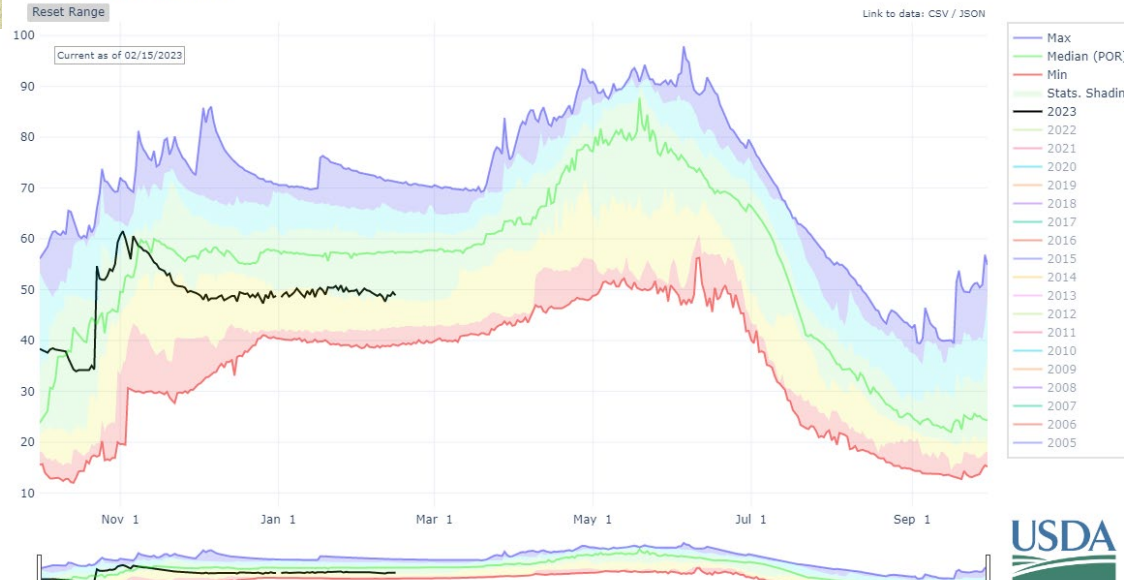
## WY 2023 – Select Site Charts



DEPTH AVERAGED SOIL SATURATION AT  
MT. HOWARD



DEPTH AVERAGED SOIL SATURATION AT  
SCHNEIDER MEADOWS



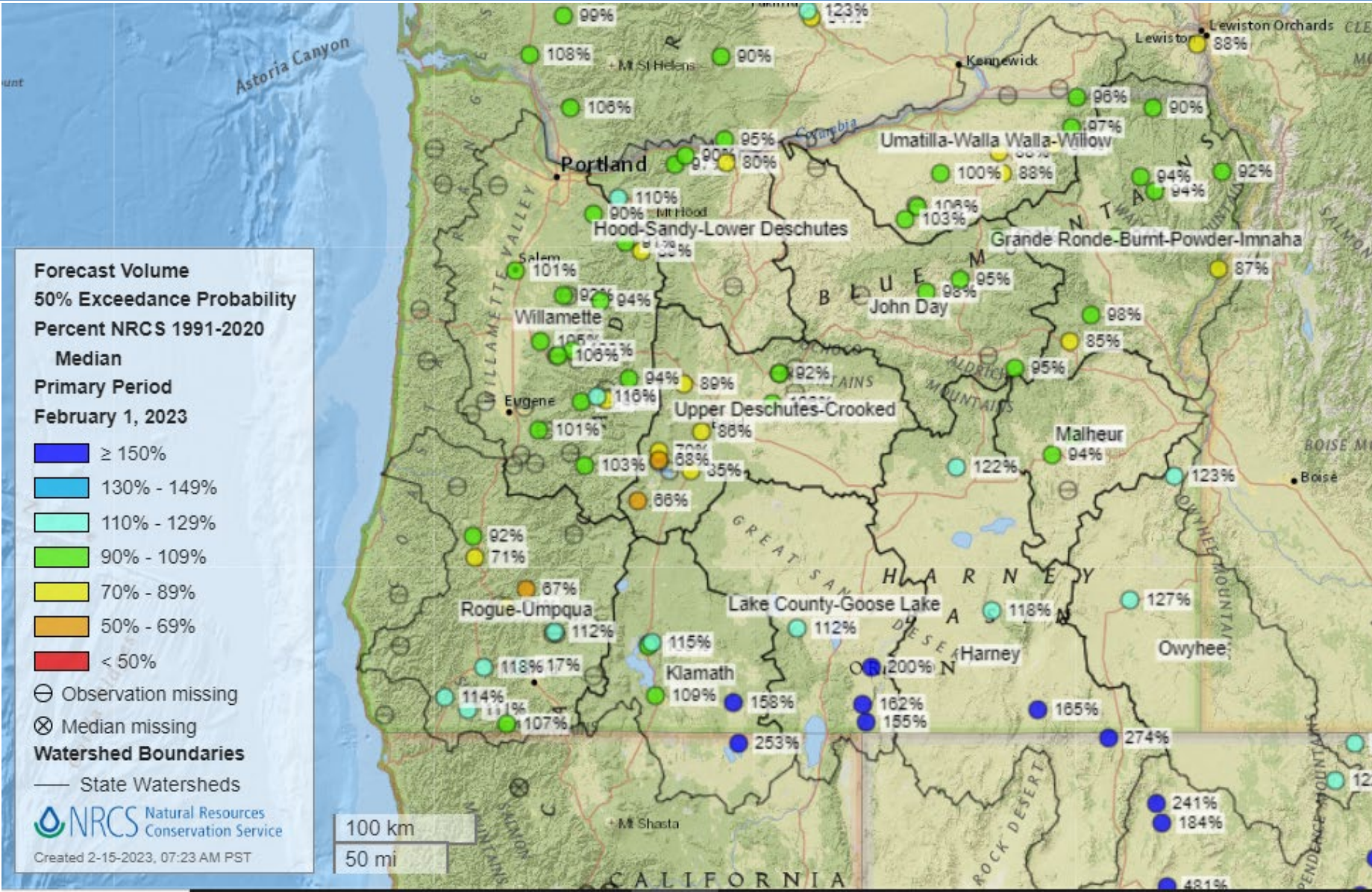




# Streamflow Forecasts

# Streamflow Forecast

February 1







**Thank you!**

**Matt Warbritton**  
**Lead Hydrologist**  
**USDA NRCS Oregon Snow Survey**  
[matt.warbritton@usda.gov](mailto:matt.warbritton@usda.gov)  
**503-307-2829**

[Oregon Snow Survey Website](#)

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Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).



# February 2023 Update for Precipitation & Temperatures



East Fork Lewis River near Battle Ground, WA

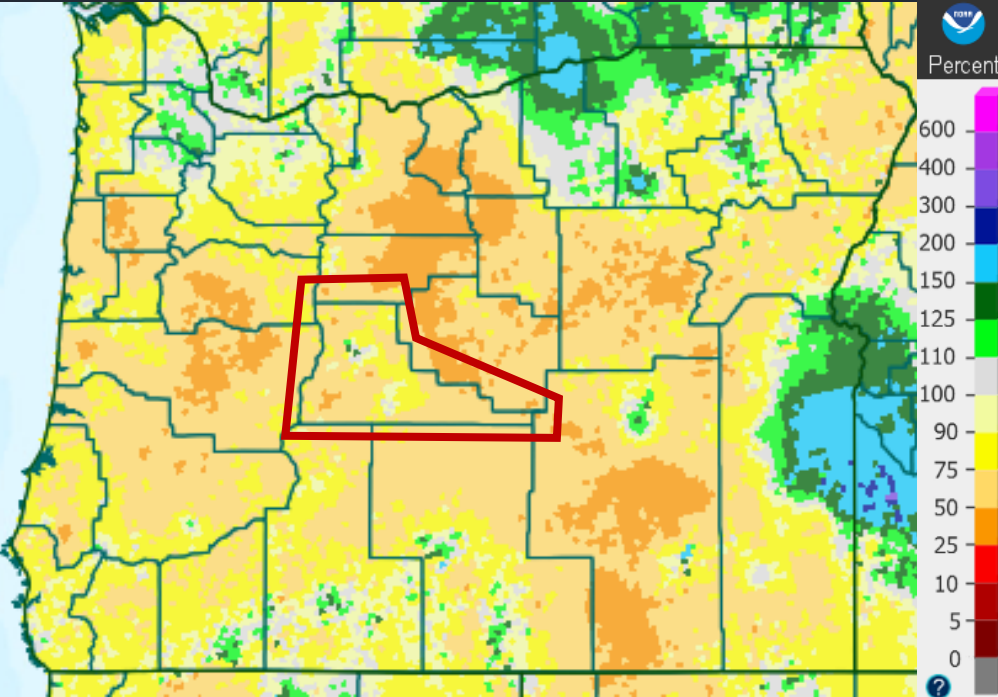
NOAA National Weather Service  
Weather Forecast Office  
Portland, Oregon



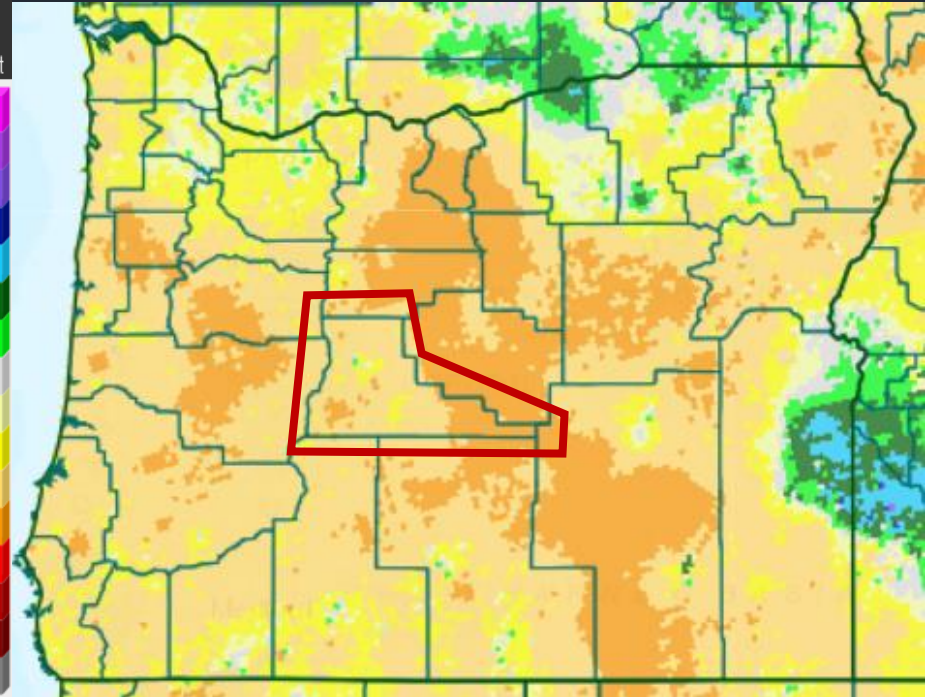


# Water Year Precipitation

As of January 17, 2023



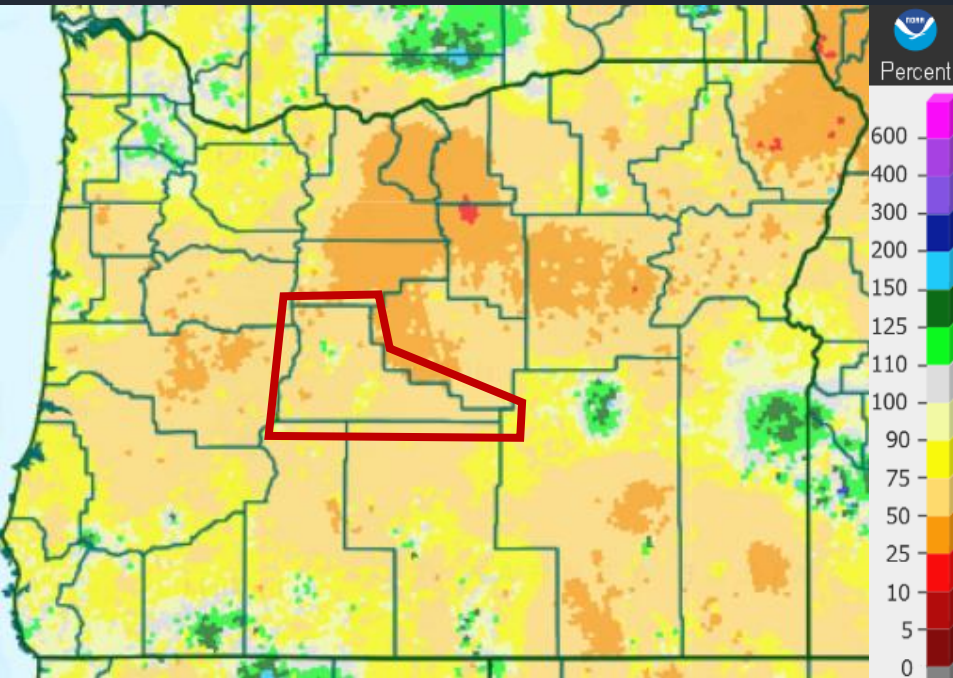
As of February 14, 2023



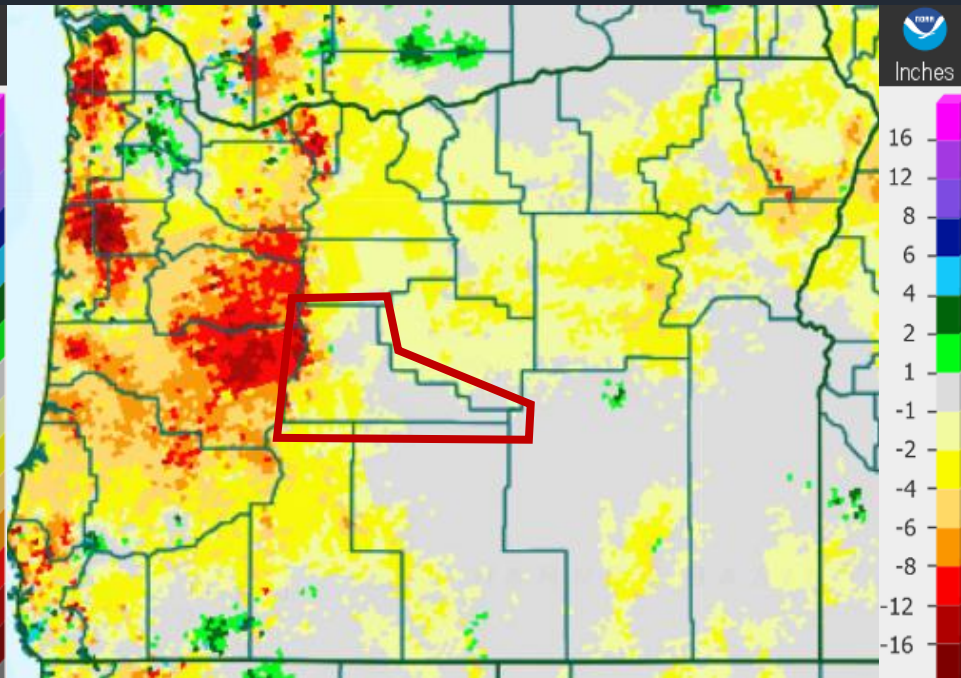
[water.weather.gov/precip/index.php](http://water.weather.gov/precip/index.php)

# Precipitation – Past 60 Days

## Past 60 Days % Normal



## Past 60 Days Departure from Normal



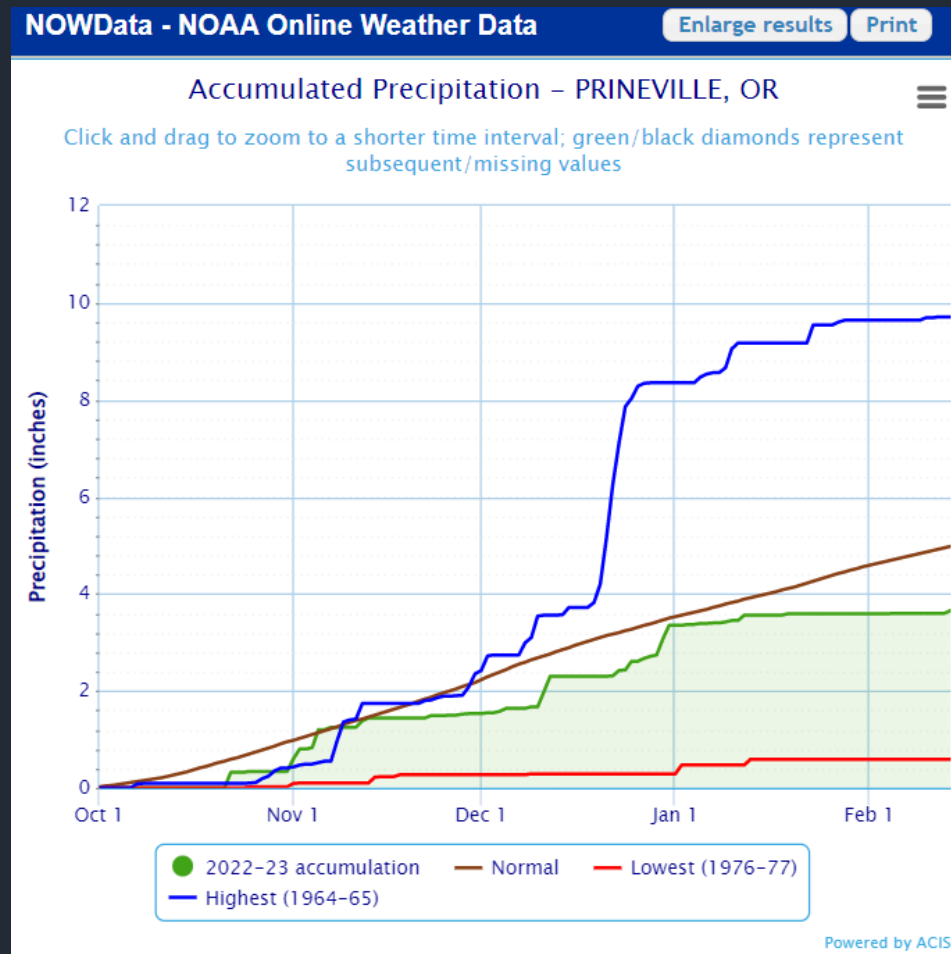
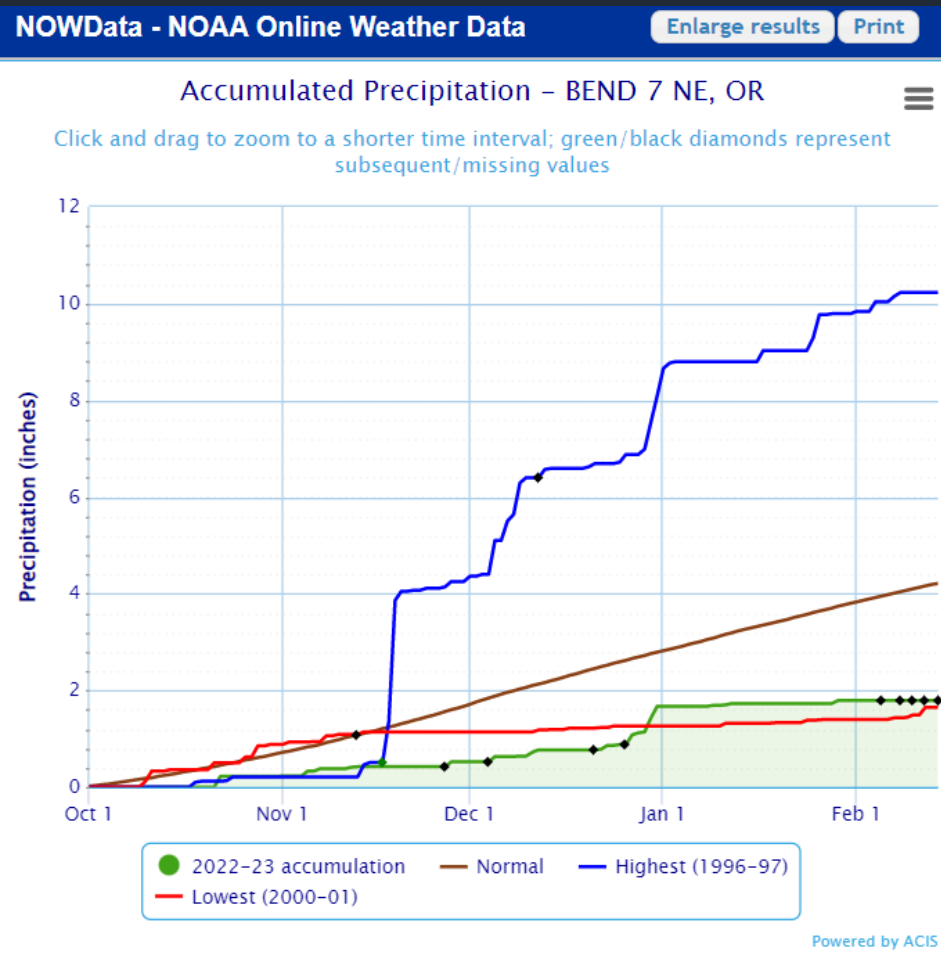
Precipitation Data as of February 14, 2023

