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May 6, 2025

MEMORANDUM

TO: Council Members

FROM: Dan Hua and Kate Self

SUBJECT: Basin Climate and Water Supply Outlook

BACKGROUND:

Presenter: Amy Burke, Senior Hydrologist, Northwest River Forecast Center, NOAA

Summary: Amy Burke will provide an update on current hydrologic and climatic conditions and seasonal water supply forecasts for the Columbia Basin. She will provide a brief background on the methods used by NOAA to develop the forecasts and discuss the current conditions and expectations for the upcoming water management season. This information is critical for informing decisions regarding dam management, hydropower production and fisheries operations across the Basin.

Relevance: The Mainstem Hydrosystem Flow and Passage strategy and the Climate Change strategy of the 2014/2020 Fish and Wildlife Program both call for the federal agencies to implement measures to better understand and track climate and river conditions and to use that information to identify and implement hydrosystem management actions that protect and improve conditions for fish. In addition, several applications of water supply forecasting for various seasonal time periods of a water year, which begins in October and ends in the following September, are in hydro-regulation planning studies. These include: (1) Biological Opinion (BiOP) operations at various hydropower projects such as setting the amount of spill, minimum and maximum flow constraints or flow in turbines; (2) flood control

operations which determine how much to draft various reservoirs to absorb the freshet runoff; (3) estimating the volume and timing of water to be released from Canadian reservoirs according the Columbia River Treaty; and (4) setting hydro-regulations to ensure a high probability of refill for all reservoirs at the end of the water year. Results from these studies enable planners to determine operations of the hydrosystem projects, which include hydropower generation over the water year.

Background: Climate and water supply forecasting is a critical component of annual water management for Columbia River system operations. It also informs long-term planning and decision-making on operations that affect both hydropower supply and fish passage and survival. Annual planned actions for reservoir operations and fish passage during the fish migration seasons are described in the Corps of Engineers' 2025 [Water Management Plan](#) and [Fish Passage Plan](#). In-season adjustments on dam and reservoir operations to accommodate changing conditions are discussed and considered through regional forum processes such as the [Technical Management Team](#). All of these discussion and decision-making processes utilize the information provided on Basin water supply and runoff forecasting.

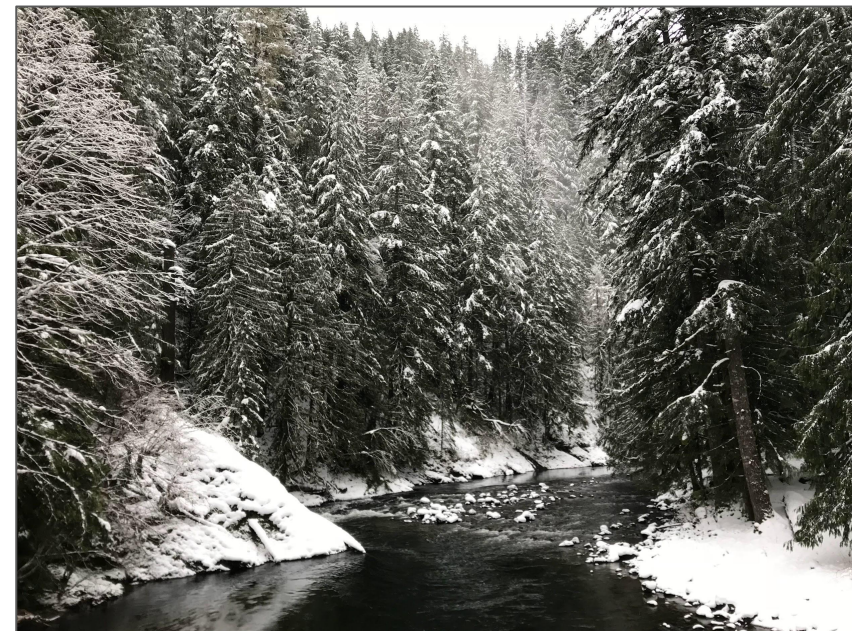
More Info: Forecast information and maps are available on the [Northwest River Forecast Center](#) website.



Northwest River Forecast Center

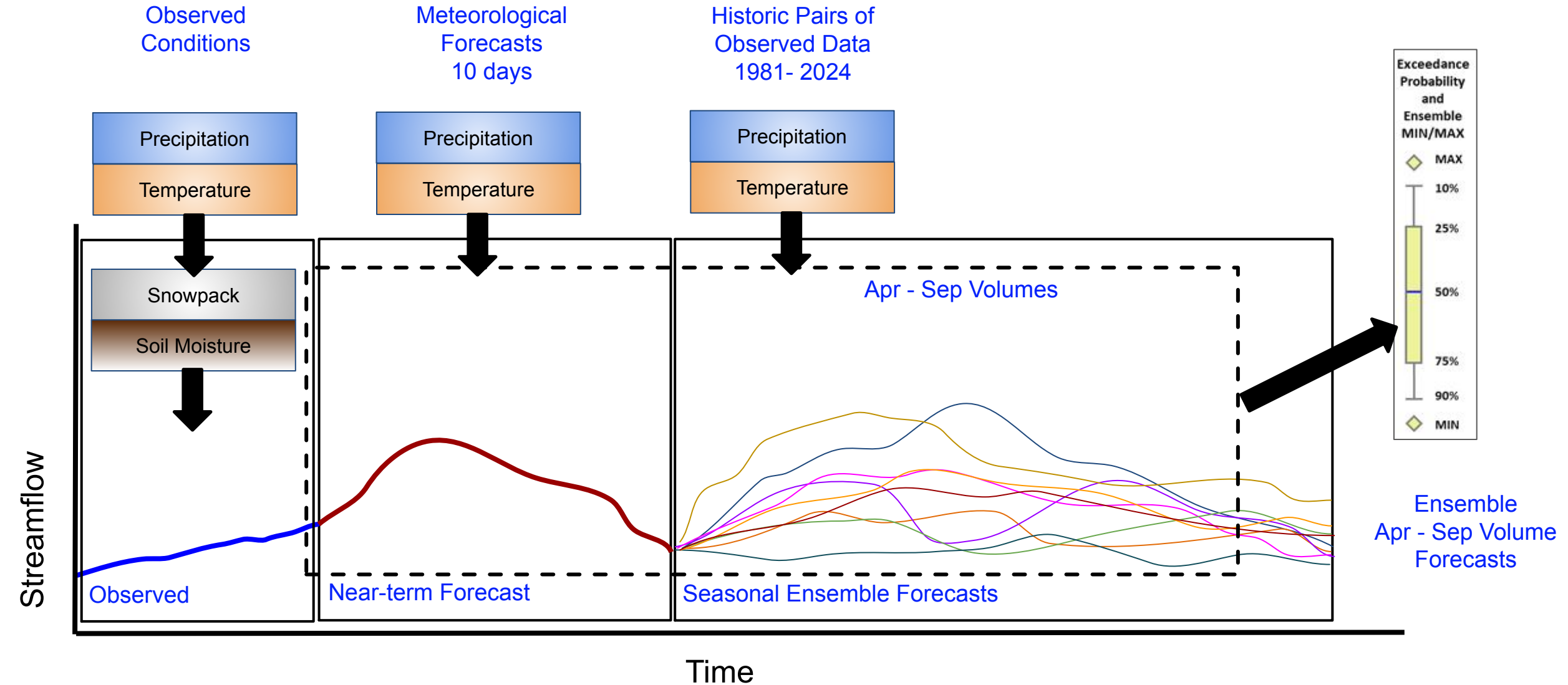
May 2025 Water Supply Briefing NPCC

Amy Burke, Senior Hydrologist
NWRFC.watersupply@noaa.gov

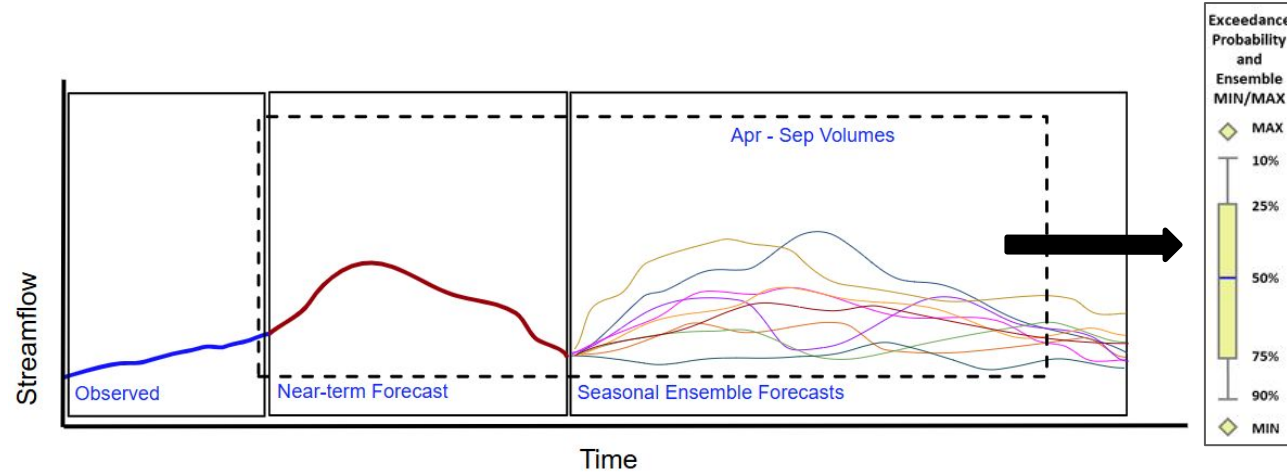


- April and May so far have been warm and dry compared to normal.
- Snowpack peaked higher than normal in the south and lower than normal in the north. Rapid snowmelt is well underway across the region and early melt out is likely.
- Observed and forecast runoff have the same north/south trend with higher amounts in the south.
- Water supply forecasts decreased significantly during the recent dry April and start of May.

