

May 2019 Water Supply Briefing

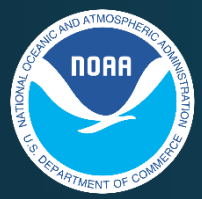
National Weather Service / Northwest River Forecast Center (NWRFC)

Telephone Conference : (415) 655-0060

Pass Code : 217-076-304#

Audio PIN is provided when logging into the webinar and will be required if you wish to ask questions at the end of presentation

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NWRFC.watersupply@noaa.gov
(503) 326-7291



Water Supply Forecast Briefing Outline



- Meteorological/Hydrological Observations WY2019

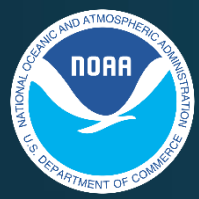
- NWRFC Water Supply Forecast Refresher

- Water Supply Components
 - Current Model States-Regional Overview
 - 10 Day Forecasts-Model Forcings

- Current Water Supply Forecasts

- Chalk Talk: Drivers of Changing Water Supply Forecasts

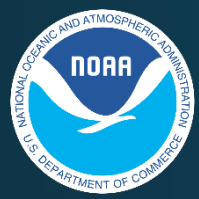
- Summary



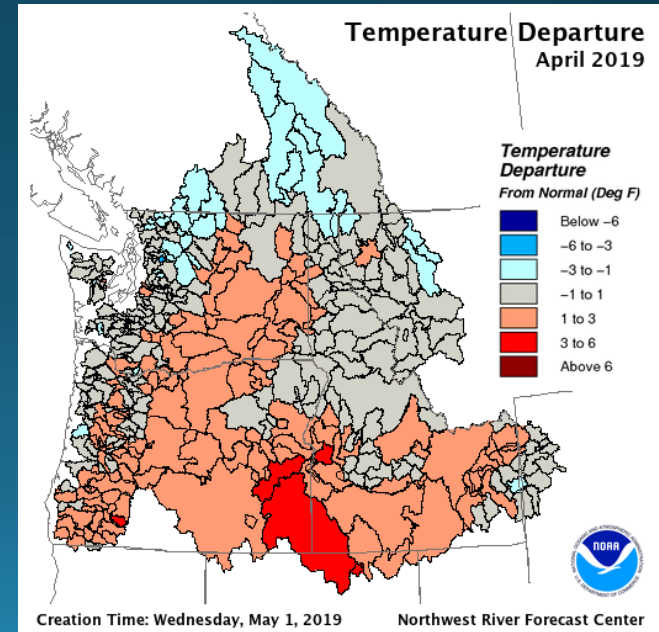
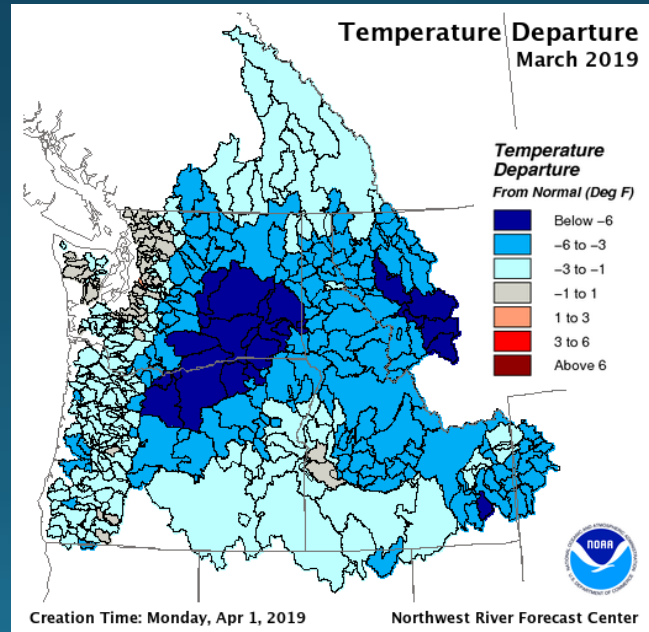
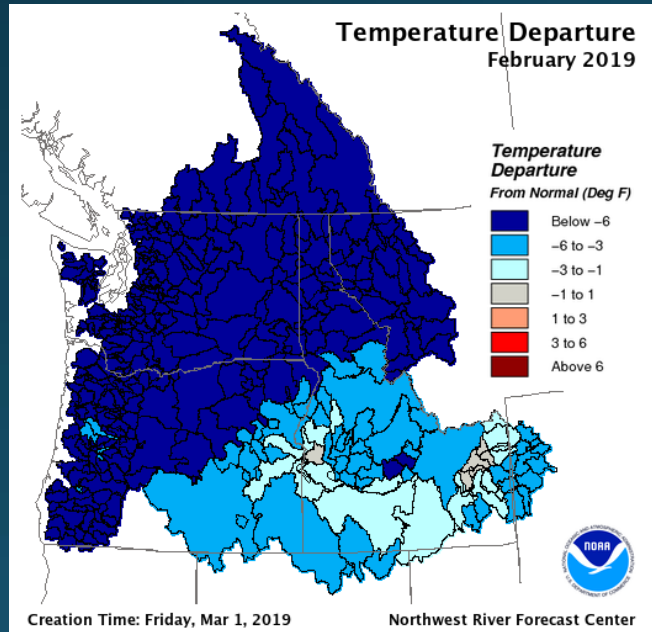
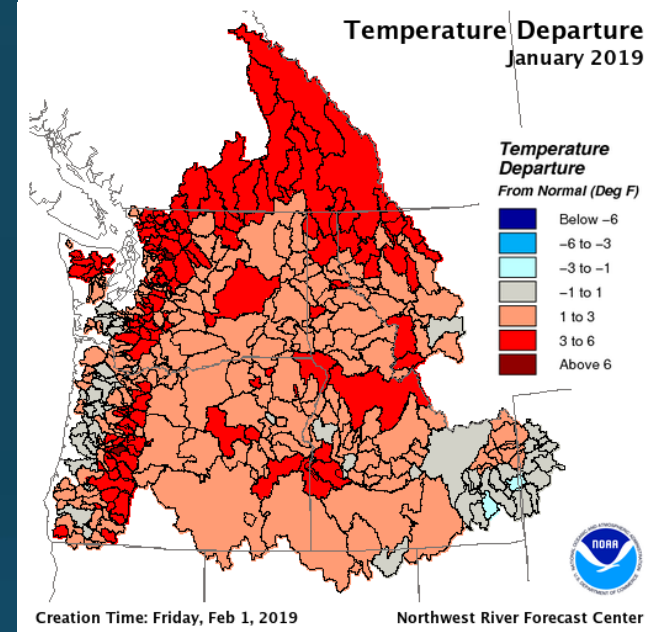
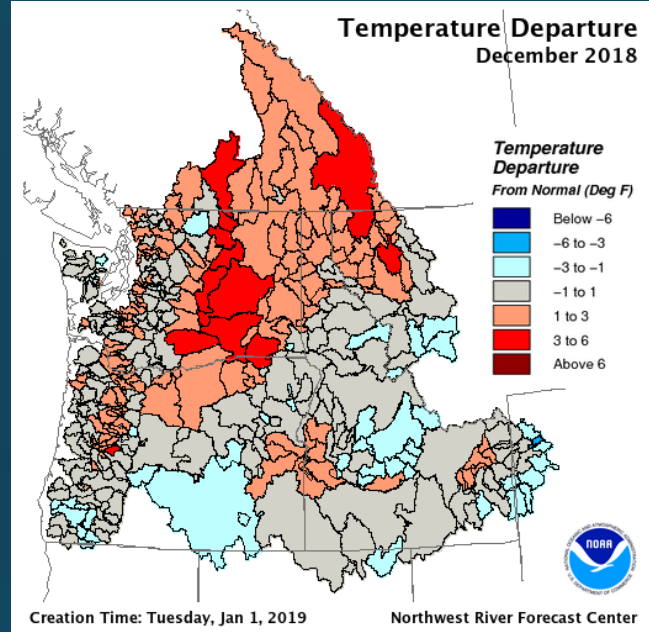
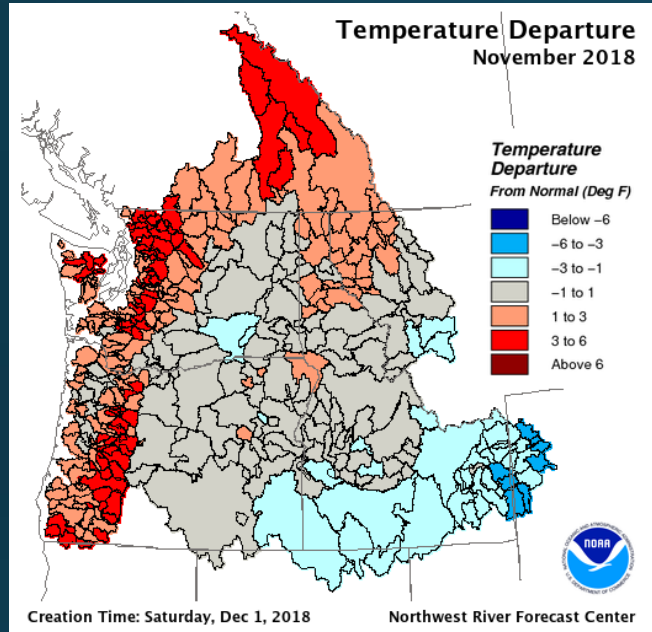
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Monthly Temperature Departure