[water.weather.gov/precip/index.php](http://water.weather.gov/precip/index.php)





# Water Year Precipitation Bend 7NE & Prineville

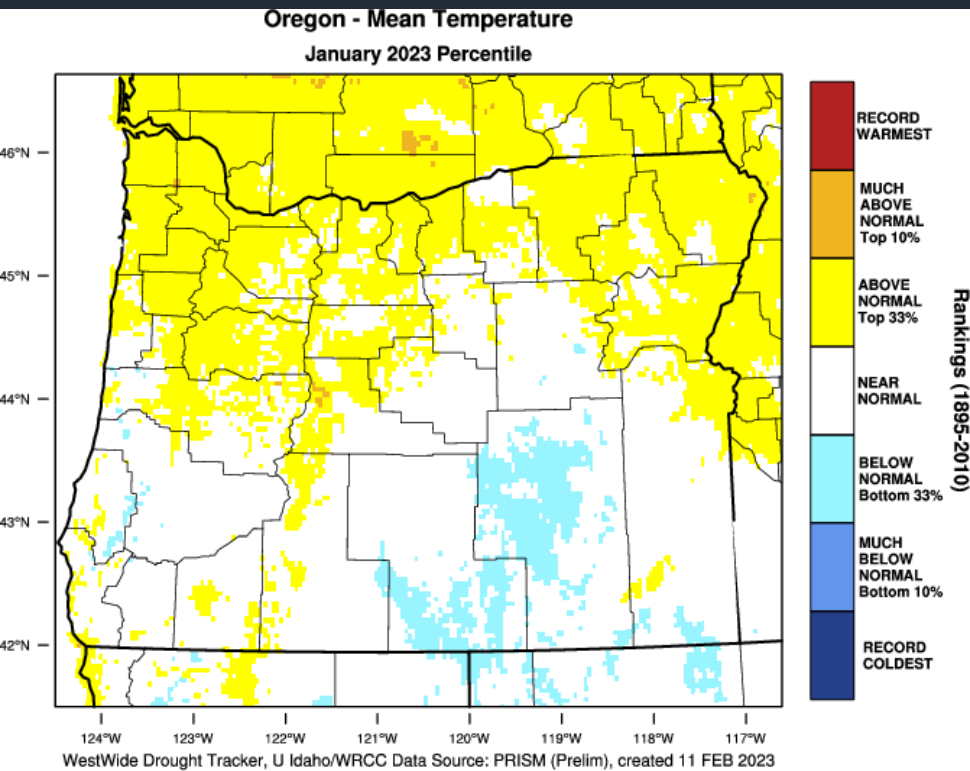
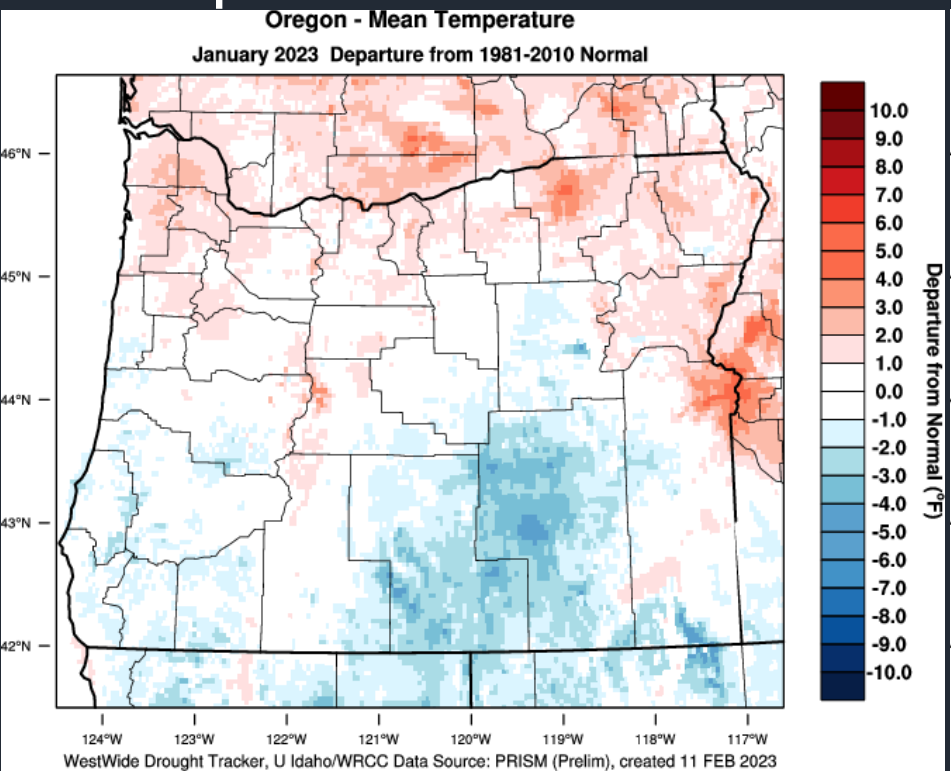


<https://www.weather.gov/wrh/climate?wfo=pdt>

# January Temperatures

## Departure from Normal

## Percentile



<https://wrcc.dri.edu/wwdt/index.php?region=pnw>



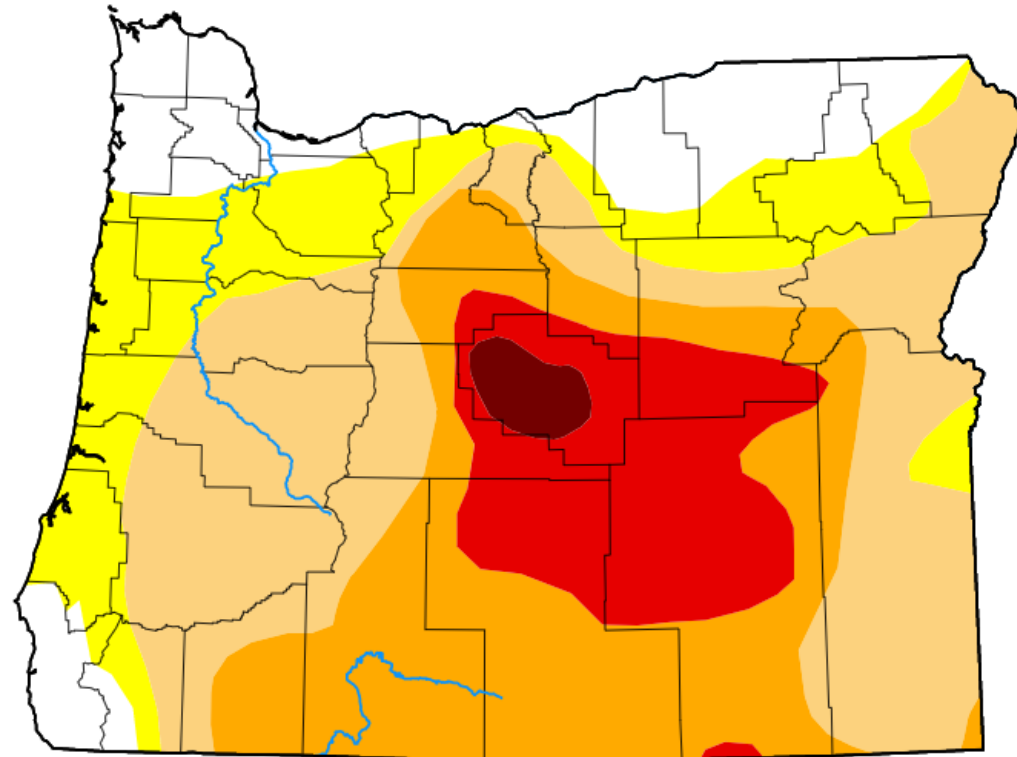
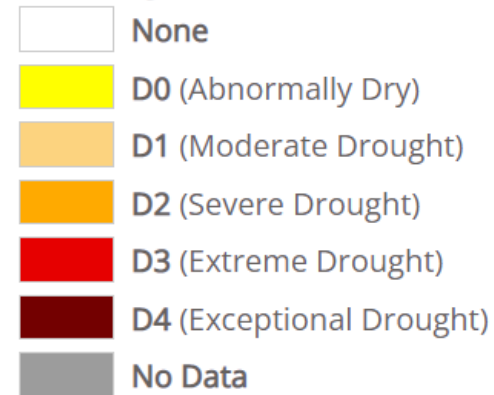


# Drought Monitor

## U.S. Drought Monitor Oregon

Map released: Thurs. February 9, 2023  
Data valid: February 7, 2023 at 7 a.m. EST

### Intensity



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

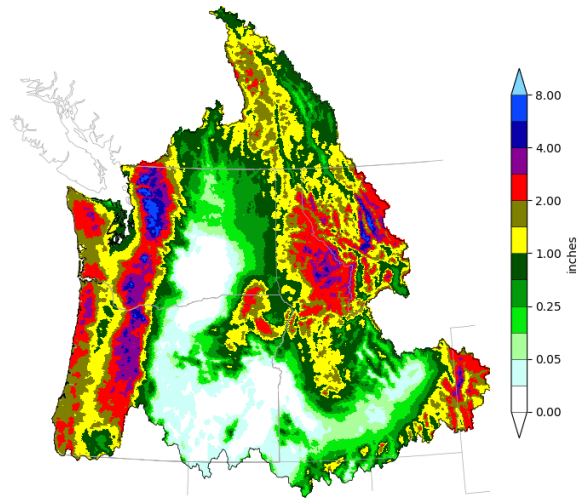


# Mid February Outlook

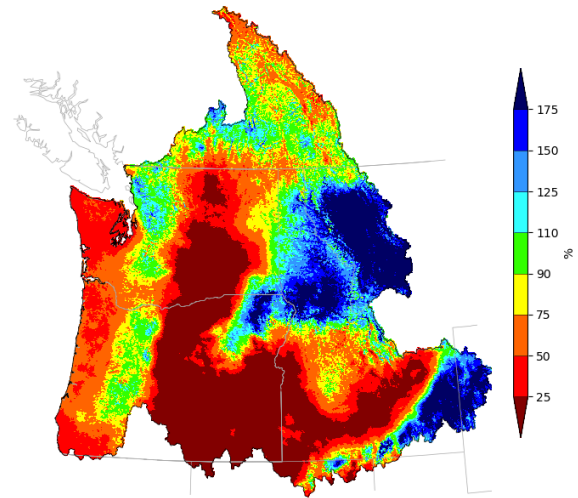
## NWRFC 10-DAY PRECIPITATION FORECAST as of 2/14/2023

[www.nwrfc.noaa.gov/water\\_supply/wy\\_summary/wy\\_summary.php](http://www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php)

Northwest River Forecast Center  
10 Day QPF, Ending 12Z, 02/24/23

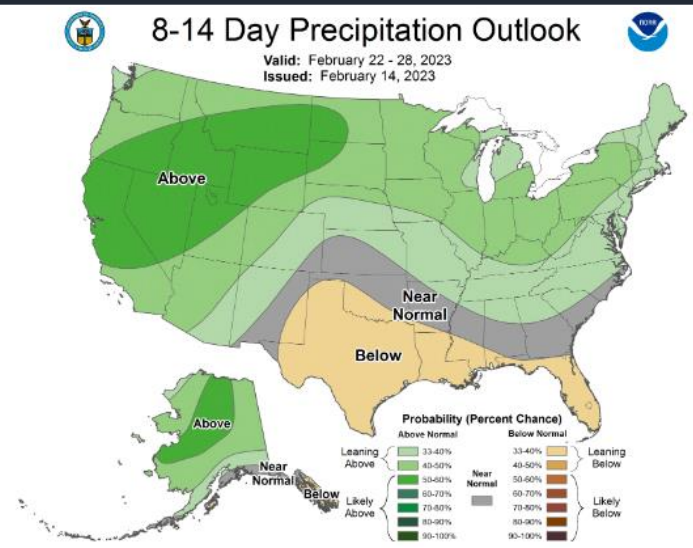
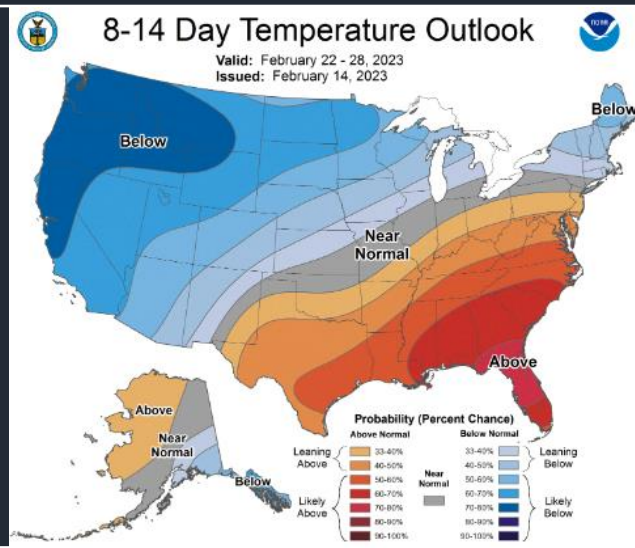


Northwest River Forecast Center  
10 Day QPF (Percent of Climatology), Ending 12Z, 02/24/23



## CPC 8 - 14 DAY OUTLOOK

[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)

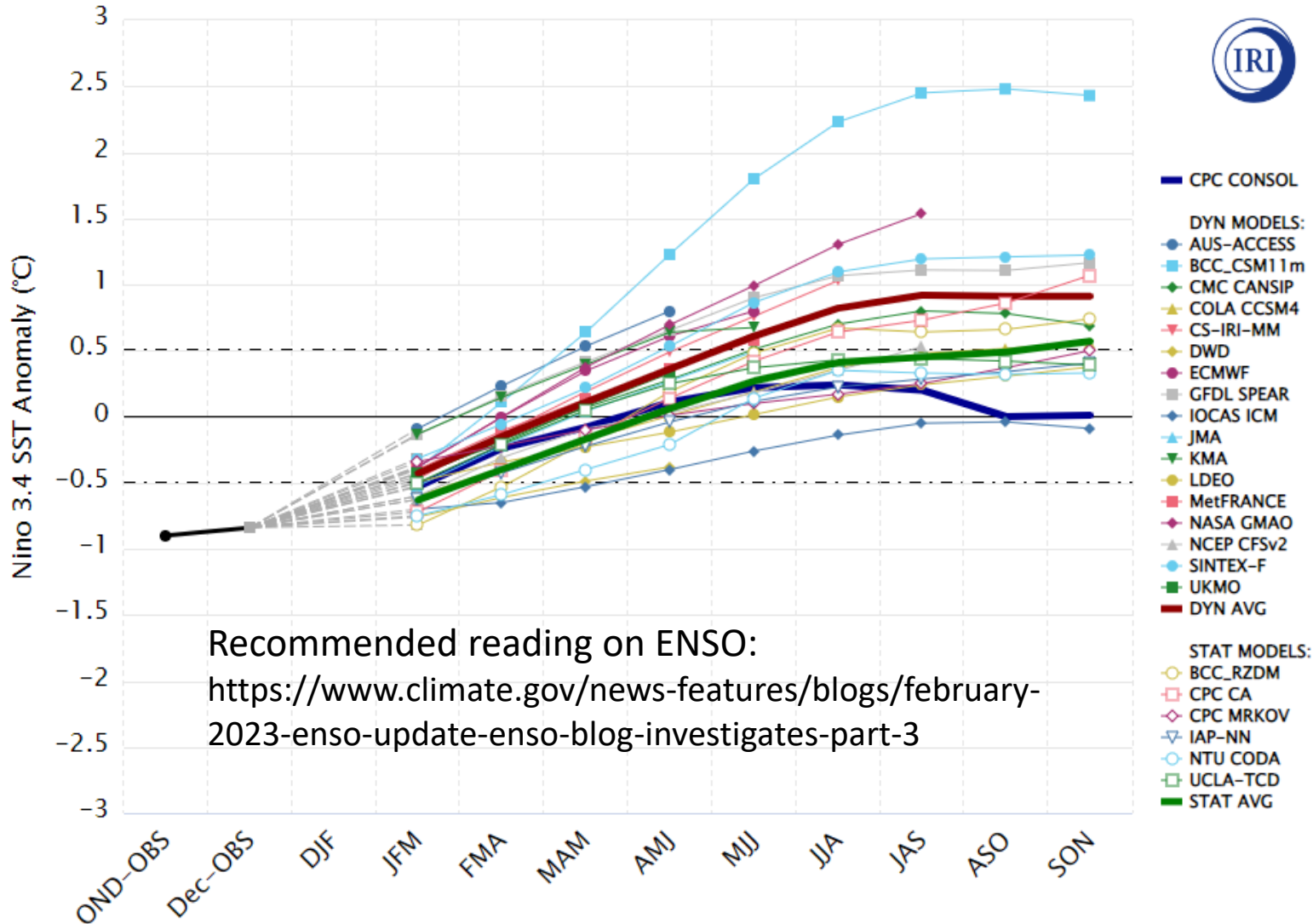






# ENSO Status & Prediction

## Model Predictions of ENSO from Jan 2023

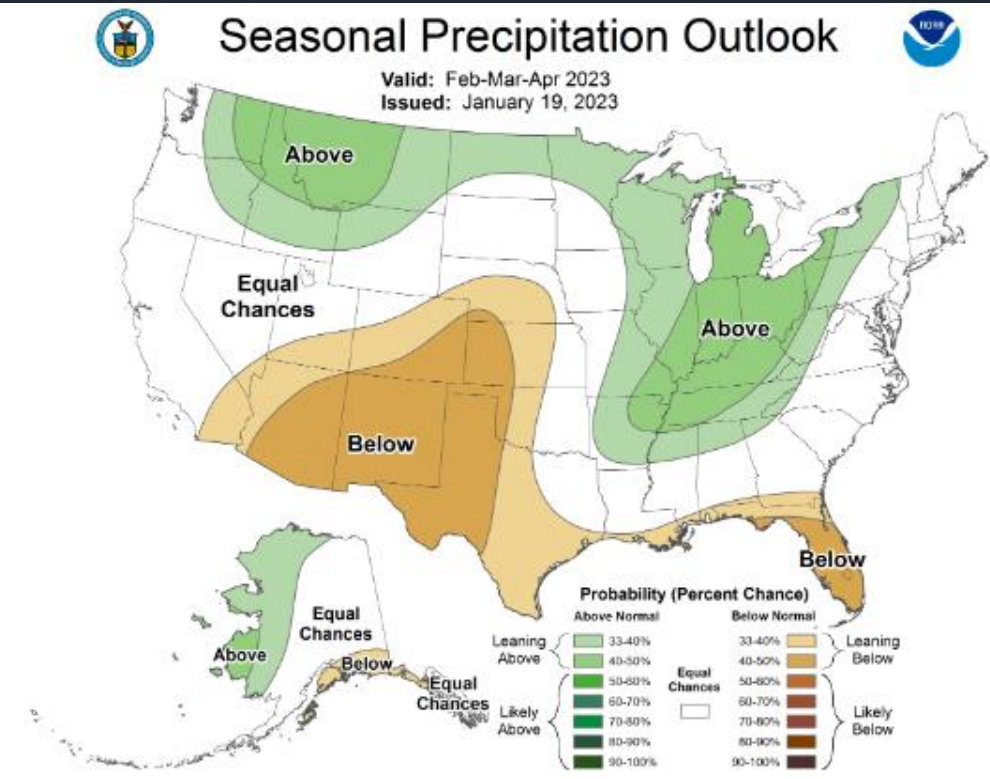
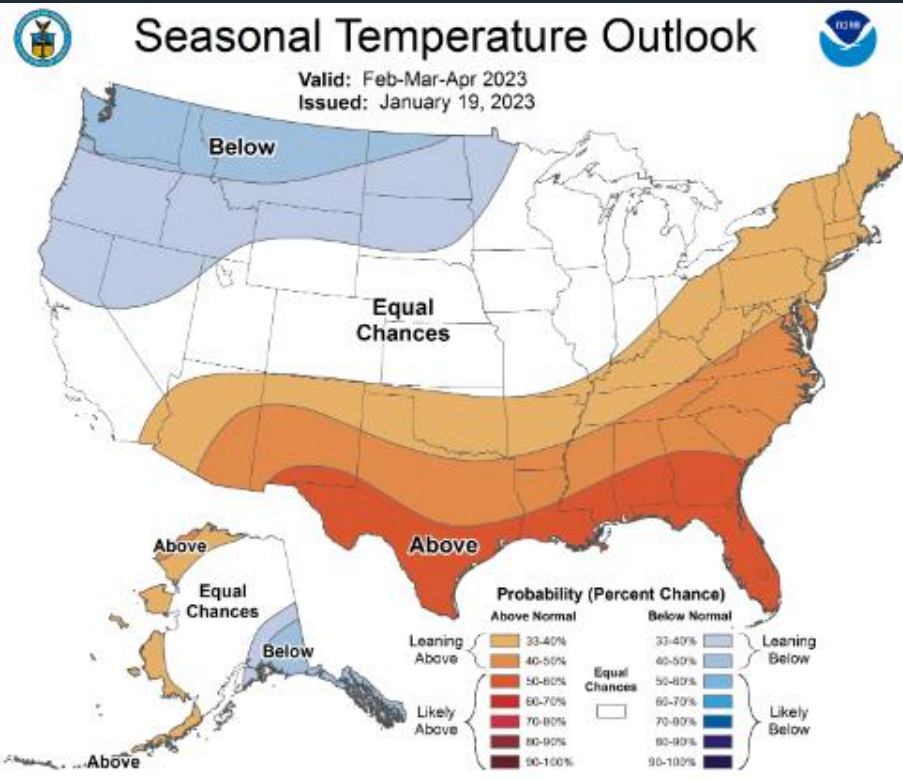