NWRFC Forecast Technique: Ensemble Streamflow Prediction

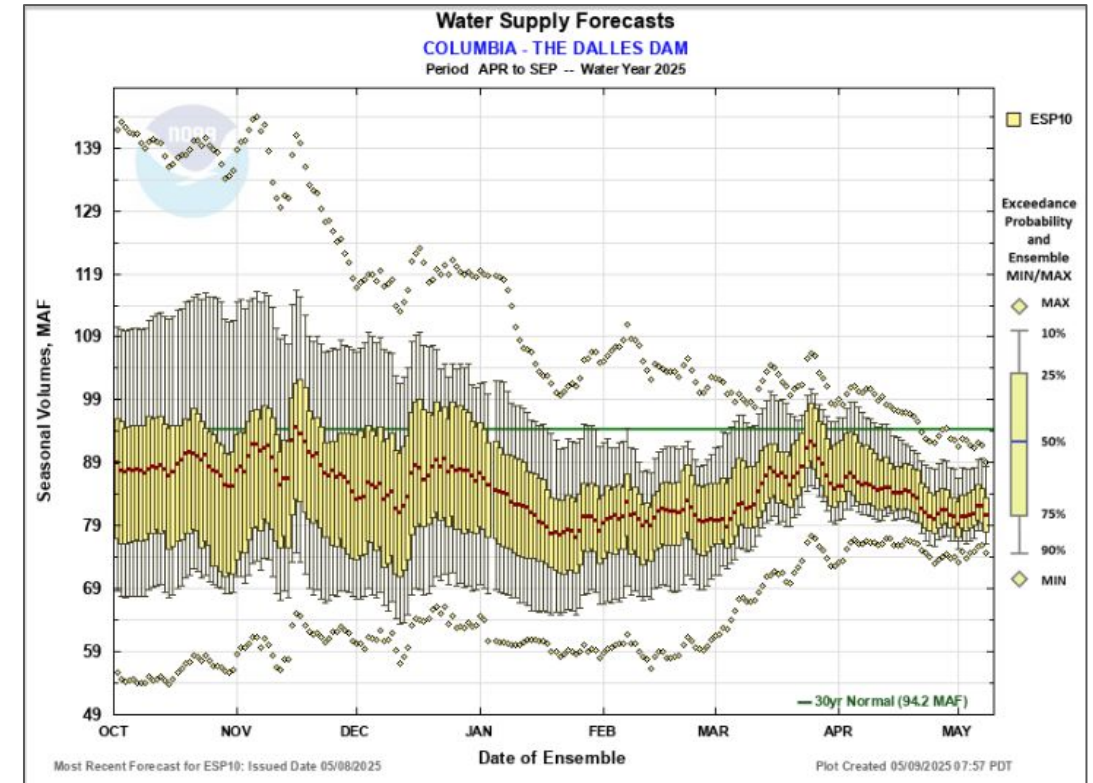


NWRFC Forecast Technique: Ensemble Streamflow Prediction

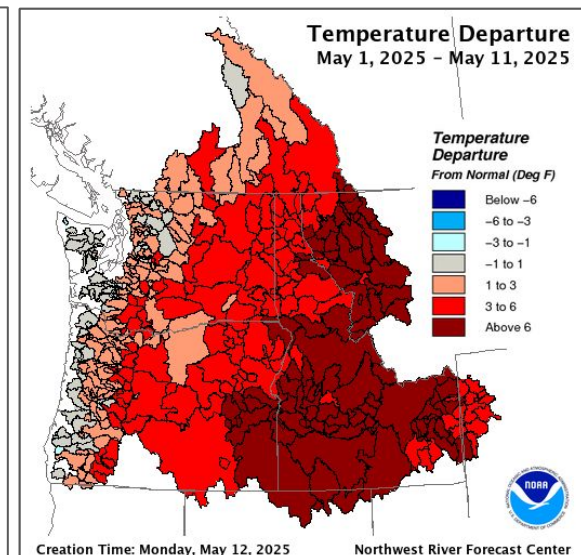
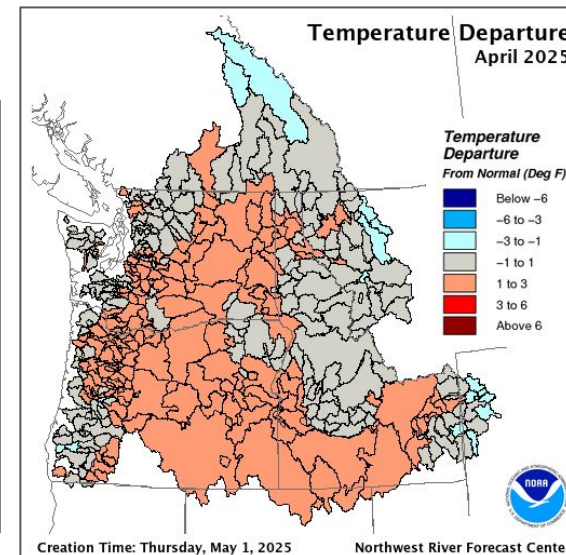
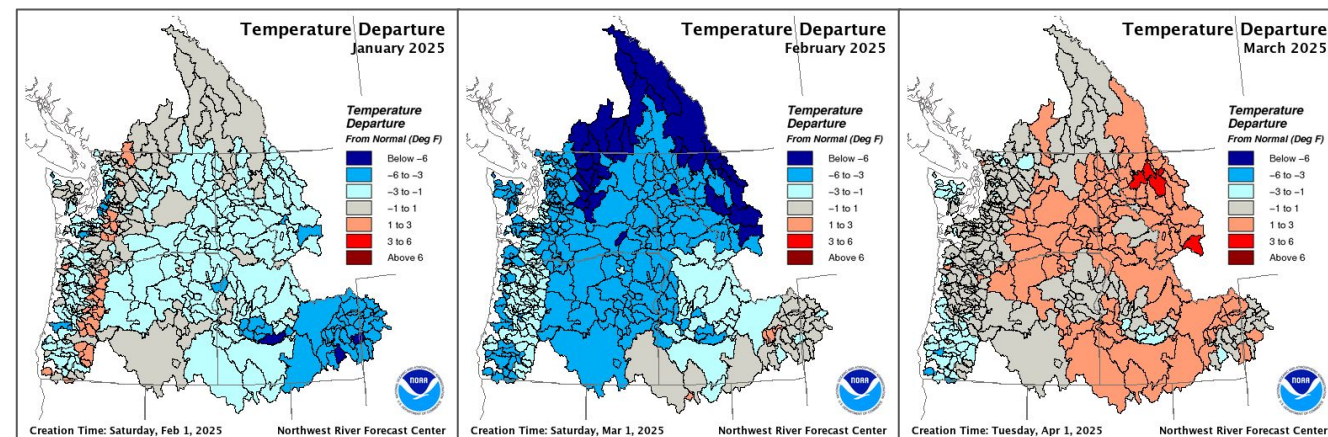
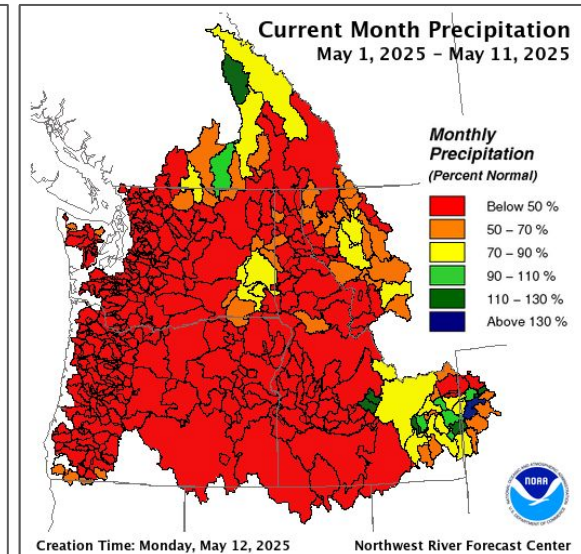
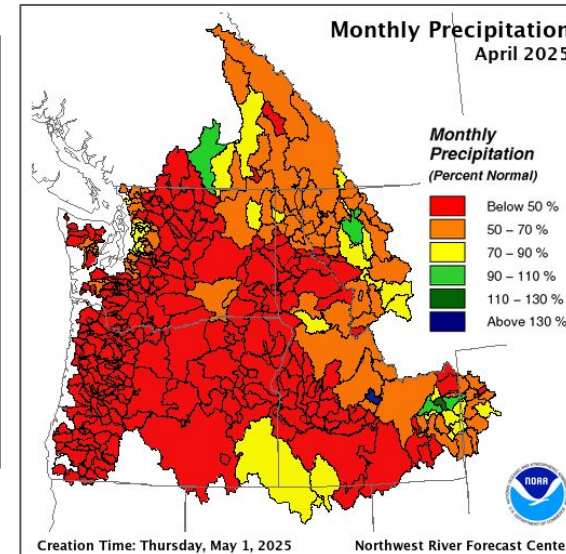
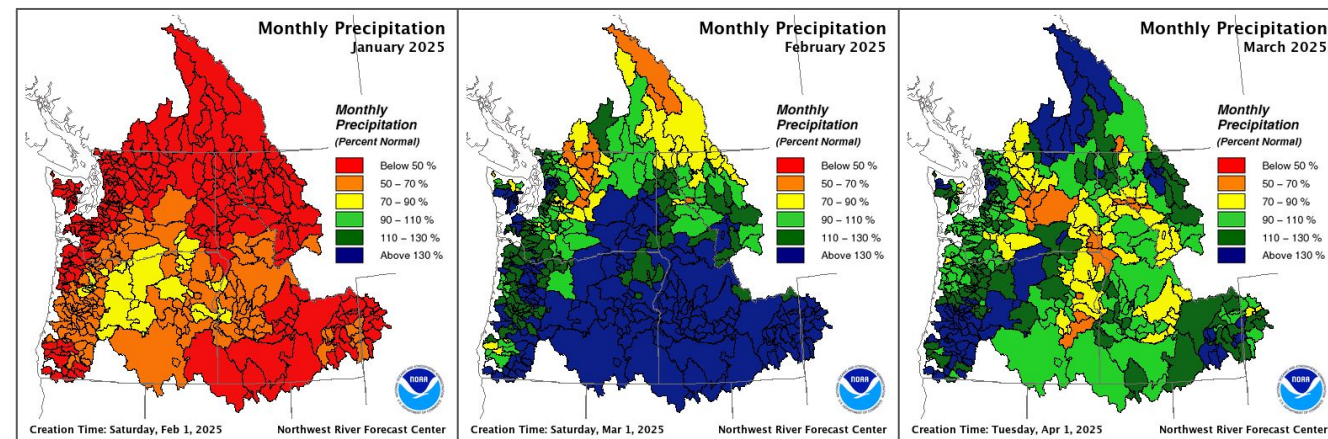


Ensemble
Apr - Sep Volume
Forecasts

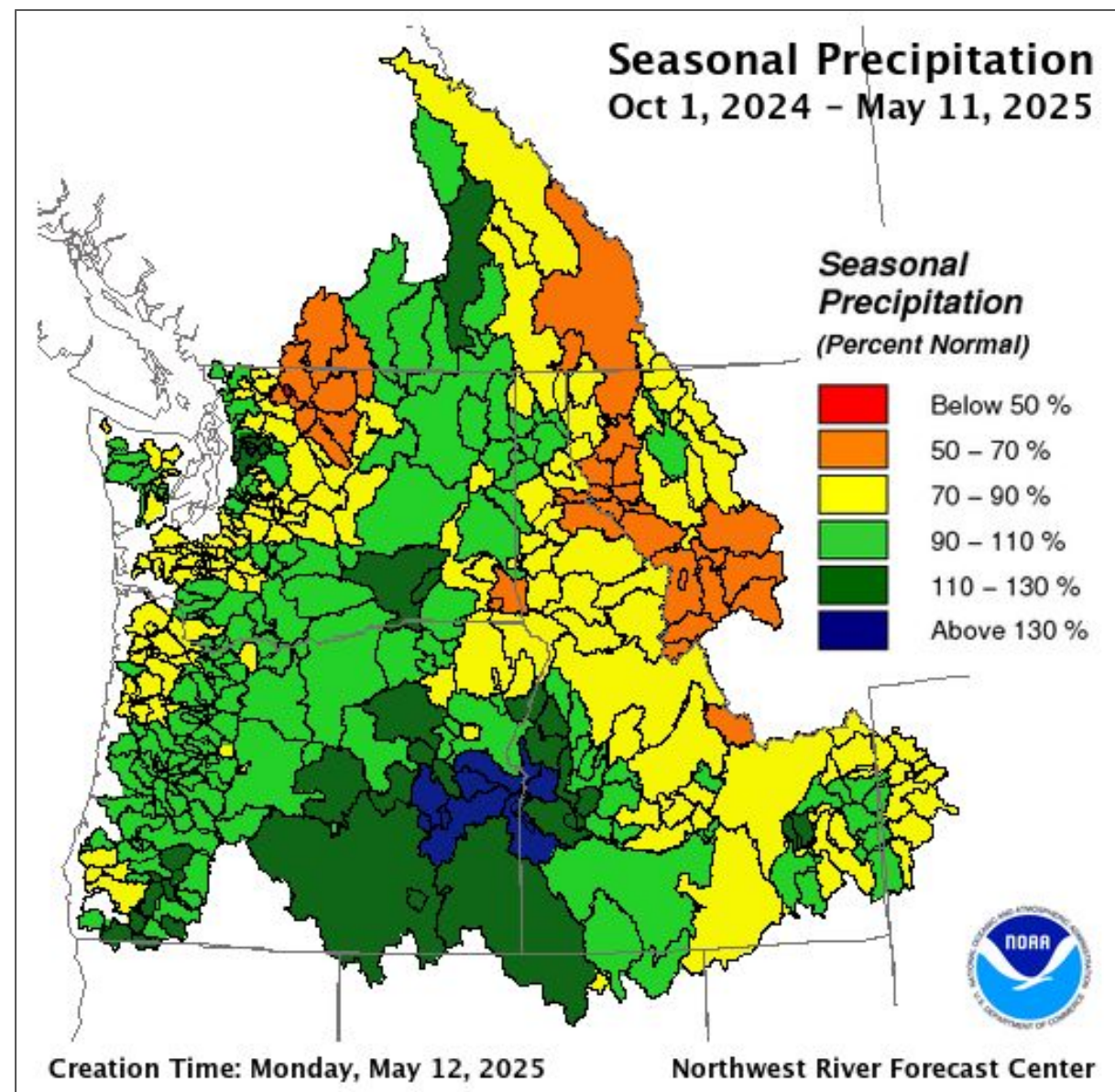
After the 10 day forecast window, river forecasts are driven by the historic temperature and precipitation data.



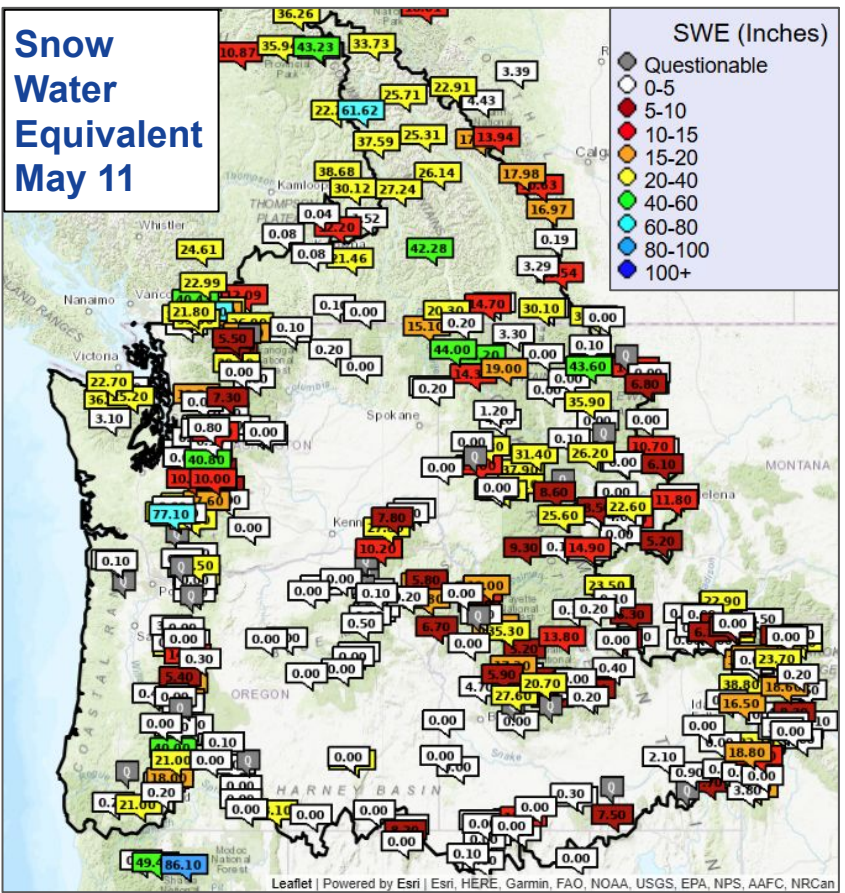
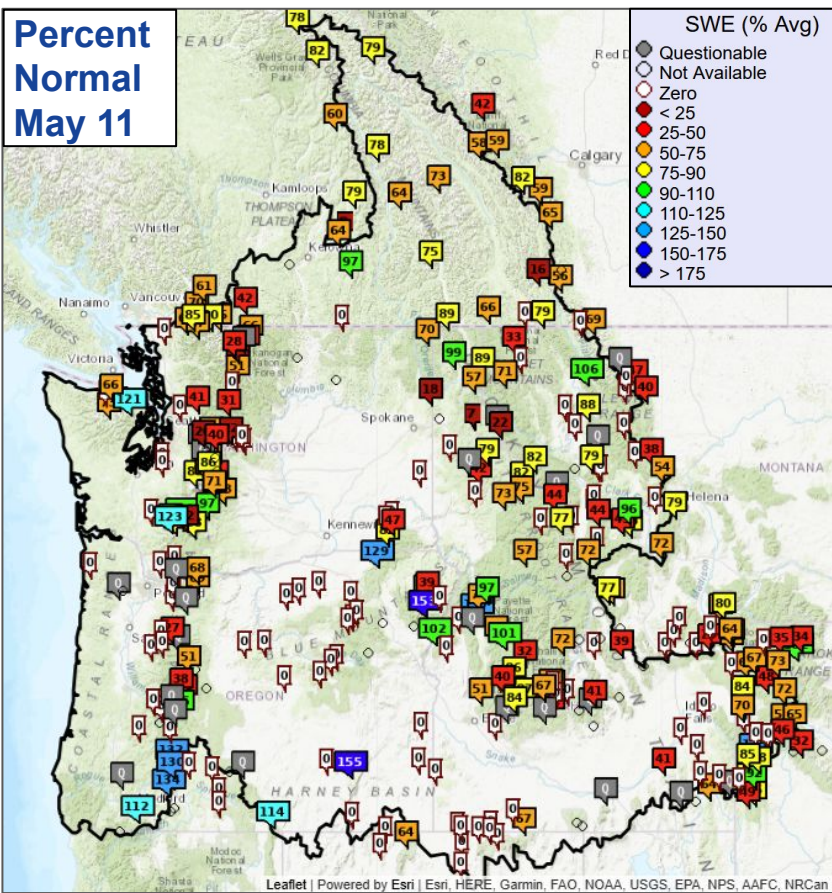
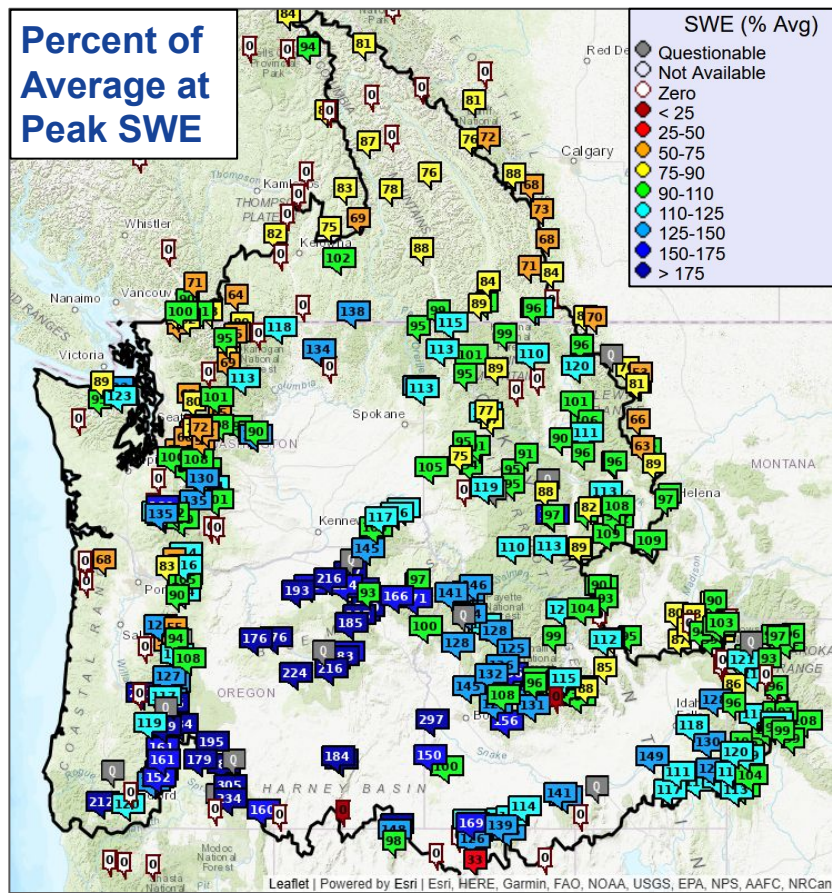
Observed Monthly Precipitation and Temperature



