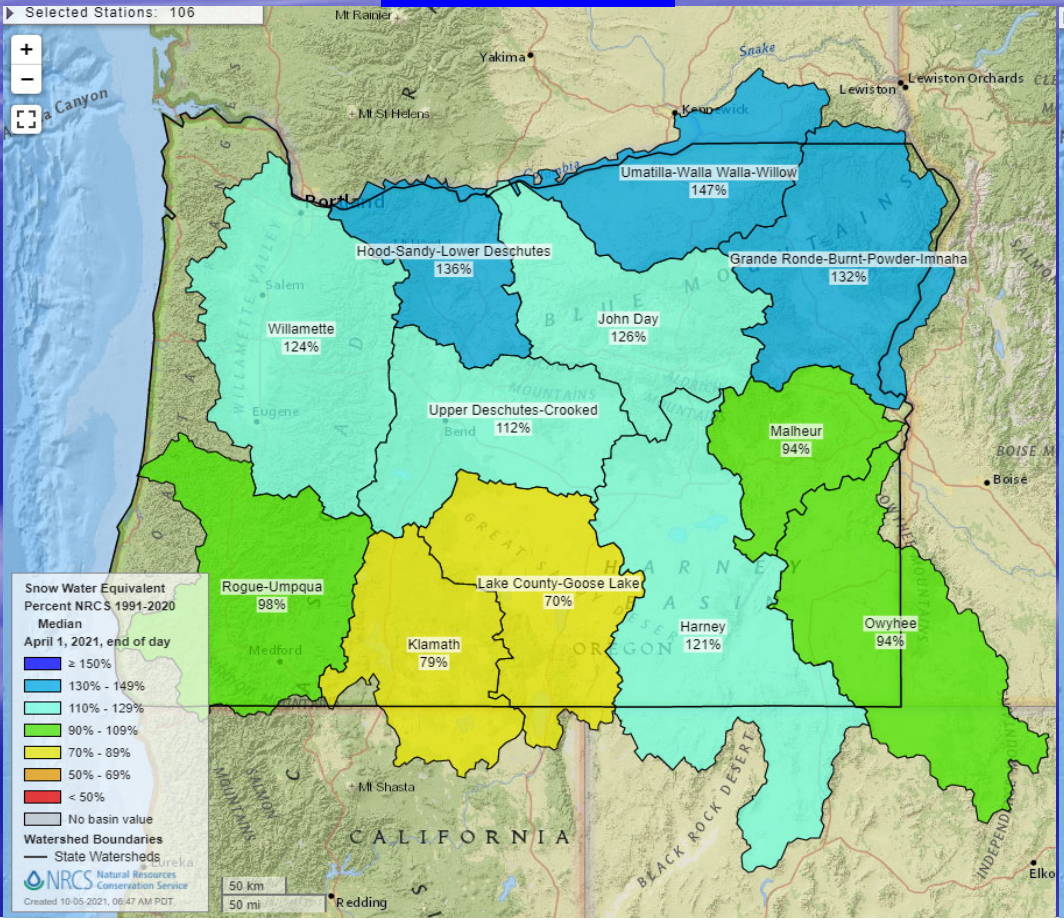
Oregon Water Supply Availability Committee - October 13, 2021

Crazyman Flat SNOTEL
Burned in Bootleg Fire – No Damage
Klamath Basin

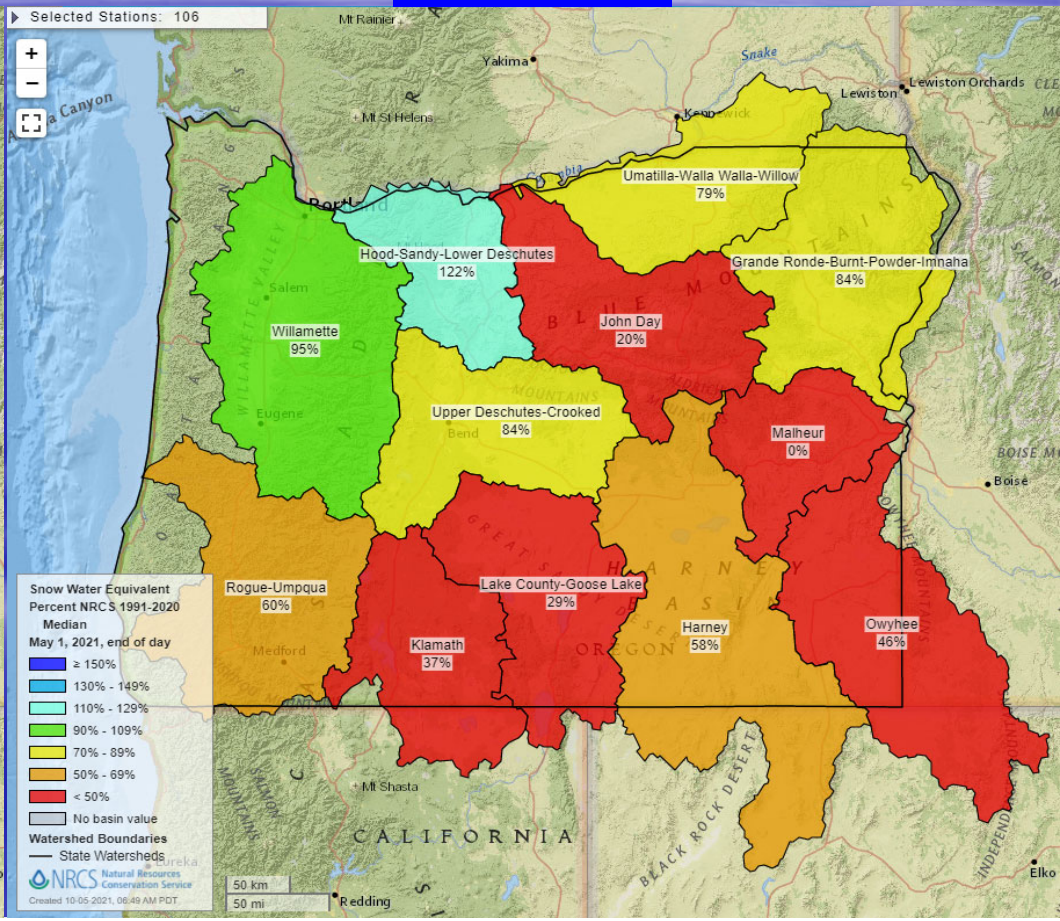
H. Scott Oviatt
Snow Survey Supervisory Hydrologist
USDA Natural Resources Conservation Service
Oregon State Office
Scott.Oviatt@usda.gov
503-414-3271

Oregon Snow Water Equivalent – April and May, 2021

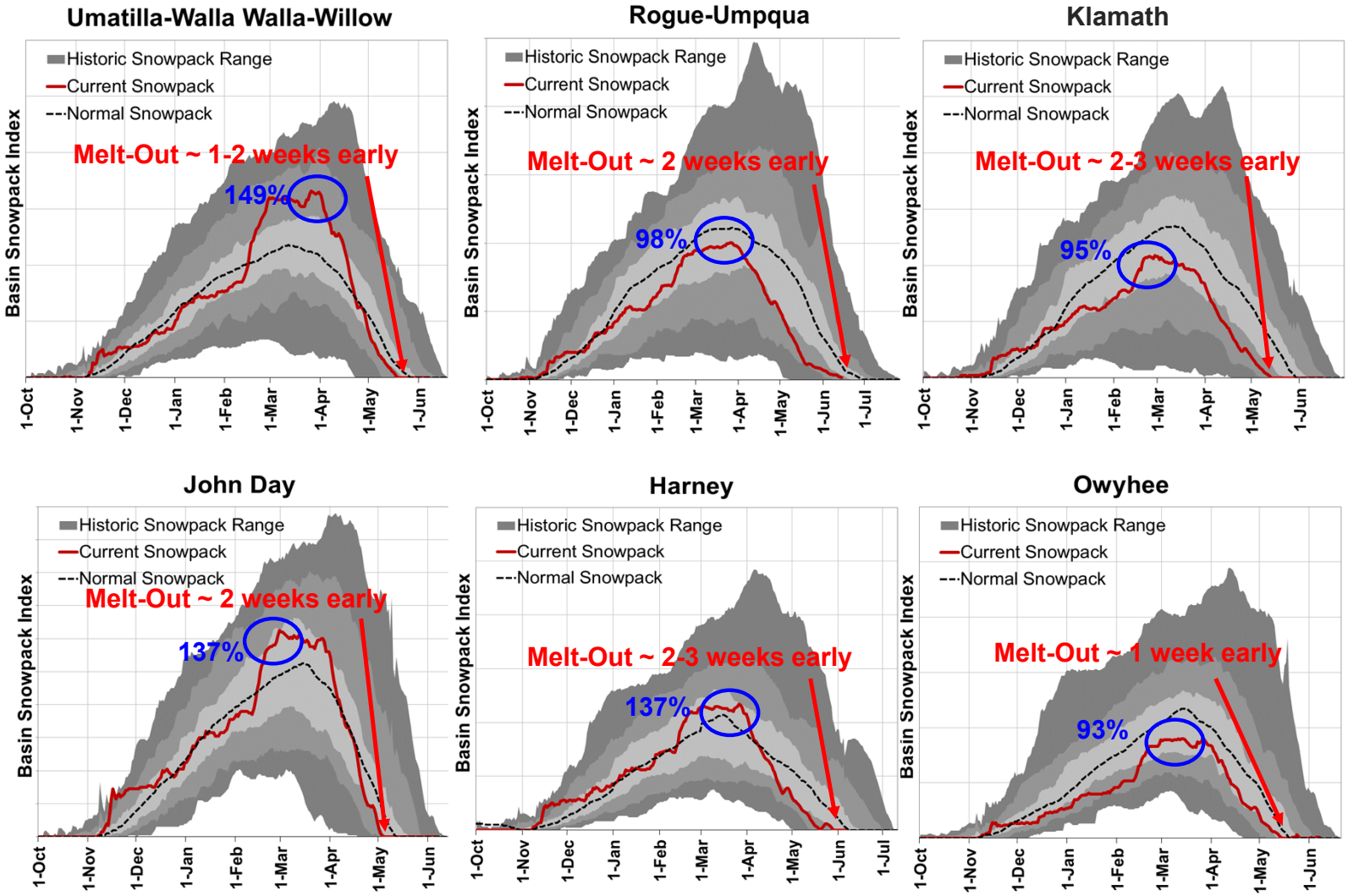
April 1, 2021

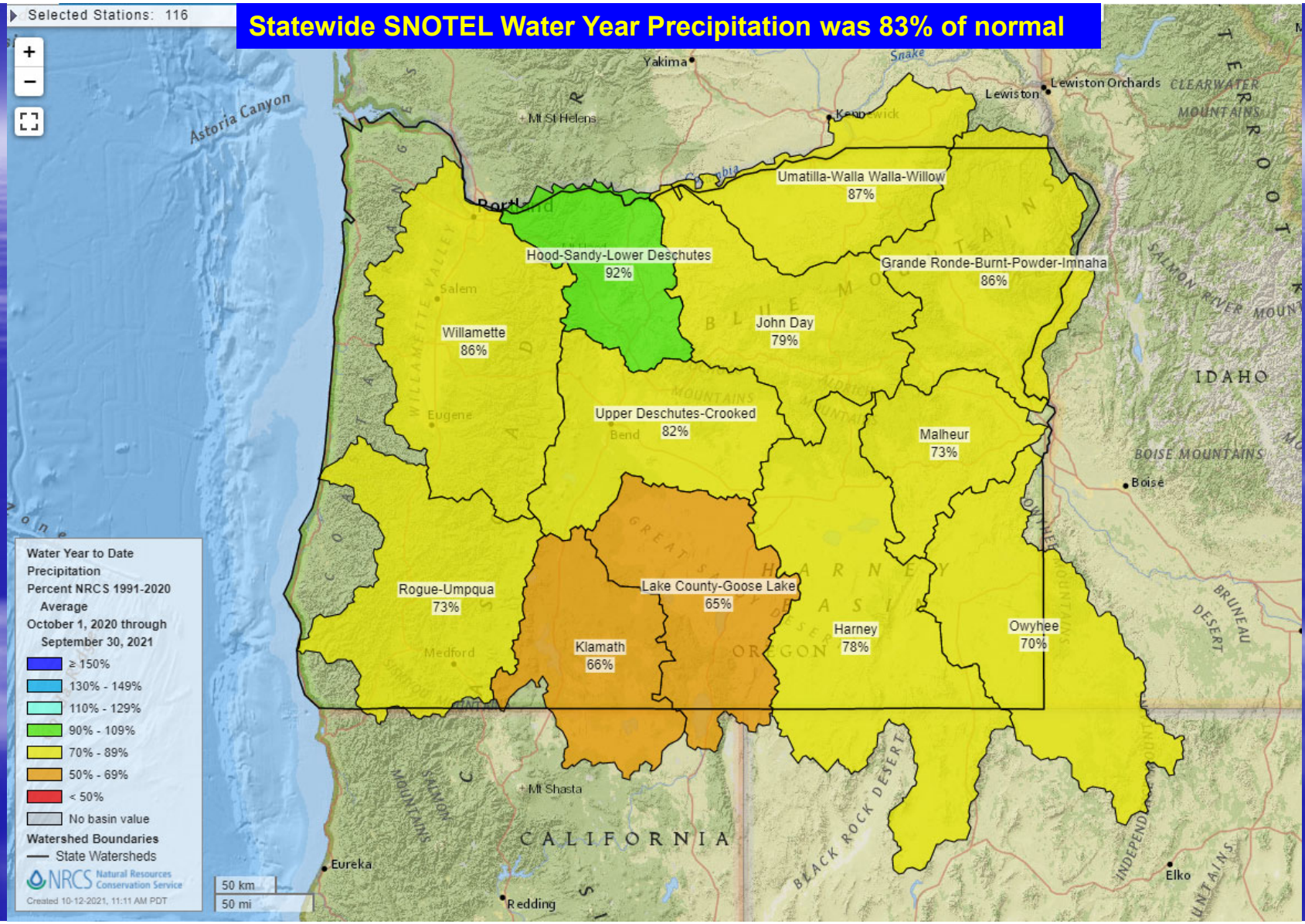


May 1, 2021

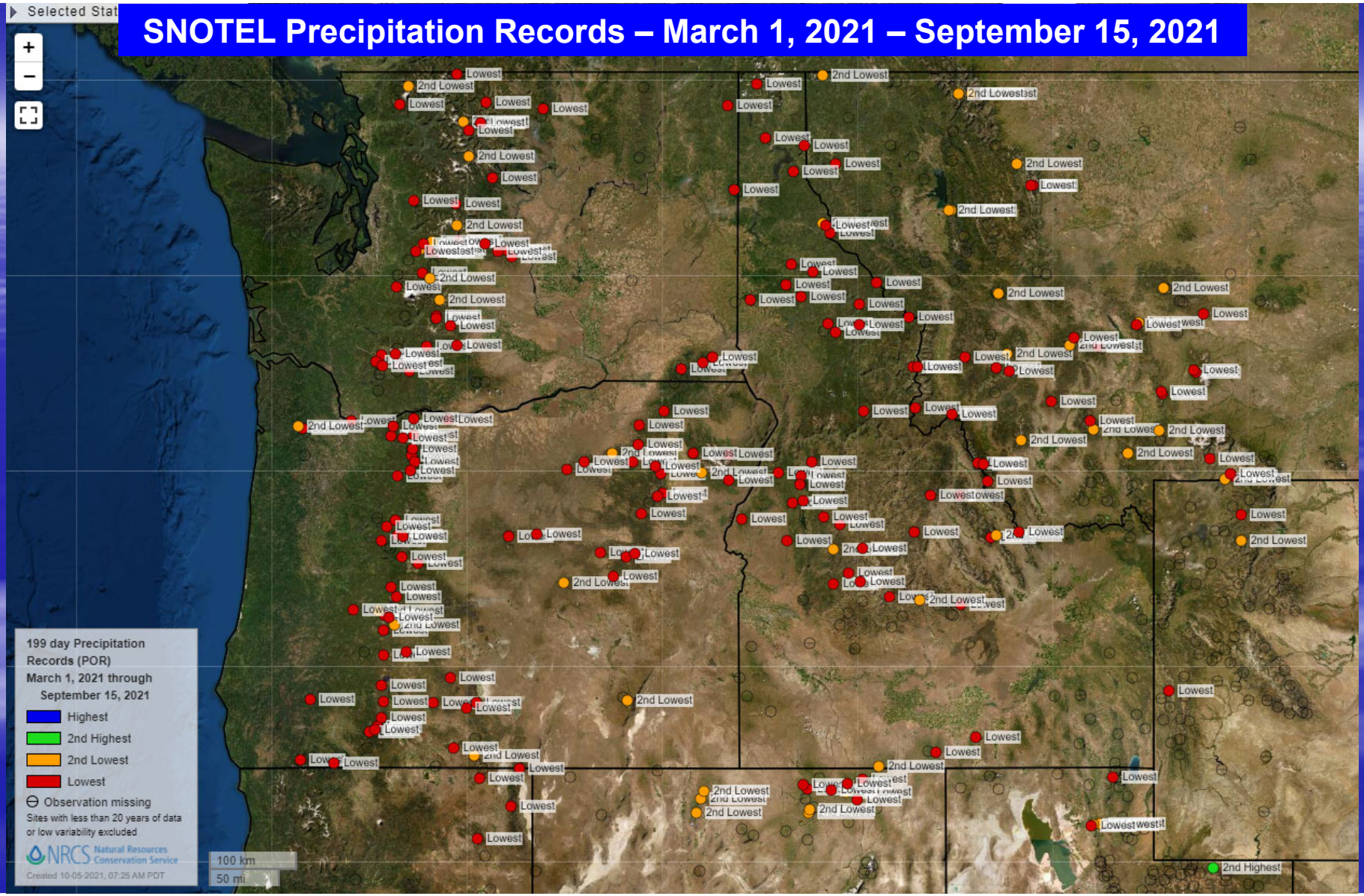


Select Oregon Snow Water Equivalent Graphs – Water Year 2021

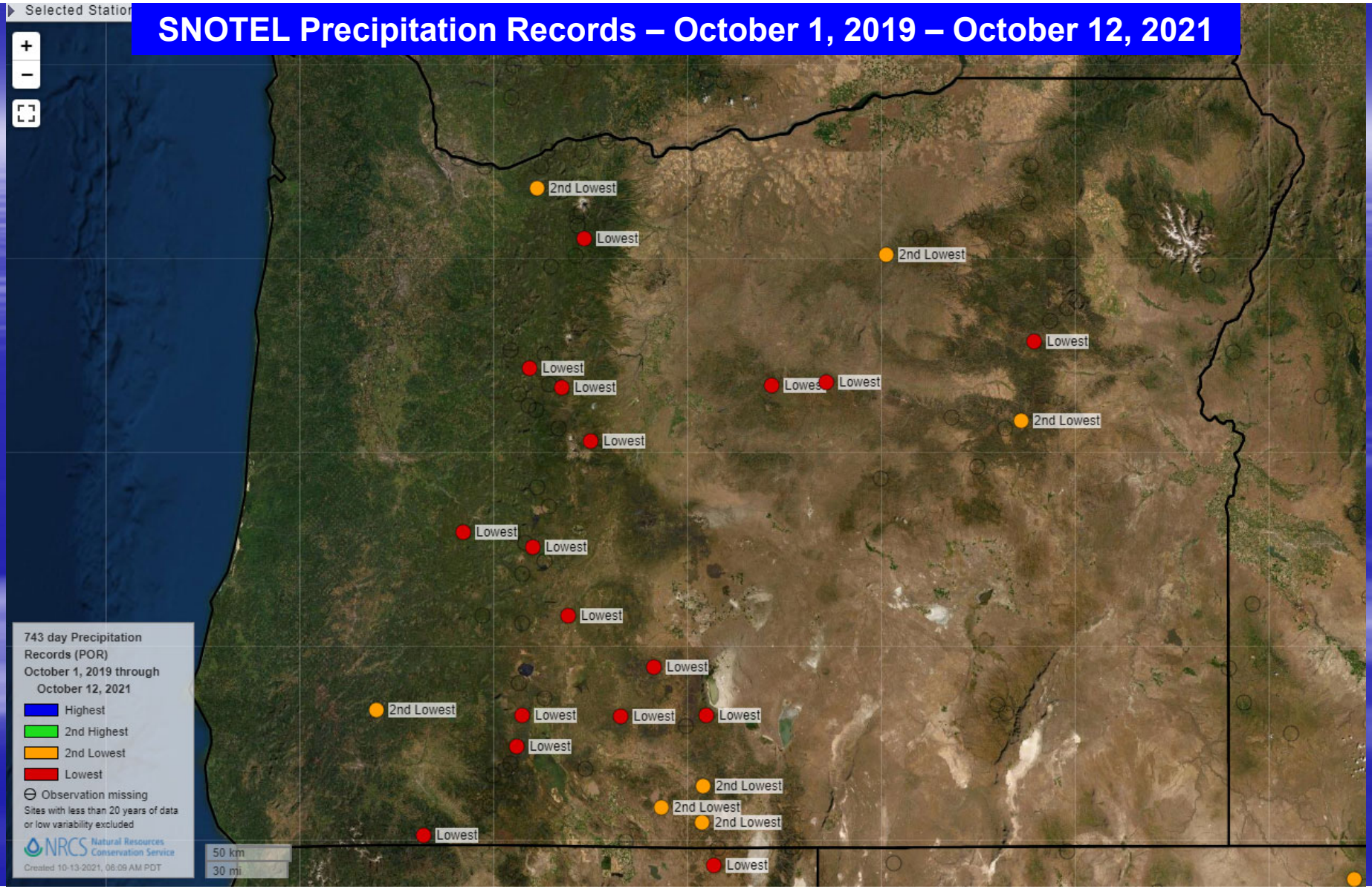



Selected Stations: 116
Statewide SNOTEL Water Year Precipitation was 83% of normal
Umatilla-Walla Walla-Willow
87%
Hood-Sandy-Lower Deschutes
92%
Grande Ronde-Burnt-Powder-Imnaha
86%
Willamette
86%
John Day
79%
Upper Deschutes-Crooked
82%
Malheur
73%
Rogue-Umpqua
73%
Lake County-Goose Lake
65%
Klamath
66%
Harney
78%
Owyhee
70%
Water Year to Date Precipitation
Percent NRCS 1991-2020 Average
October 1, 2020 through September 30, 2021
≥ 150%
130% - 149%
110% - 129%
90% - 109%
70% - 89%
50% - 69%
< 50%
No basin value
Watershed Boundaries
State Watersheds
NRCS Natural Resources Conservation Service
Created 10-12-2021, 11:11 AM PDT
50 km
50 mi
Yakima
Lewiston
Lewiston Orchards
Mt St Helens
Portland
Salem
Eugene
Bend
Medford
Boise
IDAHO
OREGON
CALIFORNIA
Mt Shasta
Redding
Eureka
Elko
Astoria Canyon

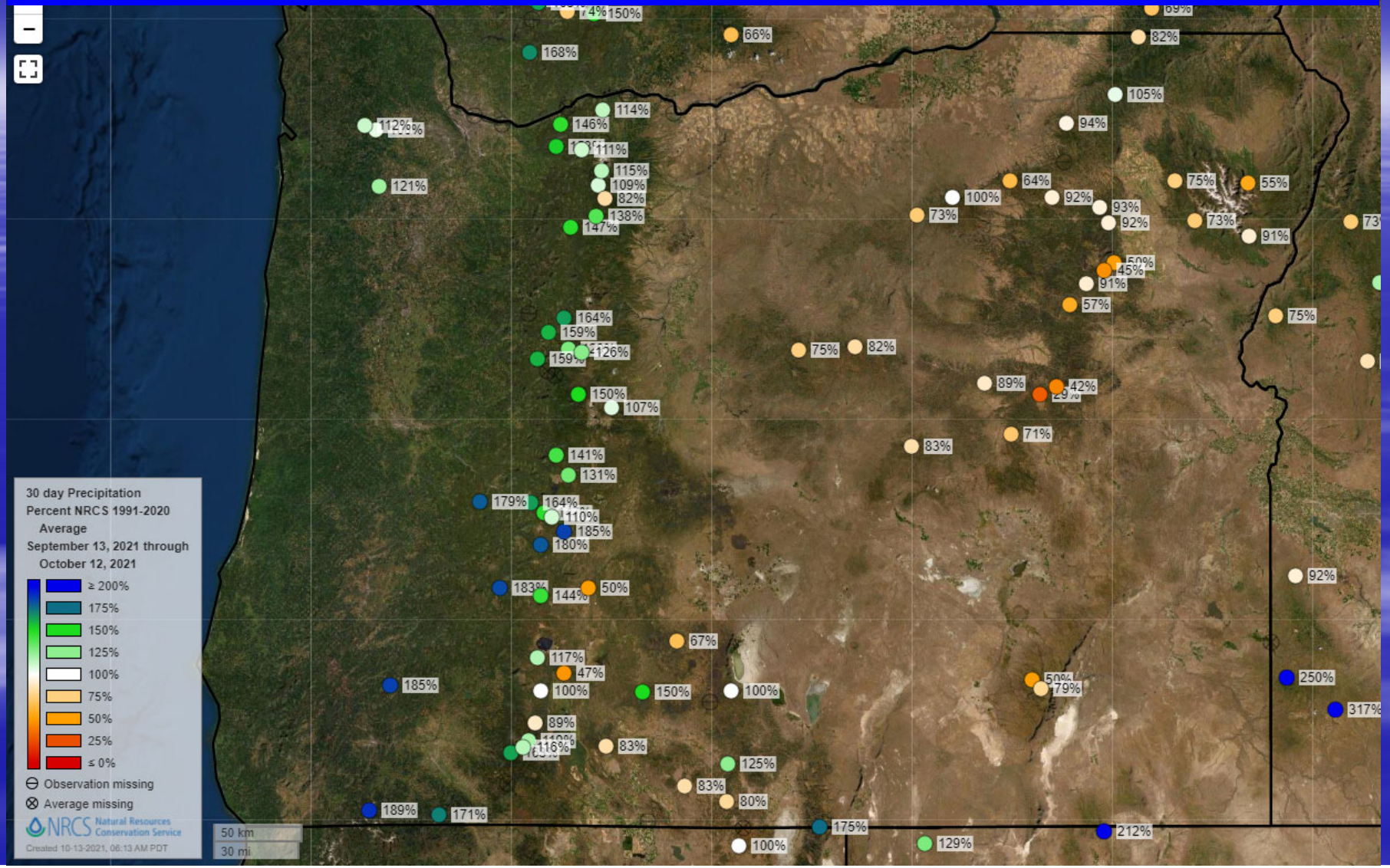
SNOTEL Precipitation Records – March 1, 2021 – September 15, 2021



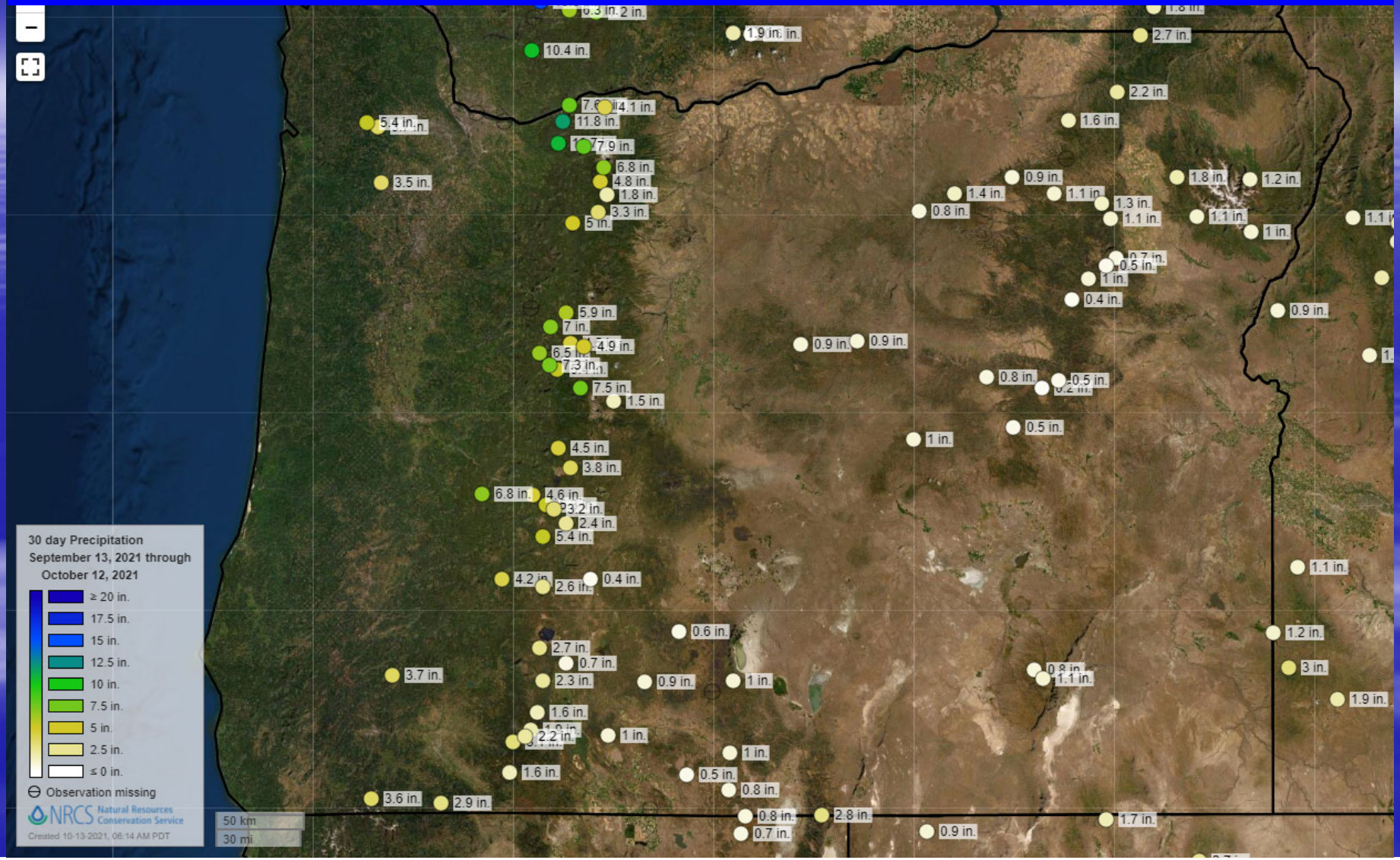
SNOTEL Precipitation Records – October 1, 2019 – October 12, 2021

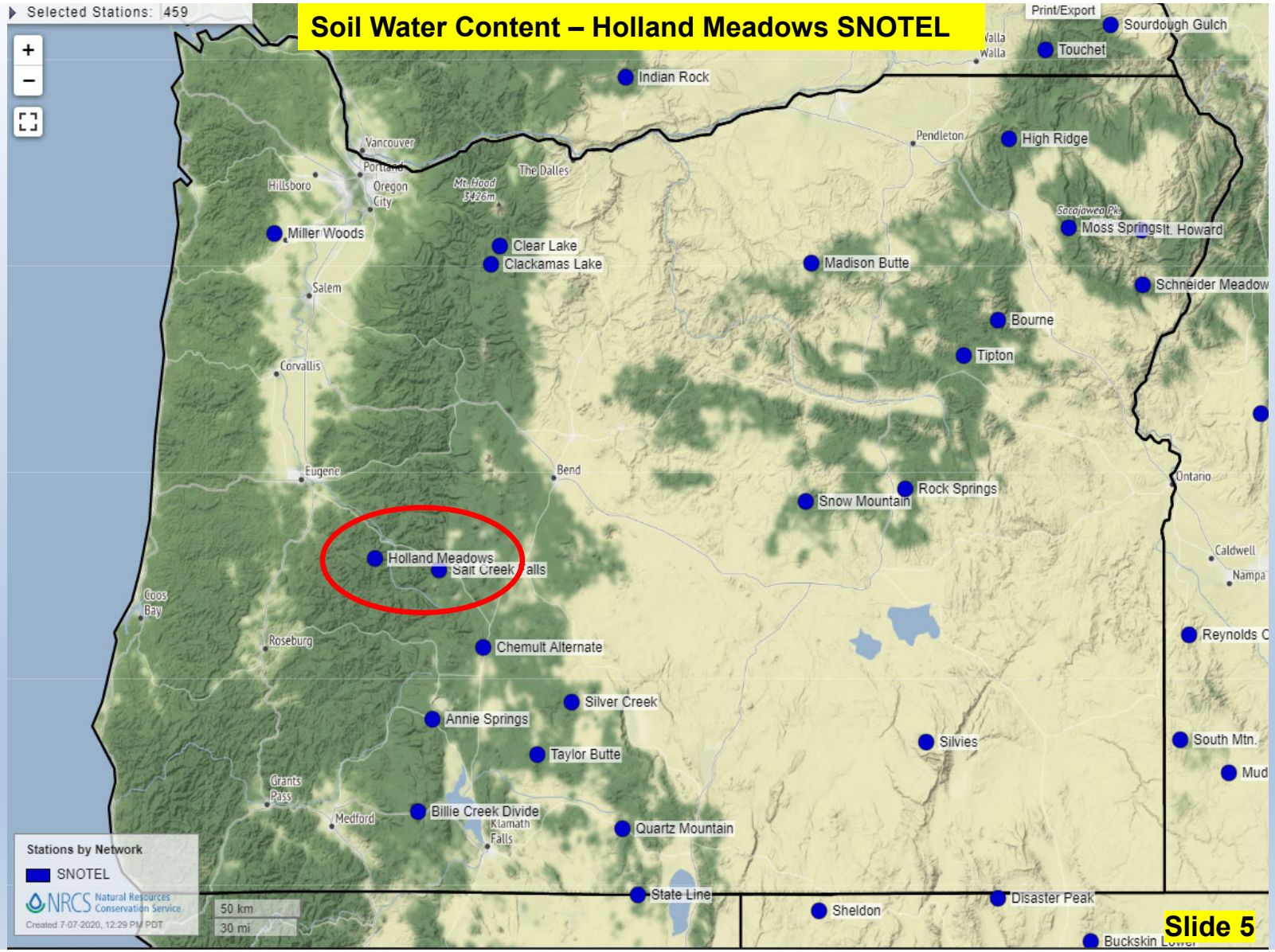


SNOTEL 30-Day Precipitation % of Average – September 12, 2021 – October 12, 2021

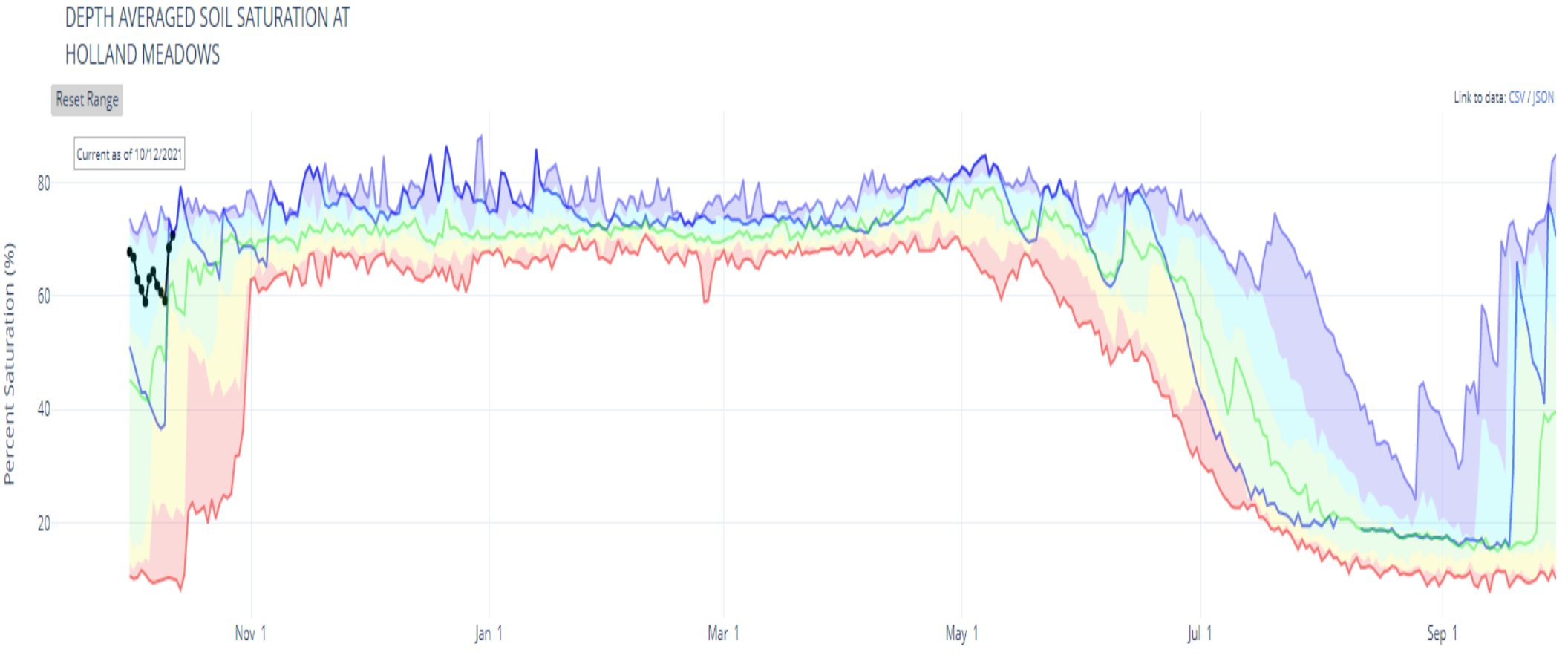


SNOTEL 30-Day Precipitation (Inches) – September 12, 2021 – October 12, 2021

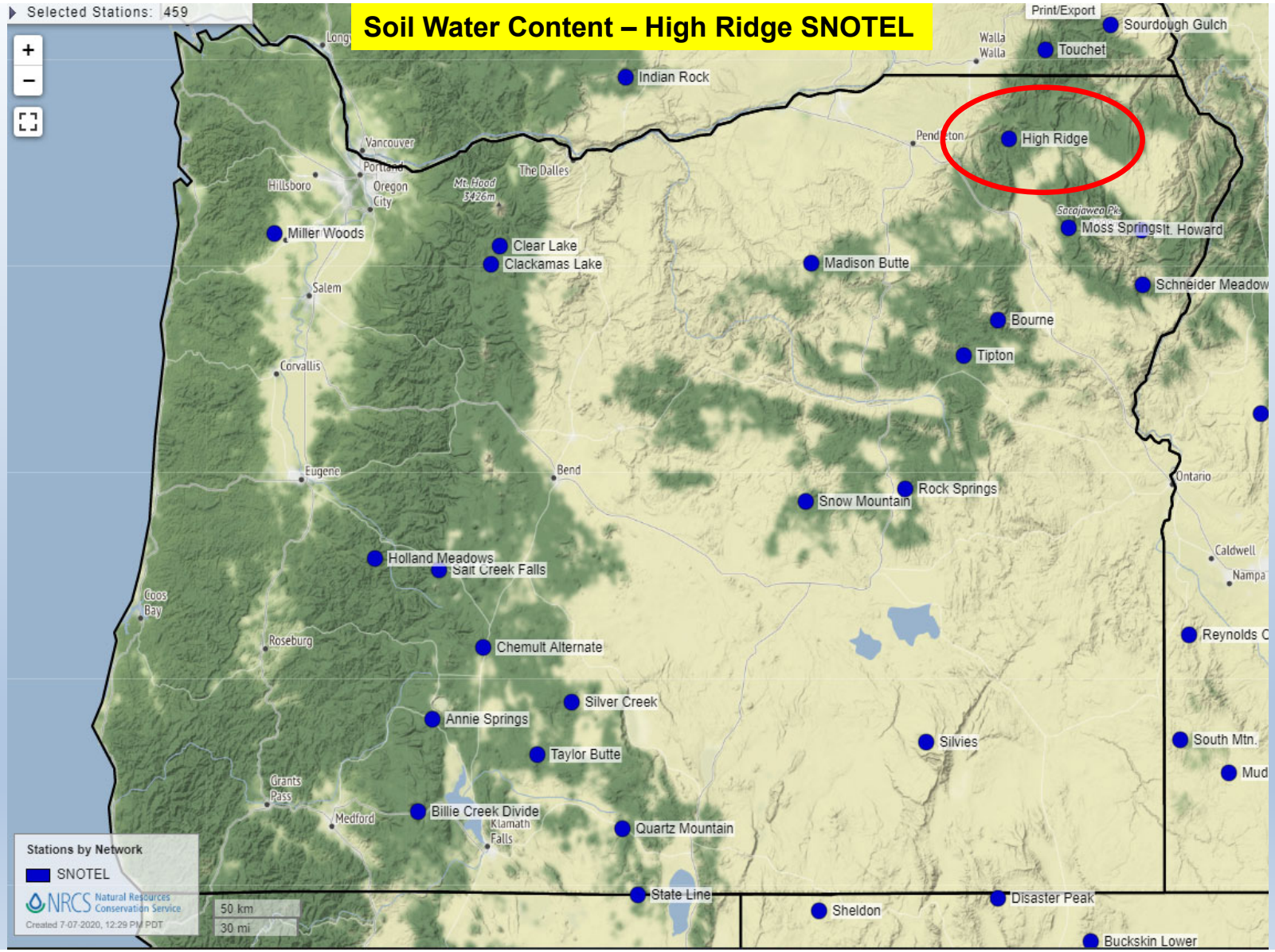



Soil Water Content – Holland Meadows SNOTEL
Selected Stations: 459
Print/Export
Sourdough Gulch
Touchet
Indian Rock
High Ridge
Pendleton
Vancouver
Portland
Hillsboro
Oregon City
Mt. Hood 5426m
The Dalles
Miller Woods
Clear Lake
Clackamas Lake
Madison Butte
Moss Springs
Mt. Howard
Schneider Meadow
Salem
Bourne
Tipton
Corvallis
Eugene
Bend
Rock Springs
Snow Mountain
Ontario
Holland Meadows
Salt Creek Falls
Caldwell
Nampa
Coos Bay
Roseburg
Chemult Alternate
Reynolds C
Silver Creek
Annie Springs
Silvies
South Mtn.
Taylor Butte
Mud
Grants Pass
Medford
Billie Creek Divide
Klamath Falls
Quartz Mountain
State Line
Sheldon
Disaster Peak
Buckskin
Stations by Network
SNOTEL
NRCS Natural Resources Conservation Service
Created 7-07-2020, 12:29 PM PDT
50 km
30 mi
Slide 5

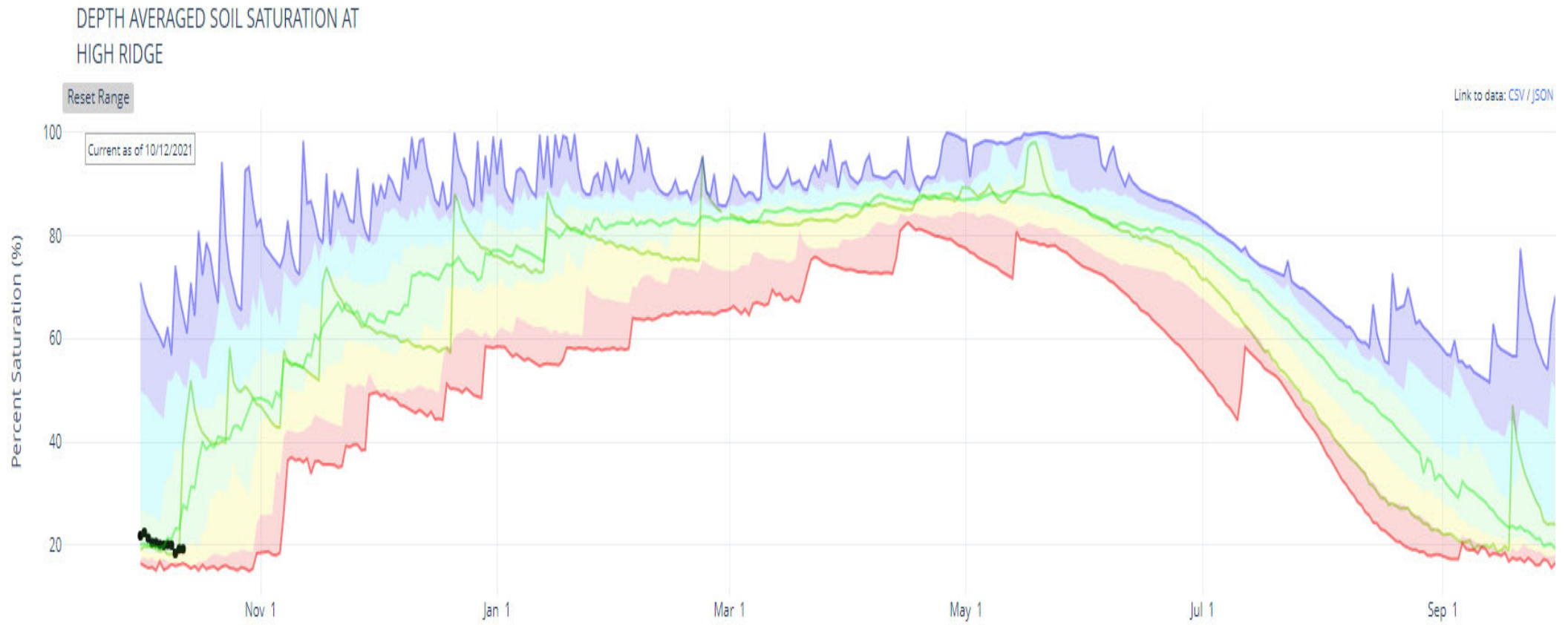
Soil Water Content – Holland Meadows SNOTEL (2011-2021)

