



June 2015 Water Supply Briefing

National Weather Service, Northwest River Forecast Center

Telephone Conference: 1-877-501-8577

Pass Code: 71967

Presentation available after brief at:

www.nwrfc.noaa.gov/presentations/presentations.cgi

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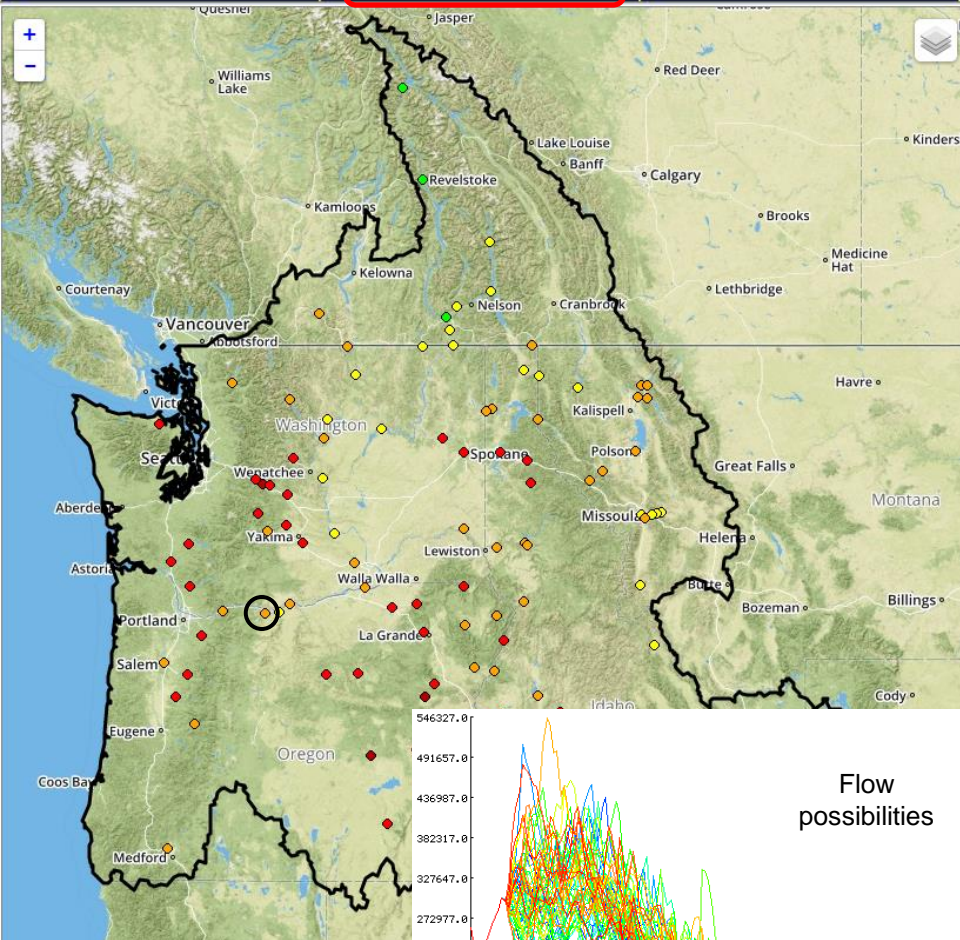
Northwest River Forecast Center

Water Supply Forecasts

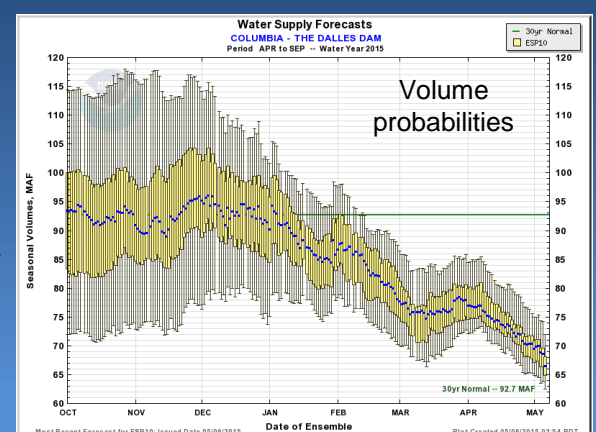
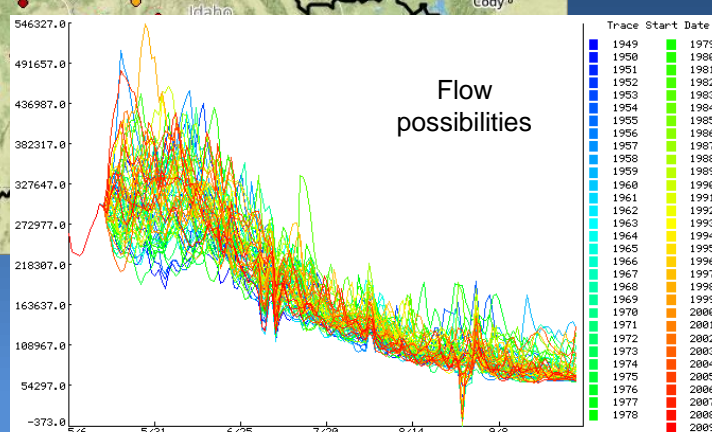
www.nwrfc.noaa.gov/ws/



- River and Hydrology
- Water Supply**
- Observations
- Weather Forecasts
- Climate
- NWRFC



- **ESP: Ensemble Streamflow Prediction**
- Official ESP water supply products include:
 - 10 days of quantitative precipitation forecast (QPF)
 - 10 days of quantitative temperature forecast (QTF)
 - Traces of historical meteorological observations (climatology) appended thereafter
- NWRFC also offers 5- and 0-day ESP products
- Forecasts are updated daily
 - Model states and observed runoff updated continuously
- Forecasts are compared to 30-year observed runoff volume normals (1981-2010)

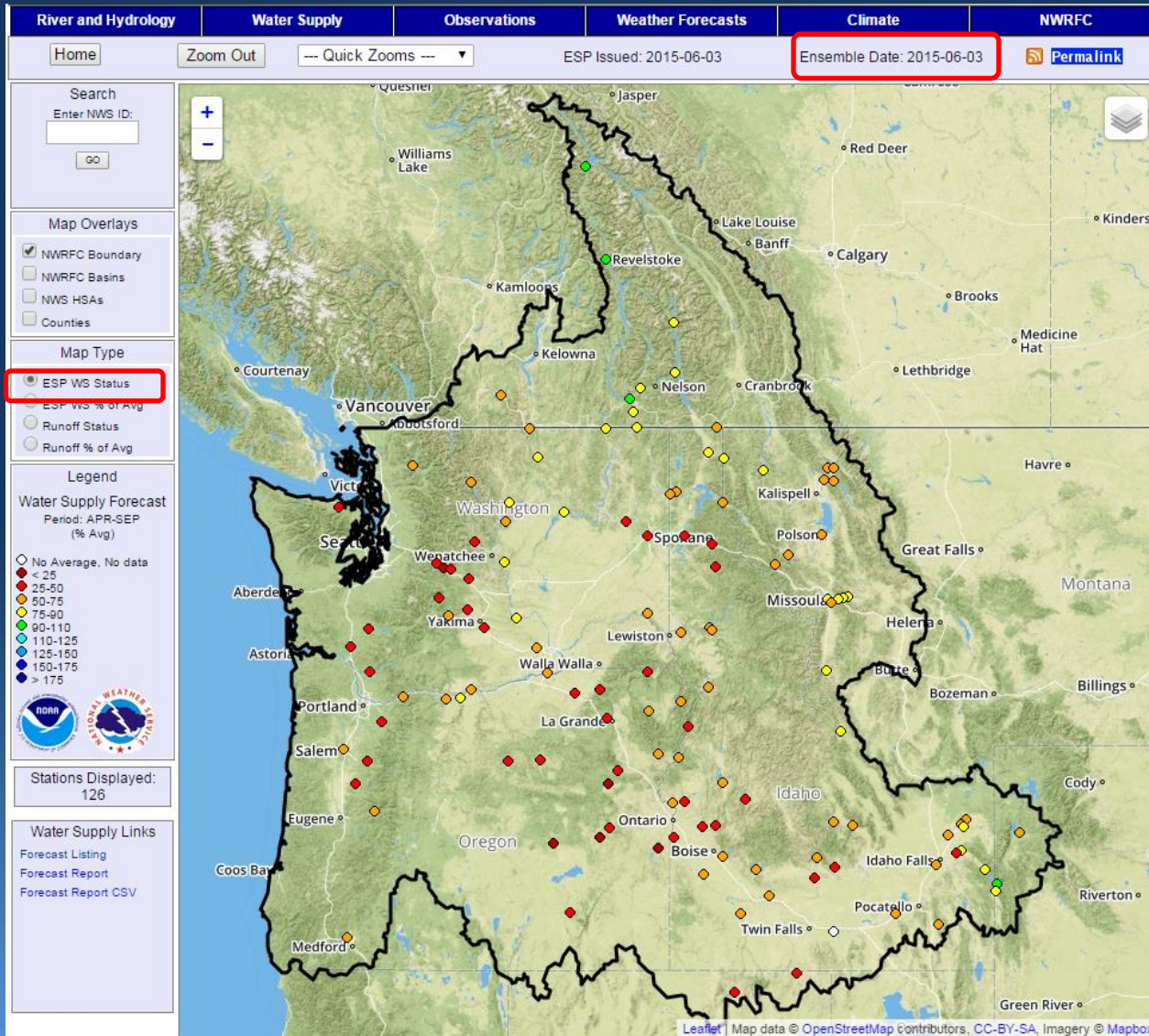




Water Supply Summary



www.nwrfc.noaa.gov/ws/



- Near to slightly below normal volumes at high elevation locations
 - Along Rocky Mountains in BC, MT, and WY
 - Majority of Columbia River fed by higher elevations

- Below to well below normal volumes everywhere else
 - Mid- to low-elevation locations strongly impacted by warm temperatures
 - Local water scarcity