Water Year Precipitation



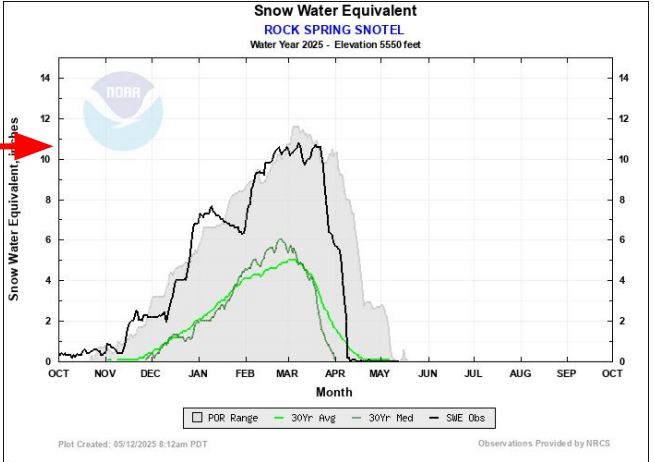
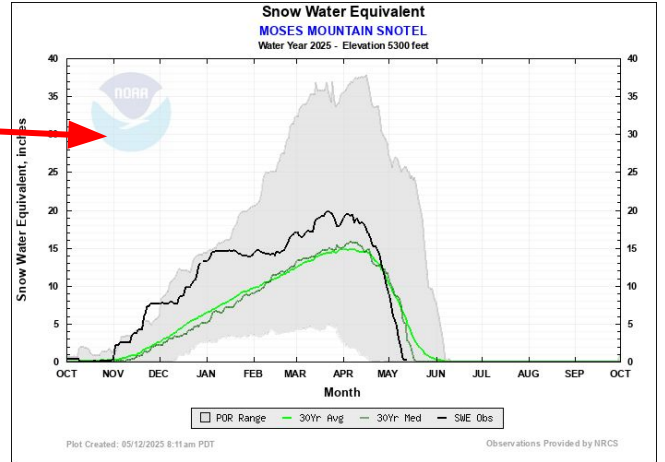
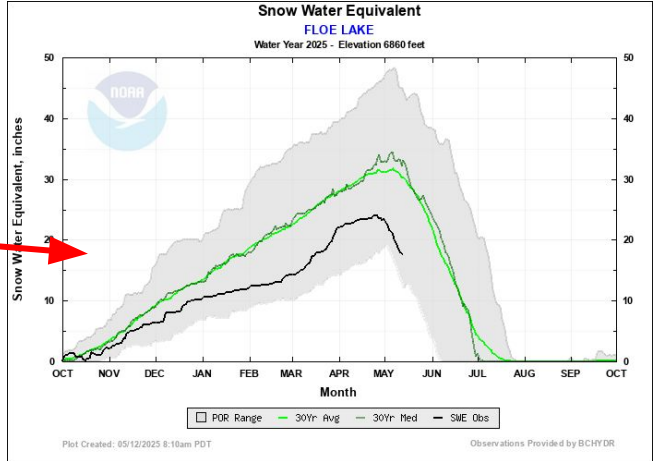
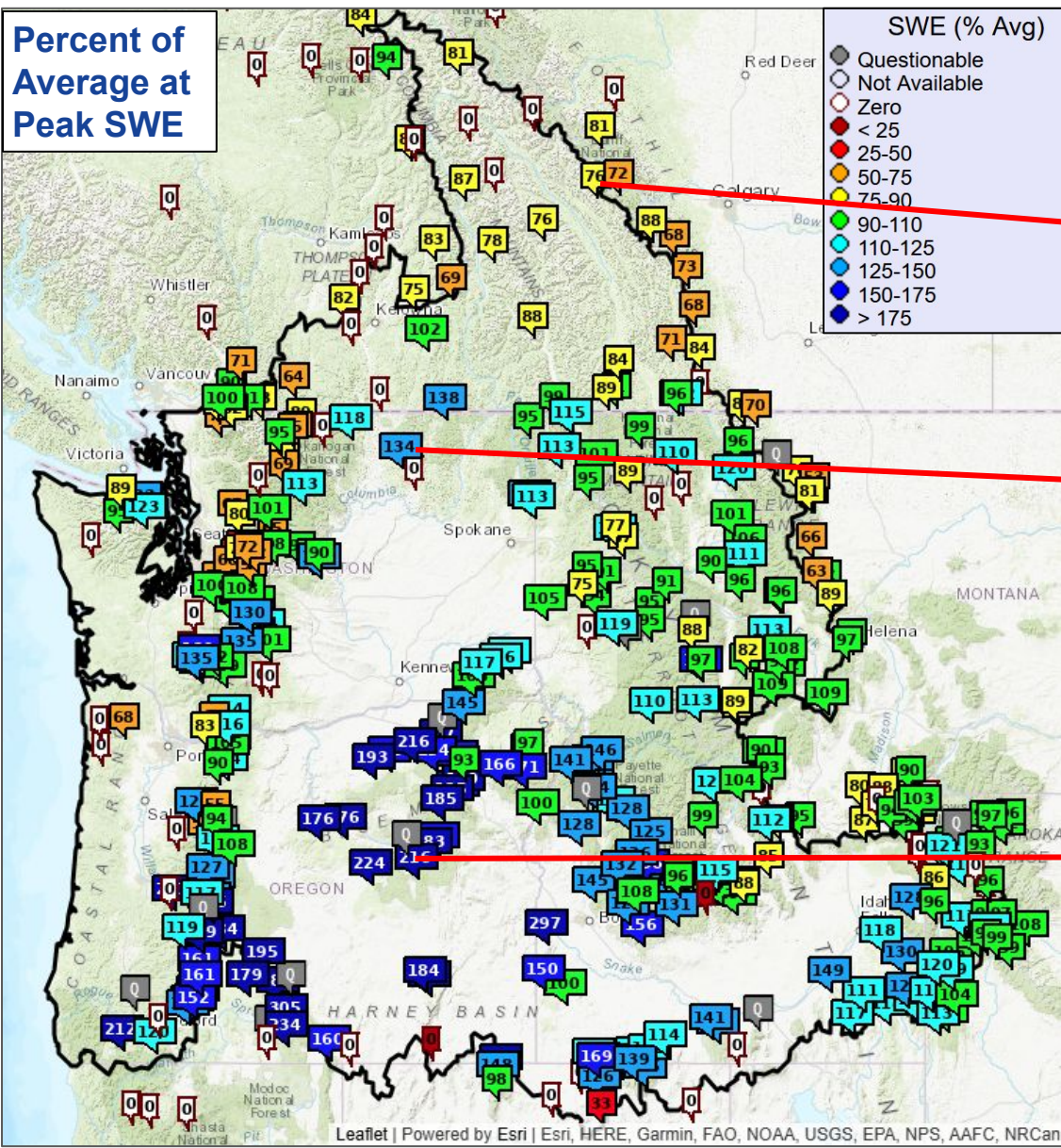
Snowpack

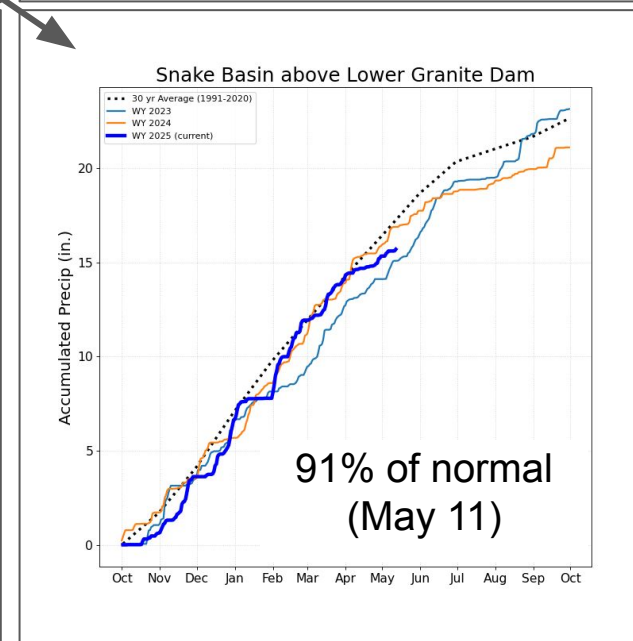
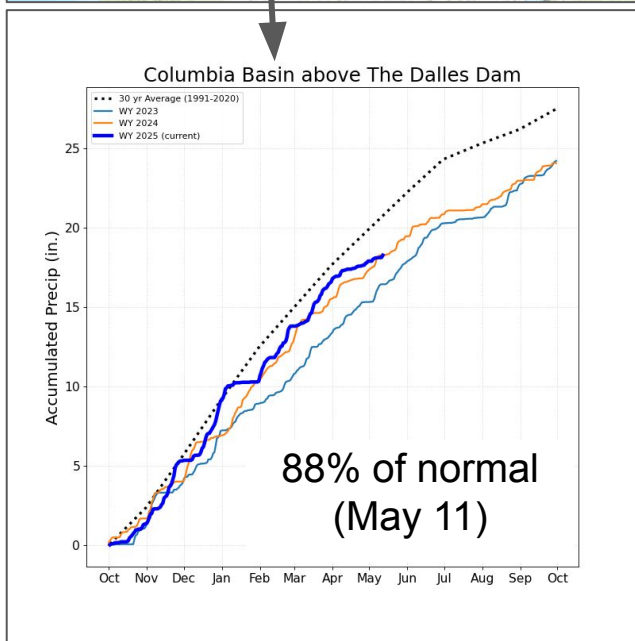
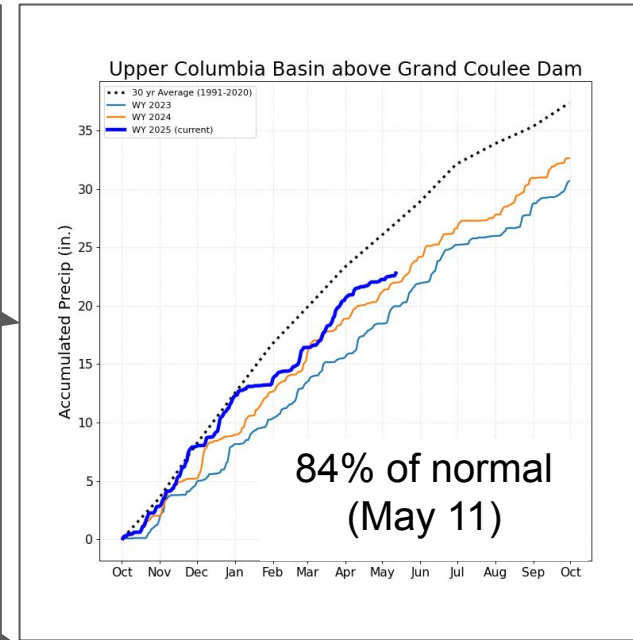