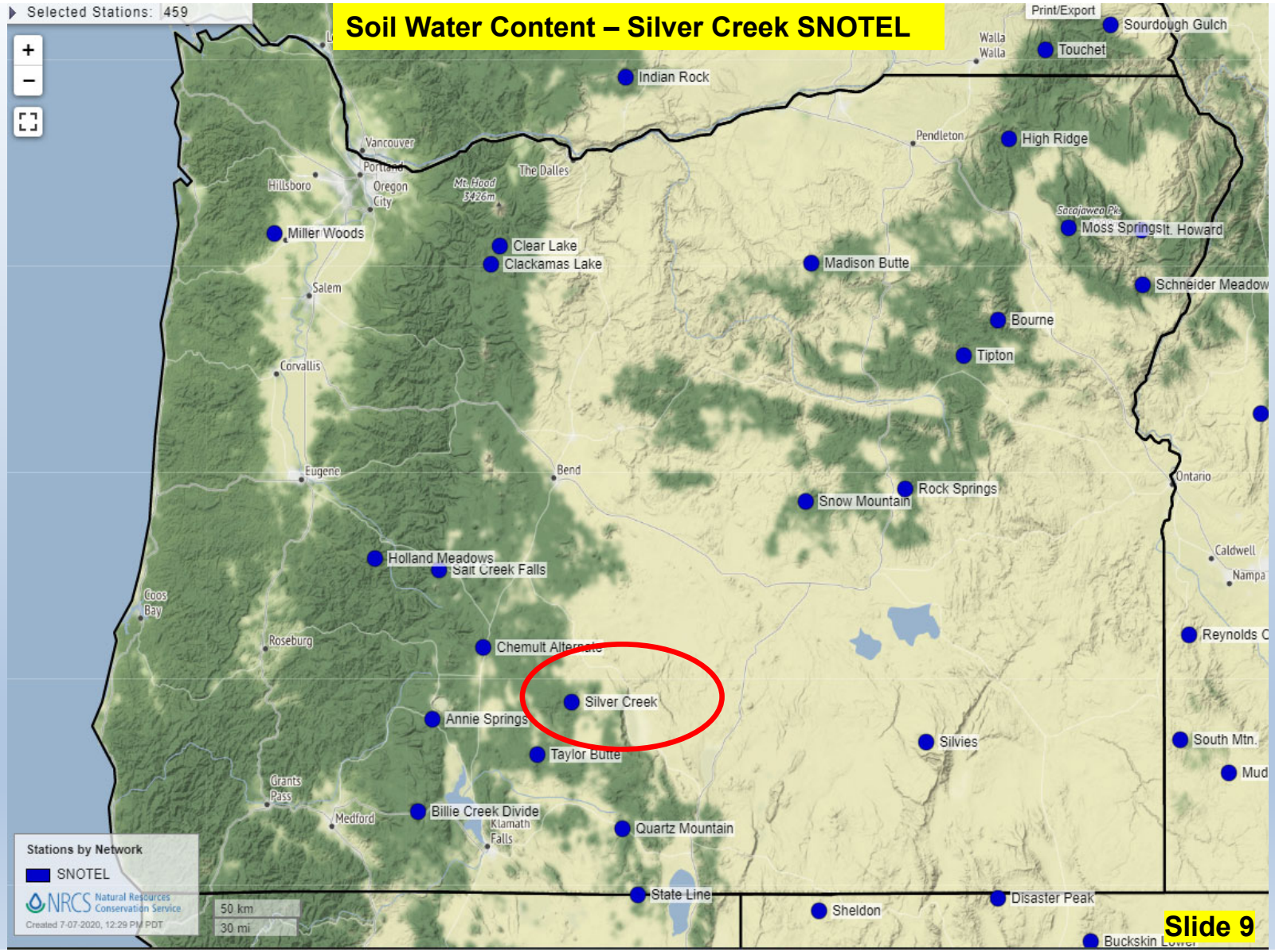


Soil Water Content – High Ridge SNOTEL

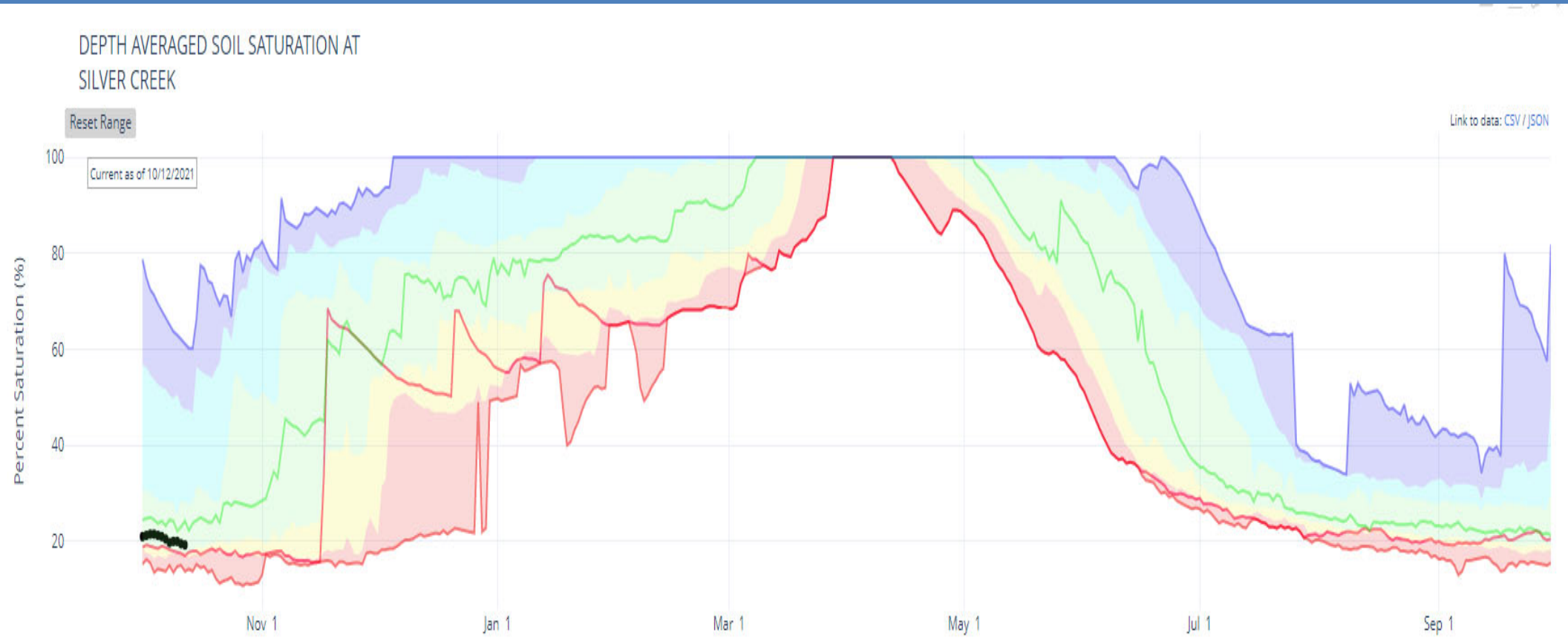


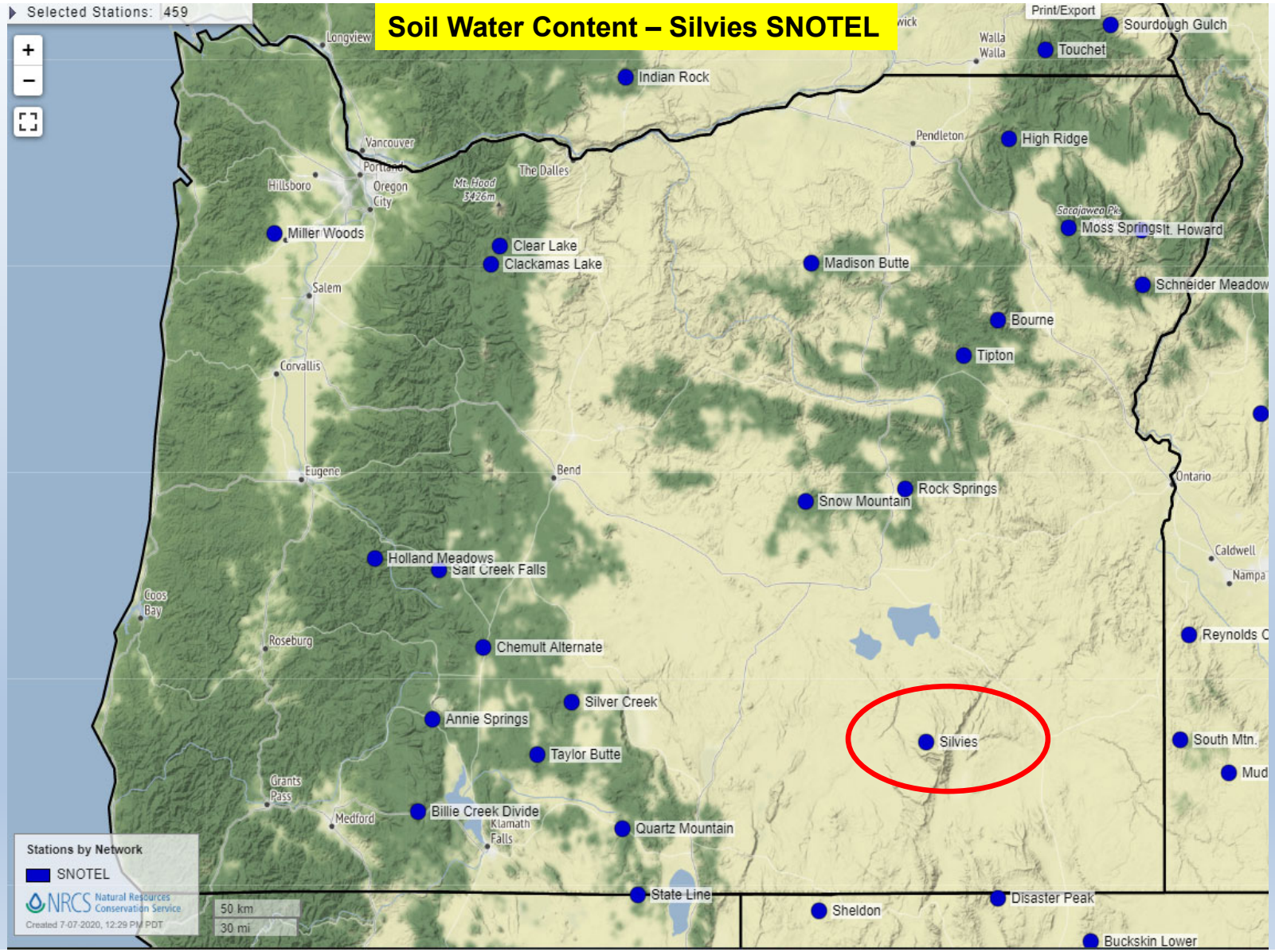
Soil Water Content – High Ridge SNOTEL (2004-2021)



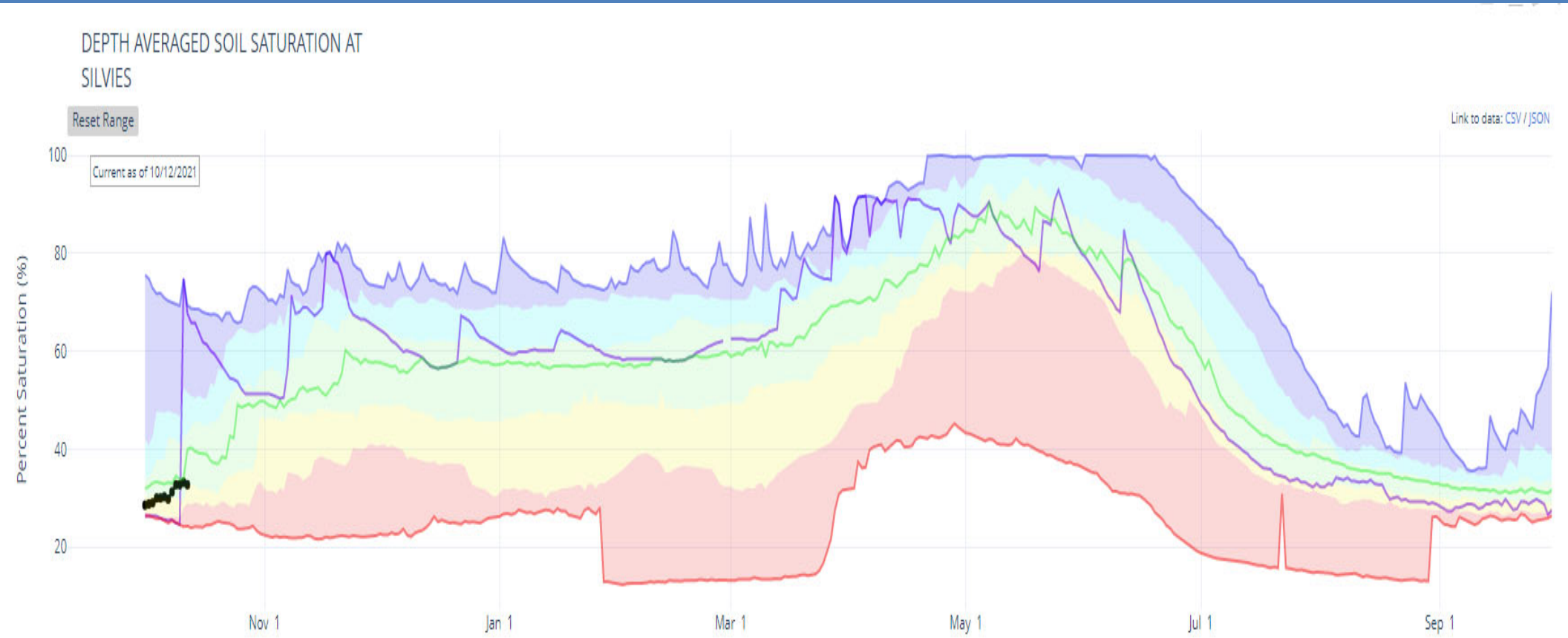

Selected Stations: 459
Soil Water Content – Silver Creek SNOTEL
Print/Export
Sourdough Gulch
Touchet
Indian Rock
High Ridge
Pendleton
Vancouver
Portland
Hillsboro
Oregon City
Mt. Hood 5426m
The Dalles
Miller Woods
Clear Lake
Clackamas Lake
Madison Butte
Moss Springs
Schneider Meadow
Salem
Bourne
Tipton
Corvallis
Eugene
Bend
Rock Springs
Snow Mountain
Ontario
Holland Meadows
Salt Creek Falls
Caldwell
Nampa
Coos Bay
Roseburg
Chemult Alternate
Reynolds C
Silver Creek
Annie Springs
Silvies
South Mtn.
Taylor Butte
Grants Pass
Medford
Billie Creek Divide
Klamath Falls
Quartz Mountain
State Line
Sheldon
Disaster Peak
Stations by Network
SNOTEL
NRCS Natural Resources Conservation Service
Created 7-07-2020, 12:29 PM PDT
50 km
30 mi
Slide 9

Soil Water Content – Silver Creek SNOTEL (2004-2021)




Soil Water Content – Silvies SNOTEL
Selected Stations: 459
Print/Export
Sourdough Gulch
Touchet
Indian Rock
High Ridge
Pendleton
Vancouver
Portland
Hillsboro
Oregon City
Mt. Hood 5426m
The Dalles
Miller Woods
Clear Lake
Clackamas Lake
Madison Butte
Moss Springs
Schneider Meadow
Salem
Bourne
Tipton
Corvallis
Eugene
Bend
Rock Springs
Snow Mountain
Ontario
Holland Meadows
Salt Creek Falls
Caldwell
Nampa
Coos Bay
Roseburg
Chemult Alternate
Reynolds C
Silver Creek
Annie Springs
Silvies
South Mtn.
Taylor Butte
Mud
Grants Pass
Medford
Billie Creek Divide
Klamath Falls
Quartz Mountain
Stations by Network
SNOTEL
NRCS Natural Resources Conservation Service
Created 7-07-2020, 12:29 PM PDT
50 km
30 mi
State Line
Sheldon
Disaster Peak
Buckskin Lower

Soil Water Content – Silvies SNOTEL (1997-2021)



Thank you

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

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.

Oregon Water Supply Availability Committee - October 13, 2021

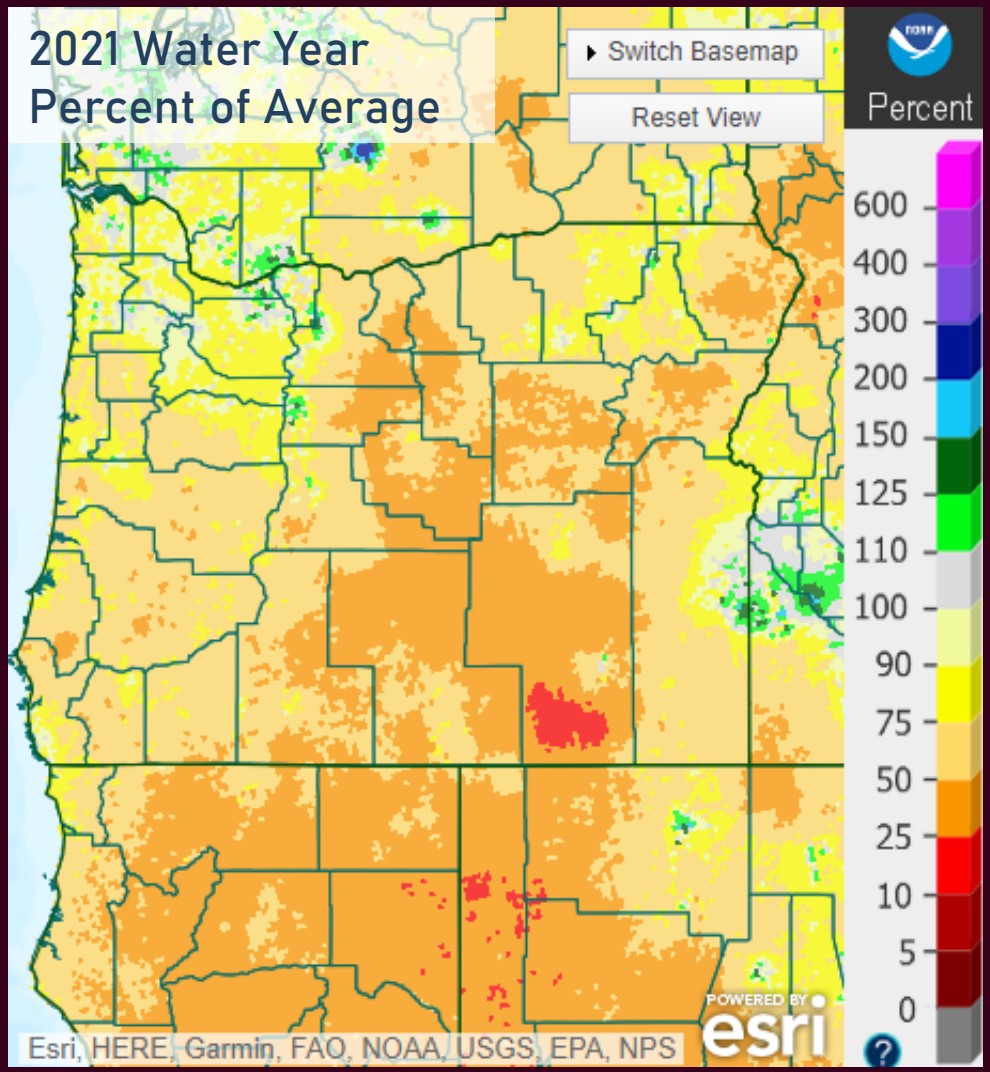
Crazyman Flat SNOTEL
Burned in Bootleg Fire – No Damage
Klamath Basin

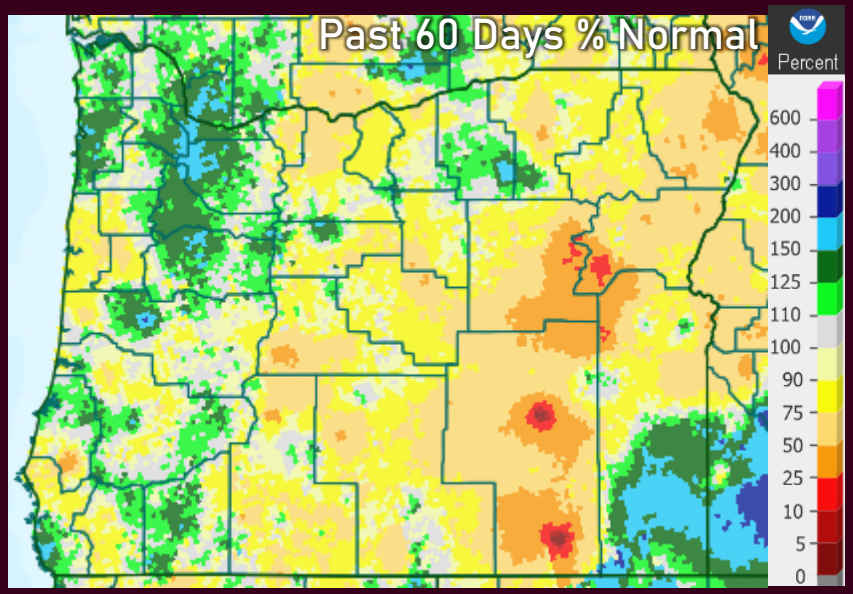
H. Scott Oviatt
Snow Survey Supervisory Hydrologist
USDA Natural Resources Conservation Service
Oregon State Office
Scott.Oviatt@usda.gov
503-414-3271

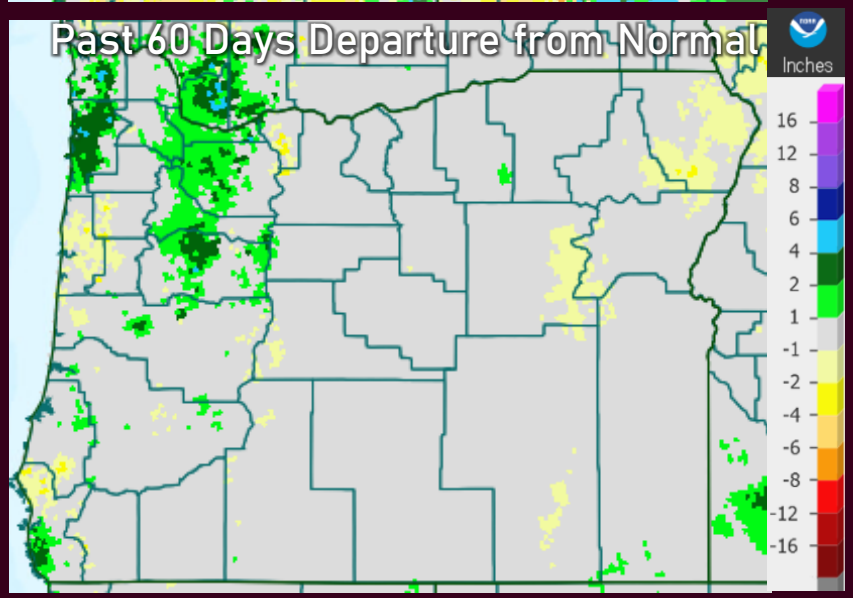
October 2021 Update for Precipitation, Temperatures, and Seasonal Conditions

Andy Bryant
Service Hydrologist
NOAA/NWS Portland
Weather Forecast Office

Precipitation





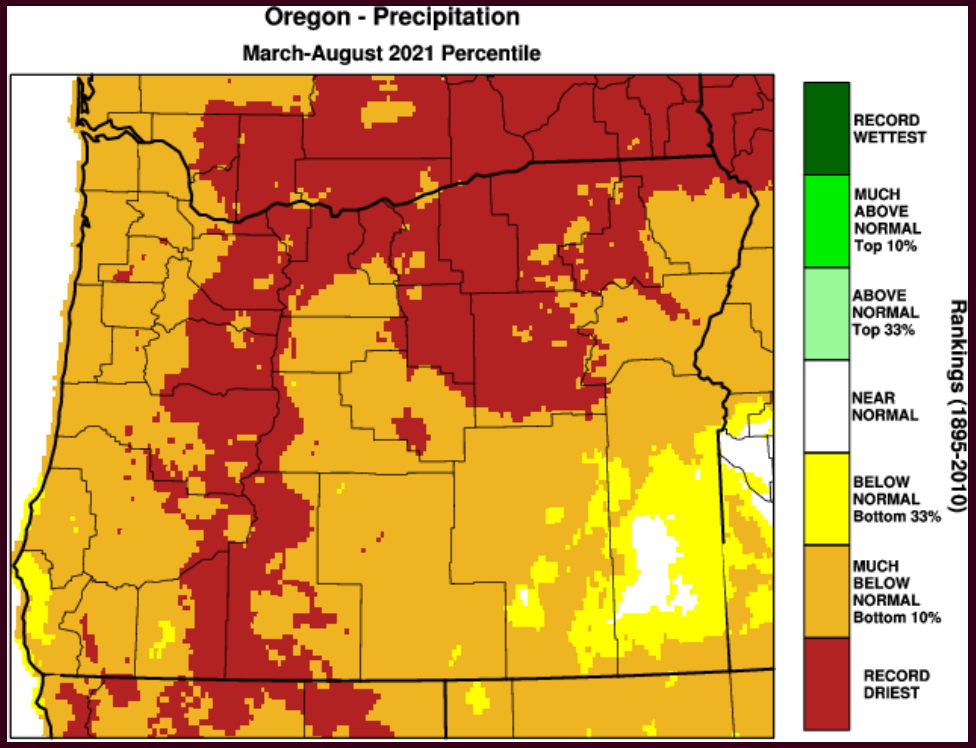


Precipitation Data as of Oct 11, 2021

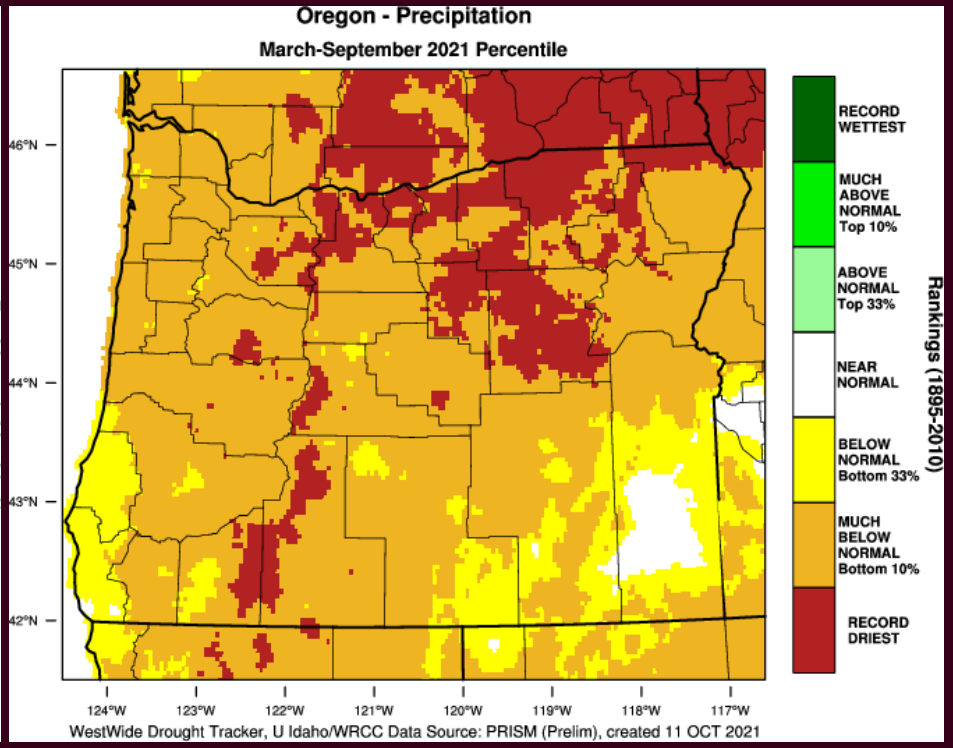
water.weather.gov/precip/index.php

Precipitation – Percentile / Ranking

March - August

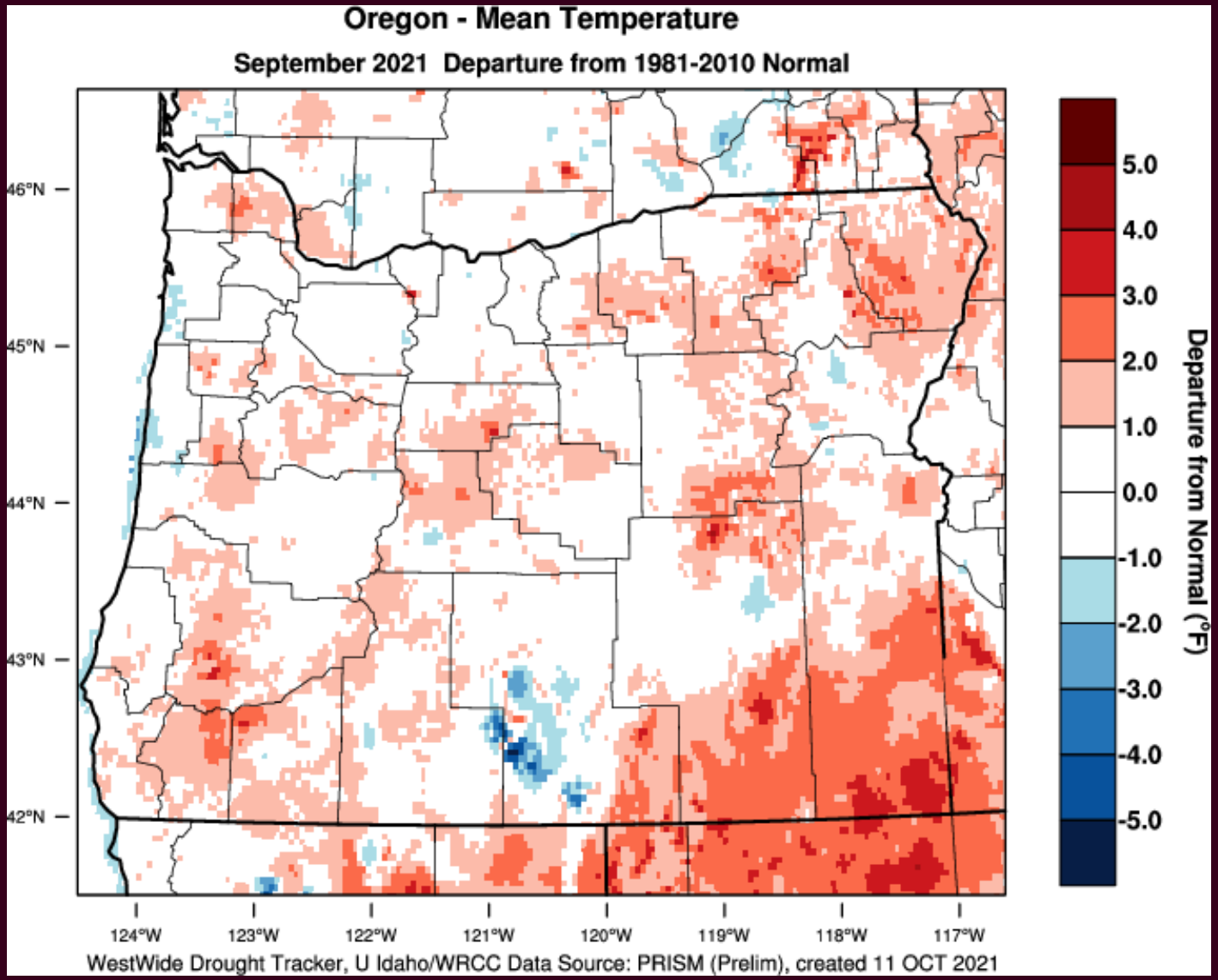


March - September



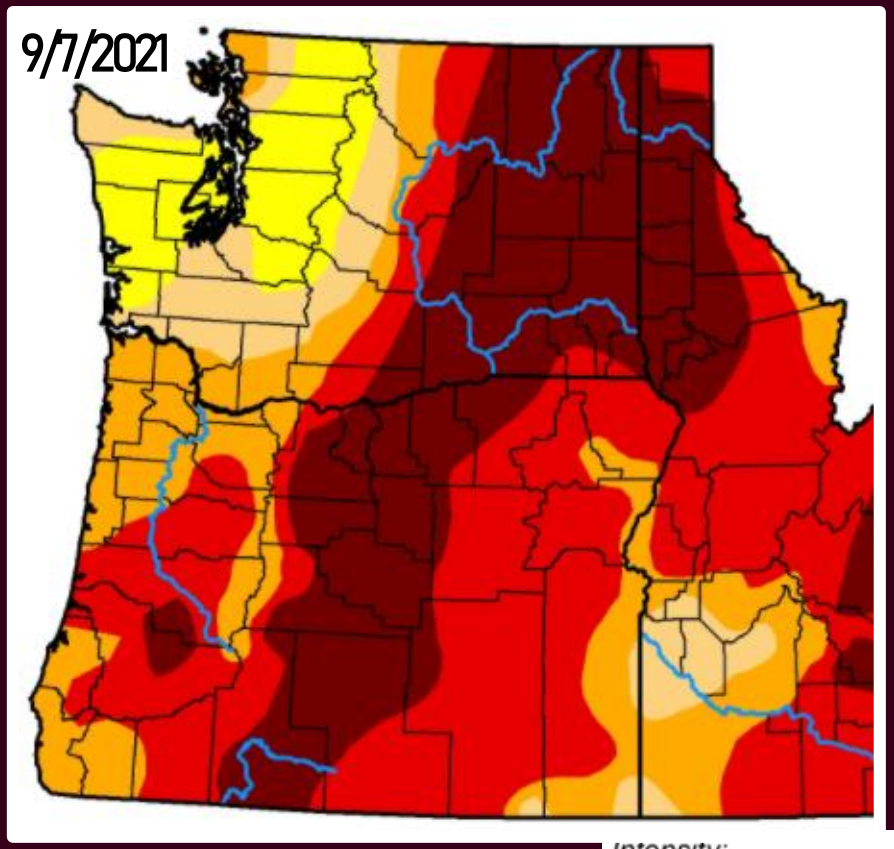
https://wrcc.dri.edu/wwdt/index.php?region=pnw

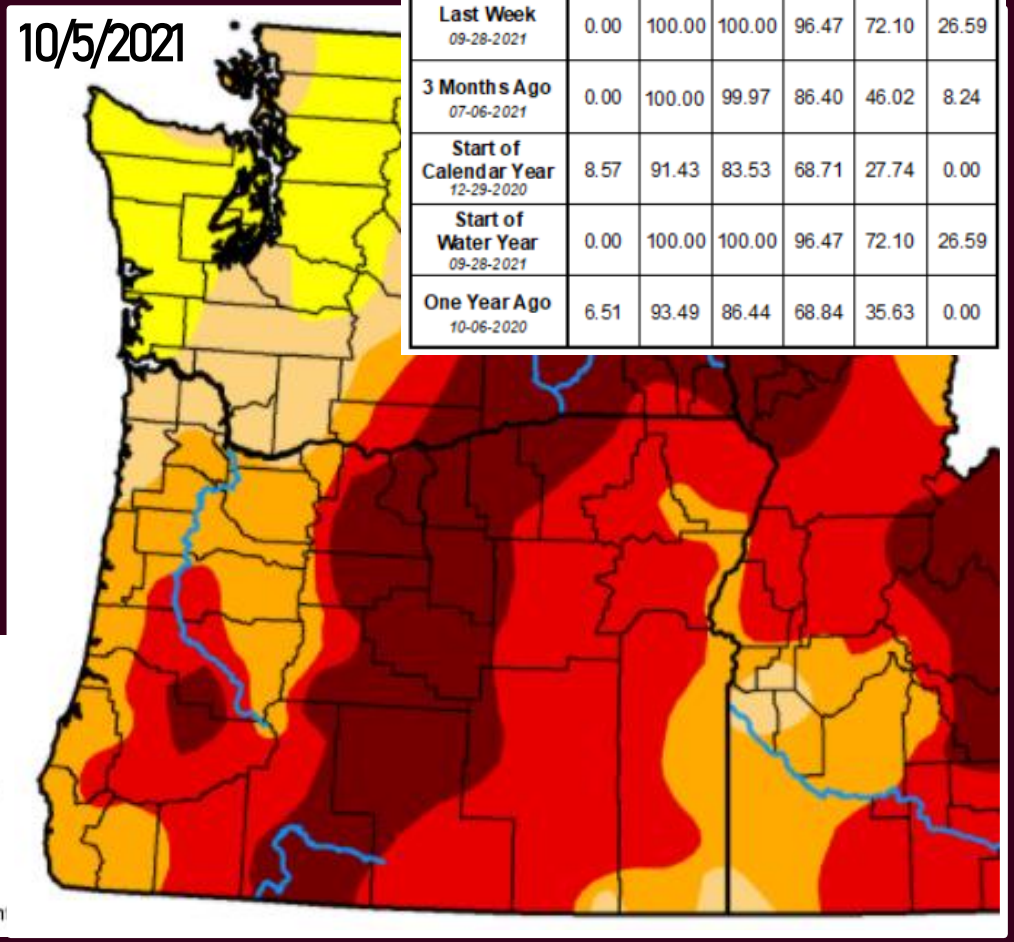
Recent Temperatures



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

Drought Monitor





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

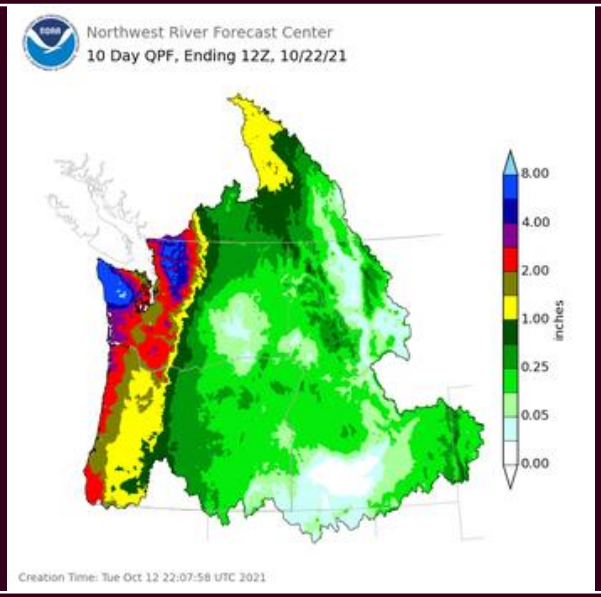
Oregon Drought Conditions History Table (% Area)

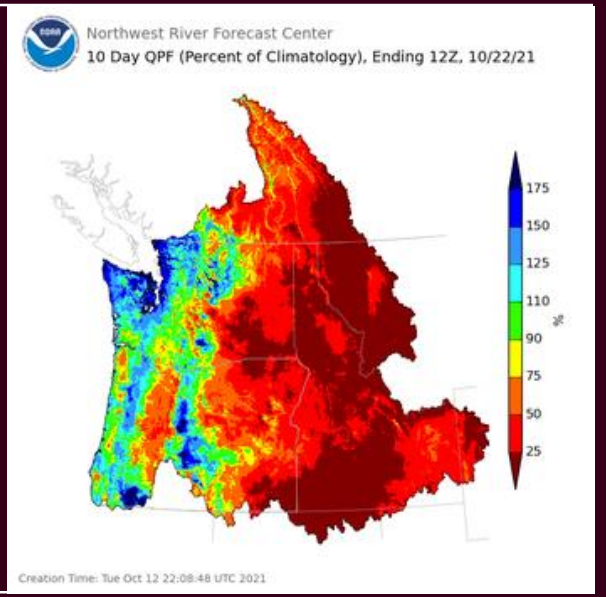
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	96.47	72.10	26.59
Last Week 09-28-2021	0.00	100.00	100.00	96.47	72.10	26.59
3 Months Ago 07-06-2021	0.00	100.00	99.97	86.40	46.02	8.24
Start of Calendar Year 12-29-2020	8.57	91.43	83.53	68.71	27.74	0.00
Start of Water Year 09-28-2021	0.00	100.00	100.00	96.47	72.10	26.59
One Year Ago 10-06-2020	6.51	93.49	86.44	68.84	35.63	0.00

Mid September Outlook

NWRFC
10-DAY
PRECIPITATION

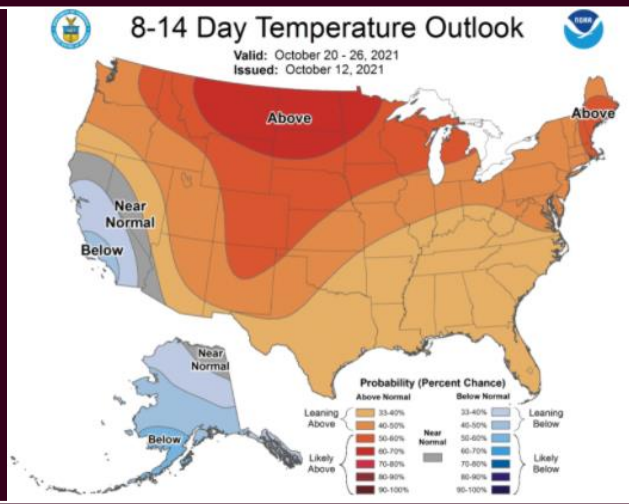
www.nwrfc.noaa.gov/water_supply/wy_summary/wy_summary.php