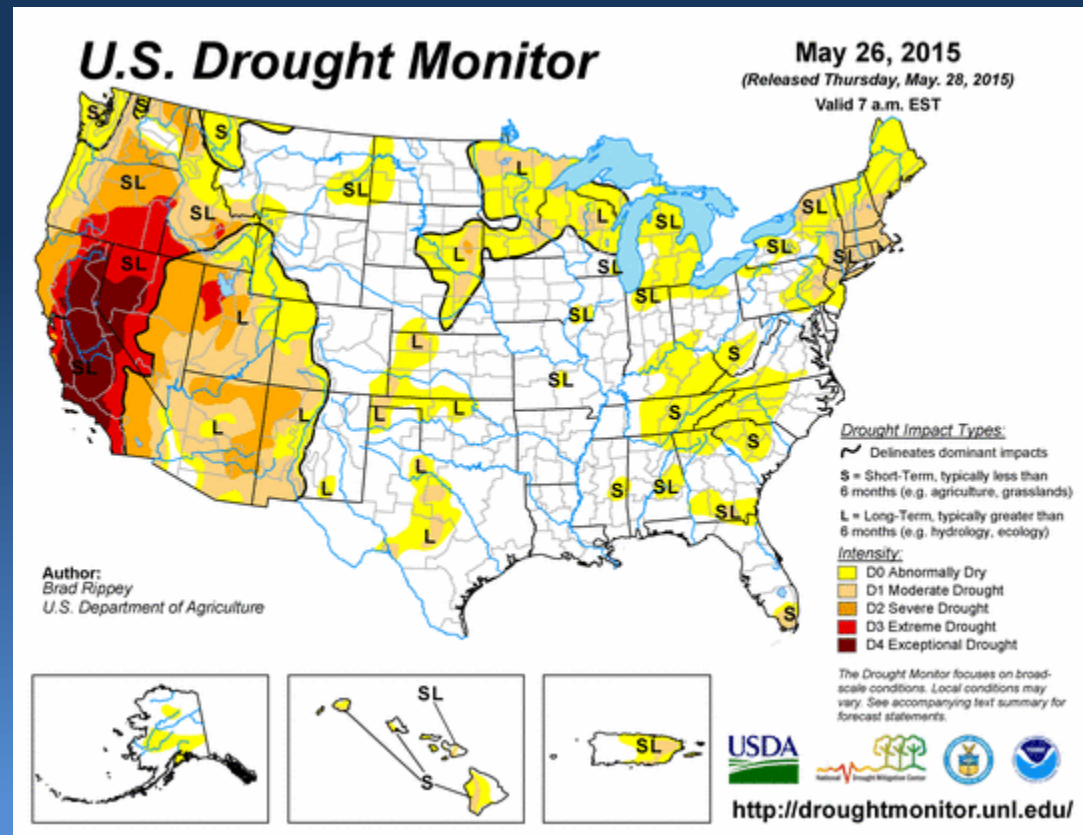
Drought Summary



- Low (even record low) snowpack across the Pacific Northwest have played a big role in prompting drought declarations
- NWRFC volume forecasts help inform county and state-level drought decisions

CURRENT DROUGHT DECLARATIONS

State	Counties	Extent
Washington	39	State-wide
Oregon	15	Central, eastern, southern
Idaho	5	Southeastern
Montana	0	N/A





Volume Forecast Inputs



■ Observed Conditions:

- Precipitation
- Temperature
- Snowpack
- Runoff

Hydrologic
model states

■ Future Conditions:

- 0, 5, or 10 days of forecast precipitation and temperature
- Traces of historical meteorological observations appended thereafter



Observed Seasonal Precipitation



www.nwrfc.noaa.gov/water_supply/wy_summary

River and Hydrology | **Water Supply** | **Observed**

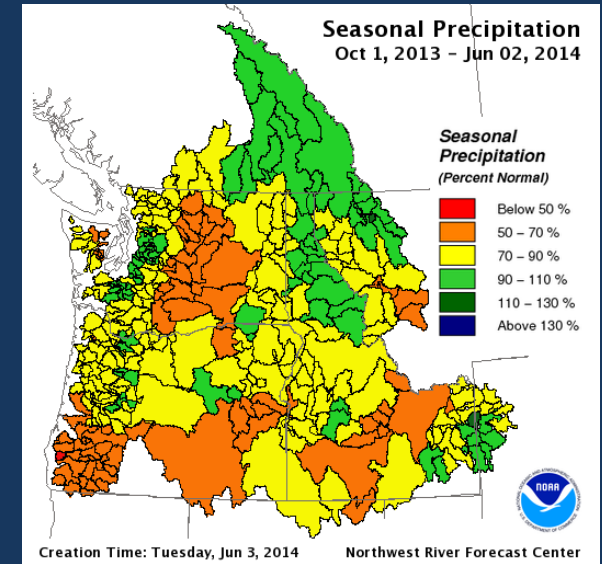
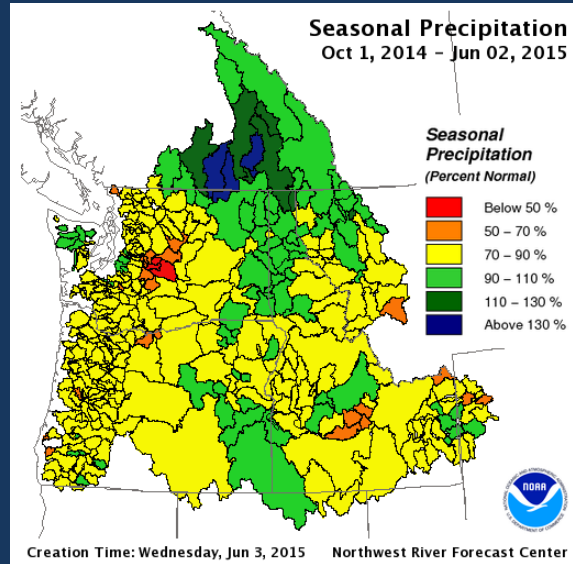
Home | Zc

Search
Enter NWS ID:
GO

Map Overlays
 NWRFC Boundary
 NWRFC Basins
 NWS HSAs
 Counties

Map Type
 ESP WS Status
 ESP WS % of Avg
 Runoff Status

- Forecast Map
- Forecast Listing
- Forecast Report
- Forecast Text Product
- Live Briefing Schedule
- Precipitation/Temperature
- Snow
- Runoff
- Runoff Text Product
- ESP Natural Volumes
- New ESP Natural Forecast **BETA**
- ESP Interactive
- Documentation



DIVISION NAME	WY 2015 OBS	WY 2015 % NORM	WY 2014 % NORM
Columbia River Basin above Grand Coulee Dam	29 in	102	93
Snake River Basin above Ice Harbor Dam	15 in	84	80
Middle Columbia Lower Tributaries	17 in	83	78
Columbia River Basin above The Dalles Dam	20 in	90	83
*Western Washington	67 in	81	83
*Western Oregon	49 in	81	76

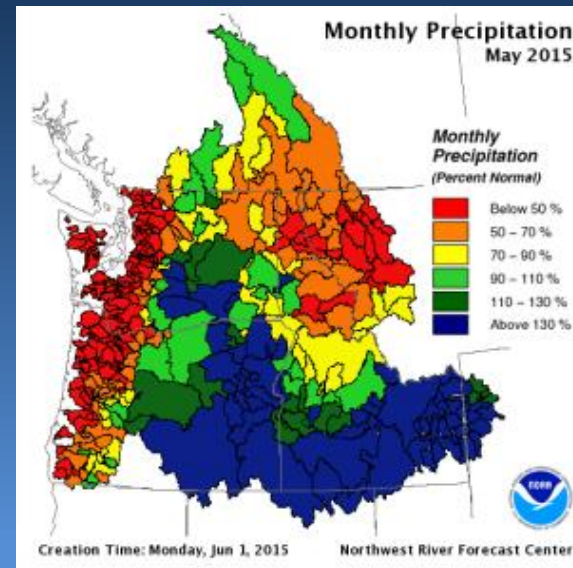
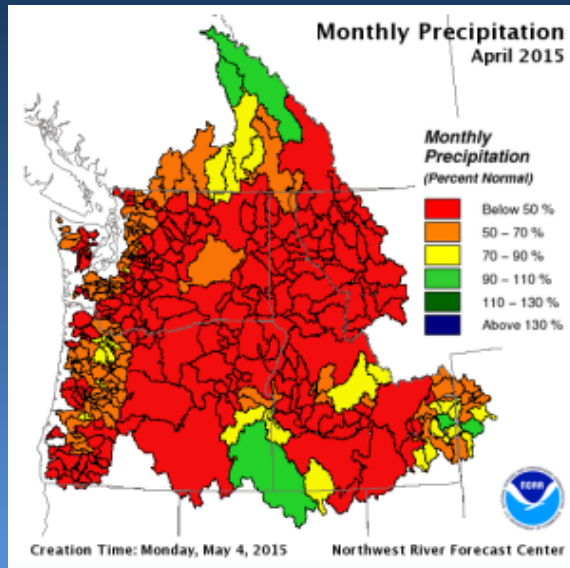
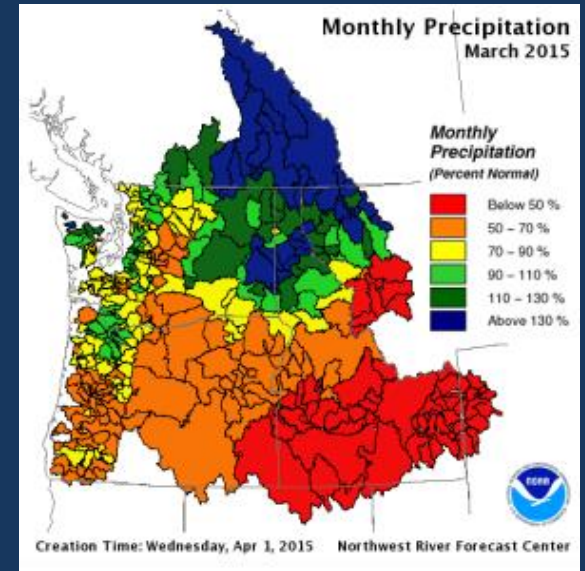
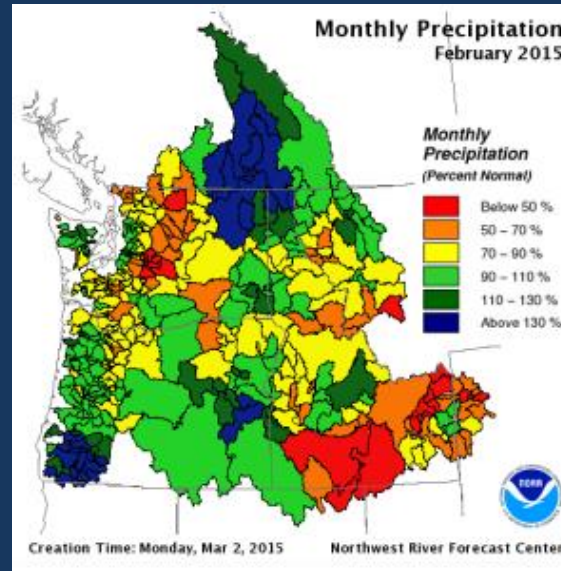
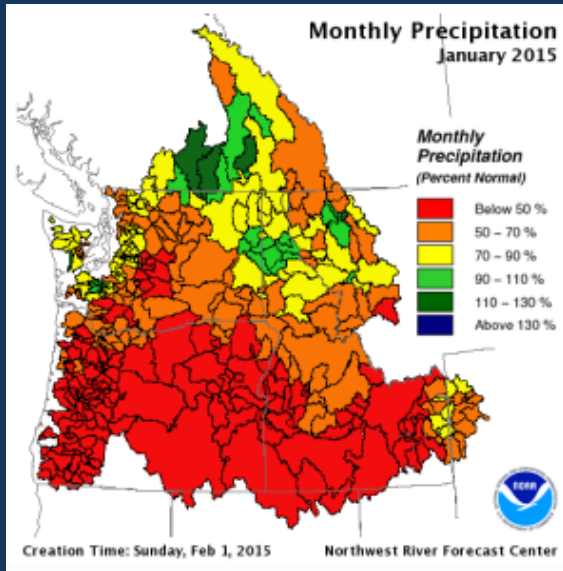
*Average of contributing divisions