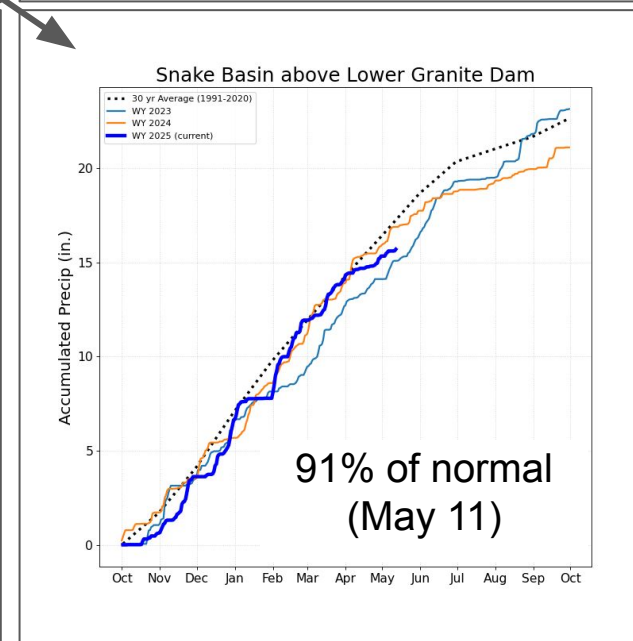
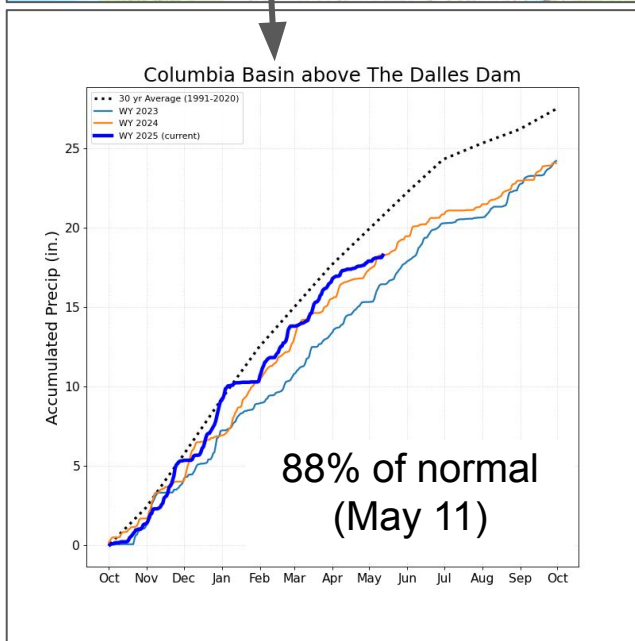
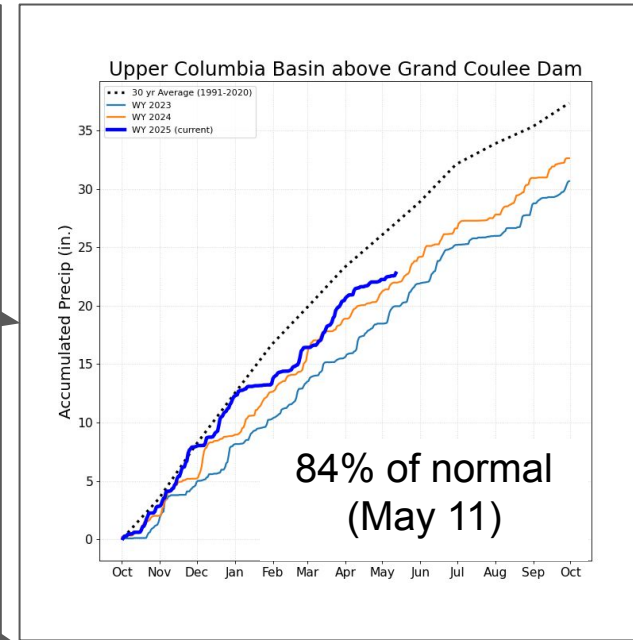
Snow data from Natural Resources Conservation Service, BC Hydro, Ministry of Environment and Climate Change Strategy, and Alberta Environment and Parks.

Snowpack

Percent of Average at Peak SWE







The dry periods is January and April/May can be seen as a flat lines in the precipitation accumulation plots.

Water Year to Date Adjusted Observed Runoff

% Normal Runoff Oct 1 - May 11

Upper Columbia Basin

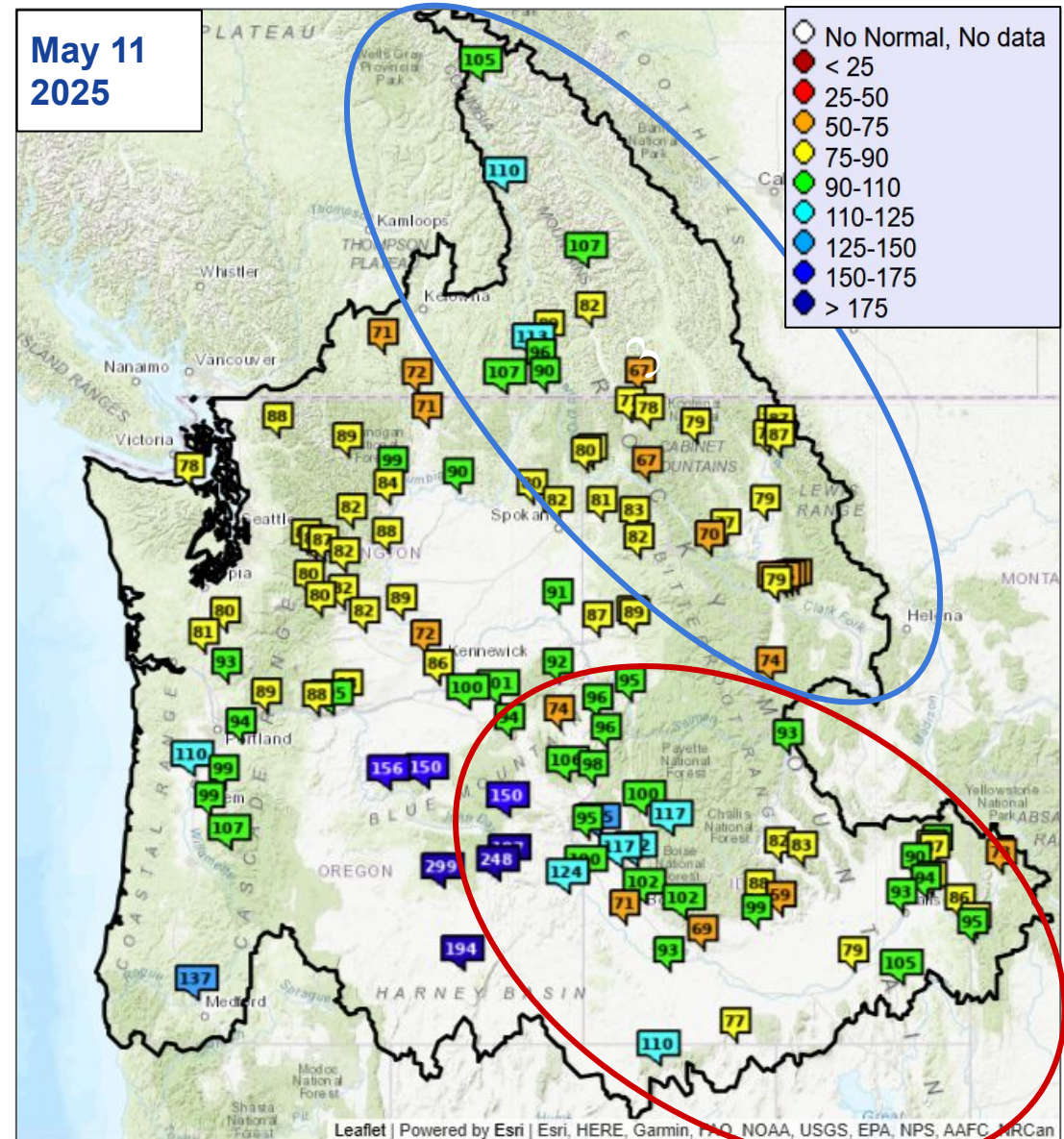
Mica	105
Duncan	107
Queens Bay	82
Libby	79
Hungry Horse	87
Grand Coulee	90

Snake River Basin

American Falls	79
Lucky Peak	102
Dworshak	85
Lower Granite	91

Lower Columbia Basin

The Dalles	88
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Water Year to Date Natural Observed Runoff

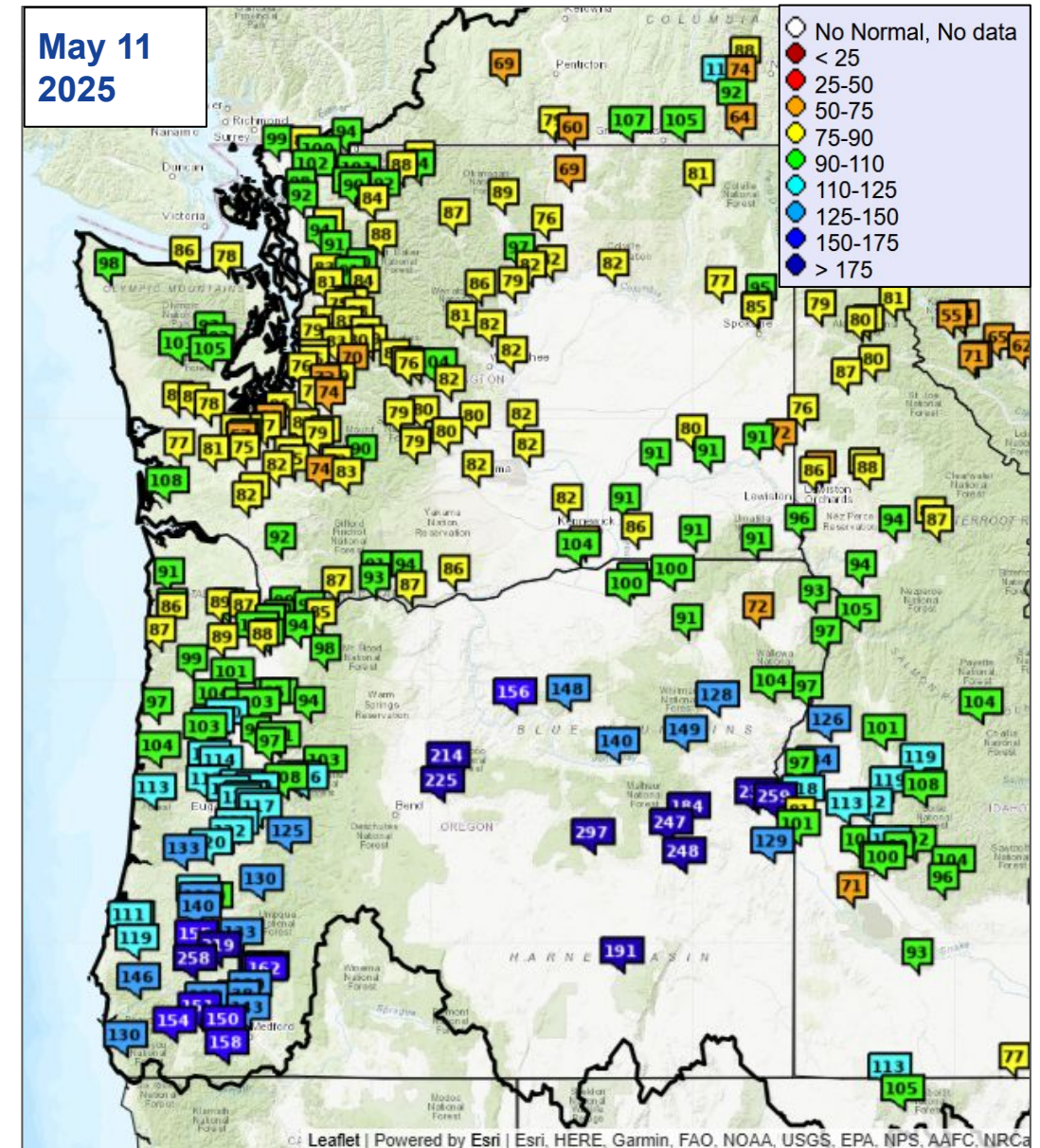
% Normal Runoff Oct 1 - May 11

Washington

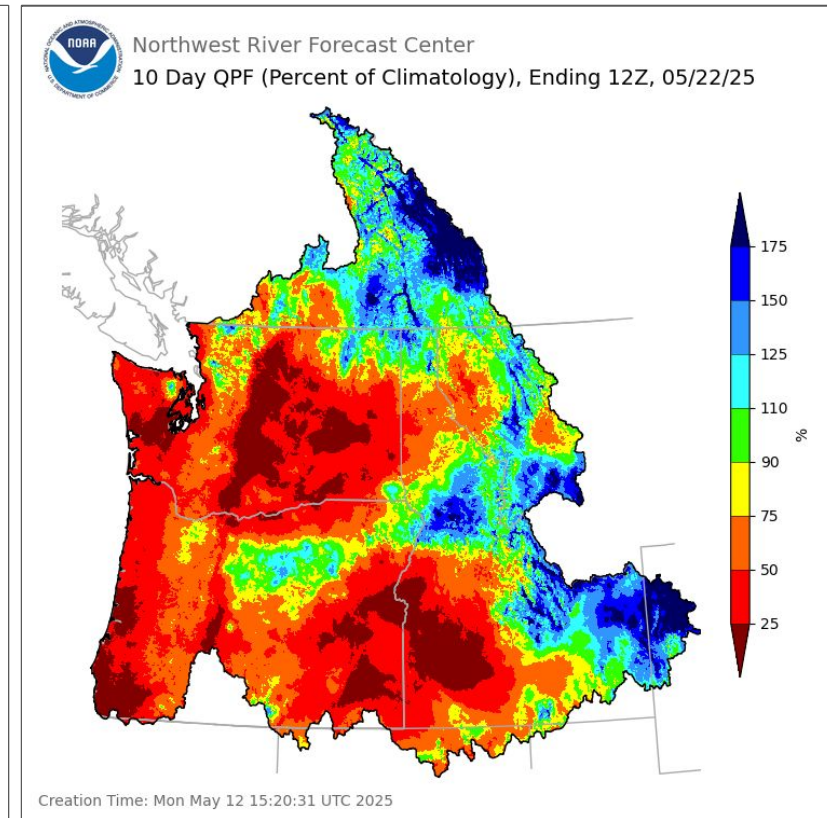
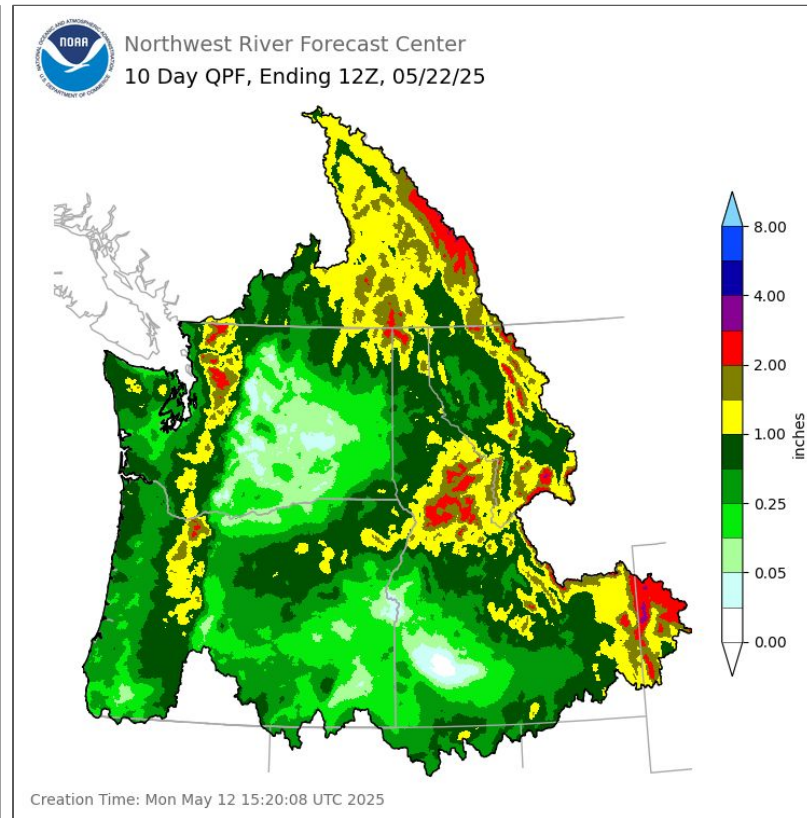
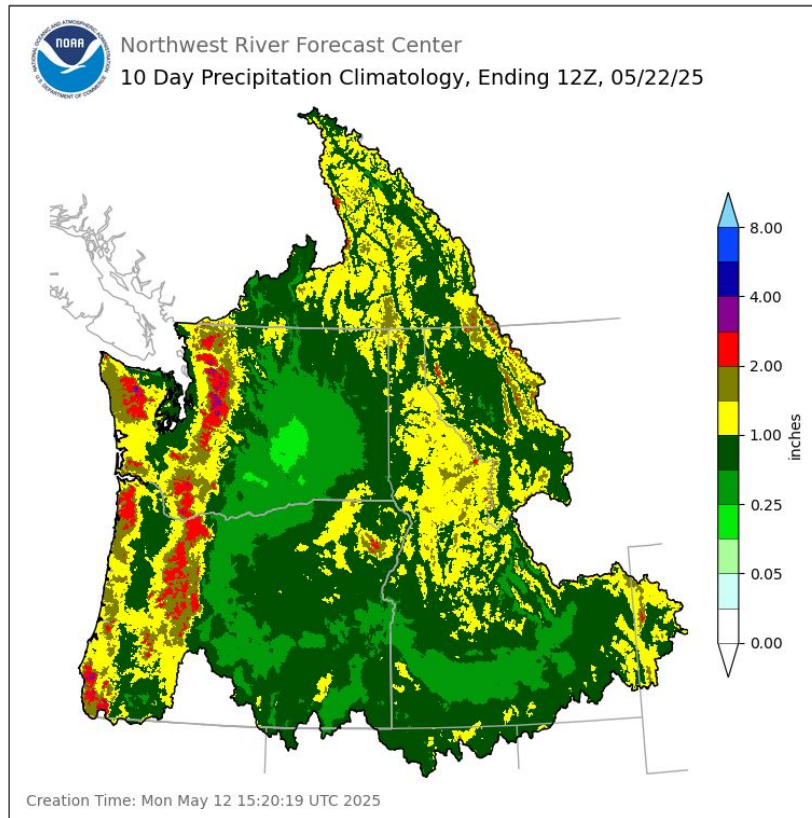
Skagit near Mt Vernon	92
Dungeness near Sequim	78
Chehalis at Porter	78
Okanogan at Malott	76
Methow near Pateros	97
Yakima at Parker	82
Walla Walla near Touchet	86