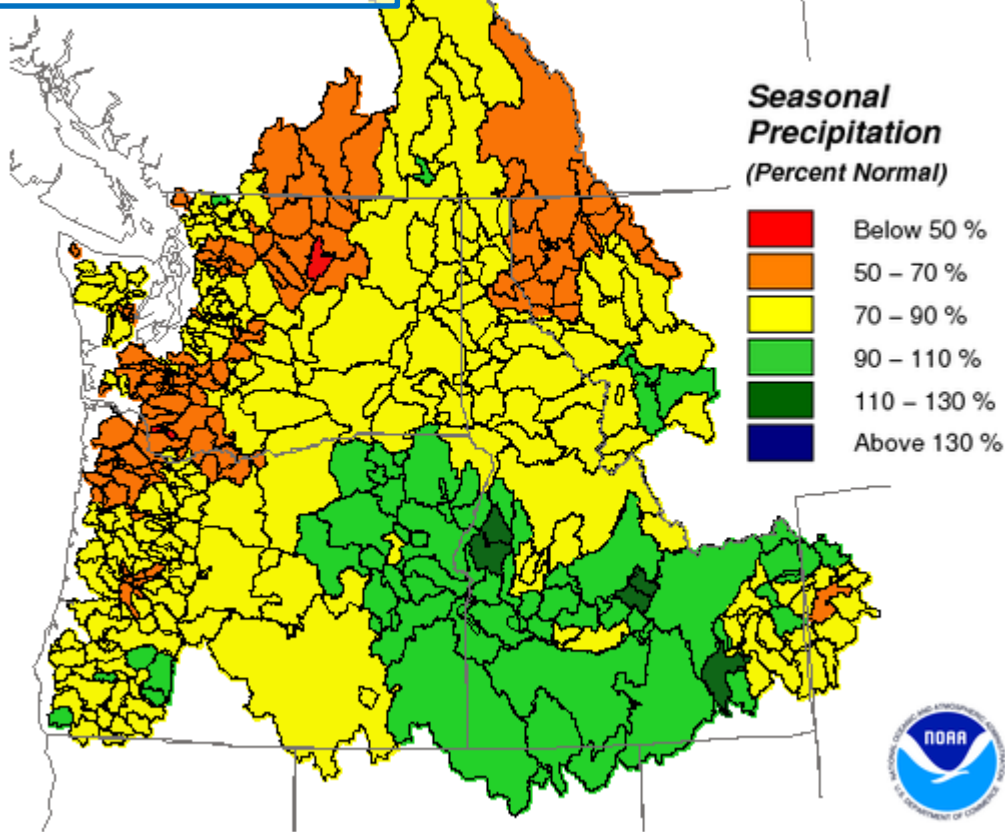


Observed % Normal Seasonal Precipitation



Oct-Mar

Seasonal Precipitation
Oct 1, 2018 - Mar 31, 2019

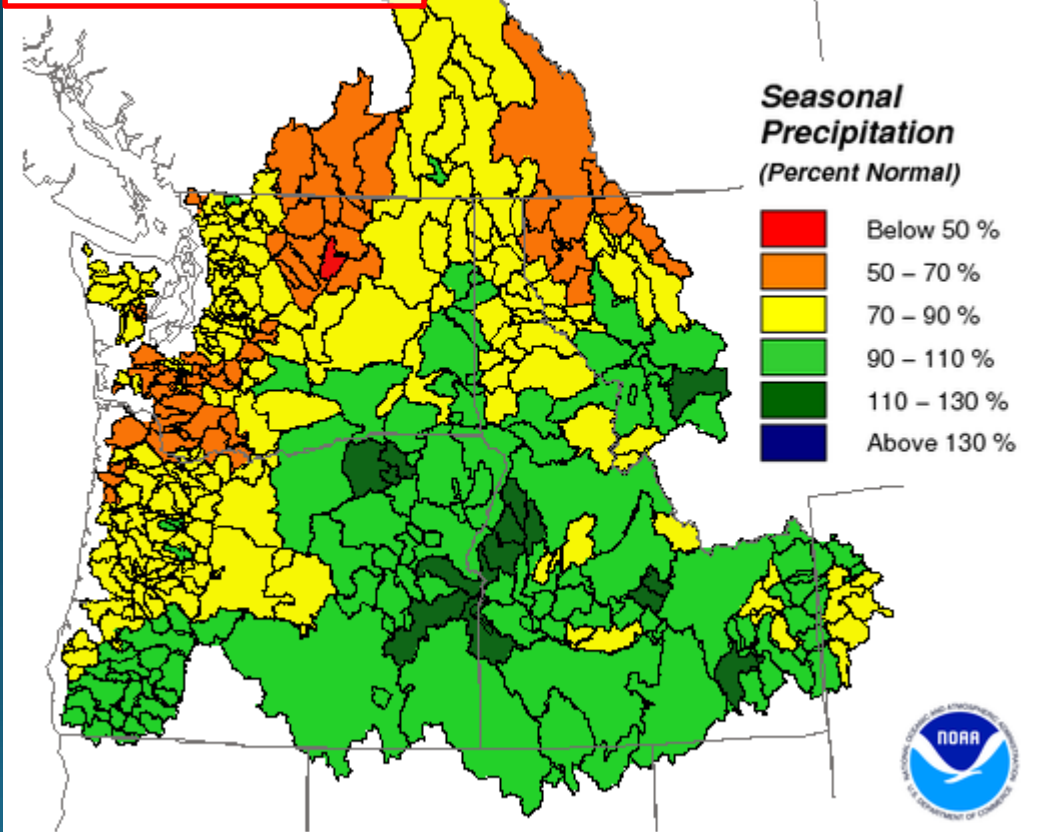


Creation Time: Monday, Apr 1, 2019

Northwest River Forecast Center

Oct-Apr

Seasonal Precipitation
Oct 1, 2018 - Apr 30, 2019

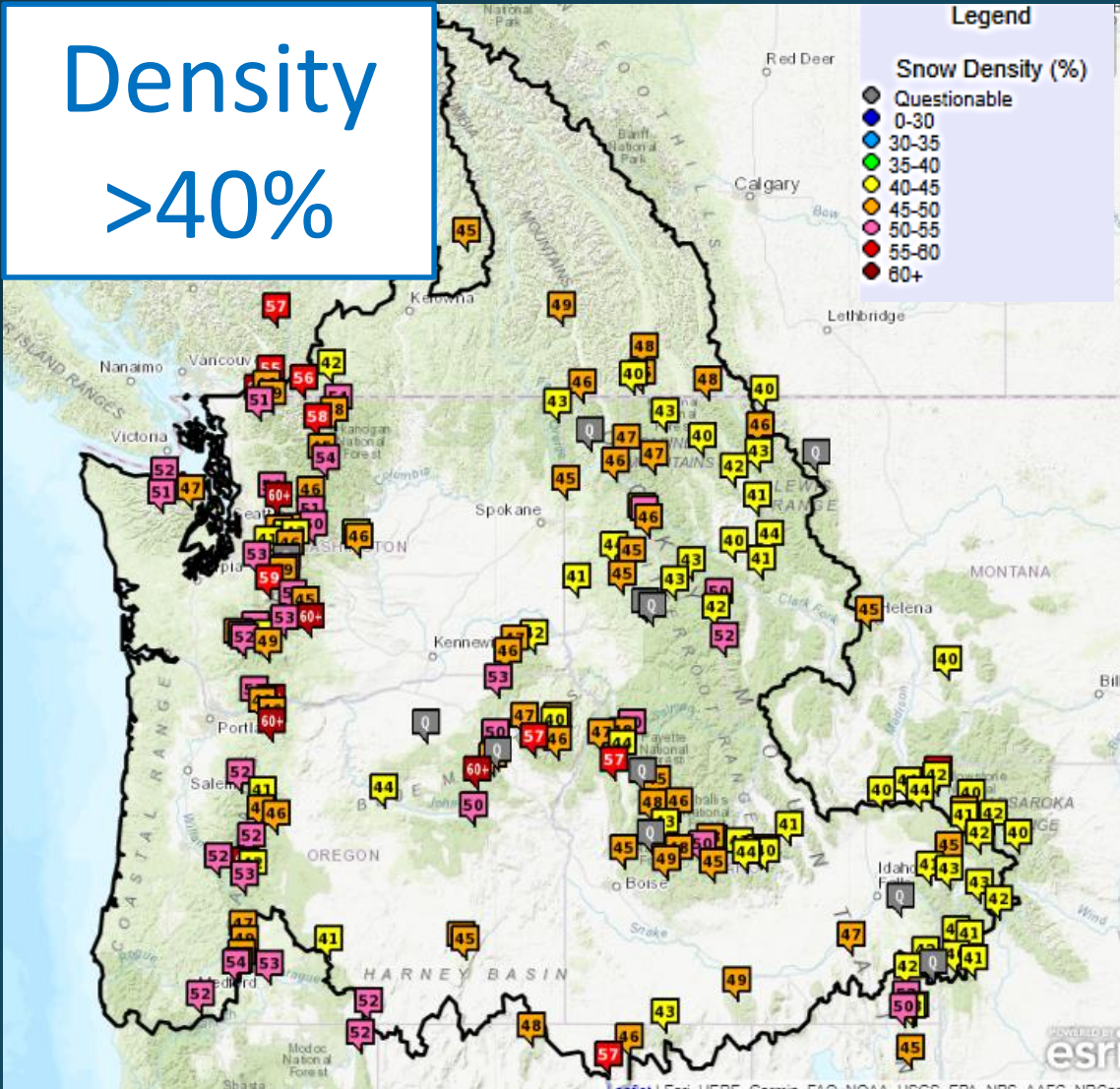


Creation Time: Wednesday, May 1, 2019

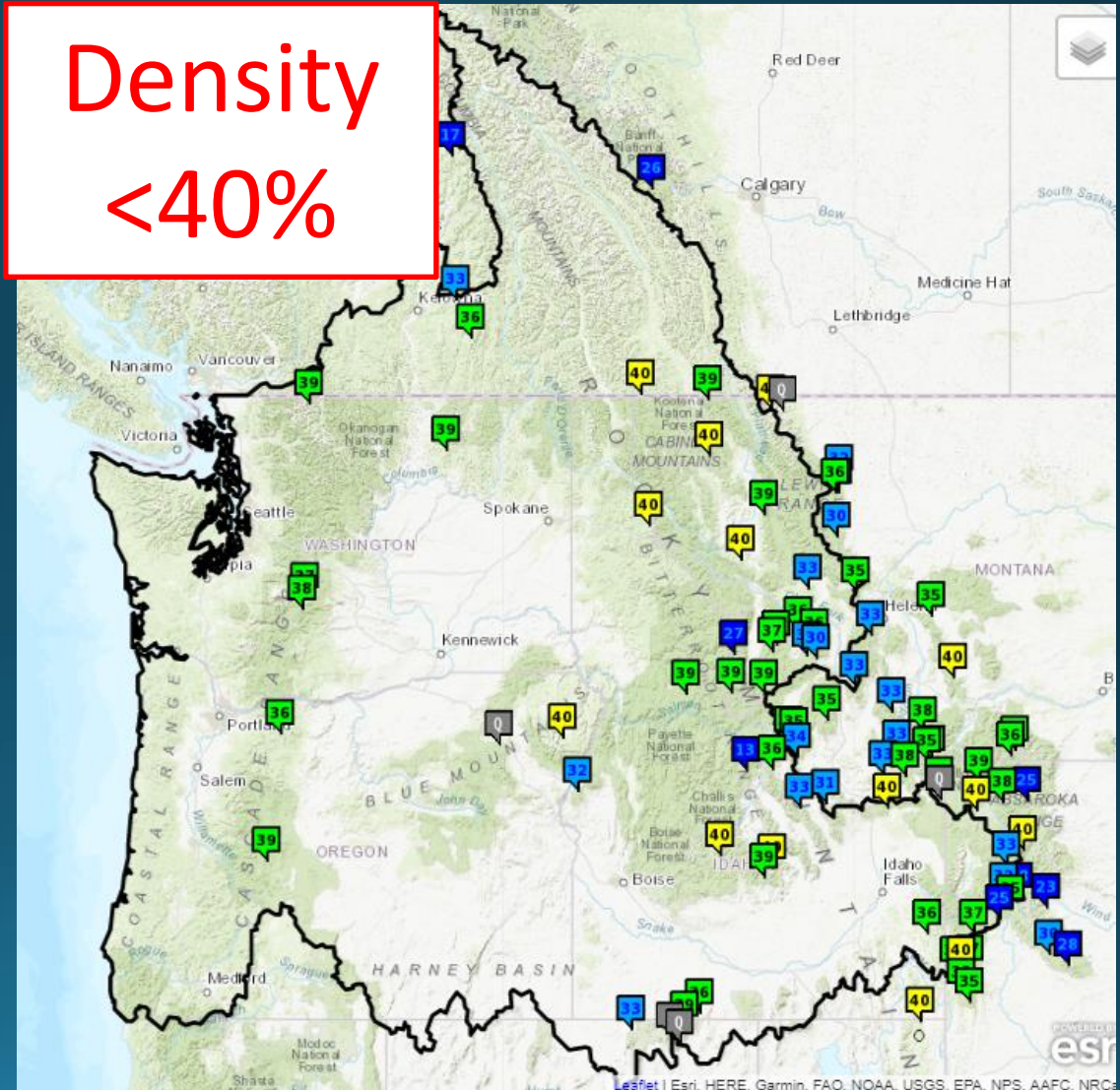
Northwest River Forecast Center

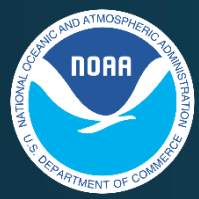
Observed Snowpack (Density %)

Density
>40%



Density
<40%

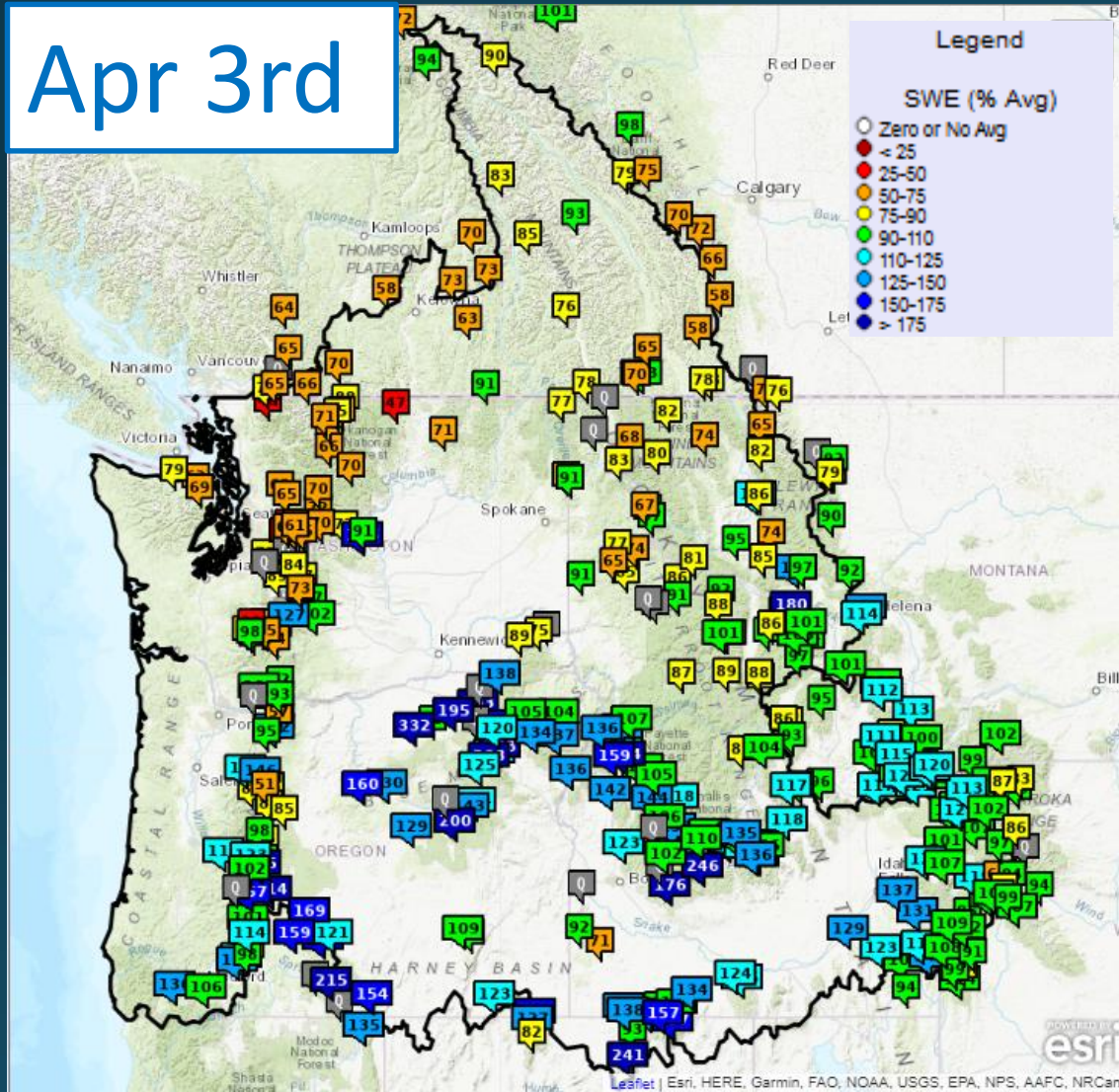




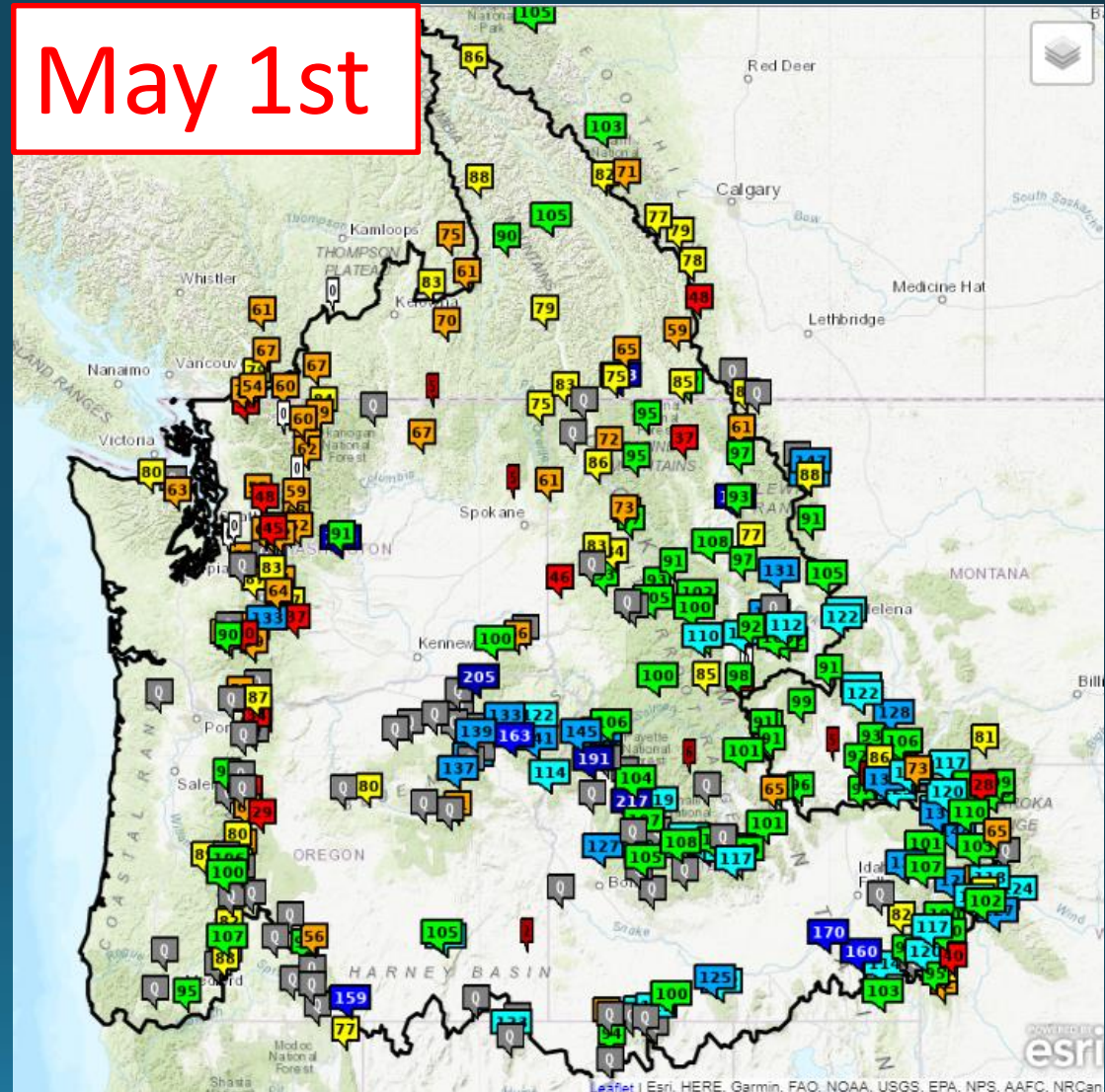
Observed Snowpack (SWE % 30 yr Norm)



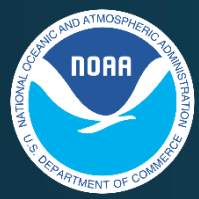
Apr 3rd



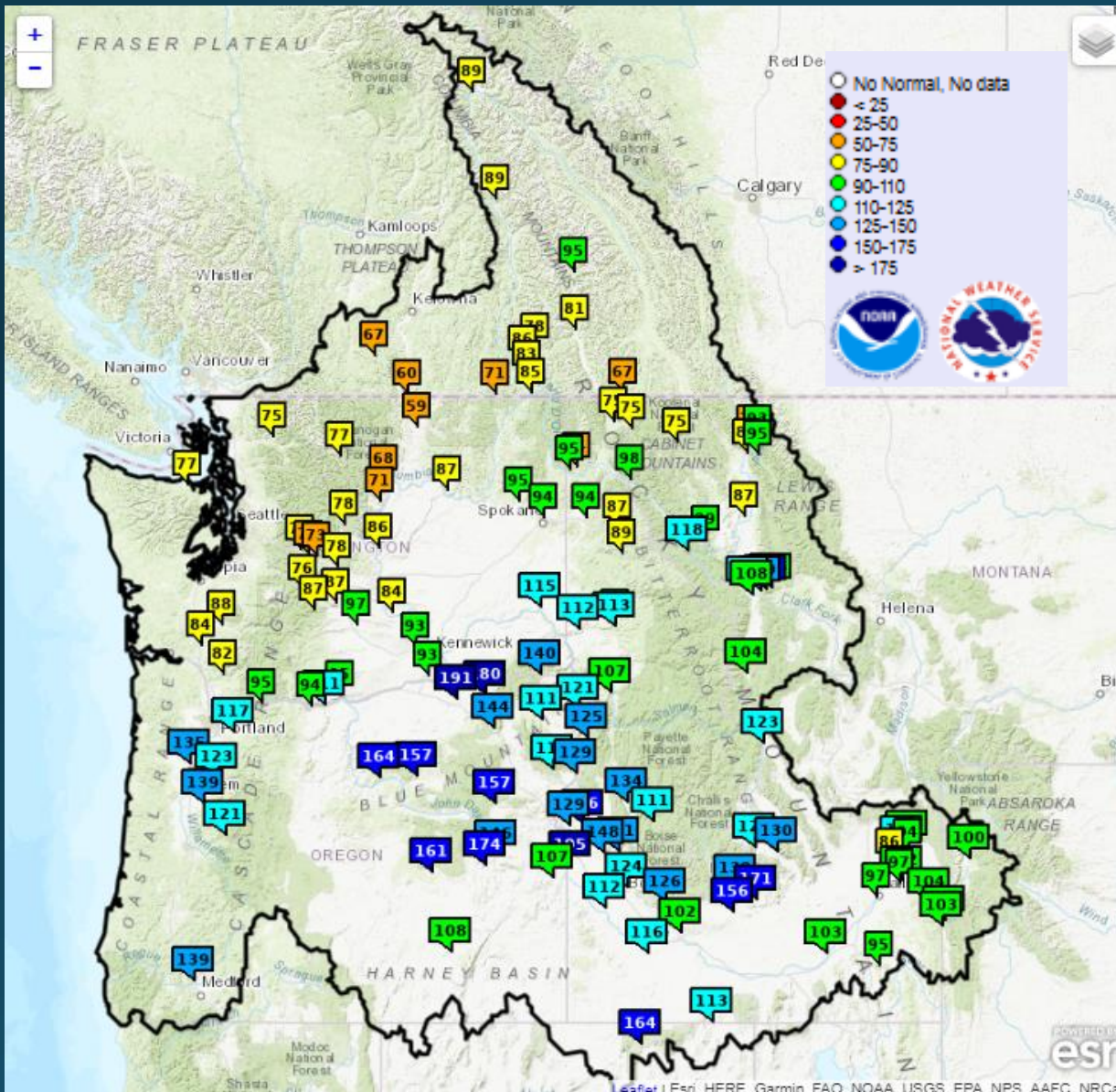
May 1st



Snow data from NRCS, BC Hydro, and Alberta Environment and Parks



Current Adjusted Runoff Conditions



% of Normal (Oct 1st– May 1st)