Observed Monthly Precipitation



www.nwrfc.noaa.gov/water_supply/wy_summary

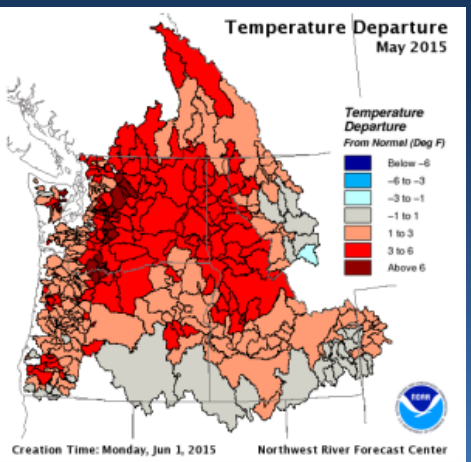
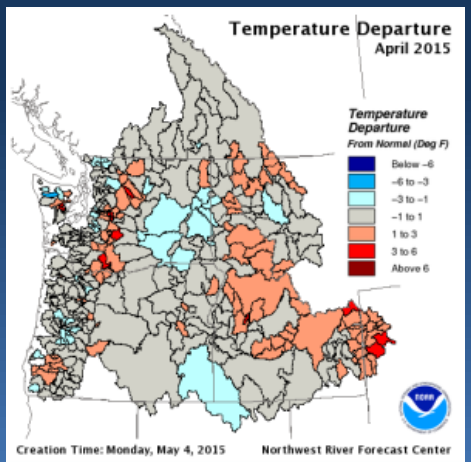
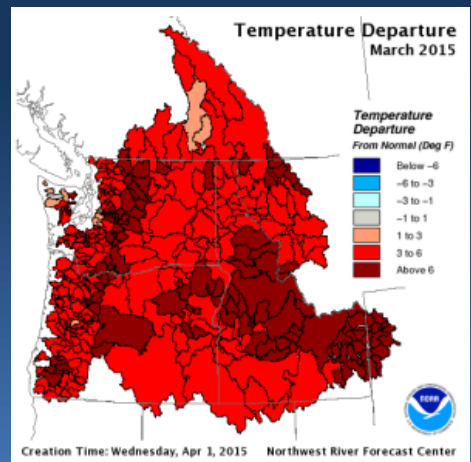
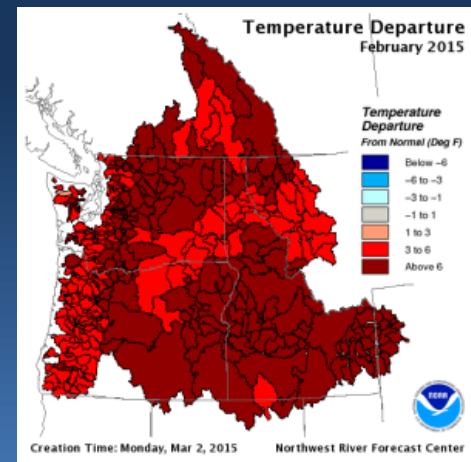
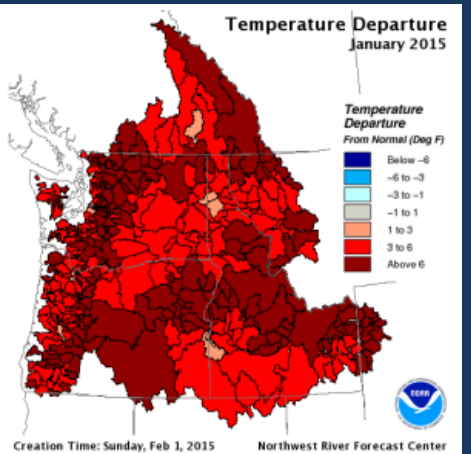
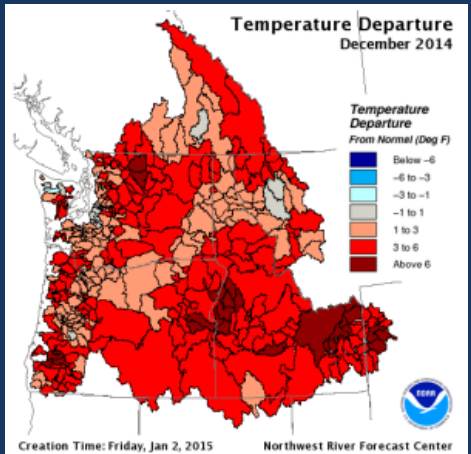
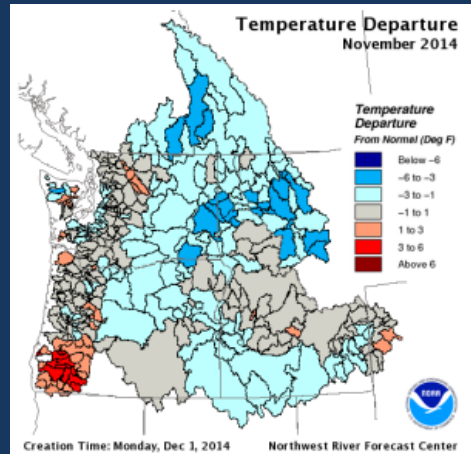
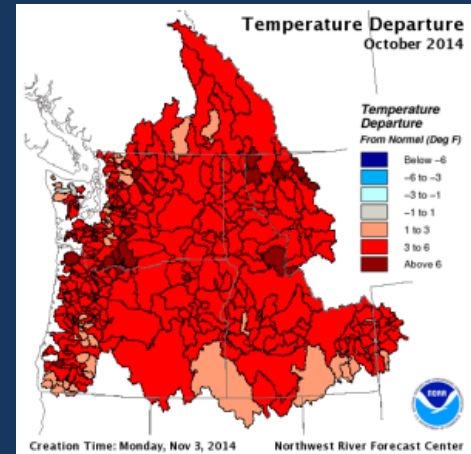




Observed Monthly Temperatures



www.nwrfc.noaa.gov/water_supply/wy_summary



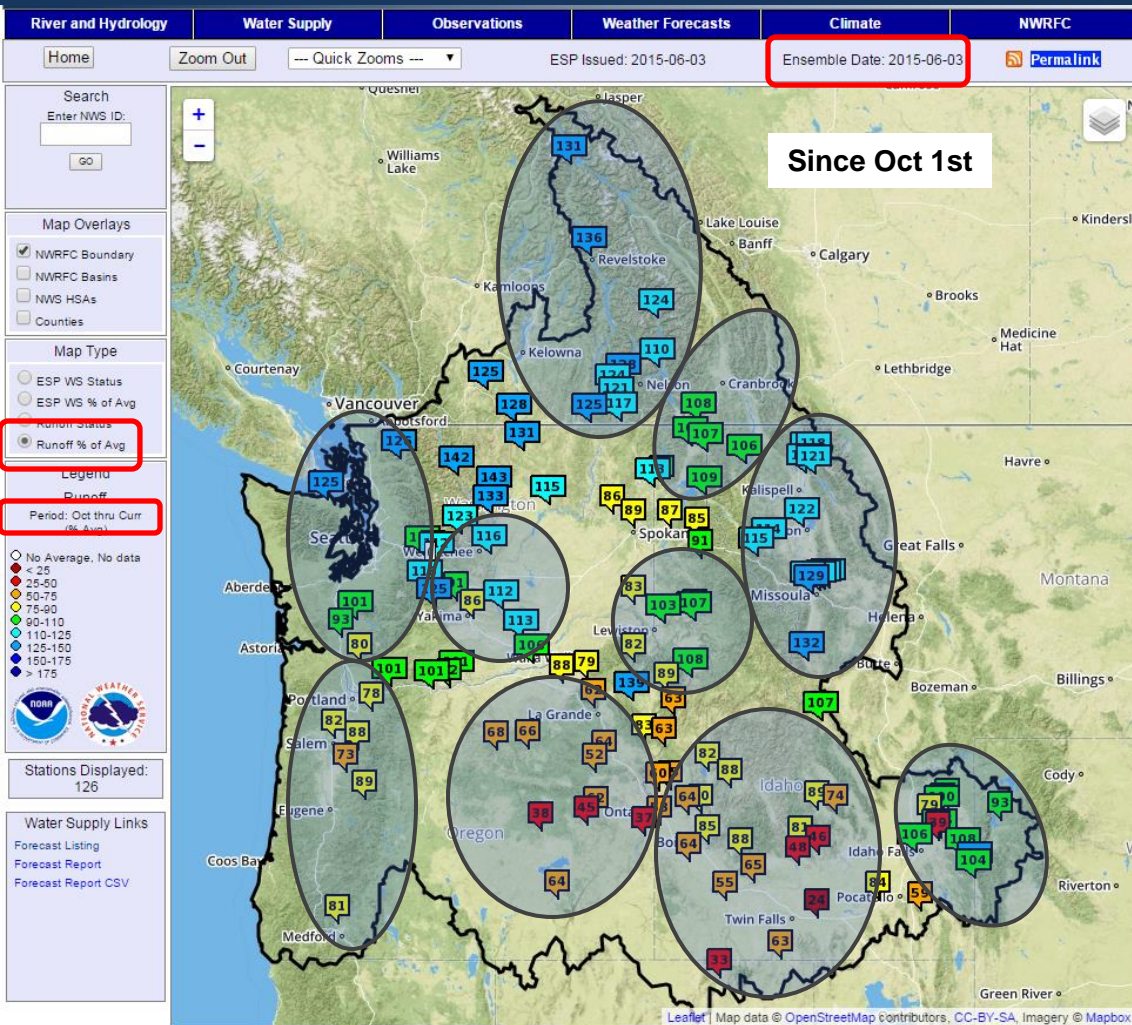
- More rain than snow (vs. normal conditions) and early snow melt → early runoff



*Observed Runoff Conditions



www.nwrfc.noaa.gov/ws/



LOCATION

OCT 1 – JUN 3
% NORM

APR 1 – JUN 3
% NORM

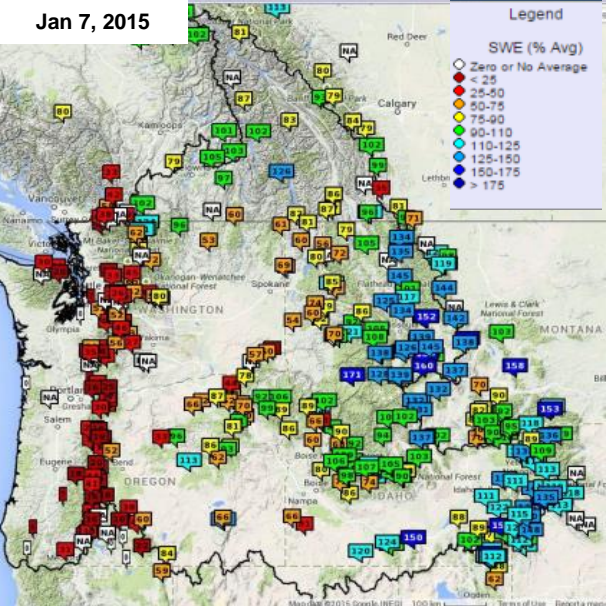
Columbia River – Arrow Lakes	127	115
Kootenai River – Queens Bay	112	84
Clark Fork River – Plains	116	81
Columbia River – Grand Coulee Dam	116	86
Snake River – Shelley	108	95
Snake River – Brownlee Dam	64	41
Snake River – Lower Granite	84	62
John Day River – Service Creek	68	38
Yakima River – Parker	87	37
Columbia River – The Dalles Dam	102	77
Skagit River – Concrete	139	82
Dungeness River – Sequim	142	69
Willamette River – Salem	85	56
Rogue River – Raygold	86	52