[https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso\\_tab=enso-sst\\_table](https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table)



# Climate Prediction Center Outlook

## February – April 2023



[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)





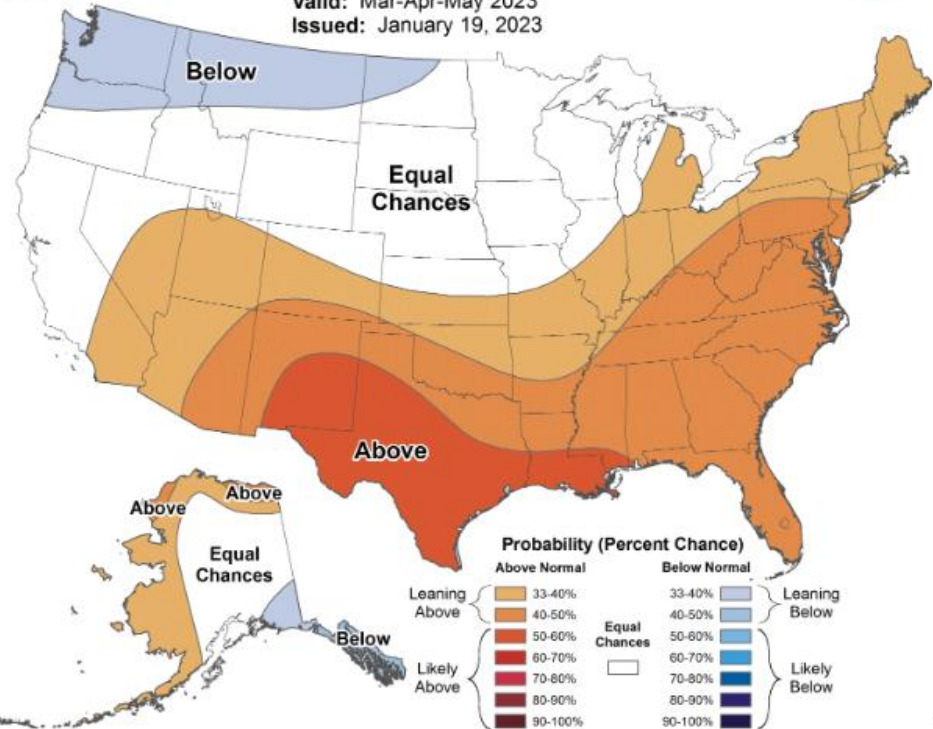
# Climate Prediction Center Outlook

## March – May 2023



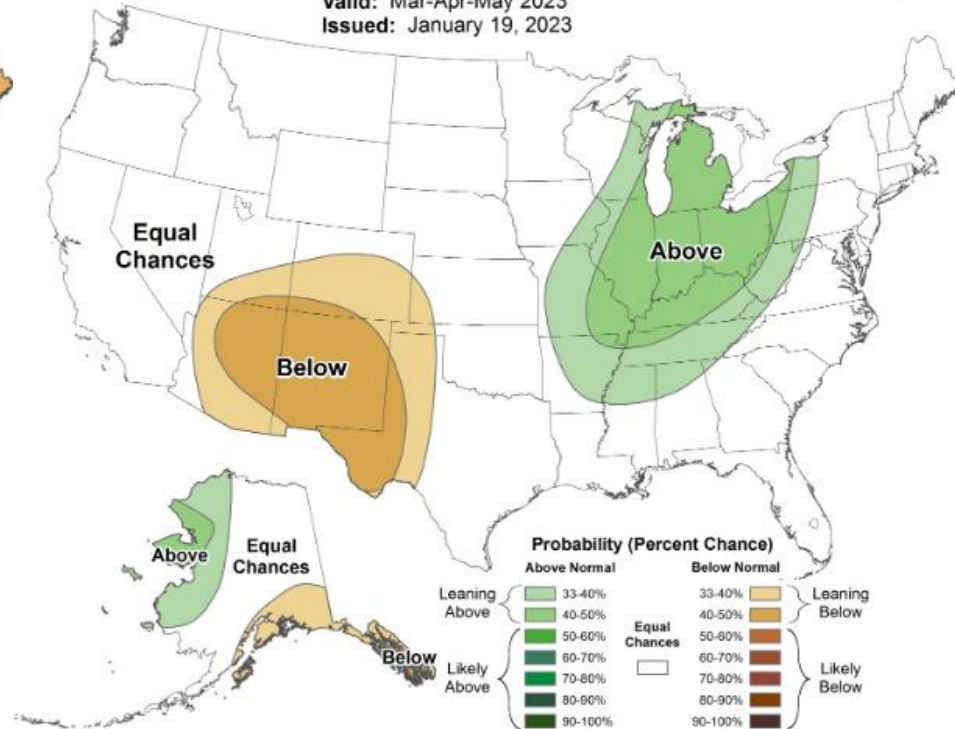
### Seasonal Temperature Outlook

Valid: Mar-Apr-May 2023  
Issued: January 19, 2023



### Seasonal Precipitation Outlook

Valid: Mar-Apr-May 2023  
Issued: January 19, 2023

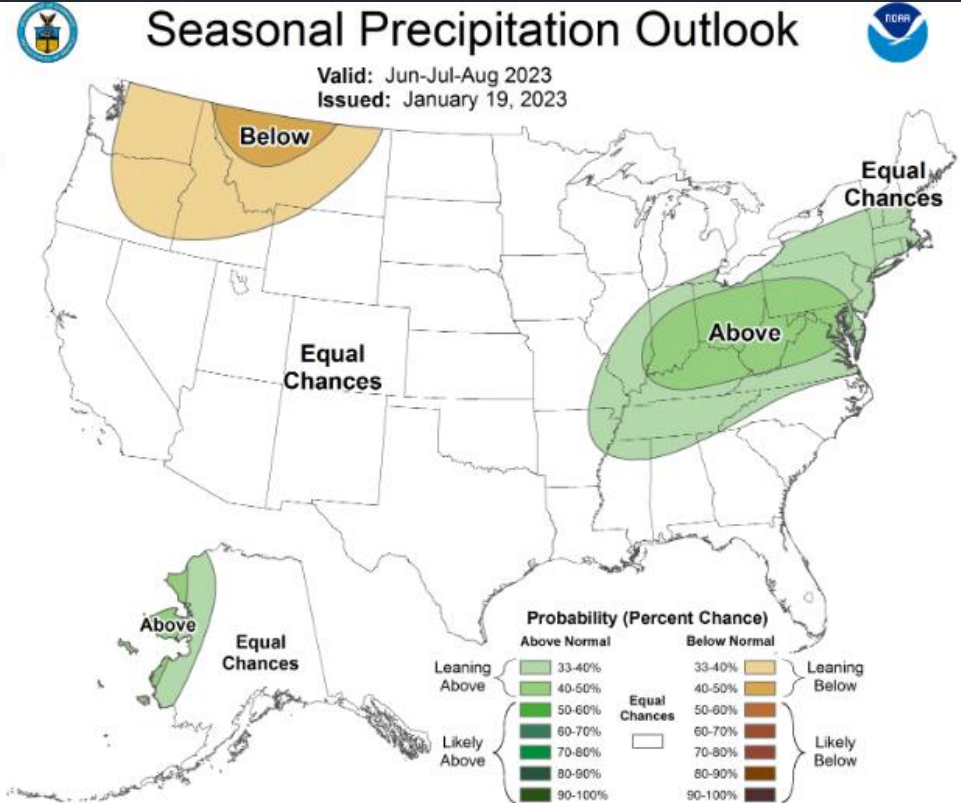
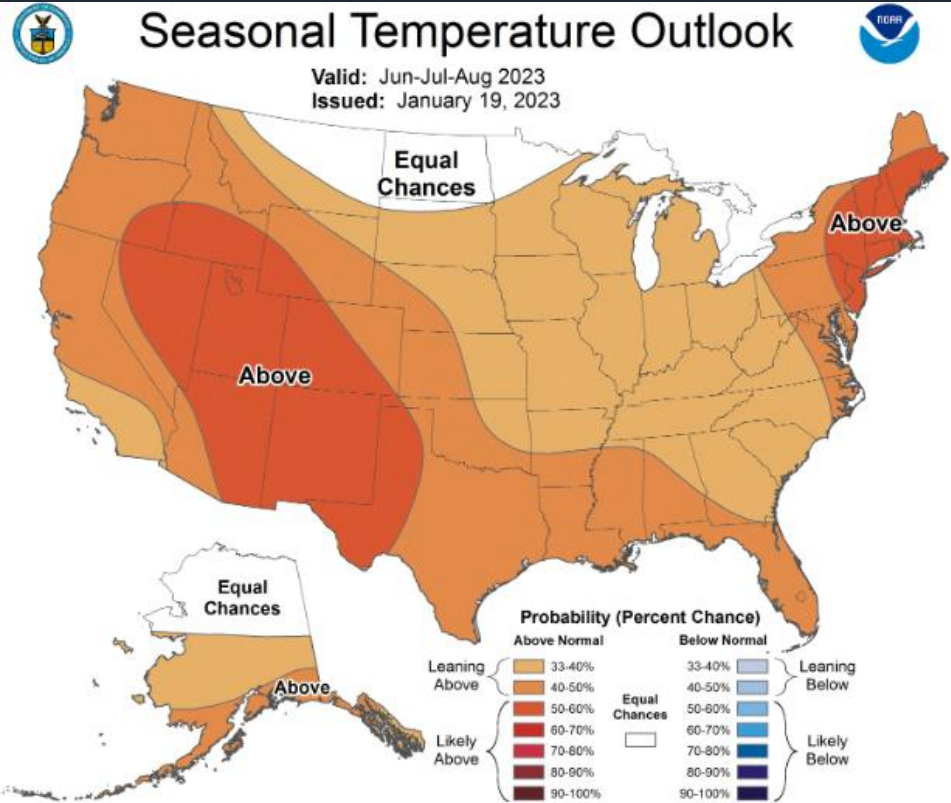


[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)



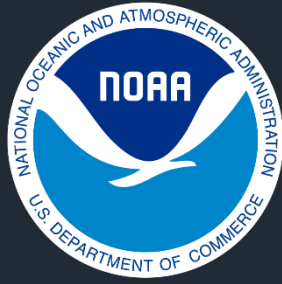
# Climate Prediction Center Outlook

## June – August 2023



[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)





# February 2023 Update for River Forecasts

NOAA National Weather Service



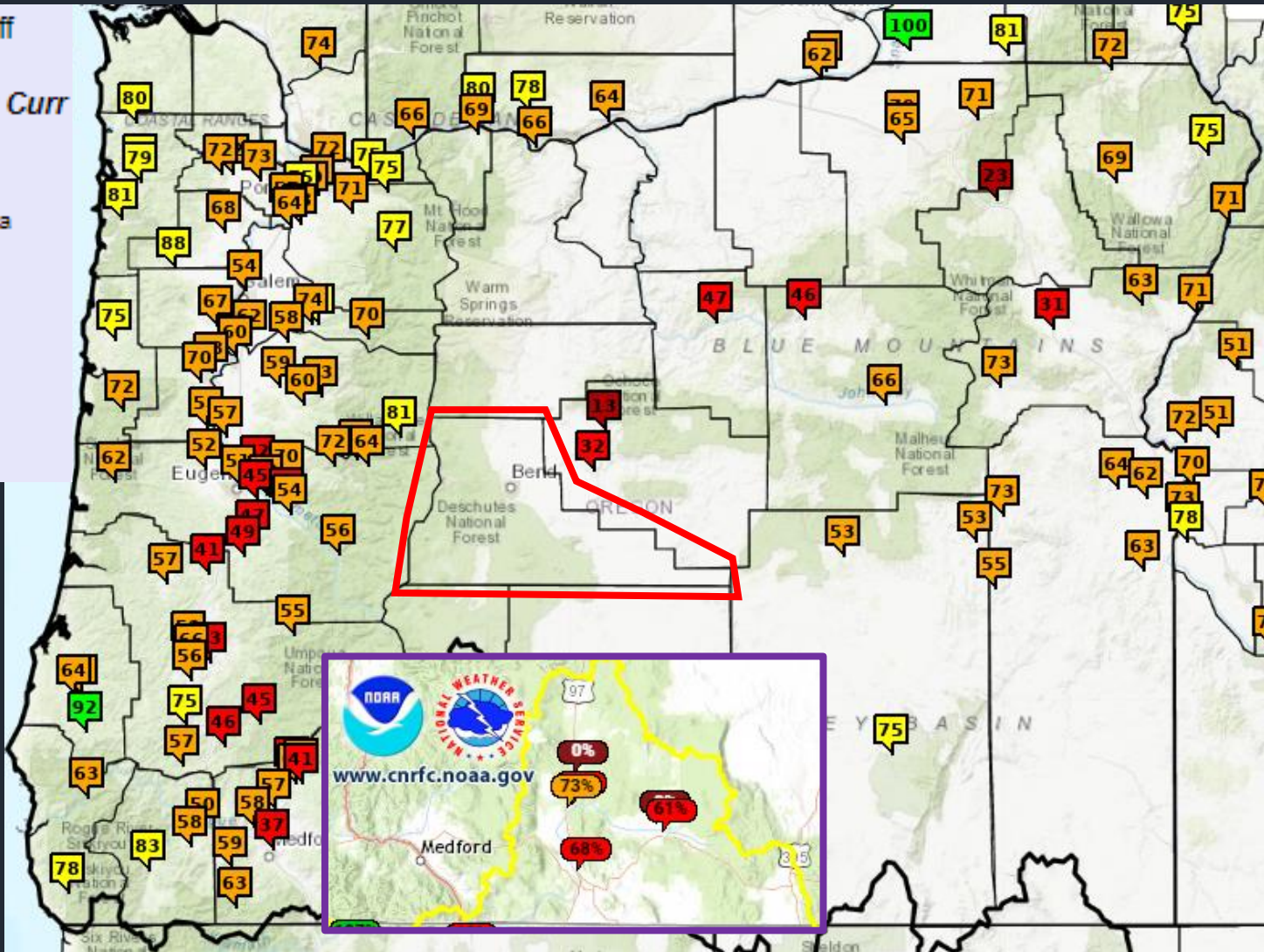
# Observed Runoff

## October – Present % of Average

Natural Runoff

Period: Oct thru Curr  
(% Normal)

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

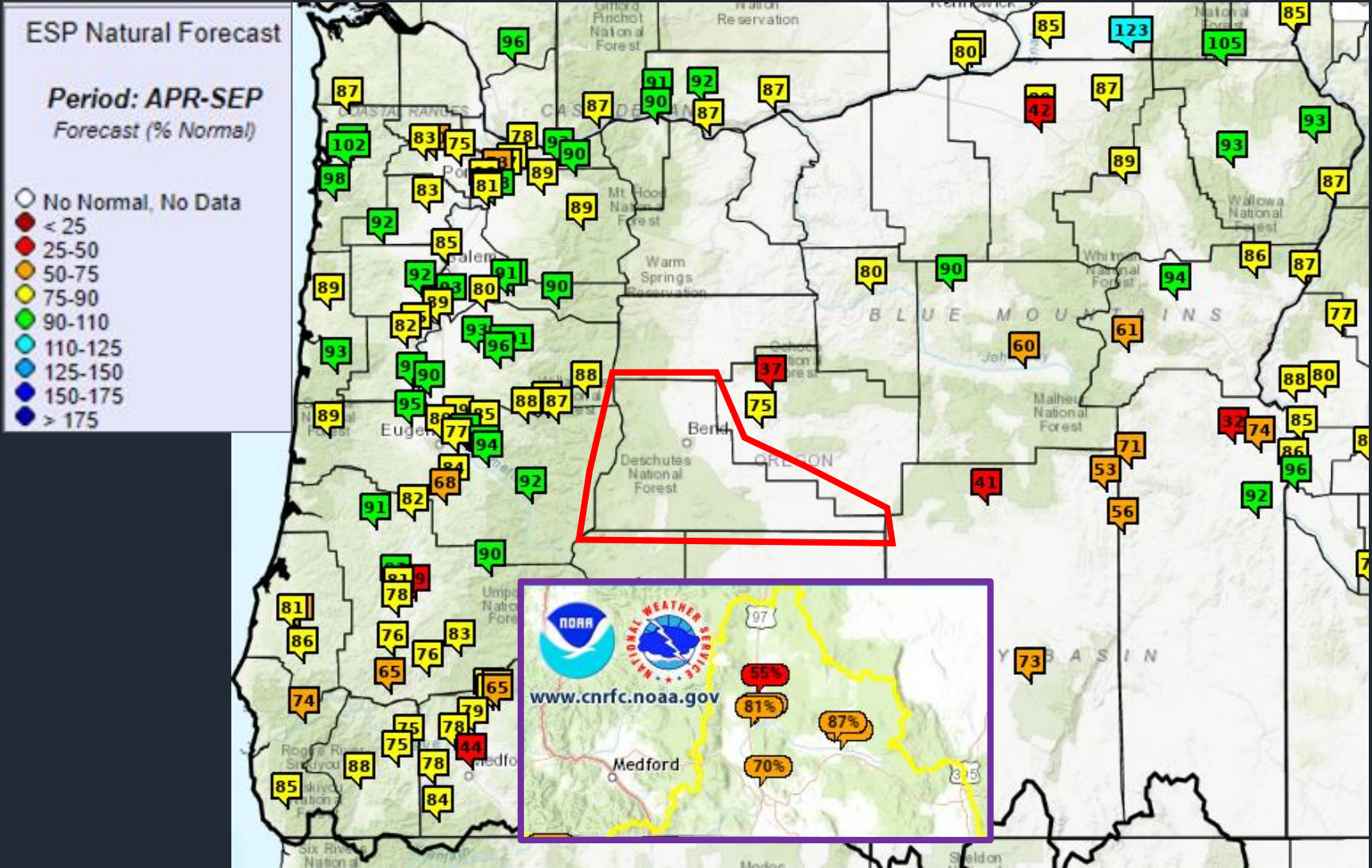






# Forecast

## April - September % of Average





# Natural Volume Forecast

## Crooked near Prineville (flows into the Deschutes)

### CROOKED - NR PRINEVILLE (PRV03) Forecasts for Water Year 2023

#### Natural Forecast

ESP with 10 Days QPF Ensemble: 2023-02-14 Issued: 2023-02-14

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	26	61	75	86	82
APR-JUL	26	61	76	86	81
JAN-SEP	78	112	64	159	174
JAN-JUL	78	112	64	159	174
OCT-SEP	84	118	62	166	191

#### Experimental

HEFS with 15 days EQPF Ensemble: 2023-02-14 Issued: 2023-02-14

APR-SEP	28	64	78	91	82
APR-JUL	28	64	79	91	81
JAN-SEP	77	117	67	181	174
JAN-JUL	77	117	67	181	174
OCT-SEP	84	123	64	187	191