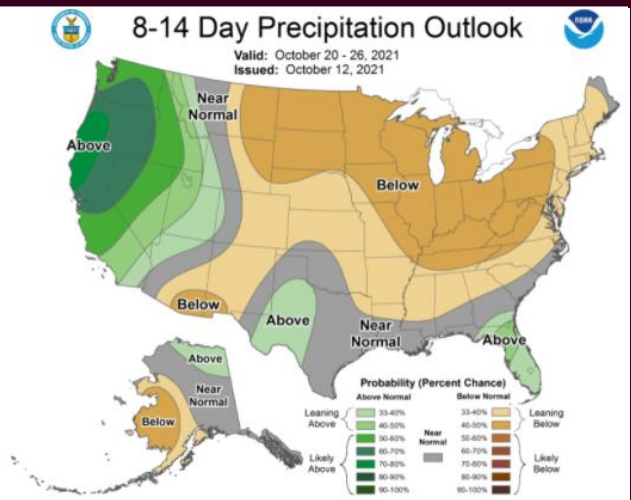




CPC
8 – 14 DAY
OUTLOOK

www.cpc.ncep.noaa.gov

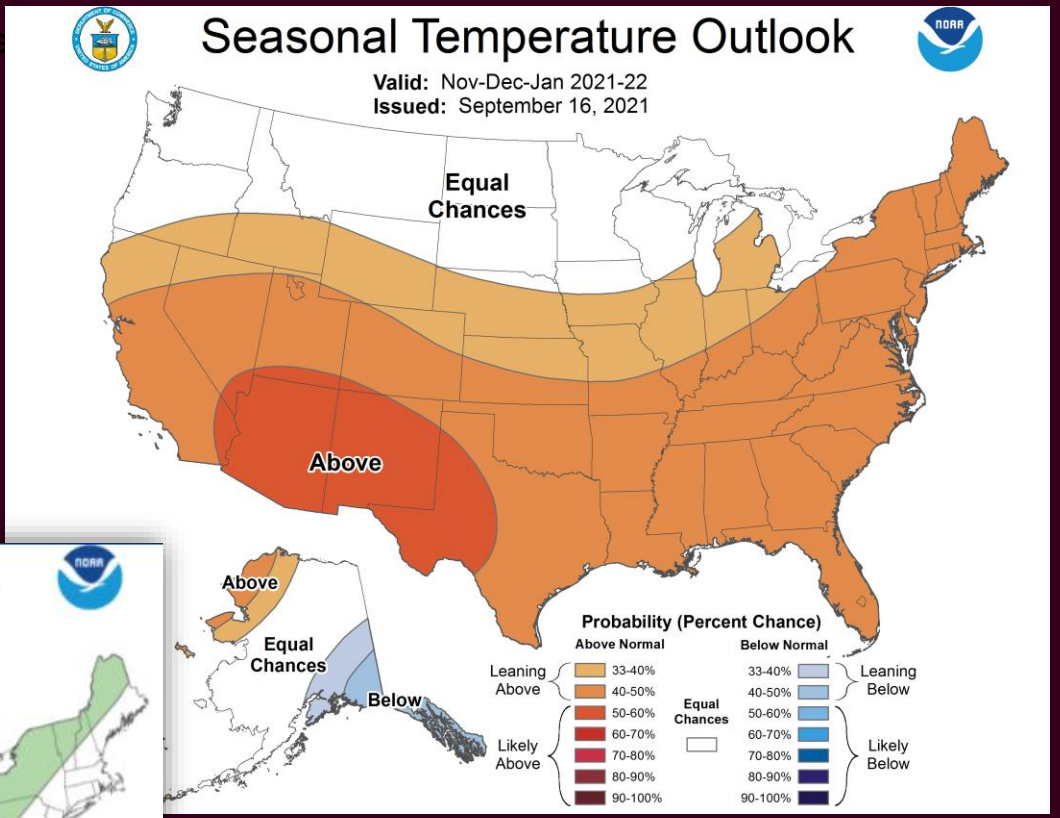


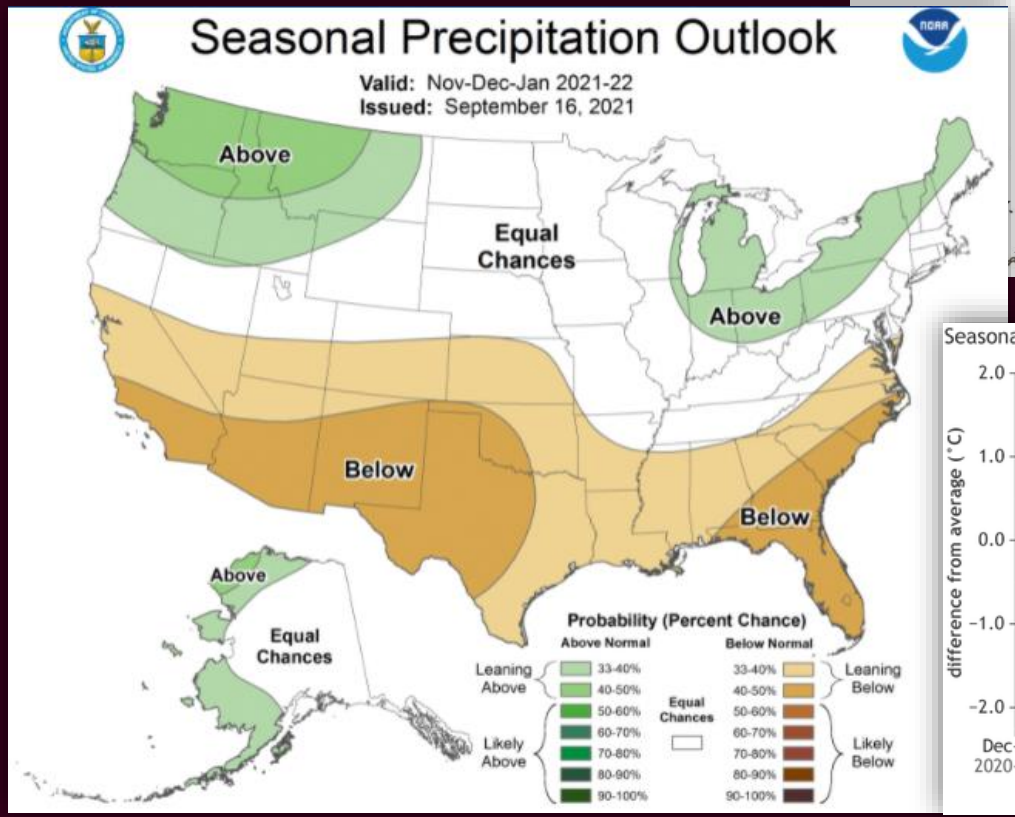


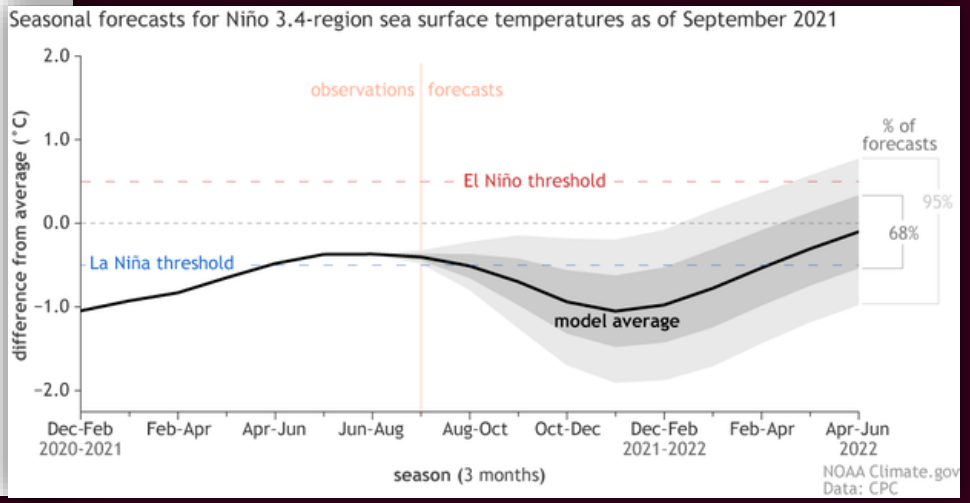
Climate Prediction Center Outlook

Nov-Dec-Jan 2021-22

www.cpc.ncep.noaa.gov

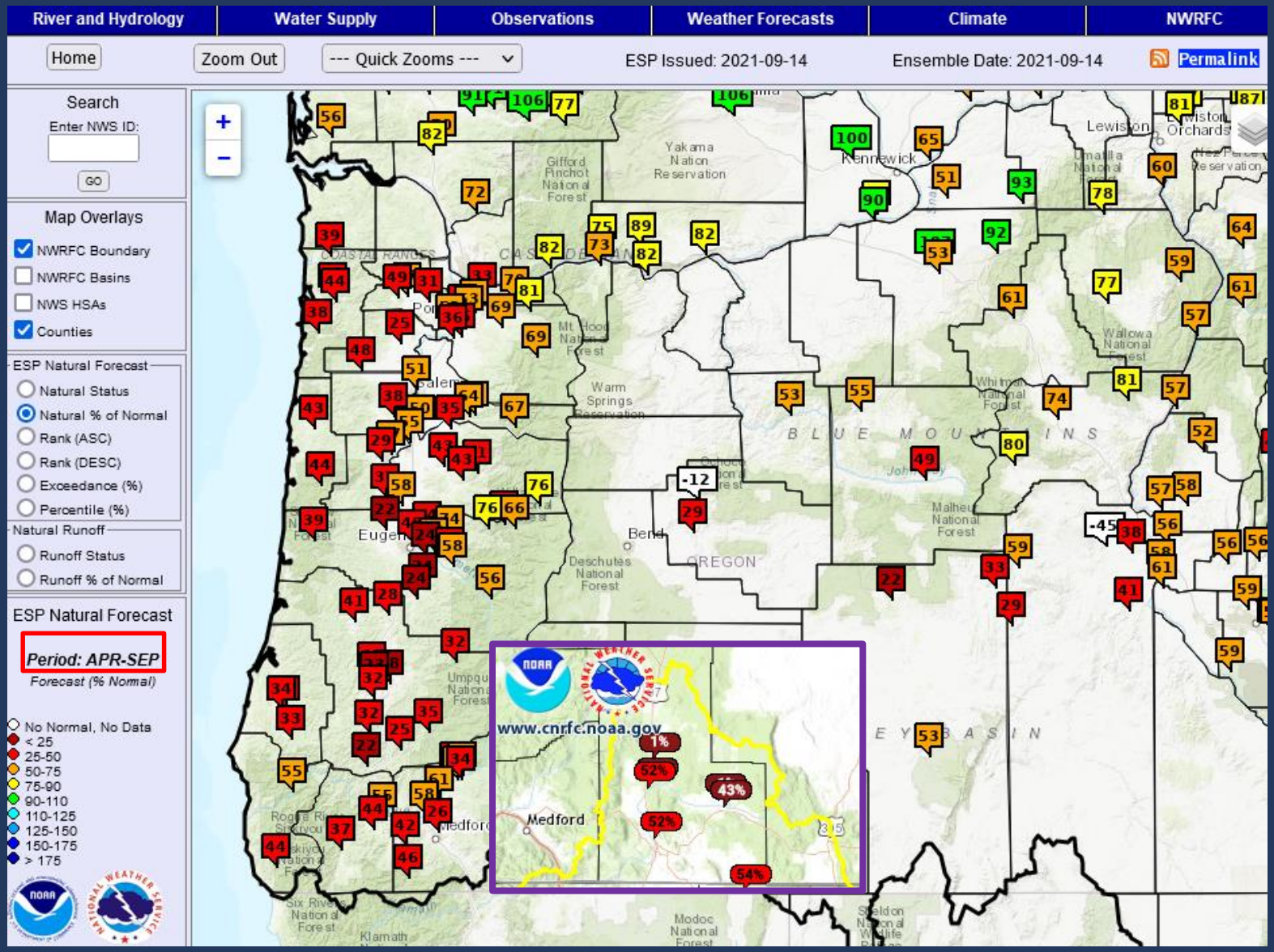






Prior WY Volume Runoff + Forecast

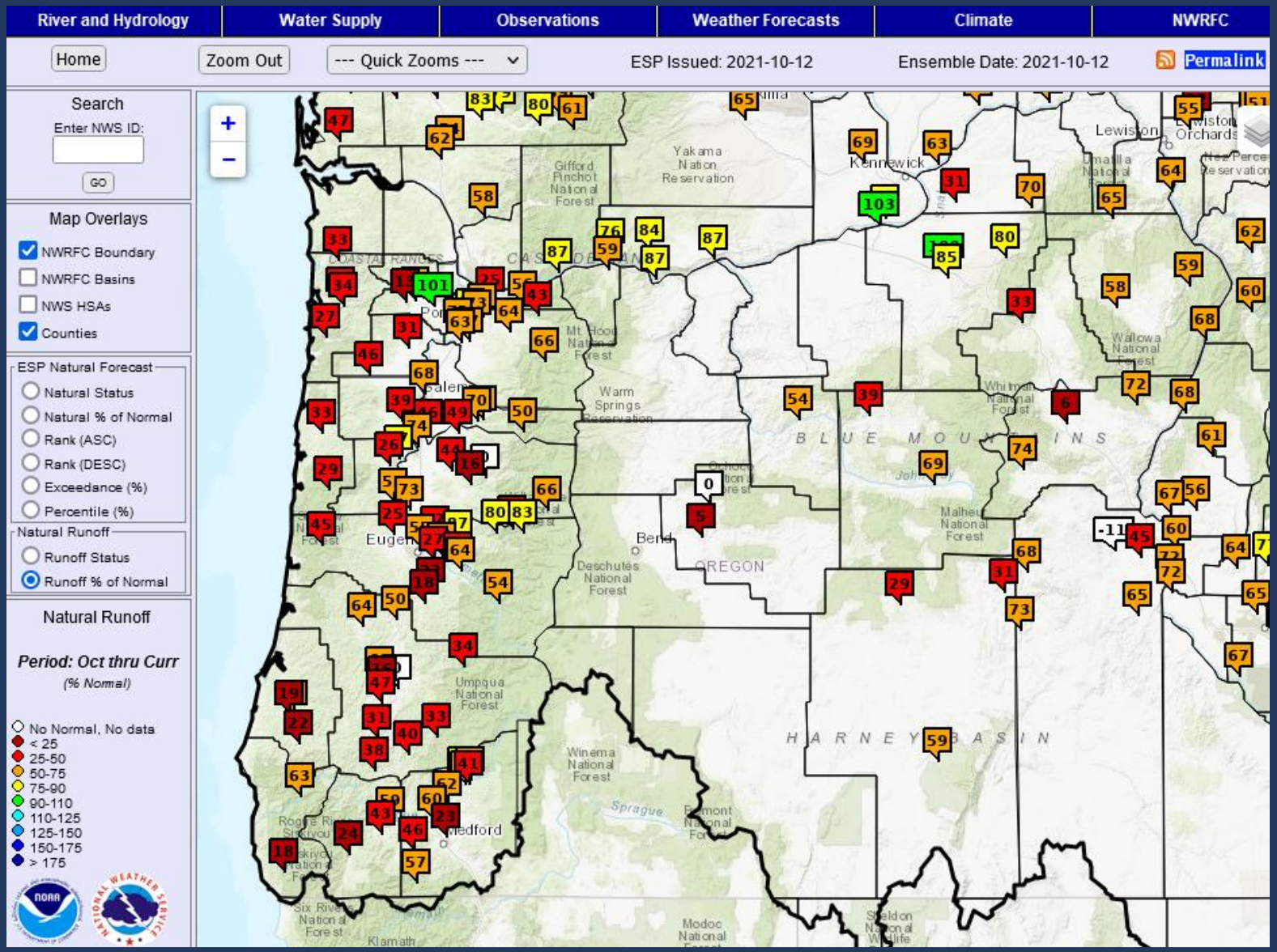
April – September ESP Natural - % of Average on Sep 14



https://www.nwrfc.noaa.gov/natural/index.html

Current WY Runoff

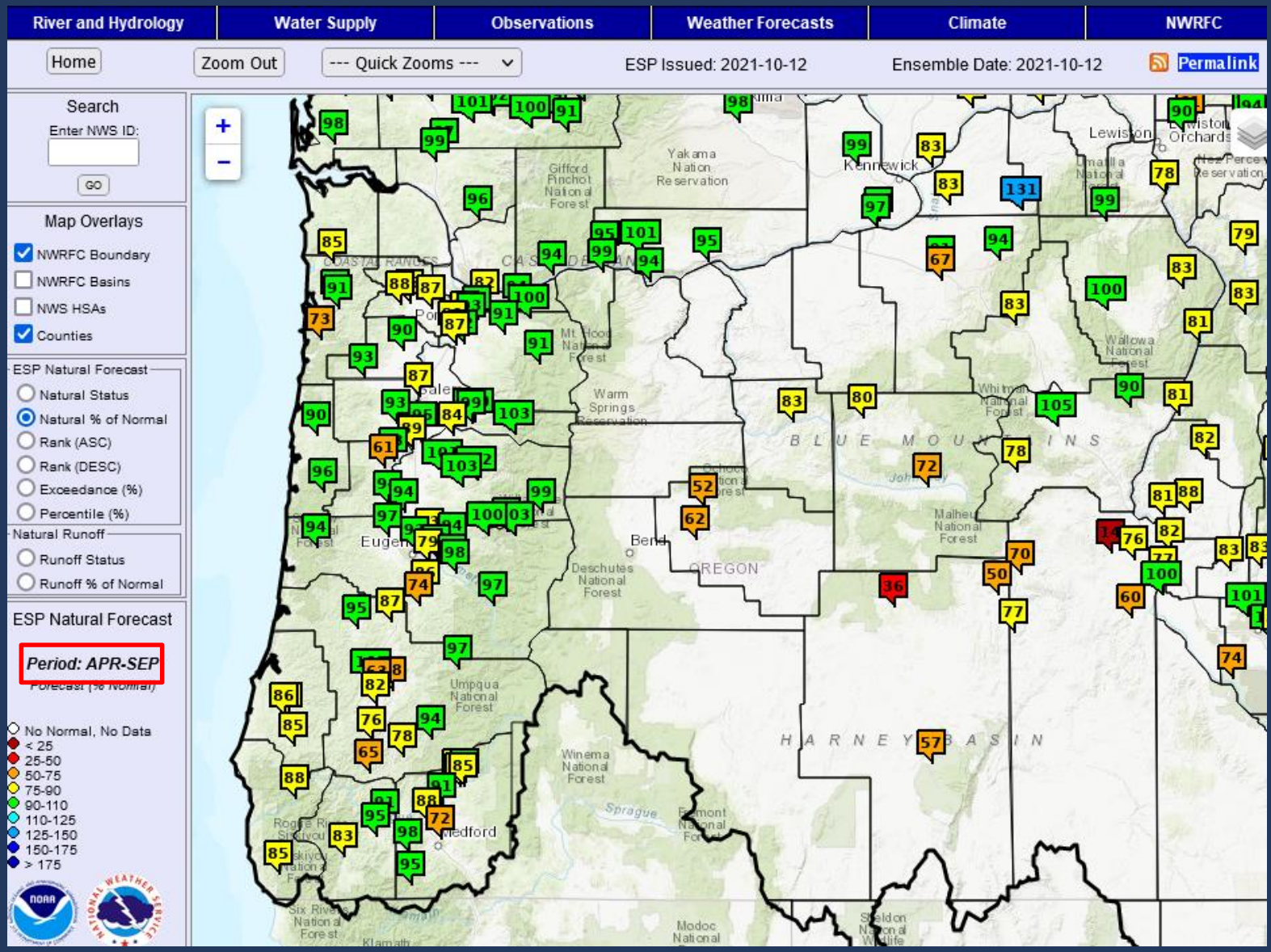
% of Average on Oct 12



https://www.nwrfc.noaa.gov/natural/index.html

Current WY Volume Forecast

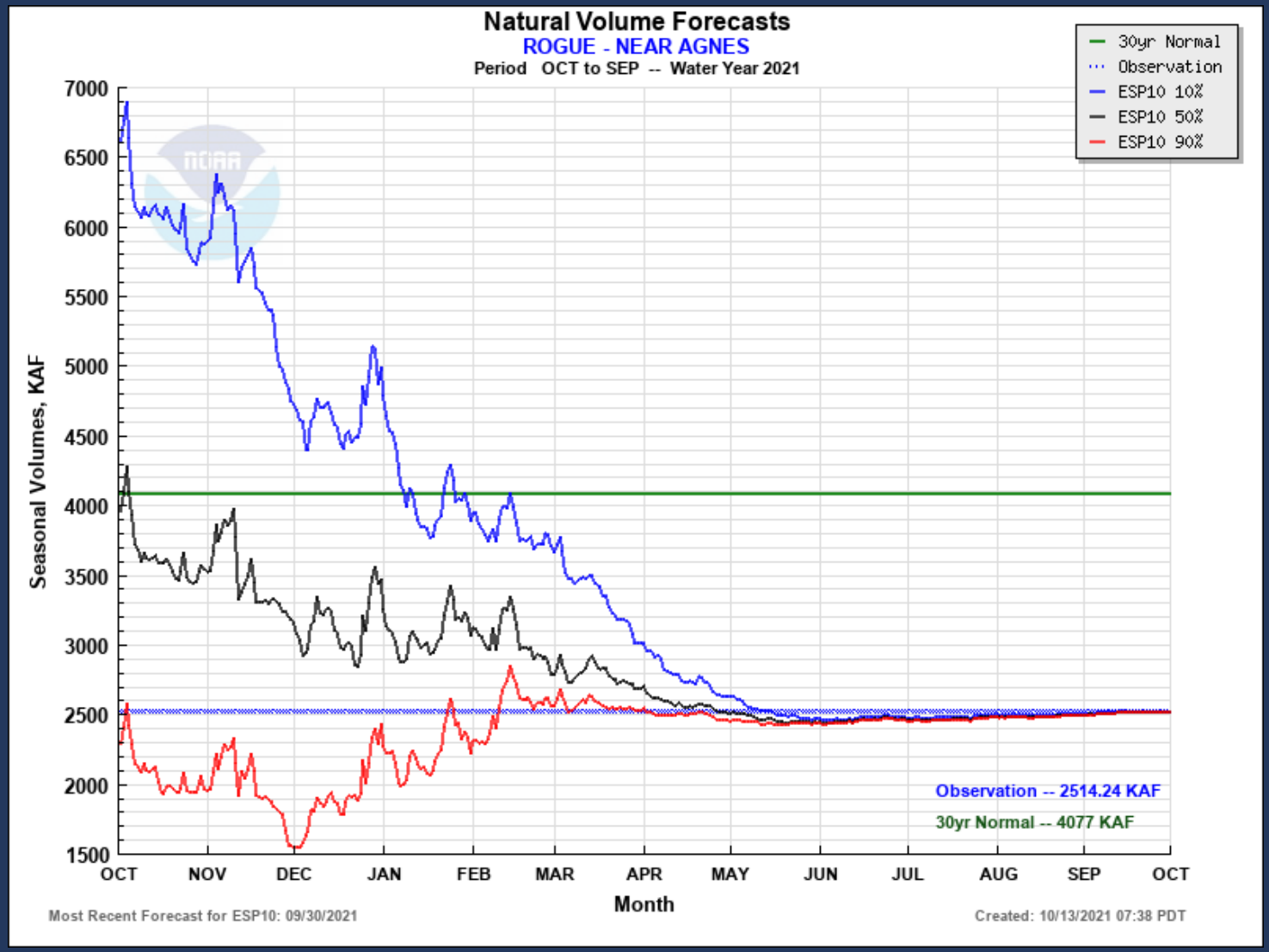
April – September ESP Natural - % of Average on Oct 12



https://www.nwrfc.noaa.gov/natural/index.html

Streamflow Prior WY Volume Forecast

Rogue near Agnes



https://www.nwrfc.noaa.gov/natural/plot/nat_archive.cgi?id=AGNO3&wy=2021

Streamflow WY Volume Forecast

Rogue near Agnes

ROGUE - NEAR AGNES (AGNO3)
Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

Forecast Period	Forecasts Are in KAF 90 %	50 %	% Average	10 %	30 Year Average (1981-2010)
APR-SEP	655	1163	88	1947	1329
APR-JUL	544	1005	87	1734	1158
JAN-SEP	1638	2882	92	4475	3132
JAN-JUL	1522	2718	92	4275	2961
OCT-SEP	2085	3436	84	6067	4077

Experimental Water Supply

HEFS with 15 days EQPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

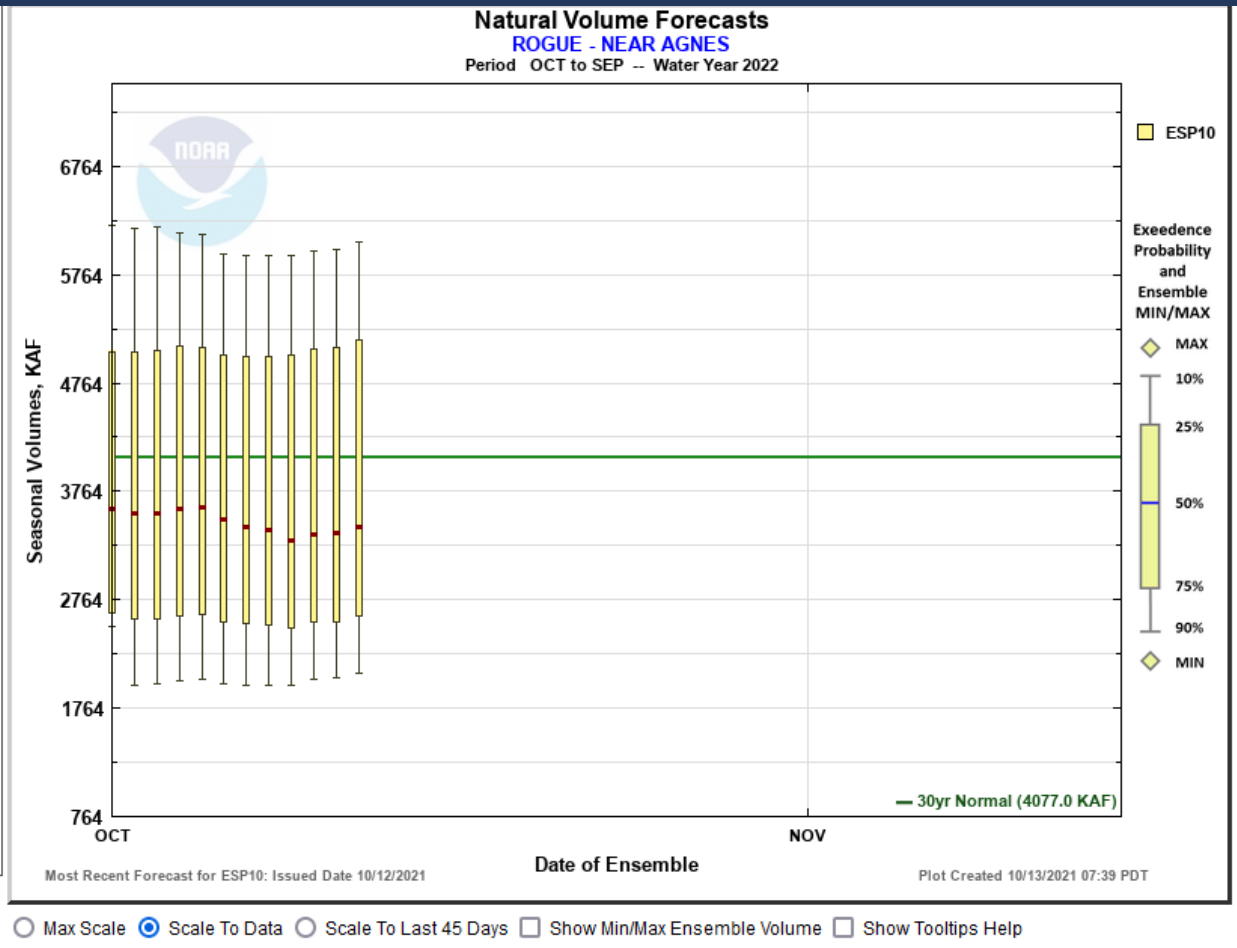
APR-SEP	670	1192	90	1978	1329
APR-JUL	556	1023	88	1761	1158
JAN-SEP	1665	2973	95	4475	3132
JAN-JUL	1544	2806	95	4287	2961
OCT-SEP	2128	3634	89	6138	4077

Reference

ESP with 0 Days QPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

APR-SEP	656	1170	88	1933	1329
APR-JUL	544	1012	87	1721	1158
JAN-SEP	1647	2926	93	4451	3132
JAN-JUL	1531	2758	93	4252	2961
OCT-SEP	1994	3563	87	6199	4077

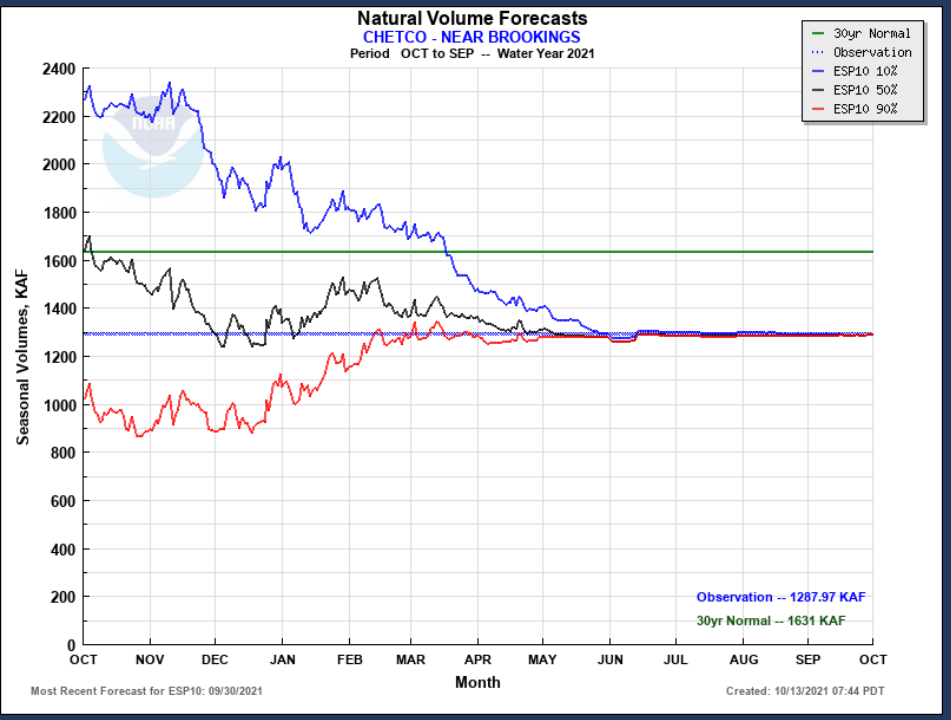
Move the mouse over the desired "Forecast Period" to display a graph.

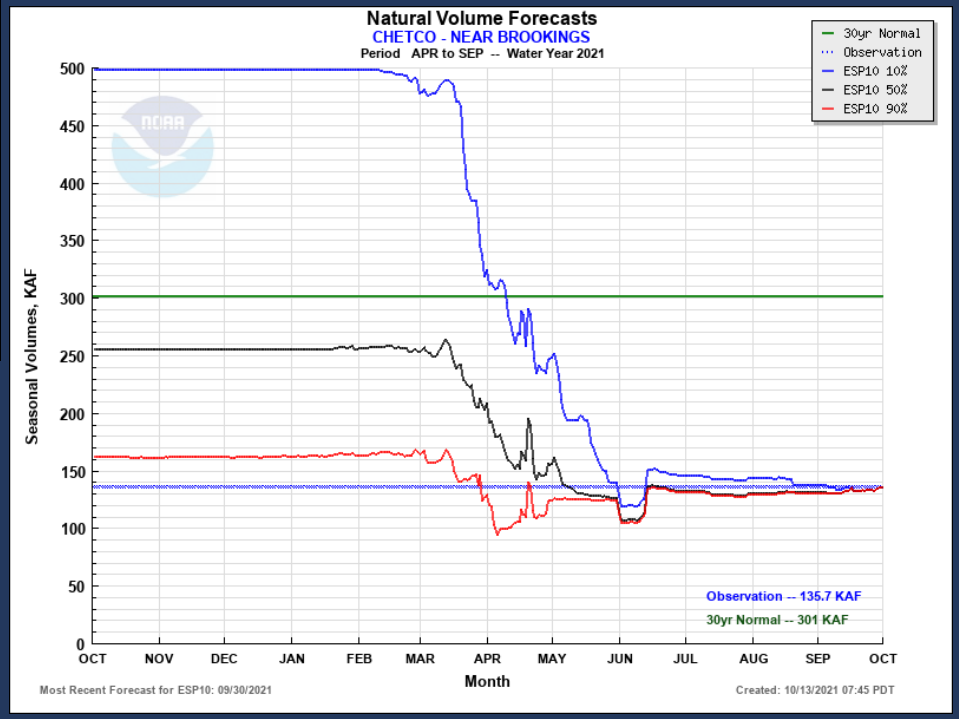


https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=AGNO3

Streamflow Prior WY + Seasonal Volume Forecast

Chetco Near Brookings





https://www.nwrfc.noaa.gov/natural/plot/nat_archive.cgi?id=CHTO3&wy=2021

Streamflow WY Volume Forecast

Chetco near Brookings

CHETCO - NEAR BROOKINGS (CHTO3)
Forecasts for Water Year 2022

Official Water Supply

ESP with 10 Days QPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	150	255	85	492	301
APR-JUL	140	242	85	473	286
JAN-SEP	652	973	90	1556	1084
JAN-JUL	642	959	90	1543	1070
OCT-SEP	982	1617	99	2245	1631

Experimental Water Supply

HEFS with 15 days EQPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

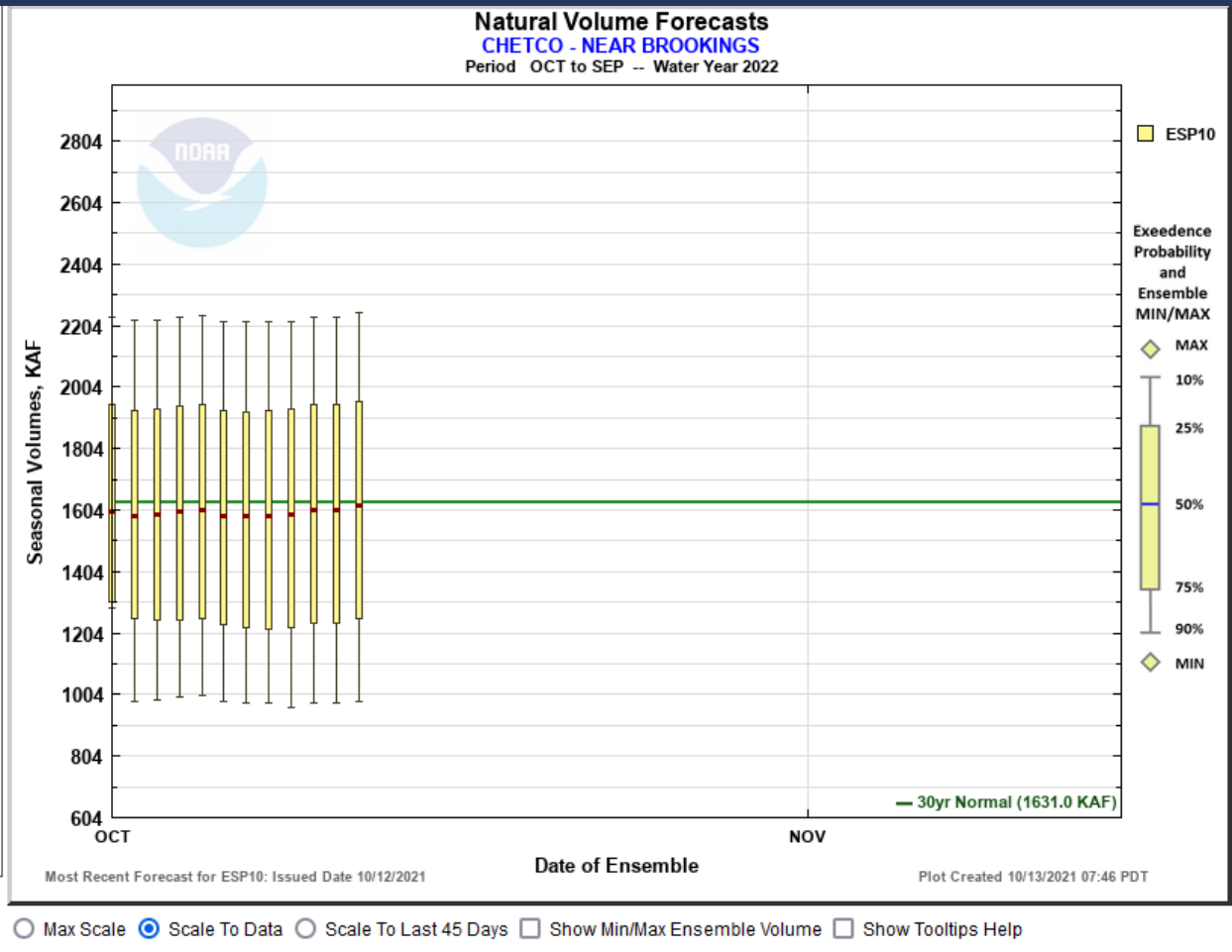
APR-SEP	150	255	85	492	301
APR-JUL	140	242	85	473	286
JAN-SEP	652	976	90	1555	1084
JAN-JUL	641	955	89	1543	1070
OCT-SEP	1032	1642	101	2256	1631

Reference

ESP with 0 Days QPF ***Ensemble:*** 2021-10-12 ***Issued:*** 2021-10-12

APR-SEP	150	255	85	492	301
APR-JUL	140	242	85	473	286
JAN-SEP	651	971	90	1555	1084
JAN-JUL	641	951	89	1543	1070
OCT-SEP	975	1578	97	2216	1631

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



https://www.nwrfc.noaa.gov/natural/plot/nat_forecasts.php?id=CHTO3

NWRFC Water Supply Briefings Schedule

2022 Schedule for *Live* Water Supply Briefings					
Jan	Feb	Mar	Apr	May	June
6	*3*	*3*	*7*	*5*	*TBD*
All presentations held at 10:00am PDT/PST, unless noted otherwise					
Click here for Registration Information					

https://www.nwrfc.noaa.gov/water_supply/ws_schd.cgi?version=20190204v1

Oregon WSAC/DRC
Drought Status and Climate Updates
October 2021

Larry O'Neill
CEOAS Oregon State University
Oregon Climate Services
State Climatologist of Oregon

Key points:

(1) Although ongoing, the 2020-2021 Oregon drought ranks among the 4 worst in state recorded history alongside 1924, 1931, and 1977

(2) Key drivers of the severity of the drought include record high temperatures which fueled high evaporative demand, a mildly dry fall, a record dry spring and summer, and early meltout of the mountain snowpack

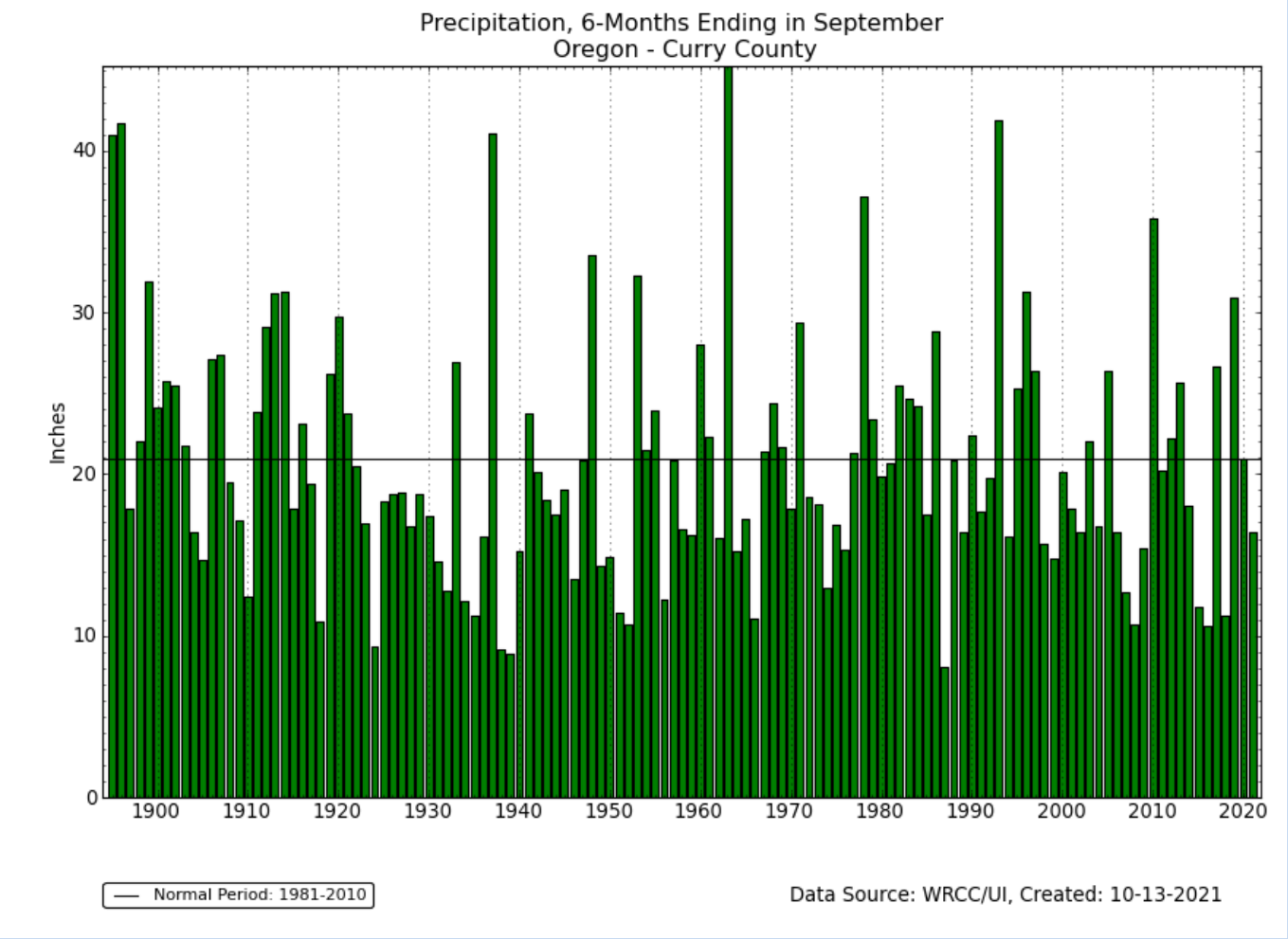
Wickiup Reservoir, August 19, 2021
Image Courtesy of Bend Bulletin

Oregon State University
College of Earth, Ocean, and Atmospheric Sciences

CCCRI

OCS Oregon Climate Service

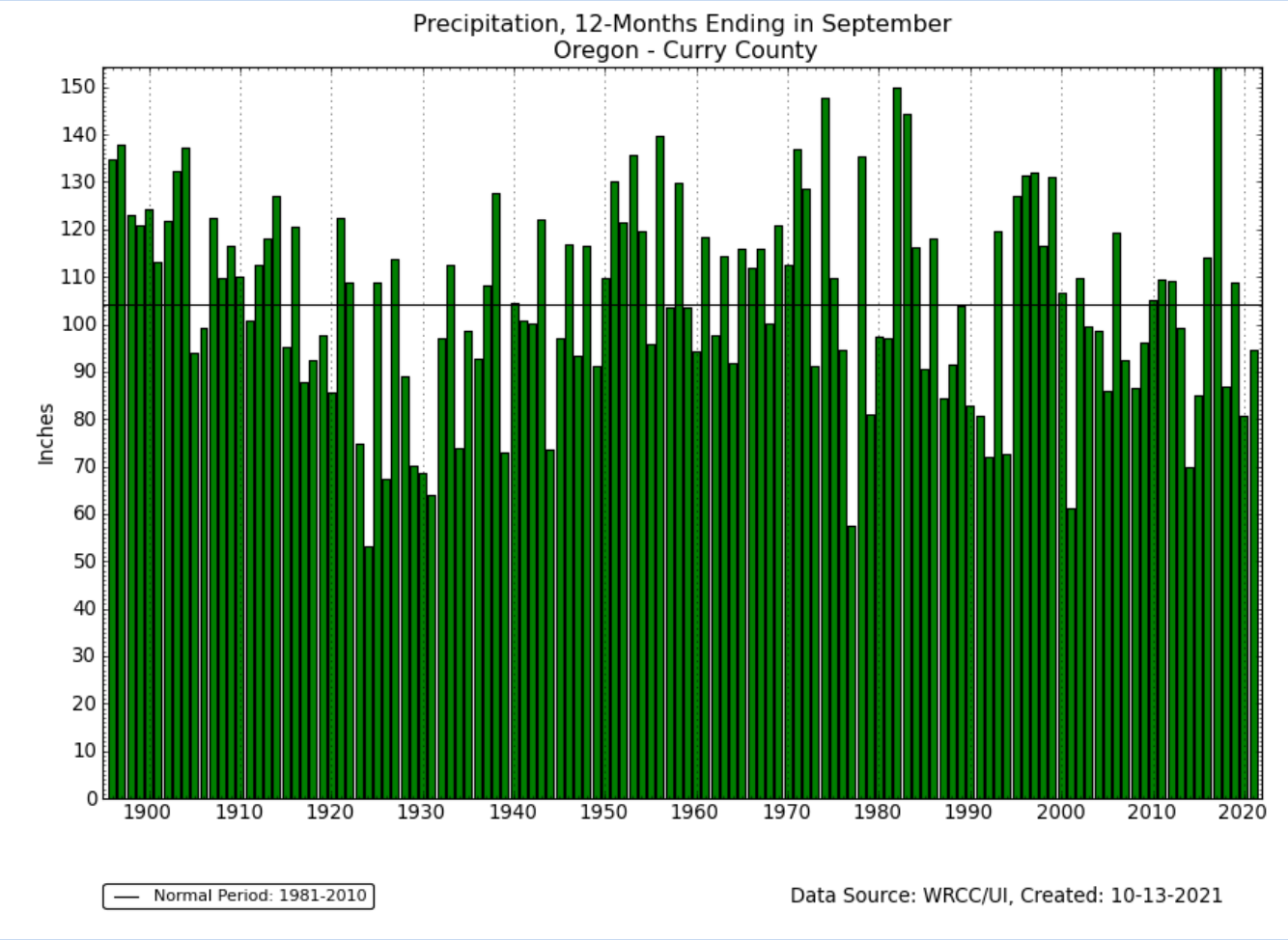
Curry County 6-month precipitation time series



For April-Sept 2021, Curry County total precipitation ranked 31st out of 127 years