*Observed runoff adjusted for changes in upstream storage

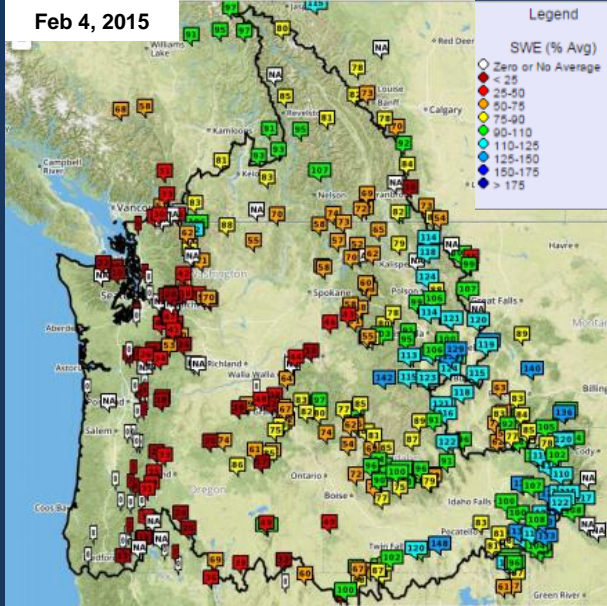
Observed Snowpack Conditions

www.nwrfc.noaa.gov/snow

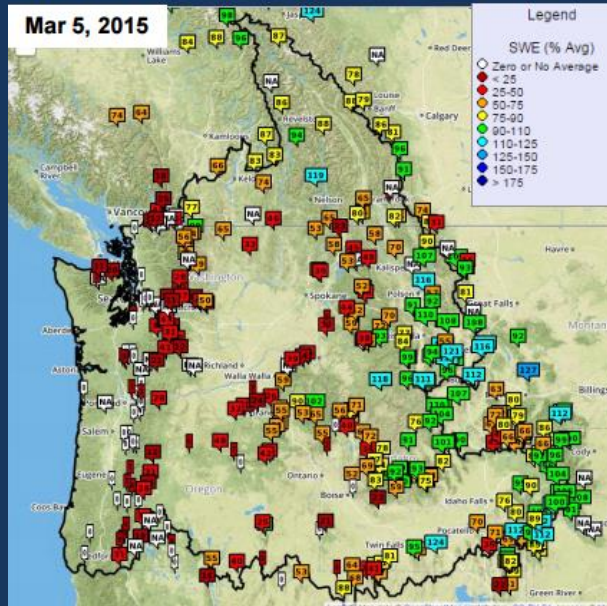
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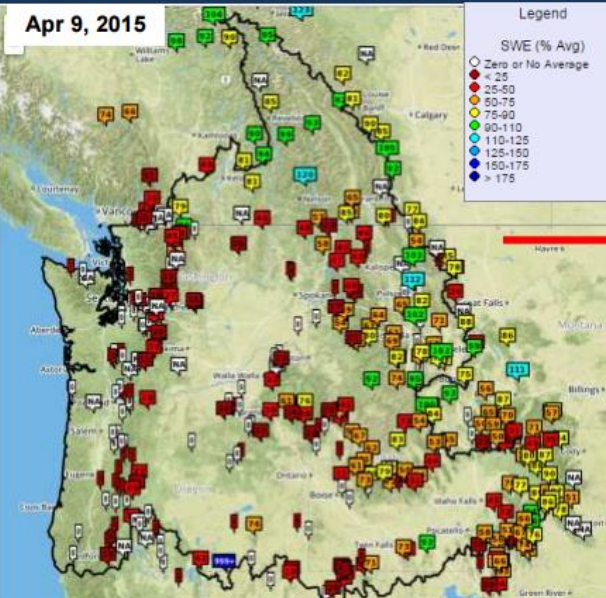
Feb 4, 2015



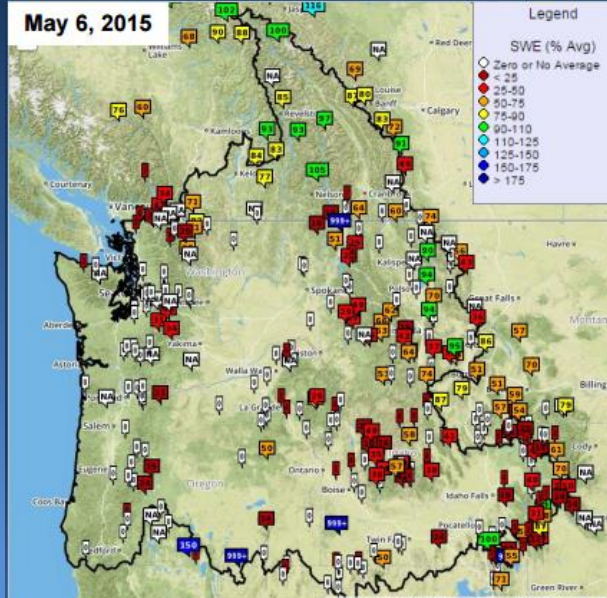
Mar 5, 2015



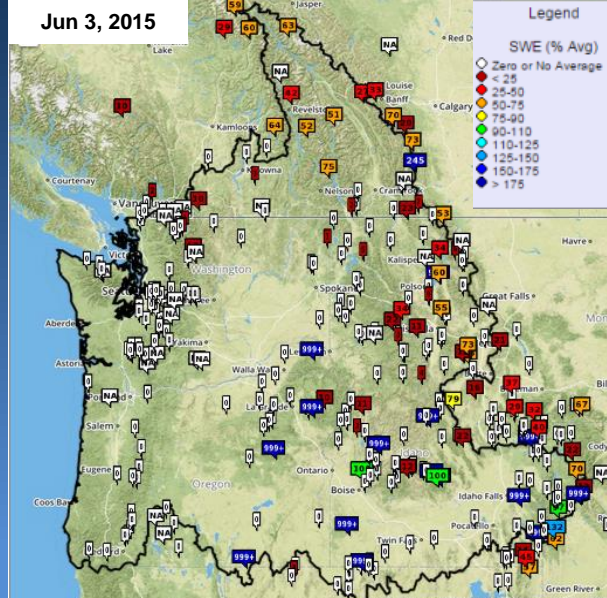
Apr 9, 2015



May 6, 2015



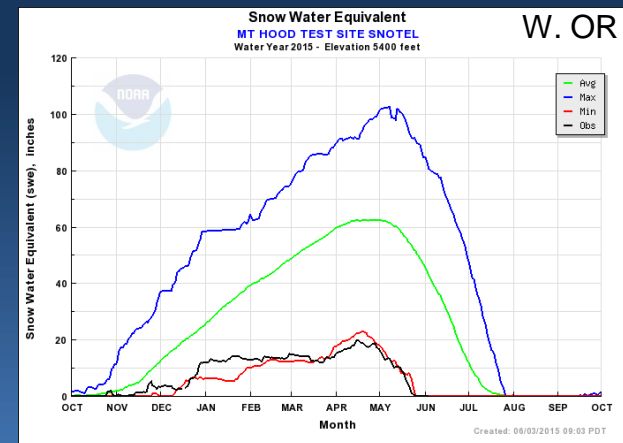
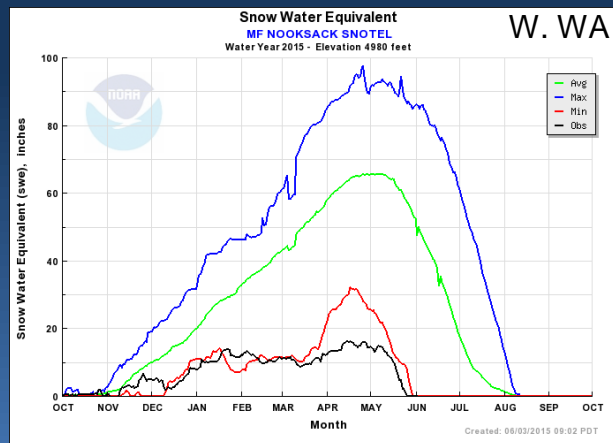
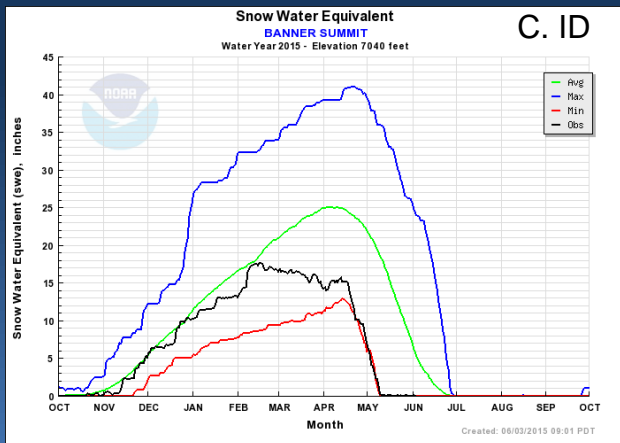
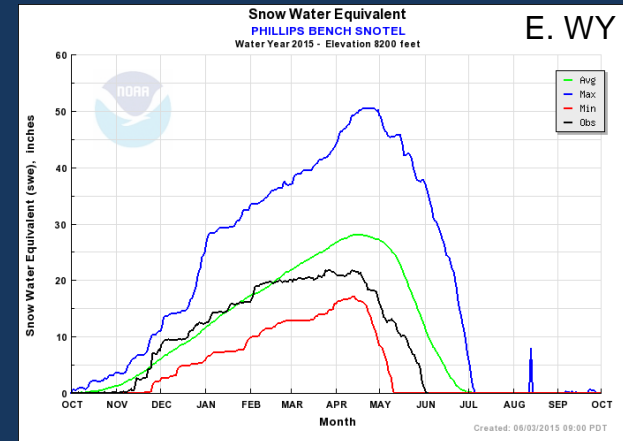
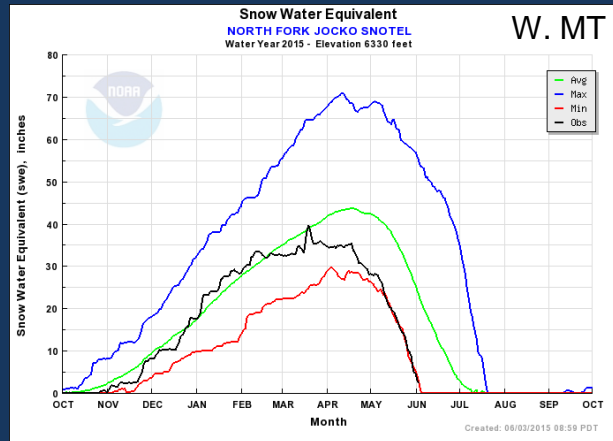
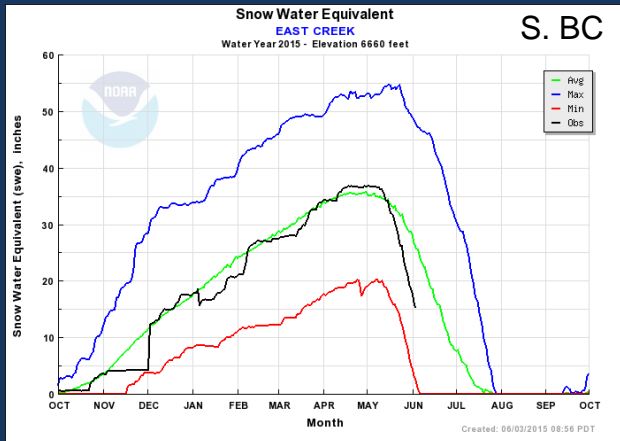
Jun 3, 2015