Oregon

Willamette at Salem	101
Rogue at Raygold	138
Umatilla at Pendleton	99
Grande Ronde at Troy	91
Crooked near Prineville	225
Owyhee Dam	129



10 Day Precipitation Forecast used in ESP10



Quantitative Precipitation Forecast (QPF) Sources:

- Days 1 - 2 NWS Weather Forecast Offices (WFO) in the US, WPC in BC.
- Days 3 - 7 NWS Weather Prediction Center (WPC).
- Days 8 - 10 NWS National Blend of Models (NBM).

ESP10 Water Supply Forecasts

% Normal Apr-Sep Volume

Upper Columbia Basin

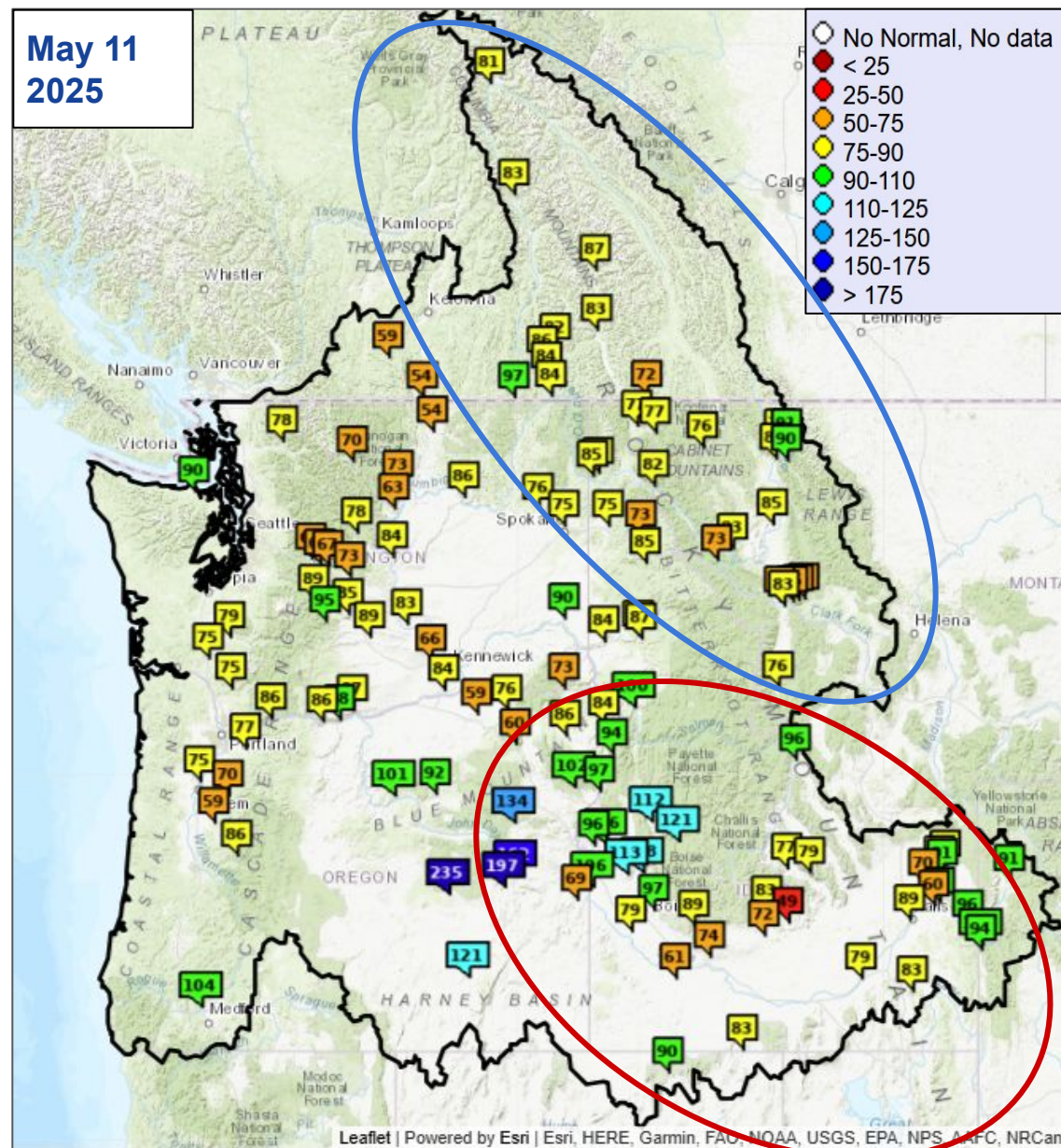
Mica	81
Duncan	87
Queens Bay	83
Libby	76
Hungry Horse	90
Grand Coulee	86

Snake River Basin

American Falls	79
Lucky Peak	97
Dworshak	80
Lower Granite	90

Lower Columbia Basin

The Dalles	86
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Natural Water Supply Forecasts