UPPER COLUMBIA BASIN

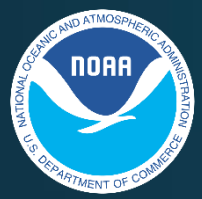
MICA	89
DUNCAN	95
QUEENS BAY	81
LIBBY	75
HUNGRY HORSE	95
GRAND COULEE	87

SNAKE RIVER BASIN

JACKSON LAKE	100
PALISADES	104
DWORSHAK	99
LOWER GRANITE	115

LOWER COLUMBIA BASIN

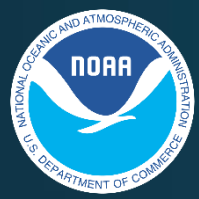
THE DALLES	95
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Water Supply Forecast Briefing Outline



- Meteorological/Hydrological Observations WY2019
- NWRFC Water Supply Forecast Refresher
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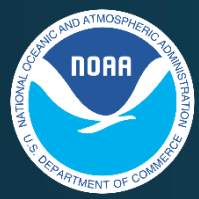
NWRFC Water Supply Forecast Refresher



- ESP: Ensemble Streamflow Prediction
- Multiple Forecast Periods (Seasonal and Monthly)
- Driven By:
 - Hydrologic Model States
 - Meteorological Forecasts*
 - Climatological Forcings (WY1949-2018)
- Issued Daily
- Two types of ESP Forecast:
 - Water Supply – Developed for Columbia River Treaty
 - ESP Natural – Anthropogenic Conditions Removed

COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2019					
Official Forecast					
[-] 10 days QPF: Ensemble: 2019-04-02 Issued: 2019-04-02					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	76605	81843	88	90832	92704
APR-JUL	64272	69520	87	78959	79855
APR-AUG	71206	76424	87	85388	87532
JAN-SEP	92455	97693	86	106683	114216
JAN-JUL	80122	85370	84	94810	101368
OCT-SEP	105996	111234	85	120224	130518
[-] 5 days QPF: Ensemble: 2019-04-02 Issued: 2019-04-02					
APR-SEP	73770	80033	86	88407	92704
APR-JUL	61708	67095	84	76501	79855
APR-AUG	68717	74320	85	83524	87532
JAN-SEP	89620	95883	84	104257	114216
JAN-JUL	77559	82946	82	92352	101368
OCT-SEP	103161	109424	84	117798	130518
[-] 0 days QPF: Ensemble: 2019-04-02 Issued: 2019-04-02					
APR-SEP	70604	77580	84	86642	92704
APR-JUL	59572	65420	82	73922	79855
APR-AUG	65455	72488	83	81698	87532
JAN-SEP	86455	93430	82	102493	114216
JAN-JUL	75423	81270	80	89772	101368
OCT-SEP	99996	106971	82	116034	130518

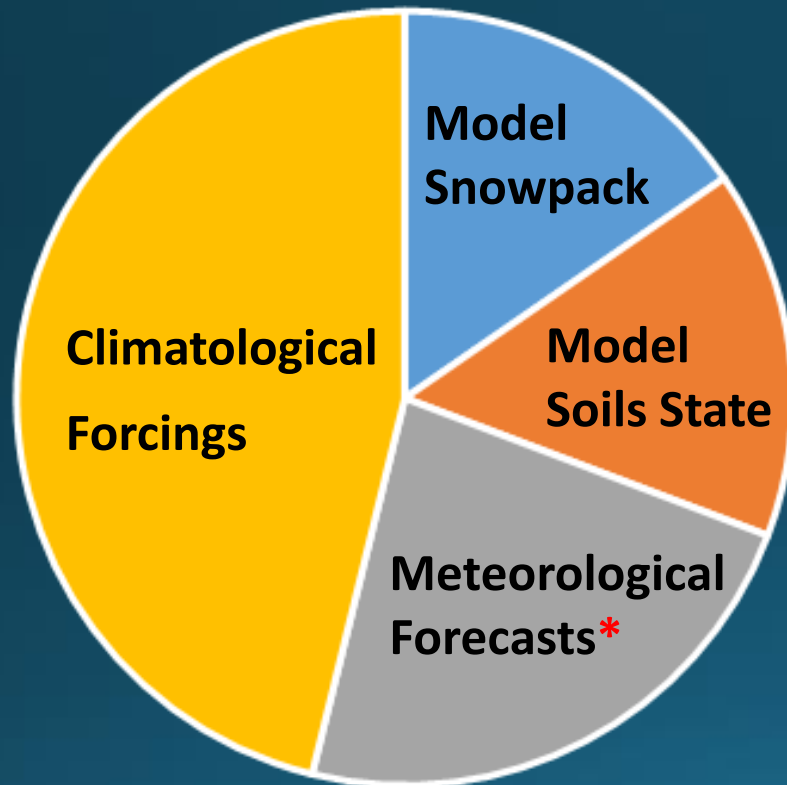
Move the mouse over the desired "Forecast Period" to display a graph.



NWRFC Water Supply Forecast Refresher



Components of Water Supply Forecasts



*Meteorological Forecast Component Includes Three Versions:
0, 5, and 10 day QPF

COLUMBIA - THE DALLES DAM (TDAO3)
Forecasts for Water Year 2019

Official Forecast

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Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
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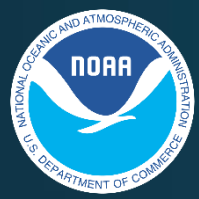
5 days QPF: Ensemble: 2019-04-02 Issued: 2019-04-02

APR-SEP	73770	80033	86	88407	92704
APR-JUL	61708	67095	84	76501	79855
APR-AUG	68717	74320	85	83524	87532
JAN-SEP	89620	95883	84	104257	114216
JAN-JUL	77559	82946	82	92352	101368
OCT-SEP	103161	109424	84	117798	130518

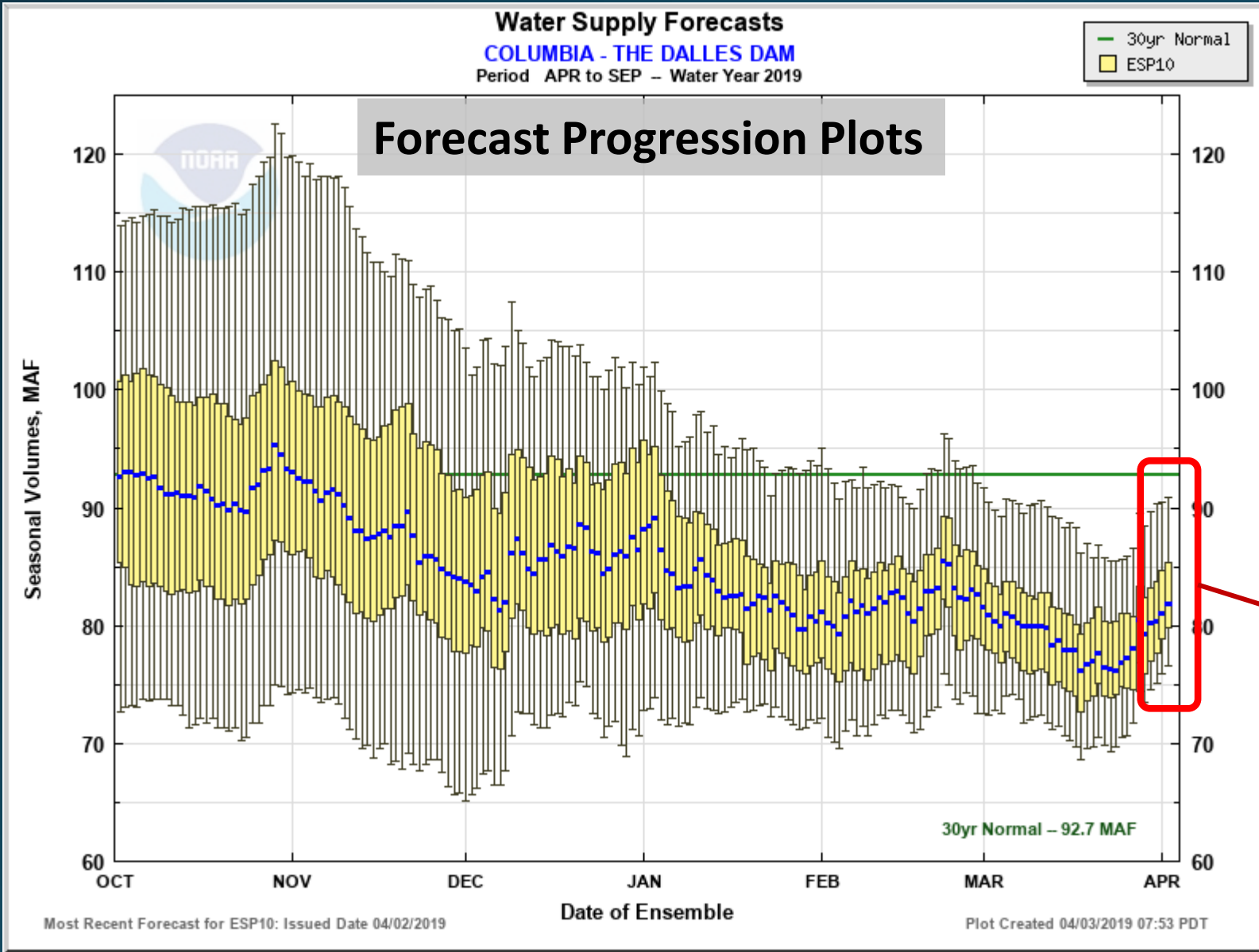
0 days QPF: Ensemble: 2019-04-02 Issued: 2019-04-02

APR-SEP	70704	77580	84	86642	92704
APR-JUL	59572	65420	82	73922	79855
APR-AUG	65455	72488	83	81698	87532
JAN-SEP	86455	93430	82	102493	114216
JAN-JUL	75423	81270	80	89772	101368
OCT-SEP	99996	106971	82	116034	130518

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

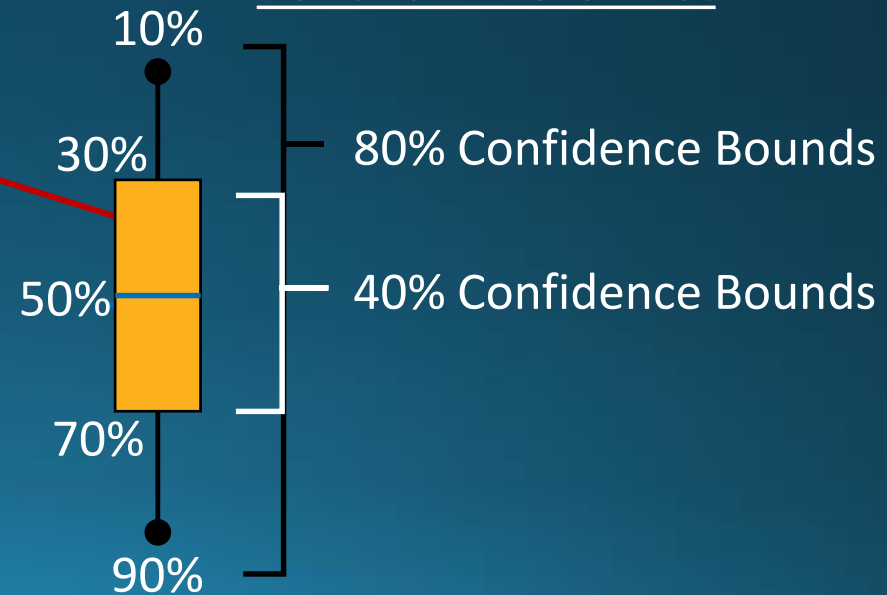


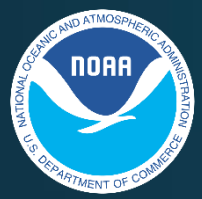
NWRFC Water Supply Forecast Refresher



**Exceedance Probabilities
 ONLY Quantify Uncertainty
 in Climatological Forcings**

Box and Whisker Plot

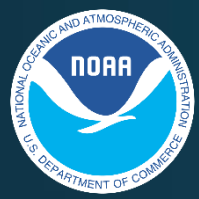




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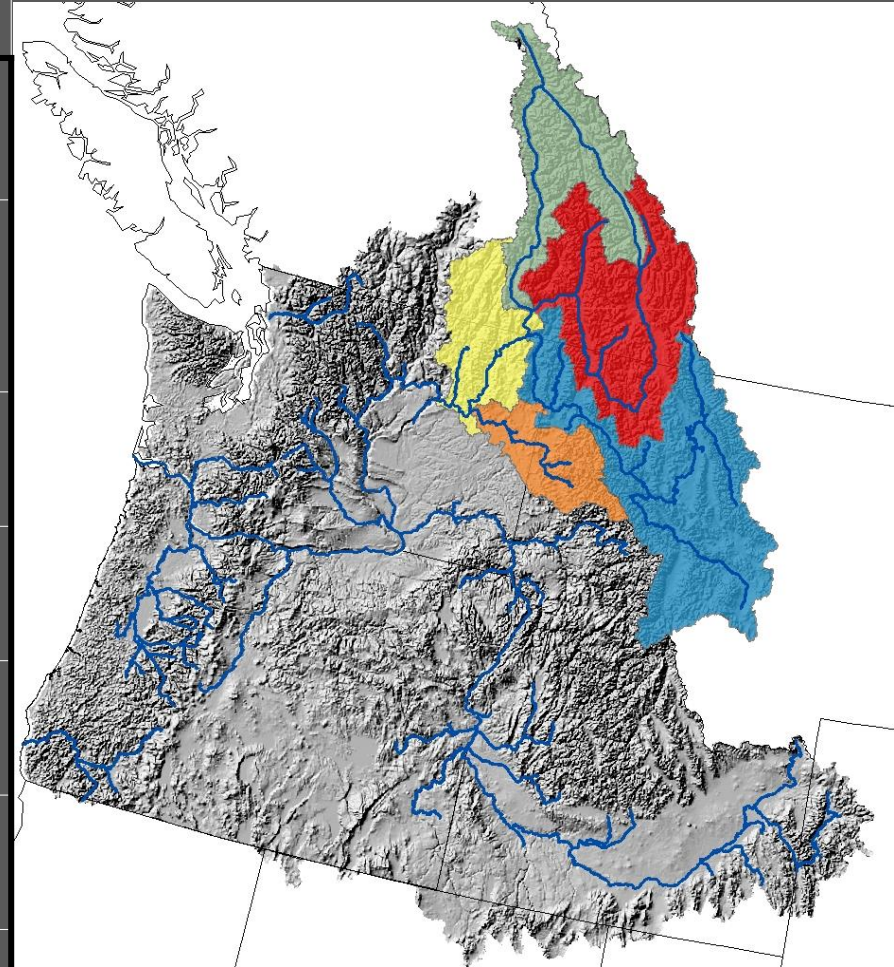