Observed Snowpack Conditions

www.nwrfc.noaa.gov/snow



- Observed snow water equivalent (SWE) values provided by:
 - Natural Resources Conservation Service (NRCS) SNOTEL network
 - Environment Canada (EC) Automated Snow Pillow network



Volume Forecast Inputs



- **Observed Conditions:**

- Precipitation
- Temperature
- Snowpack
- Runoff



Hydrologic
model states

- **Future Conditions:**

- 10, 5, or 0 days of forecast precipitation and temperature
- Traces of historical meteorological observations appended thereafter

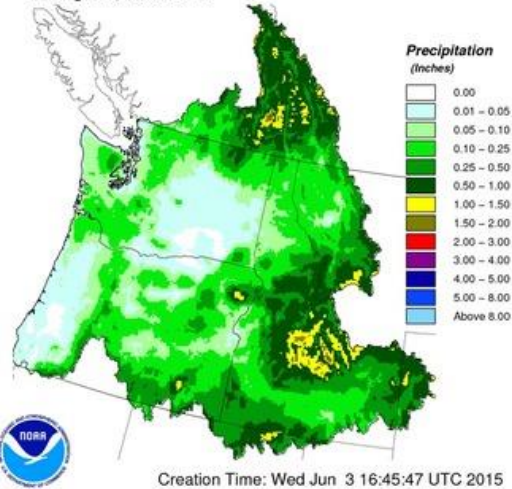
Short-Term Weather Forecasts

www.nwrfc.noaa.gov/water_supply/wy_summary

10 Day Forecast Precipitation: Volume Analysis

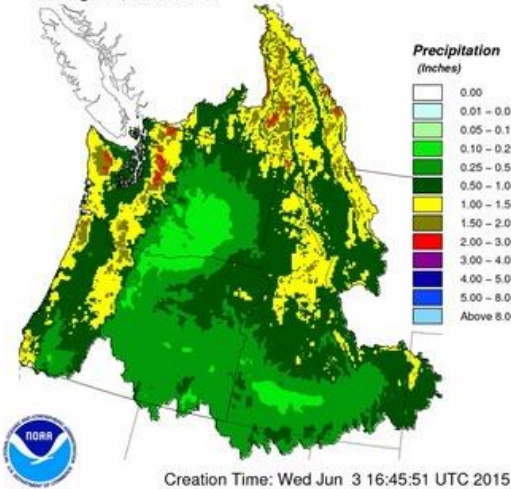
10 Day QPF

Ending 12Z, 06/13/2015



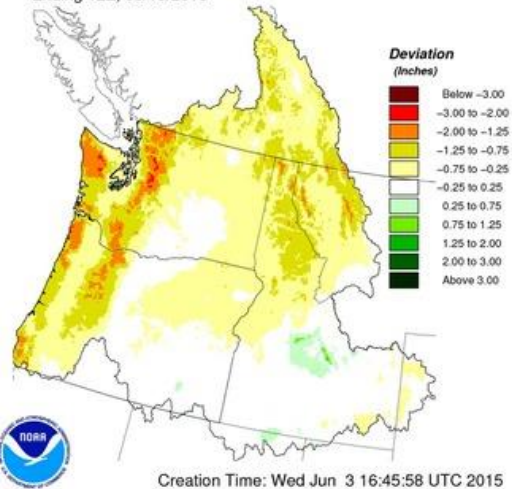
10 Day Precipitation Climatology

Ending 12Z, 06/13/2015



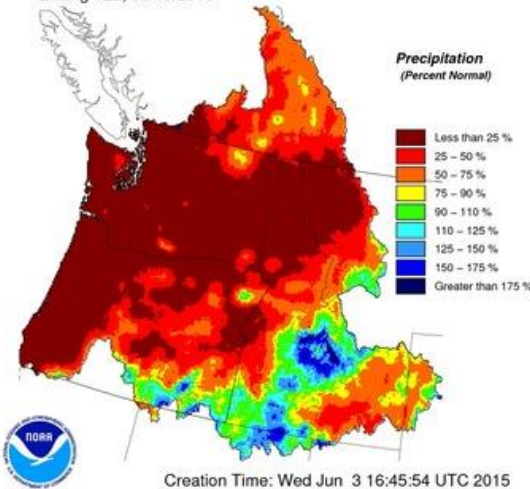
10 Day QPF (Deviation from Climatology)

Ending 12Z, 06/13/2015

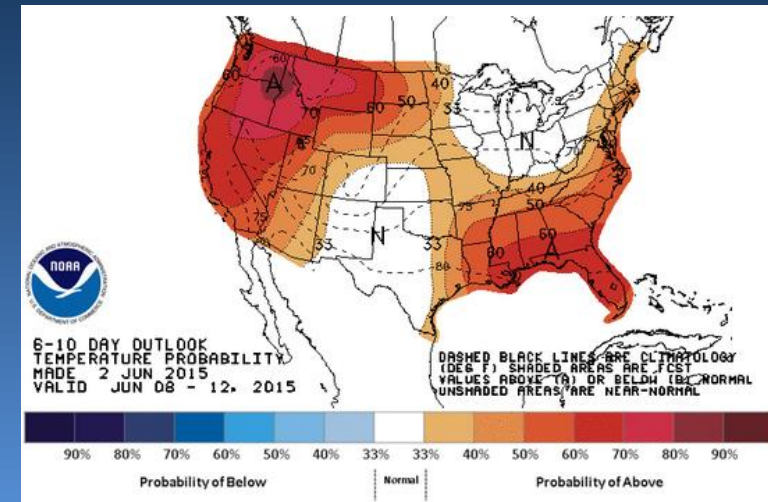


10 Day QPF (Percent of Climatology)

Ending 12Z, 06/13/2015



- Relatively dry conditions forecasted to continue across much of the PNW
- Central Idaho may see some moisture
- Temperatures expected to be warm
- Water supply forecasts have steadied
 - Already well within volume period
 - Late spring rains can contribute, but snowmelt is main input in most locations





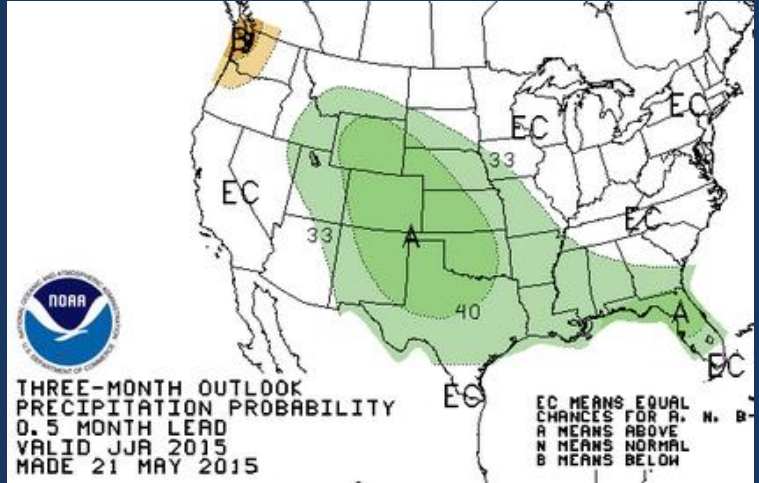
Climate Outlook

www.cpc.ncep.noaa.gov

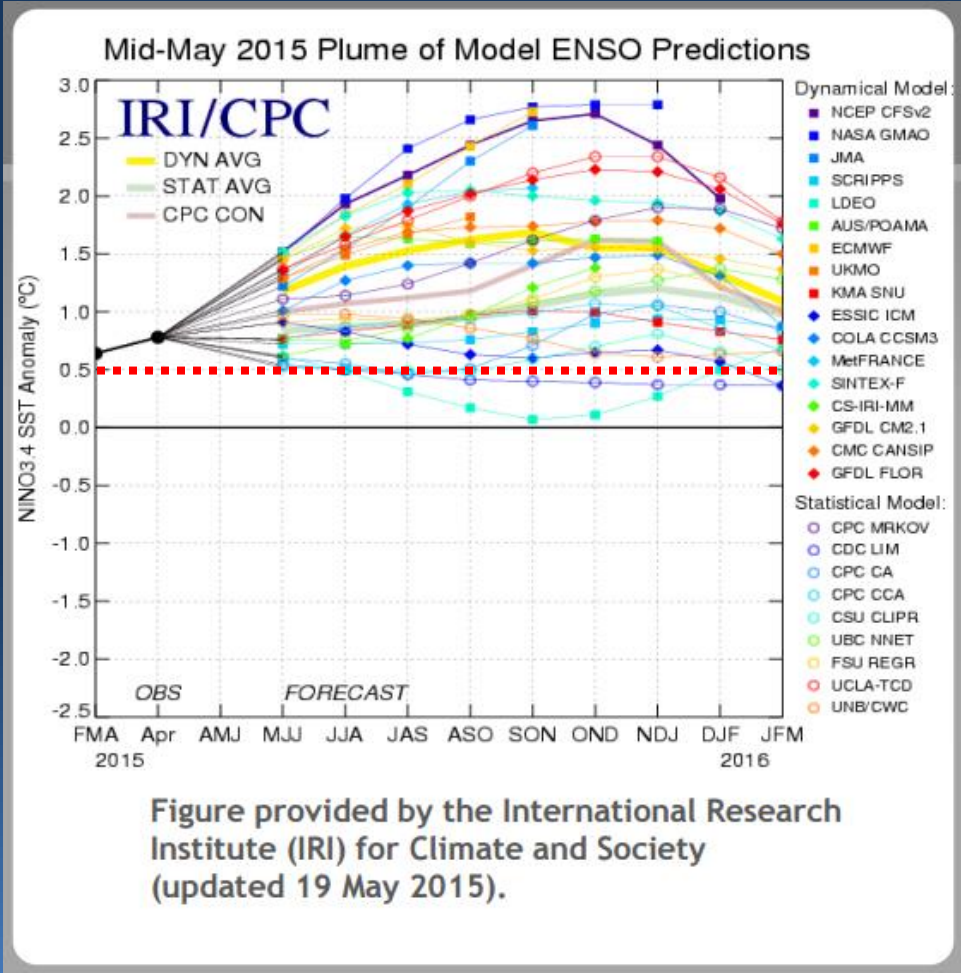
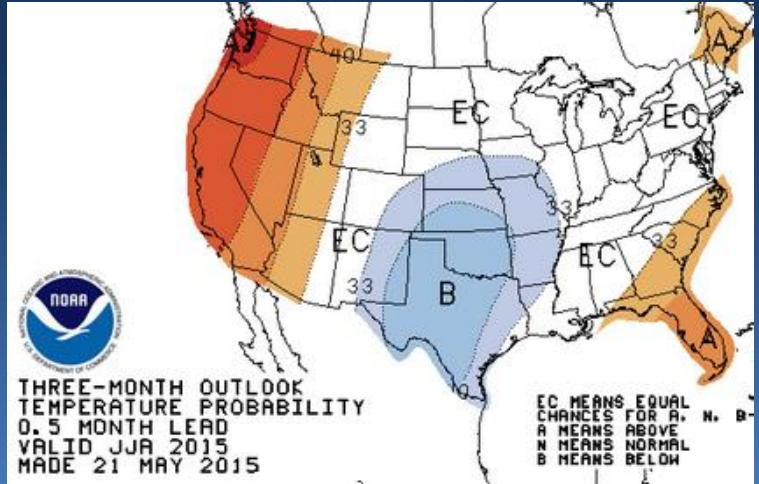