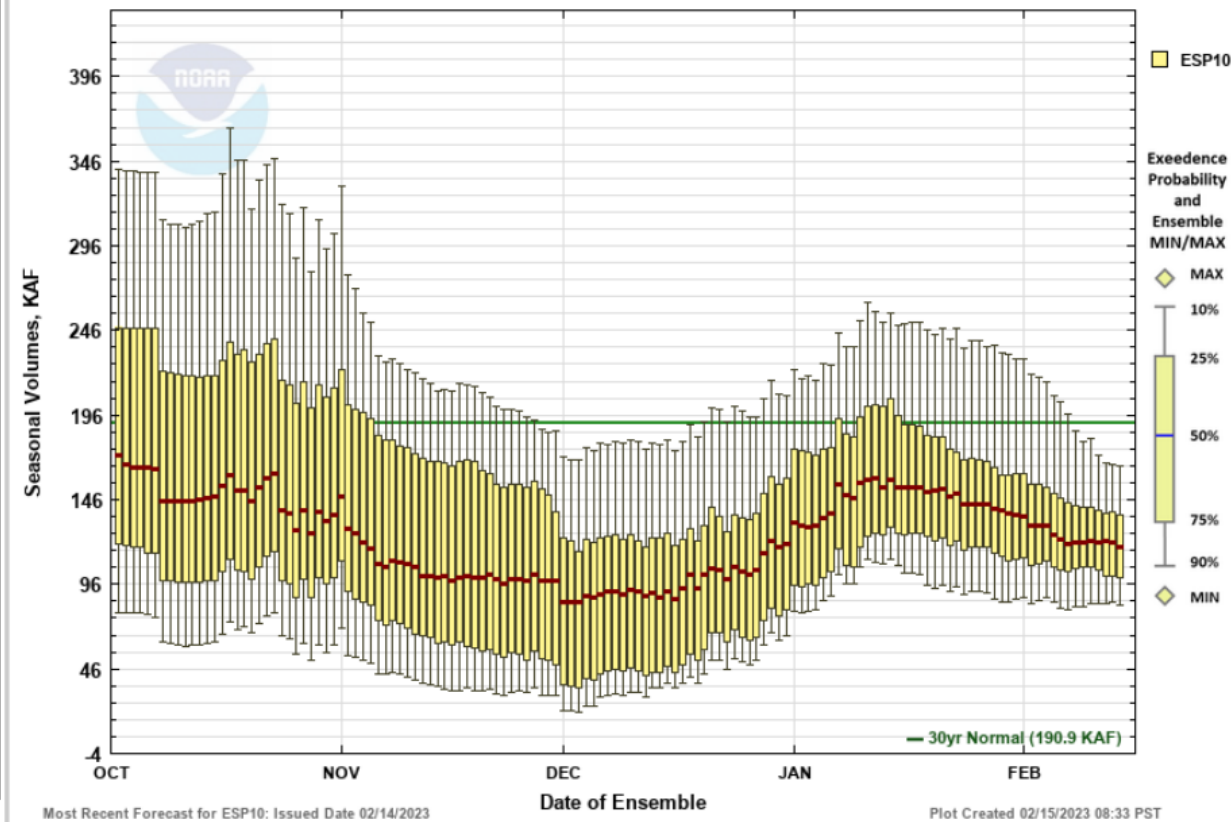
#### Reference

ESP with 0 Days QPF Ensemble: 2023-02-14 Issued: 2023-02-14

APR-SEP	28	66	81	100	82
APR-JUL	28	66	81	99	81
JAN-SEP	80	122	70	208	174
JAN-JUL	80	122	70	207	174
OCT-SEP	87	128	67	214	191

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

### Natural Volume Forecasts CROOKED - NR PRINEVILLE Period OCT to SEP -- Water Year 2023



[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=TRBO3](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=TRBO3)



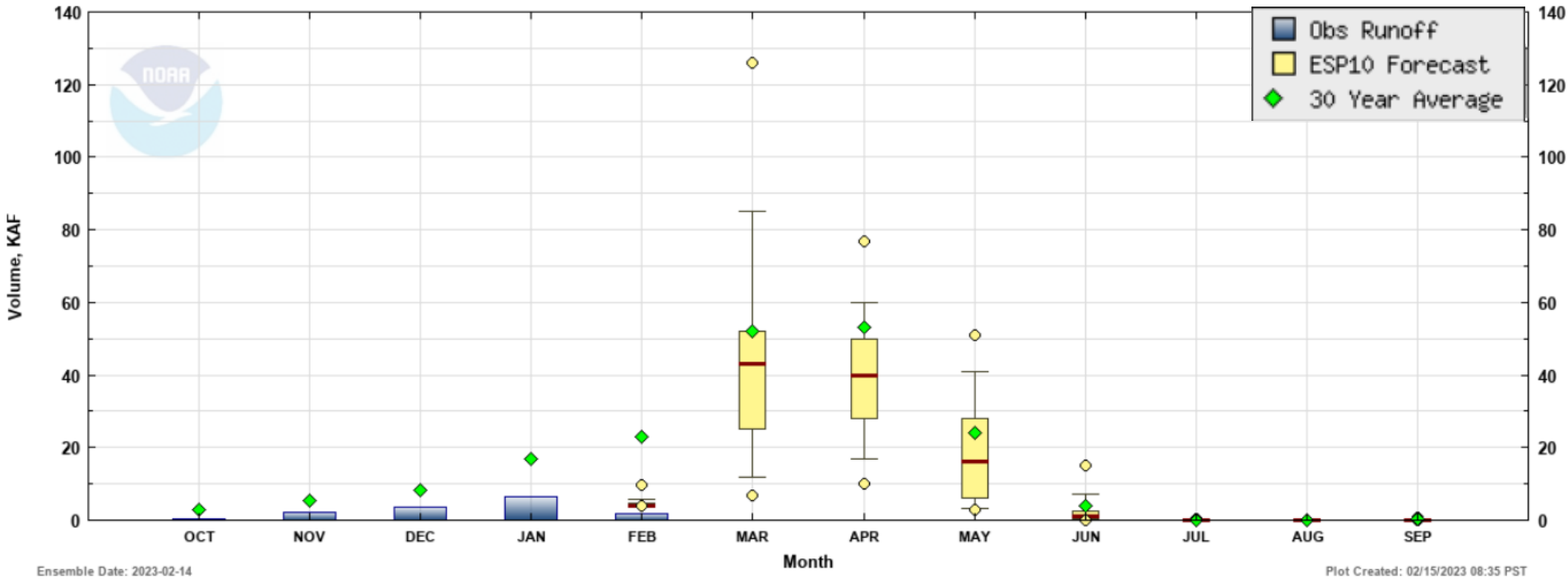


# Monthly Natural Volumes

## Crooked near Prineville

Period	Last Month %	Recent %
Apr – Sep	92	75
Water Year	80	62

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023  
(PRV03) CROOKED - NR PRINEVILLE



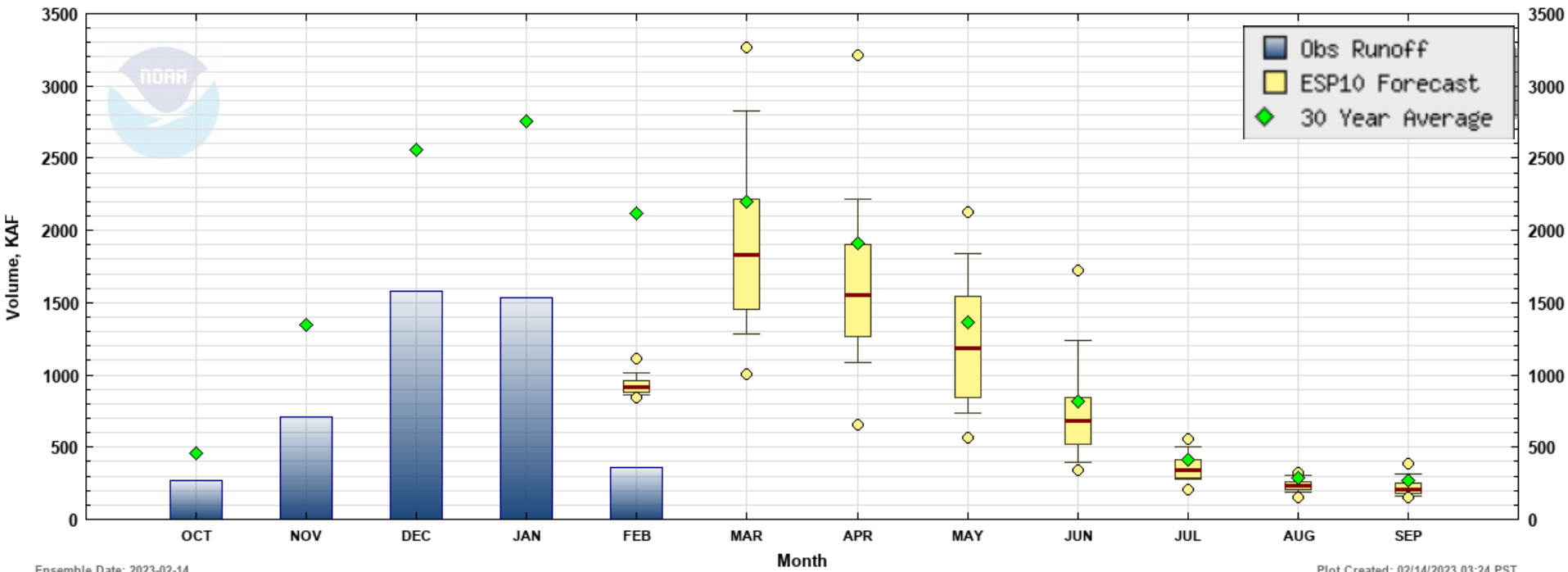
[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=PRV03](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=PRV03)



# Monthly Natural Volumes Willamette R at Salem

Period	Last Month %	Recent %
Apr – Sep	86	85
Water Year	72	67

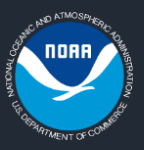
Natural Volume Monthly Forecasts (ESP10) for Water Year 2023  
(SLMO3) WILLAMETTE - AT SALEM



Ensemble Date: 2023-02-14

Plot Created: 02/14/2023 03:24 PST

[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=SLMO3](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=SLMO3)

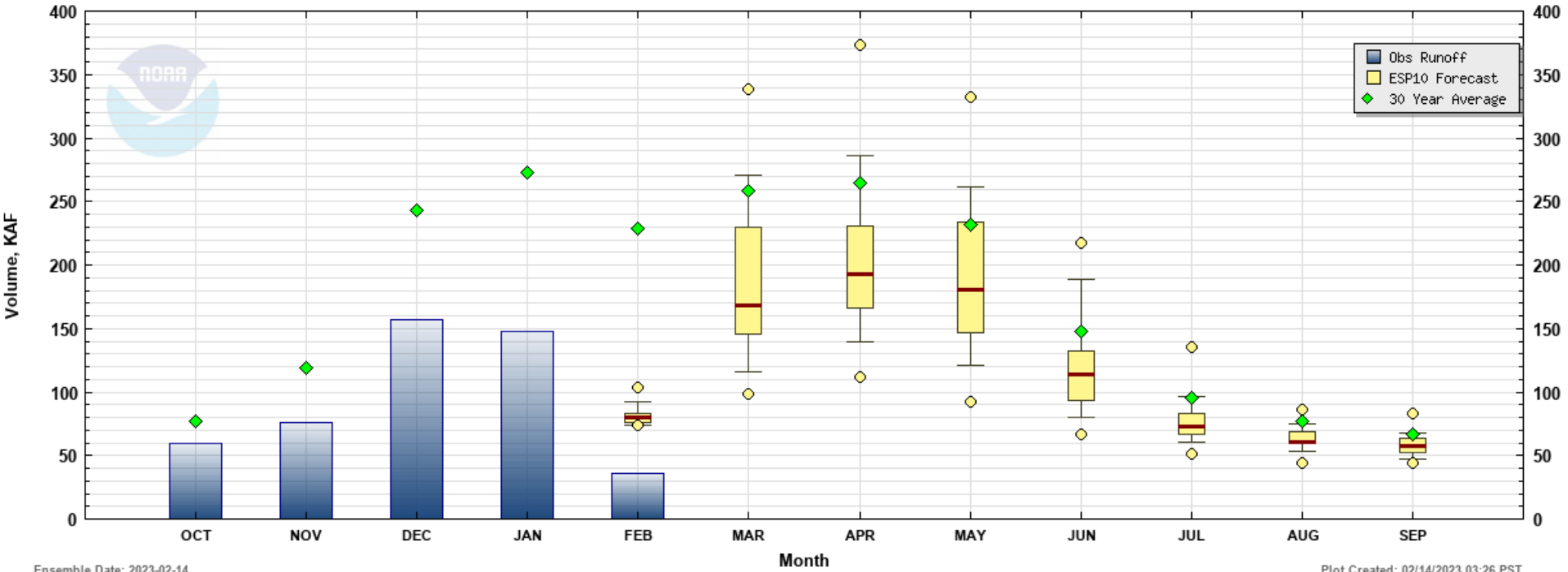


# Monthly Natural Volumes

## Rogue R near Raygold

Period	Last Month %	Recent %
Apr – Sep	82	78
Water Year	76	67

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023  
(RYGO3) ROGUE - AT RAYGOLD



[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=RYGO3](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=RYGO3)



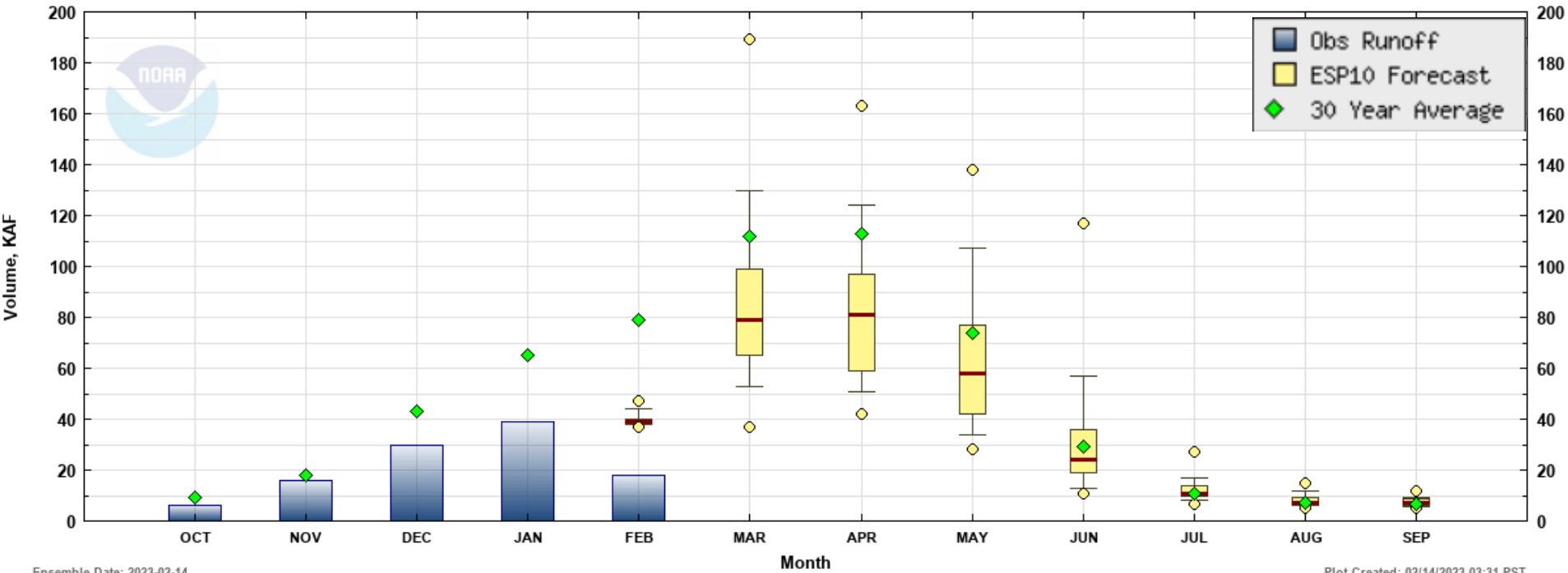


# Monthly Natural Volumes

## Umatilla R near Umatilla

Period	Last Month %	Recent %
Apr – Sep	81	80
Water Year	74	71

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023  
(UMA03) UMATILLA - NEAR UMATILLA



Ensemble Date: 2023-02-14

Plot Created: 02/14/2023 03:31 PST

[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=UMA03](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=UMA03)

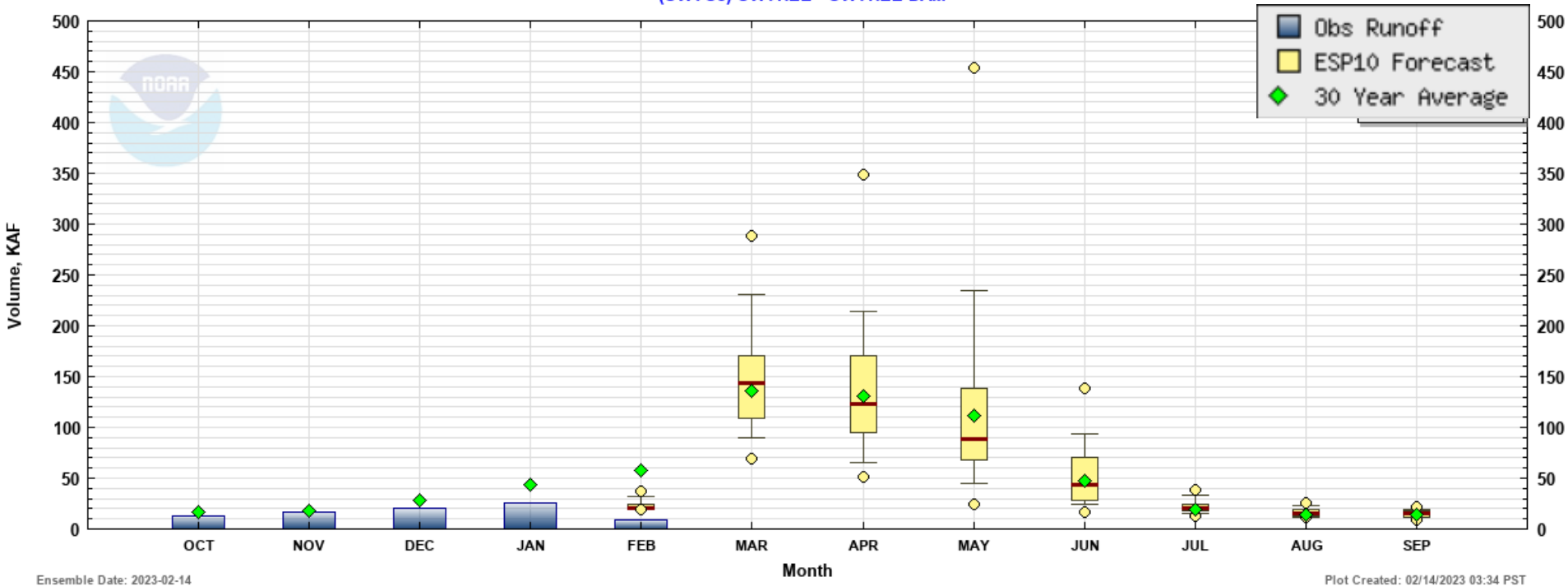


# Monthly Natural Volumes

## Owyhee R at Owyhee Dam

Period	Last Month %	Recent %
Apr – Sep	96	92
Water Year	115	86

Natural Volume Monthly Forecasts (ESP10) for Water Year 2023  
(OWYO3) OWYHEE - OWYHEE DAM



Ensemble Date: 2023-02-14

Plot Created: 02/14/2023 03:34 PST

[https://www.nwrfc.noaa.gov/natural/plot/nat\\_forecasts.php?id=OWYO3](https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=OWYO3)



# Monthly Natural Volumes

## Owyhee R at Owyhee Dam

2023 Schedule for Live Water Supply Briefings					
Jan	Feb	Mar	Apr	May	Jun
5	2	2	6	4	TBD
<i>All presentations held at 10:00am PDT/PST, unless noted otherwise</i>					
<a href="#"><b>Click here for Registration Information</b></a>					

Info: [https://www.nwrfc.noaa.gov/water\\_supply/ws\\_schd.cgi?version=20190204v1](https://www.nwrfc.noaa.gov/water_supply/ws_schd.cgi?version=20190204v1)  
Webinar Registration: <https://register.gotowebinar.com/rt/9001532798339394573>