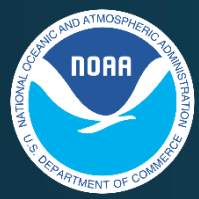
Current Model States-Regional Overview



UPPER COLUMBIA RIVER

Subregion	Model Forcing (WY 2019)		Observed Runoff	Current Model States (5/1)	
	Precip. % Norm	Temp. Departure DegF	April % Norm	Snow Pack % Norm	Soil % Norm
Above Arrow Dam	75	-1.1	96	85	99
Kootenai	69	-1.2	71	85	88
Pend Oreille	82	-2.2	83	83	108
Spokane	80	-1.2	117	74	101
Above Grand Coulee	75	-1.5	89	84	97



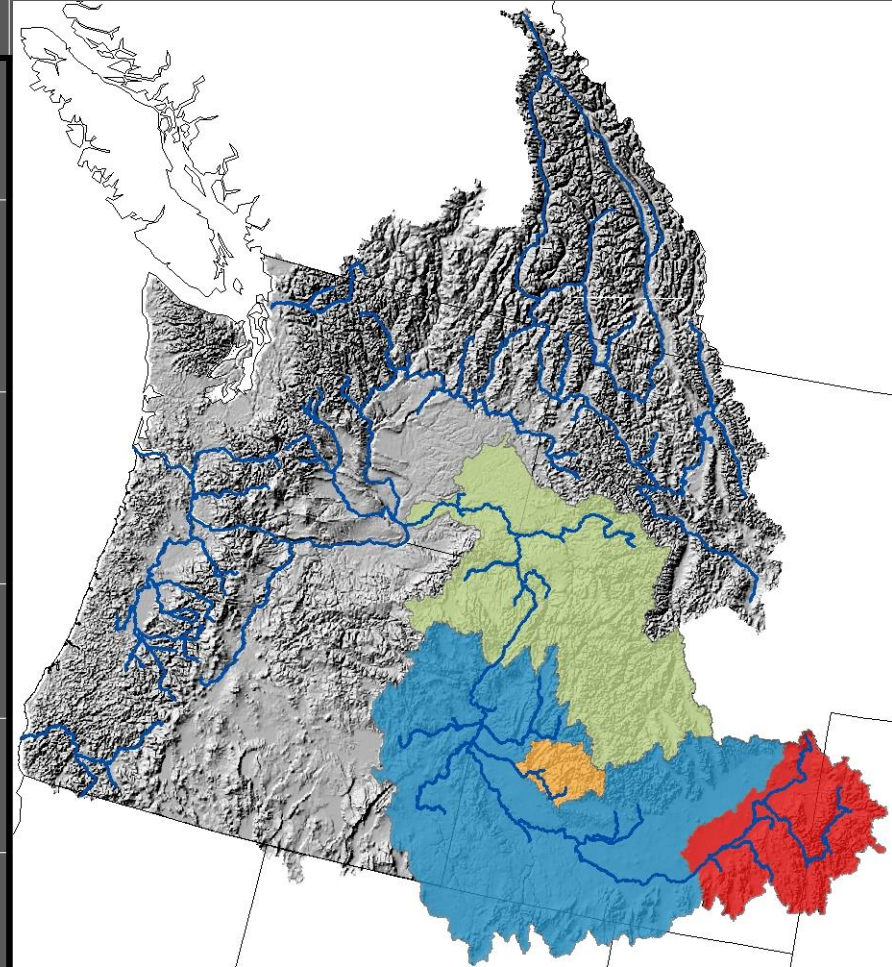


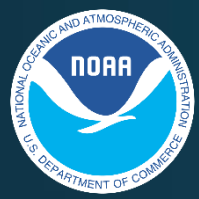
Current Model States-Regional Overview



SNAKE RIVER

Subregion	Model Forcing (WY 2019)		Observed Runoff	Current Model States (5/1)	
	Precip. % Norm	Temp. Departure DegF	April % Norm	Snow Pack % Norm	Soil % Norm
Above American Falls Dam	95	-1.2	115	109	113
Boise	96	-0.7	172	111	117
Above Brownlee Dam	97	-0.8	163	116	121
Above Ice Harbor Dam	93	-1.0	173	104	121



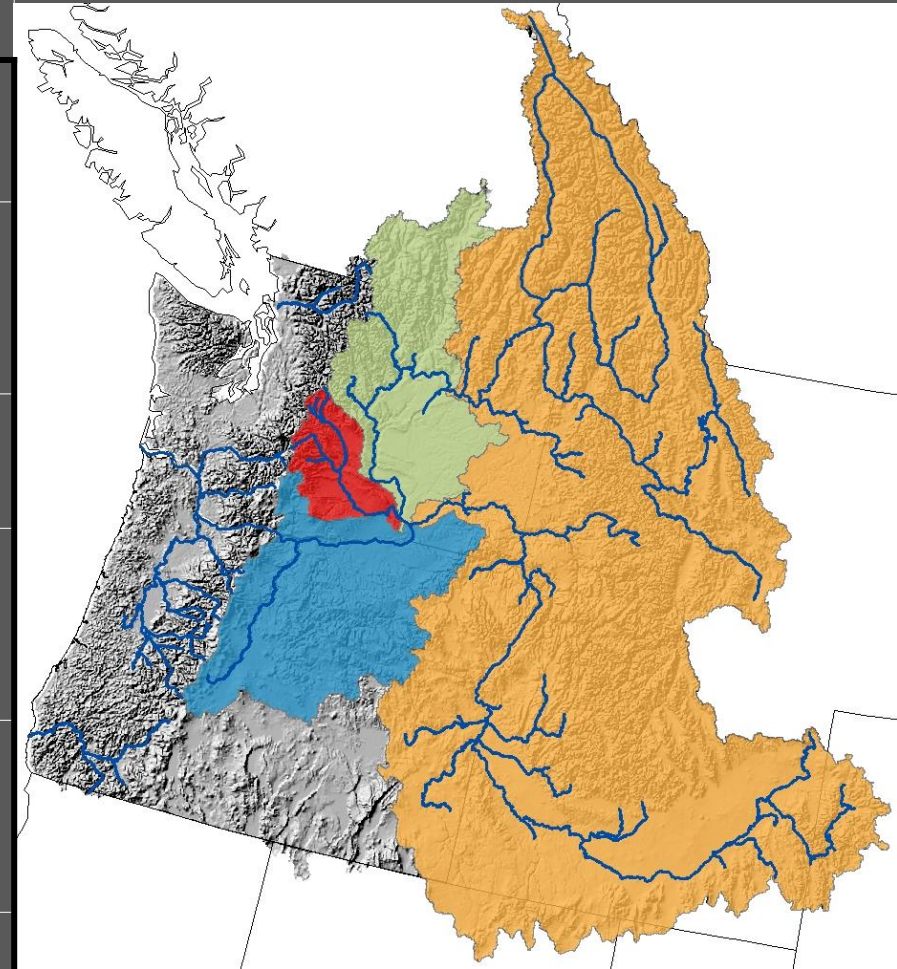


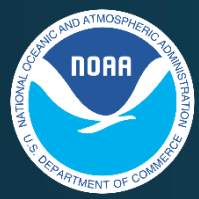
Current Model States-Regional Overview



COLUMBIA RIVER MAINSTEM

Subregion	Model Forcing (WY 2019)		Observed Runoff	Current Model States (5/1)	
	Precip. % Norm	Temp. Departure DegF	April % Norm	Snow Pack % Norm	Soil % Norm
Yakima	76	-1.3	125	66	98
Upper Mid-Columbia Tribs	66	-1.2	NA	72	99
Lower Mid-Columbia Tribs	90	-1.3	NA	121	138
Above The Dalles Dam	83	-1.3	134	89	105







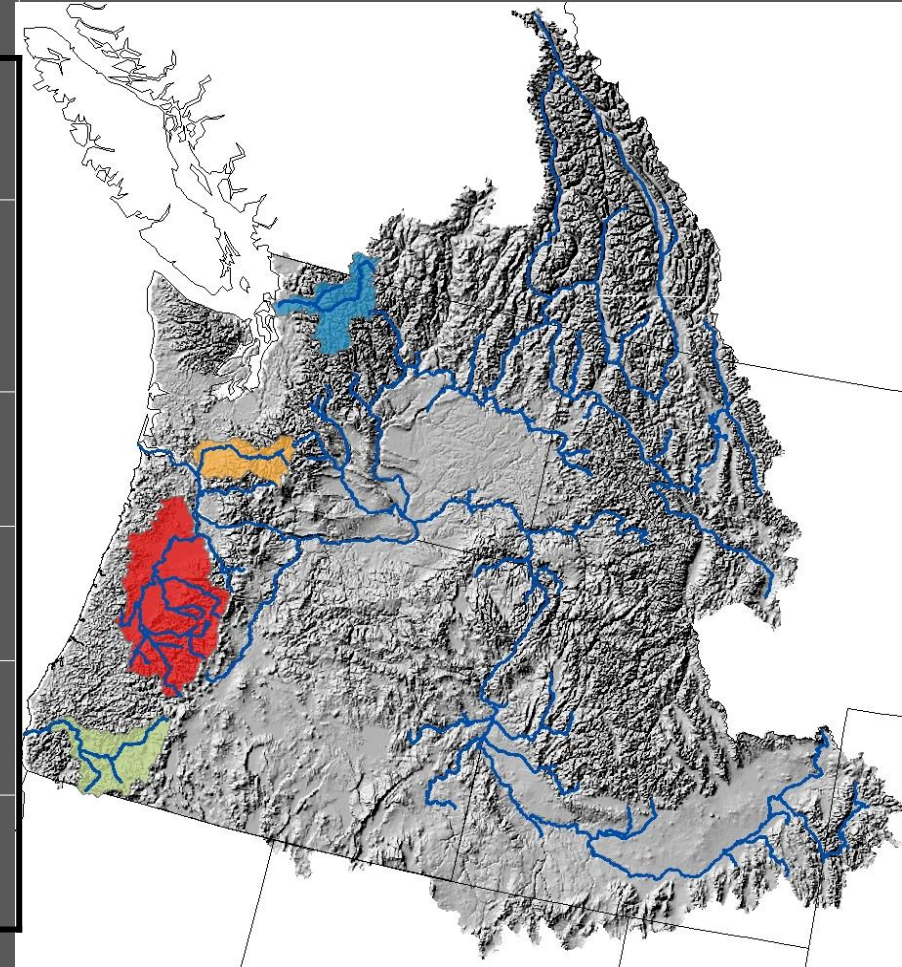


Current Model States-Regional Overview



WESTSIDE

Subregion	Model Forcing (WY 2019)		Observed Runoff	Current Model States (5/1)		
	Precip. % Norm	Temp. Departure DegF	April % Norm	Snow Pack % Norm	Soil % Norm	
	Willamette	84	-0.2	204	84	101
	Rogue	96	-0.4	222	89	110
	Skagit	77	0.2	109	66	97
	Cowlitz	70	-0.2	115	73	93





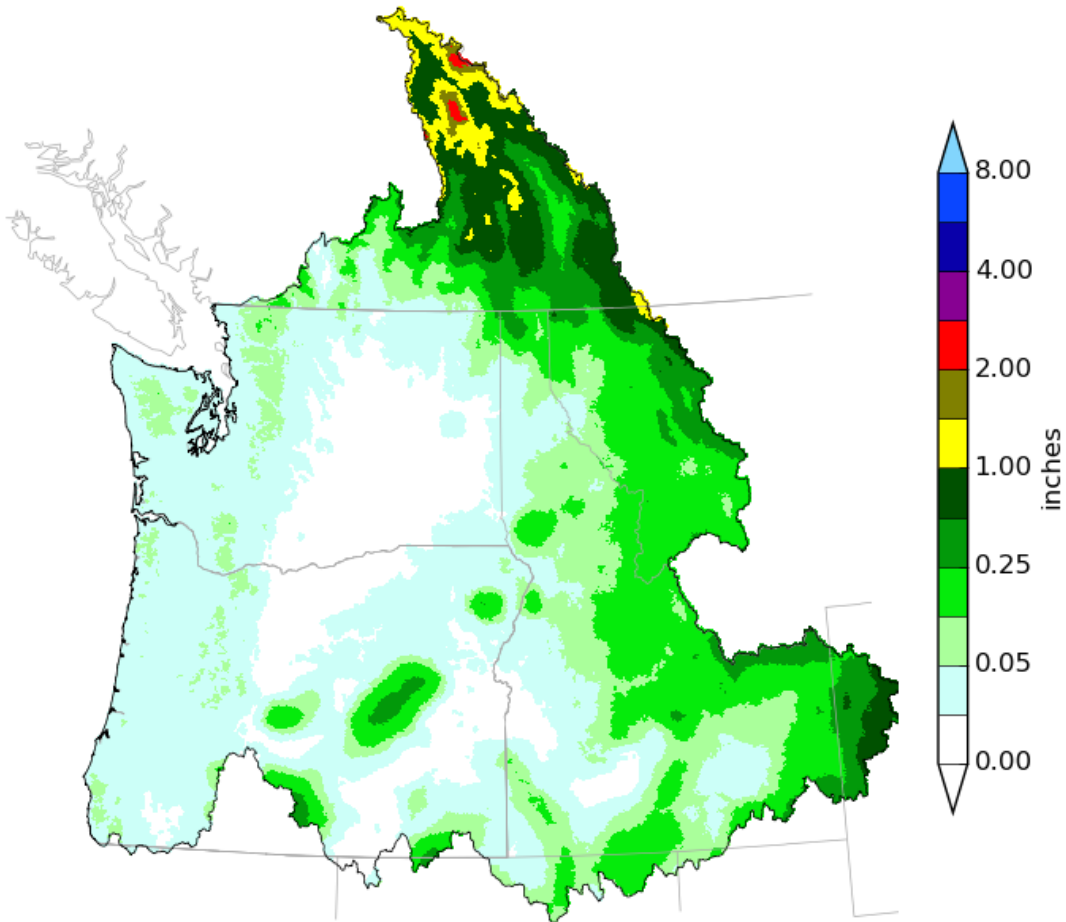
Cumulative 10 Day Precipitation Forecast



May 1-11, 2019



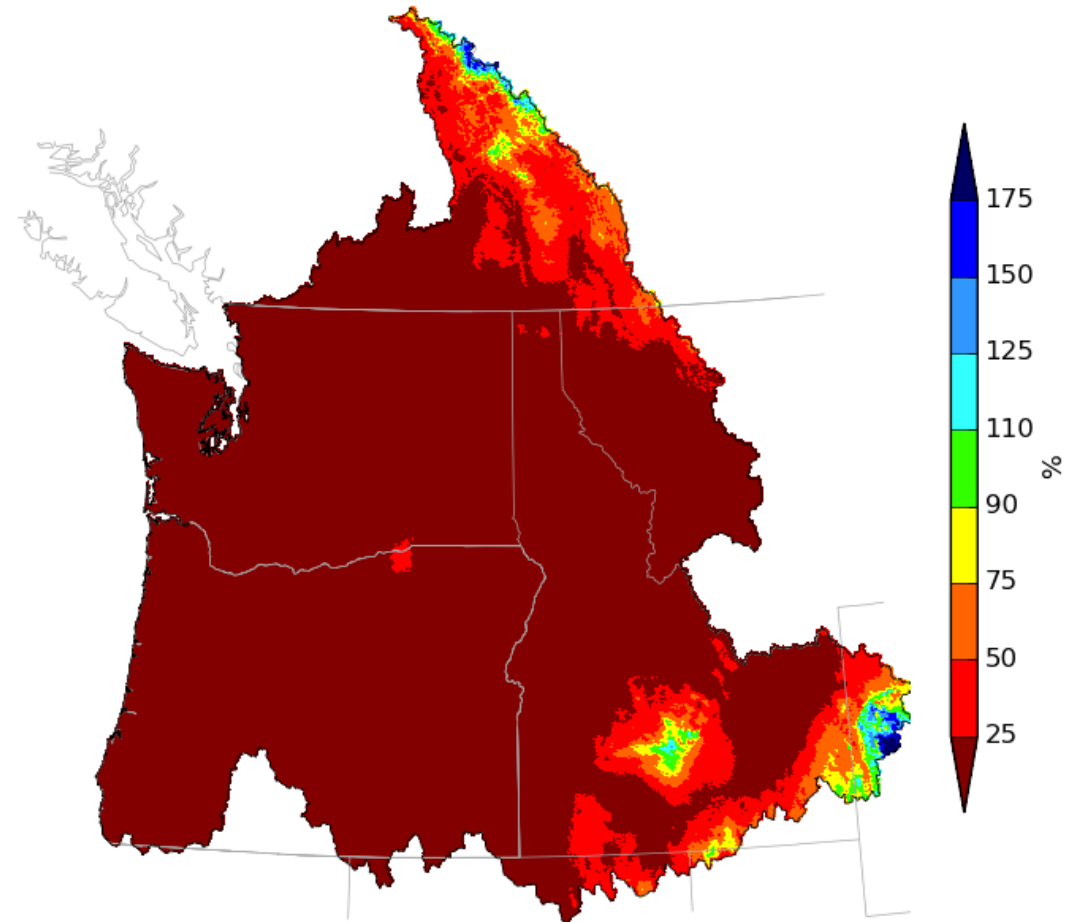
Northwest River Forecast Center
10 Day QPF, Ending 12Z, 05/11/19