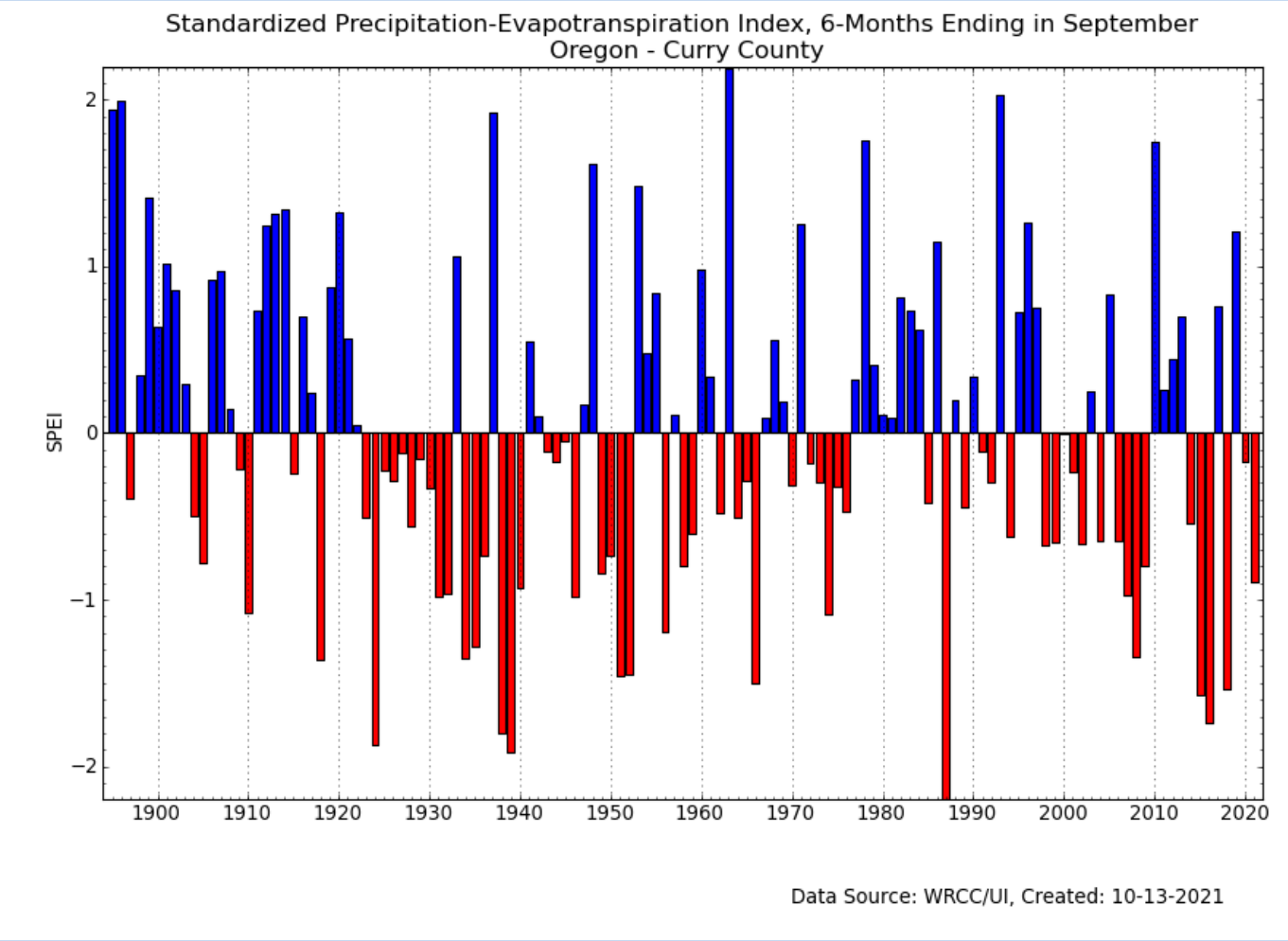
Received 78% of the 1981-2010 average

Curry County WY2021 precipitation



For WY2021, Curry County had 91% of avg precip, ranking 50th out of 127 years

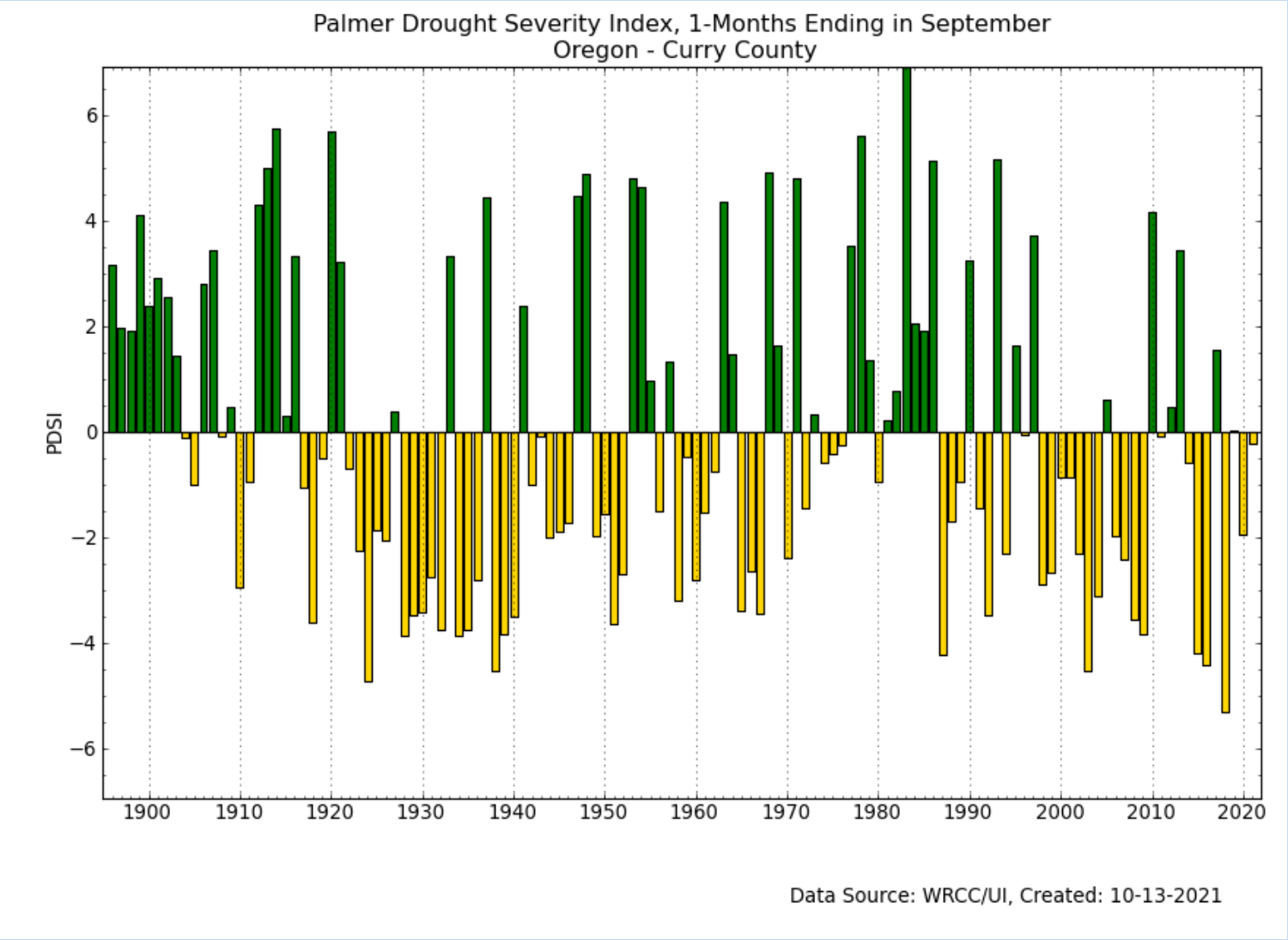
Assessing Curry County drought severity – 6-month SPEI



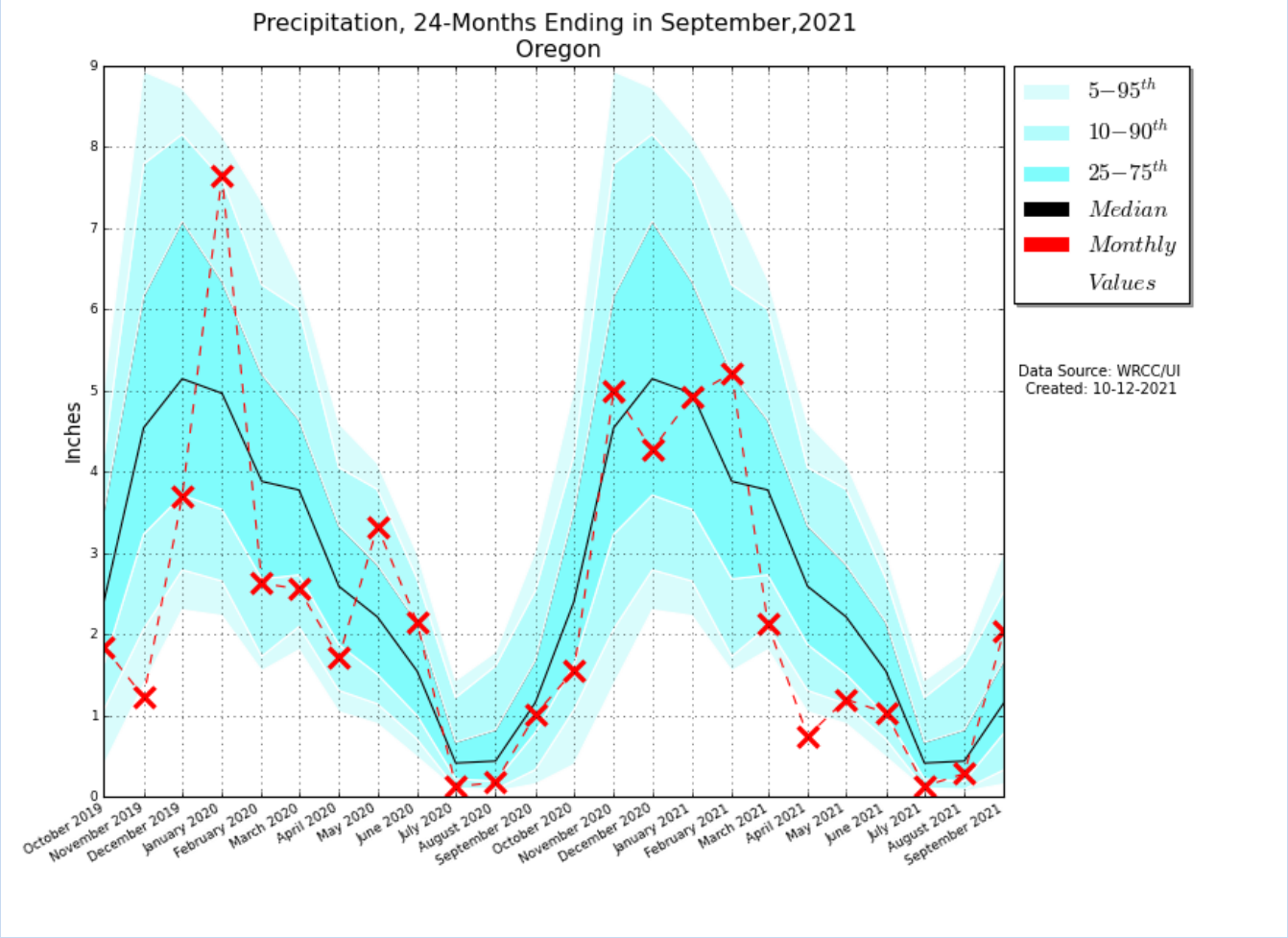
The 6-month SPEI is at -0.9 as of the end of Sept, which is consistent with D1 drought conditions

D1 = moderate drought

Assessing Curry County drought severity – PDSI

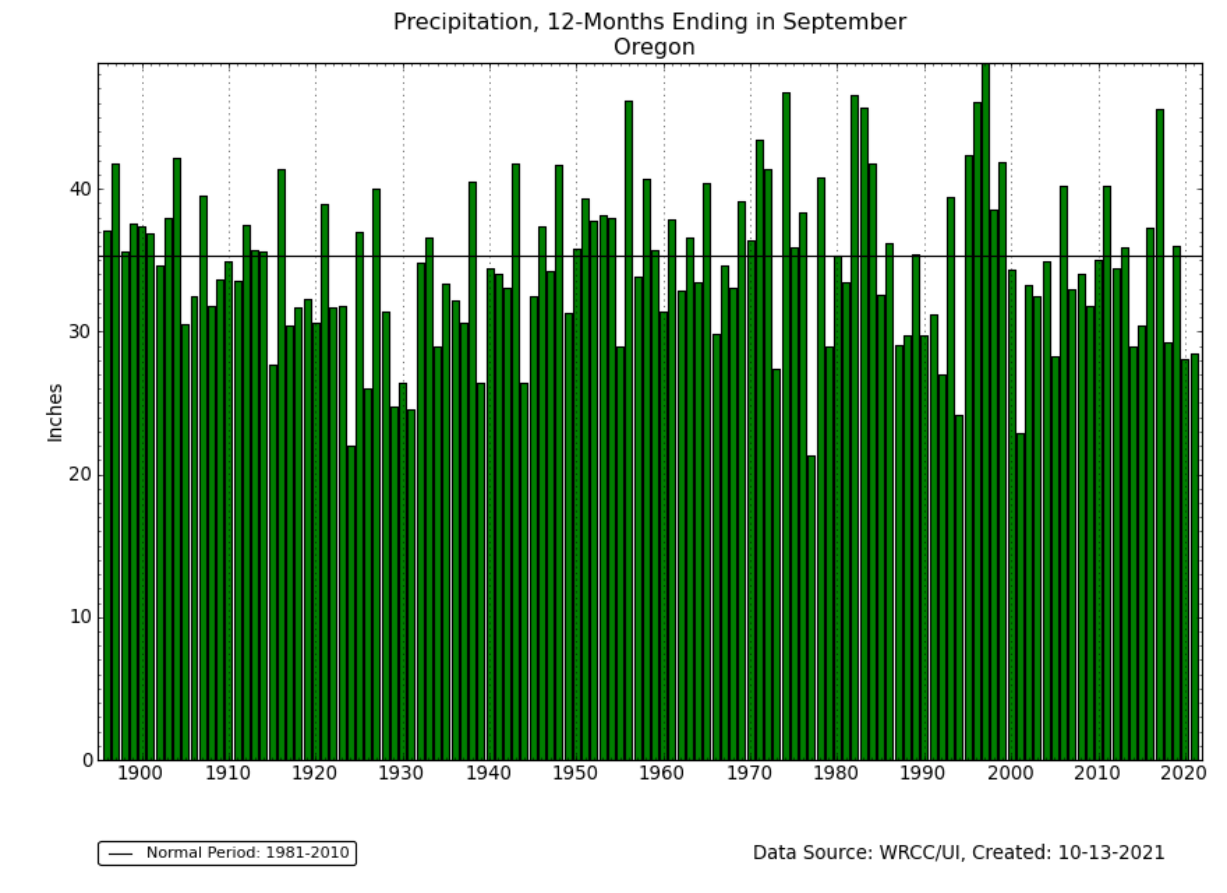


Oregon statewide monthly precipitation for WY2020 and WY2021



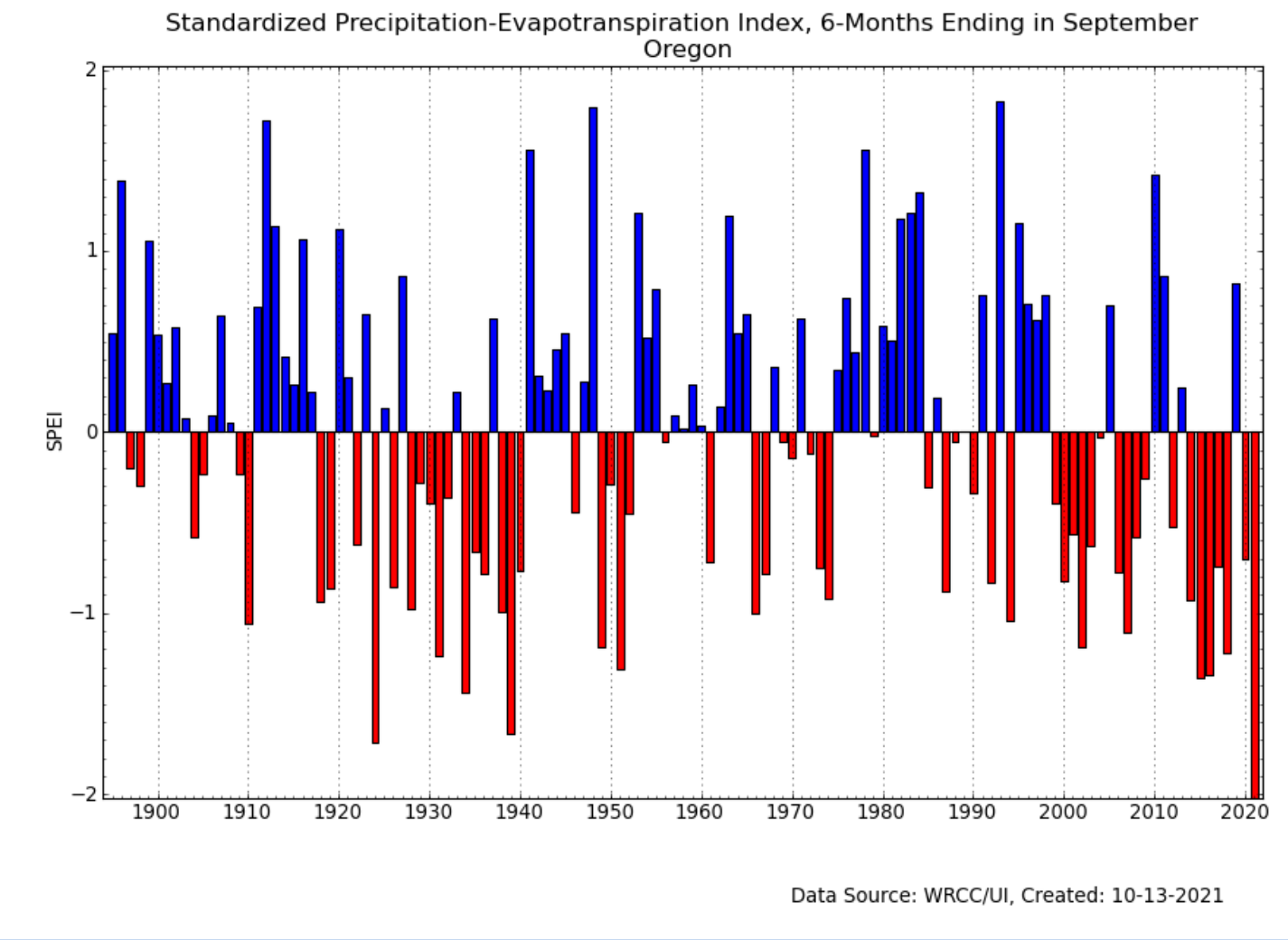
17 out of the last 24 months were below average precipitation statewide.

Oregon WY 2021 Precipitation

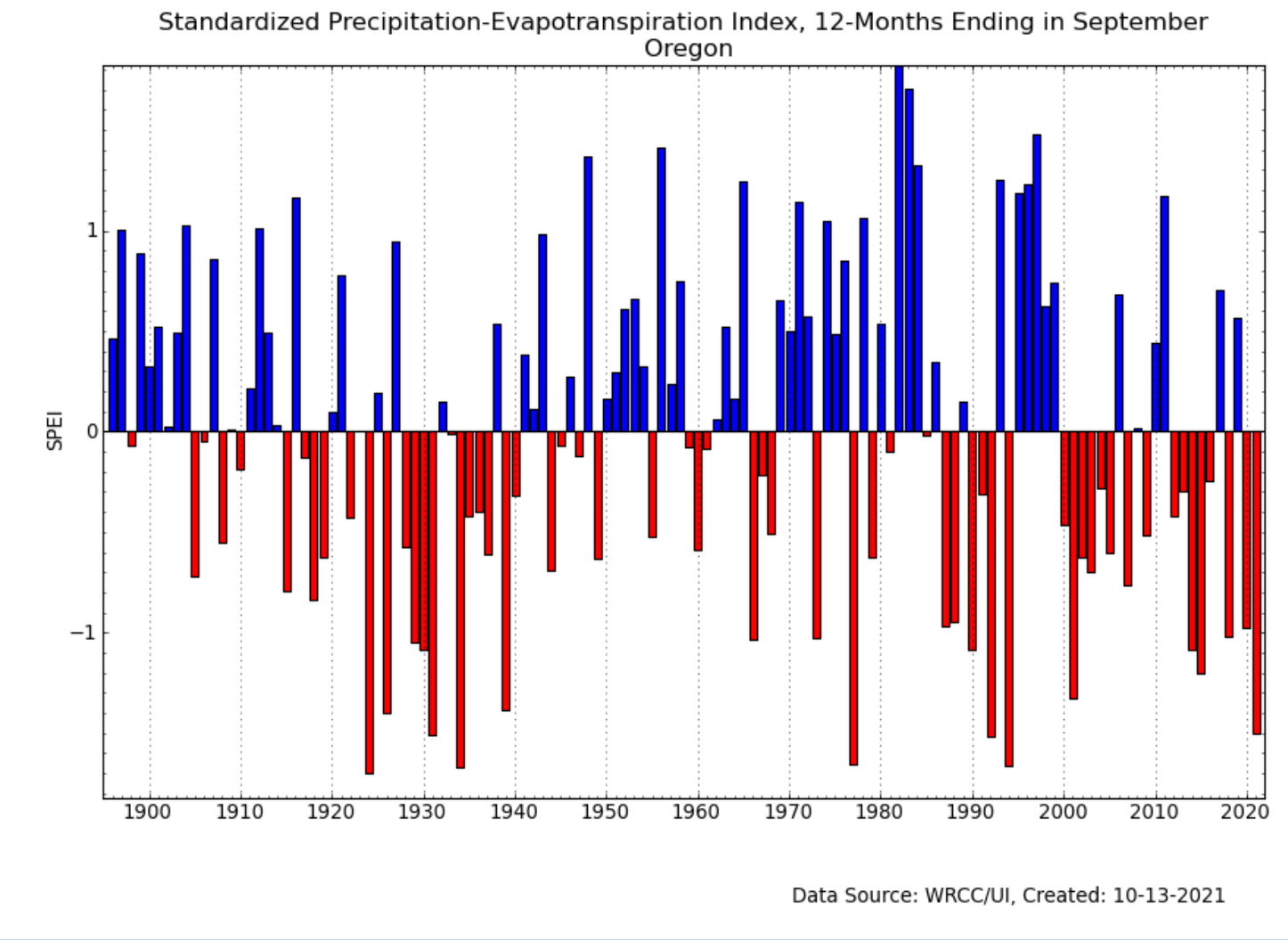


- Oregon received 81% of avg precip for WY2021 (this is preliminary estimate)
- Ranks 14th lowest out of 127 years
- WY2020 was 79% of avg precip

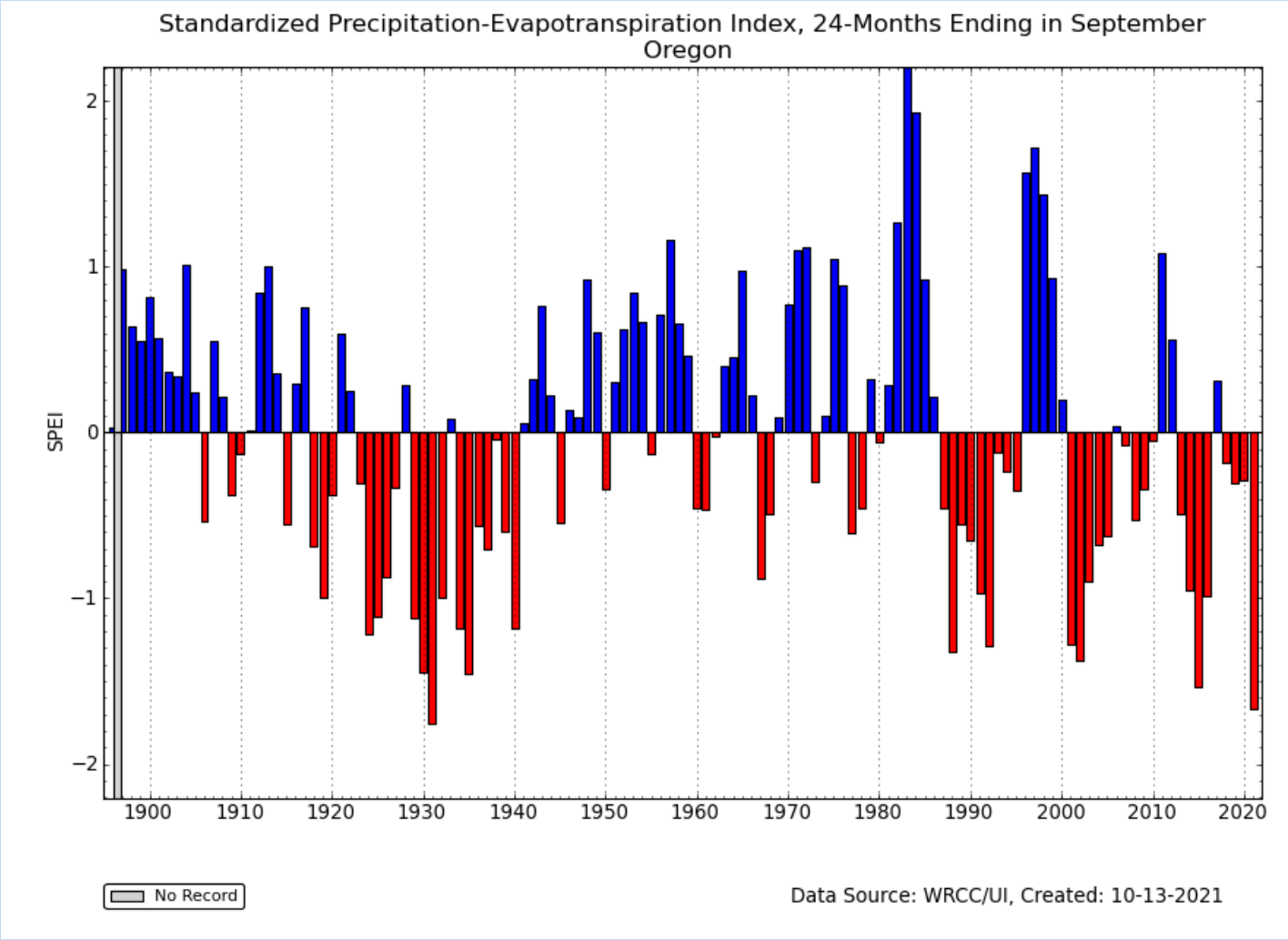
Assessing drought severity
6-month SPEI

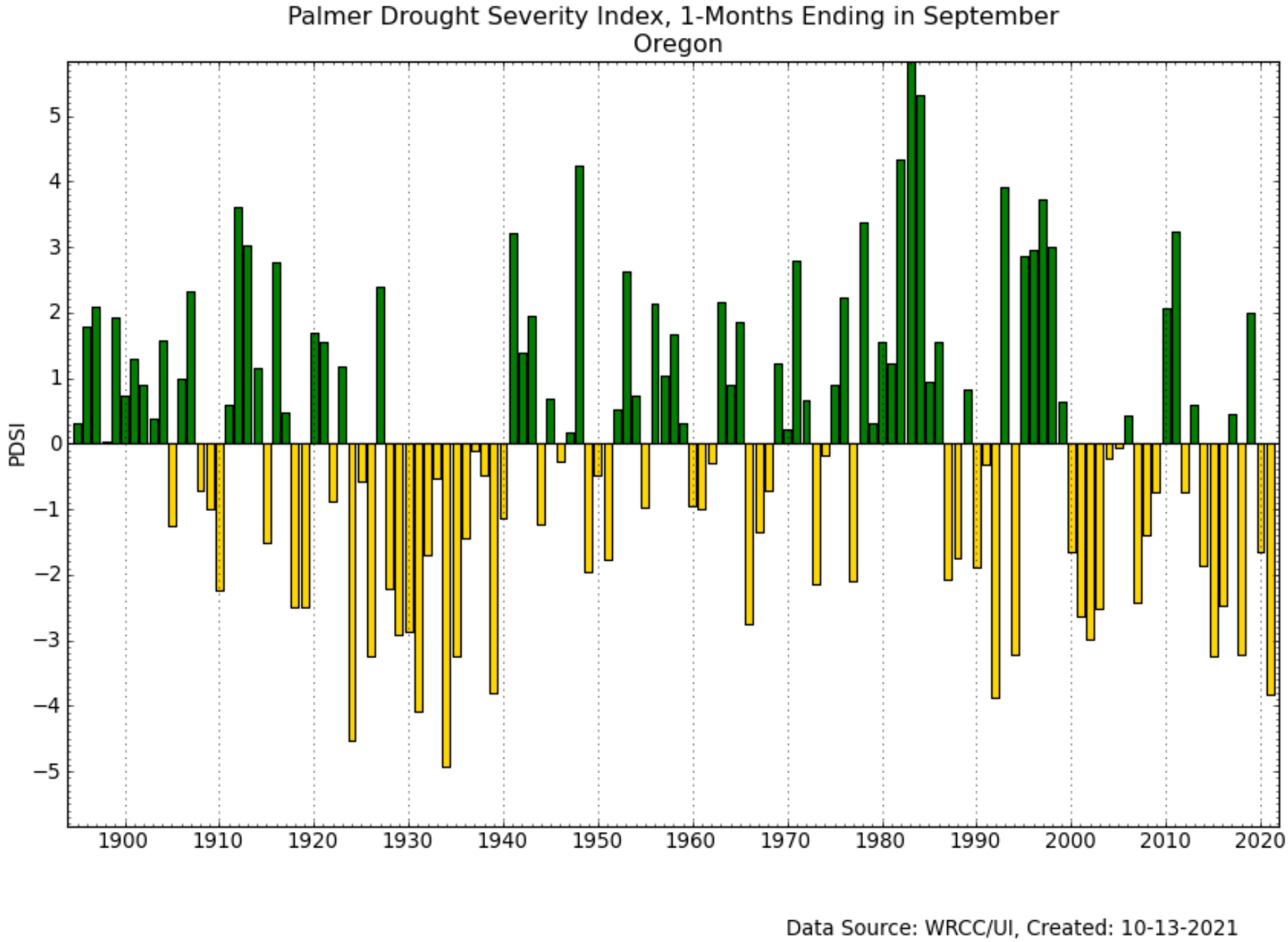


Assessing drought severity
12-month SPEI



Assessing drought severity
24-month SPEI

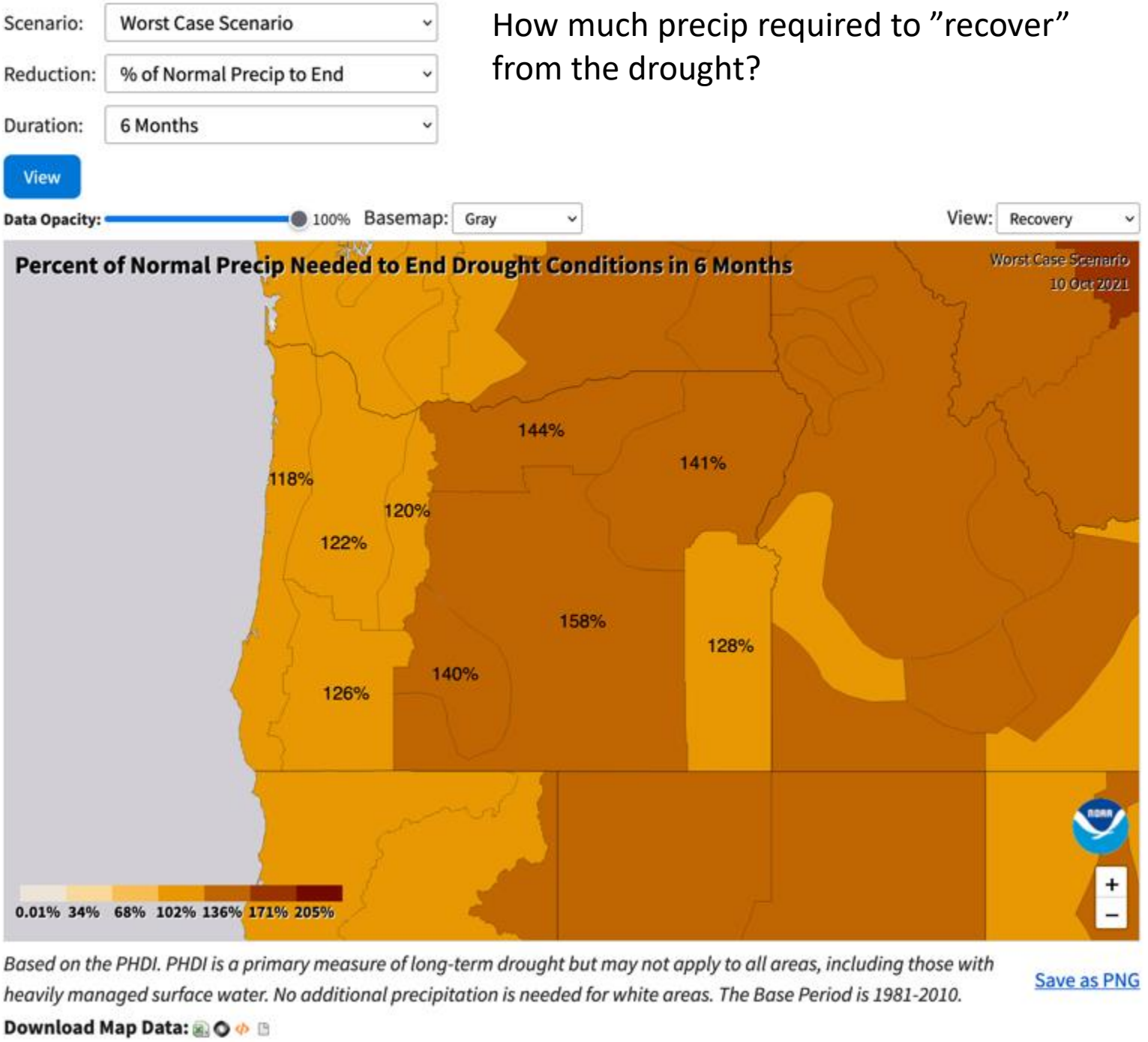



Palmer Drought Severity Index, 1-Months Ending in September
Oregon
PDSI
5
4
3
2
1
0
−1
−2
−3
−4
−5
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Data Source: WRCC/UI, Created: 10-13-2021

% of normal precipitation needed in next 6 months to increase the PHDI to greater than -0.5, which is a threshold for drought

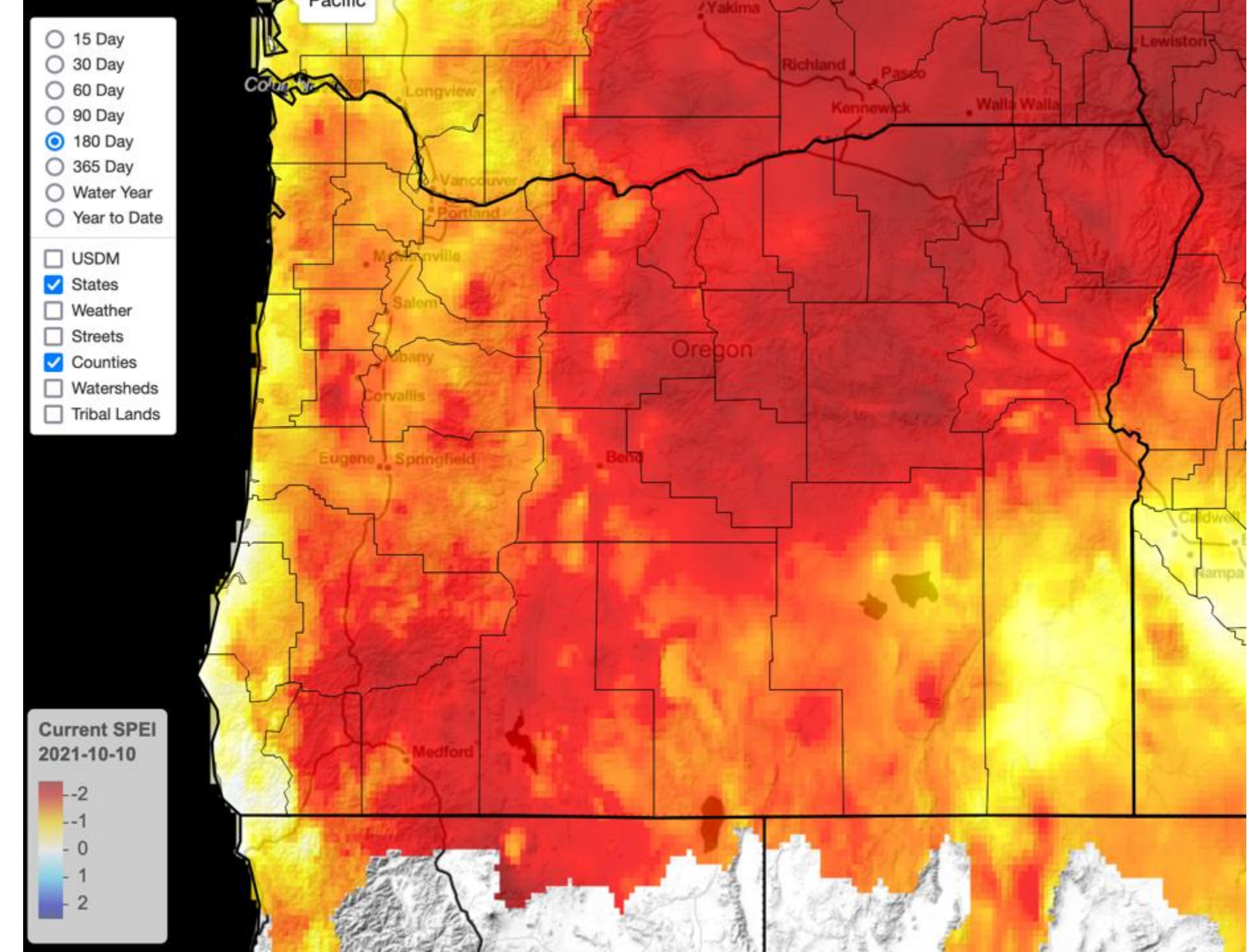
PHDI is similar to the PSDI for Oregon

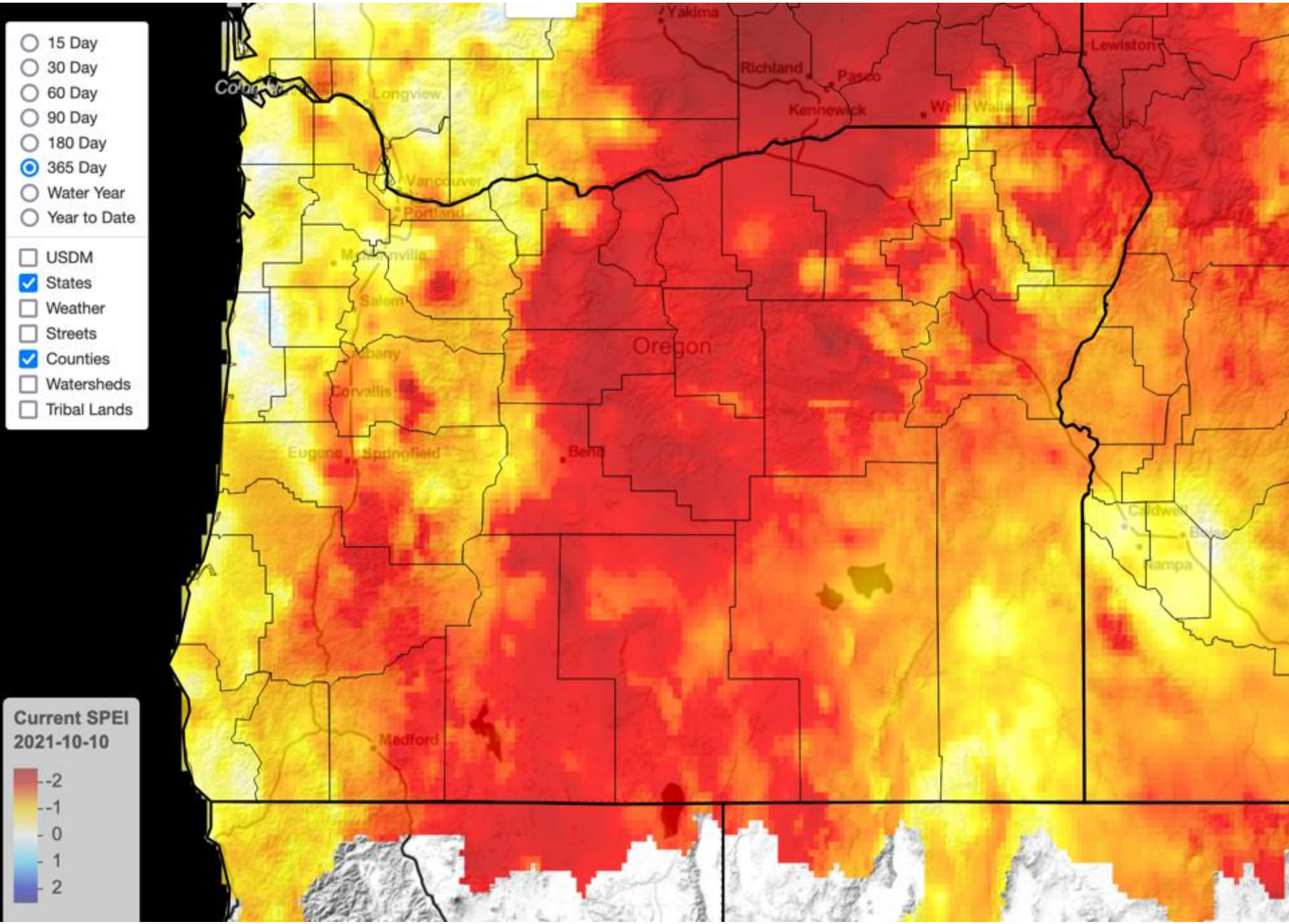
How much precip required to ”recover” from the drought?