Three Month Outlook

Precipitation



Temperature



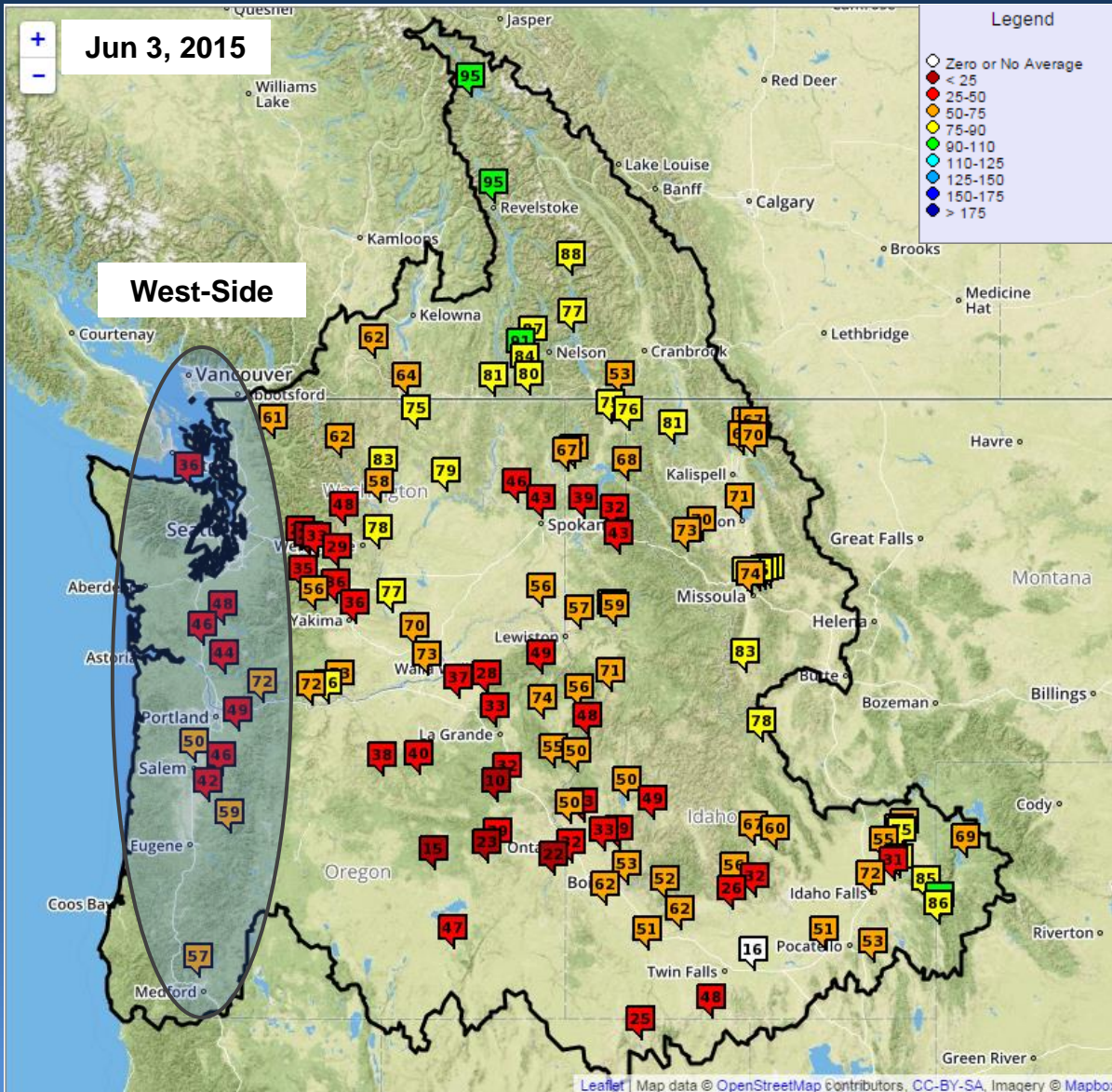
- Increased probability that temperatures will be warm this summer
- May see some moisture, but unlikely to significantly impact seasonal volumes
- Warm temperatures can increase consumptive water uses → decrease measured volumes



Official Water Supply Forecasts



www.nwrfc.noaa.gov/ws/



WEST-SIDE LOCATION

APR – SEP % NORM

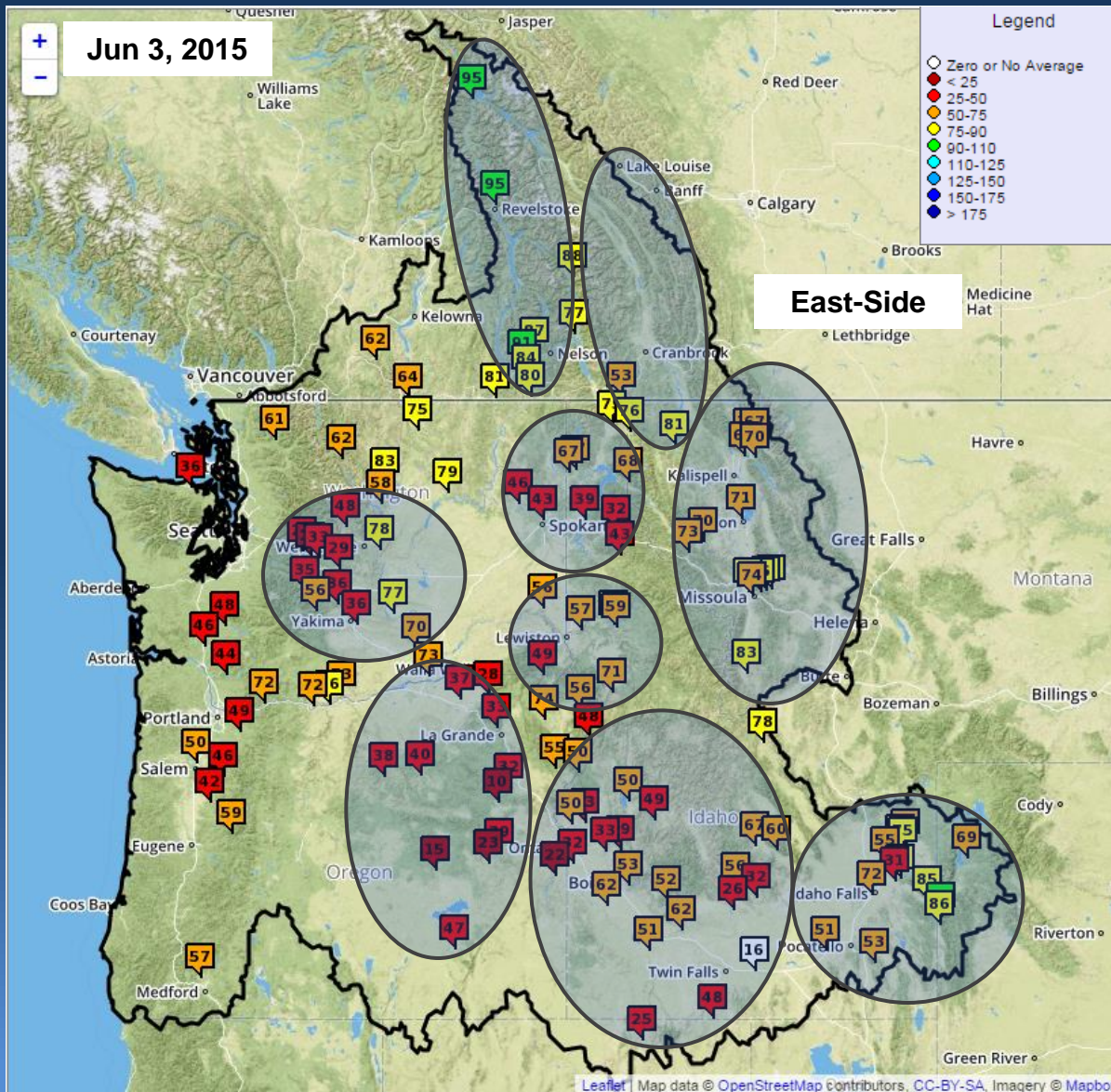
Skagit River – Concrete	<u>61</u>
Dungeness River – Sequim	<u>36</u>
Cowlitz River – Castle Rock	<u>46</u>
Lewis River – Merwin Dam	<u>44</u>
Rogue River – Raygold	57
McKenzie River – Vida	<u>59</u>
South Santiam River – Waterloo	<u>42</u>
North Santiam River – Mehama	<u>46</u>
Willamette River – Salem	<u>50</u>
Clackamas River – Estacada	<u>49</u>



Official Water Supply Forecasts



www.nwrfc.noaa.gov/ws/



EAST-SIDE LOCATION	APR – SEP % NORM
Columbia River – Arrow Lakes	91
Kootenai River – Libby Dam	81
Clark Fork – Cabinet Gorge Dam	68
Spokane River – Spokane	<u>43</u>
Columbia River – Grand Coulee Dam	79
Snake River – Shelley	72
Snake River – Brownlee Dam	50
Snake River – Lower Granite Dam	56
Grande Ronde -- Perry	33
John Day River – Service Creek	38
Yakima River – Parker	<u>36</u>
Columbia River – The Dalles Dam	72



Columbia River – The Dalles Dam



www.nwrfc.noaa.gov/water_supply/ws_forecasts.php?id=TDAO3

Close Data/Normals **Rankings** Adjustments Verification Verify All Years Help Archive Beta Monthly Water Supply Forecasts

COLUMBIA - THE DALLES DAM (TDAO3)
Forecasts for Water Year 2015

Official Forecast

10 days QPF: **Ensemble: 2015-06-03** Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	64527	66527	72	68928	92704
APR-JUL	54915	55997	70	58047	79855
APR-AUG	60216	61840	71	64290	87532
JAN-SEP	94602	96642	85	99007	114216
JAN-JUL	85407	86489	85	88539	101368
OCT-SEP	113104	115144	88	117509	130518