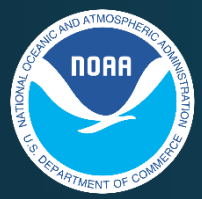
Creation Time: Wed May 1 22:37:11 UTC 2019



Northwest River Forecast Center
10 Day QPF (Percent of Climatology), Ending 12Z, 05/12/19



Creation Time: Thu May 2 14:33:10 UTC 2019



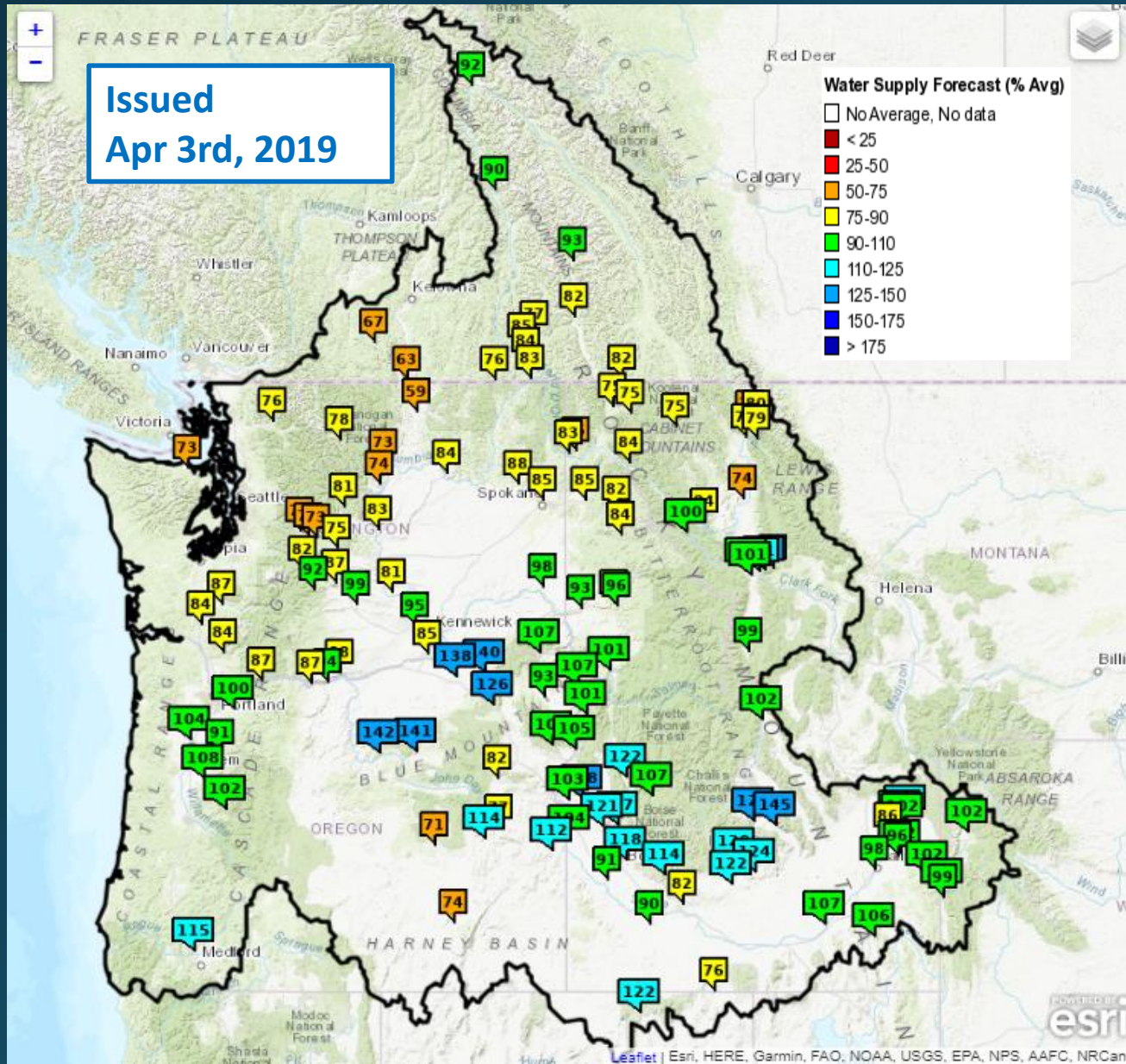
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ESP10 Apr-Sep Water Supply Forecasts



Basins

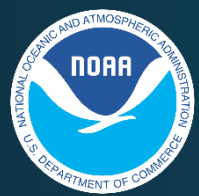
% (30yr Norm)

Upper Columbia River

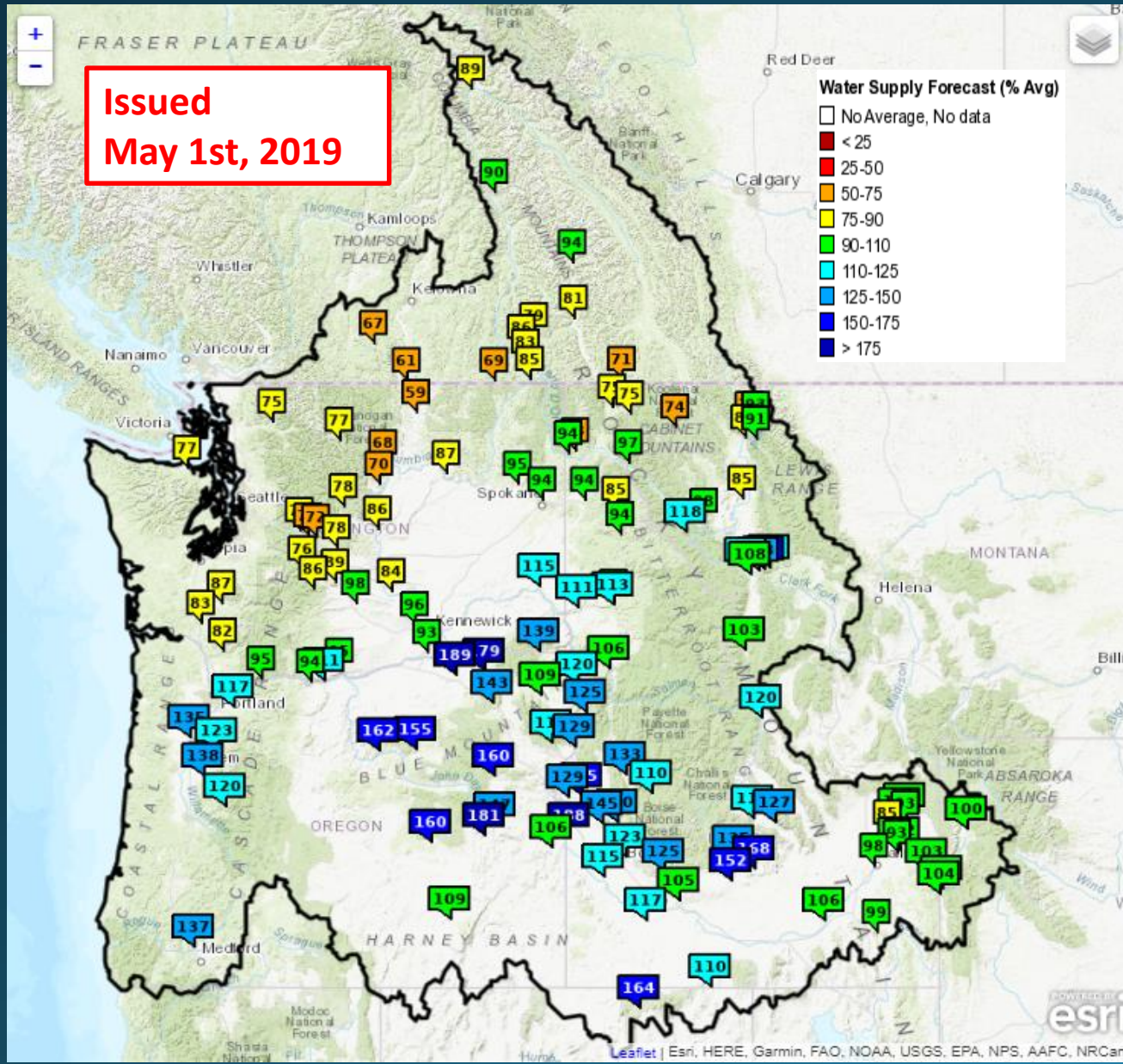
Columbia River - Mica Dam	92%
Kootenai River - Libby Dam	75%
Coeur d'Alene Lake	85%
SF Flathead River - Hungry Horse Dam	82%
Pend Oreille R-Albeni Falls Dam	87%

Snake River

Jackson Lake Dam	102%
Palisades Dam	102%
Boise River - Lucky Peak Dam	118%
NF Clearwater River-Dworshak Dam	84%
Lower Snake River-Lower Granite Dam	98%
Lower Columbia - The Dalles Dam	87%



ESP10 Apr-Sep Water Supply Forecasts



Basins

% (30yr Norm)

Upper Columbia River

Columbia River - Mica Dam	89% (-3)
Kootenai River - Libby Dam	74% (-1)
Coeur d'Alene Lake	94% (+9)
SF Flathead River - Hungry Horse Dam	91% (+9)
Pend Oreille R-Albeni Falls Dam	94% (+7)

Snake River

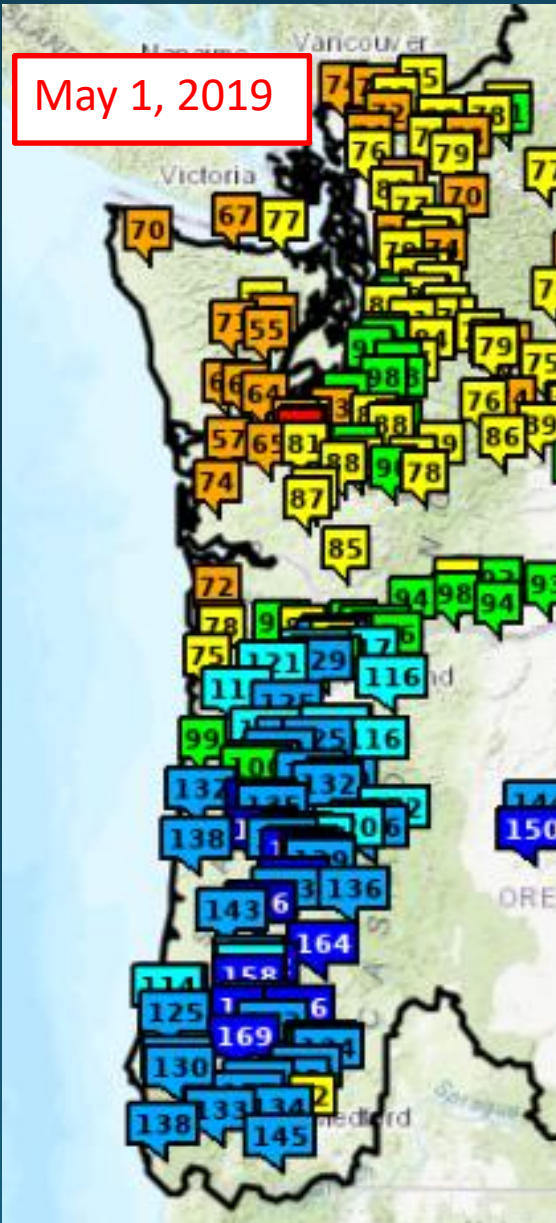
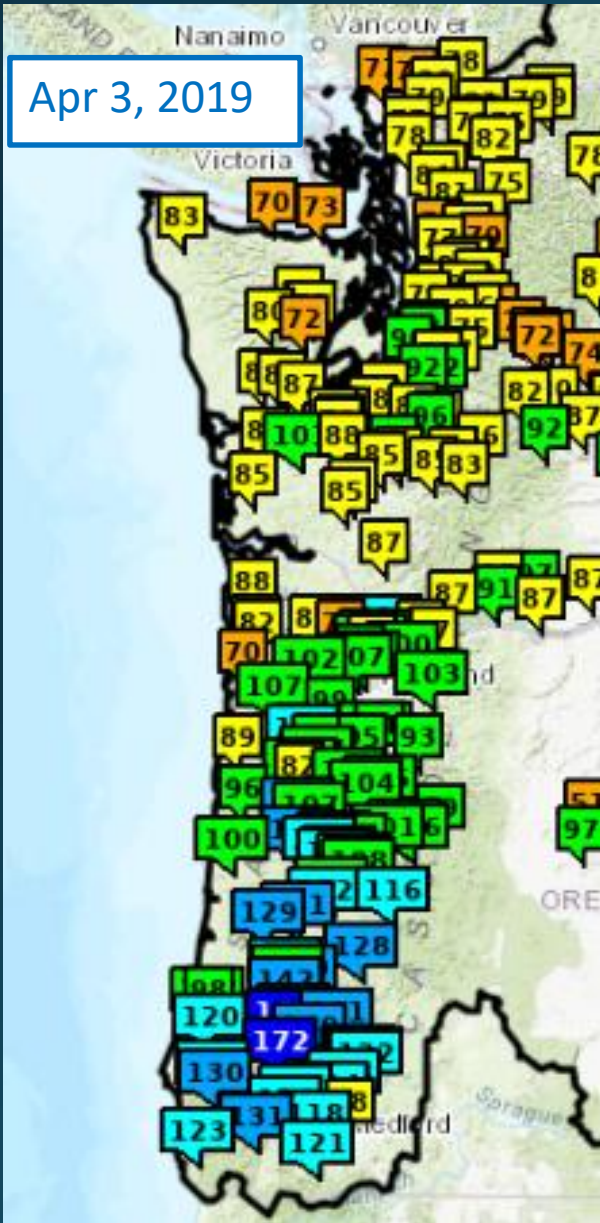
Jackson Lake Dam	100% (-2)
Palisades Dam	103% (+1)
Boise River - Lucky Peak Dam	123% (+5)
NF Clearwater River-Dworshak Dam	99% (+15)
Lower Snake River-Lower Granite Dam	115% (+17)
Lower Columbia - The Dalles Dam	94% (+7)

% Change from Previous WS Briefing in Parenthesis (--)

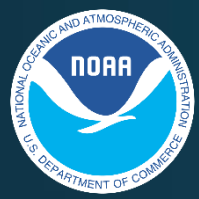


ESP10 Natural Apr-Sep Forecasts

ESP Natural - Western Oregon and Washington



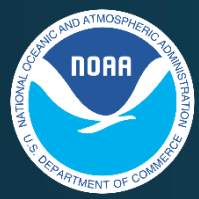
Basin	% (30yr Norm)
Skagit River near Concrete	78% (-1)
Green River Howard Hanson Res	84% (+9)
Cowlitz River Mossyrock Reservoir	89% (+4)
Cowlitz River Mayfield Reservoir	88% (+3)
Willamette River at Salem	125% (+26)
Rogue River Applegate Reservoir	145% (+24)
<i>% Change from Previous WS Briefing in Parenthesis (--)</i>	