— BUREAU OF —  
RECLAMATION

Scoggins Dam  
June 5, 1998

# Reclamation Storage Update

Oregon Water Supply Availability  
Committee Meeting

February 15, 2023



# Basin Operations Summary

- **Operations Activities:**

- Reservoirs are releasing winter minimums to continue filling
- No FRM operations currently

- **Water Supply Notes**

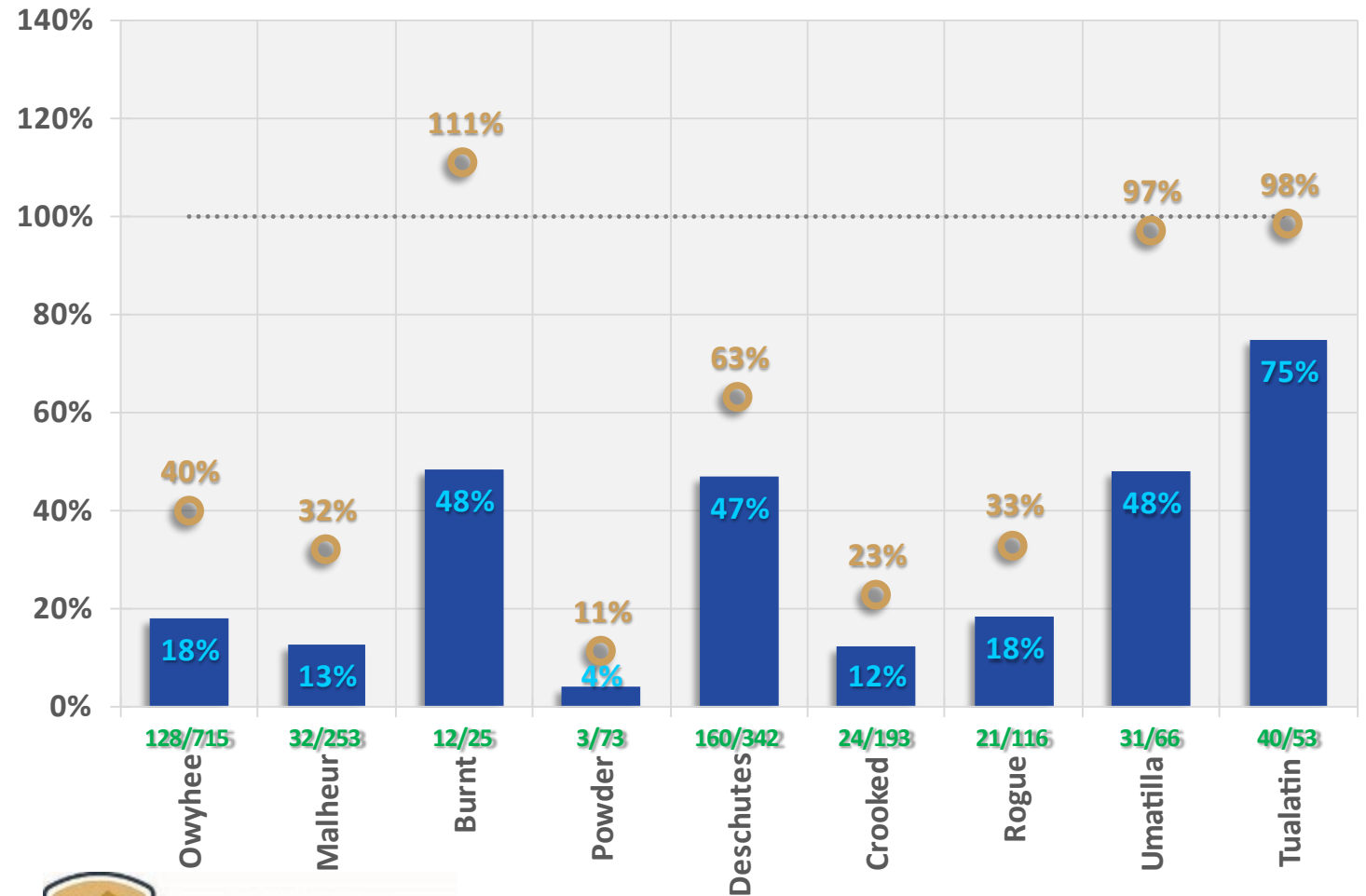
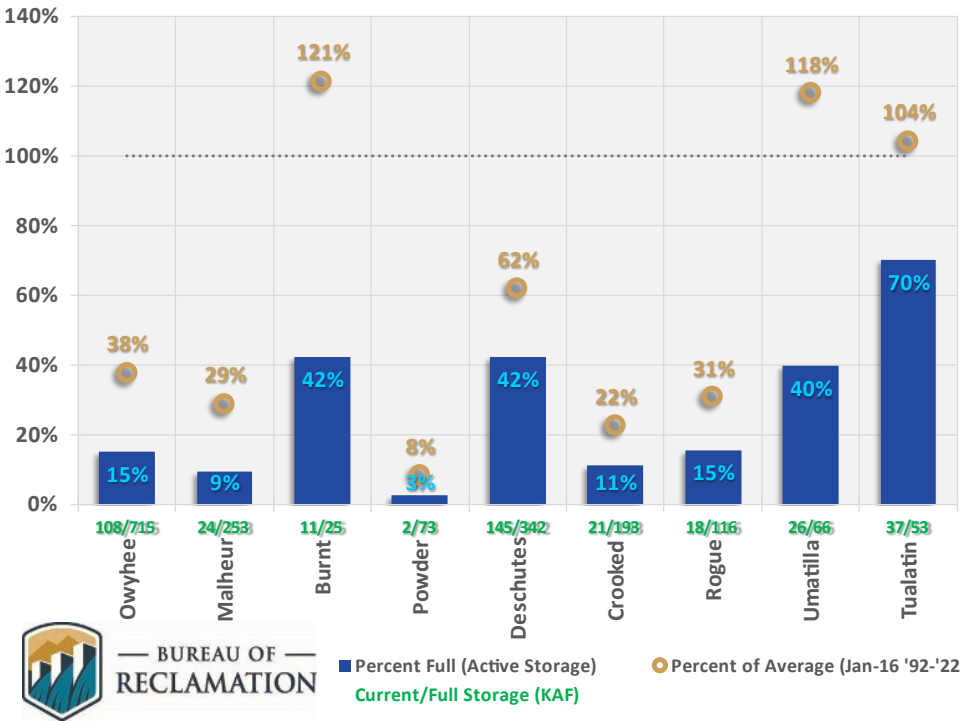
- Inflows have fallen back to very low levels with dry conditions following the wet weather in late December/early January. Statistically inflows typically start to increase as we head into March, peaking at most locations in late March to early April
- Much below normal storage content in the southern, central and southeastern basins (Rogue, Deschutes, Crooked, Malheur, Powder, Owyhee). Near normal storage content in the northern basins (Unity, McKay, Scoggins)
- February forecasts generally saw around a 5-20% of average reduction compared to January forecasts and are generally below average at most facilities
- Refill is unlikely at many facilities, but could be possible at some locations with wet spring conditions



# Storage Conditions

## Oregon Reservoir Storage (Feb 13 2023)

### Oregon Reservoir Storage (Jan 16 2023)

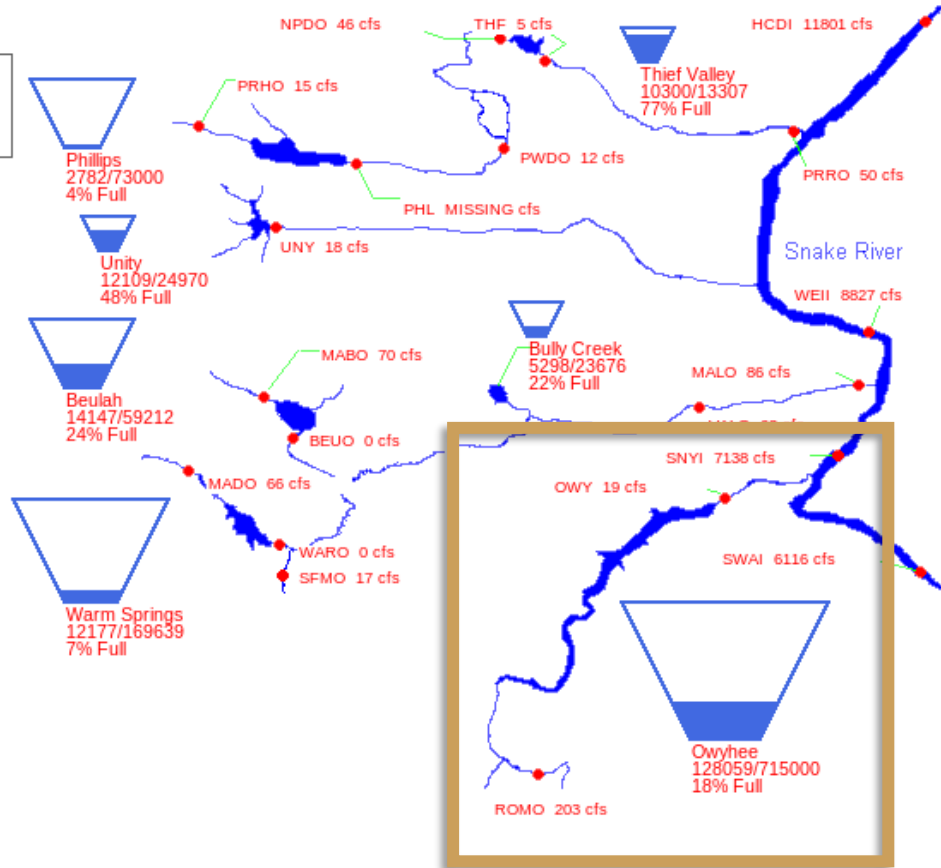
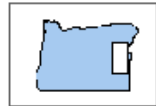


■ Percent Full (Active Storage)    ● Percent of Average (Feb-13 '92-'22)  
 Current/Full Storage (KAF)



# Owyhee River Basin

02/13/2023

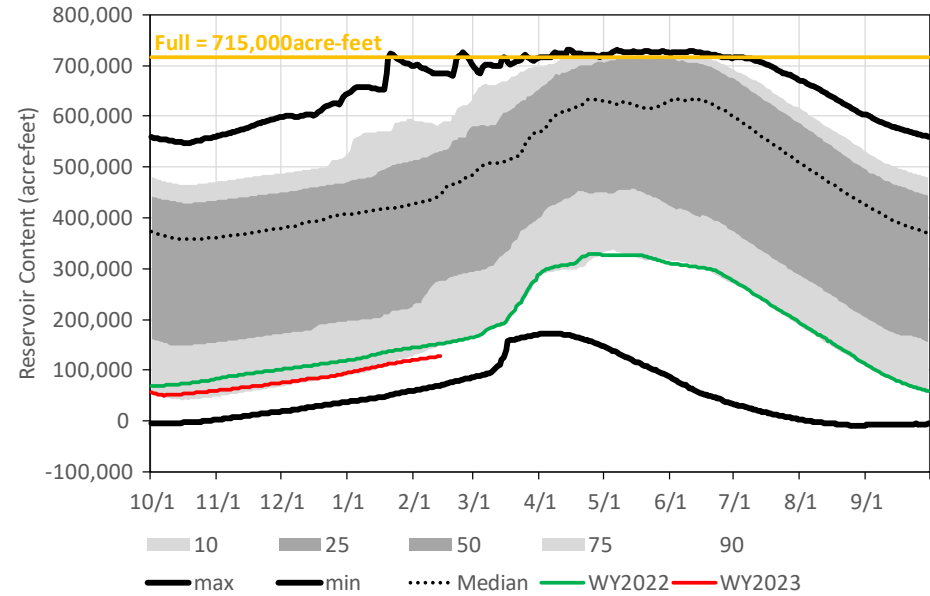


## Runoff Forecasts:

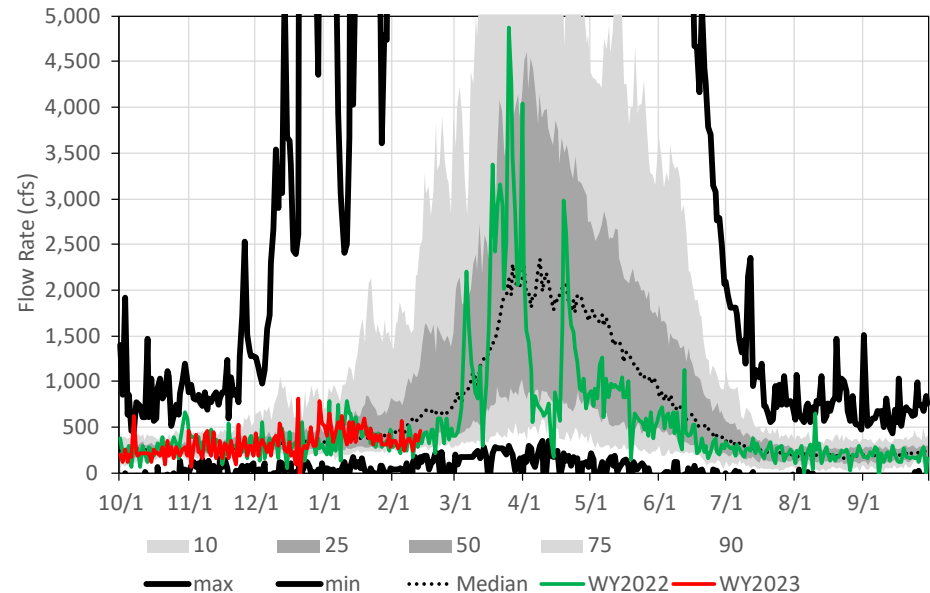
Jan-Jun: 572 kaf (108% of 91-20 Ave)

Feb-Jun: 593 kaf (122% of 91-20 Ave)

Owyhee Reservoir  
Historical Reservoir Content  
Statistics based on WY1939WY2022 Data in Reclamation Hydromet Database

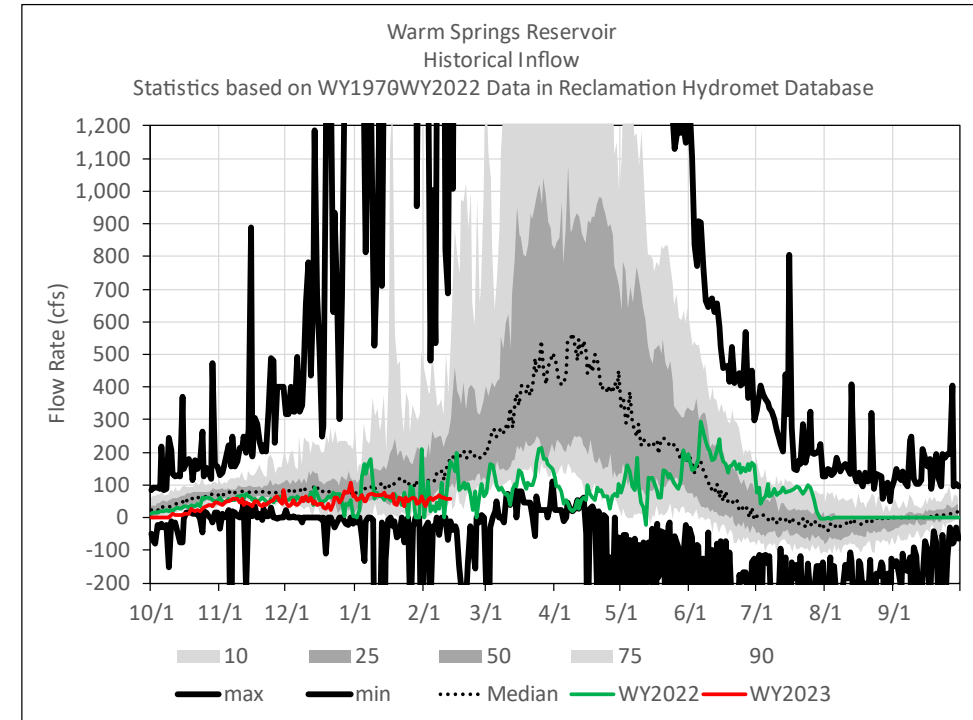
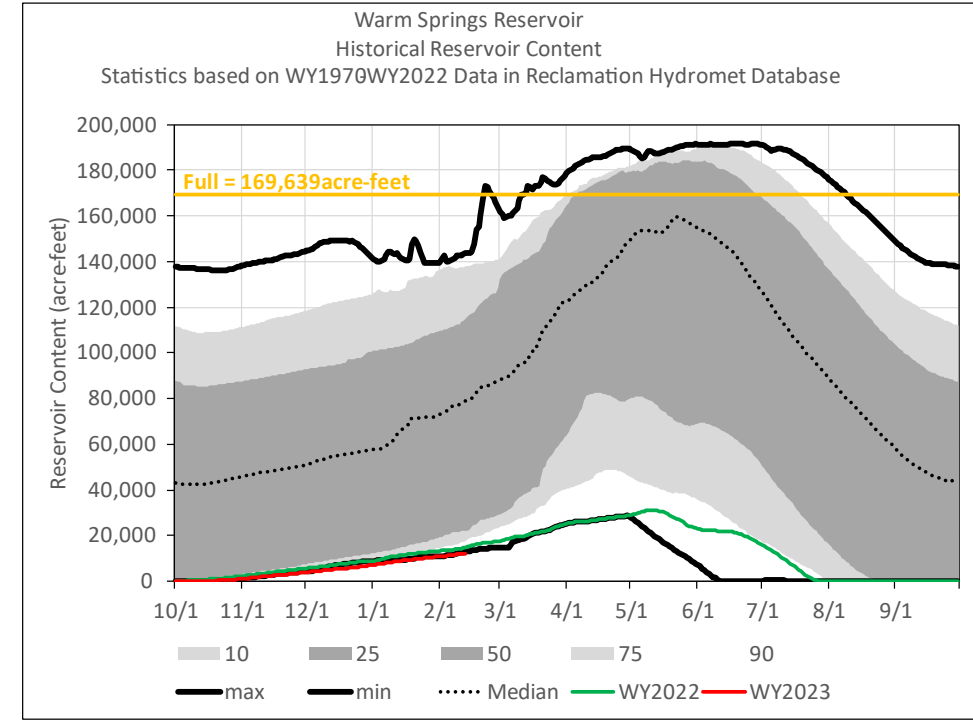
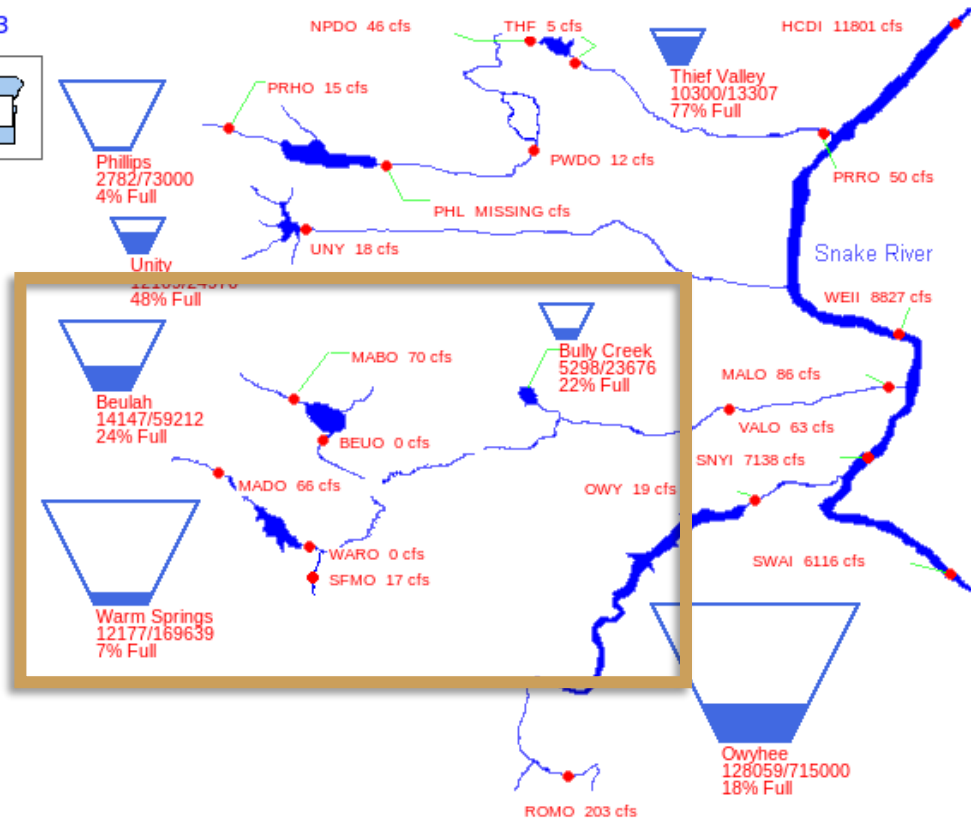
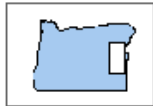