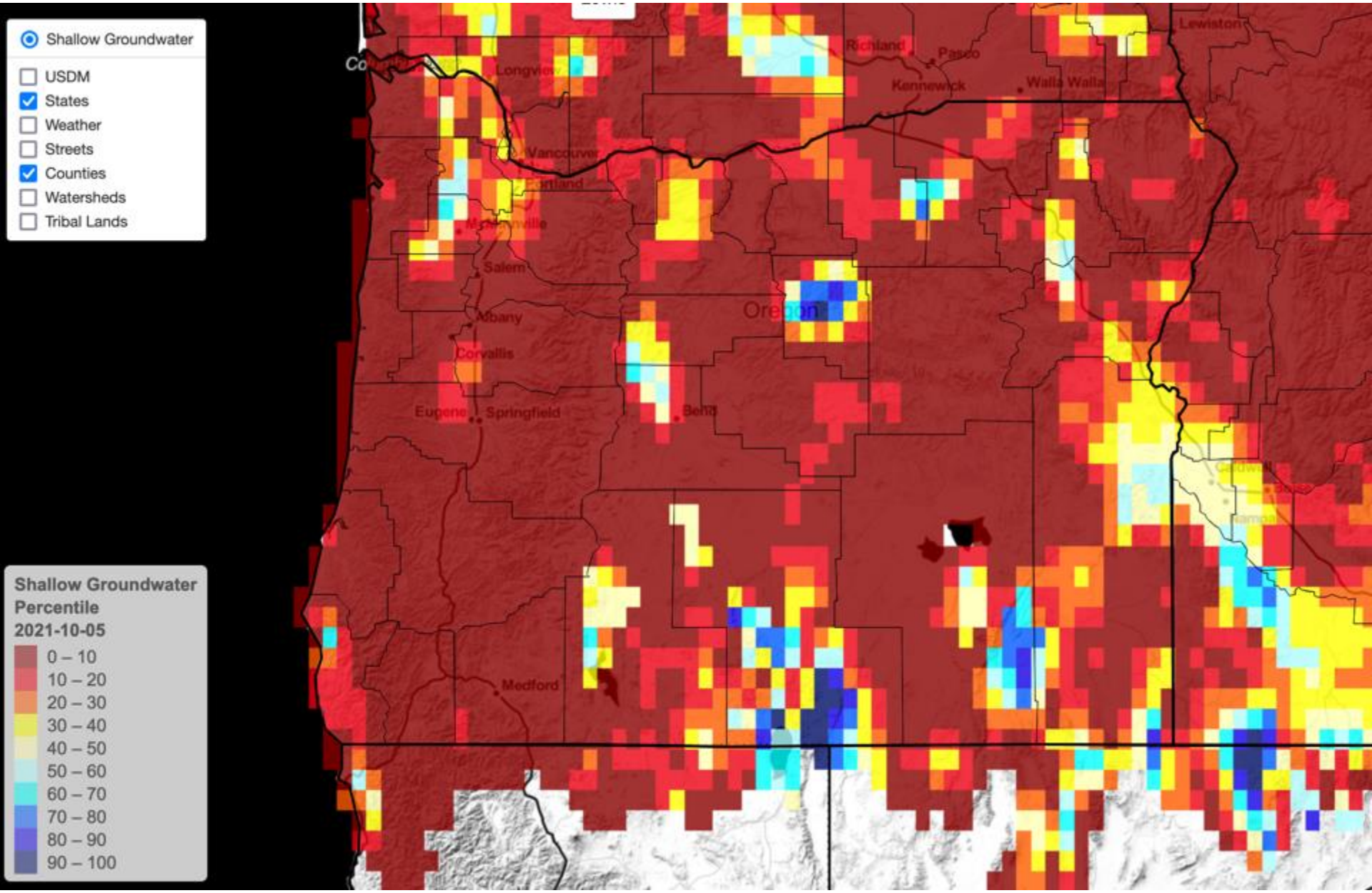


Thoughts on Oregon drought severity

- WY2021 was the second year of a multiyear drought
- Drought metrics show severe drought on medium timescales, particularly Mar-Aug 2021
- Character of the drought affected by early snow meltout
- Streamflows and soil moisture set record lows for most of the summer statewide
- Impacts were more severe this year compared with last year


15 Day
30 Day
60 Day
90 Day
180 Day
365 Day
Water Year
Year to Date
USDM
States
Weather
Streets
Counties
Watersheds
Tribal Lands
Current SPEI
2021-10-10
-2
-1
0
1
2
Pacific
Yakima
Richland
Pasco
Kennewick
Walla Walla
Lewiston
Longview
Vancouver
Portland
McMinnville
Salem
Albany
Corvallis
Eugene
Springfield
Bend
Oregon
Medford
Caldwell
Nampa

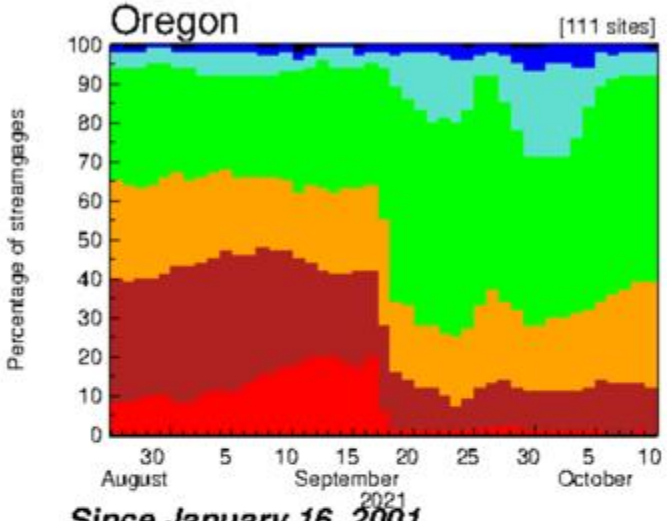

15 Day
30 Day
60 Day
90 Day
180 Day
365 Day
Water Year
Year to Date
USDM
States
Weather
Streets
Counties
Watersheds
Tribal Lands
Current SPEI
2021-10-10
-2
-1
0
1
2
Yakima
Richland
Pasco
Kennewick
Lewiston
Longview
Vancouver
Portland
Salem
Albany
Corvallis
Eugene
Springfield
Bend
Oregon
Medford
Nampa


Shallow Groundwater
USDM
States
Weather
Streets
Counties
Watersheds
Tribal Lands
Shallow Groundwater Percentile
2021-10-05
0 – 10
10 – 20
20 – 30
30 – 40
40 – 50
50 – 60
60 – 70
70 – 80
80 – 90
90 – 100
Richland
Pasco
Kennewick
Walla Walla
Lewiston
Longview
Vancouver
Salem
Albany
Corvallis
Eugene
Springfield
Bend
Medford
Oregon

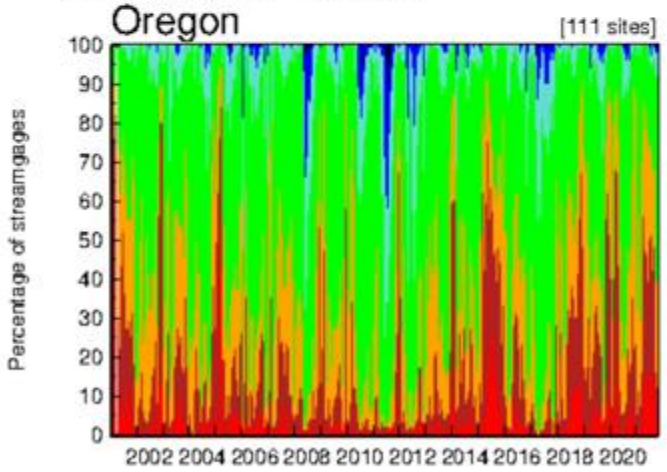
Time series plot of 7-day average streamflow compared to historical streamflow for the day of the year (Oregon)

Oregon or Water-Resources Regions All Days

Last 45 Days



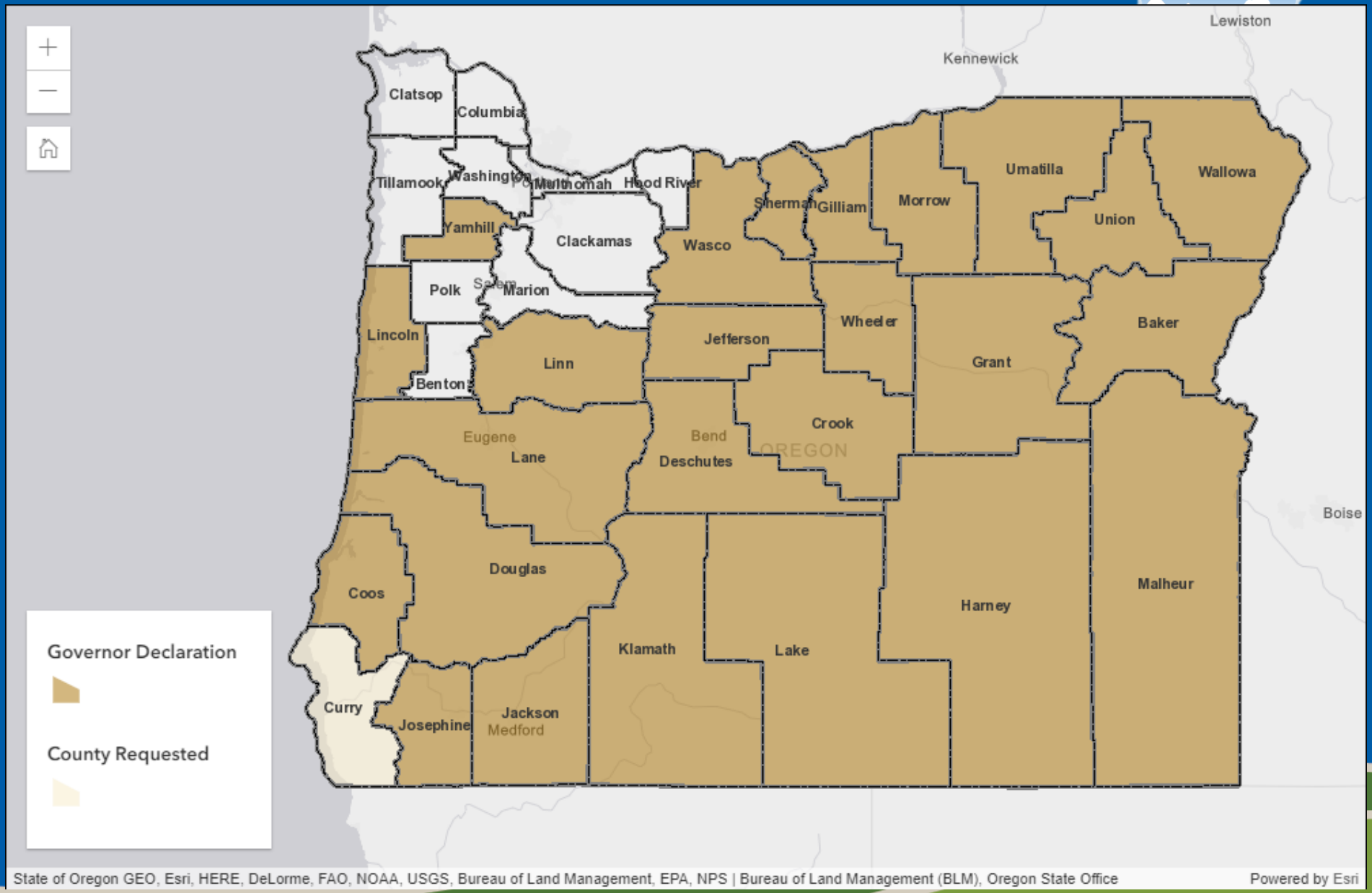
Since January 16, 2001

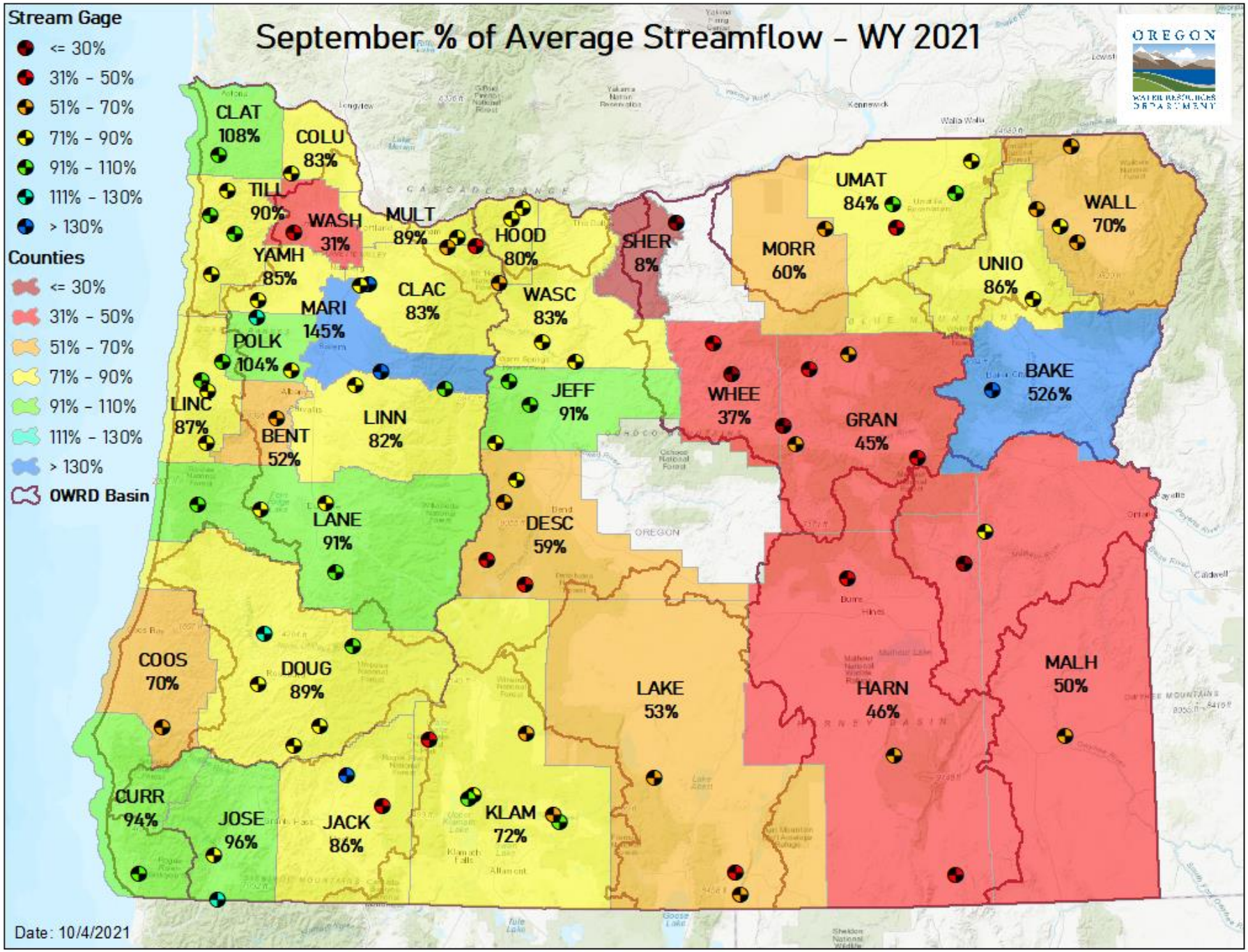


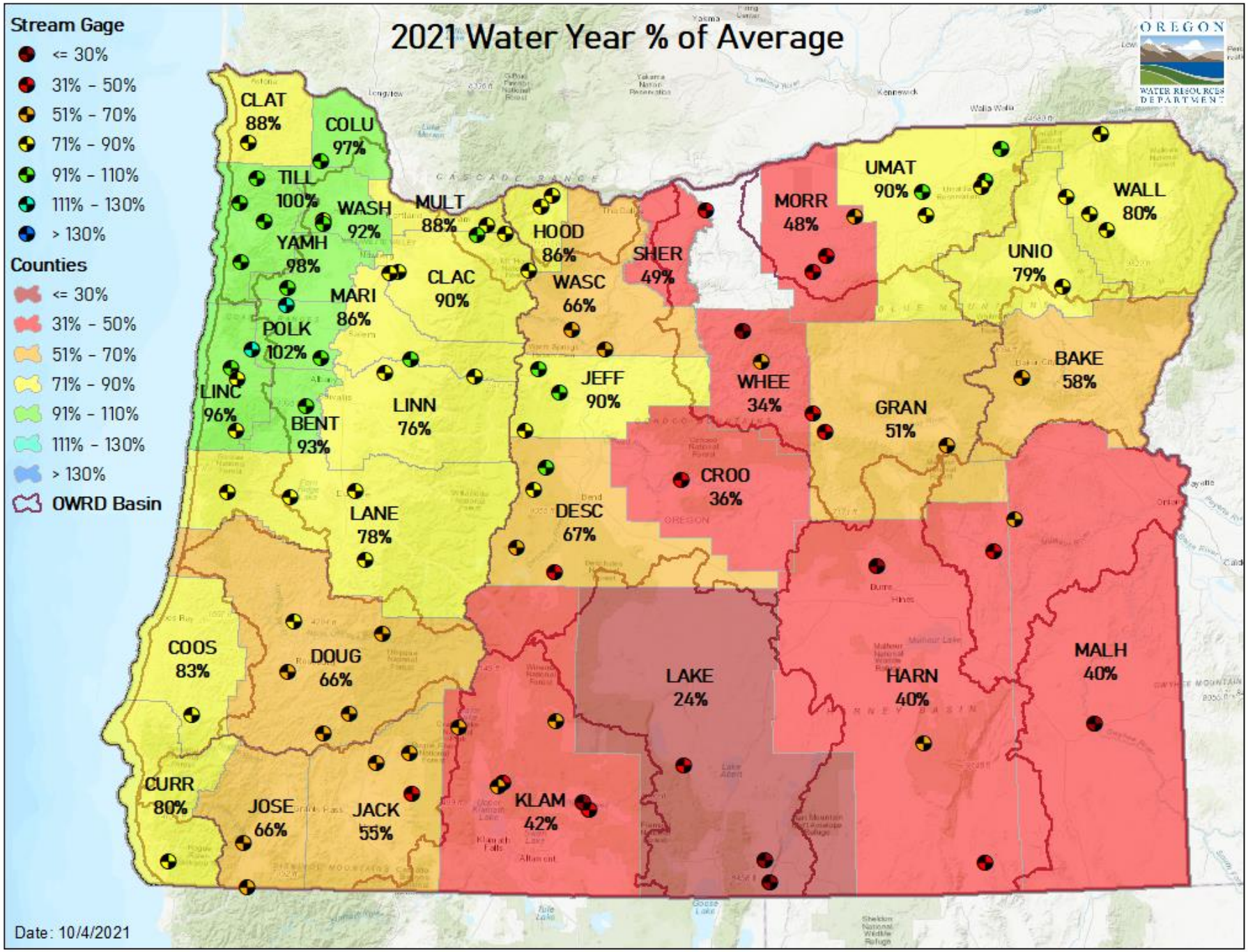
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

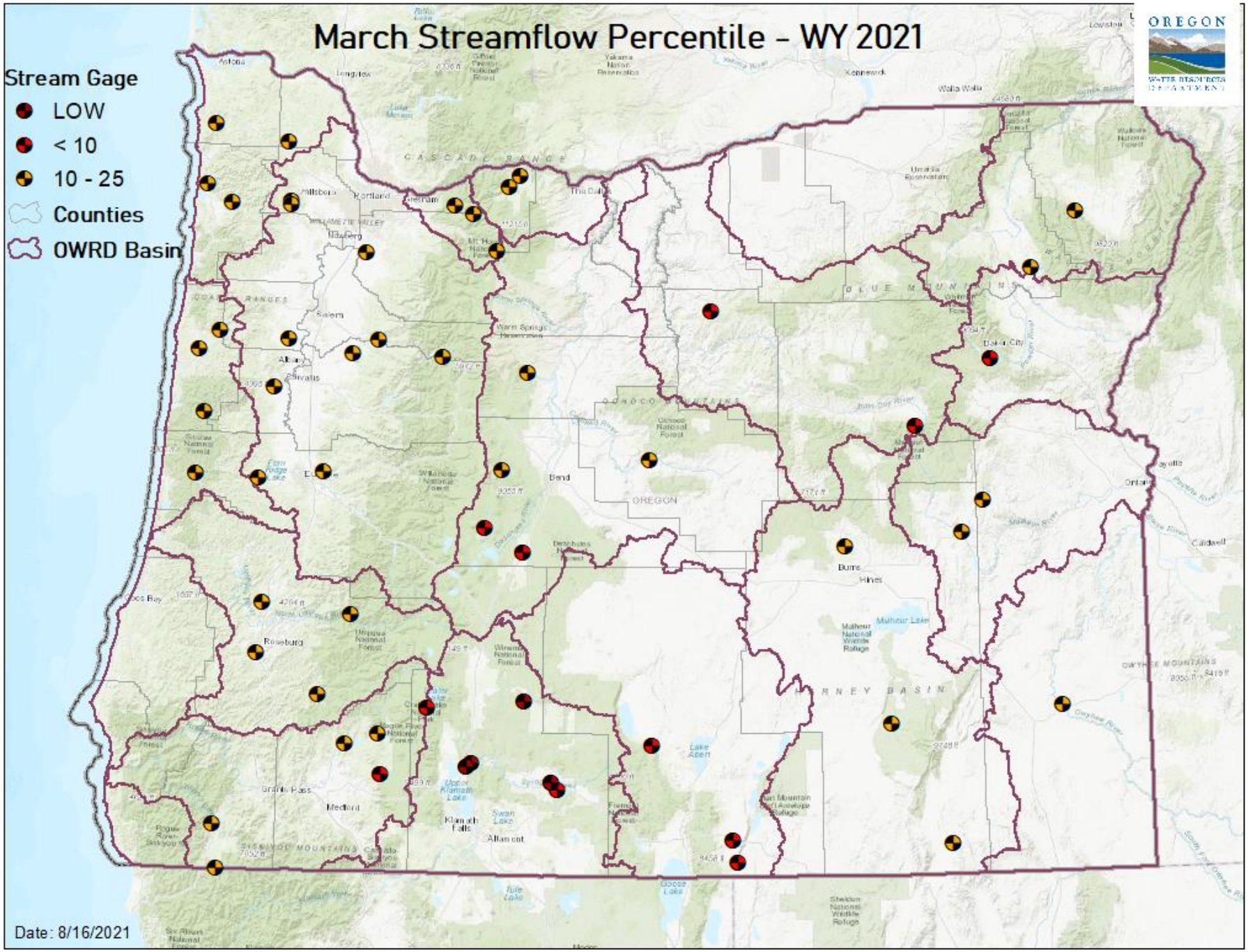
Water Supply Availability Committee
Ryan Andrews
October 13th, 2021

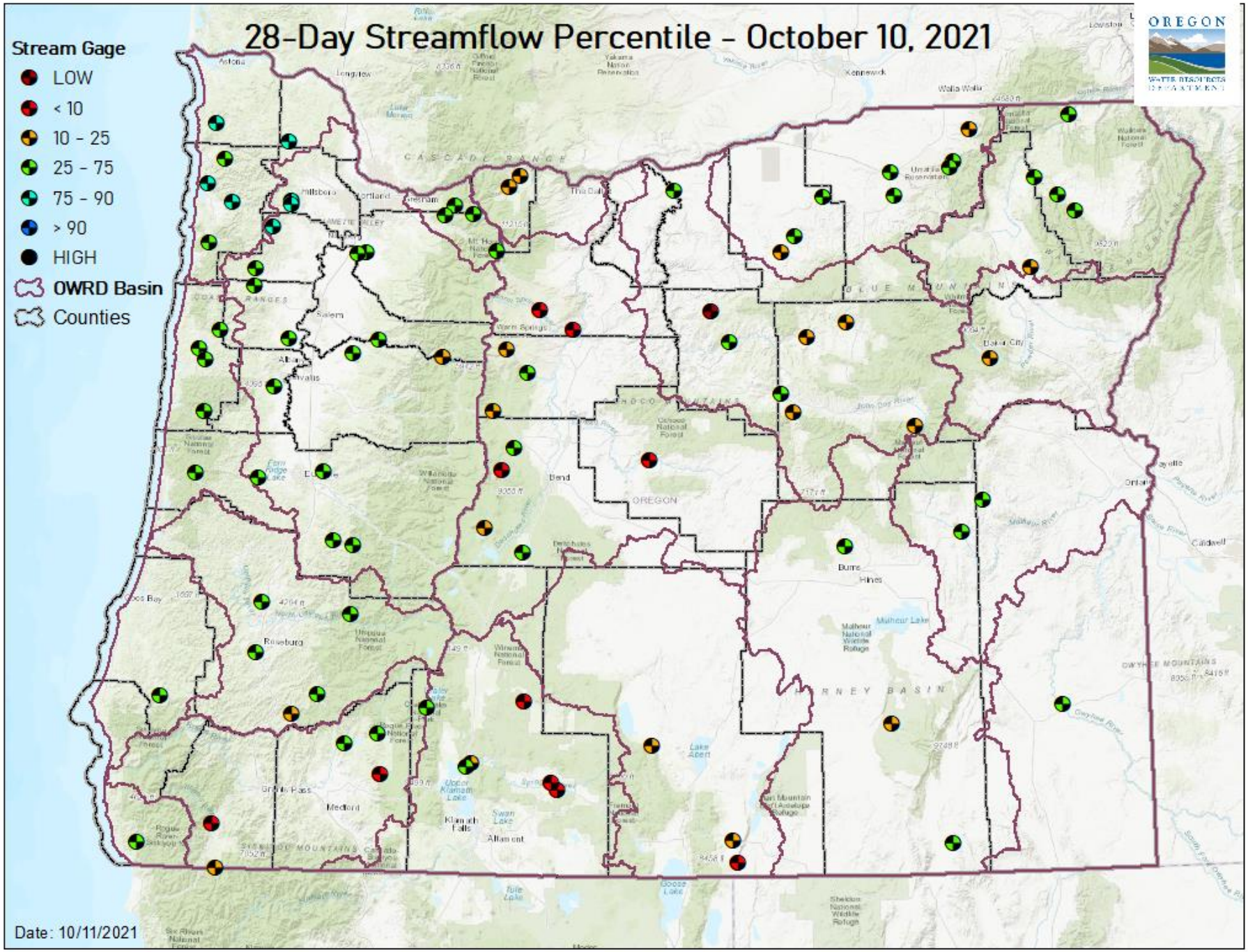
Drought Declaration Status Map

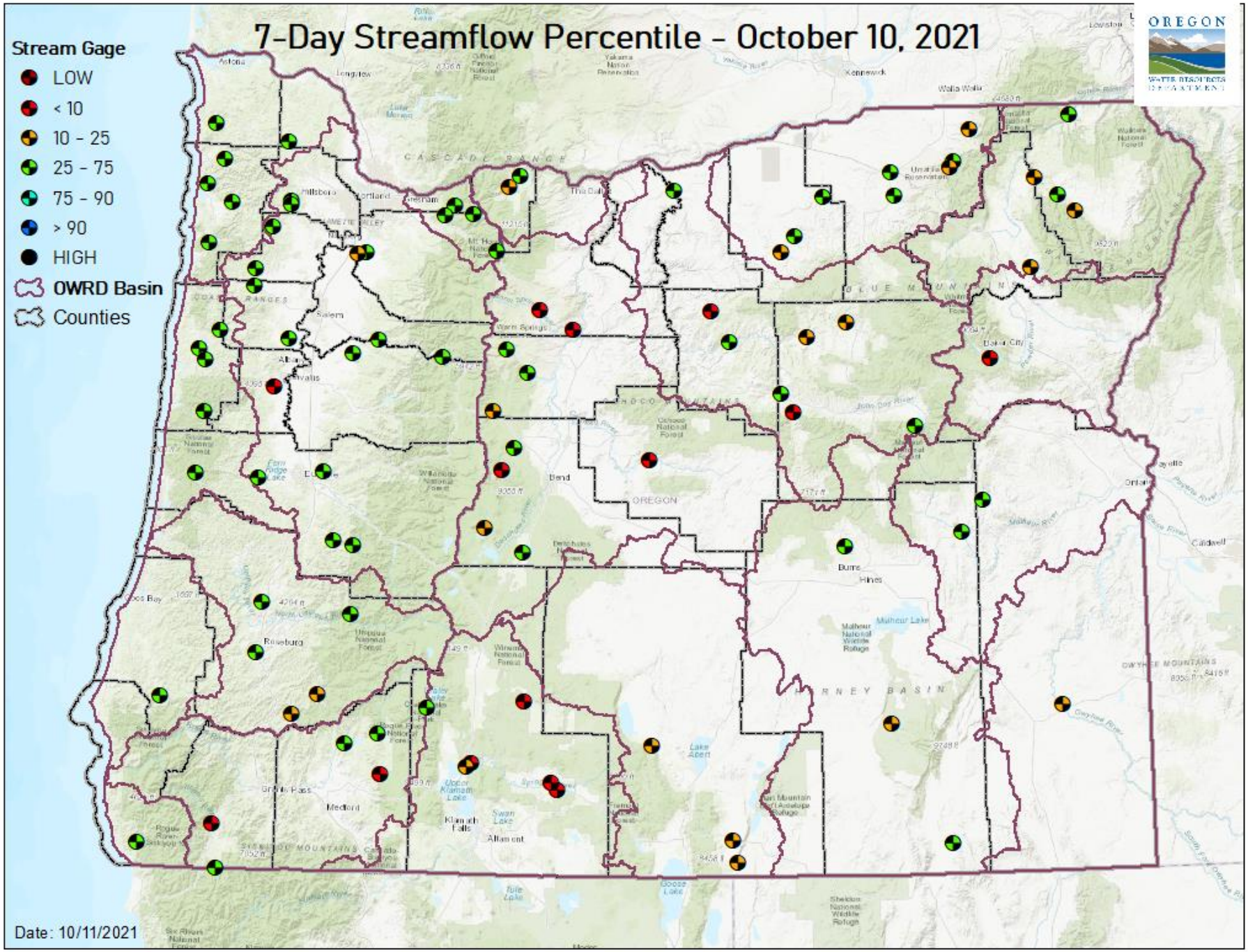


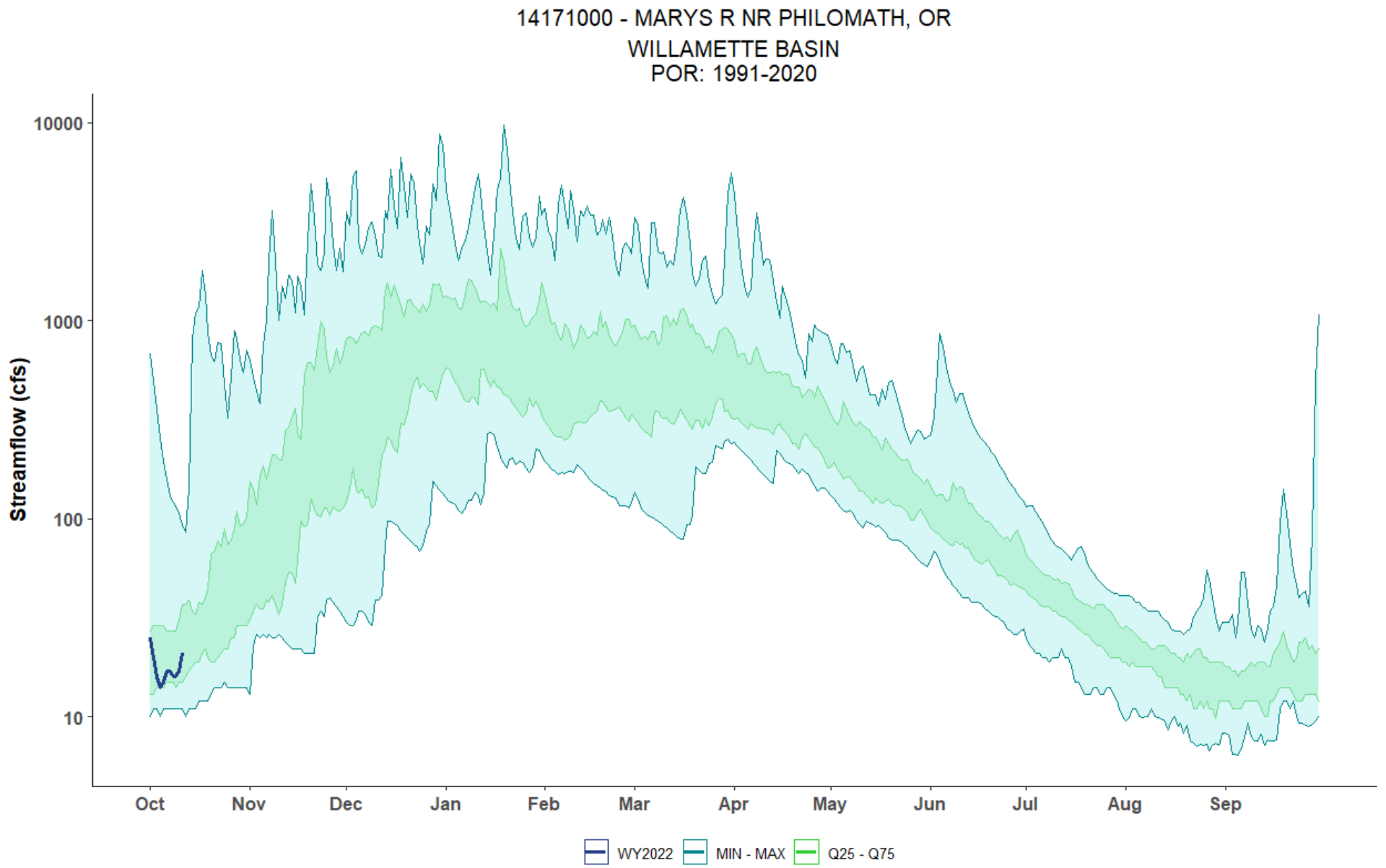

September % of Average Streamflow - WY 2021
Stream Gage
<= 30%
31% - 50%
51% - 70%
71% - 90%
91% - 110%
111% - 130%
> 130%
Counties
<= 30%
31% - 50%
51% - 70%
71% - 90%
91% - 110%
111% - 130%
> 130%
OWRD Basin
CLAT 108%
COLU 83%
TILL 90%
WASH 31%
MULT 89%
HOOD 80%
SHER 8%
UMAT 84%
MORR 60%
WALL 70%
UNIO 86%
YAMH 85%
CLAC 83%
WASC 83%
MARI 145%
POLK 104%
LINC 87%
BENT 52%
LINN 82%
JEFF 91%
WHEE 37%
GRAN 45%
BAKE 526%
LANE 91%
DESC 59%
COOS 70%
DOUG 89%
LAKE 53%
HARN 46%
MALH 50%
CURR 94%
JOSE 96%
JACK 86%
KLAM 72%
Date: 10/4/2021

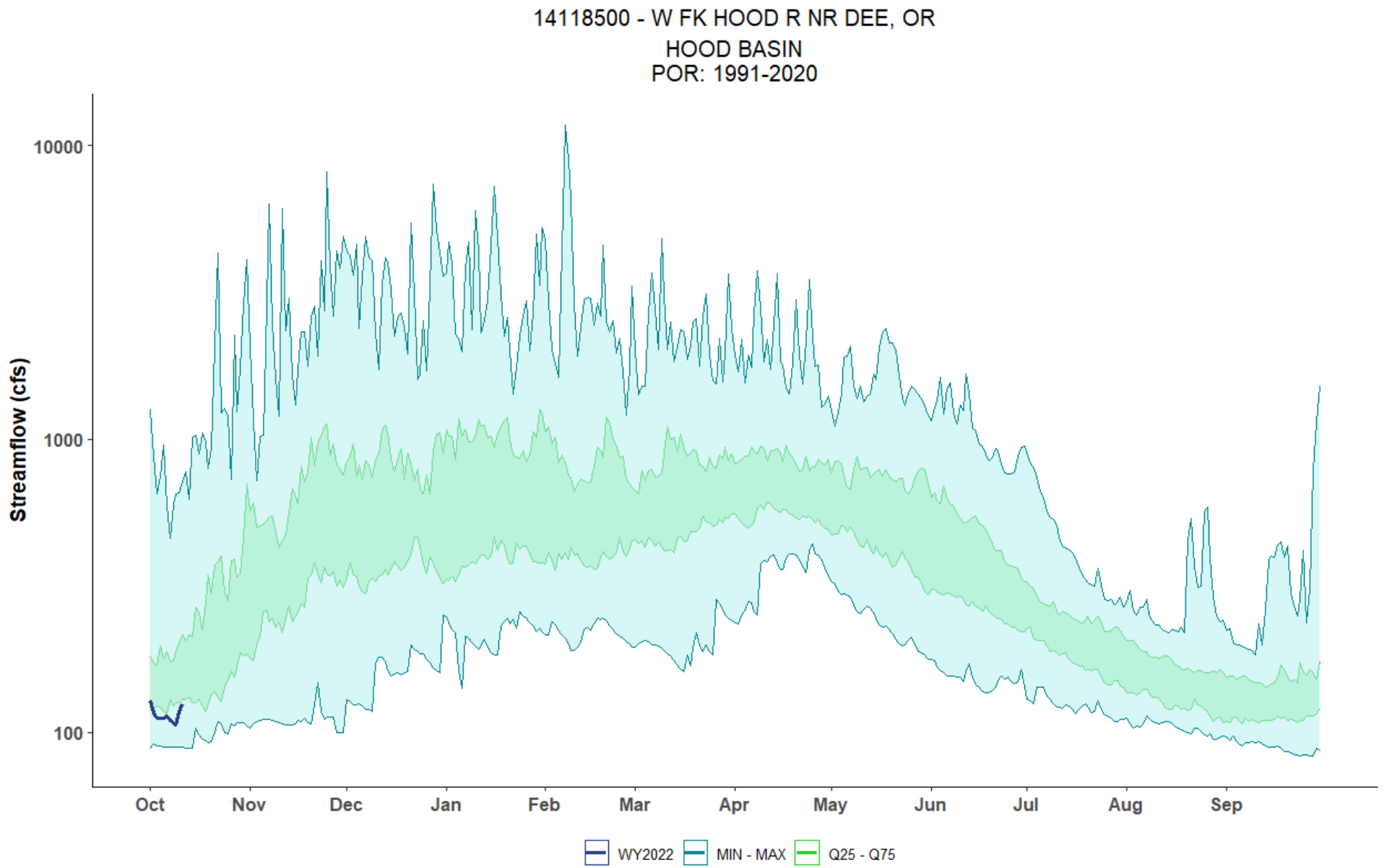

2021 Water Year % of Average
Stream Gage
<= 30%
31% - 50%
51% - 70%
71% - 90%
91% - 110%
111% - 130%
> 130%
Counties
<= 30%
31% - 50%
51% - 70%
71% - 90%
91% - 110%
111% - 130%
> 130%
OWRD Basin
CLAT 88%
COLU 97%
TILL 100%
WASH 92%
YAMH 98%
MULT 88%
HOOD 86%
CLAC 90%
MARI 86%
POLK 102%
LINC 96%
BENT 93%
LINN 76%
LANE 78%
SHER 49%
WASC 66%
JEFF 90%
MORR 48%
UMAT 90%
UNIO 79%
WALL 80%
WHEE 34%
GRAN 51%
BAKE 58%
CROO 36%
DESC 67%
COOS 83%
DOUG 66%
CURR 80%
JOSE 66%
JACK 55%
KLAM 42%
LAKE 24%
HARN 40%
MALH 40%
Date: 10/4/2021

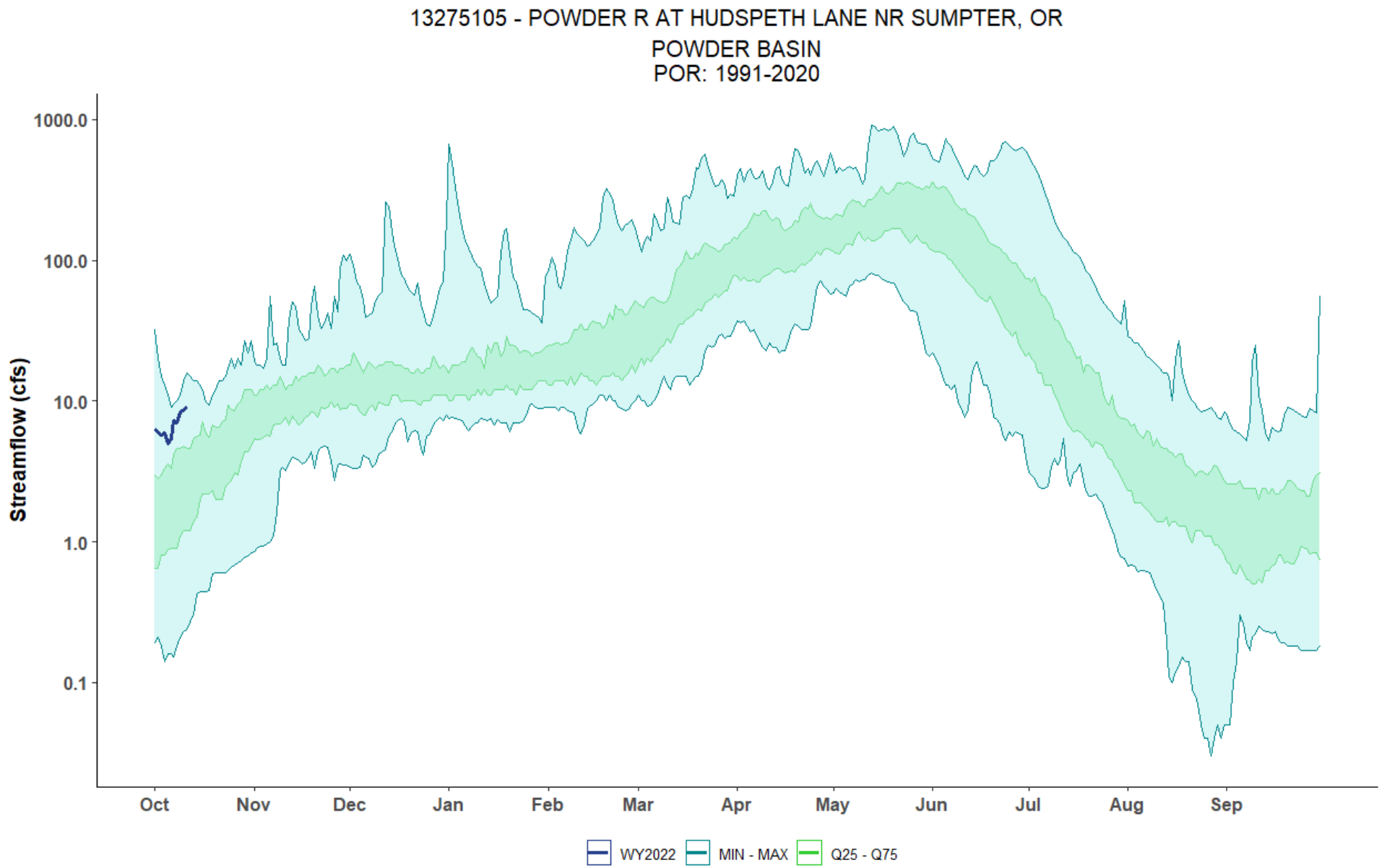

March Streamflow Percentile - WY 2021
Stream Gage
LOW
< 10
10 - 25
Counties
OWRD Basin
OREGON
WATER RESOURCES DEPARTMENT
Date: 8/16/2021

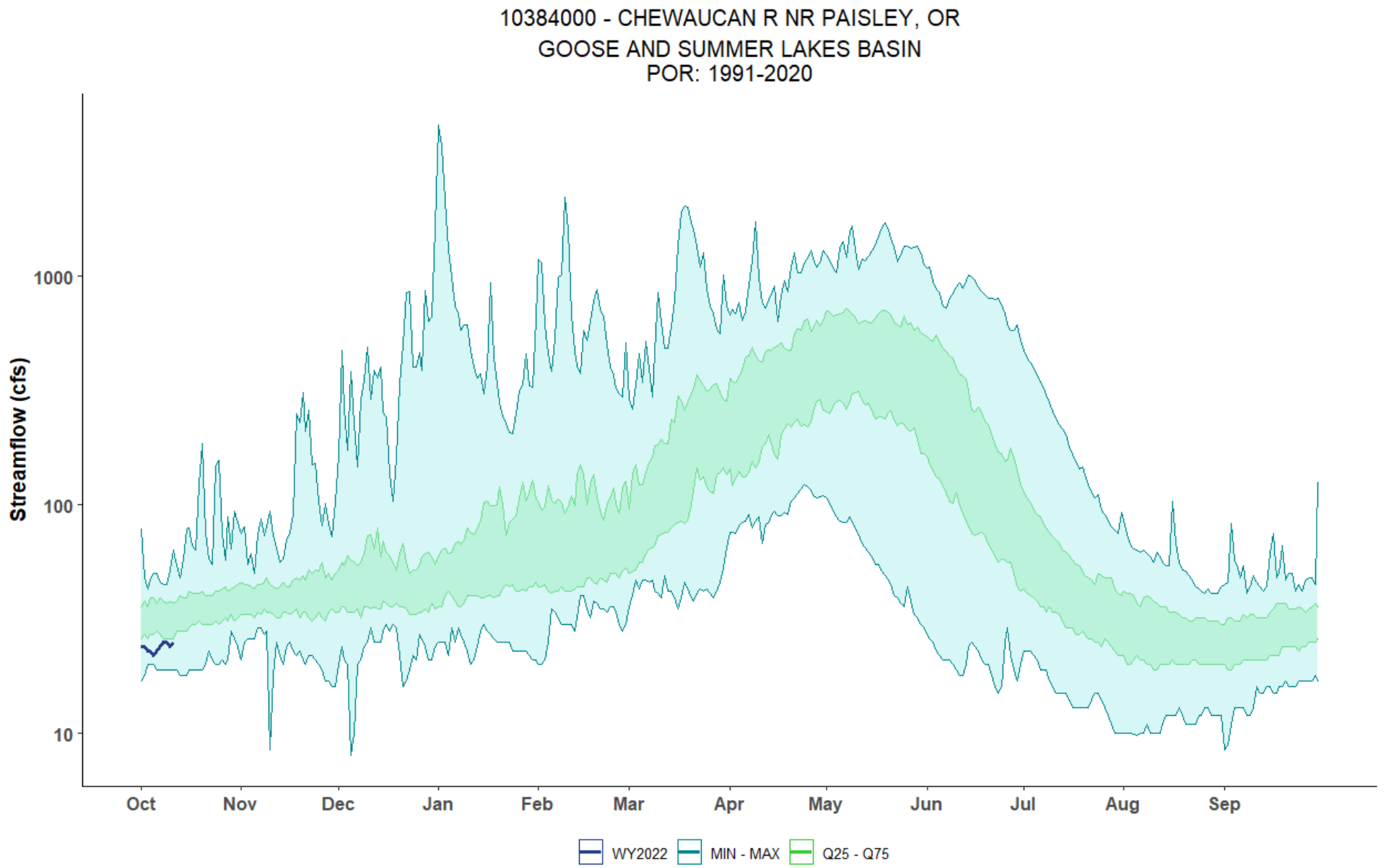

28-Day Streamflow Percentile - October 10, 2021
Stream Gage
LOW
< 10
10 - 25
25 - 75
75 - 90
> 90
HIGH
OWRD Basin
Counties
OREGON
WATER RESOURCES DEPARTMENT
Date: 10/11/2021

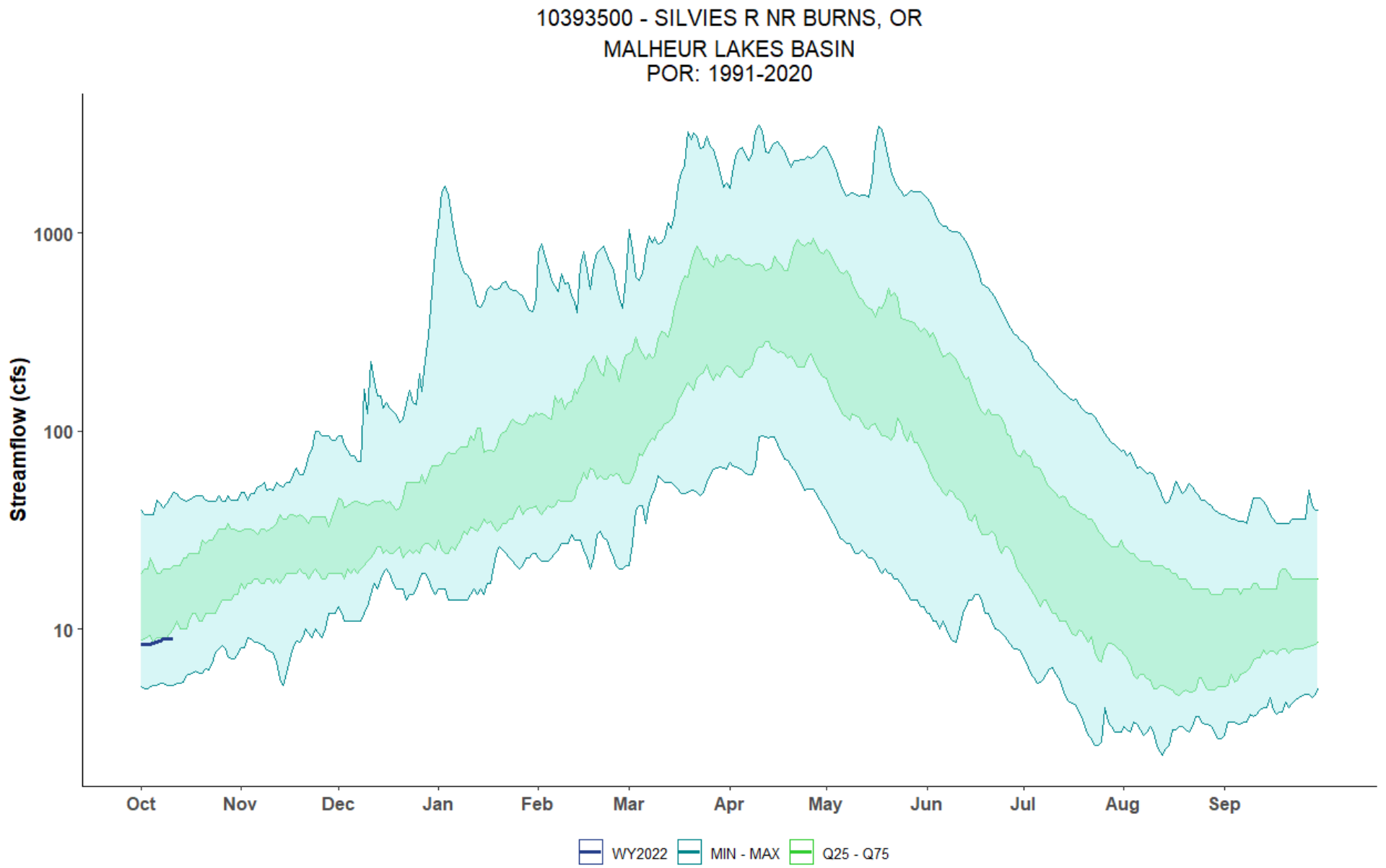

7-Day Streamflow Percentile - October 10, 2021
Stream Gage
LOW
< 10
10 - 25
25 - 75
75 - 90
> 90
HIGH
OWRD Basin
Counties
OREGON
WATER RESOURCES DEPARTMENT
Date: 10/11/2021


14171000 - MARYS R NR PHILOMATH, OR
WILLAMETTE BASIN
POR: 1991-2020
Streamflow (cfs)
10000
1000
100
10
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
WY2022
MIN - MAX
Q25 - Q75


14118500 - W FK HOOD R NR DEE, OR
HOOD BASIN
POR: 1991-2020
Streamflow (cfs)
10000
1000
100
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
WY2022
MIN - MAX
Q25 - Q75


13275105 - POWDER R AT HUDSPETH LANE NR SUMPTER, OR
POWDER BASIN
POR: 1991-2020
Streamflow (cfs)
1000.0
100.0
10.0
1.0
0.1
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
WY2022
MIN - MAX
Q25 - Q75


10384000 - CHEWAUCAN R NR PAISLEY, OR
GOOSE AND SUMMER LAKES BASIN
POR: 1991-2020
Streamflow (cfs)
1000
100
10
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
WY2022
MIN - MAX
Q25 - Q75


10393500 - SILVIES R NR BURNS, OR
MALHEUR LAKES BASIN
POR: 1991-2020
Streamflow (cfs)
1000
100
10
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
WY2022
MIN - MAX
Q25 - Q75

QUESTIONS?