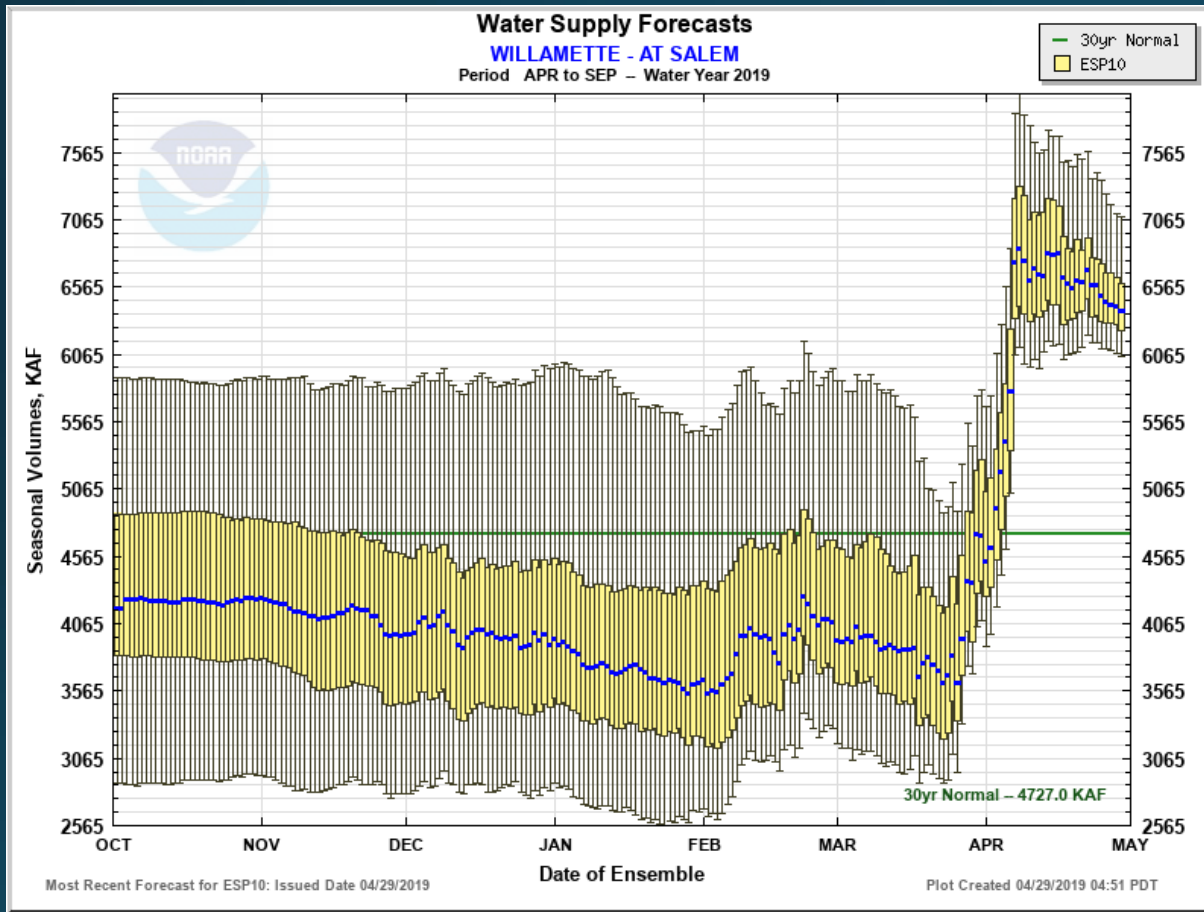
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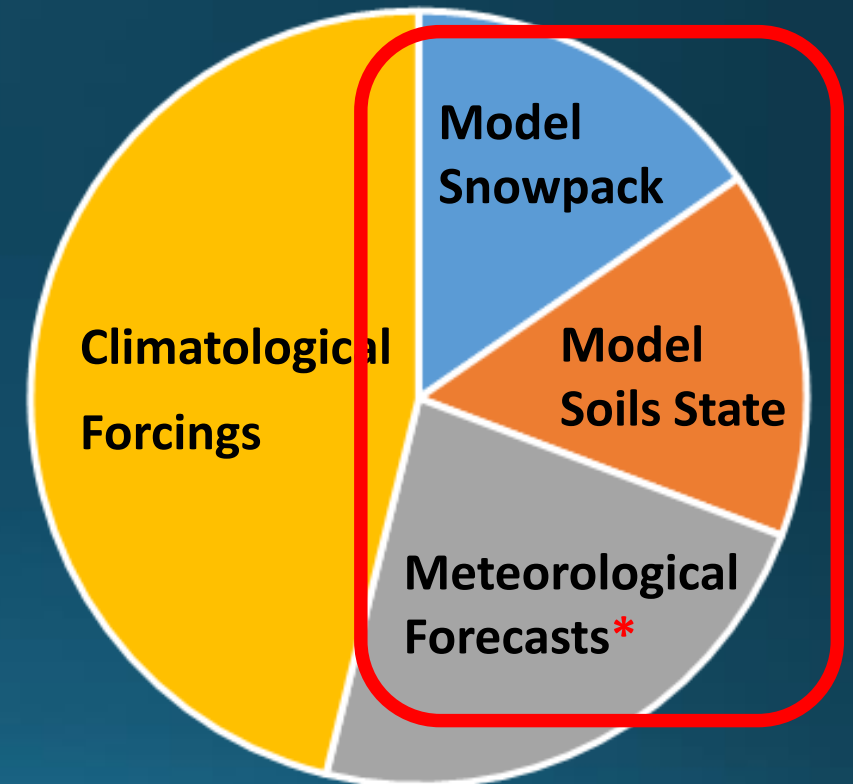
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Drivers of Changing Water Supply Forecasts

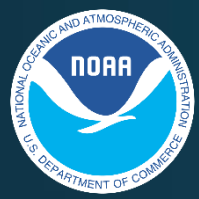


Components of Water Supply Forecasts



*Includes Three Versions: 0, 5, and 10 day QPF

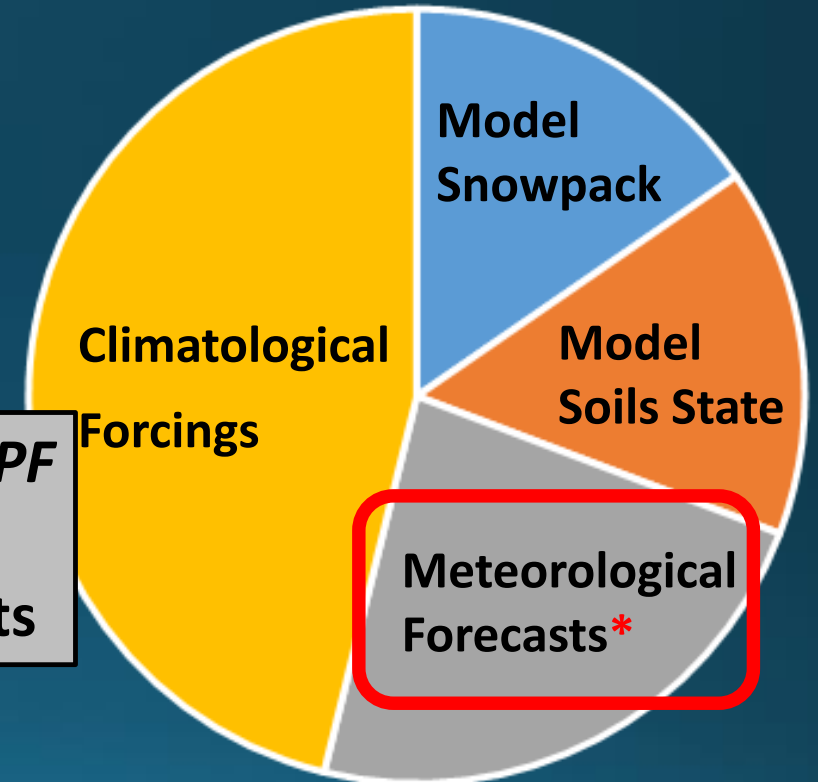
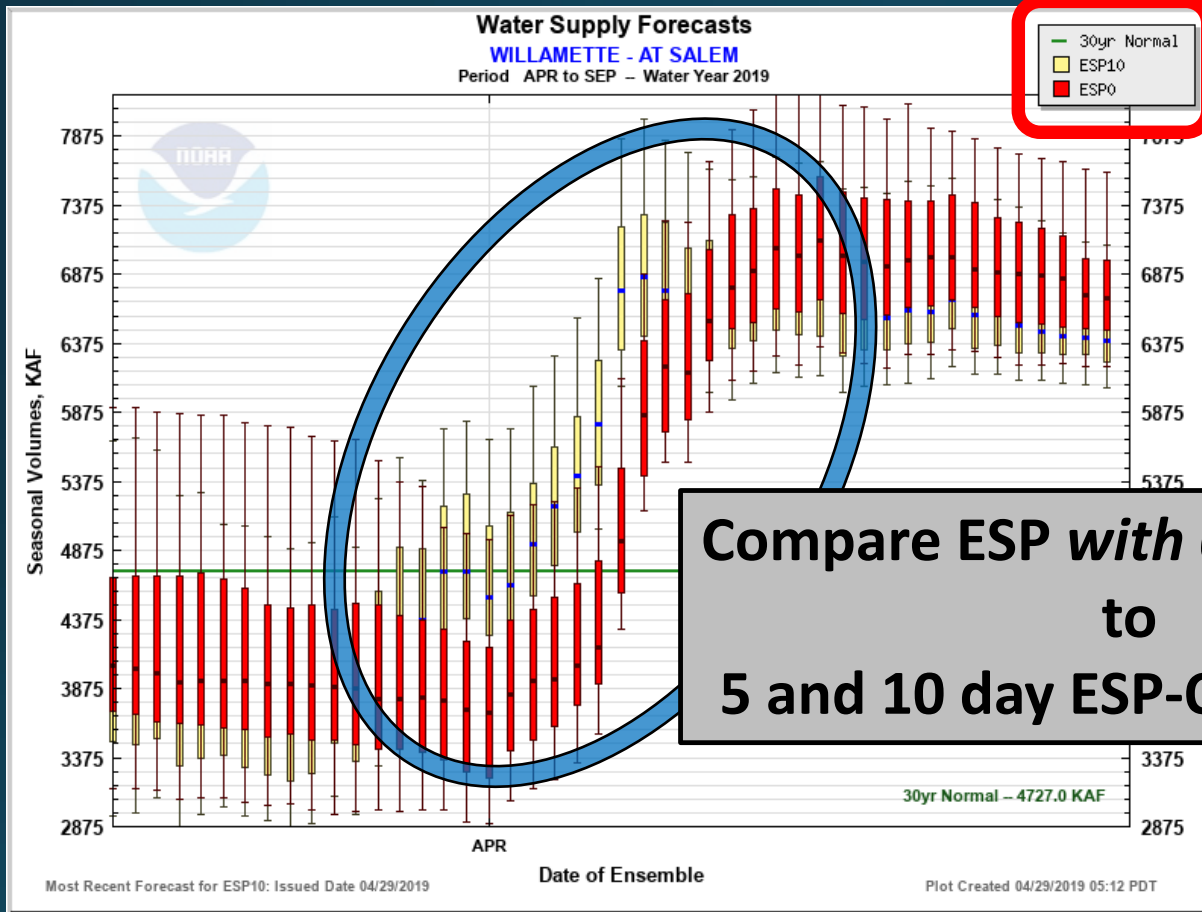
What resources are available to diagnose causes of changes to a water supply forecast?



Drivers of Changing Water Supply Forecasts

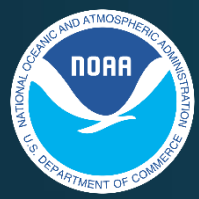


Components of Water Supply Forecasts

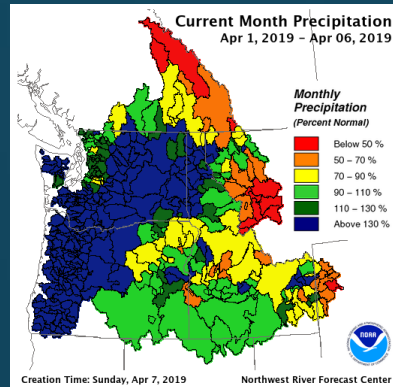
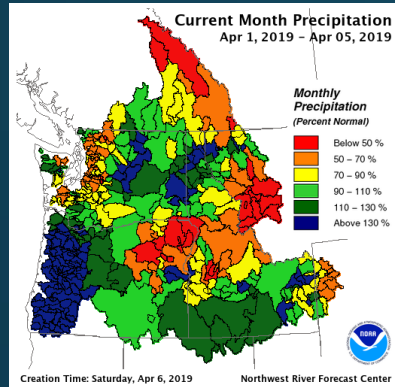
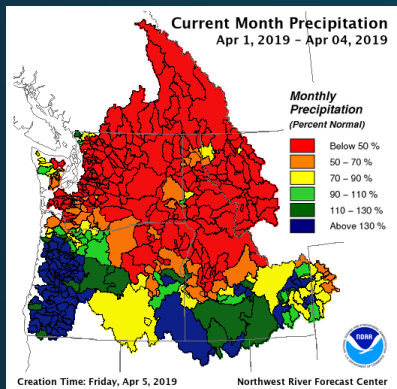


*Includes Three Versions: 0, 5, and 10 day QPF

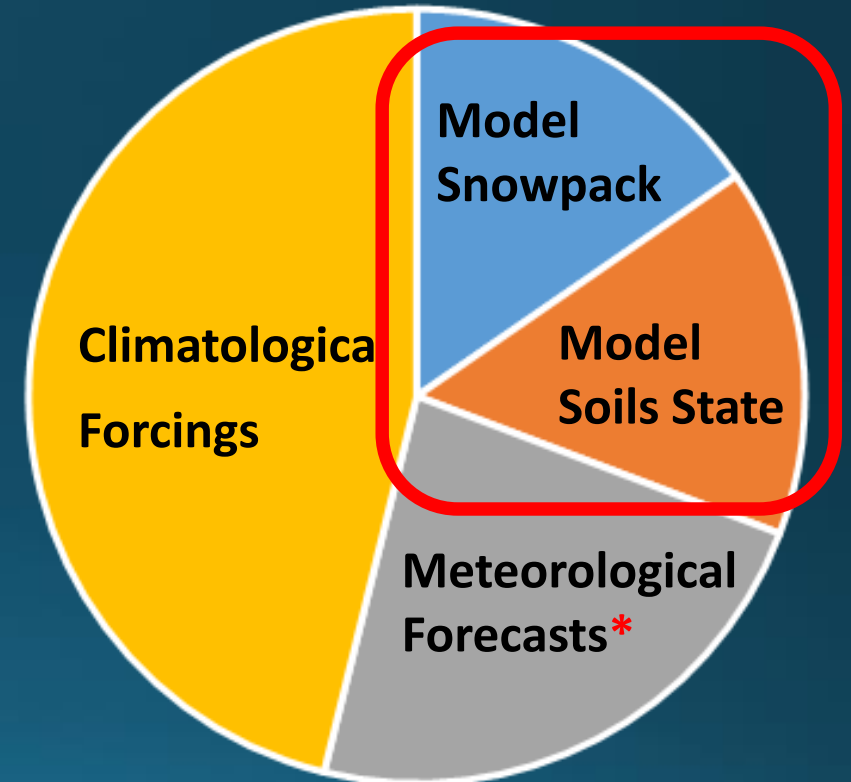
What resources are available to diagnose causes of changes to a water supply forecast?