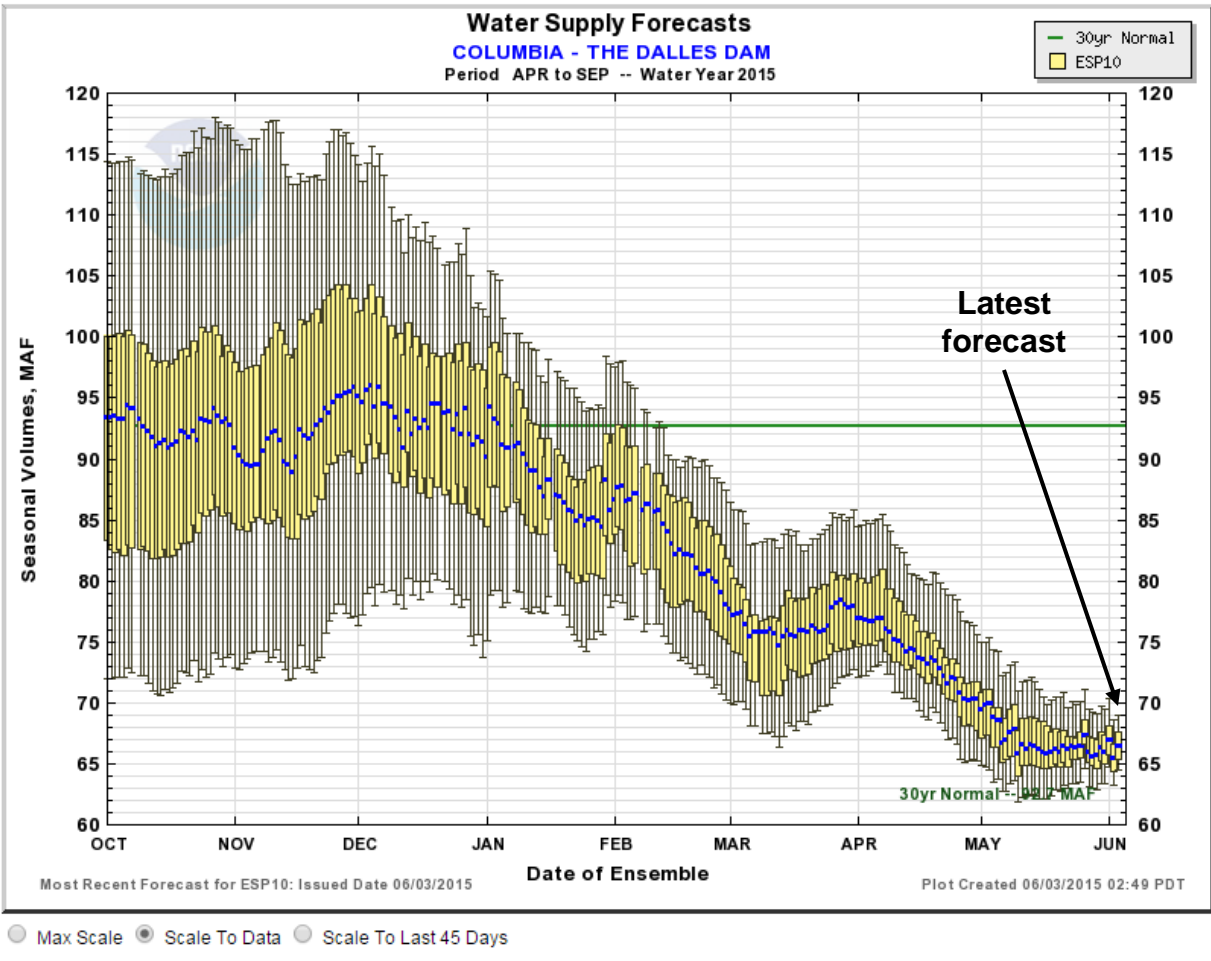
5 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

APR-SEP	64350	67094	72	70420	92704
APR-JUL	54694	56541	71	59304	79855
APR-AUG	60264	62489	71	65181	87532
JAN-SEP	94437	97168	85	100542	114216
JAN-JUL	85186	87033	86	89796	101368
OCT-SEP	112939	115671	89	119045	130518

0 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

APR-SEP	64799	67843	73	71448	92704
APR-JUL	55042	57388	72	60408	79855
APR-AUG	60591	63288	72	66715	87532
JAN-SEP	94875	97919	86	101477	114216
JAN-JUL	85534	87880	87	90900	101368
OCT-SEP	113378	116422	89	119980	130518

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



Overlay ESP10 ESP5 ESPO

Data Files CSV (ESP10 / APR-SEP) **Forecast Ensemble**

90% -> 9 in 10 chance of volume being exceeded (quite likely)
 50% -> 5 in 10 chance of volume being exceeded (most likely)
 10% -> 1 in 10 chance of volume being exceeded (a possibility)



New Water Supply Products



www.nwrfc.noaa.gov/ws/

Close Data/Normals Rankings Adjustments Verification Verify All Years Help Archive

Beta Monthly Water Supply Forecasts

COLUMBIA - GRAND COULEE DAM (GCDW1) Forecasts for Water Year 2015

Official Forecast

10 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	45464	47469	79	49628	60110
APR-JUL	38633	39578	78	41567	51015
APR-AUG	42680	44138	78	46431	56763
JAN-SEP	61121	63131	92	65218	68694
JAN-JUL	54628	55573	93	57562	59599
OCT-SEP	71777	73787	96	75874	76824

5 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

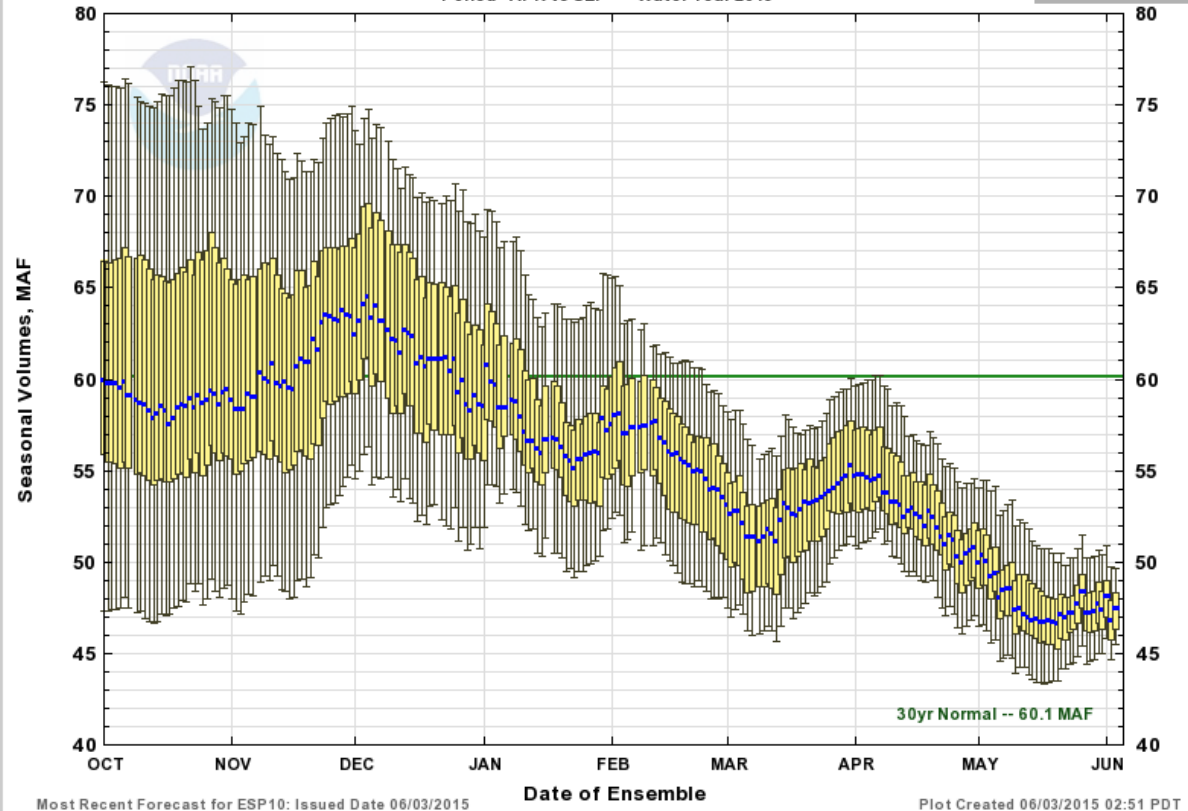
Forecast Period	90 %	50 %	% Average	10 %	30 Year Average (1981-2010)
APR-SEP	45334	47909	80	50856	60110
APR-JUL	38348	40046	78	42298	51015
APR-AUG	42468	44626	79	46950	56763
JAN-SEP	60996	63578	93	66503	68694
JAN-JUL	54343	56041	94	58293	59599
OCT-SEP	71652	74234	97	77159	76824

0 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	90 %	50 %	% Average	10 %	30 Year Average (1981-2010)
APR-SEP	45486	48293	80	51391	60110
APR-JUL	38300	40493	79	42925	51015
APR-AUG	42493	45256	80	47792	56763
JAN-SEP	61144	63956	93	66931	68694
JAN-JUL	54295	56488	95	58920	59599
OCT-SEP	71800	74612	97	77587	76824

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

Water Supply Forecasts COLUMBIA - GRAND COULEE DAM Period APR to SEP -- Water Year 2015



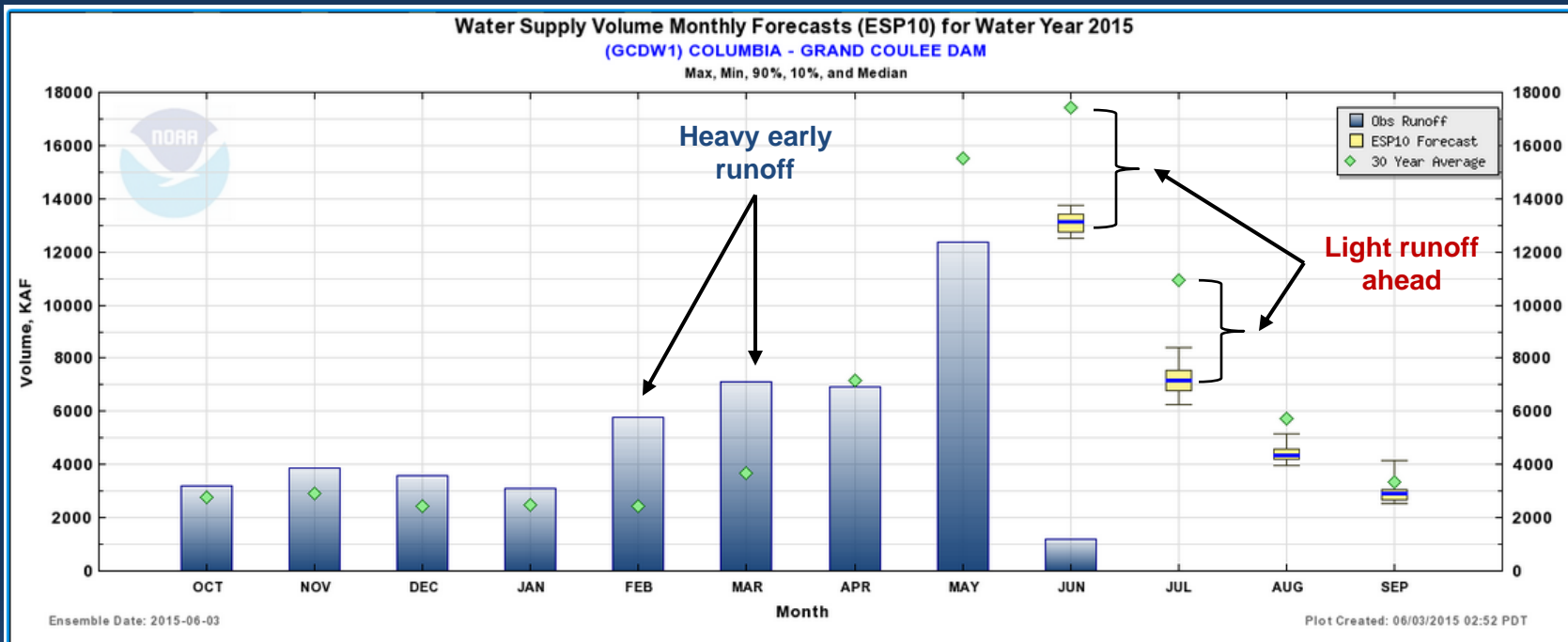
Max Scale Scale To Data Scale To Last 45 Days