Oregon Water Supply Availability Meeting

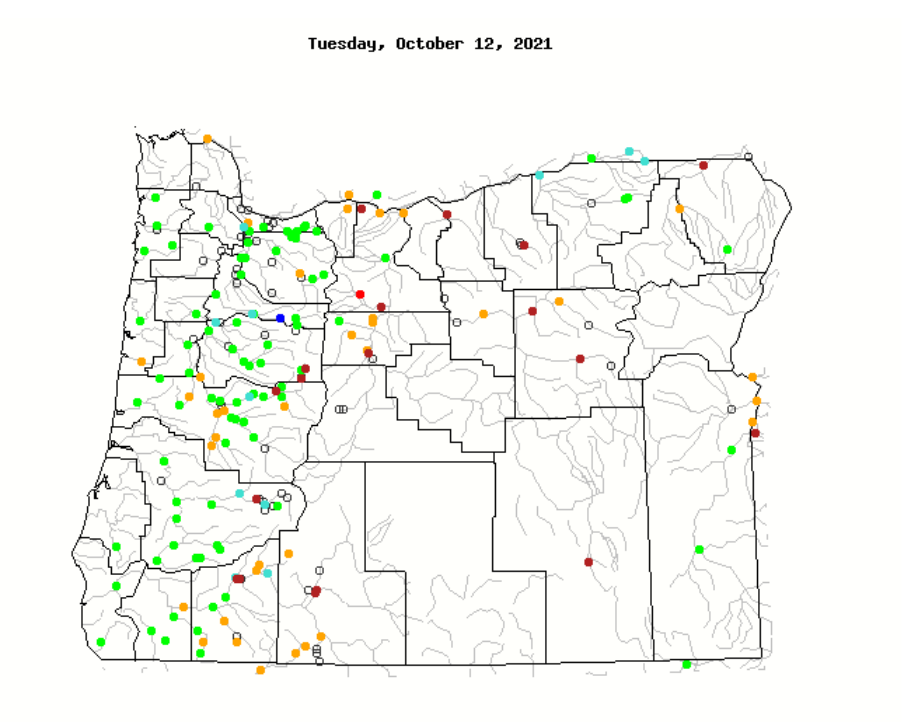
October 2021

USGS Update on Surface Water Conditions
Carrie Boudreau & Marc Stewart
Oregon Water Science Center
Photo: Tamanawas Falls.

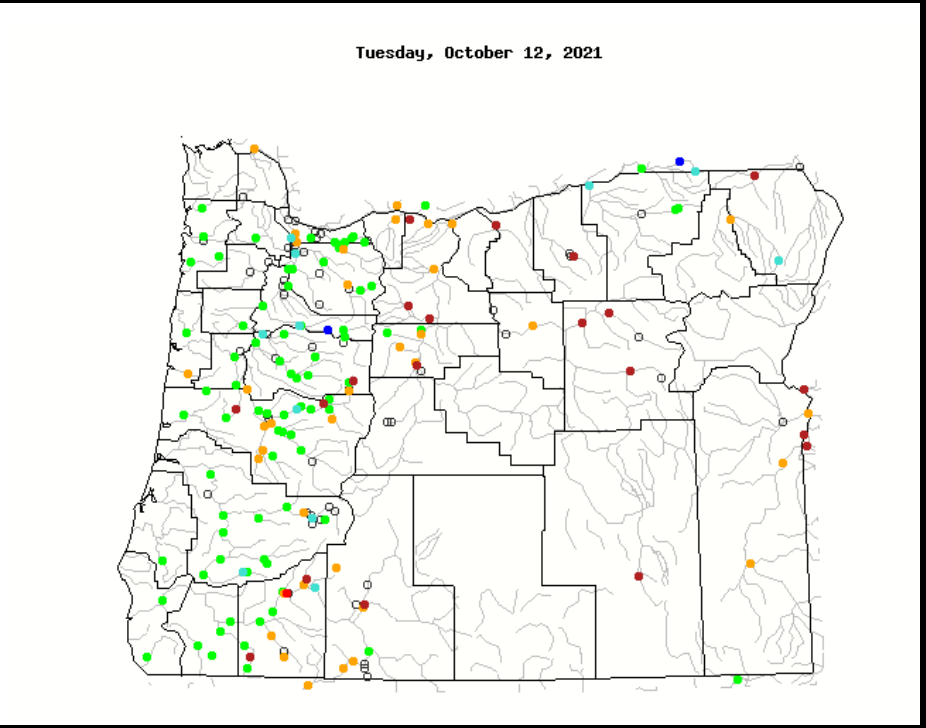
Streamflow Conditions

Oregon Streamflow Maps (as compared to Historical Record)

Daily



7-day Average

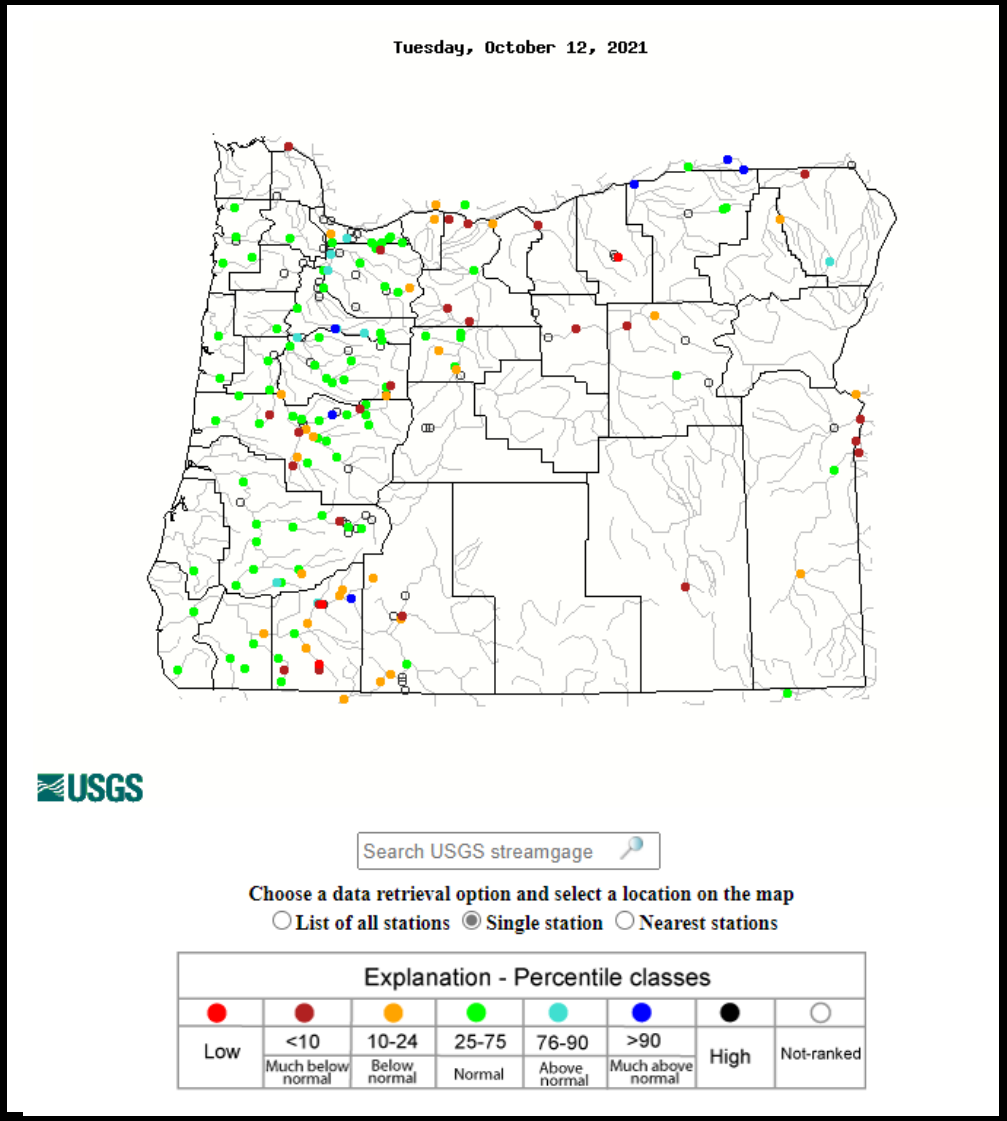


Explanation - Percentile classes							
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked

USGS

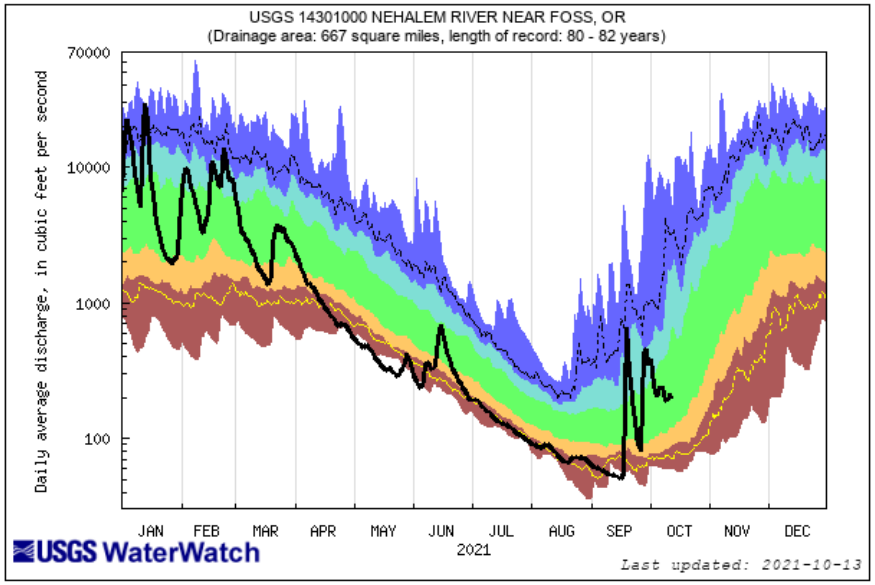
Streamflow Conditions

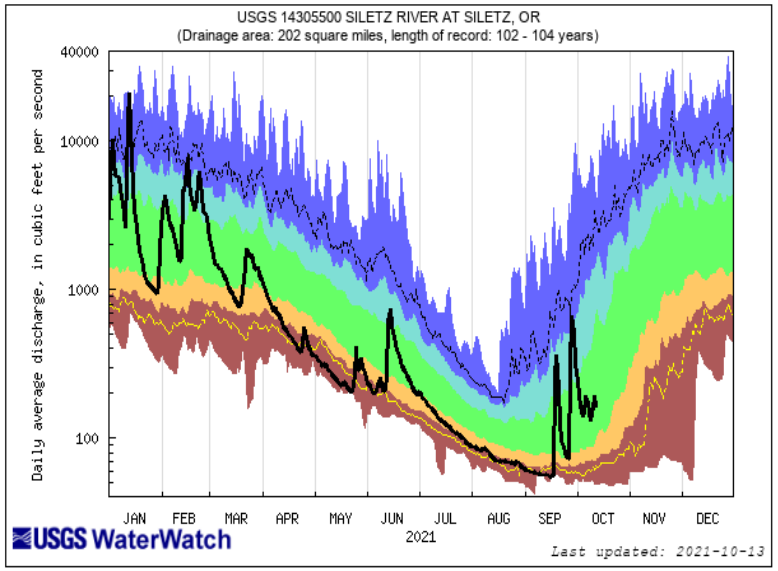
28-day Average Streamflow (as compared to Historical Record)

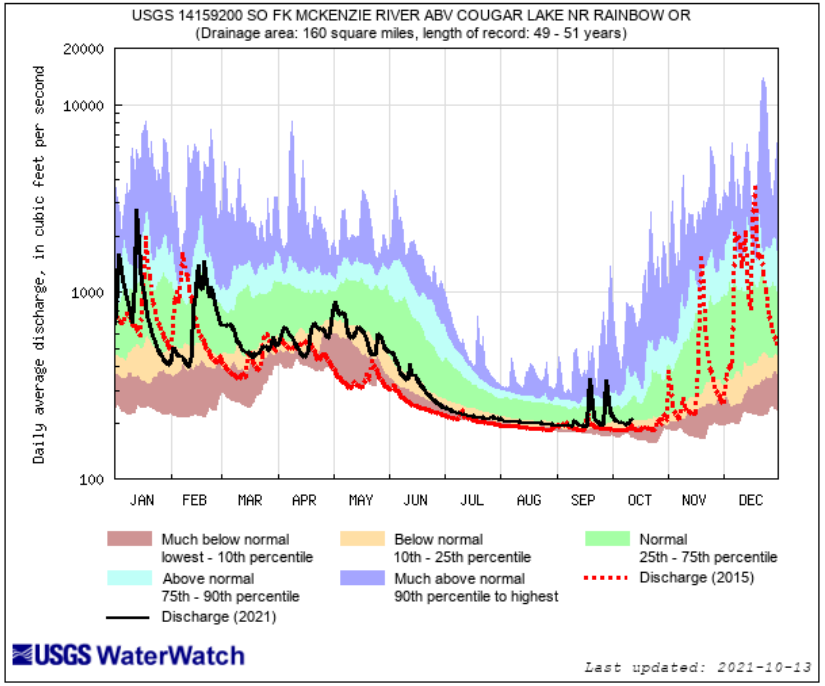


USGS

Northwestern OR

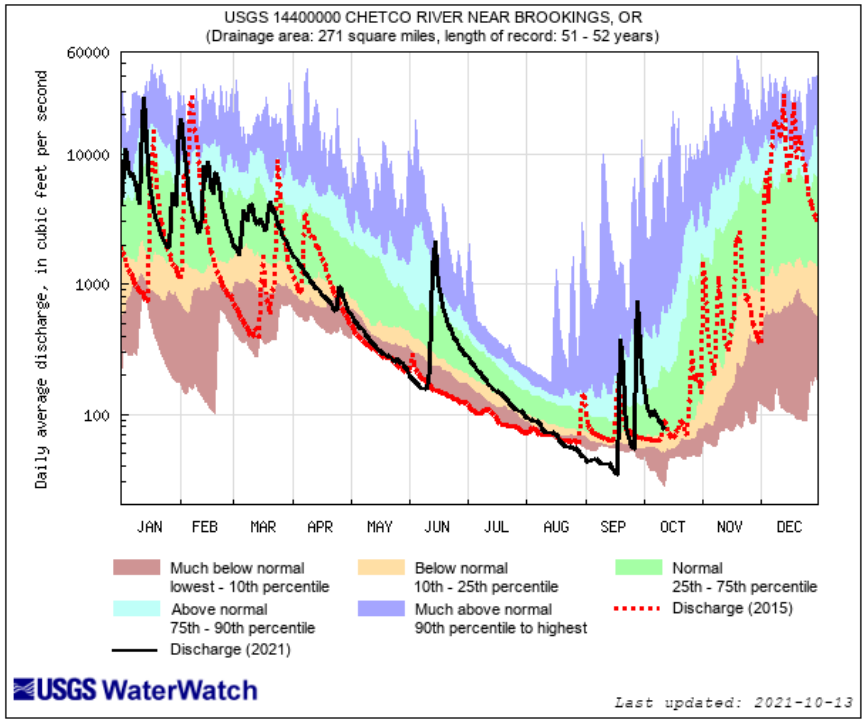


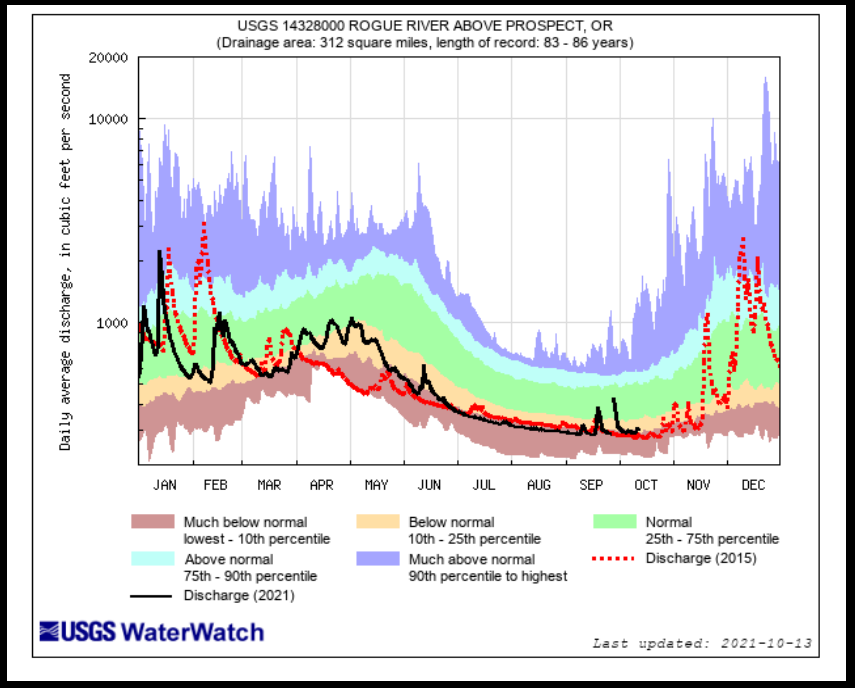


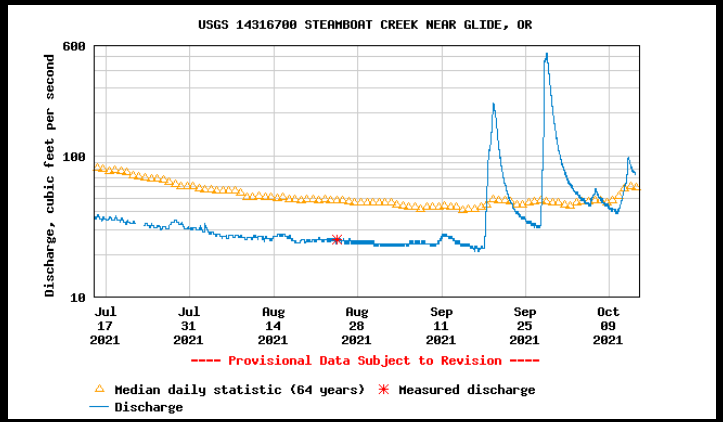


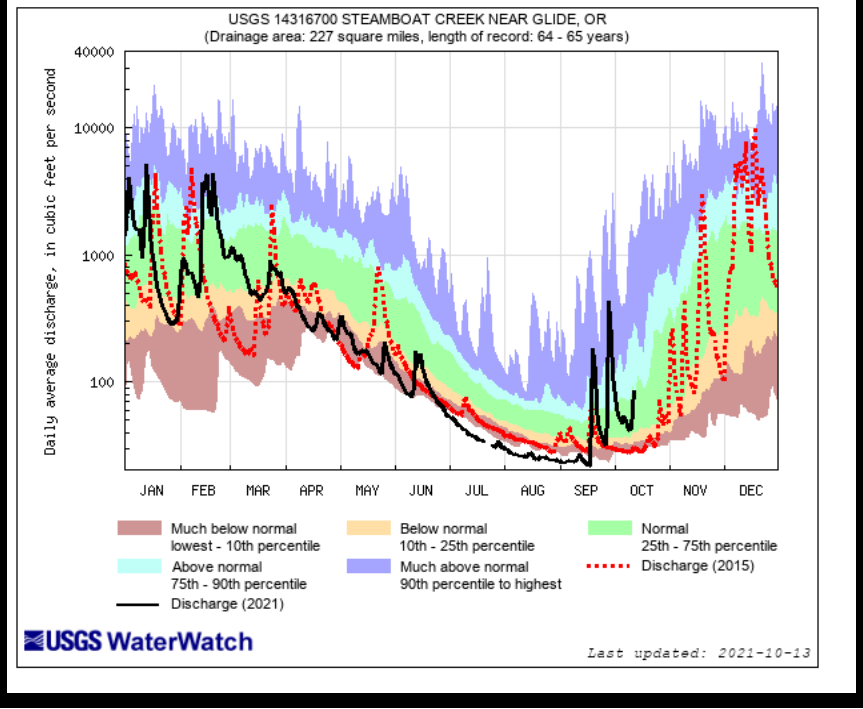
USGS

Southwestern OR



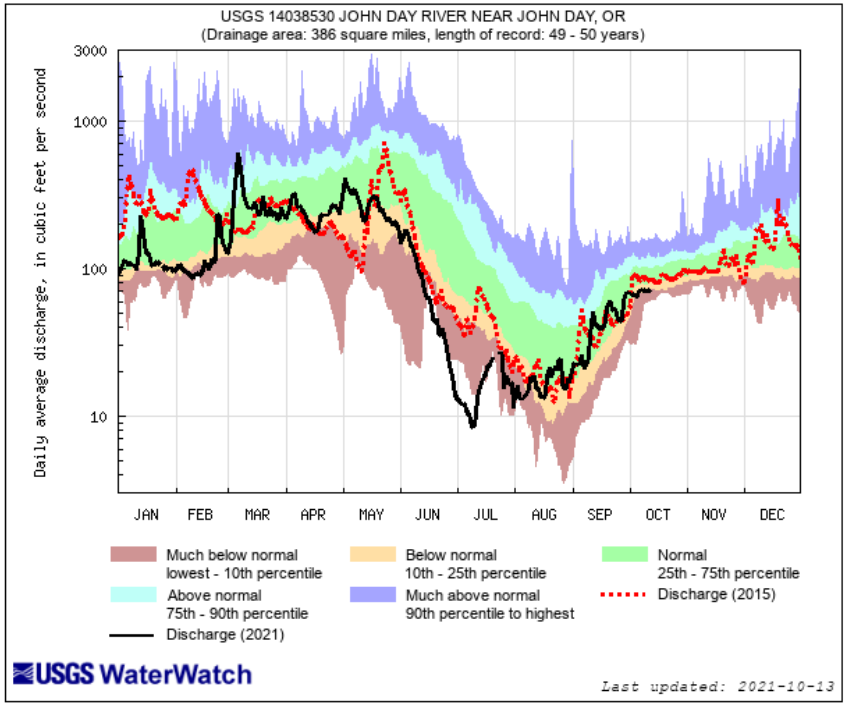


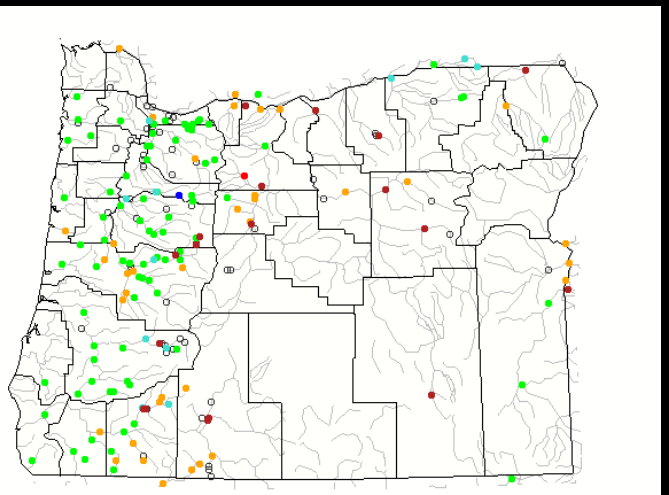


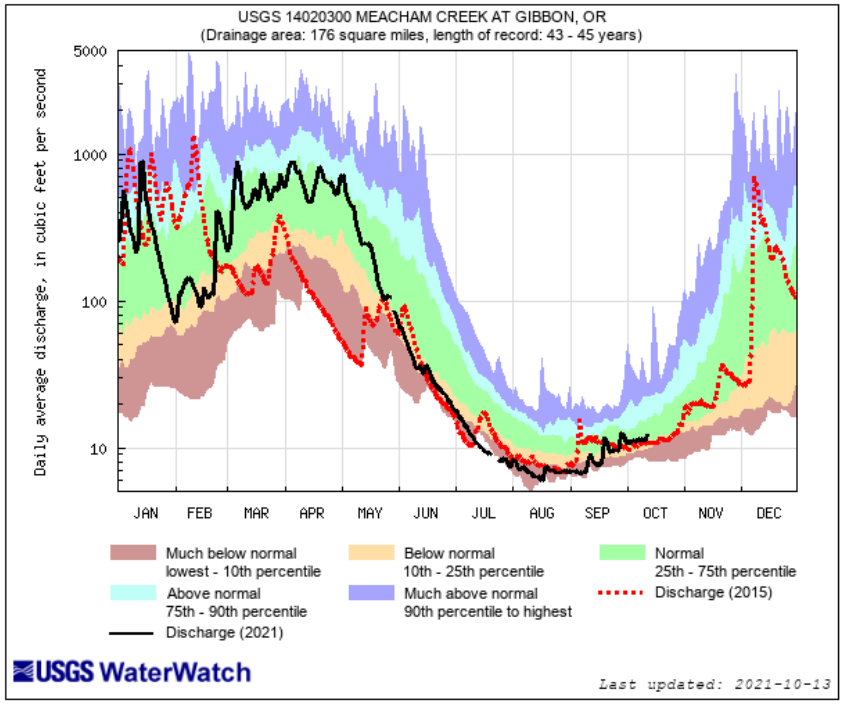


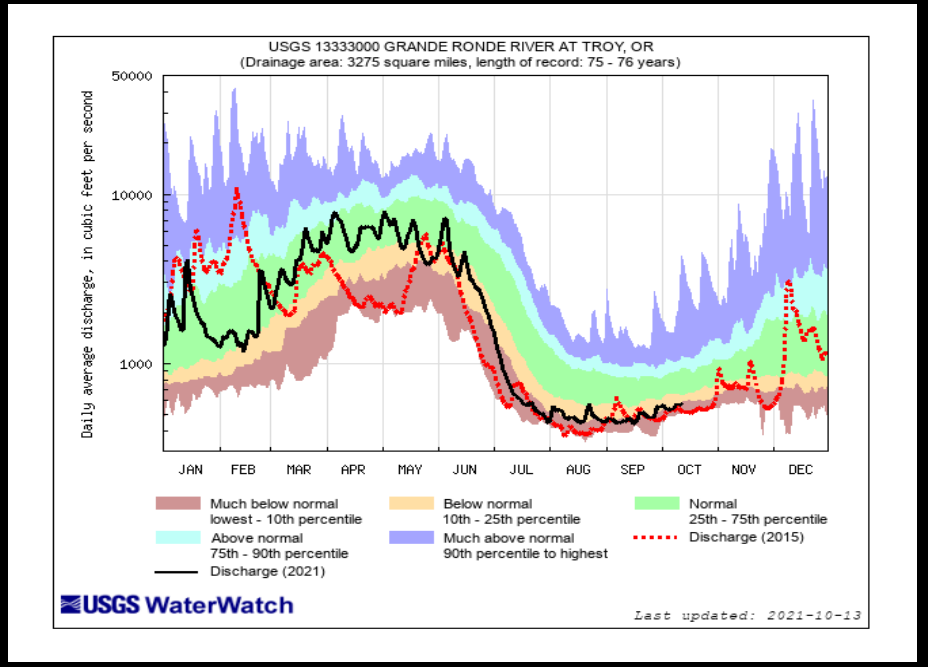
USGS

Northeastern OR

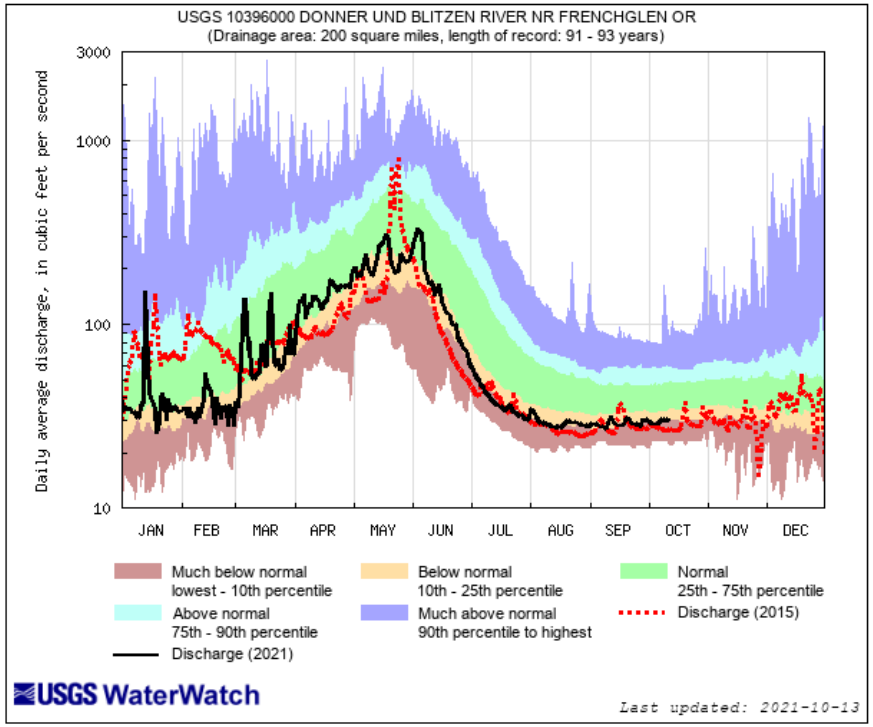


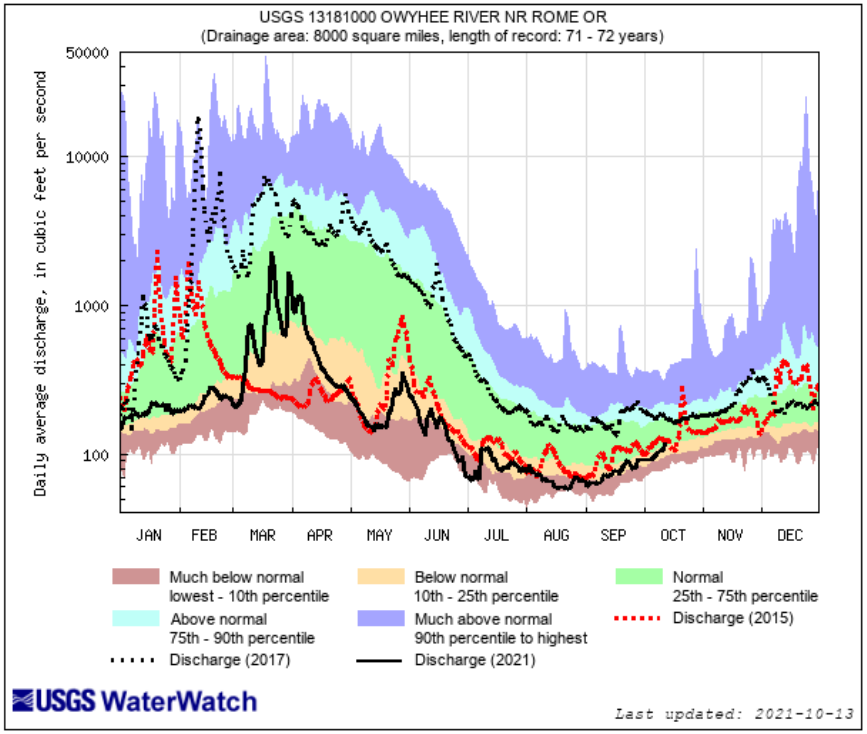




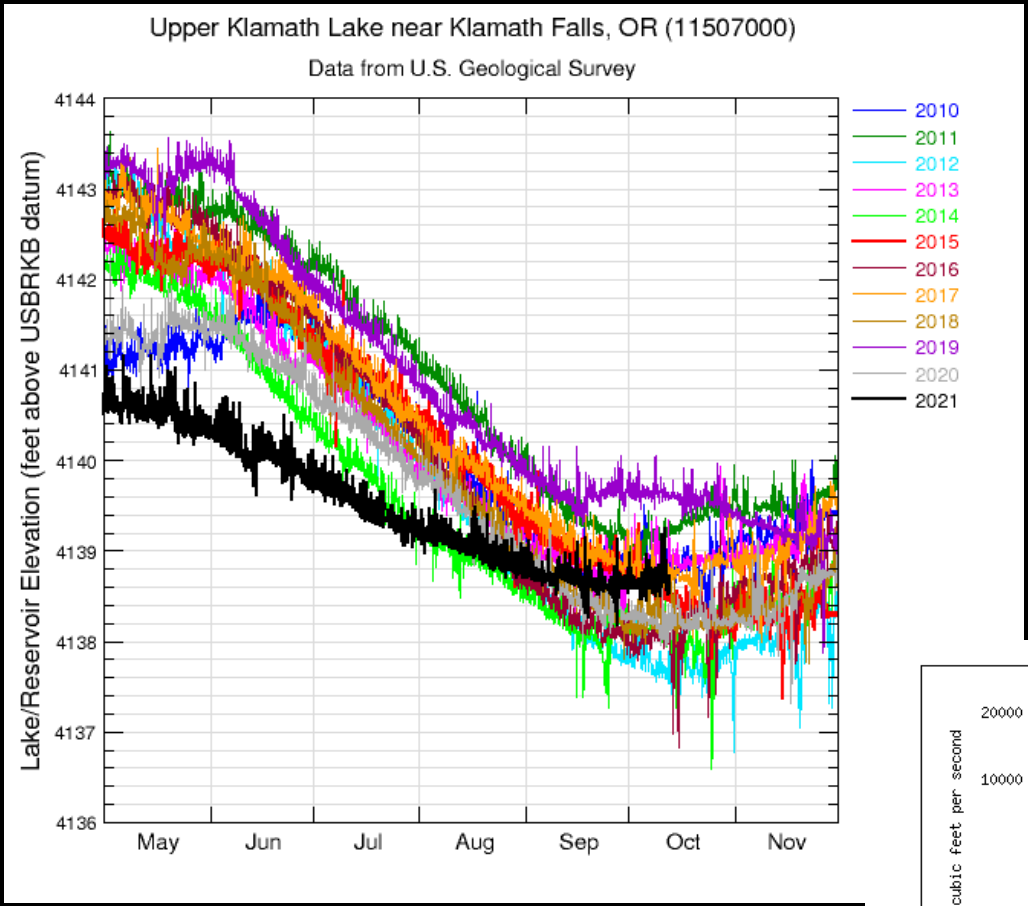


Southeastern OR

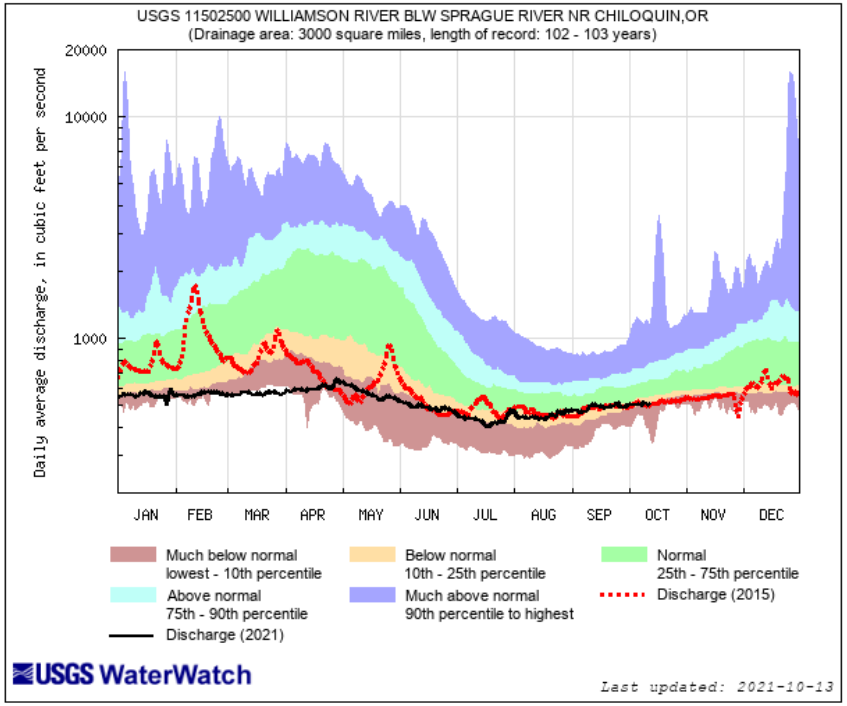


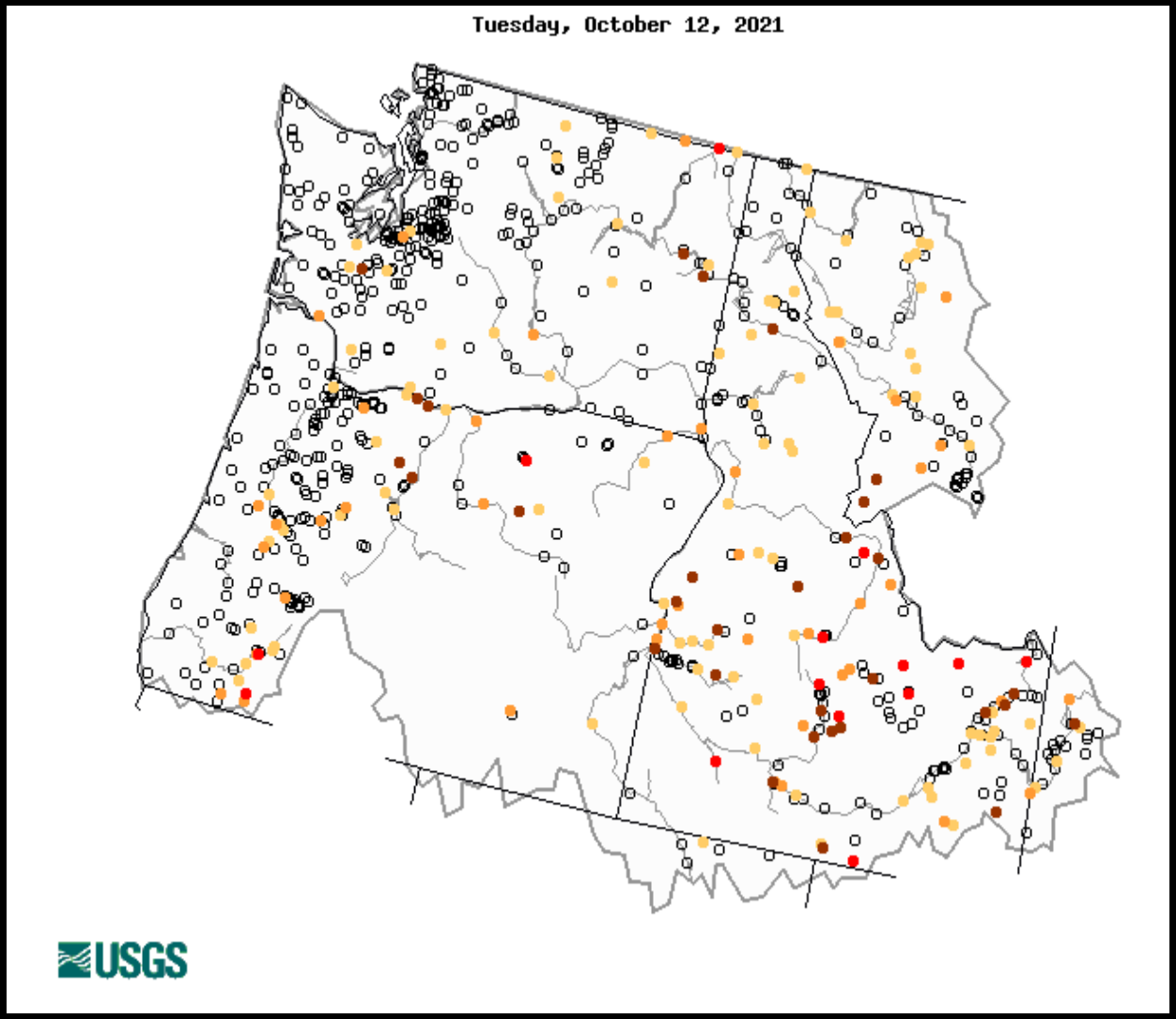


USGS

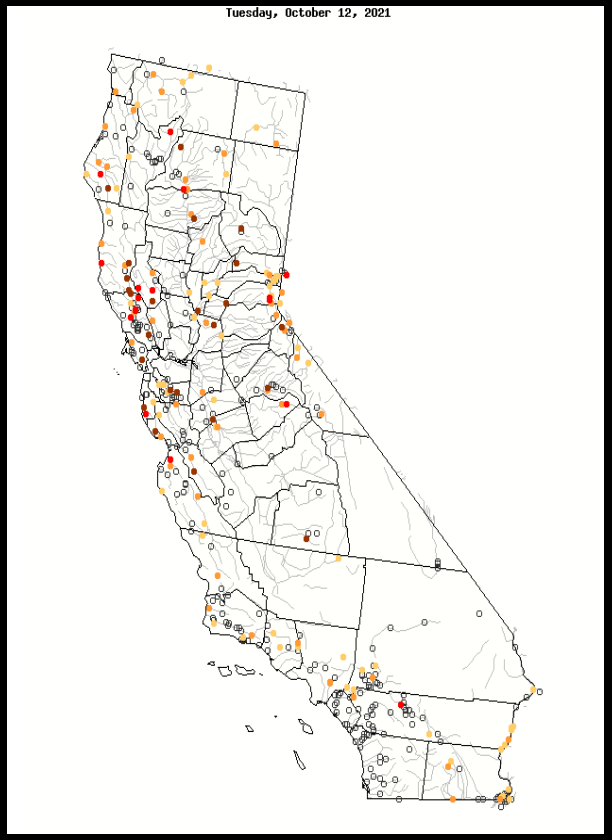


Klamath Lake



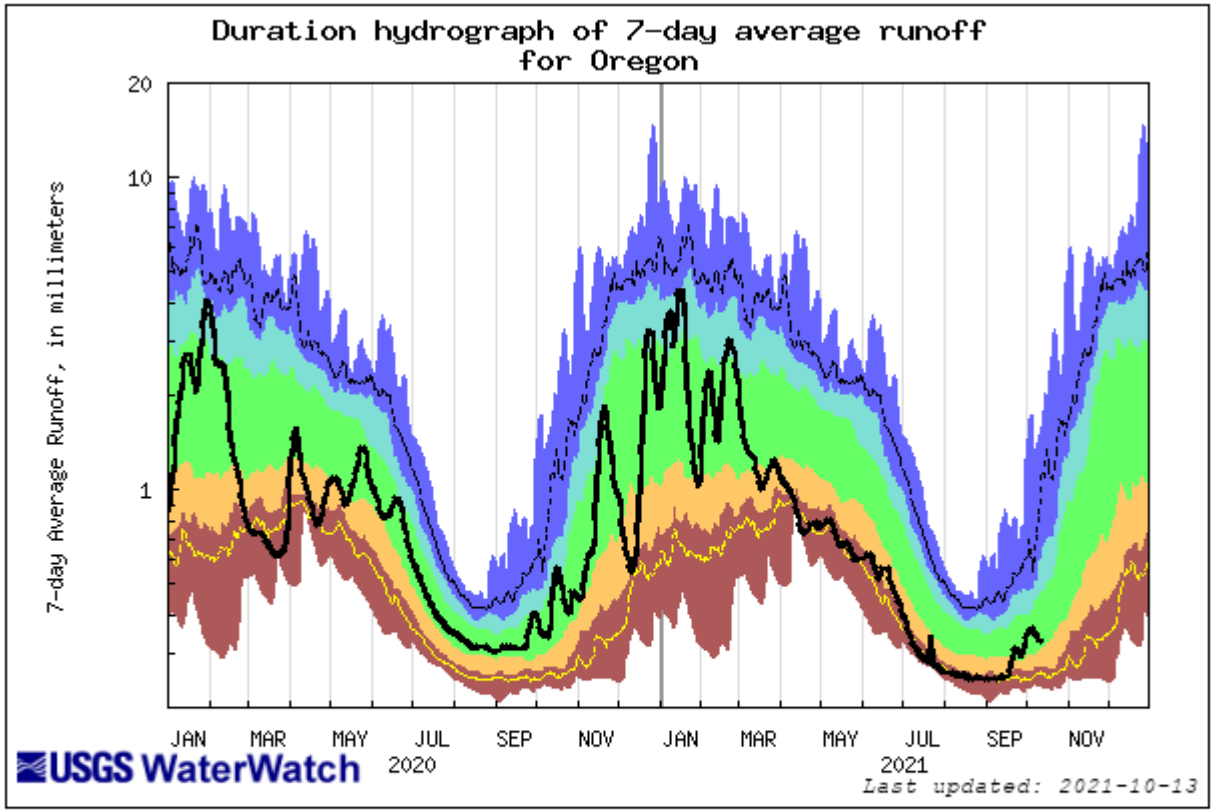


Map of below normal 28-day average streamflow compared to historical streamflow for the day of year (Pacific Northwest & CA)