Drivers of Changing Water Supply Forecasts

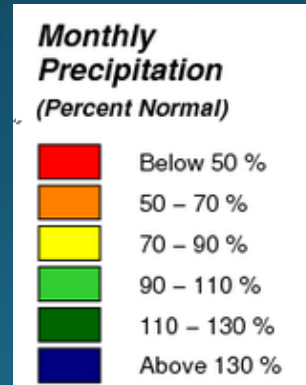
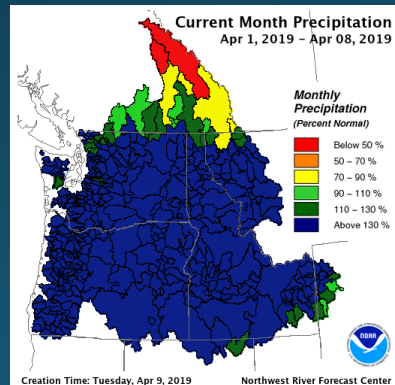
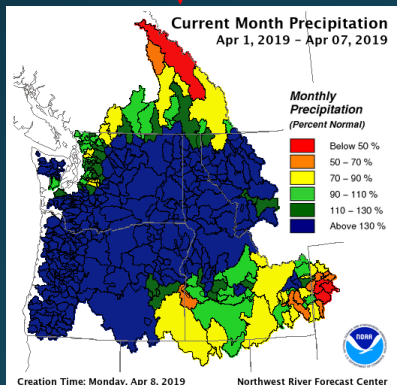


Components of Water Supply Forecasts

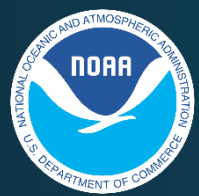


*Includes Three Versions: 0, 5, and 10 day QPF

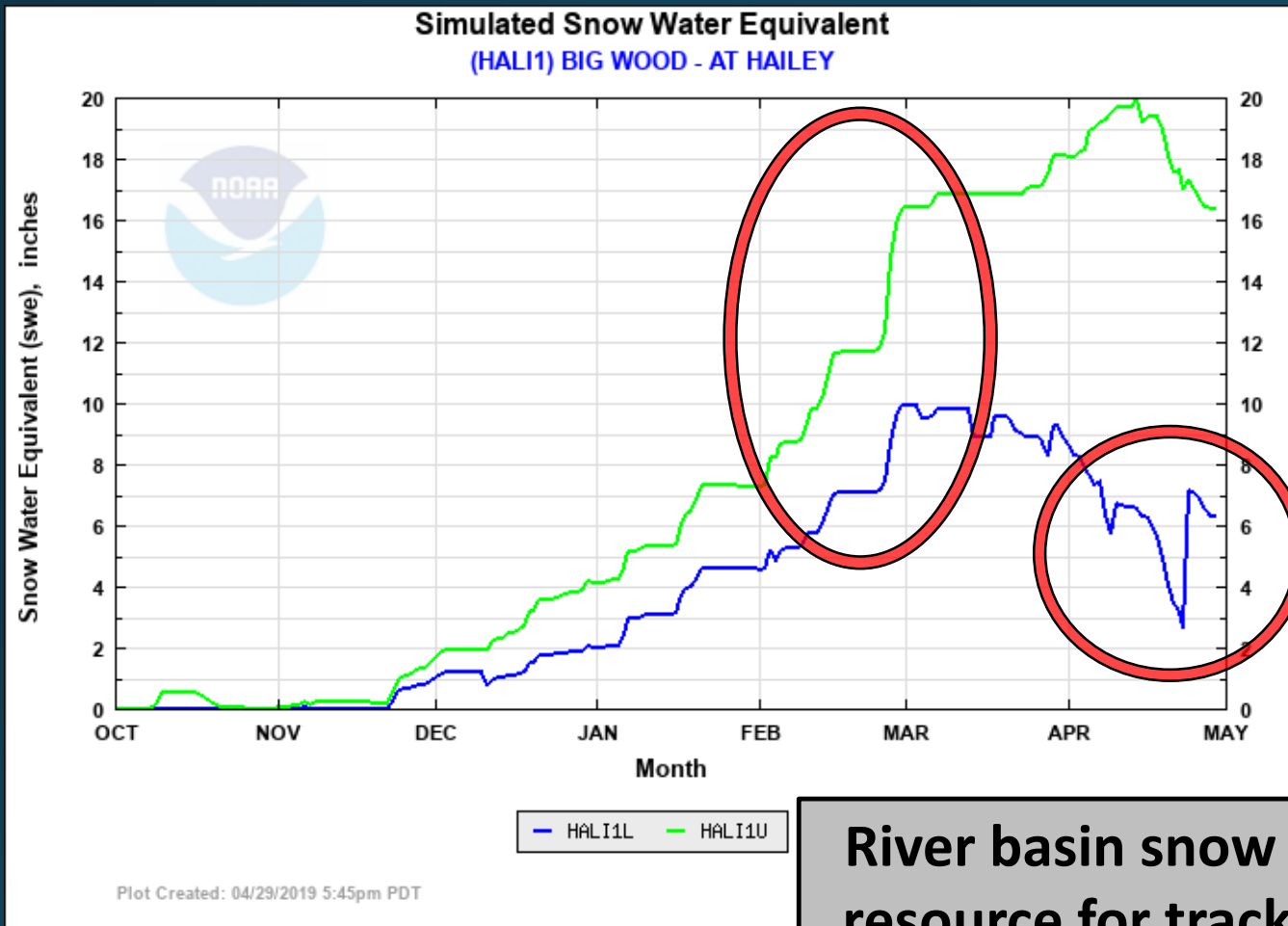
Use precipitation and temperature plots to track deviation from normal climatic conditions



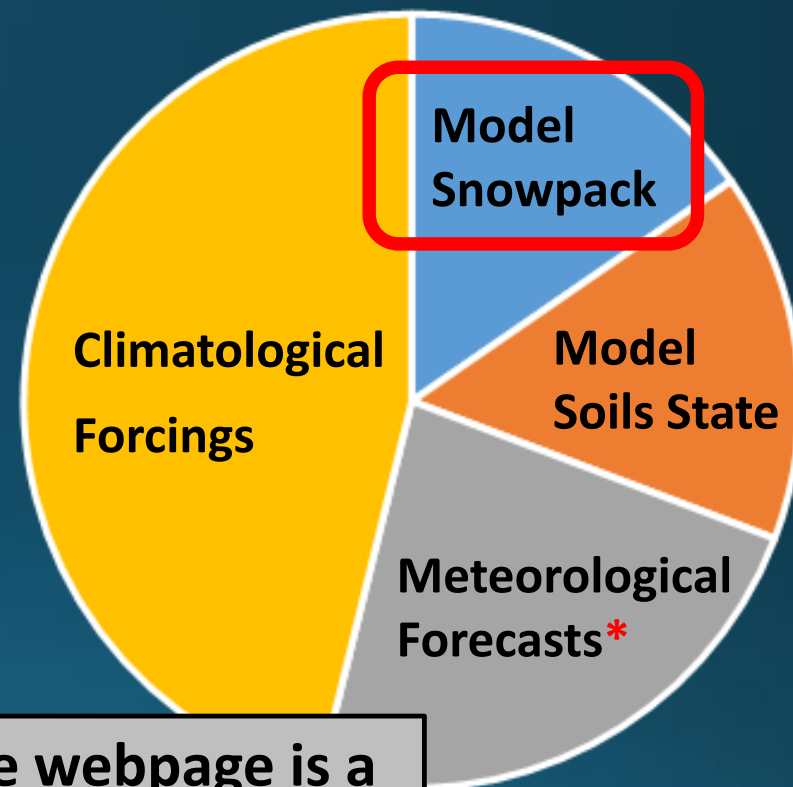
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Drivers of Changing Water Supply Forecasts



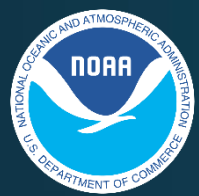
Components of Water Supply Forecasts



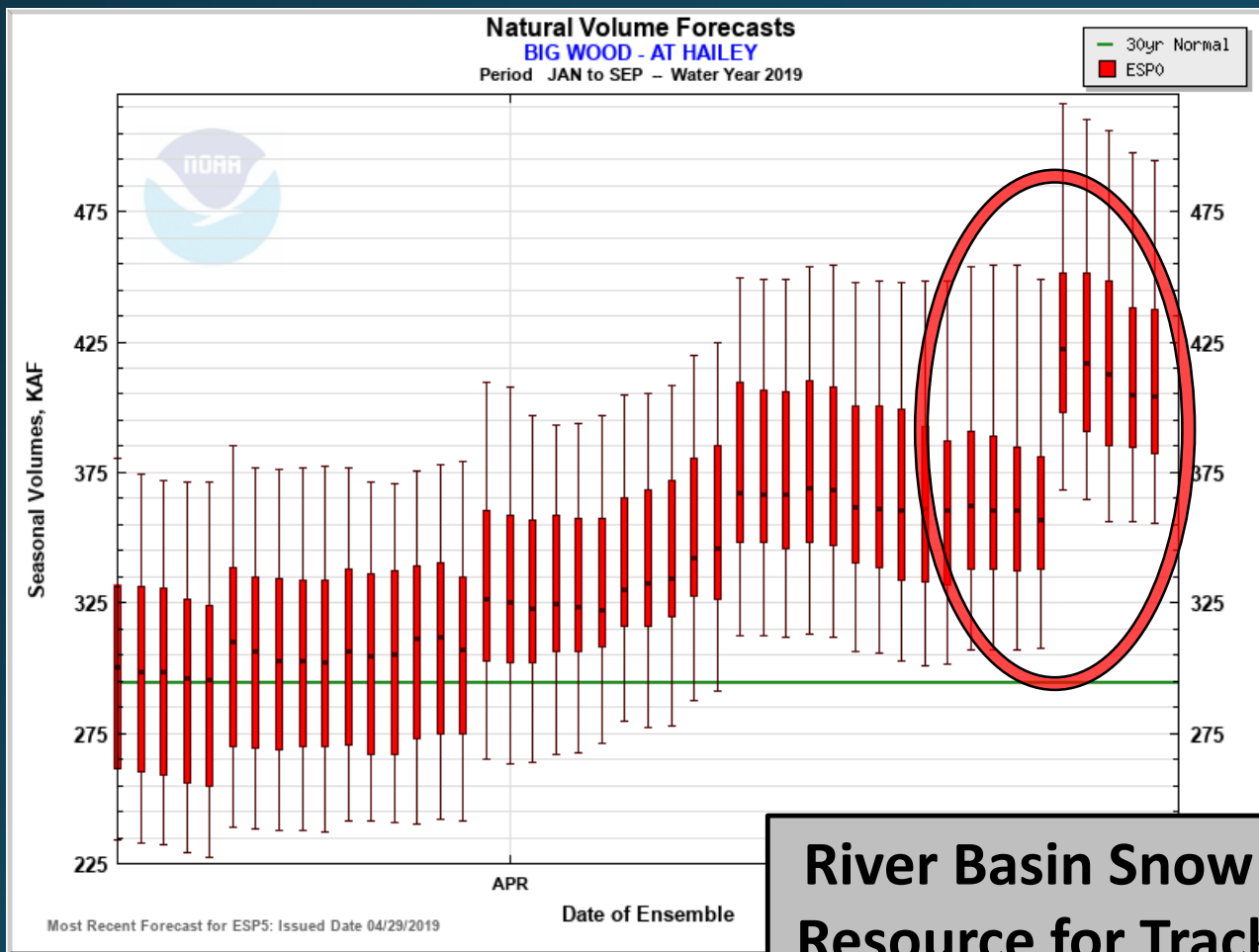
River basin snow compare webpage is a resource for tracking model snow states

, 5, and 10 day QPF

What Resources are available to diagnose causes of changes to a water supply forecast?

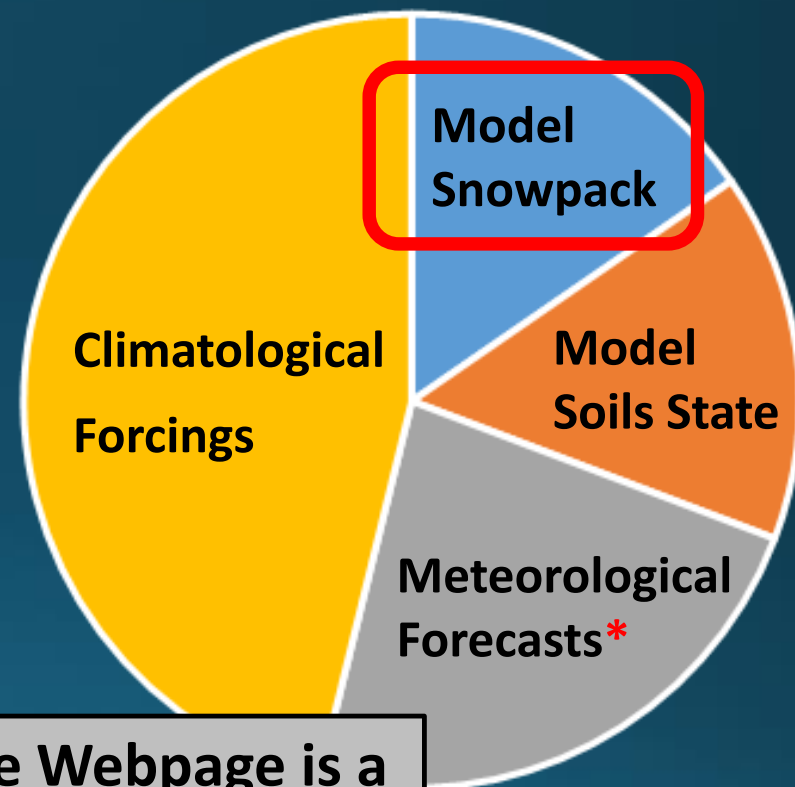


Drivers of Changing Water Supply Forecasts



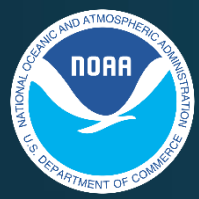
River Basin Snow Compare Webpage is a Resource for Tracking Model Snow States

Components of Water Supply Forecasts



, 5, and 10 day QPF

What resources are available to diagnose causes of changes to a water supply forecast?

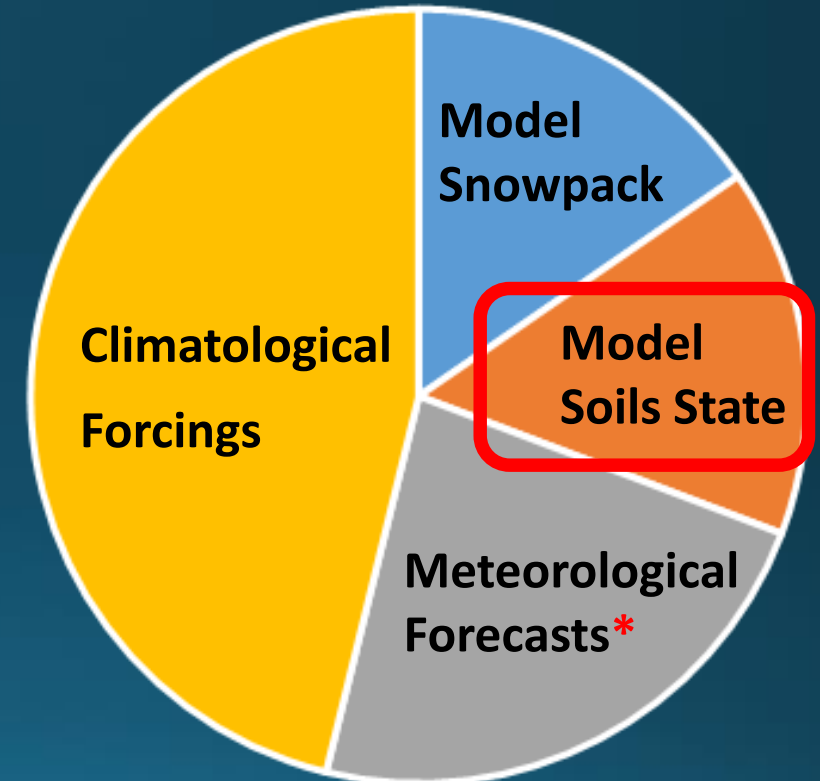


Drivers of Changing Water Supply Forecasts



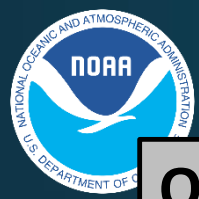
- **Currently no web resource for tracking model soil states.**
 - No gage soil moisture network to validate states
 - Yet to find reliable satellite product to use as an index
- **However:**
 - *Use baseflow/recession streamflow periods to validate soil moisture states*
 - *Forecasters, generally, limit adjustments to those times*

Components of Water Supply Forecasts



*Includes Three Versions: 0, 5, and 10 day QPF

What resources are available to diagnose causes of changes to a water supply forecast?