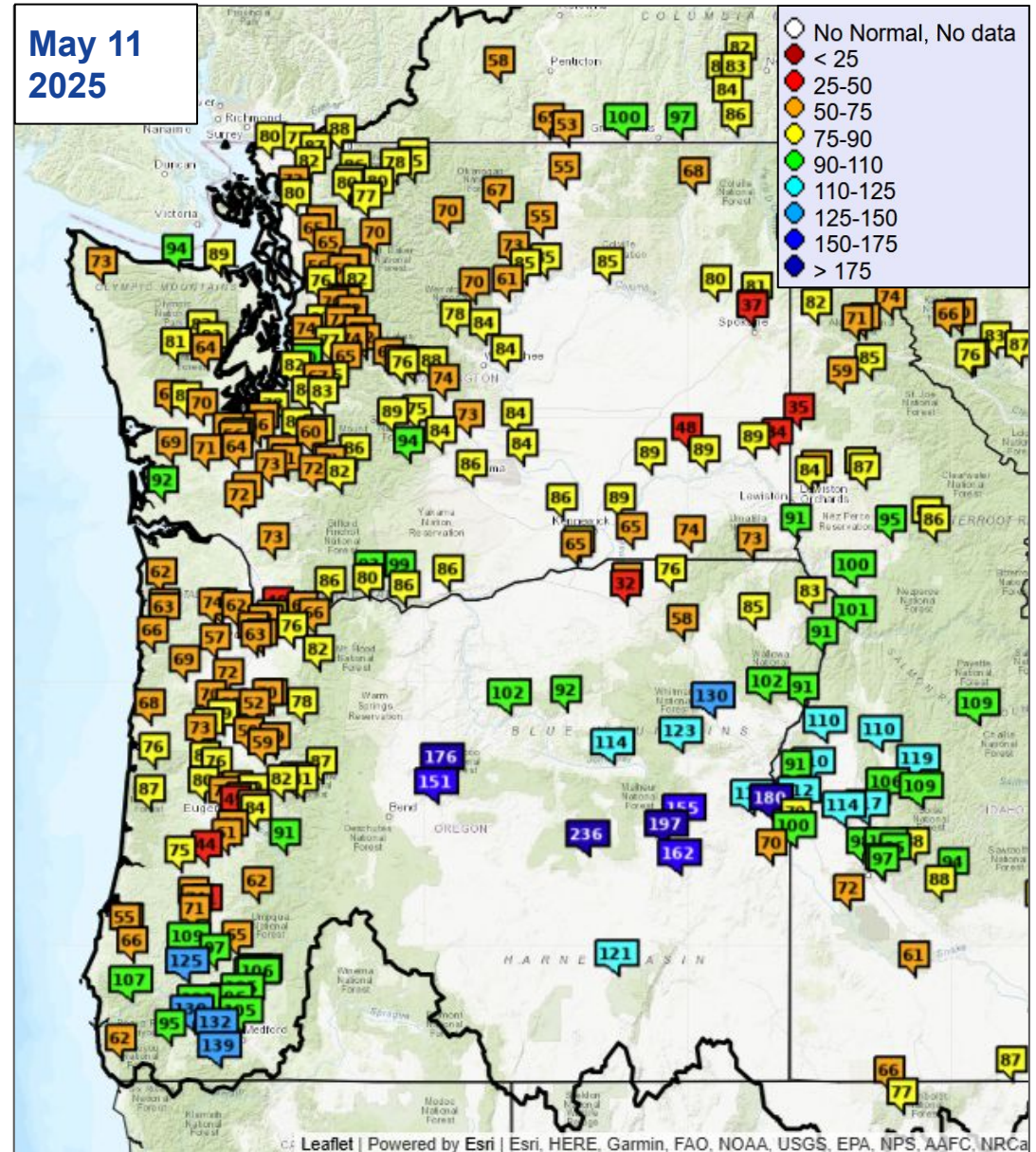
% Normal Apr-Sep Volume

Washington

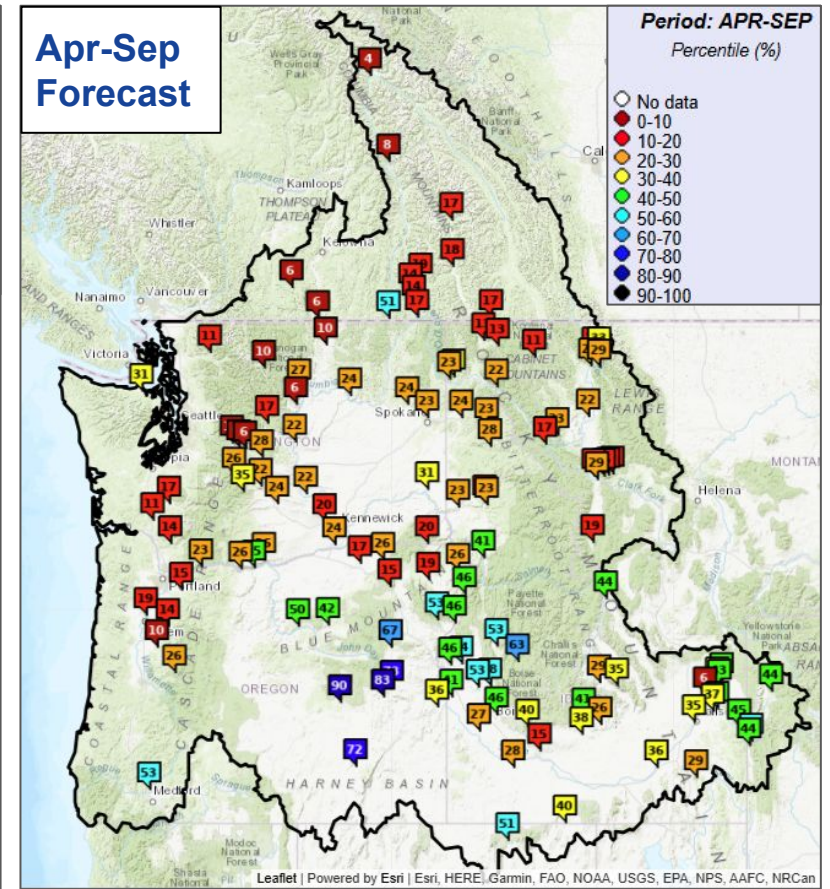
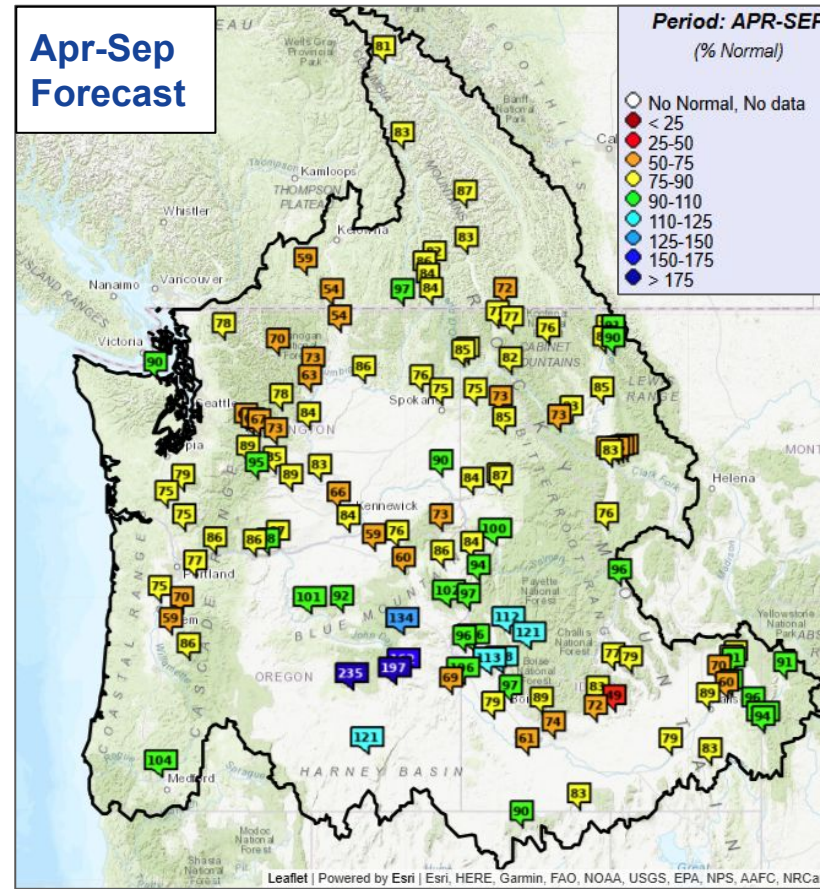
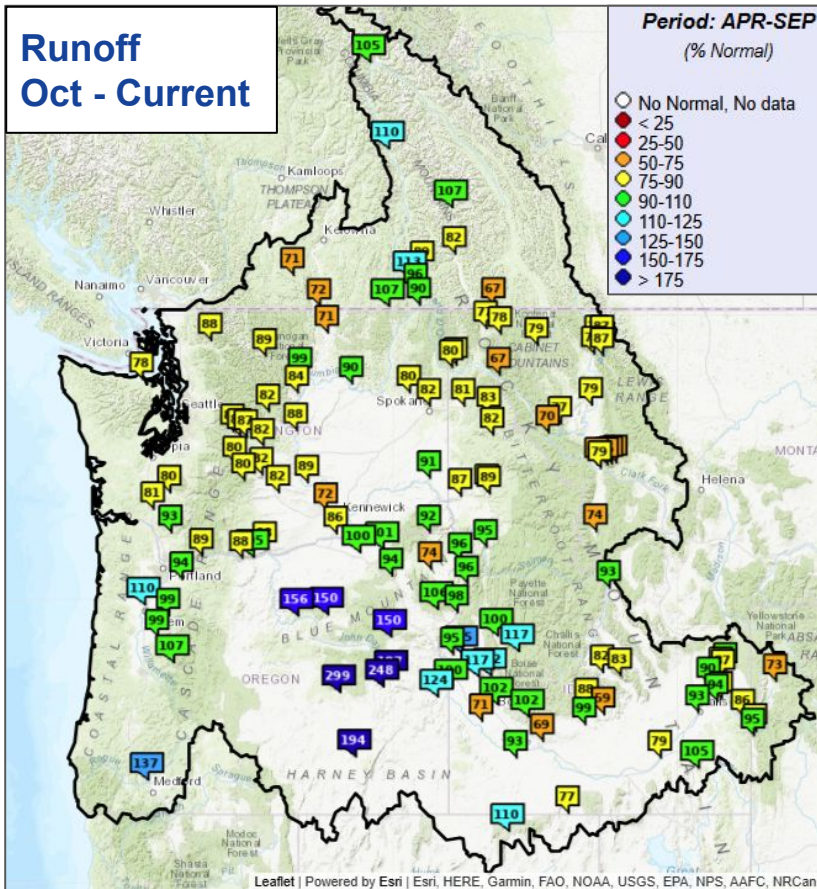
Skagit near Mt Vernon	80
Dungeness near Sequim	89
Chehalis at Porter	70
Okanogan at Malott	55
Methow near Pateros	73
Yakima at Parker	86
Walla Walla near Touchet	65

Oregon

Willamette at Salem	72
Rogue at Raygold	106
Umatilla at Pendleton	61
Grande Ronde at Troy	73
Crooked near Prineville	151
Owyhee Dam	70



Observed Runoff and Forecast Runoff as of May 11

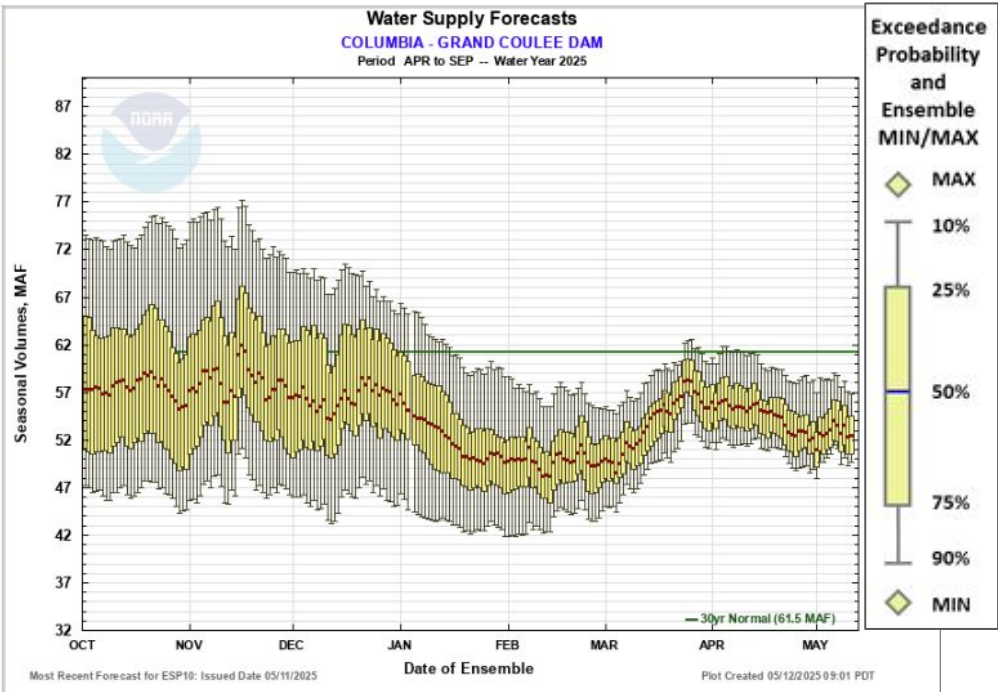


nwrfc.noaa.gov/ws/index.html?version=20190313v1

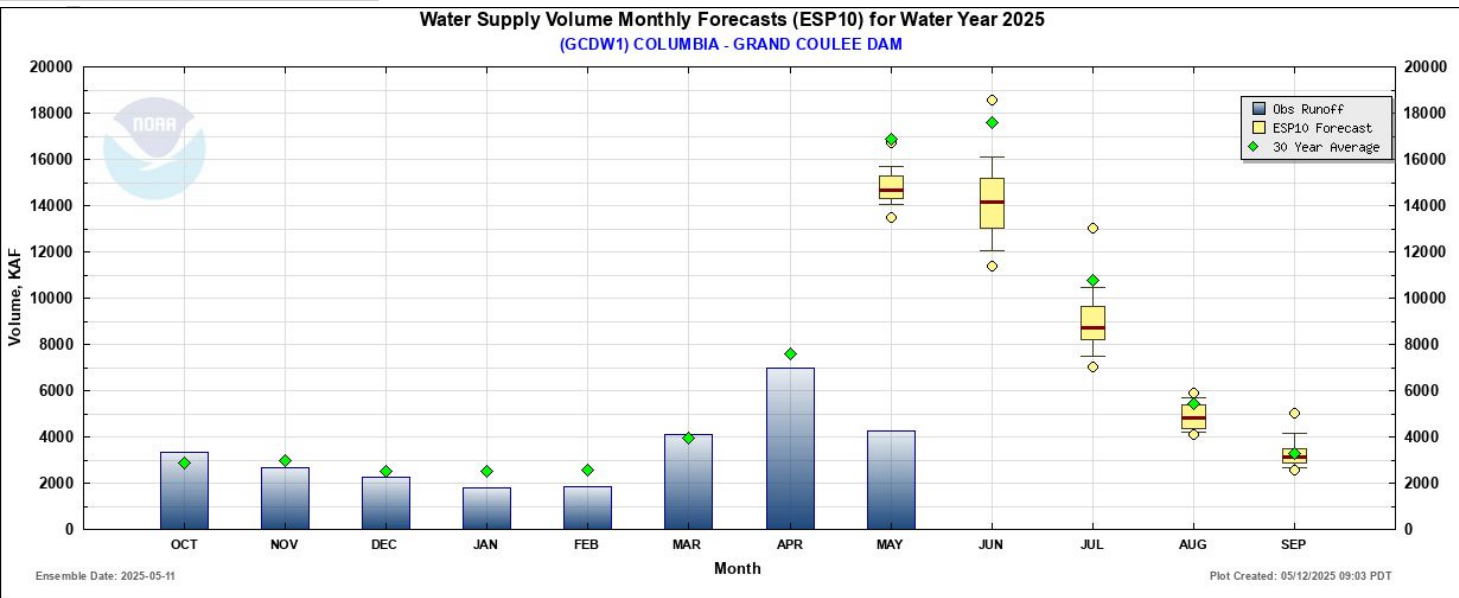


ESP10 Water Supply Forecast

COLUMBIA - GRAND COULEE DAM (GCDW1) Forecasts for Water Year 2025					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	49860	52712	86	57106	61483
APR-JUL	42137	44309	84	48341	52774
APR-AUG	46875	48899	84	53886	58186
JAN-SEP	57592	60444	86	64837	70457
JAN-JUL	49869	52041	84	56073	61749
OCT-SEP	65890	68742	87	73135	78842
Experimental Water Supply					
HEFS with 15 days EQPF Ensemble: 2025-05-11 Issued: 2025-05-11					
APR-SEP	49697	52960	86	58196	61483
APR-JUL	41996	44655	85	49683	52774
APR-AUG	46562	49649	85	55160	58186
JAN-SEP	57428	60692	86	65928	70457
JAN-JUL	49728	52386	85	57414	61749
OCT-SEP	65727	68990	88	74226	78842
Reference					
ESP with 0 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11					
APR-SEP	49156	52222	85	58161	61483
APR-JUL	41121	44053	83	49501	52774
APR-AUG	46081	49291	85	54996	58186
JAN-SEP	56888	59954	85	65893	70457
JAN-JUL	48853	51785	84	57232	61749
OCT-SEP	65186	68252	87	74191	78842



☐ Max Scale ☒ Scale To Data ☐ Scale To Last 45 Days ☐ Show Min/Max Ensemble



[↑ nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=GCDW1](https://nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=GCDW1)

nwrfc.noaa.gov/water_supply/monthly/monthly_forecasts.php?id=GCDW1



ESP10 Water Supply Forecast

SNAKE - LOWER GRANITE DAM (LGDW1) Forecasts for Water Year 2025

Official Water Supply

ESP with 10 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11

Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	Average	10 %	
APR-SEP	18910	19954	90	21791	22232
APR-JUL	16570	17431	87	19082	19946
APR-AUG	17698	18626	88	20442	21121
JAN-SEP	26031	27075	91	28912	29736
JAN-JUL	23690	24551	89	26203	27450
OCT-SEP	29609	30654	89	32490	34287

Experimental Water Supply

HEFS with 15 days EQPF Ensemble: 2025-05-11 Issued: 2025-05-11

APR-SEP	19098	20153	91	22357	22232
APR-JUL	16688	17578	88	19684	19946
APR-AUG	17869	18791	89	20963	21121
JAN-SEP	26218	27274	92	29478	29736
JAN-JUL	23809	24698	90	26805	27450
OCT-SEP	29797	30853	90	33056	34287

Reference

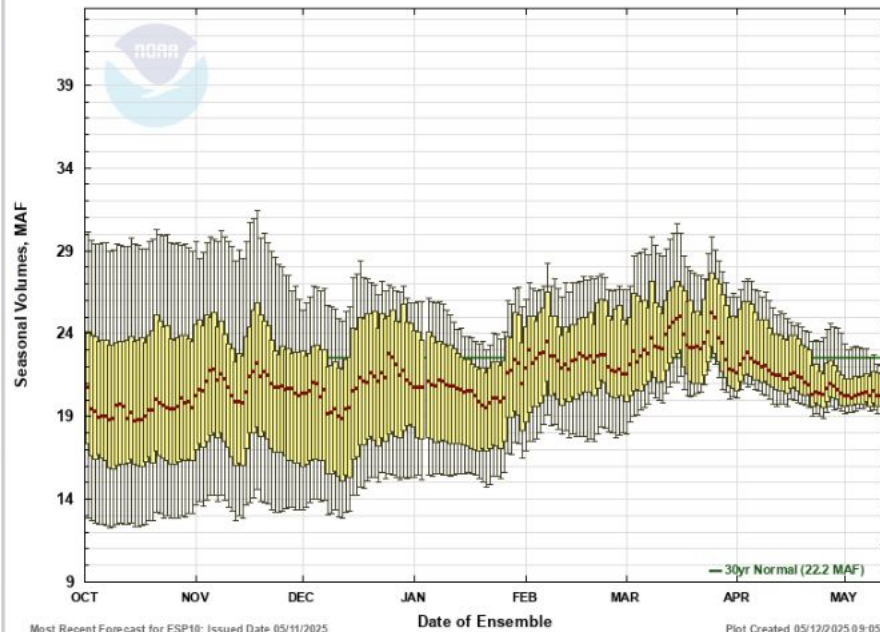
ESP with 0 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11

APR-SEP	19197	20233	91	23297	22232
APR-JUL	16708	17700	89	20576	19946
APR-AUG	17916	18928	90	21887	21121
JAN-SEP	26317	27354	92	30417	29736
JAN-JUL	23828	24820	90	27696	27450
OCT-SEP	29896	30933	90	33996	34287