Explanation - Percentile classes				
New low	<=5	6-9	10-24	Not ranked
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

USGS



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

USGS

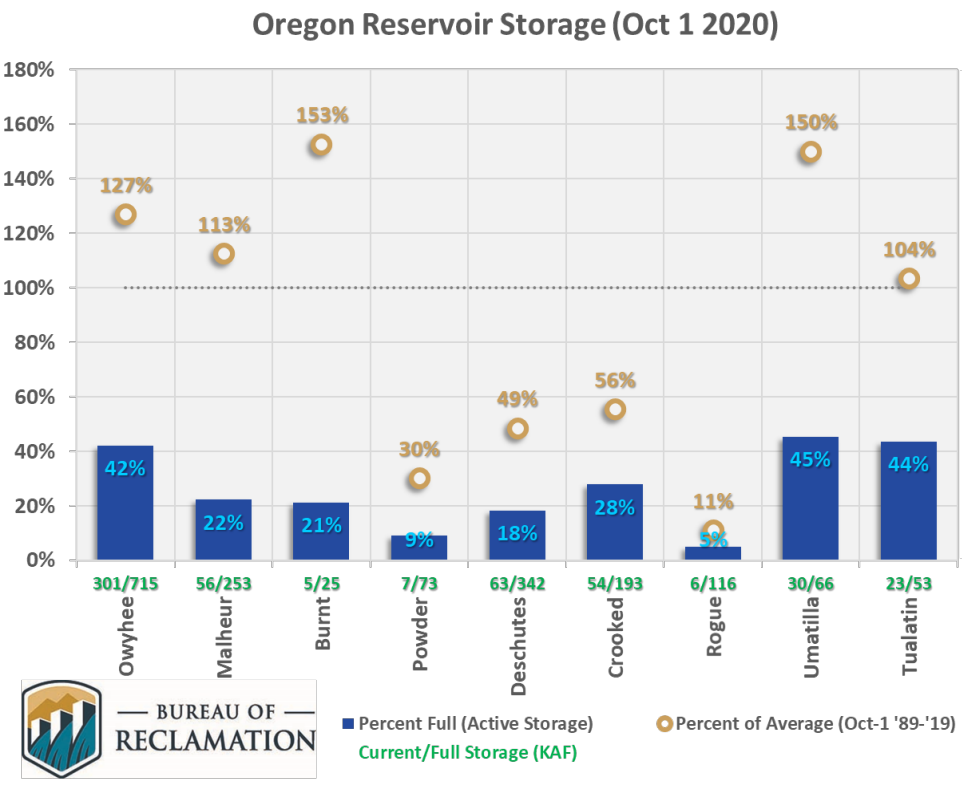
BUREAU OF RECLAMATION

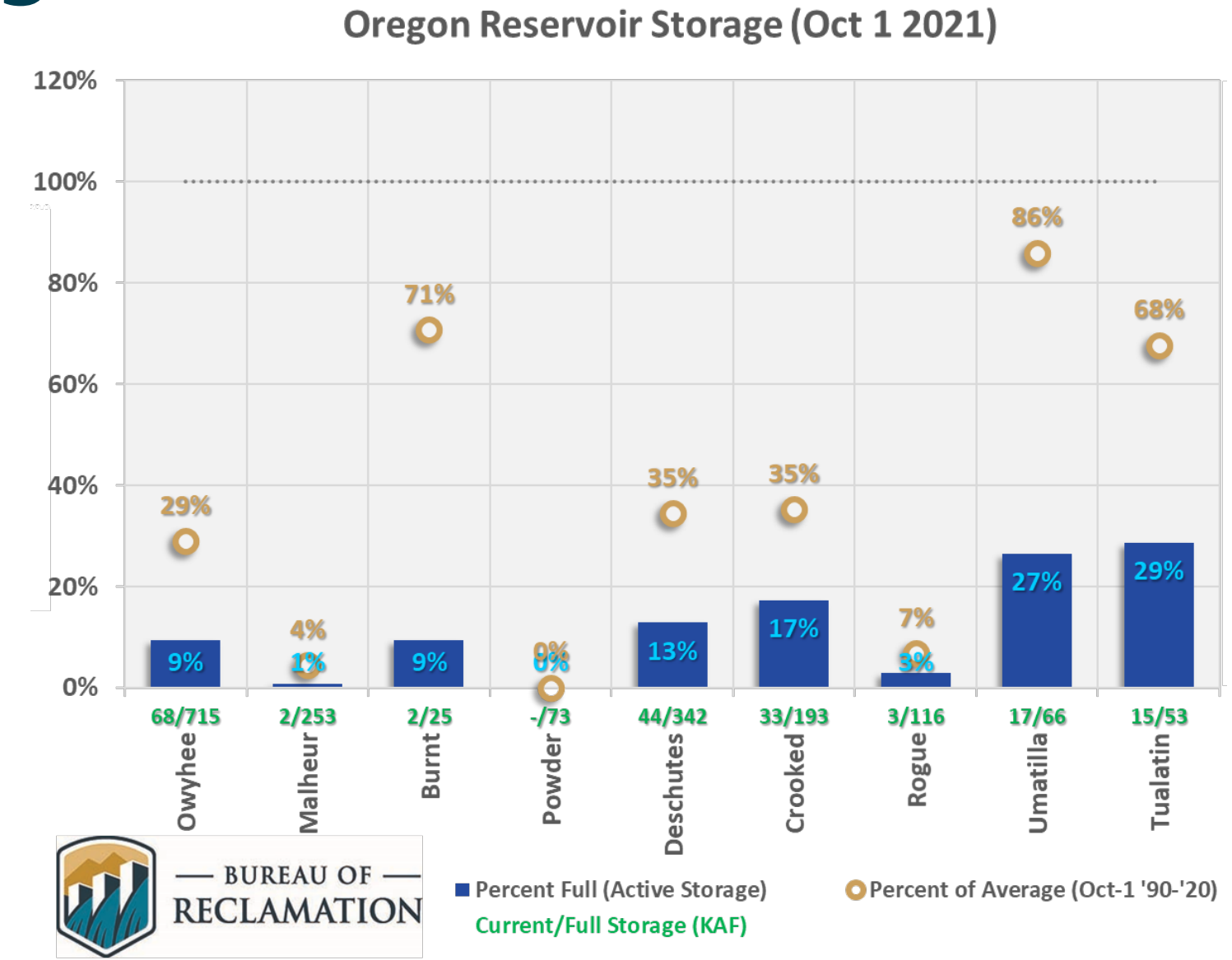
Reclamation Storage Update

Oregon Water Supply Availability Committee Meeting

October 13, 2021

Carry-Over Storage Conditions



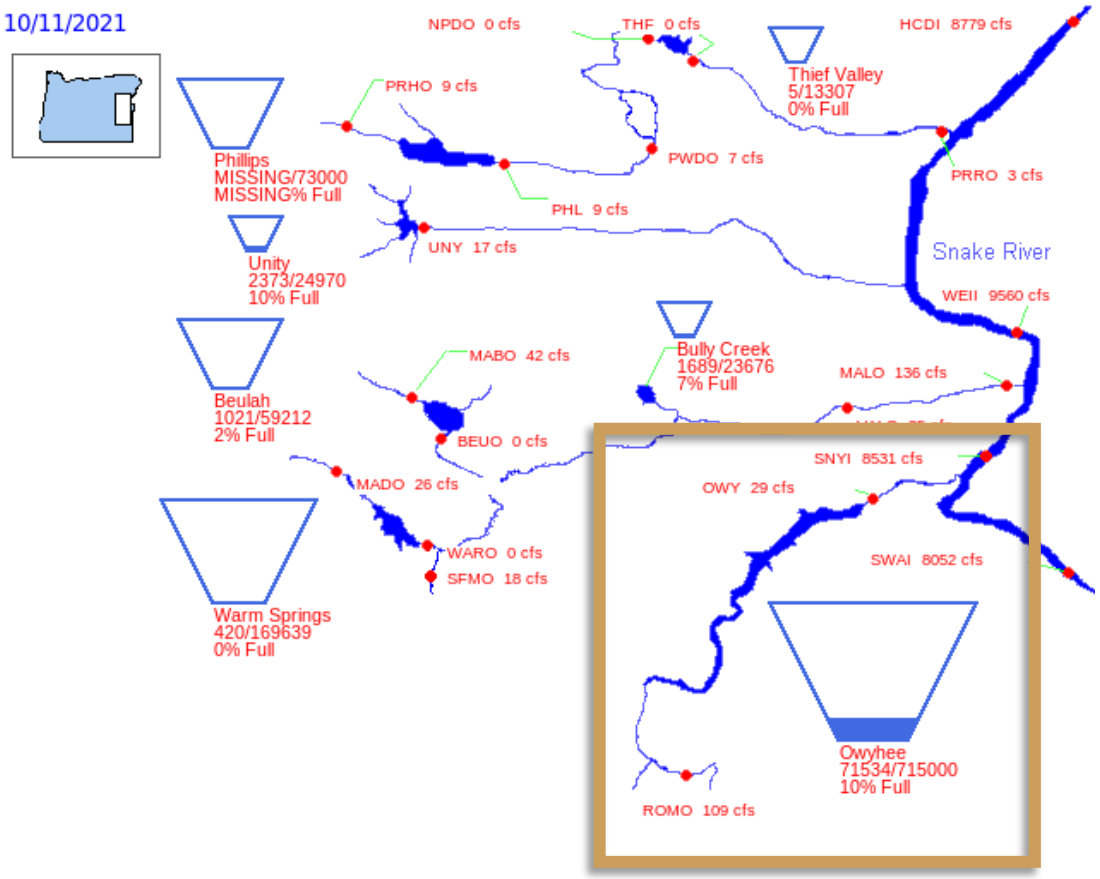


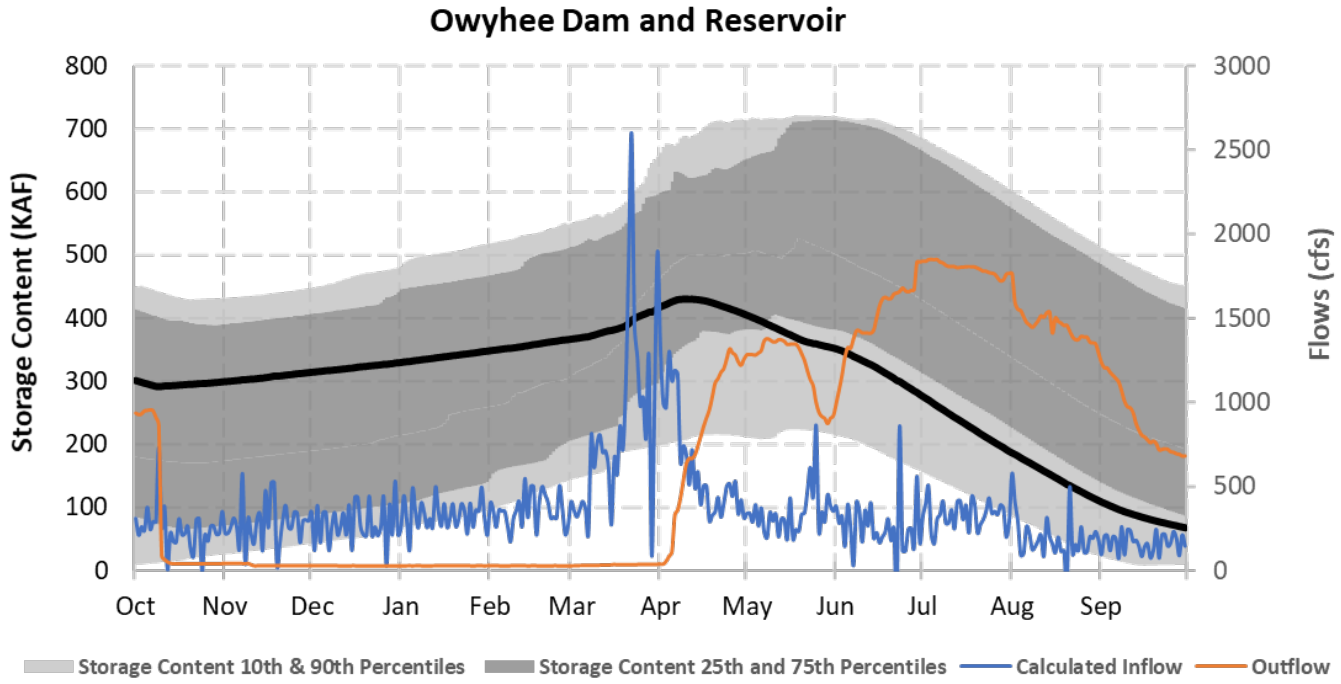
Basin Operations Summary

- Operations Activities:
  - All Oregon projects have transitioned to typical fall/winter operations
  - Some Reclamation river basins still delivering water for ecological purposes
    - Tualatin, Umatilla
  - Irrigation delivery shut-down dates
    - Rogue (July 19), Malheur (8/23), Deschutes (8/25), Powder (8/27), Crooked (10/1), Owyhee (10/1), Burnt (10/3)

- Water Supply Challenges
  - Very low carry-over to start the WY for all Reclamation river basins
  - Most river basins would need very wet conditions this WY to refill
    - 75th percentile of historical volume - Umatilla, Crooked
    - 90th percentile of historical volume - Malheur, Powder, Owyhee, Rogue, Deschutes