Owyhee Reservoir  
Historical Inflow  
Statistics based on WY1939WY2022 Data in Reclamation Hydromet Database



# Malheur River Basin

02/13/2023



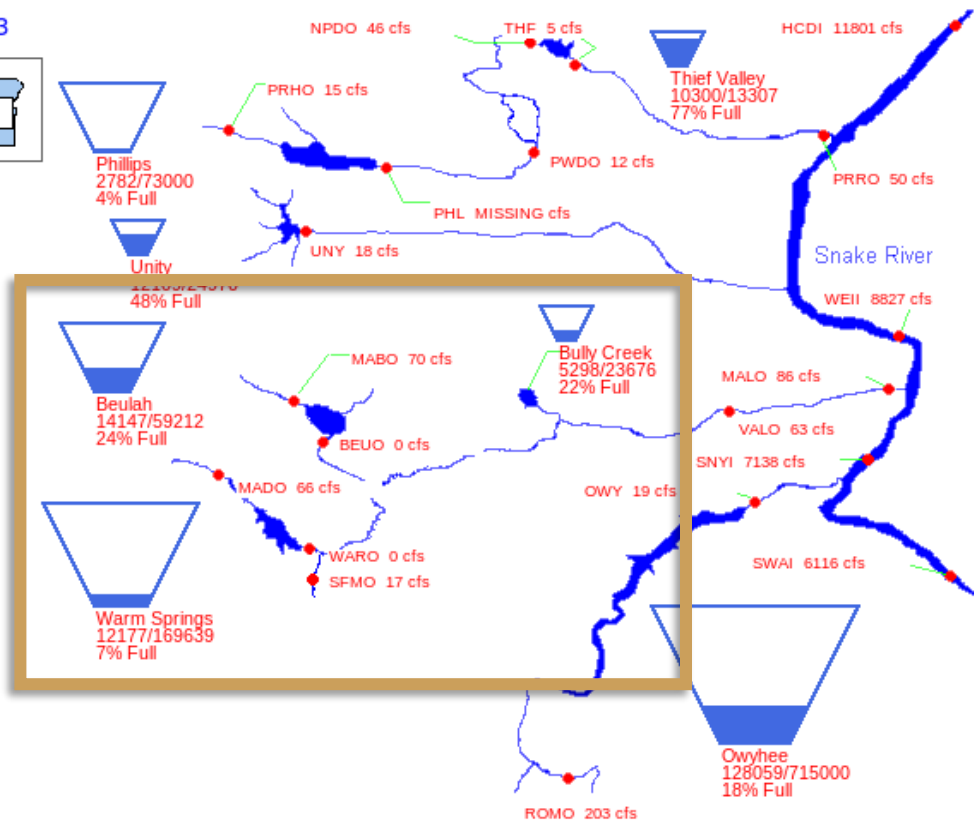
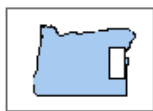
## Runoff Forecasts:

Jan-Jun: 109 kaf (94% of 91-20 Ave)

Feb-Jun: 84 kaf (78% of 91-20 Ave)

# Malheur River Basin

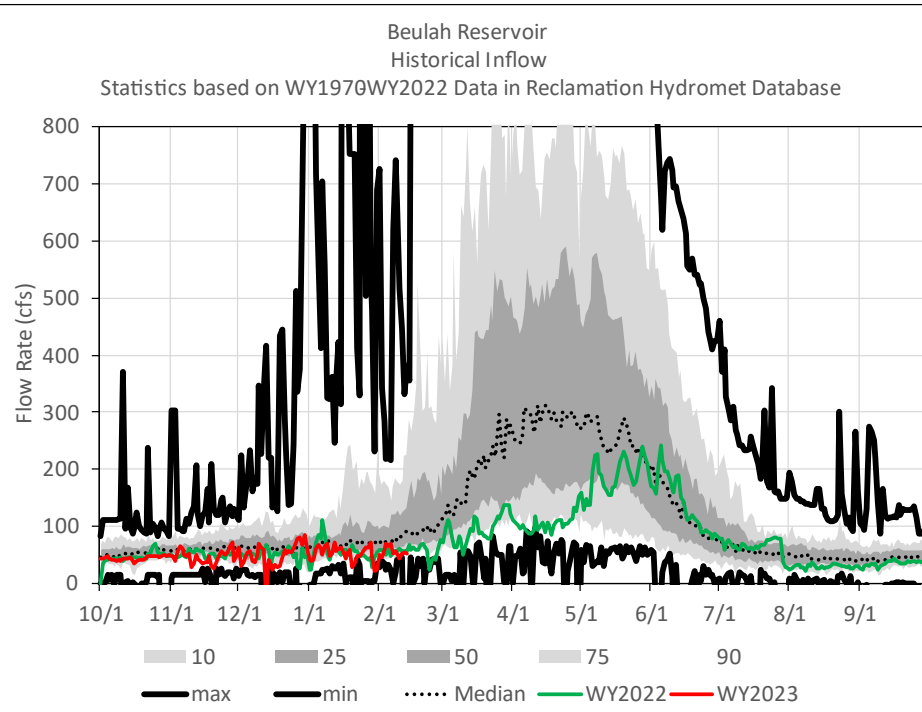
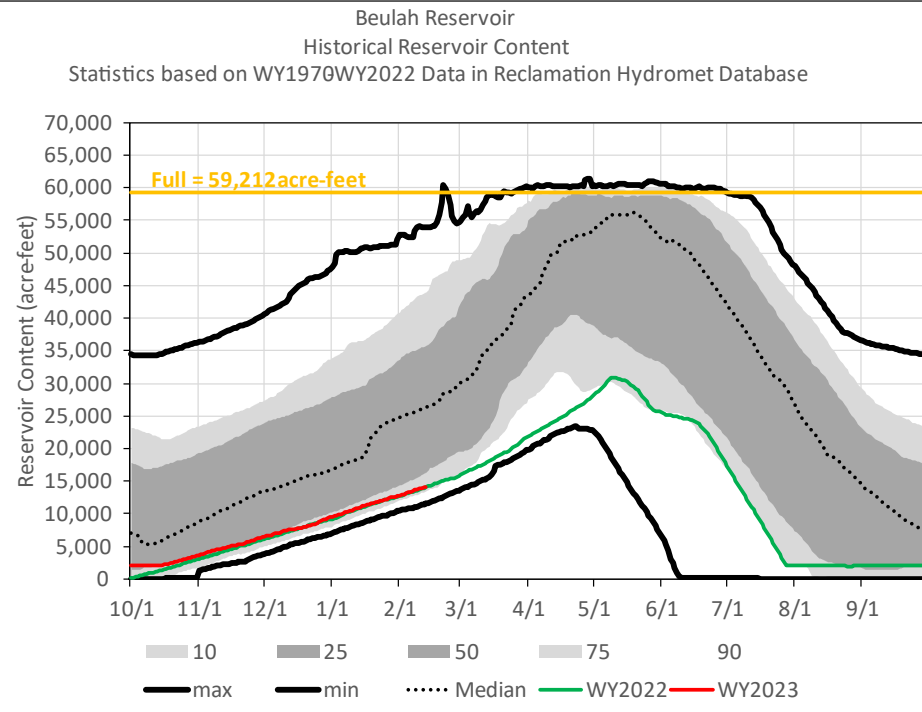
02/13/2023



## Runoff Forecasts:

Jan-Jun: 84 kaf (105% of 91-20 Ave)

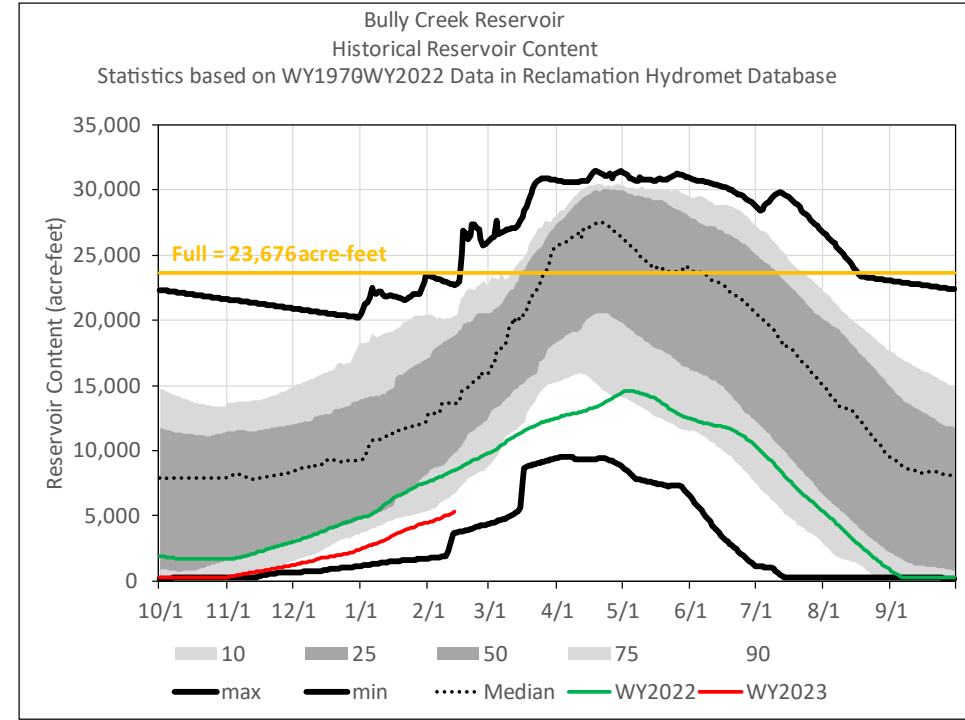
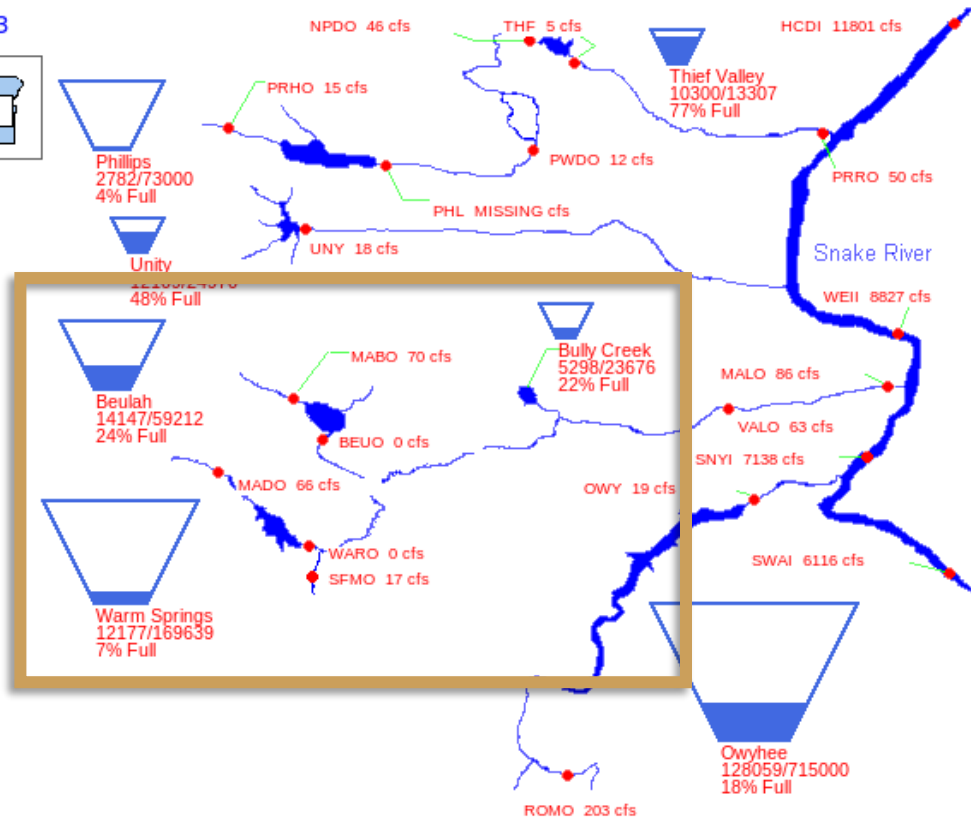
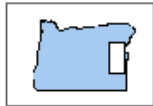
Feb-Jun: 63 kaf (85% of 91-20 Ave)





# Malheur River Basin

02/13/2023



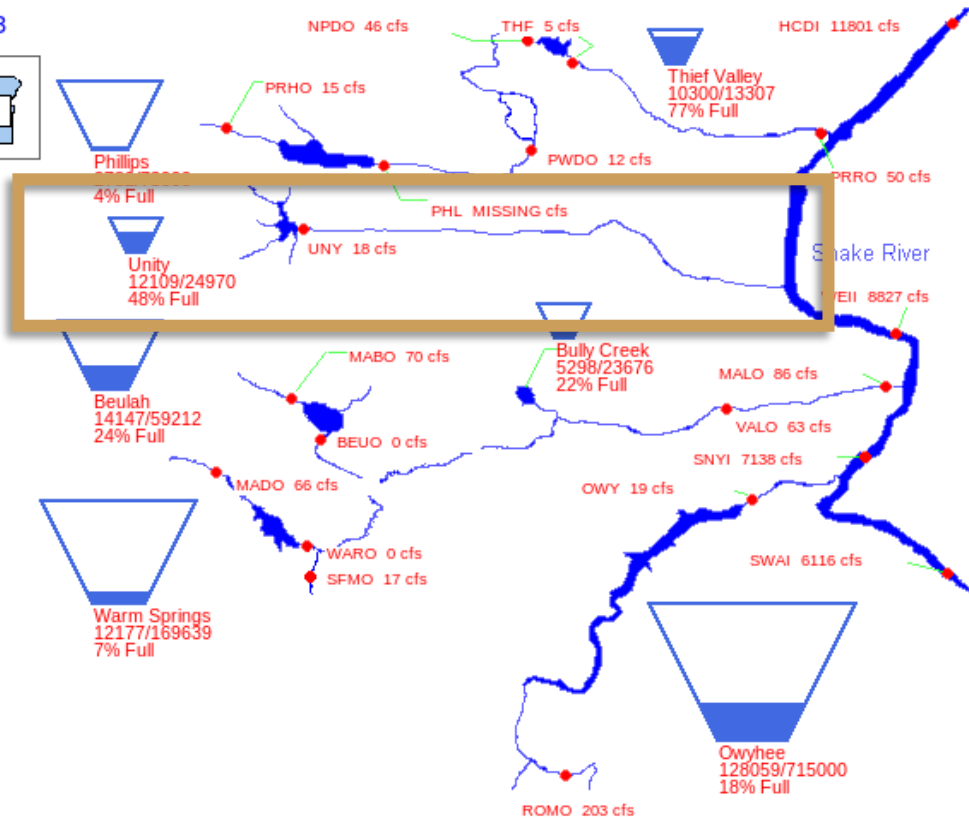
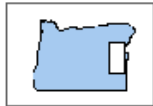
## Runoff Forecasts:

Jan-Jun: 31 kaf (105% of 91-20 Ave)

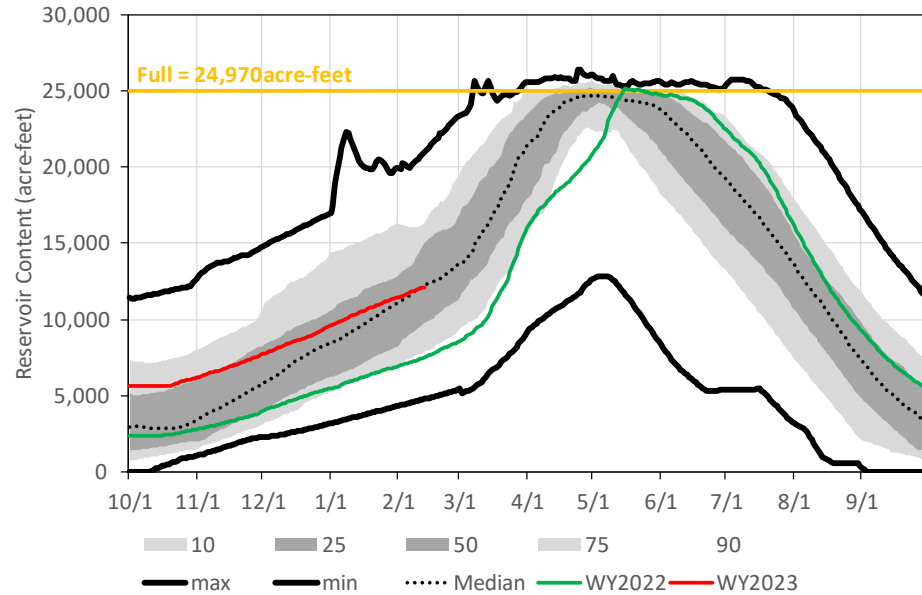
Feb-Jun: 25 kaf (96% of 91-20 Ave)

# Burnt River Basin

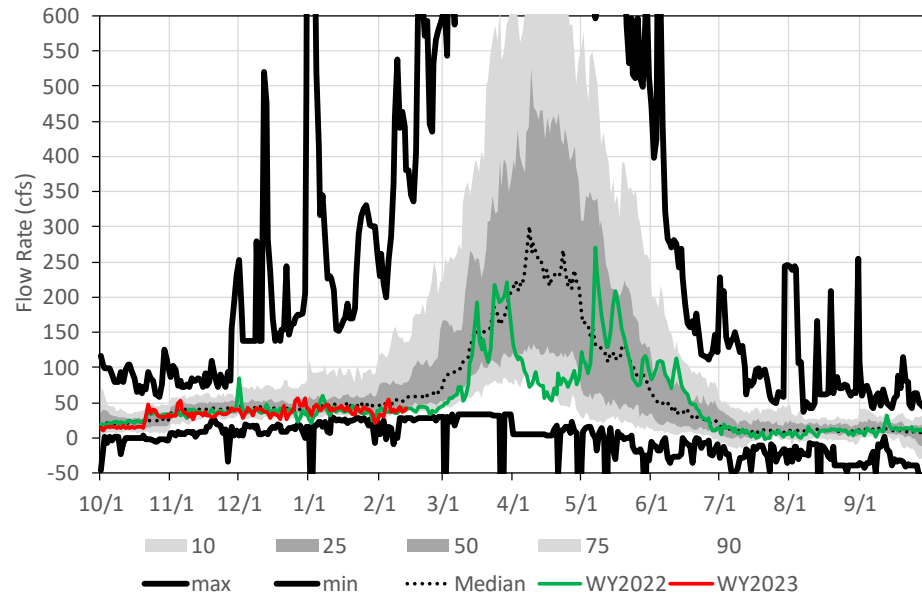
02/13/2023



Unity Reservoir  
Historical Reservoir Content  
Statistics based on WY1961-WY2022 Data in Reclamation Hydromet Database