Water Supply Forecasts

SNAKE - LOWER GRANITE DAM

Period APR to SEP -- Water Year 2025



Most Recent Forecast for ESP10: Issued Date 05/11/2025

Plot Created 05/12/2025 09:05 PDT

☐ Max Scale ☒ Scale To Data ☐ Scale To Last 45 Days ☐ Show Min/Max Ensemble

Exceedance Probability and Ensemble MIN/MAX

MAX

10%

25%

50%

75%

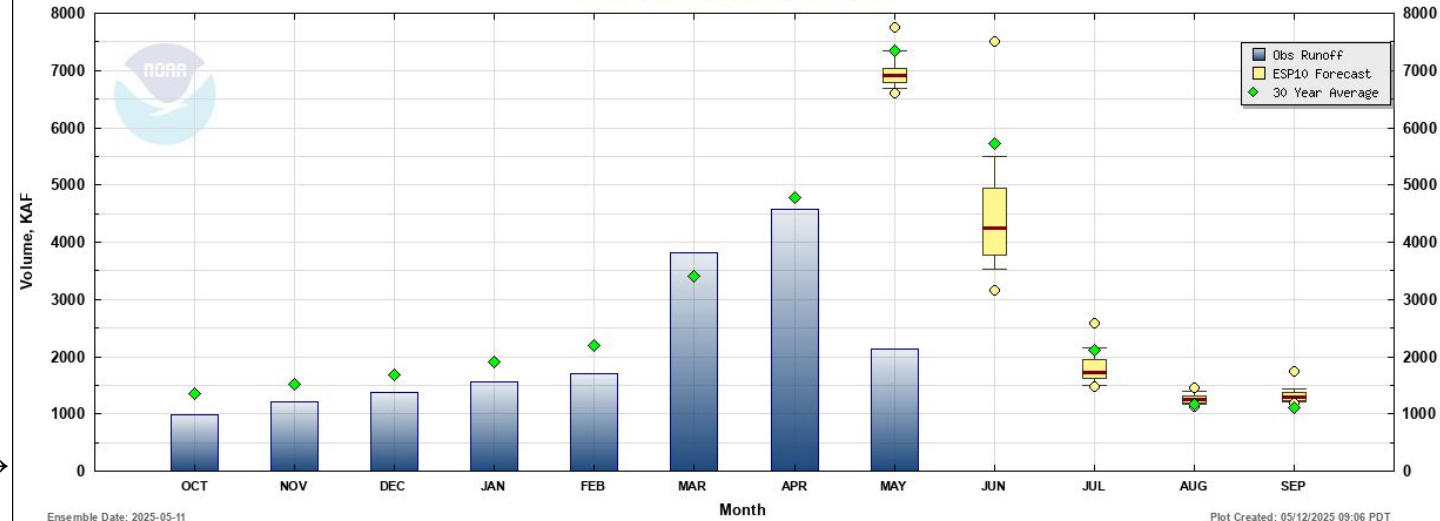
90%

MIN



Water Supply Volume Monthly Forecasts (ESP10) for Water Year 2025

(LGDW1) SNAKE - LOWER GRANITE DAM



Ensemble Date: 2025-05-11

Plot Created: 05/12/2025 09:06 PDT

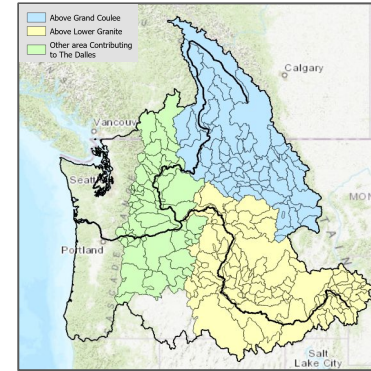
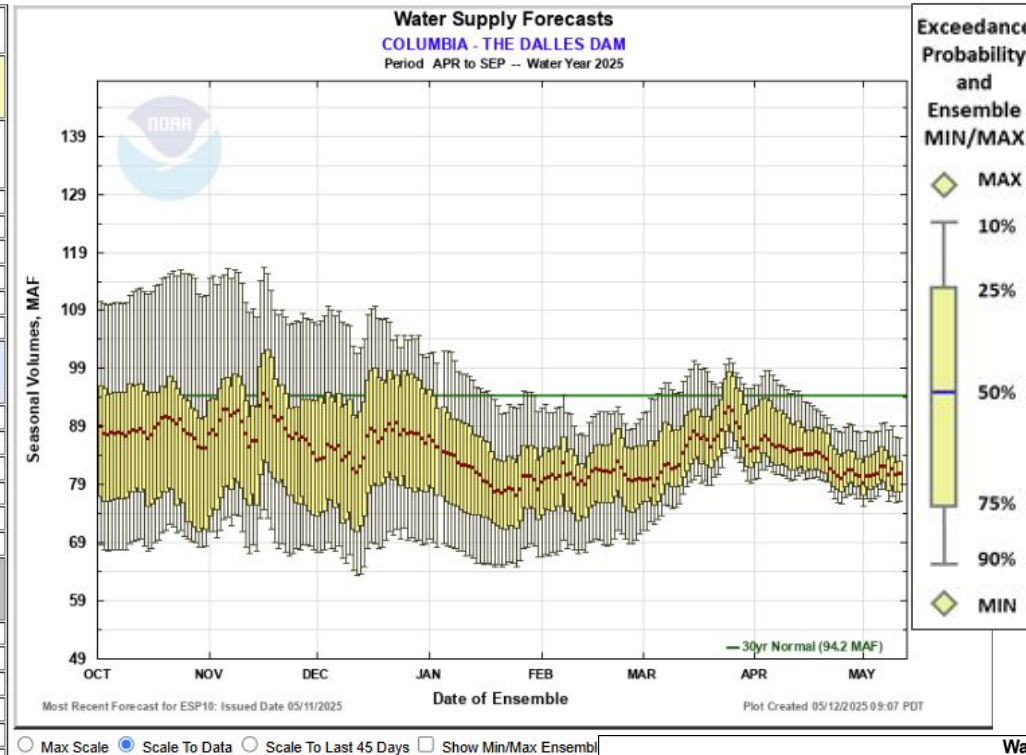
[↑ nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=LGDW1](https://nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=LGDW1)

nwrfc.noaa.gov/water_supply/monthly/monthly_forecasts.php?id=LGDW1 →



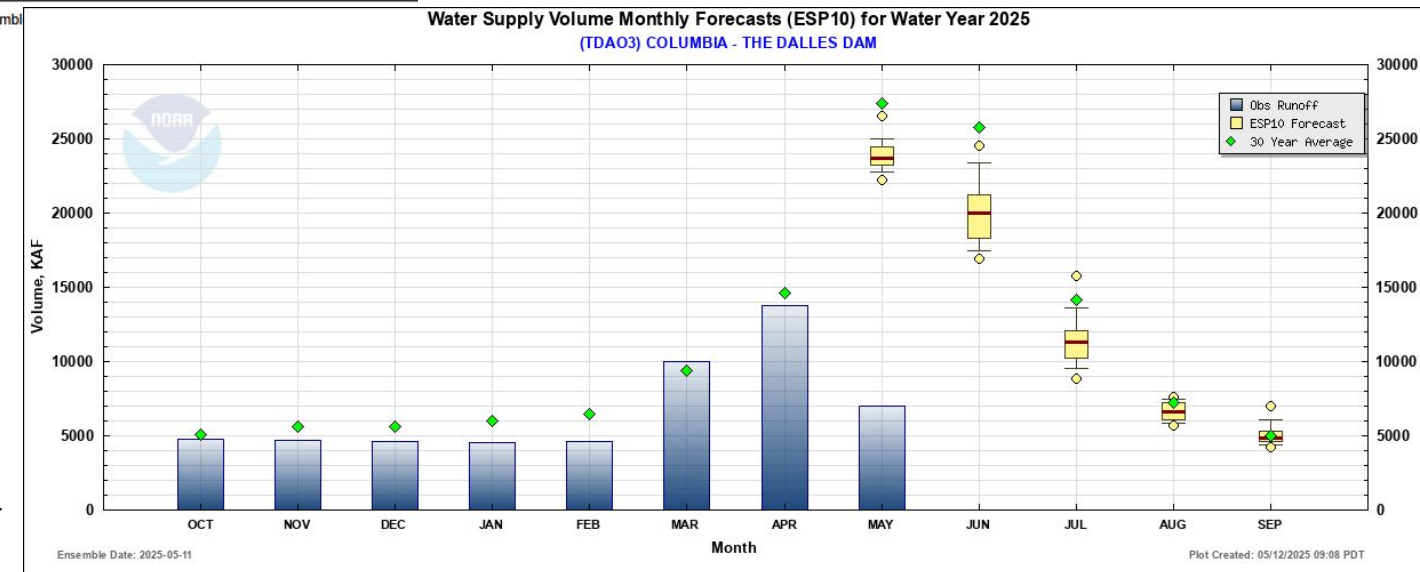
ESP10 Water Supply Forecast

COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2025					
Official Water Supply					
ESP with 10 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11					
Forecast Period	Forecasts Are in KAF				30 Year Average (1991-2020)
	90 %	50 %	% Average	10 %	
APR-SEP	75979	80745	86	86703	94166
APR-JUL	64730	68250	83	74571	81933
APR-AUG	71103	74824	84	81872	89196
JAN-SEP	95230	99996	86	105954	115946
JAN-JUL	83981	87501	84	93822	103714
OCT-SEP	109305	114071	86	120029	132314
Experimental Water Supply					
HEFS with 15 days EQPF Ensemble: 2025-05-11 Issued: 2025-05-11					
APR-SEP	76287	80155	85	86914	94166
APR-JUL	65165	69270	85	74846	81933
APR-AUG	71338	75438	85	82122	89196
JAN-SEP	95538	99406	86	106165	115946
JAN-JUL	84416	88521	85	94097	103714
OCT-SEP	109613	113481	86	120240	132314
Reference					
ESP with 0 Days QPF Ensemble: 2025-05-11 Issued: 2025-05-11					
APR-SEP	75665	79636	85	87116	94166
APR-JUL	64711	68729	84	75246	81933
APR-AUG	70971	74962	84	82403	89196
JAN-SEP	94916	98887	85	106367	115946
JAN-JUL	83962	87980	85	94497	103714
OCT-SEP	108991	112962	85	120442	132314

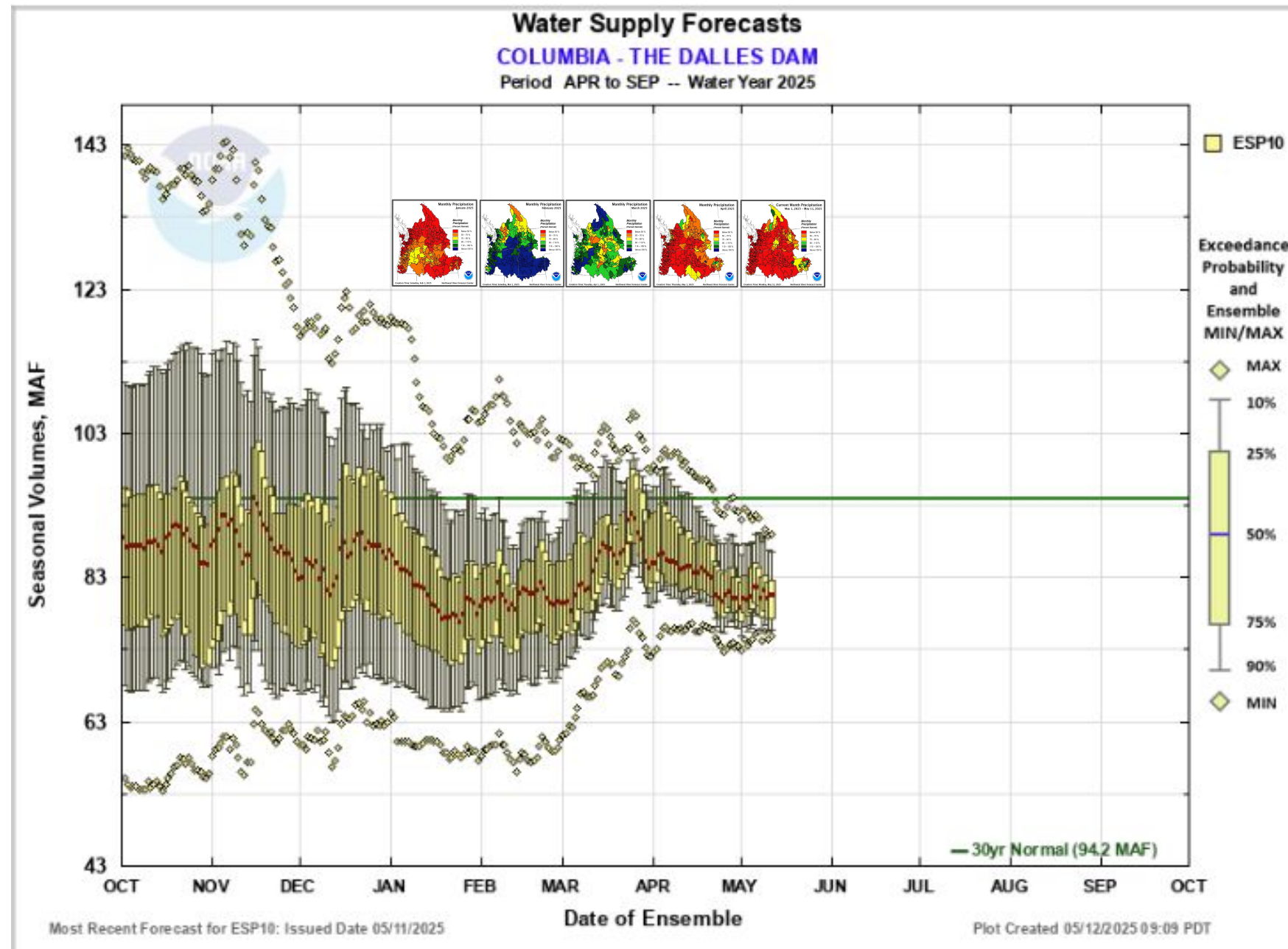


[↑ nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=TDAO3](https://nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=TDAO3)