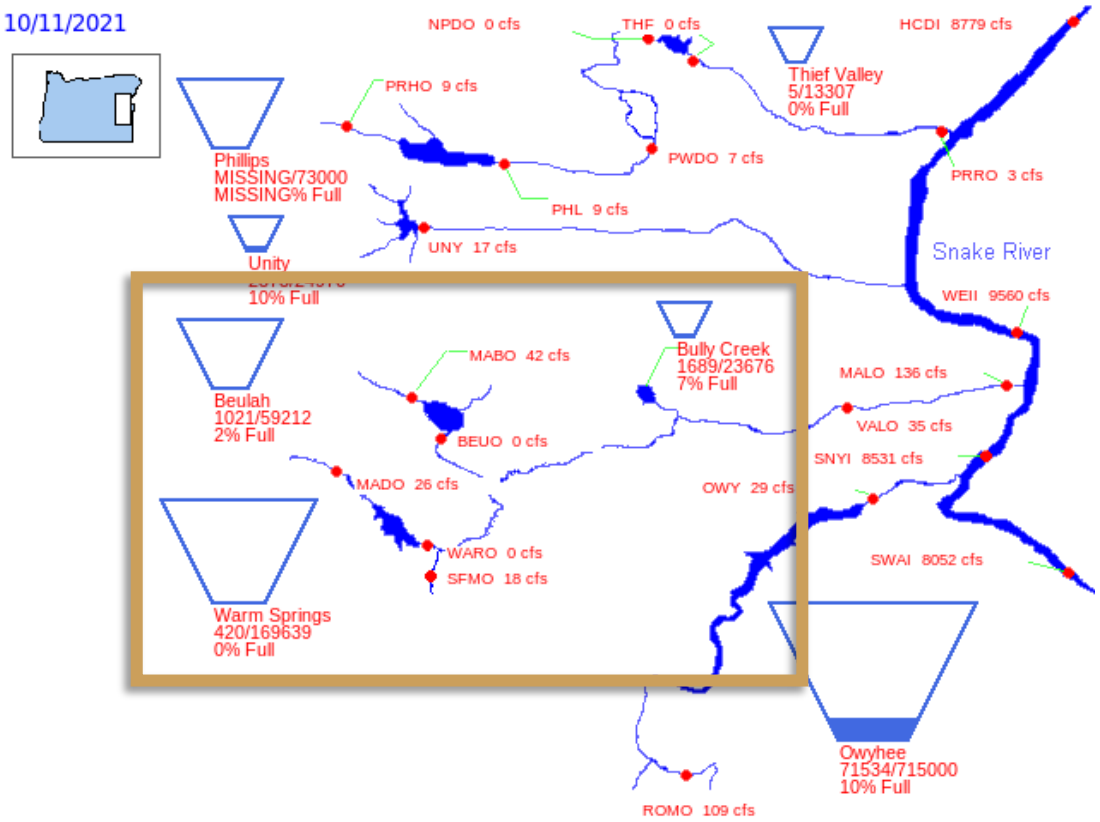
Owyhee River Basin

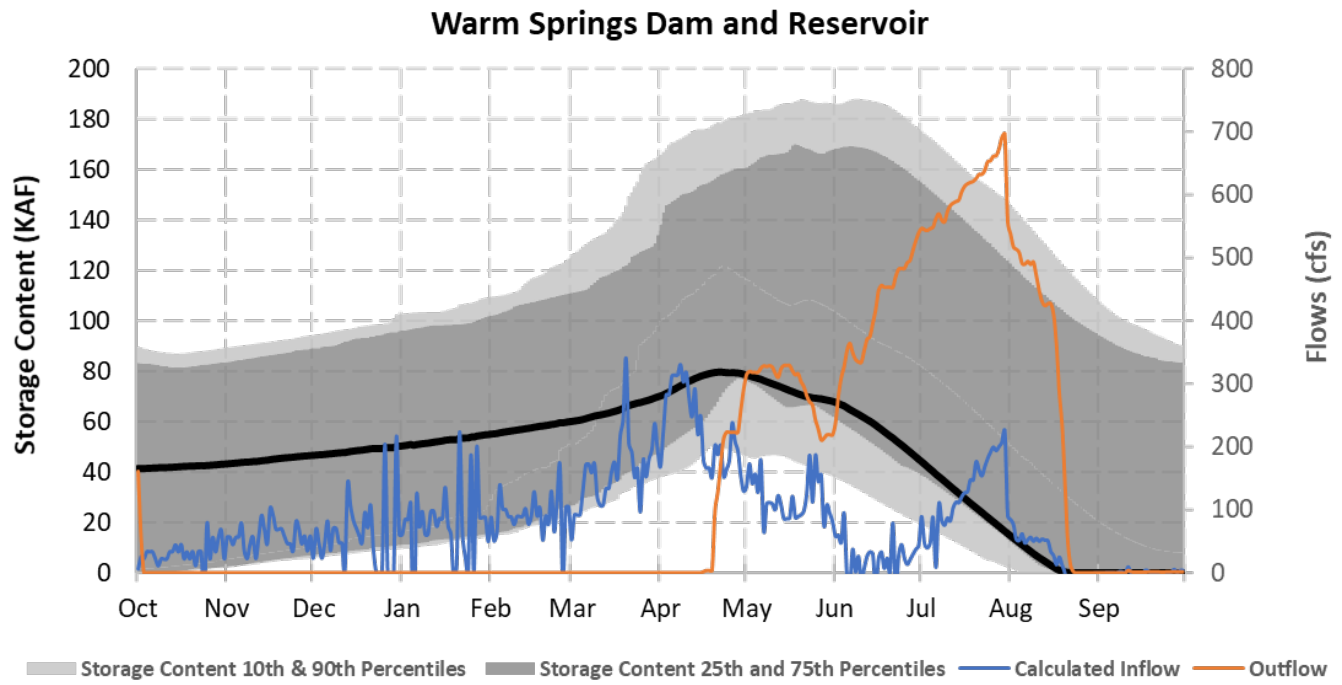


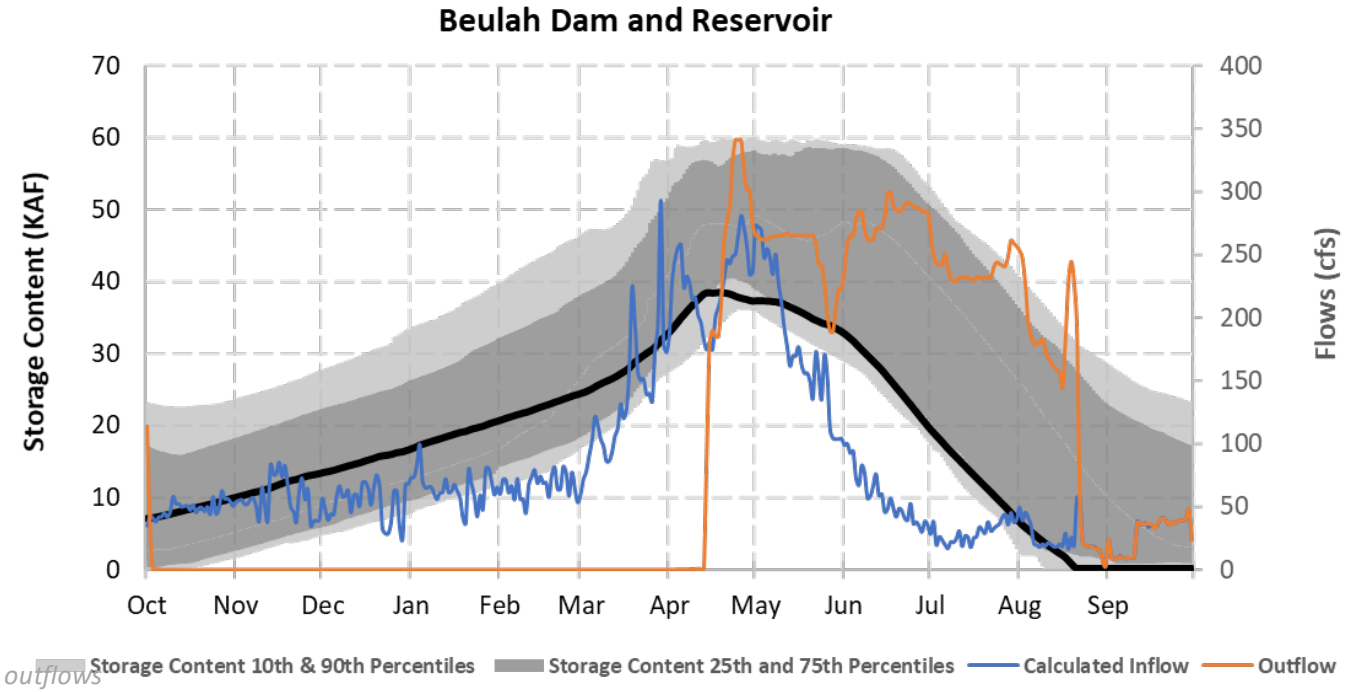


*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Malheur River Basin

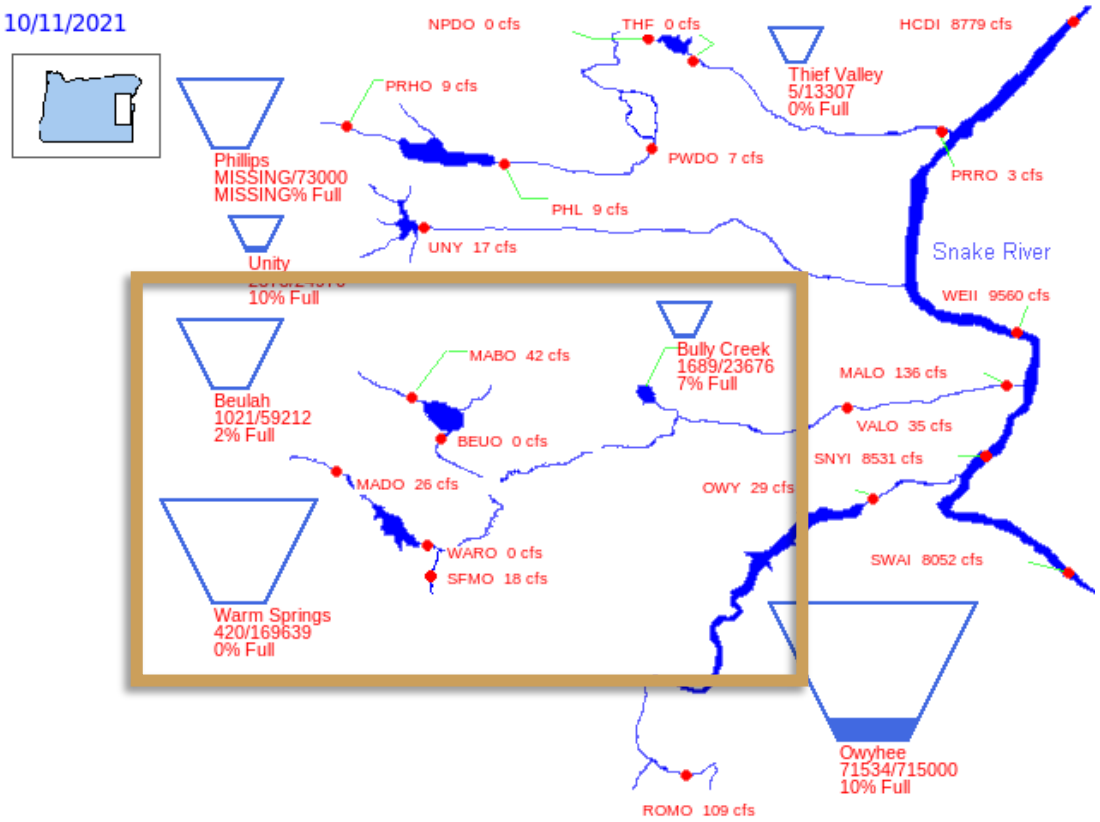


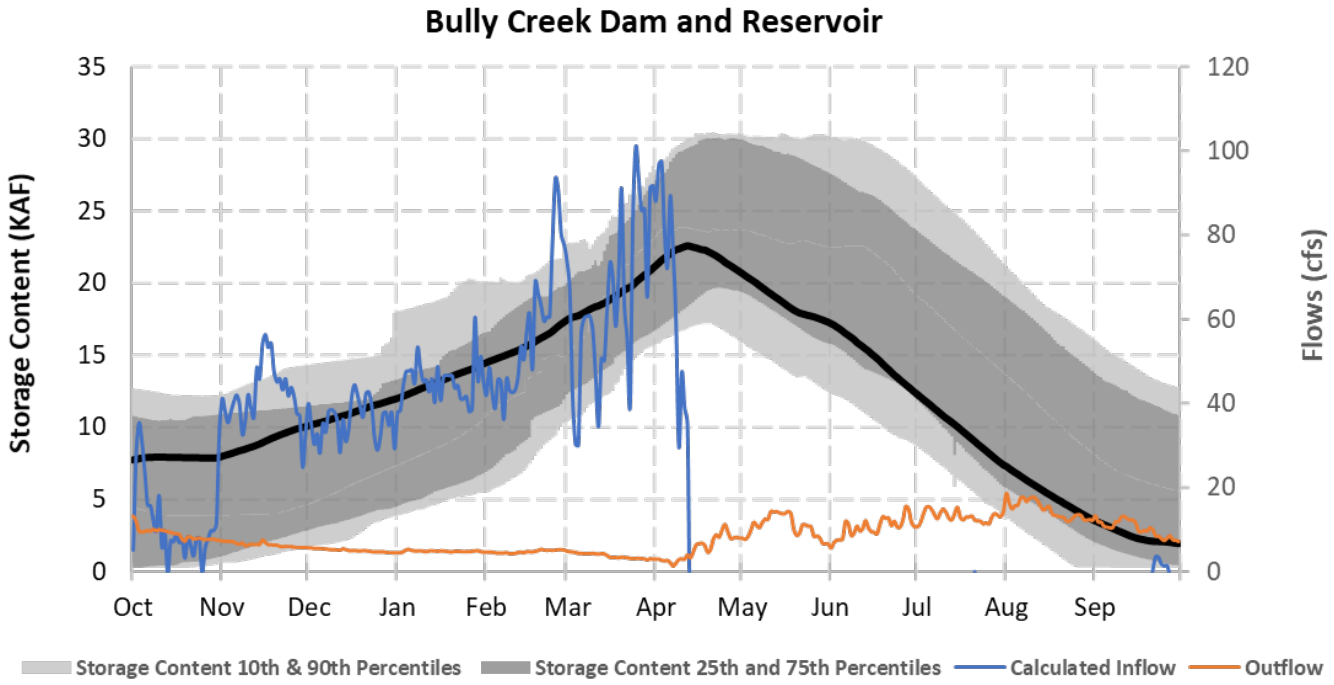




*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

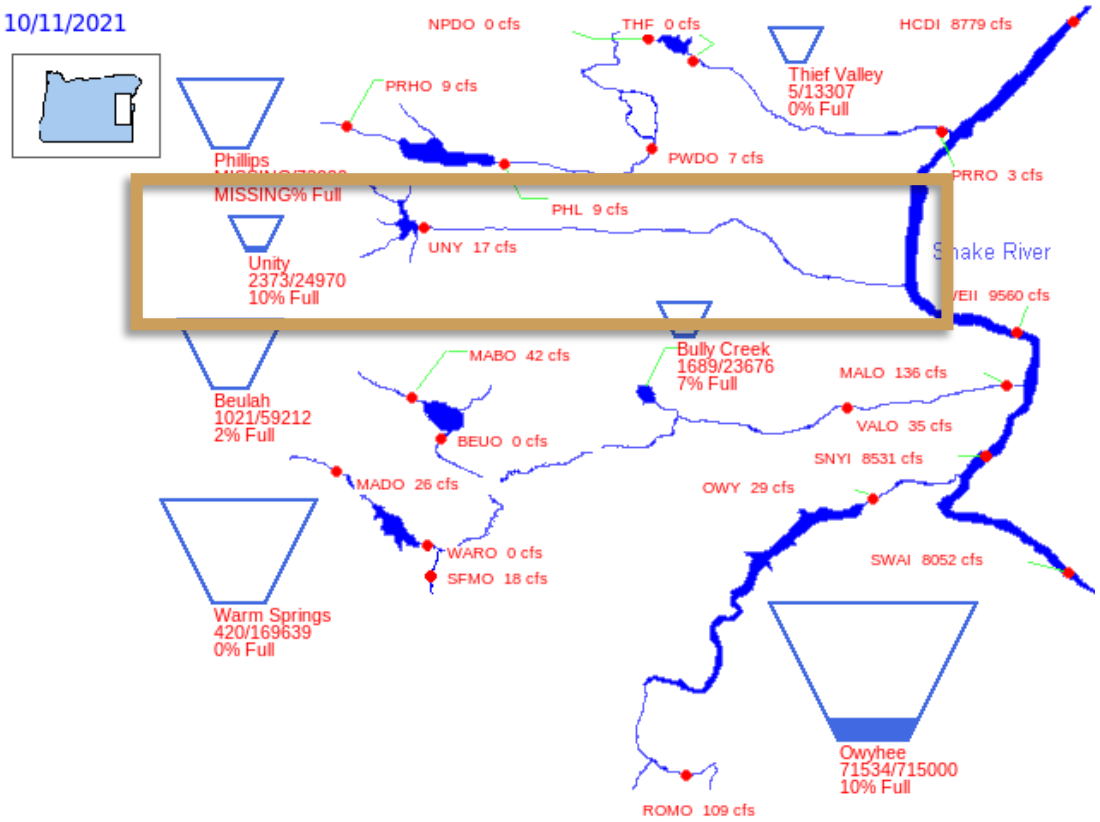
Malheur River Basin

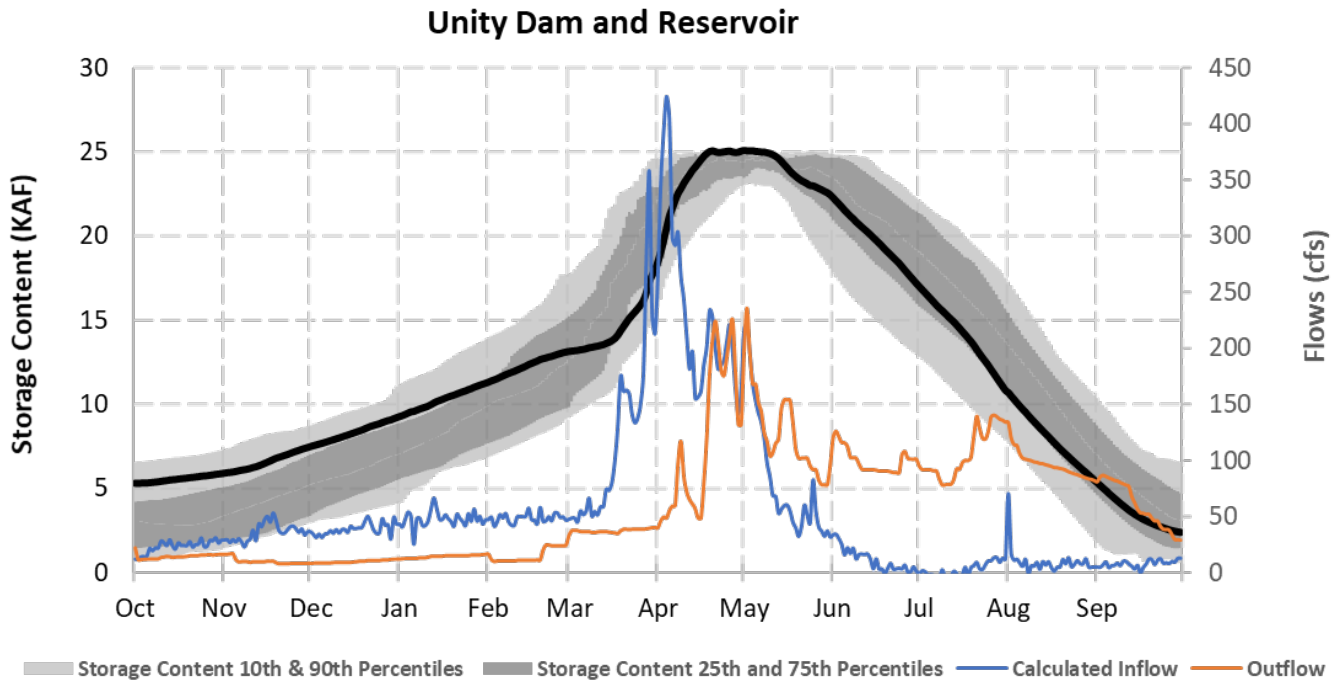




*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

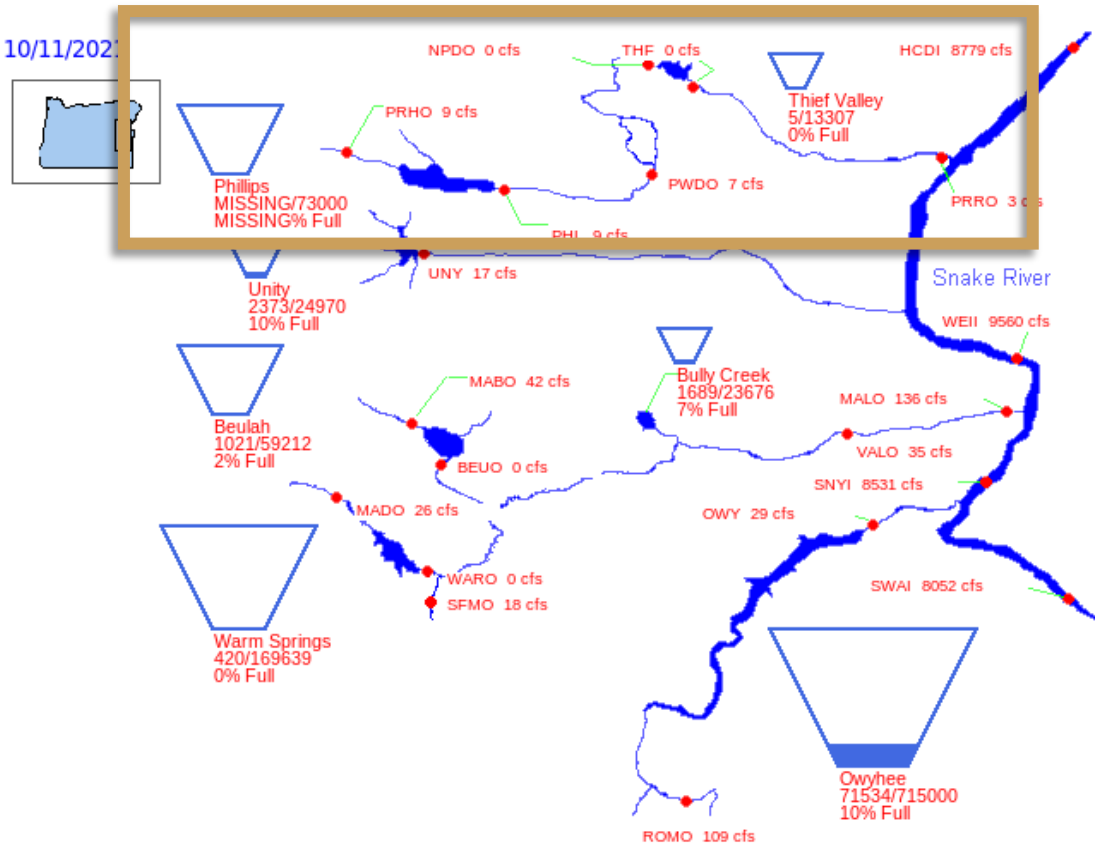
Burnt River Basin

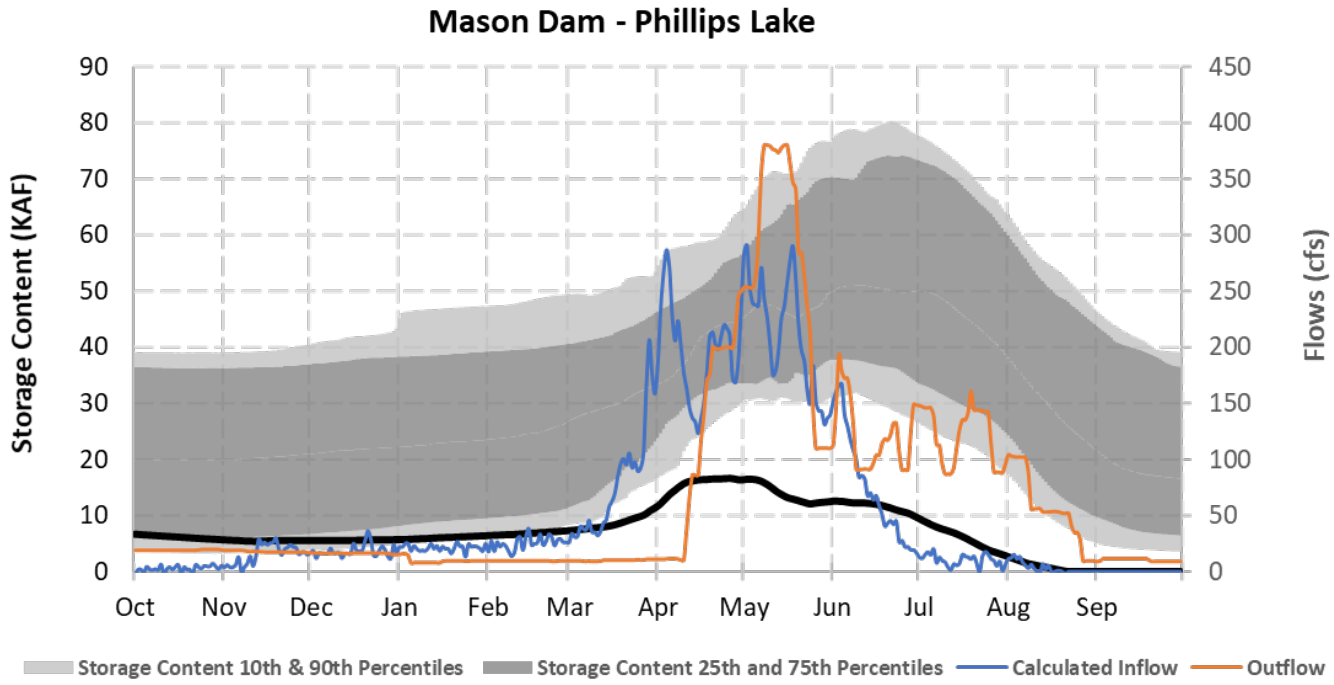




*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

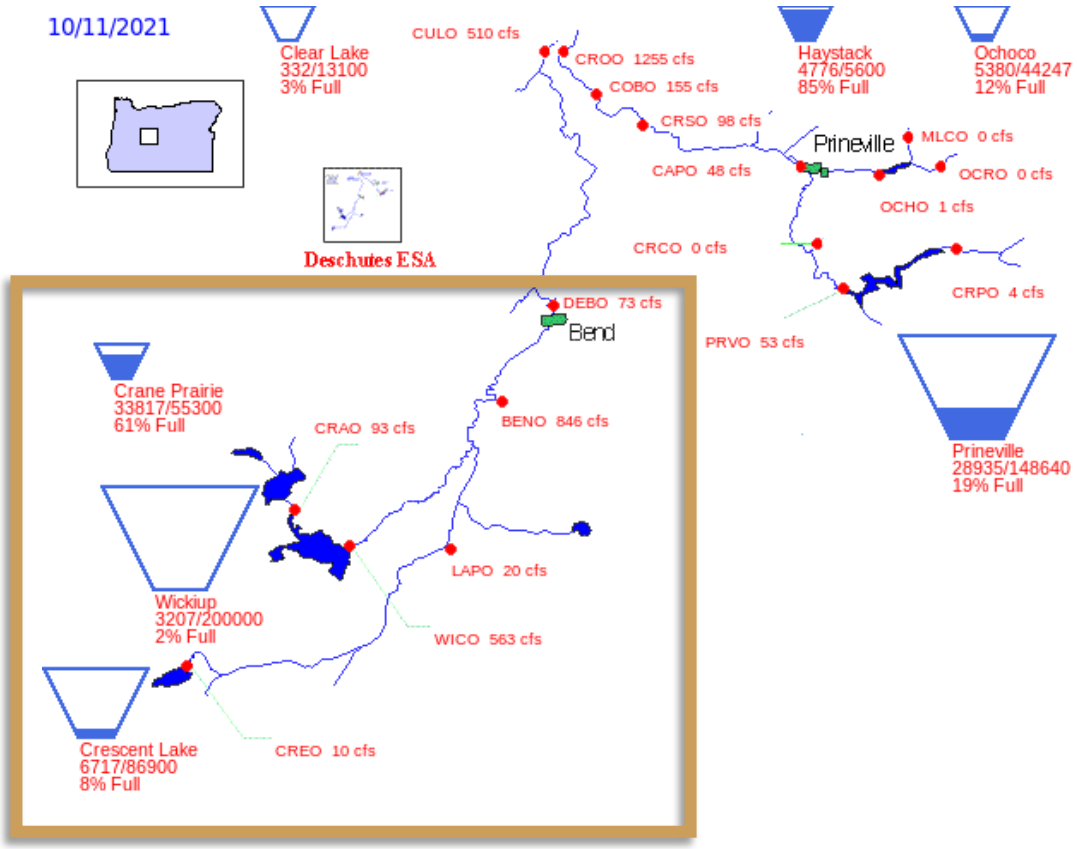
Powder River Basin

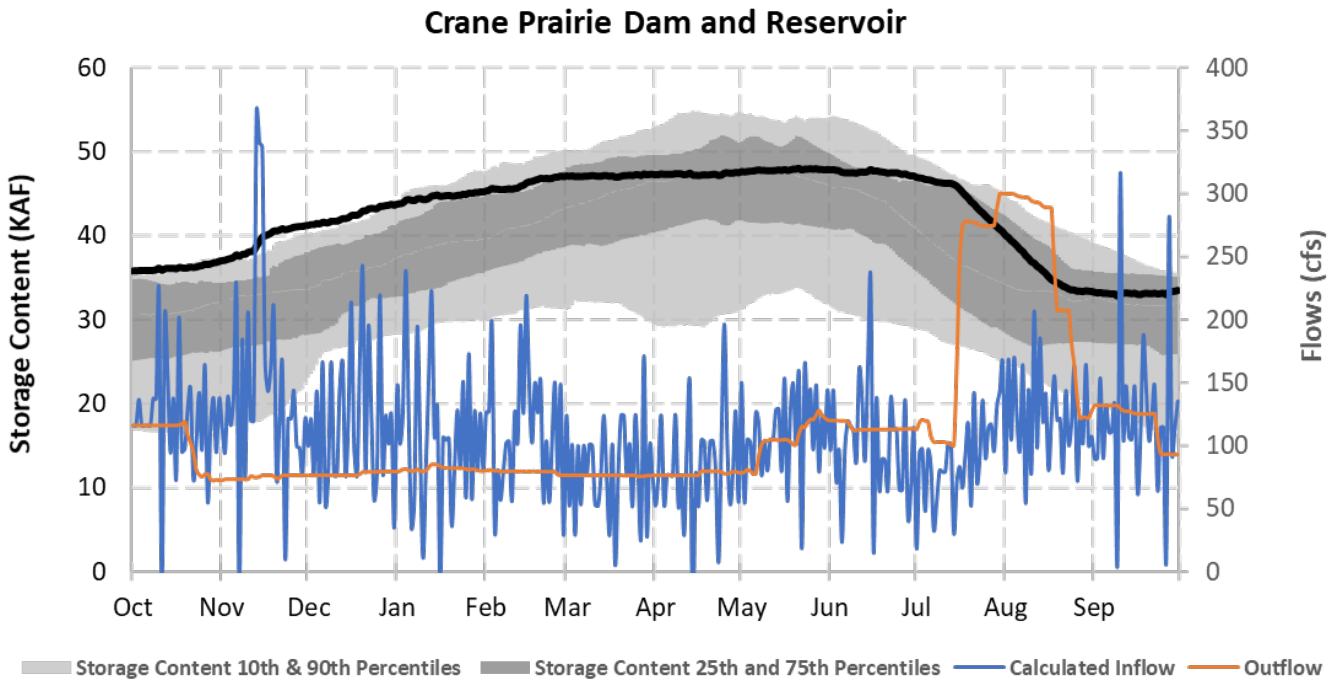


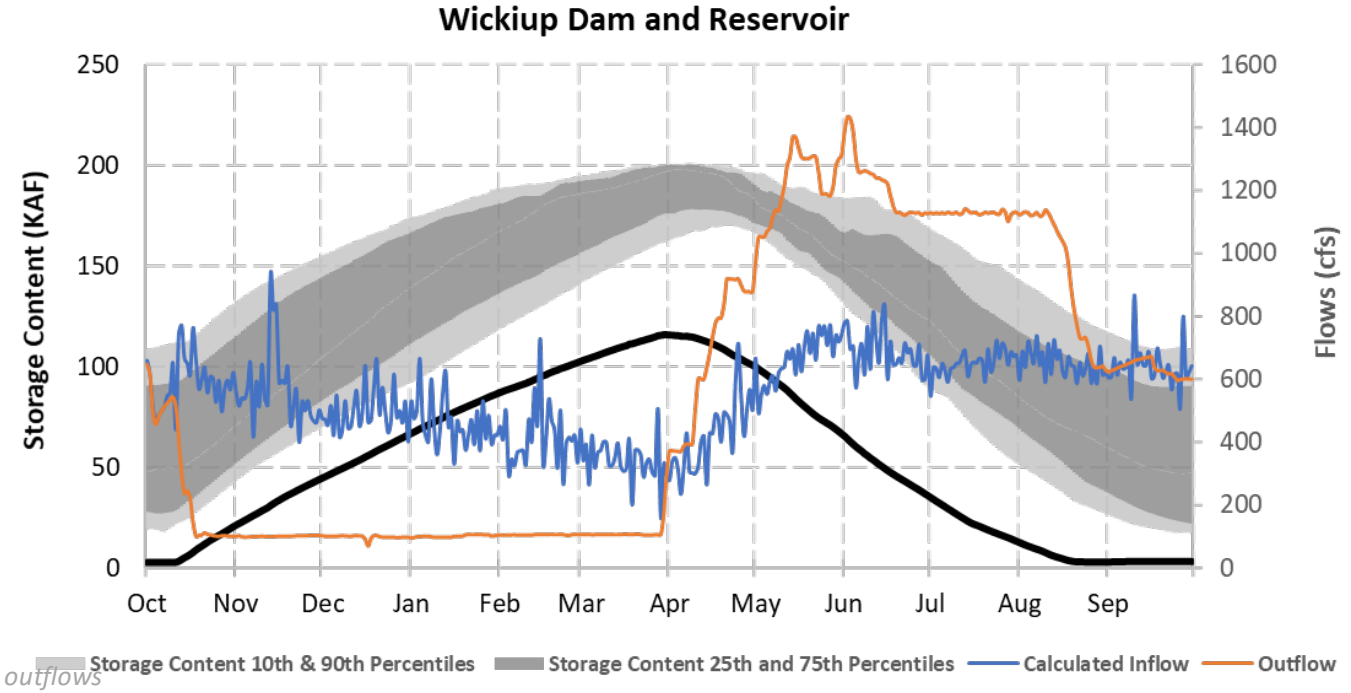


*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Deschutes River Basin

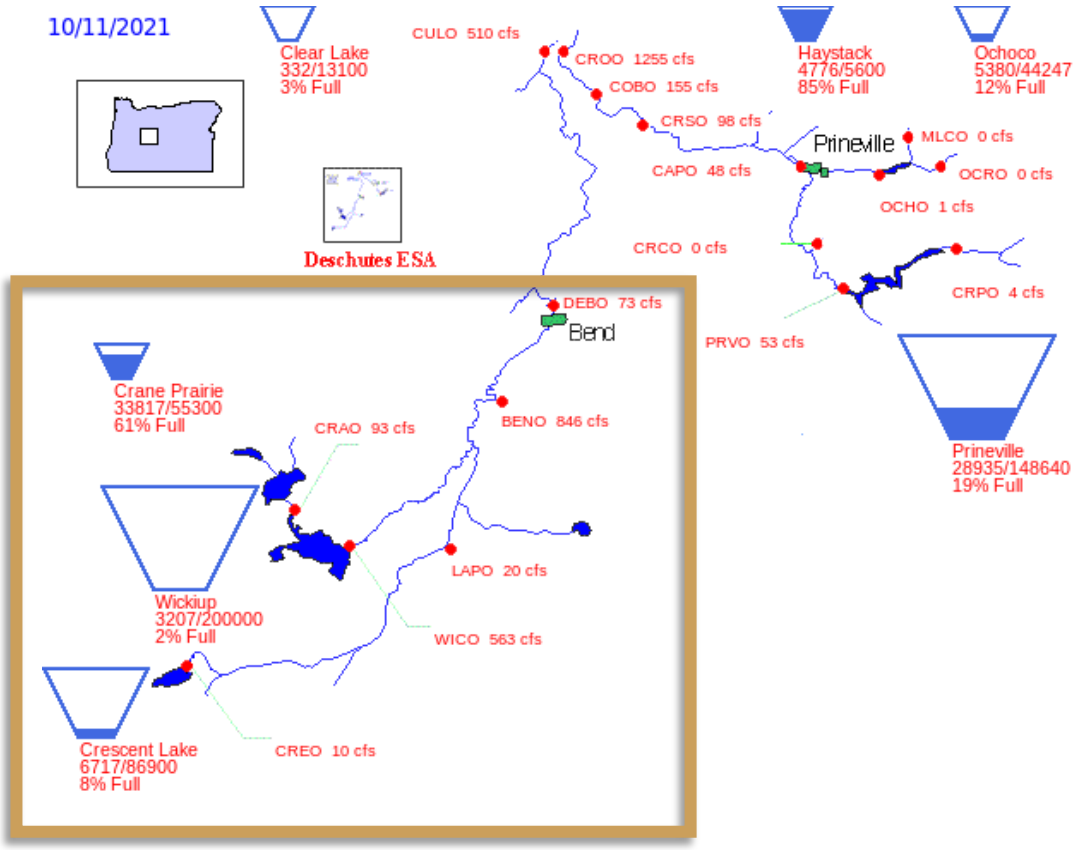


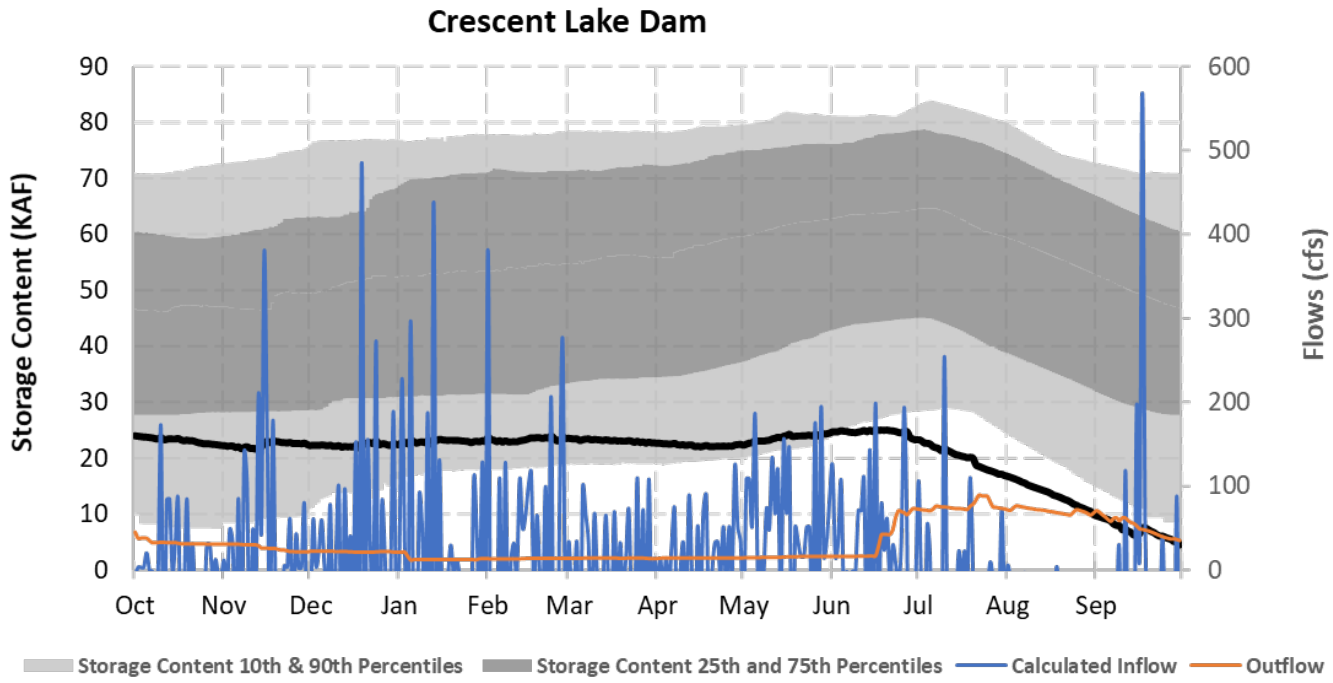




*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

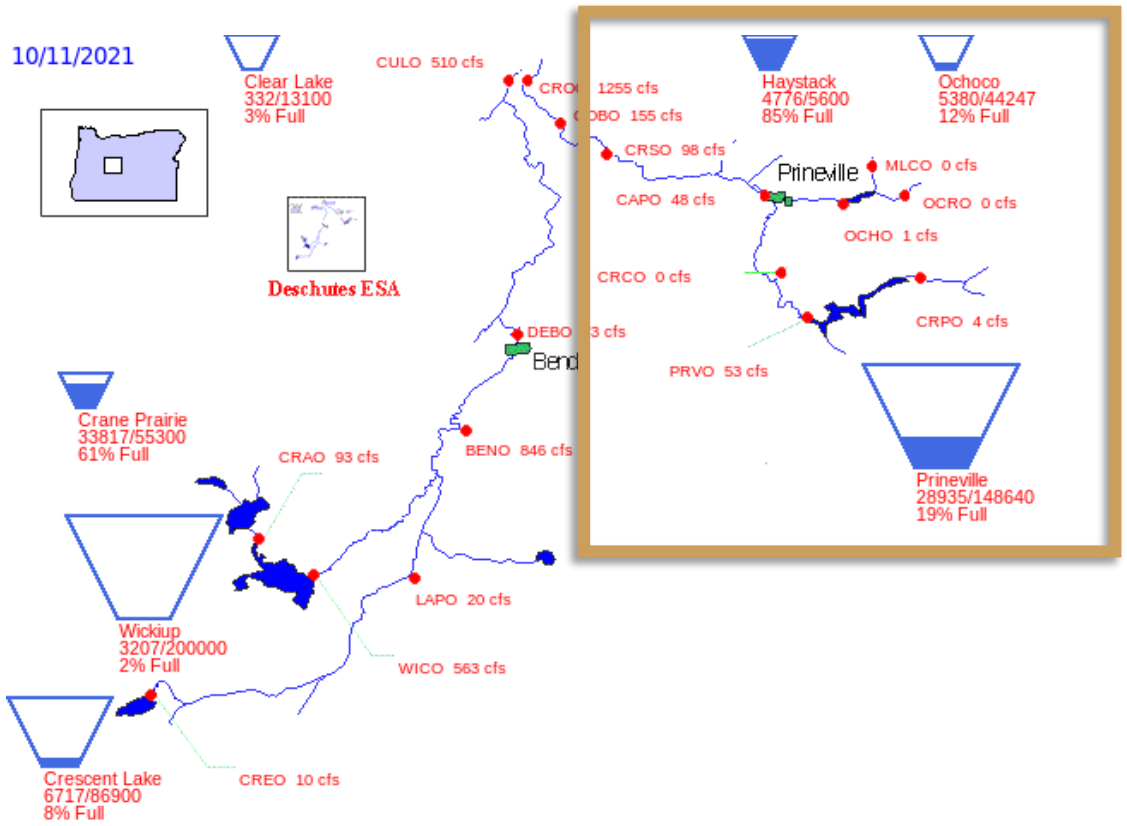
Deschutes River Basin

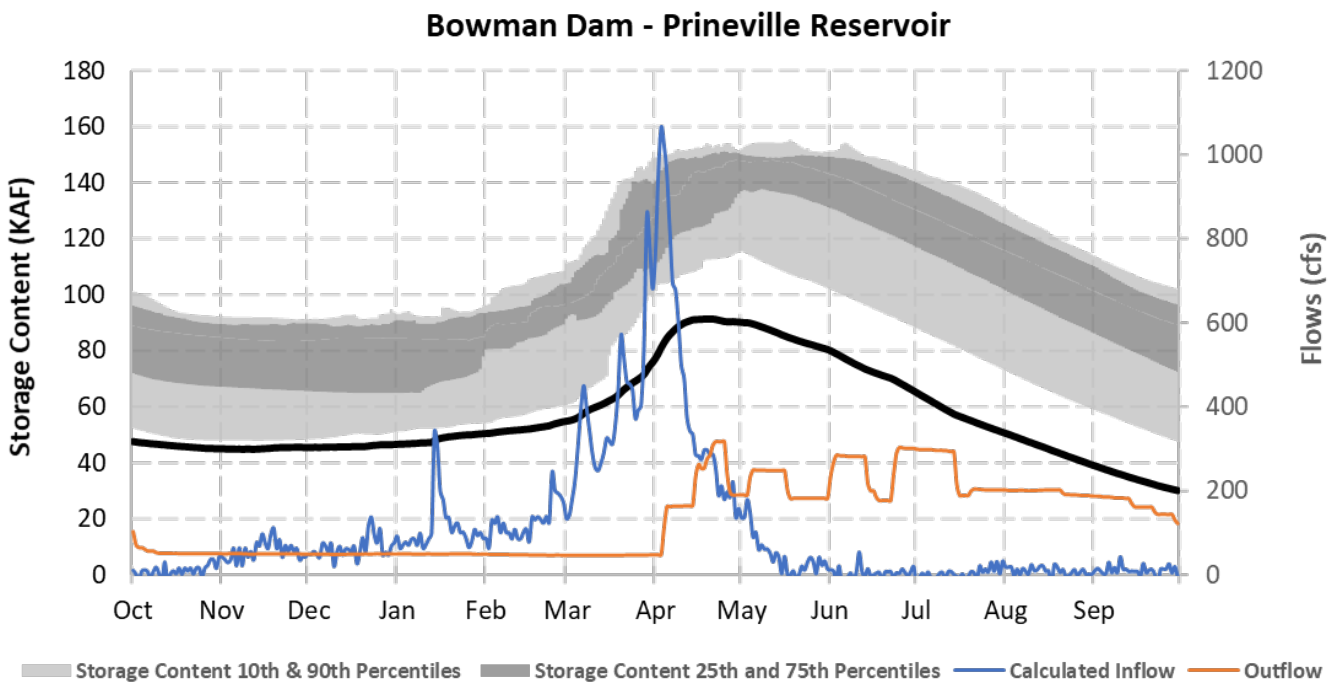


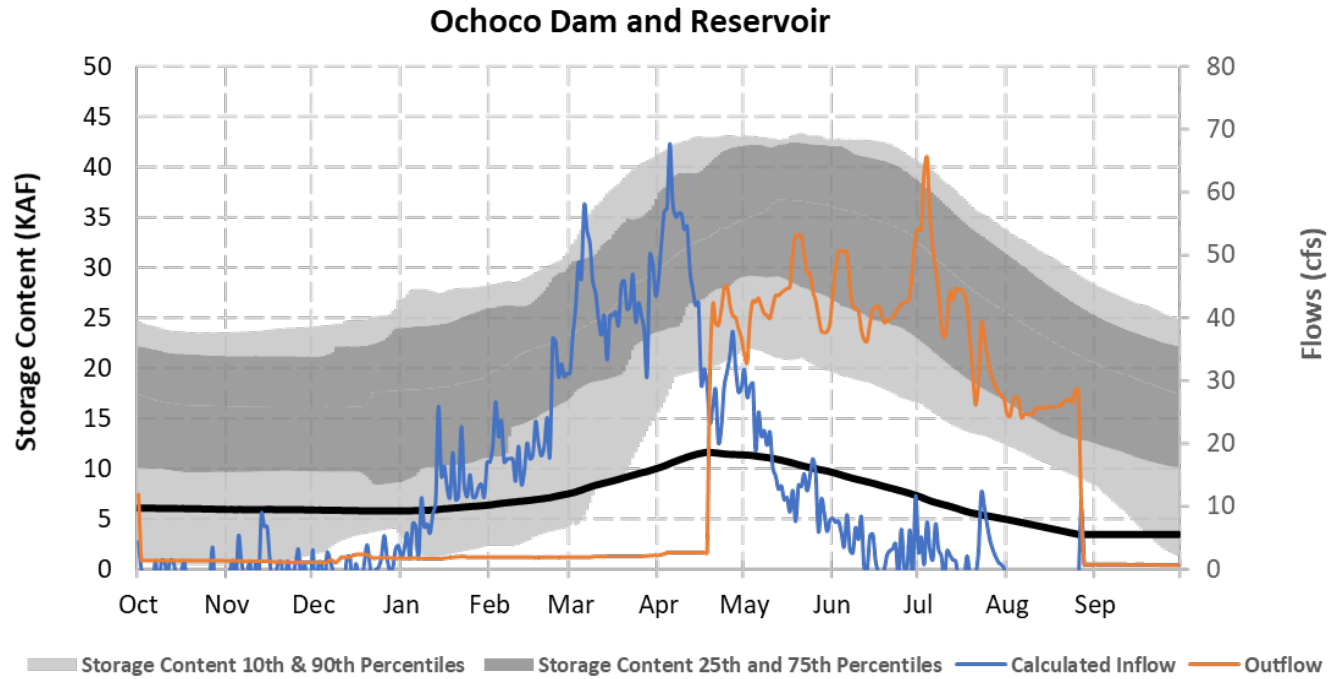


*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Crooked River Basin



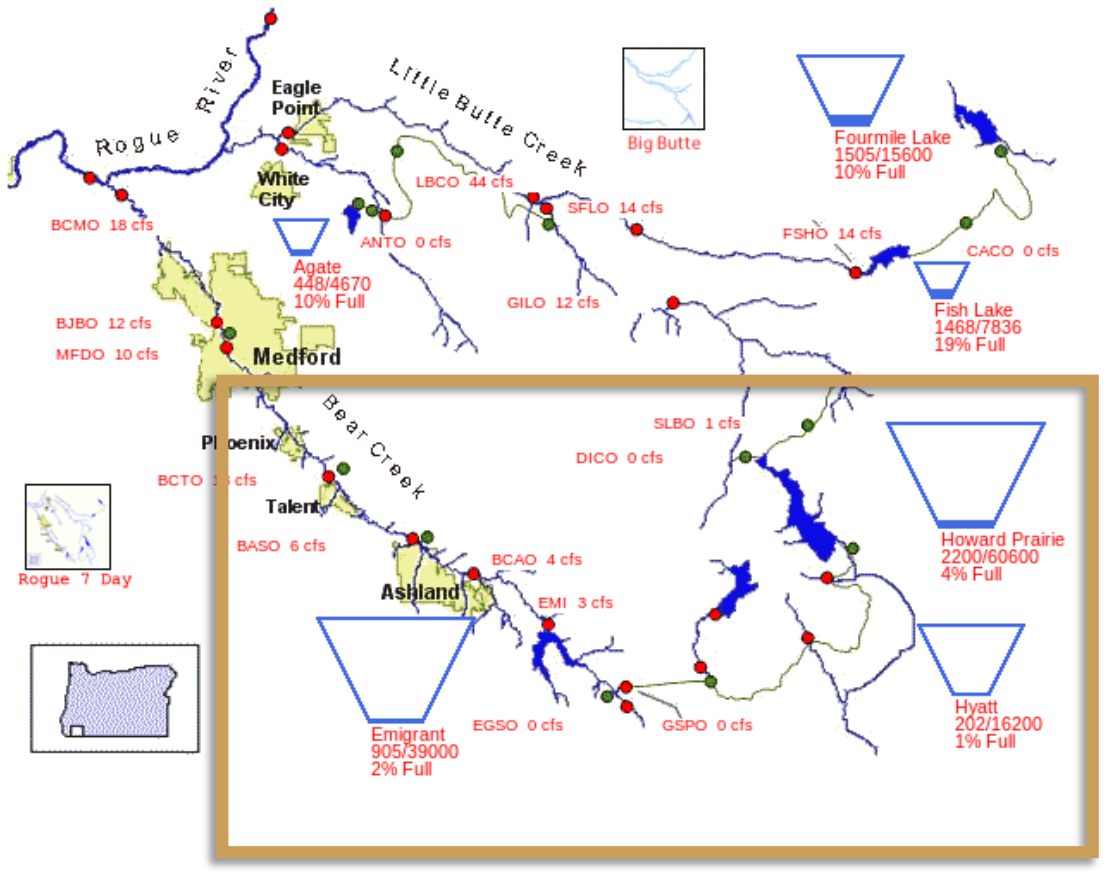


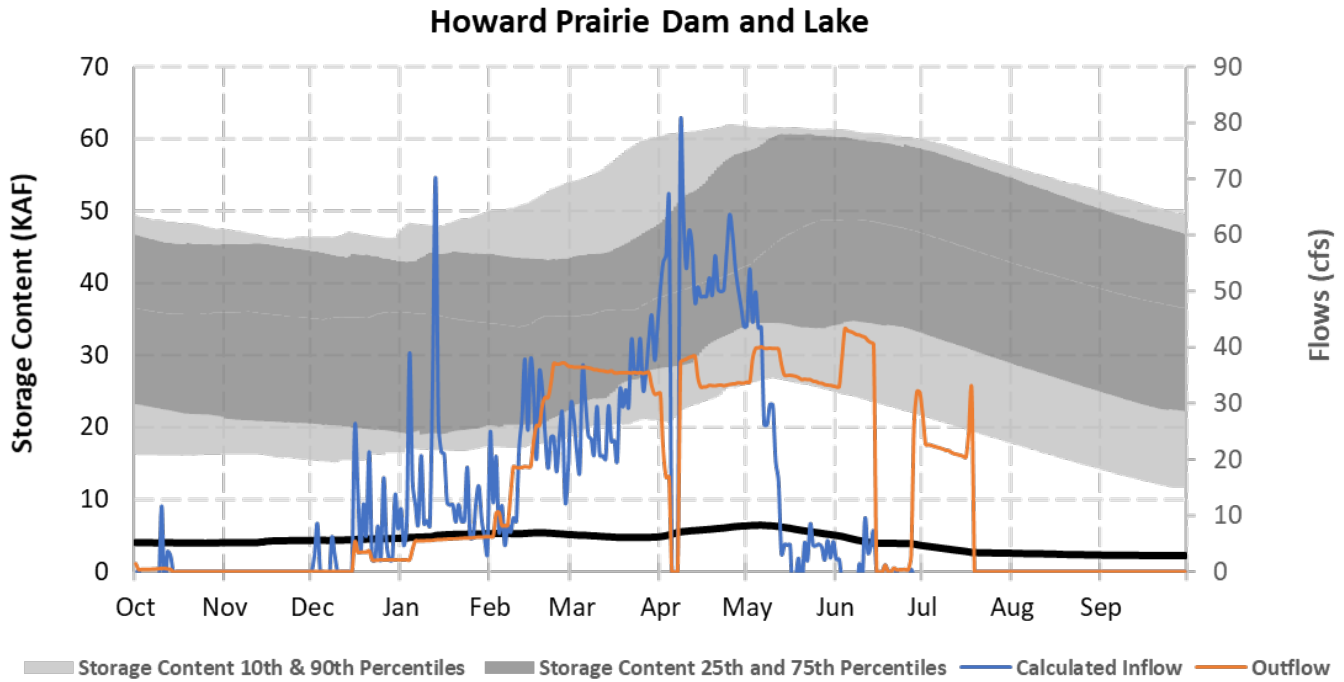


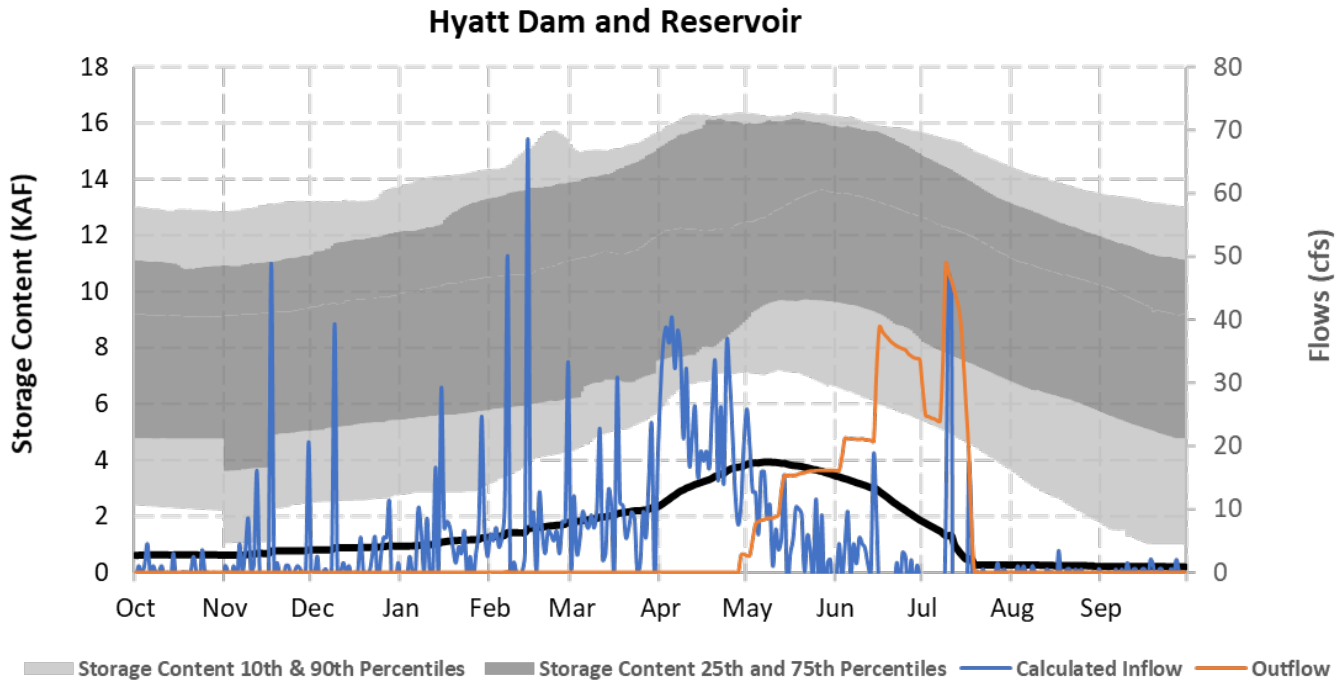
*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Rogue River Basin

10/11/2021



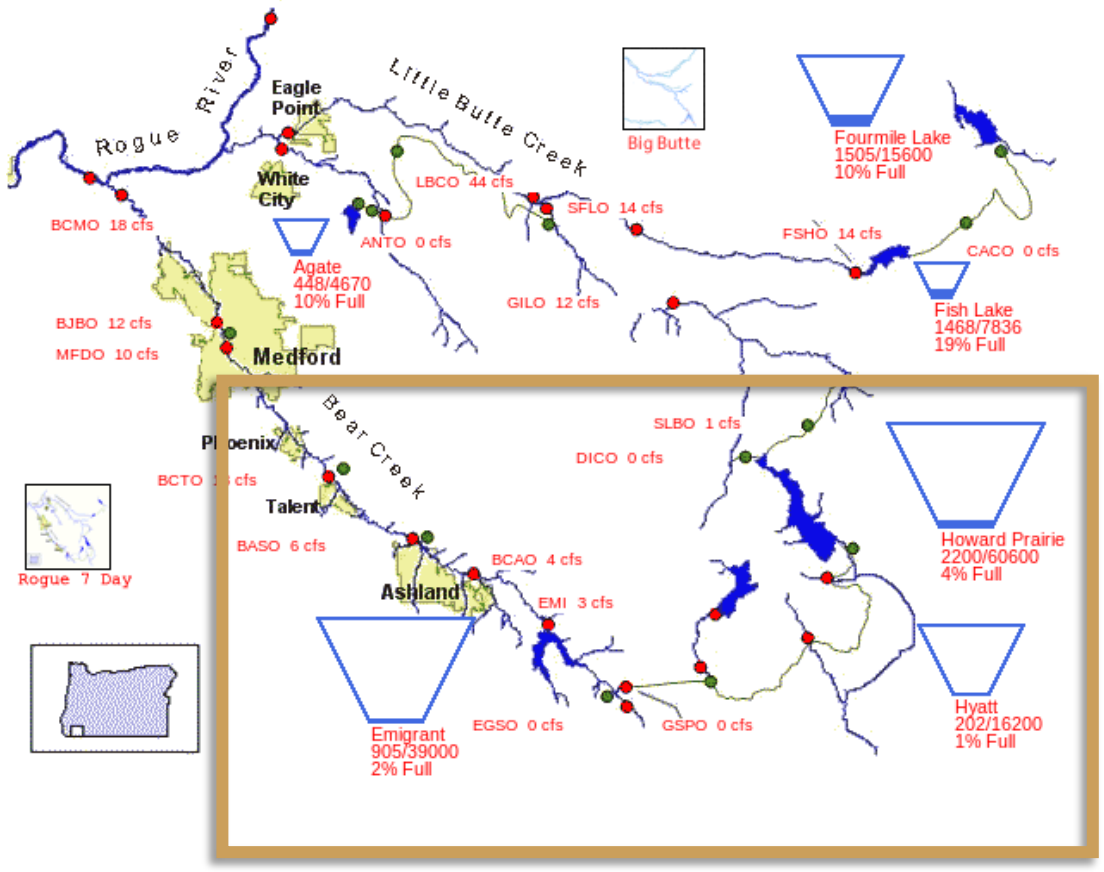


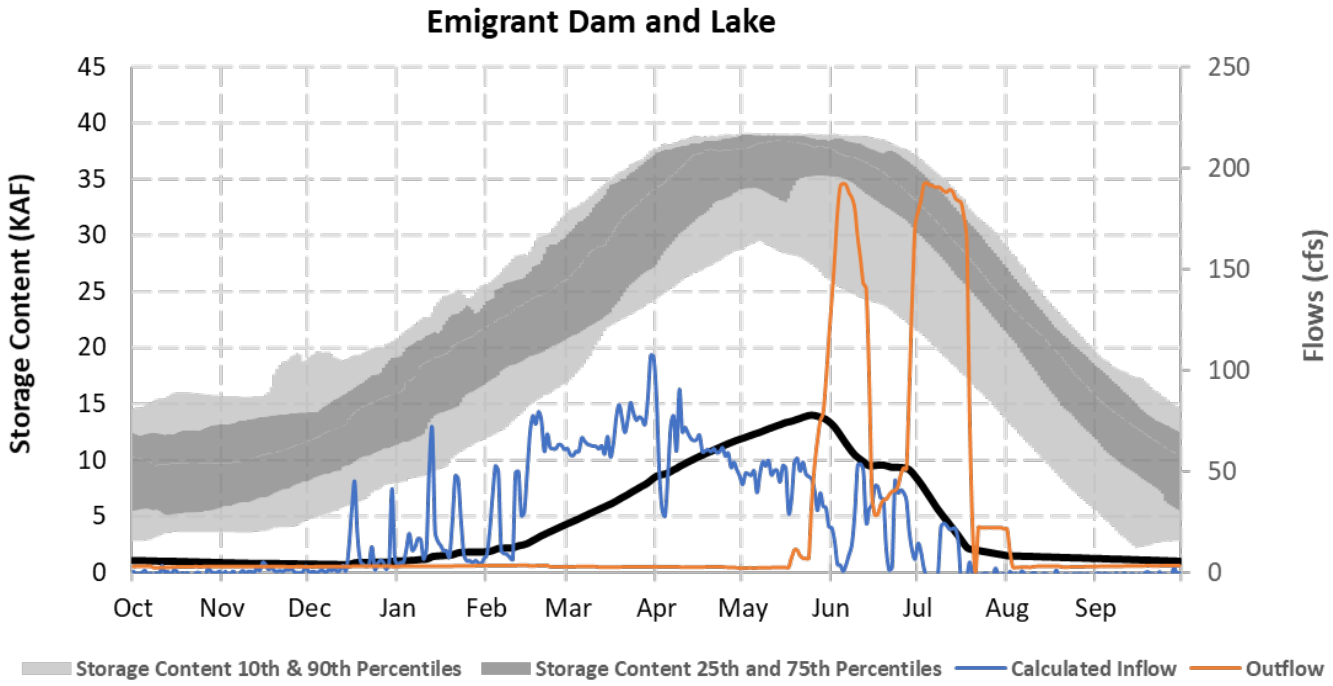


*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Rogue River Basin

10/11/2021

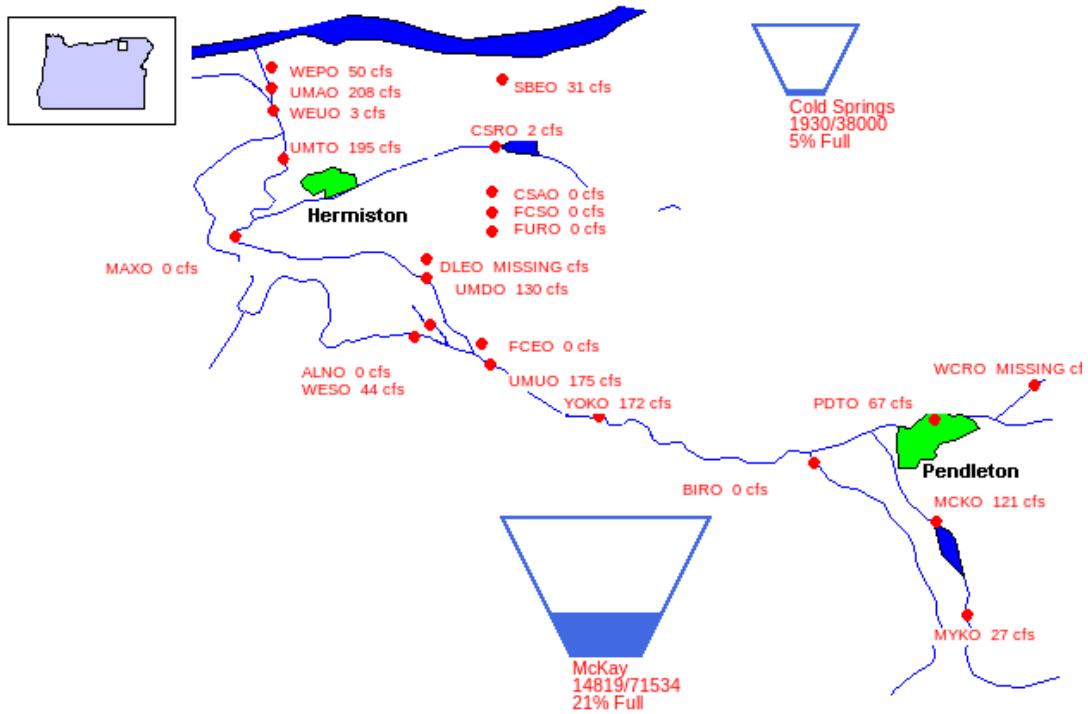


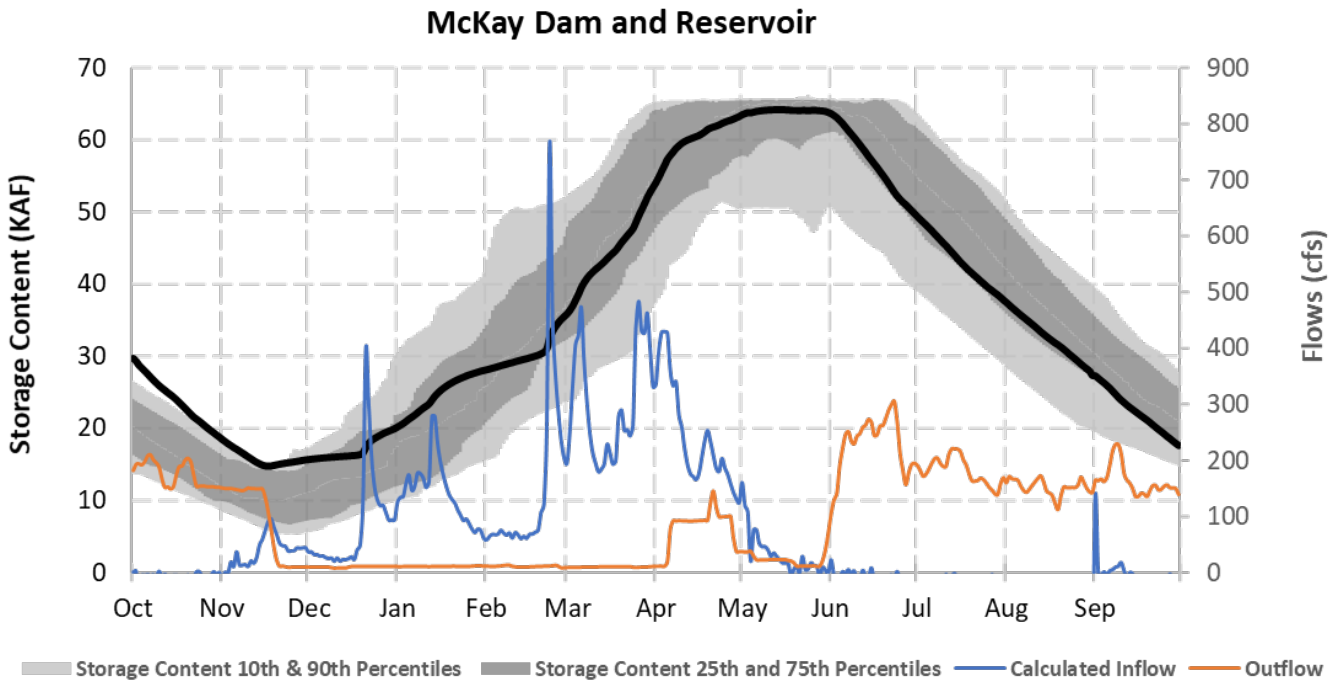


*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Umatilla River Basin

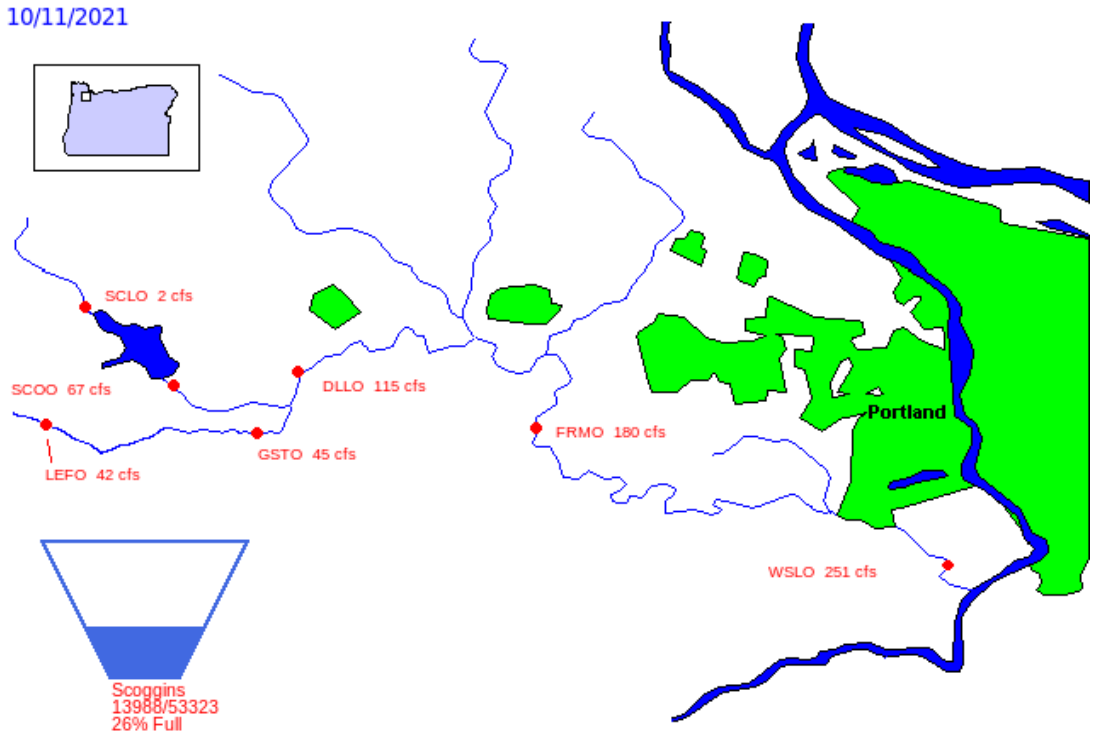
10/11/2021

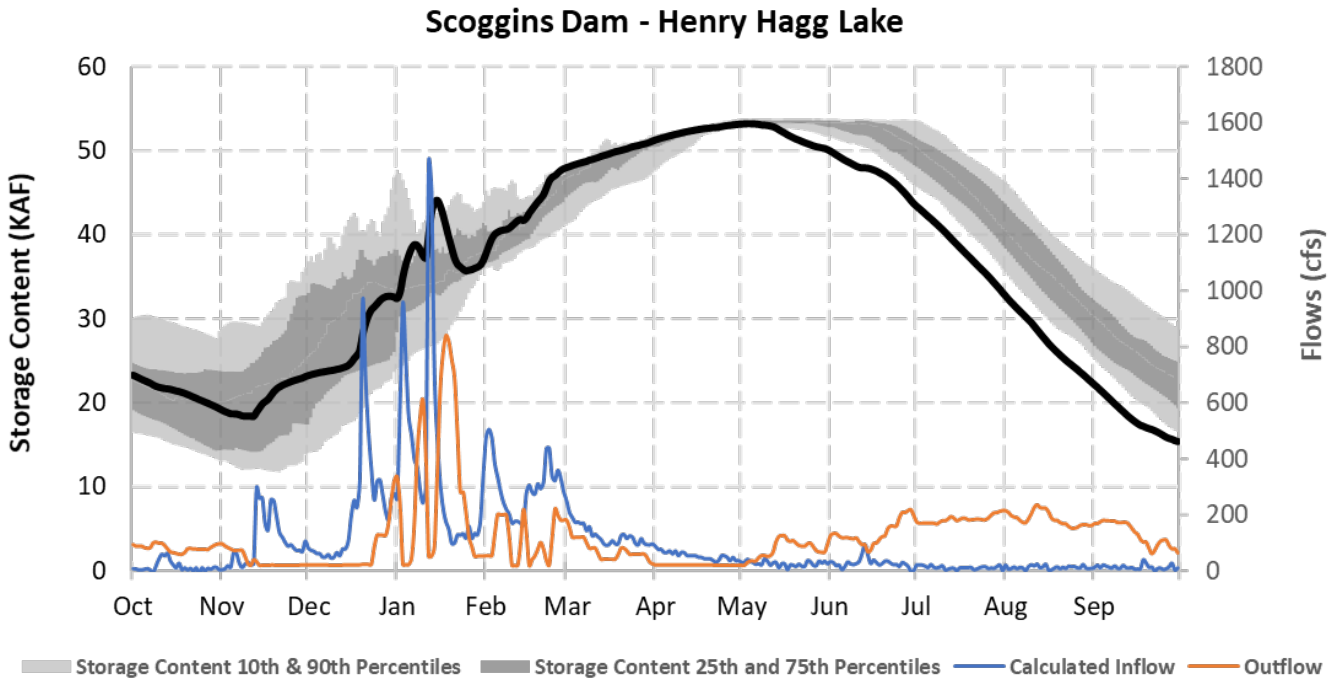




*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Tualatin River Basin





*Graphed projections are the 10th, 50th, and 90th percentile storage values based on historical inflows and outflows

Jon Rocha – Columbia Pacific Northwest Regional Office

jrocha@usbr.gov

208.378.6213

BUREAU OF RECLAMATION