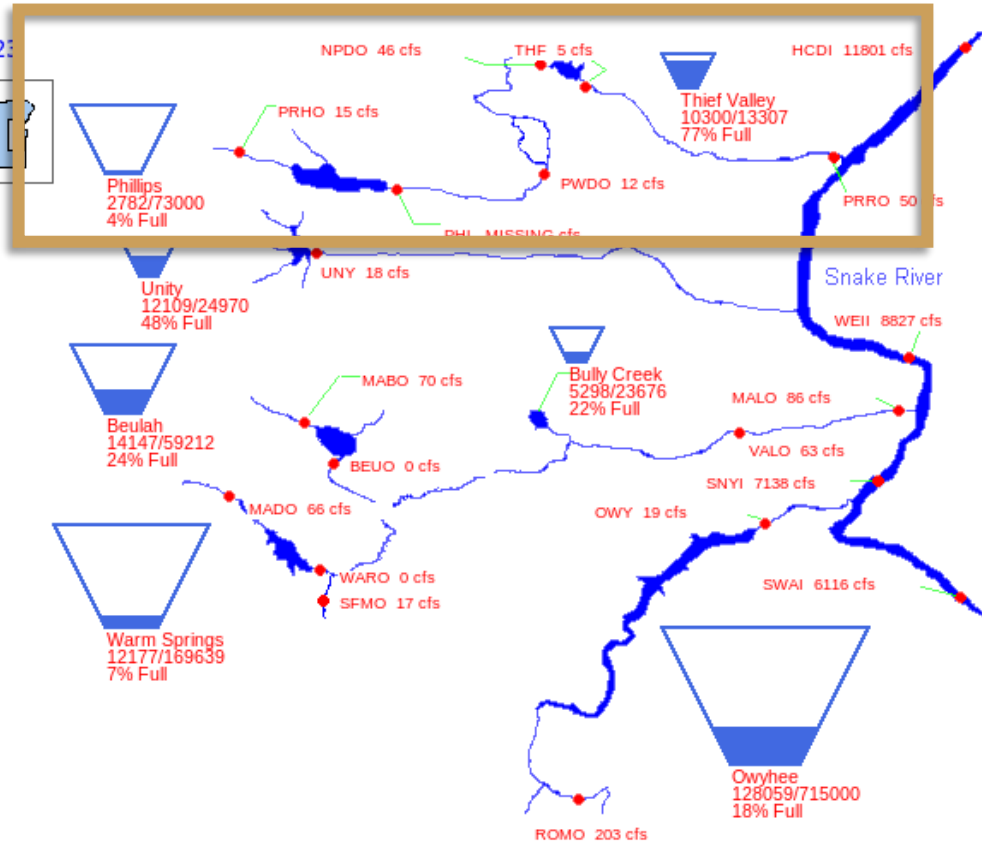


Unity Reservoir  
Historical Inflow  
Statistics based on WY1961-WY2022 Data in Reclamation Hydromet Database



# Powder River Basin

02/13/2023

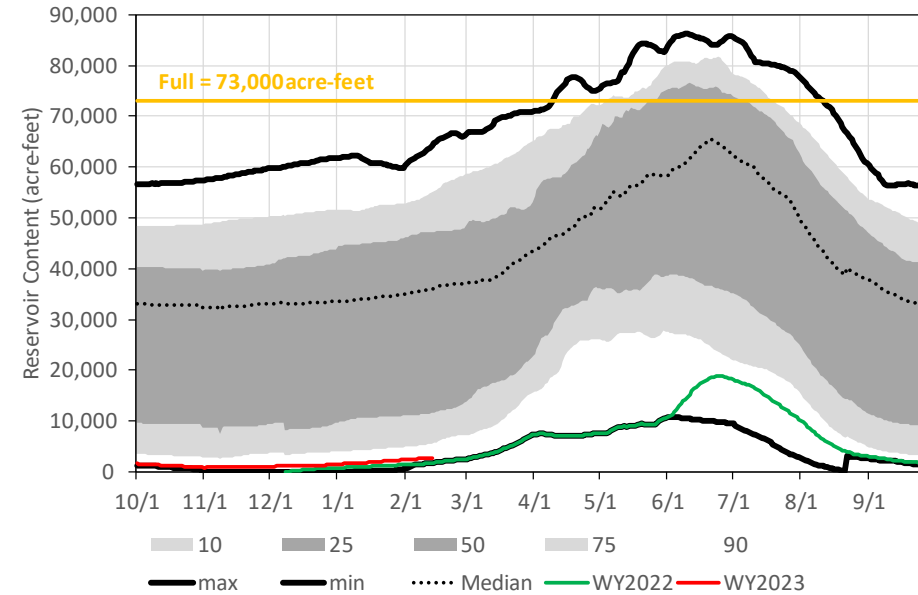


## Runoff Forecasts:

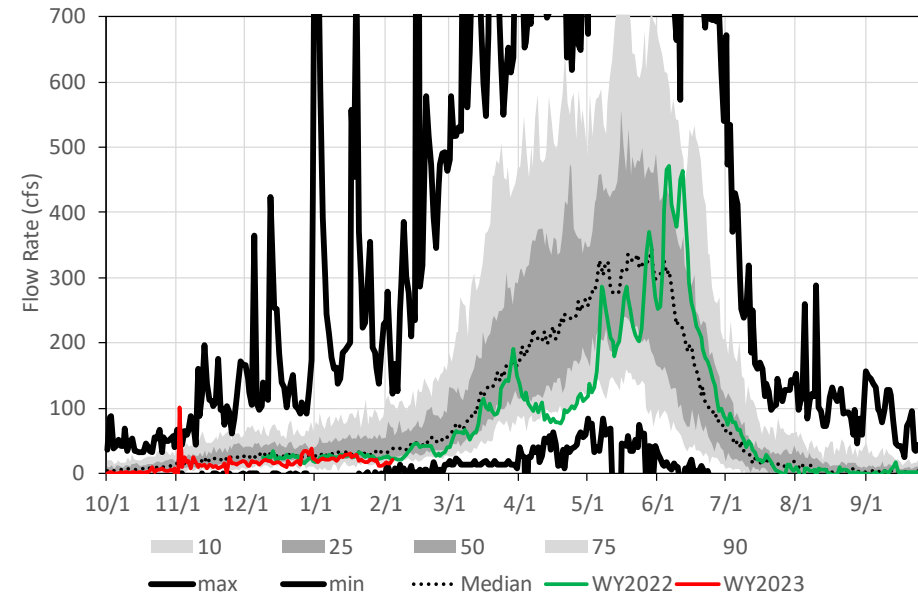
Jan-Jul: 69 kaf (97% of 91-20 Ave)

Feb-Jul: 65 kaf (95% of 91-20 Ave)

Phillips Reservoir  
Historical Reservoir Content  
Statistics based on WY1968WY2022 Data in Reclamation Hydromet Database



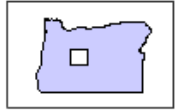
Phillips Reservoir  
Historical Inflow  
Statistics based on WY1968WY2022 Data in Reclamation Hydromet Database



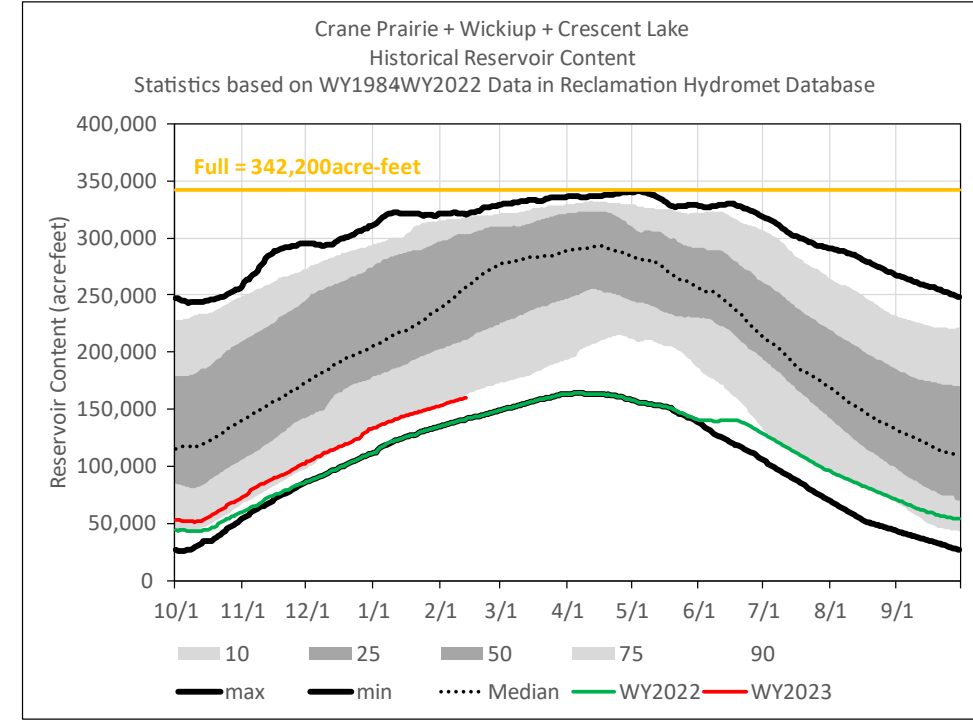
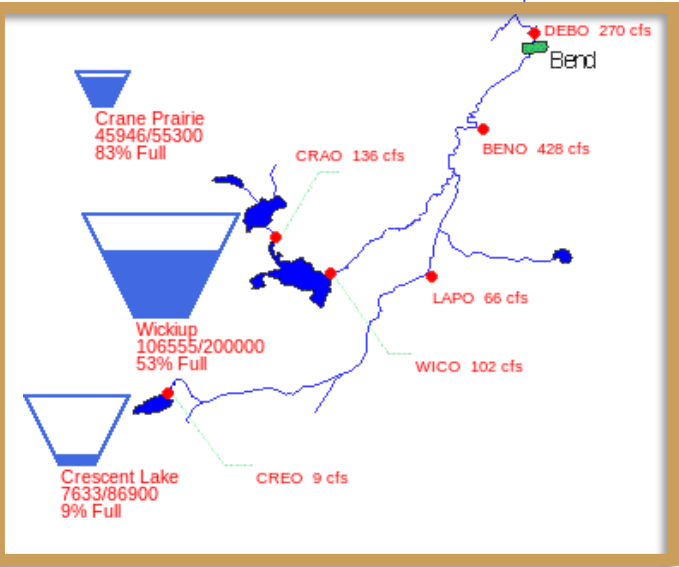


# Deschutes River Basin

02/13/2023

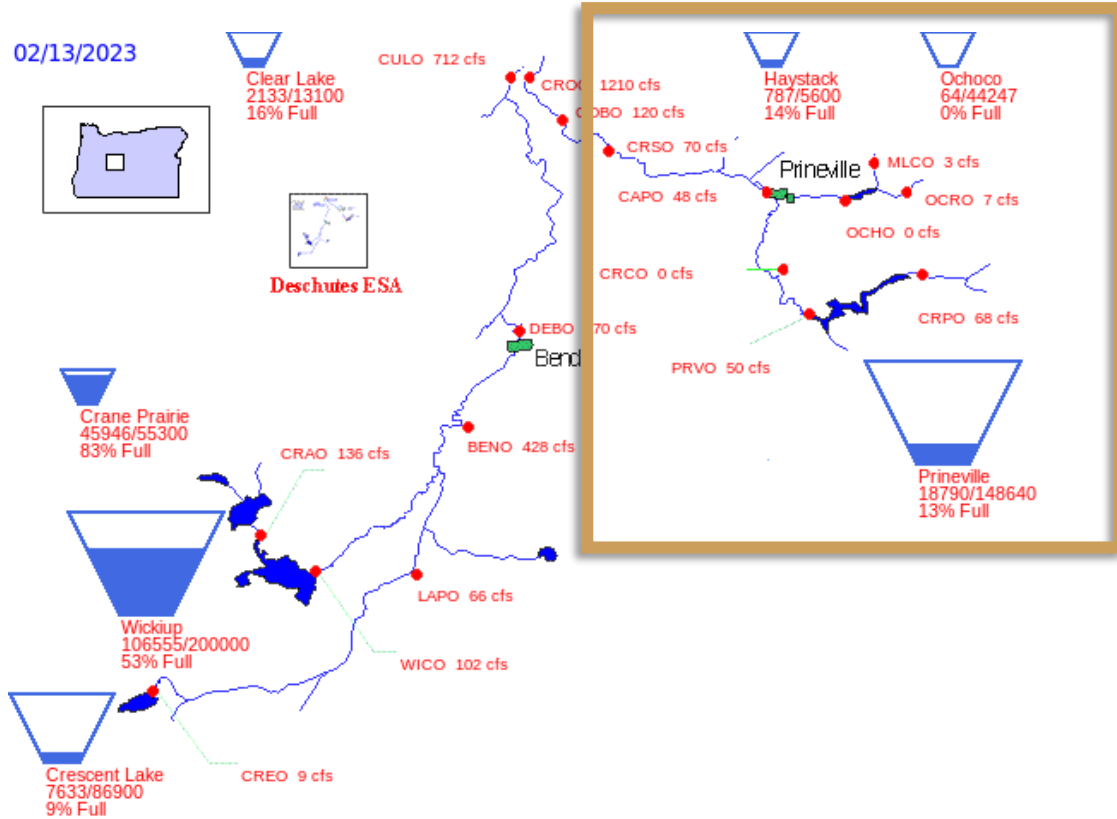


Deschutes ESA



# Crooked River Basin

02/13/2023

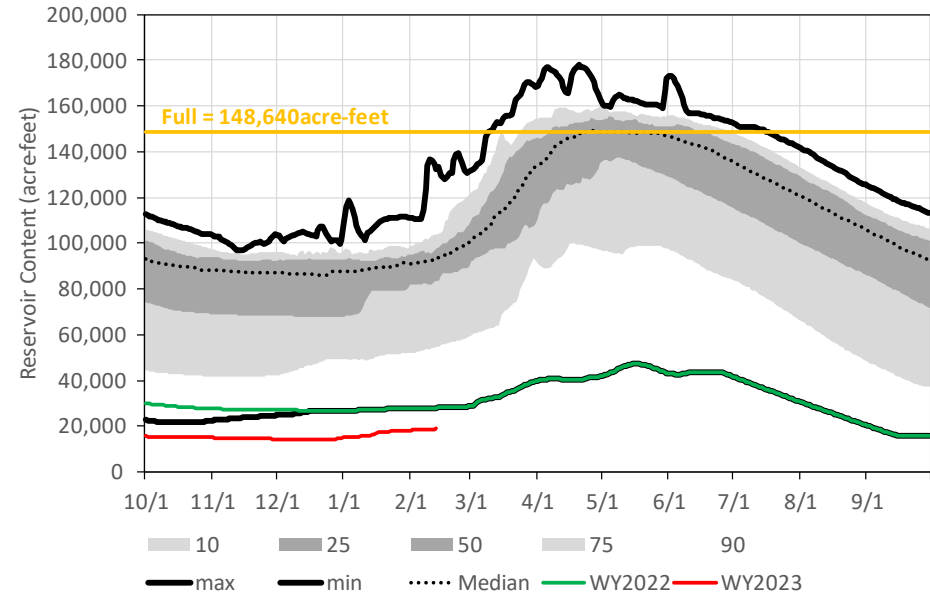


## Runoff Forecasts:

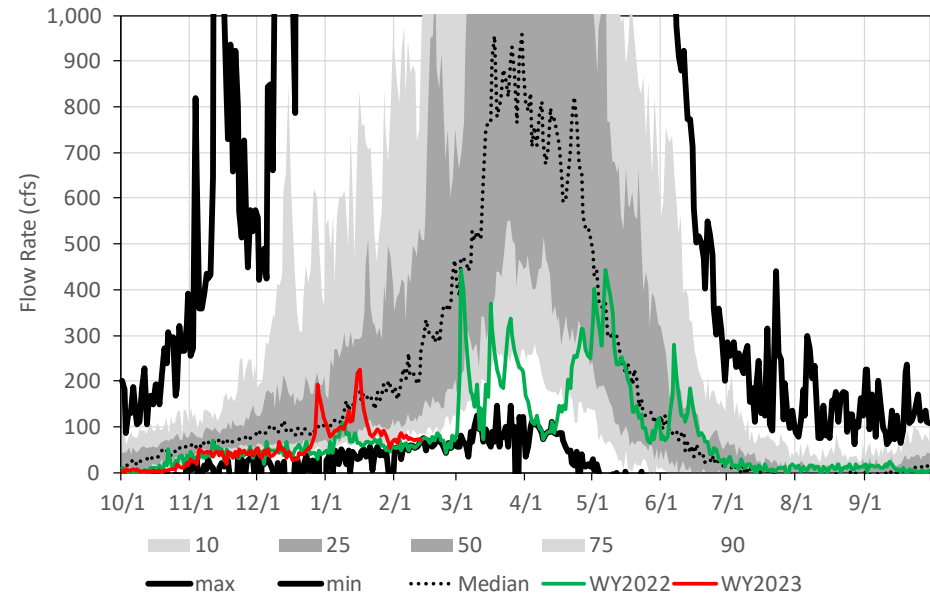
Jan-Aug: 155 kaf (85% of 91-20 Ave)

Feb-Aug: 130 kaf (79% of 91-20 Ave)

Prineville Reservoir  
Historical Reservoir Content  
Statistics based on WY1976WY2022 Data in Reclamation Hydromet Database

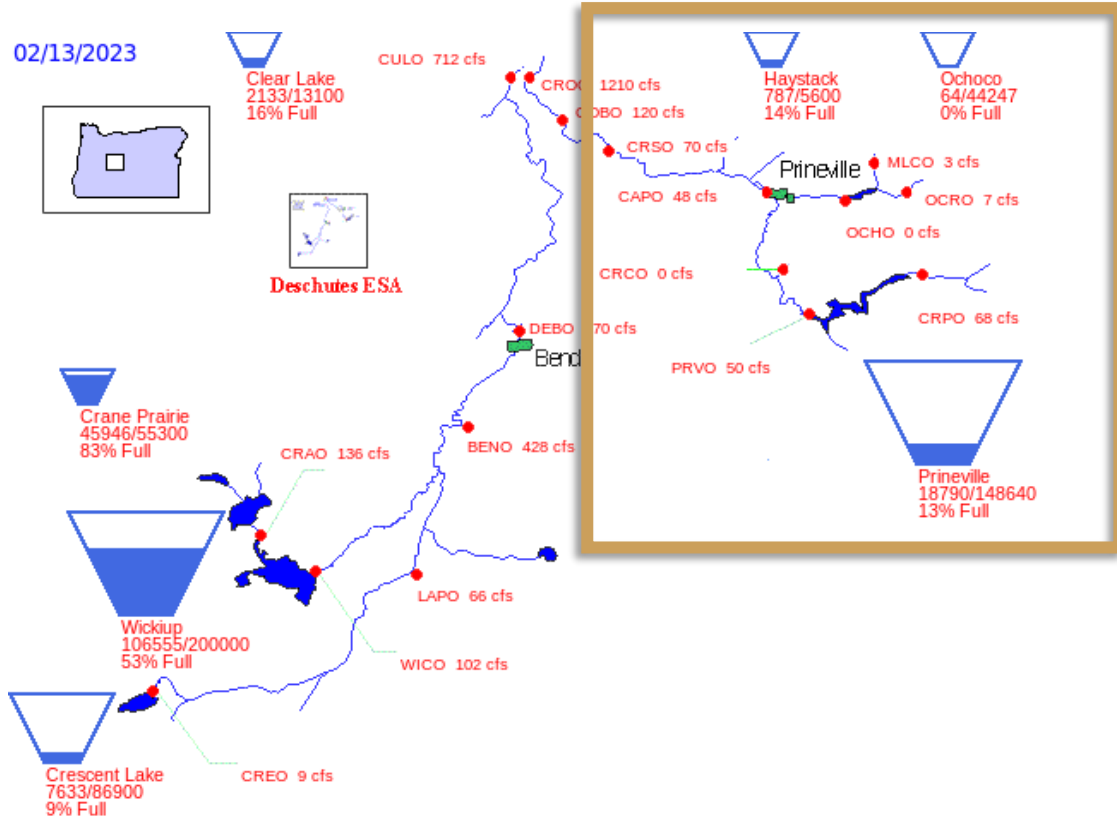


Prineville Reservoir  
Historical Inflow  
Statistics based on WY1976WY2022 Data in Reclamation Hydromet Database