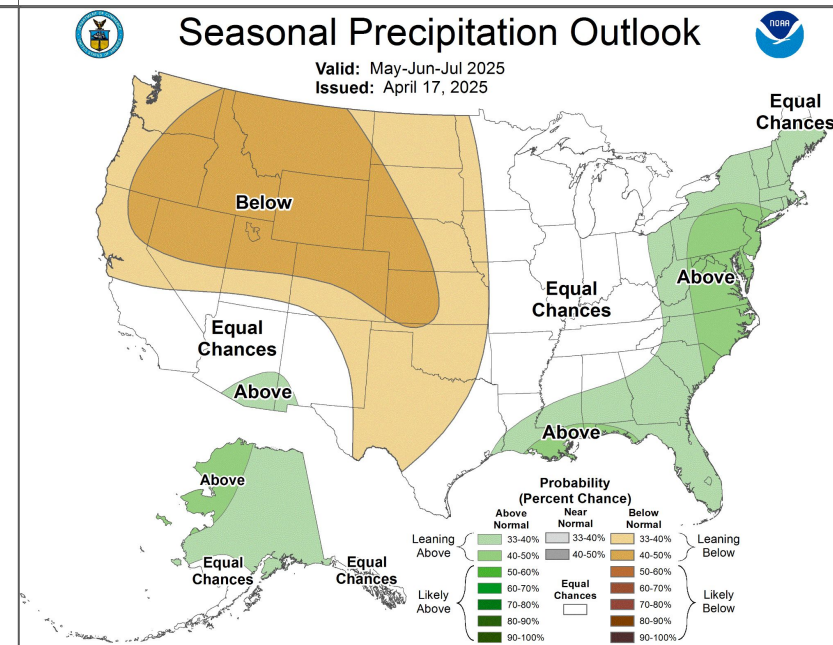
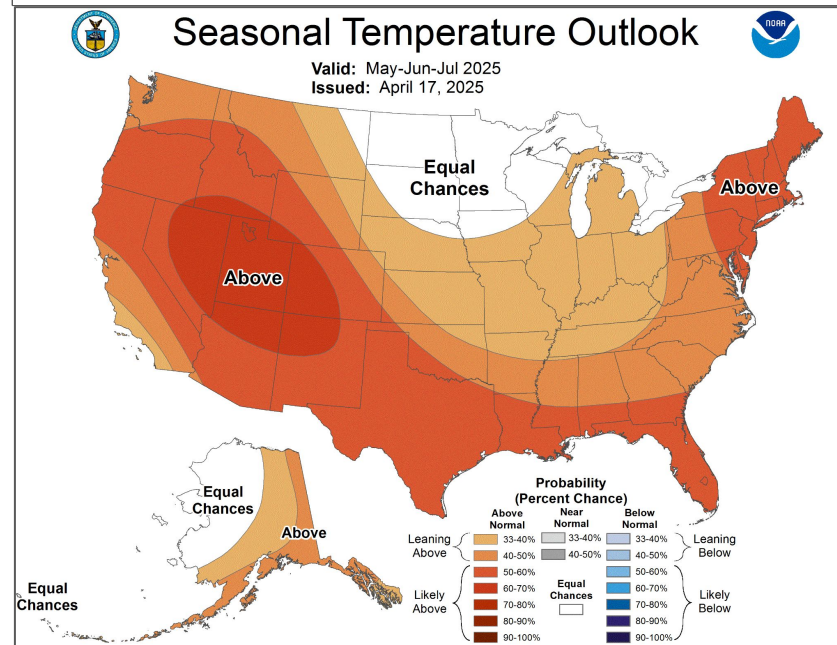
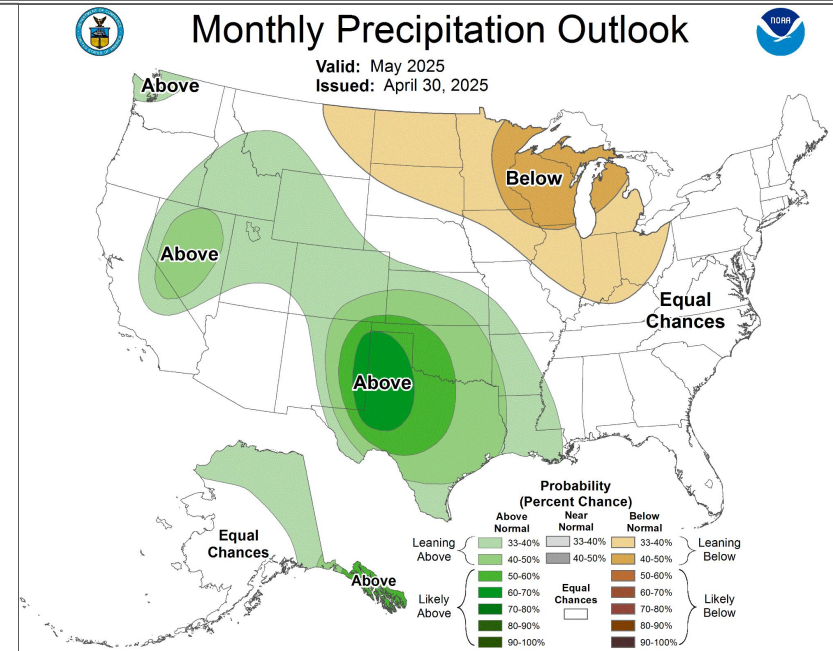
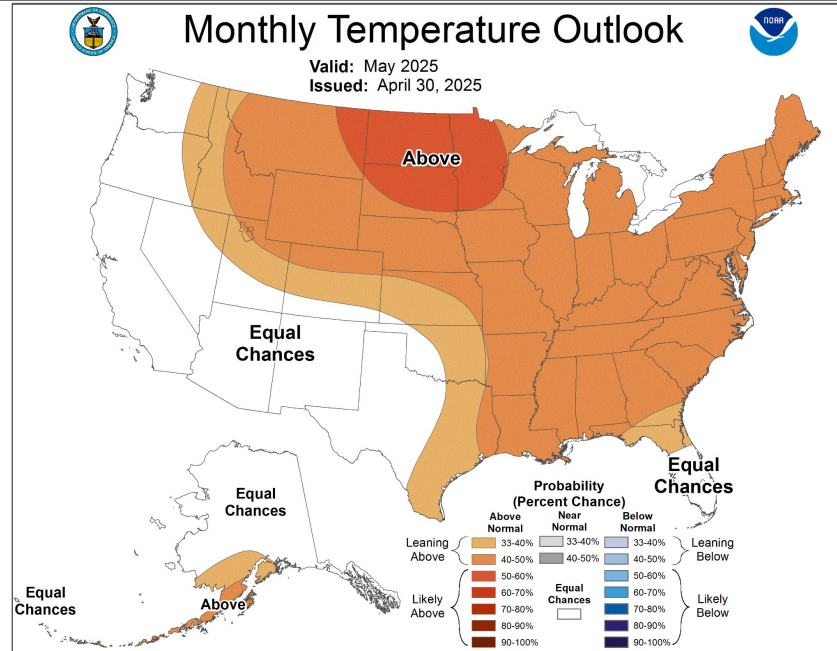
nwrfc.noaa.gov/water_supply/monthly/monthly_forecasts.php?id=TDAO3 →



ESP10 Monthly Water Supply Forecast



Monthly and Seasonal Outlooks

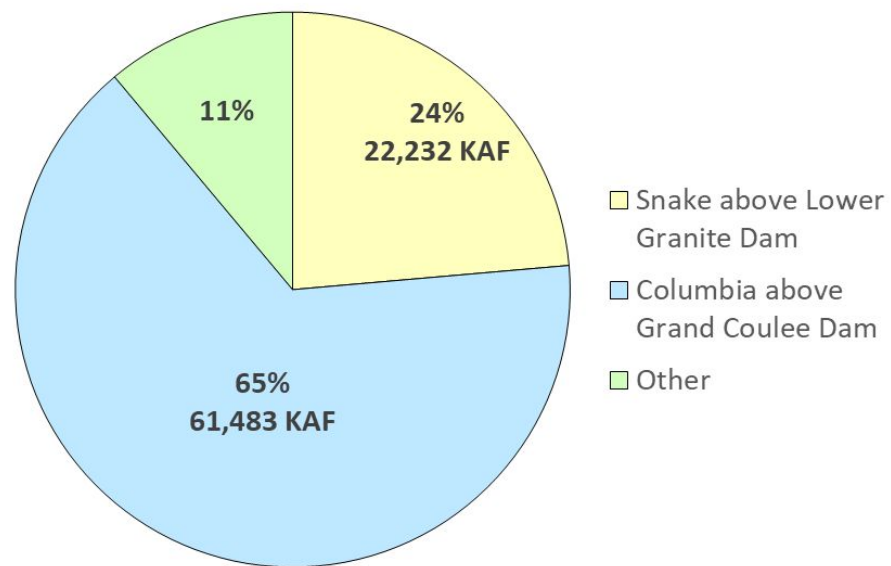


- April and May so far have been warm and dry compared to normal.
- Snowpack peaked higher than normal in the south and lower than normal in the north. Rapid snowmelt is well underway across the region and early melt out is likely.
- Observed and forecast runoff have the same north/south trend with higher amounts in the south.
- Water supply forecasts decreased significantly during the recent dry April and start of May.

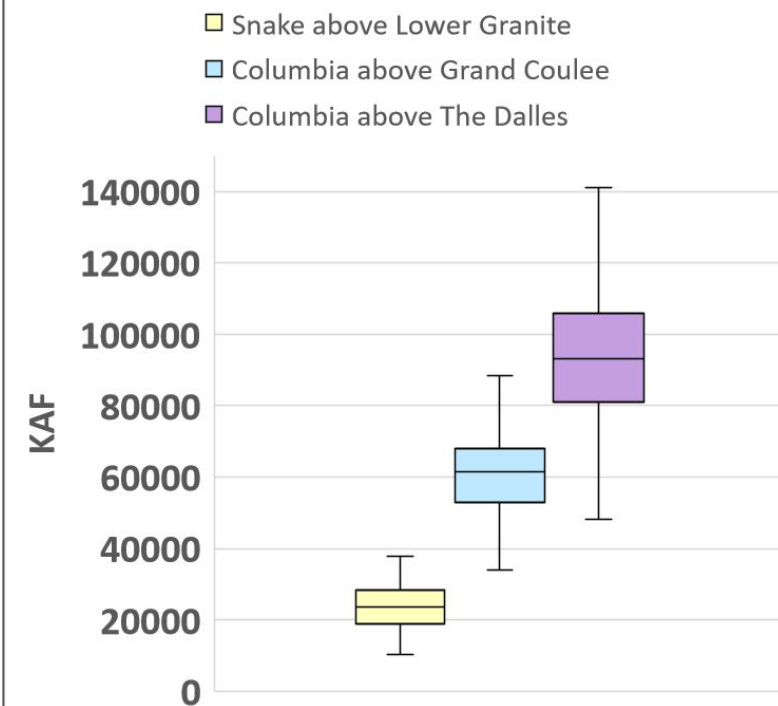
Average Contributions to the Columbia River

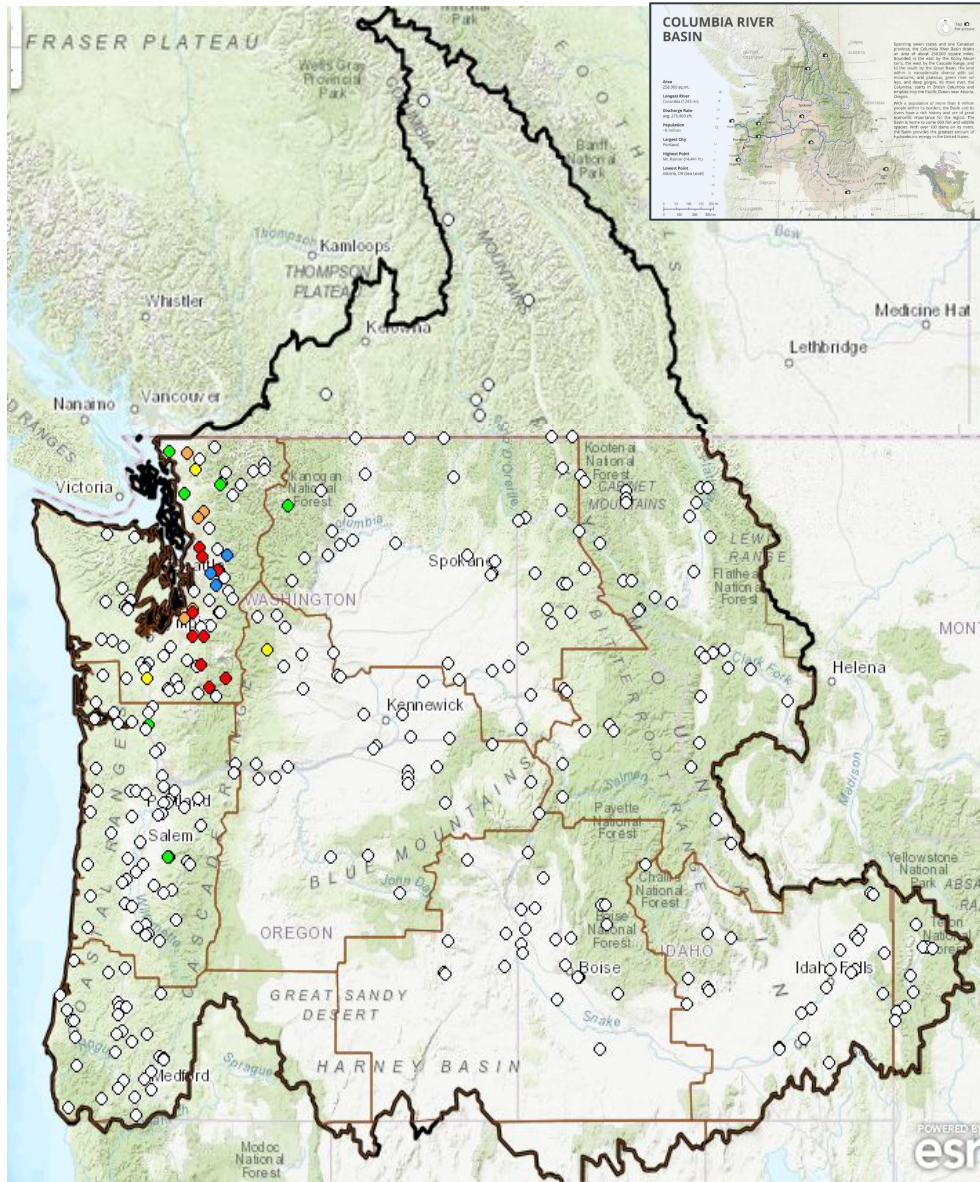


**Apr - Sep Runoff at The Dalles
1991 - 2020 Average**



Apr -Sep Runoff





326,000 Square Miles

- 2 Countries, 6+ States
- 10 NWS WFOs

Forecast Service Suite

- ~ 400 river locations
- ~ 100 reservoirs
- Multiple time scales
- Deterministic & probabilistic

NWRFC forecast and services inform regional and local decisions:

- Water Management
 - USACE, USBR, Others
- Hydropower
- Flood Control
- Drought Planning
- River Commerce
- Species Protection