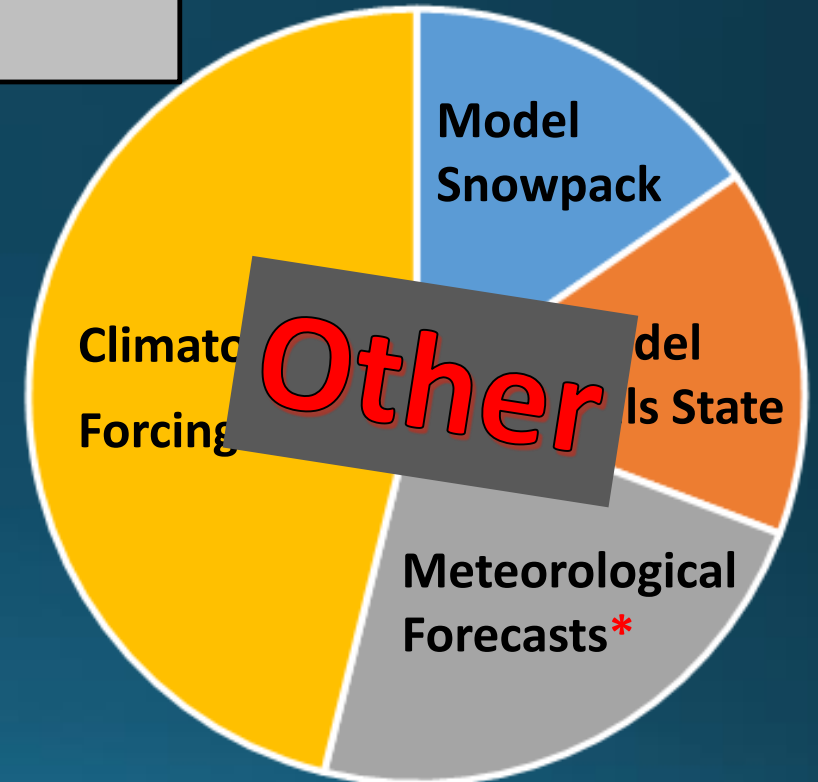
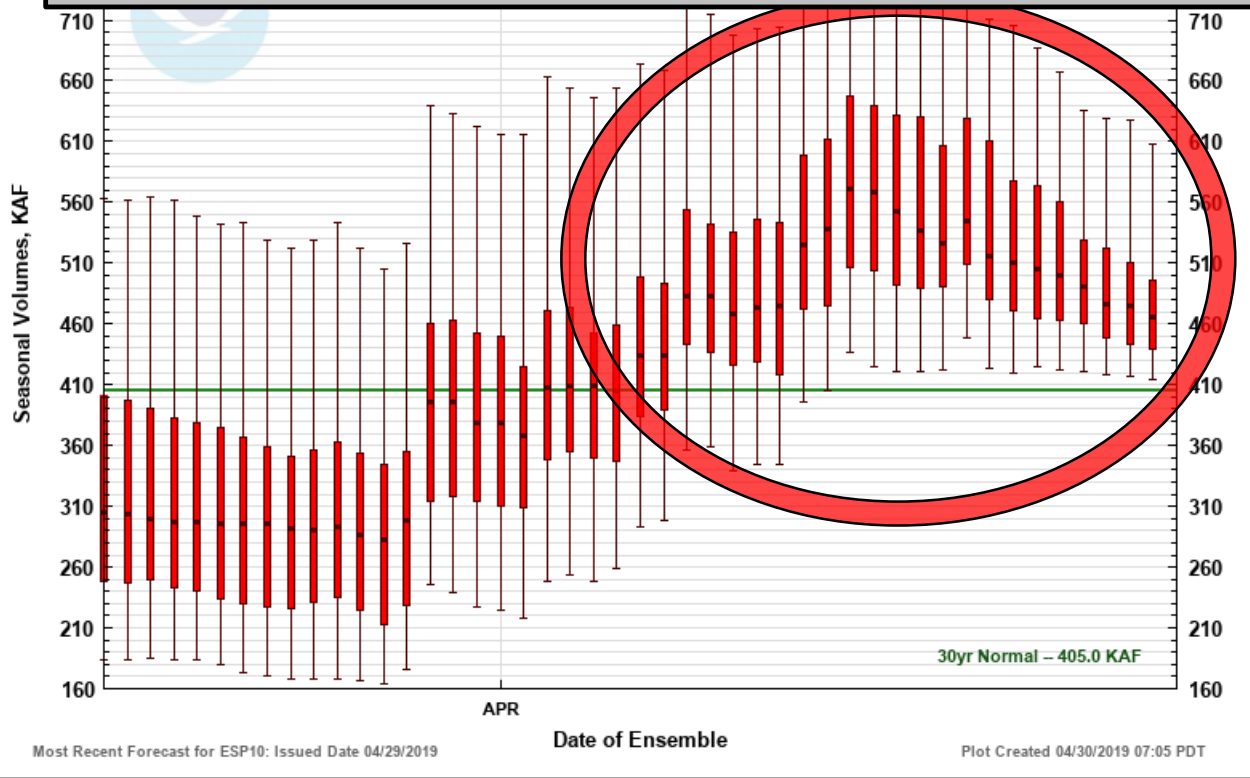
Drivers of Changing Water Supply Forecasts



Other drivers:

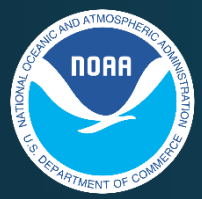
- Uncertainty in model states
- Near term meteorological forecast uncertainty
- Timing of event (inside/outside forecast period)

Drivers of Water Supply Forecasts



*Includes Three Versions: 0, 5, and 10 day QPF

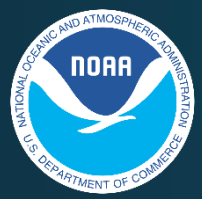
What resources are available to diagnose causes of changes to a water supply forecast?



Water Supply Forecast Briefing Outline



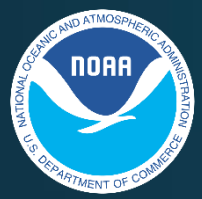
- Meteorological/Hydrological Observations WY2019
- NWRFC Water Supply Forecast Refresher
- Water Supply Components
 - Current Model States-Regional Overview
 - 10 Day Forecasts-Model Forcings
- Current Water Supply Forecasts
- Chalk Talk: Drivers of Changing Water Supply Forecasts
- Summary



Summary



- Observed conditions WY2019
 - Series of storms brought a warmer and wetter early April
 - Regional snow measurements are indicating that melt has begun, with exception along MT/ID border
- Water supply components
 - Model states
 - SWE % norms could be biased high, due to exclusion of basins w/out snowpack (i.e. early melt)
 - Early melt and anomalously high precipitation in snake basin, has resulted in above normal soil sat.
 - April runoff was unusually high in the southern and central NWRFC region due to series of early April events
- Current water supply forecasts
 - Water supply forecasts remain largely unchanged over the past month above Grand Coulee Dam
 - Large increases in water supply forecast throughout Western Oregon and Lower Snake Basin
- Drivers of changing water supply forecasts
 - Multiple tools publicly available on the NWRFC website to diagnose root cause (www.nwrfc.noaa.gov)



2019 Schedule for Live Water Supply Briefings

June*

6

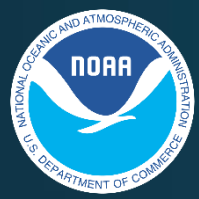
All presentations held at 10:00 am PST/PDT unless noted otherwise

Telephone Conference Call Number
(same for each month's brief):

(415) 655-0060

Pass Code:

217-076-304

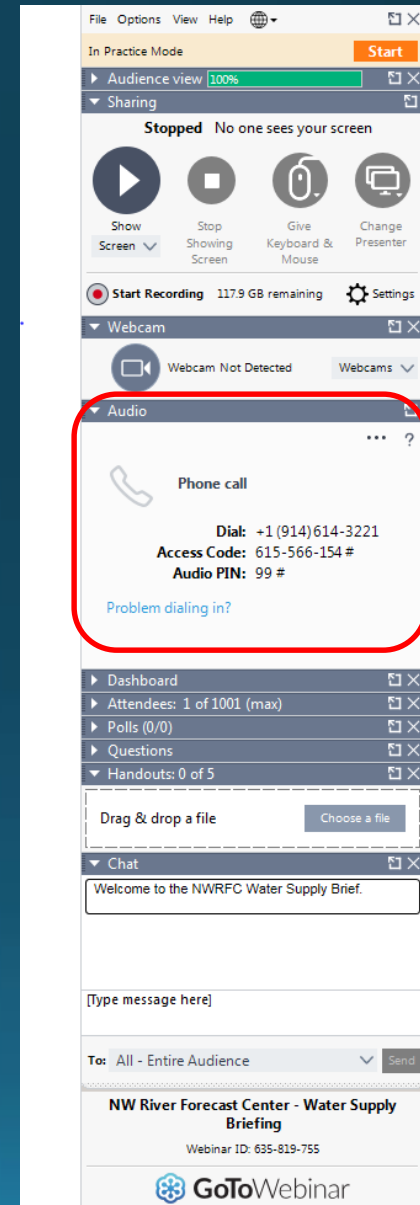


Questions?

In order to ask questions using your phone, you will need to enter the **AUDIO PIN** followed by the **#** sign using your phone keypad. The **AUDIO PIN** was provided when you logged into the webinar.

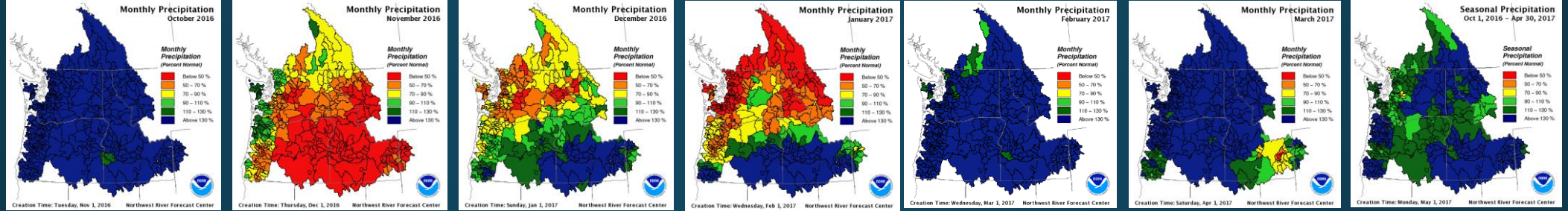
You will be muted until the presenter unmutes you. If you have a question, use the 'Raise Hand' function to let us know to unmute your phone.

NWRFC.watersupply@noaa.gov
(503) 326-7291

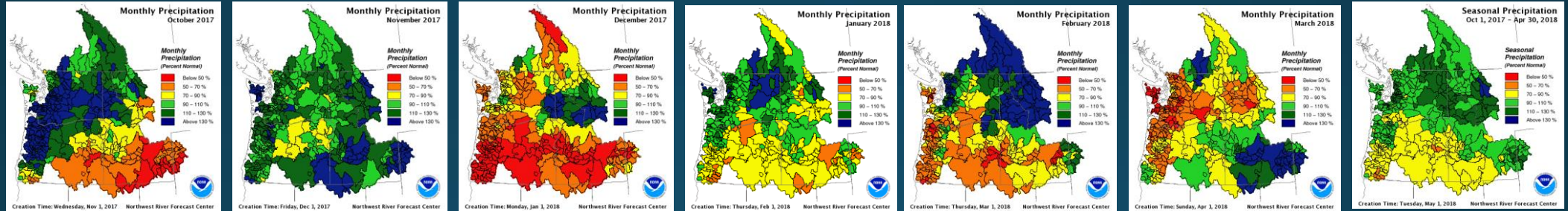


Observed Monthly Precipitation

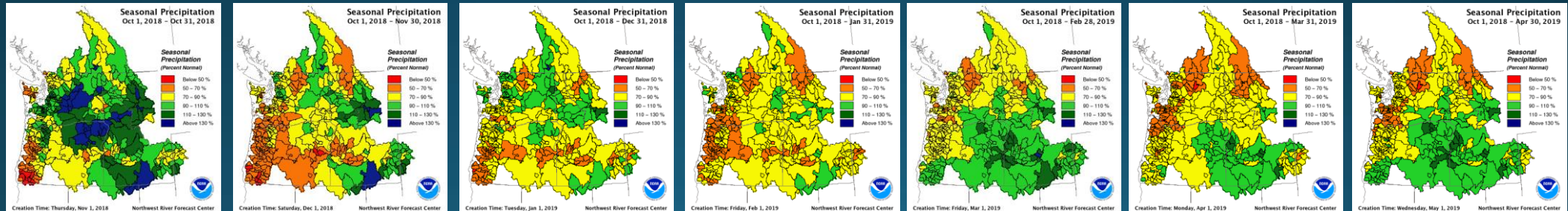
WY2017



WY2018

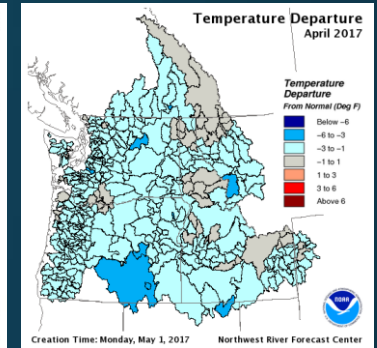
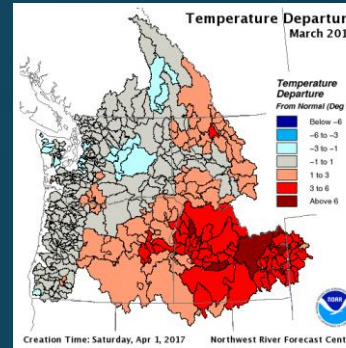
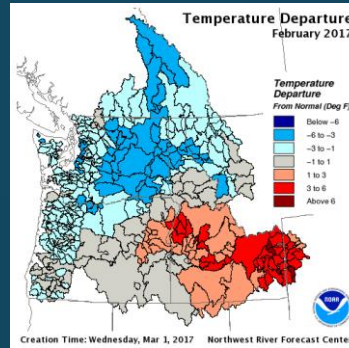
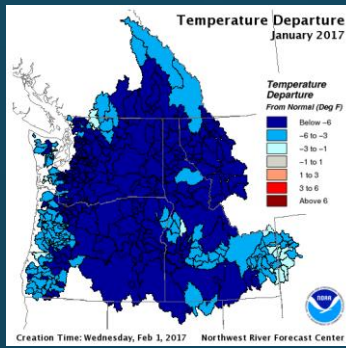
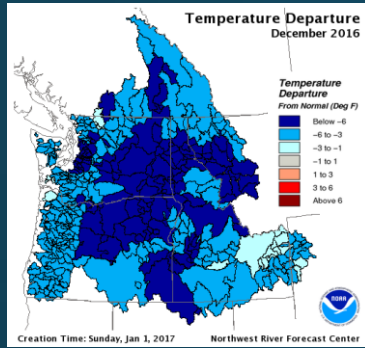
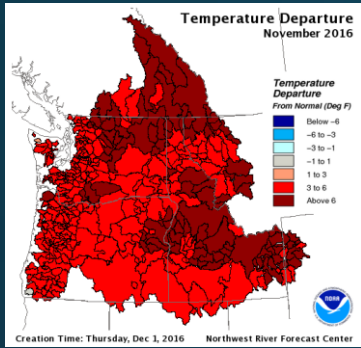


WY2019

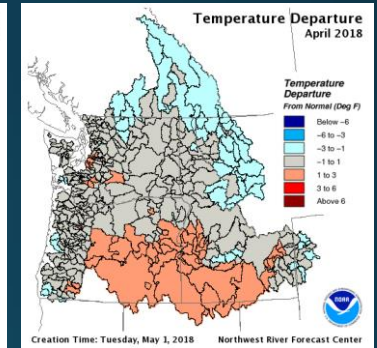
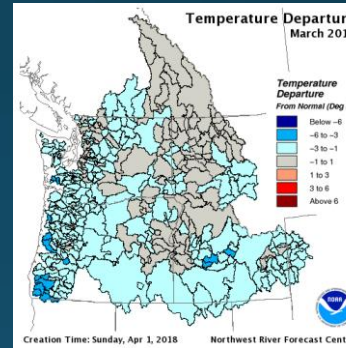
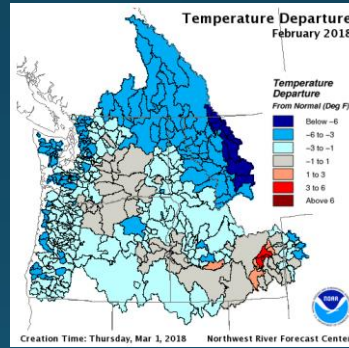
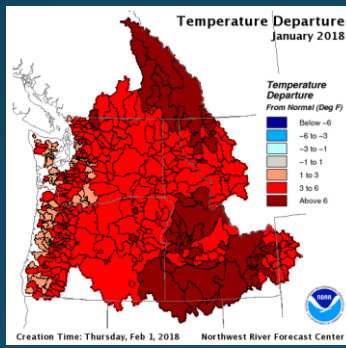
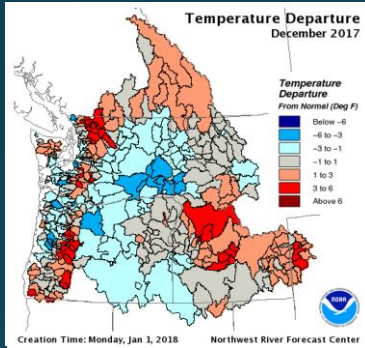
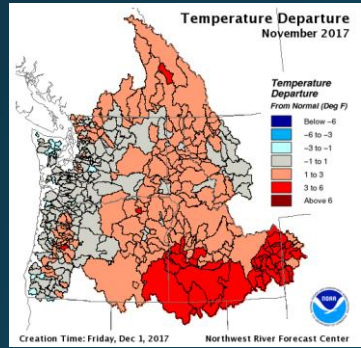


Monthly Temperature Departure from Normal

WY2017



WY2018



WY2019