# Crooked River Basin

02/13/2023

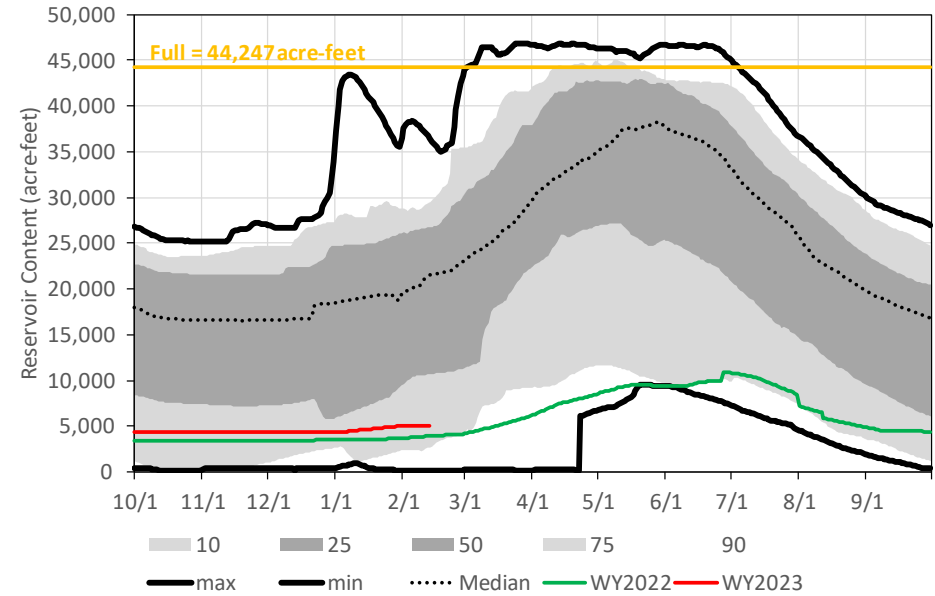


## Runoff Forecasts:

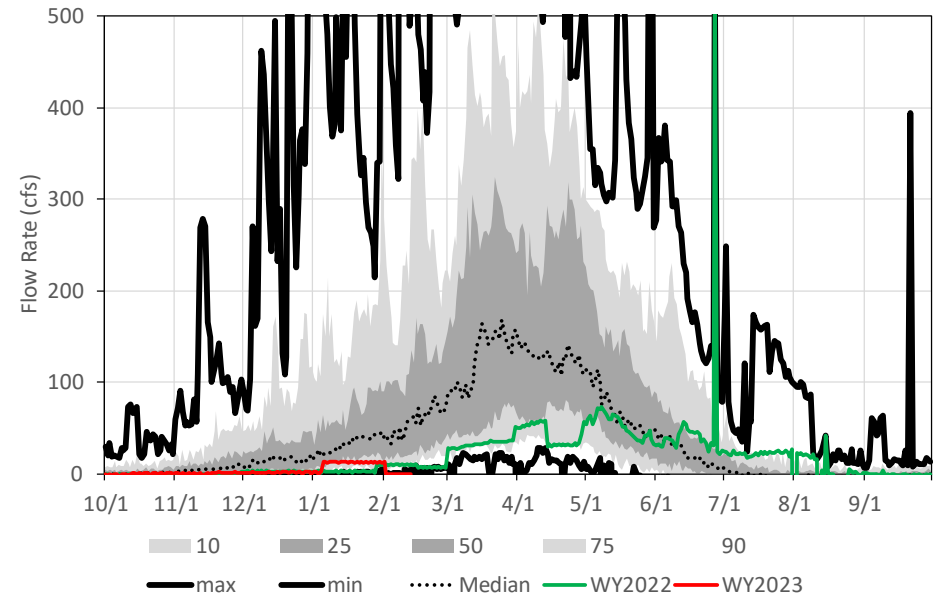
Jan-Jun: 35 kaf (88% of 91-20 Ave)

Feb-Jun: 20 kaf (57% of 91-20 Ave)

Ochoco Reservoir  
Historical Reservoir Content  
Statistics based on WY1984WY2022 Data in Reclamation Hydromet Database



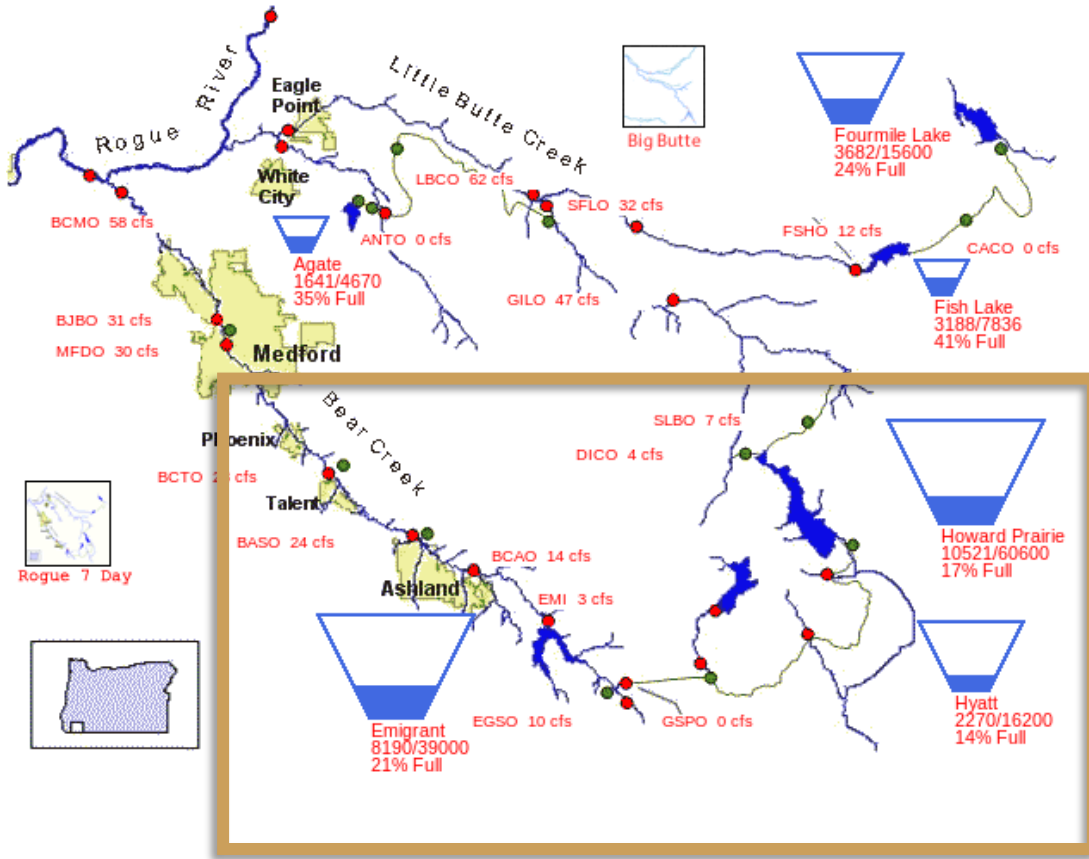
Ochoco Reservoir  
Historical Inflow  
Statistics based on WY1984WY2022 Data in Reclamation Hydromet Database



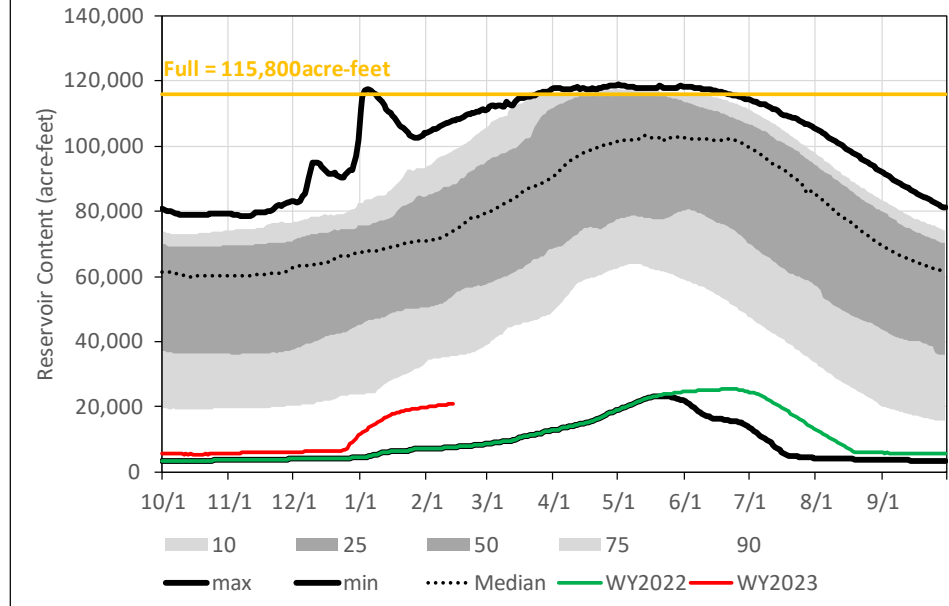


# Rogue River Basin

02/13/2023

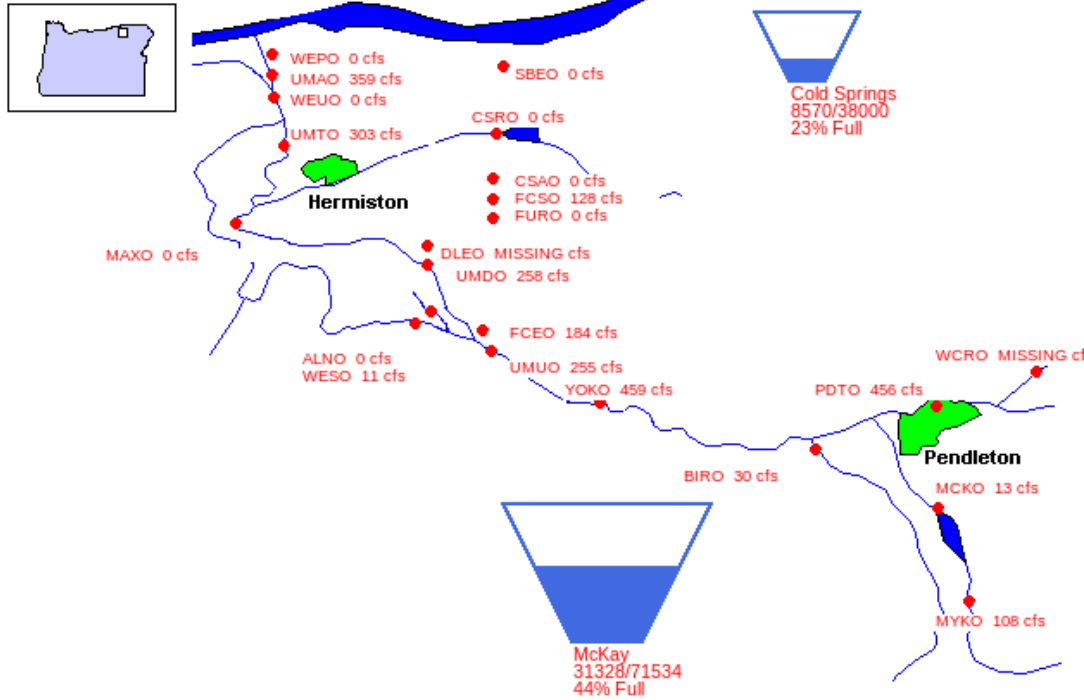


Hyatt + Howard Prairie + Emigrant Reservoirs  
 Historical Reservoir Content  
 Statistics based on WY1969WY2022 Data in Reclamation Hydromet Database



# Umatilla River Basin

02/13/2023

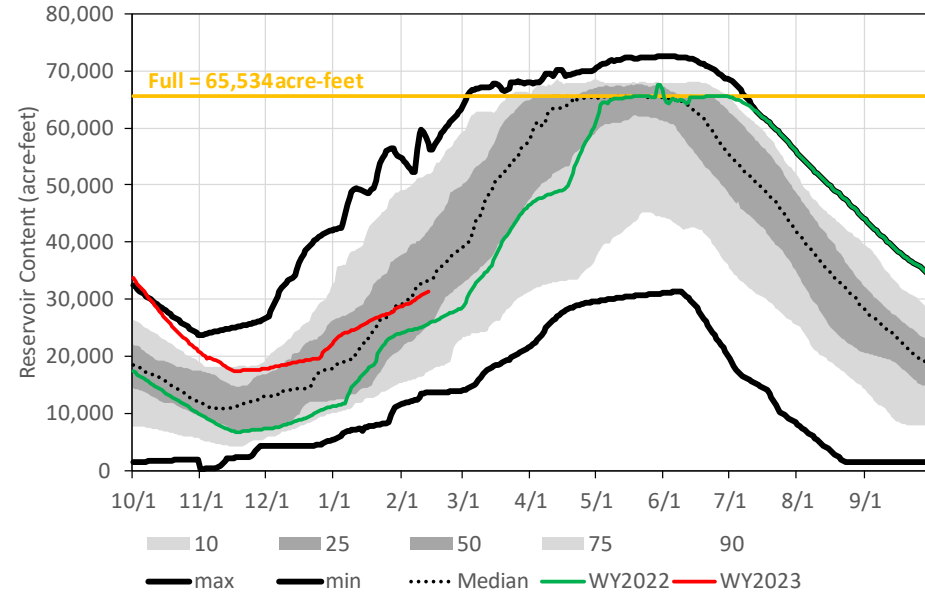


## Runoff Forecasts:

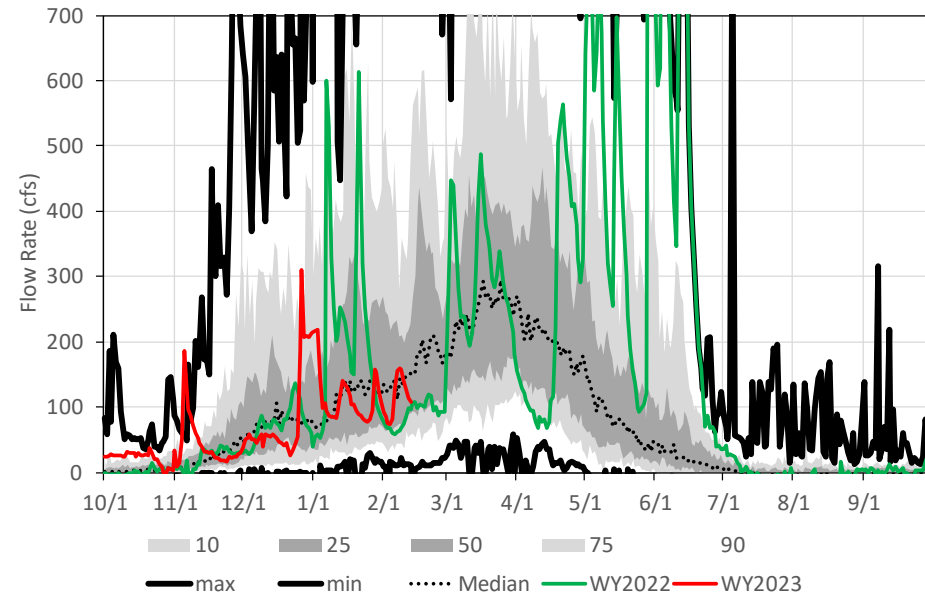
Jan-Jun: 70 kaf (100% of 91-20 Ave)

Feb-Jun: 56 kaf (95% of 91-20 Ave)

McKay Reservoir  
Historical Reservoir Content  
Statistics based on WY1974WY2022 Data in Reclamation Hydromet Database

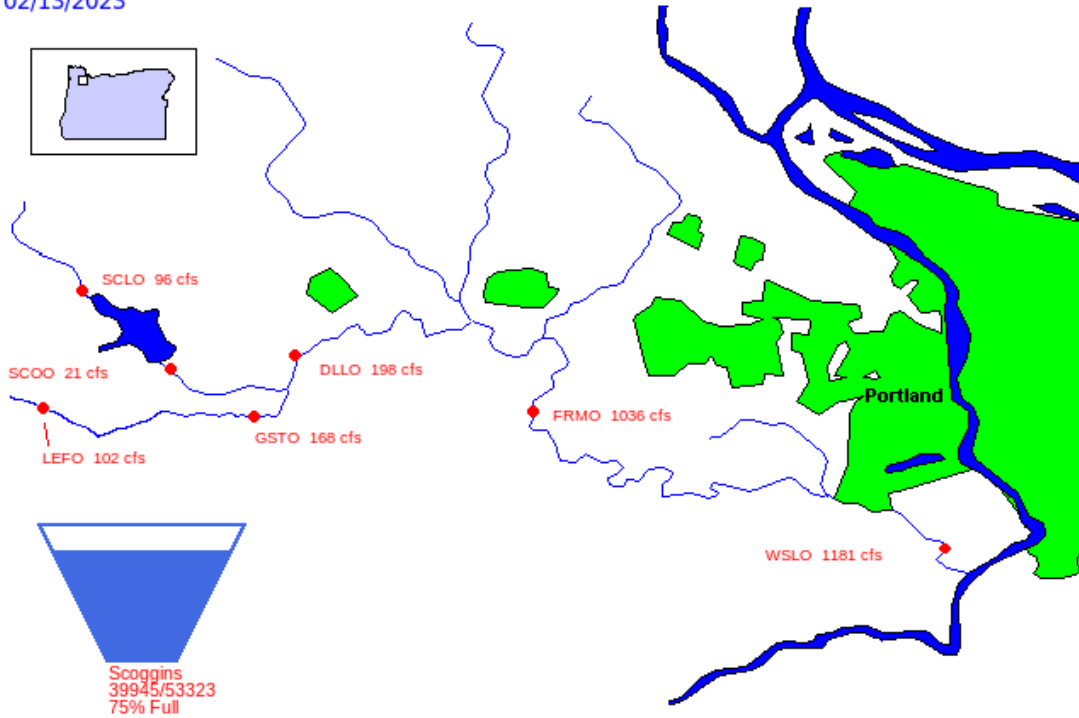


McKay Reservoir  
Historical Inflow  
Statistics based on WY1974WY2022 Data in Reclamation Hydromet Database

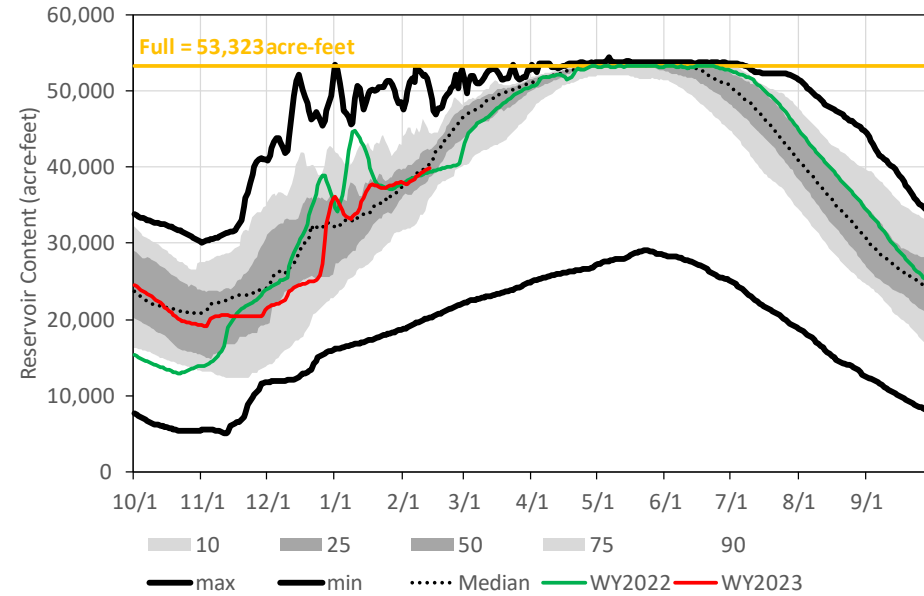


# Tualatin River Basin

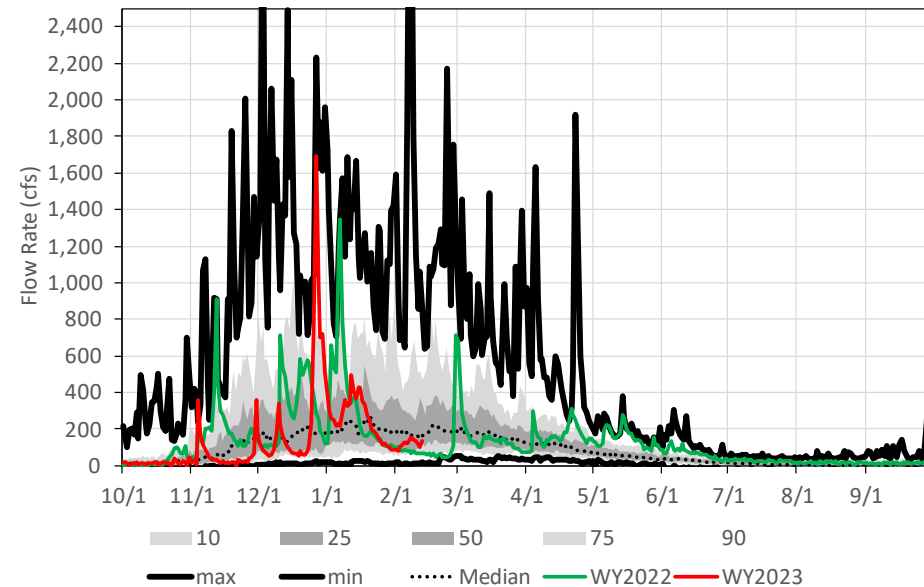
02/13/2023



Scoggins Reservoir  
Historical Reservoir Content  
Statistics based on WY1977WY2022 Data in Reclamation Hydromet Database



Scoggins Reservoir  
Historical Inflow  
Statistics based on WY1977WY2022 Data in Reclamation Hydromet Database





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208.378.5037



BUREAU OF  
RECLAMATION

Bully Creek Dam  
June 22, 2005