- Now offering more volume periods for all water supply forecast points
- Also offering new monthly volume products



New Monthly Water Supply Products

www.nwrfc.noaa.gov/ws/



COLUMBIA - GRAND COULEE DAM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 10 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %		
OCT					3191	2784
NOV					3878	2894
DEC					3578	2452
JAN					3102	2465
FEB					5770	2433
MAR					7123	3686
APR					6923	7143
MAY					12345	15506
JUN	12516	13113	75	13768	1216*	17434
JUL	6257	7172	66	8401		10934
AUG	3940	4323	75	5135		5747
SEP	2519	2896	87	4131		3348

Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
 [ESP10](#)
 [Forecast Ensemble](#)

COLUMBIA - GRAND COULEE DAM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 5 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %		
OCT					3191	2784
NOV					3878	2894
DEC					3578	2452
JAN					3102	2465
FEB					5770	2433
MAR					7123	3686
APR					6923	7143
MAY					12345	15506
JUN	12249	12978	74	14107	1216*	17434
JUL	6440	7504	69	8928		10934
AUG	4031	4426	77	5246		5747
SEP	2579	2922	87	4200		3348

Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
 [ESP5](#)
 [Forecast Ensemble](#)

COLUMBIA - GRAND COULEE DAM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 0 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
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OCT					3191	2784
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DEC					3578	2452
JAN					3102	2465
FEB					5770	2433
MAR					7123	3686
APR					6923	7143
MAY					12345	15506
JUN	12041	13297	76	14681	1216*	17434
JUL	6633	7668	70	9057		10934
AUG	4054	4516	79	5363		5747
SEP	2601	2984	89	4246		3348

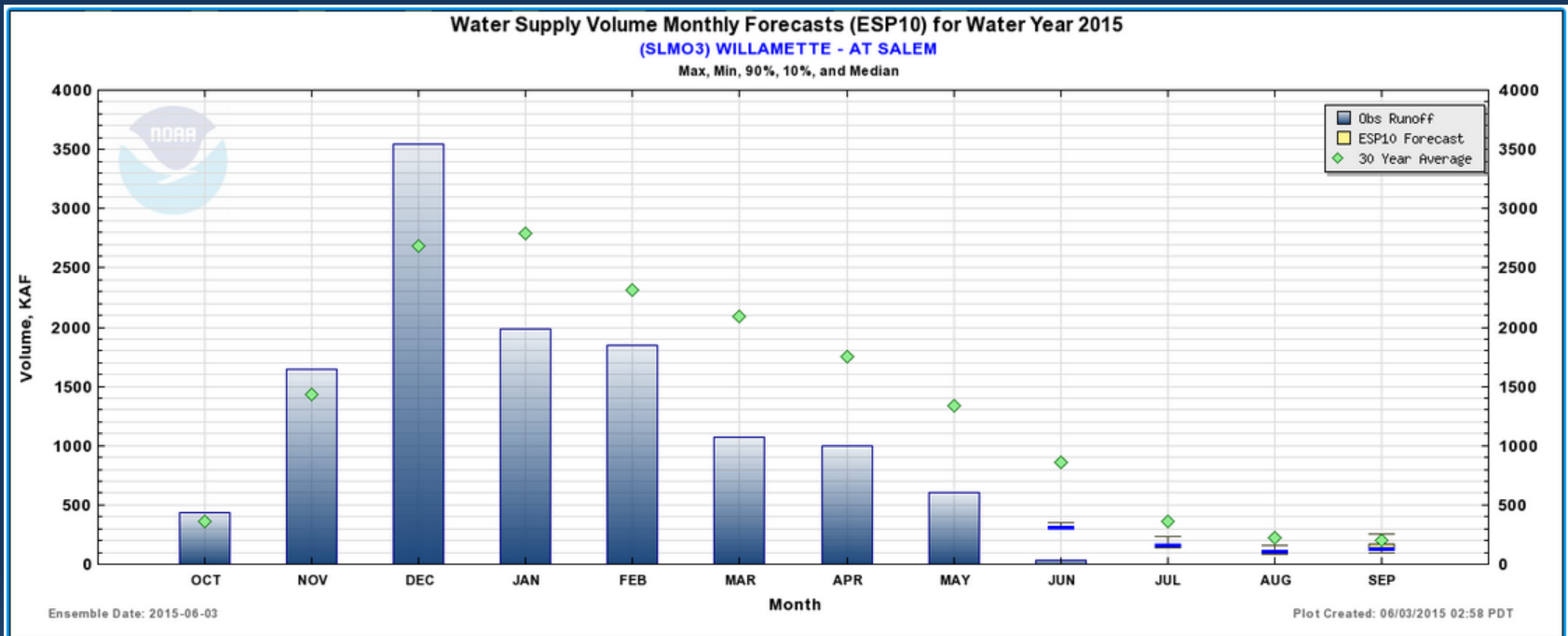
Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
 [ESP0](#)
 [Forecast Ensemble](#)



New Monthly Water Supply Products

www.nwrfc.noaa.gov/ws/



WILLAMETTE - AT SALEM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 10 days QPF: Ensemble: **2015-06-03** Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %		
OCT					438	363
NOV					1643	1432
DEC					3542	2680
JAN					1983	2787
FEB					1841	2317
MAR					1070	2086
APR					1001	1750
MAY					605	1337
JUN	293	310	36	355	34*	861
JUL	143	158	44	237		358
AUG	90	108	49	161		219
SEP	99	130	64	258		203

Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
ESP10
Forecast Ensemble

WILLAMETTE - AT SALEM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 5 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %		
OCT					438	363
NOV					1643	1432
DEC					3542	2680
JAN					1983	2787
FEB					1841	2317
MAR					1070	2086
APR					1001	1750
MAY					605	1337
JUN	297	320	37	426	34*	861
JUL	144	163	45	237		358
AUG	90	110	50	164		219
SEP	99	131	65	260		203

Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
ESP5
Forecast Ensemble

WILLAMETTE - AT SALEM
Forecasts For Water Year 2015

ESP Monthly Water Supply Forecast
 0 days QPF: Ensemble: 2015-06-03 Issued: 2015-06-03

Forecast Period	Forecasts Are in KAF				Obs Runoff (2015-06-03)	30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %		
OCT					438	363
NOV					1643	1432
DEC					3542	2680
JAN					1983	2787
FEB					1841	2317
MAR					1070	2086
APR					1001	1750
MAY					605	1337
JUN	304	345	40	599	34*	861
JUL	145	168	47	254		358
AUG	91	117	54	164		219
SEP	99	134	66	260		203

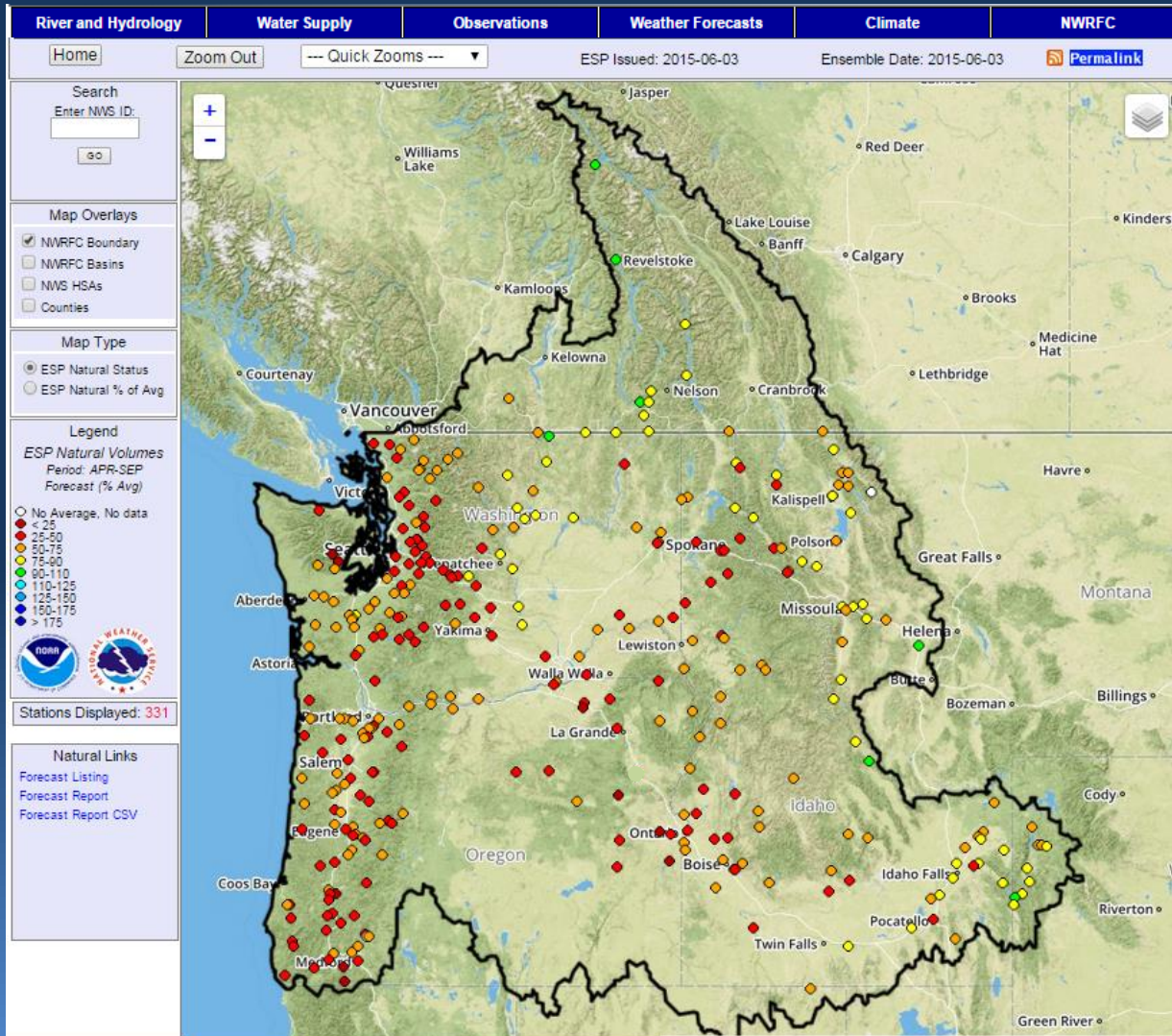
Move the mouse over the desired "Forecast Table" to update graph.
 * Partial Monthly Total

[CSV Download](#)
ESP0
Forecast Ensemble



New Natural Volume Forecasts

www.nwrfc.noaa.gov/natural/



- Same look and feel as traditional water supply volume products
 - Many more locations

- Incorporates new naturalized observed runoff
 - No volume period restrictions
 - Verification now possible

- Adjustments are more comprehensive
 - All modeled man-made impacts accounted for

www.nwrfc.noaa.gov/natural/nat_adjust.php



June 2015 Water Supply Briefing

National Weather Service, Northwest River Forecast Center

Questions?

Presentation available after brief at:
www.nwrfc.noaa.gov/presentations/presentations.cgi

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