



# January 2016 Water Supply Briefing

National Weather Service/Northwest River Forecast Center



Telephone Conference : 1-888-819-6075

Pass Code : 79838

2016 Briefing Dates:

**February 4 - 10am PST**

March 3 - 10am PST

April 7 - 10am PST

May 5 - 10am PST

Kevin Berghoff, NWRFC  
W-ptr.Webmaster@noaa.gov  
(503)326-7291



# Northwest River Forecast Center Water Supply Forecasts



River and Hydrology

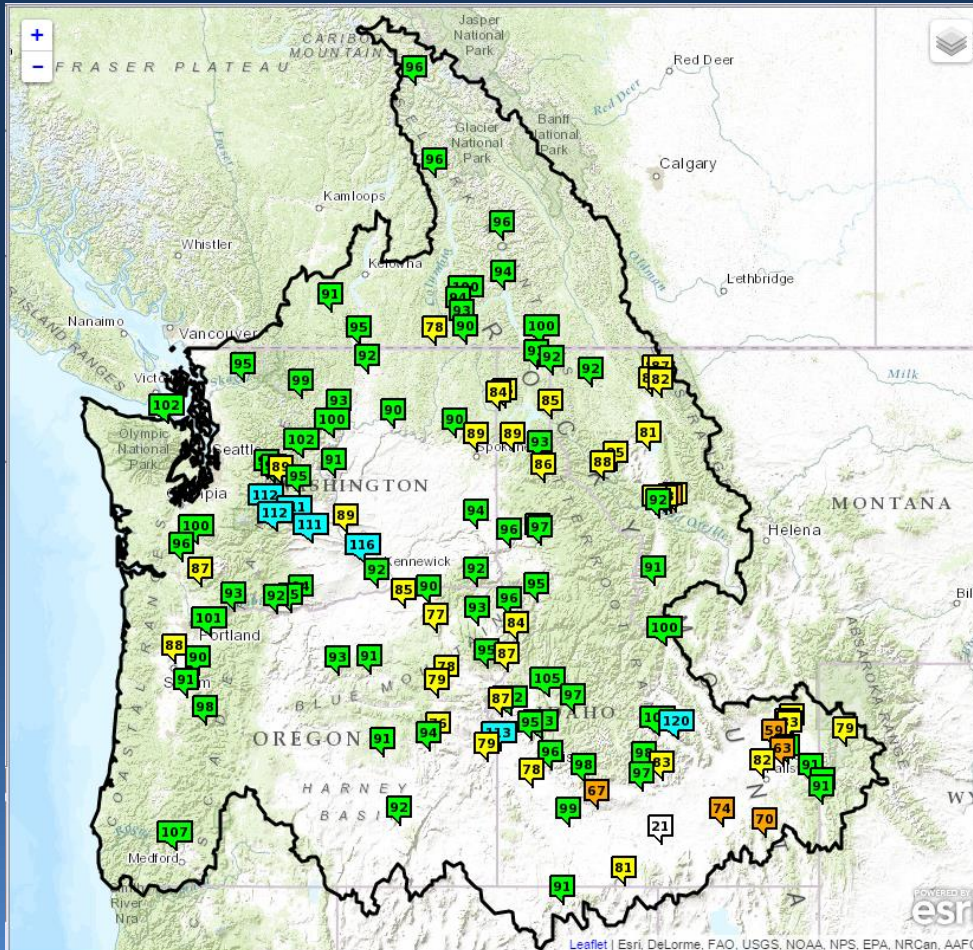
**Water Supply**

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)
  - Historical climate forcings appended thereafter
- NWRFC also offers 5 and 0 day QPF/QTF products
- Forecasts are updated daily
- Forecasts are compared to 30 year observed runoff normals (1981-2010)



# Water Supply Forecast Briefing Outline



- Review of 2015 Water Supply Season
- Observed Conditions WY2016:
  - Precipitation
  - Temperature
  - Snowpack
  - Runoff
- Future Conditions:
  - 10 days of quantitative forecast precipitation (QPF)
  - 10 days of quantitative forecast temperature (QTF)
  - Historical climate forcings appended thereafter
  - Climate Outlook
- Modeling Changes, new products

Hydrologic  
model states

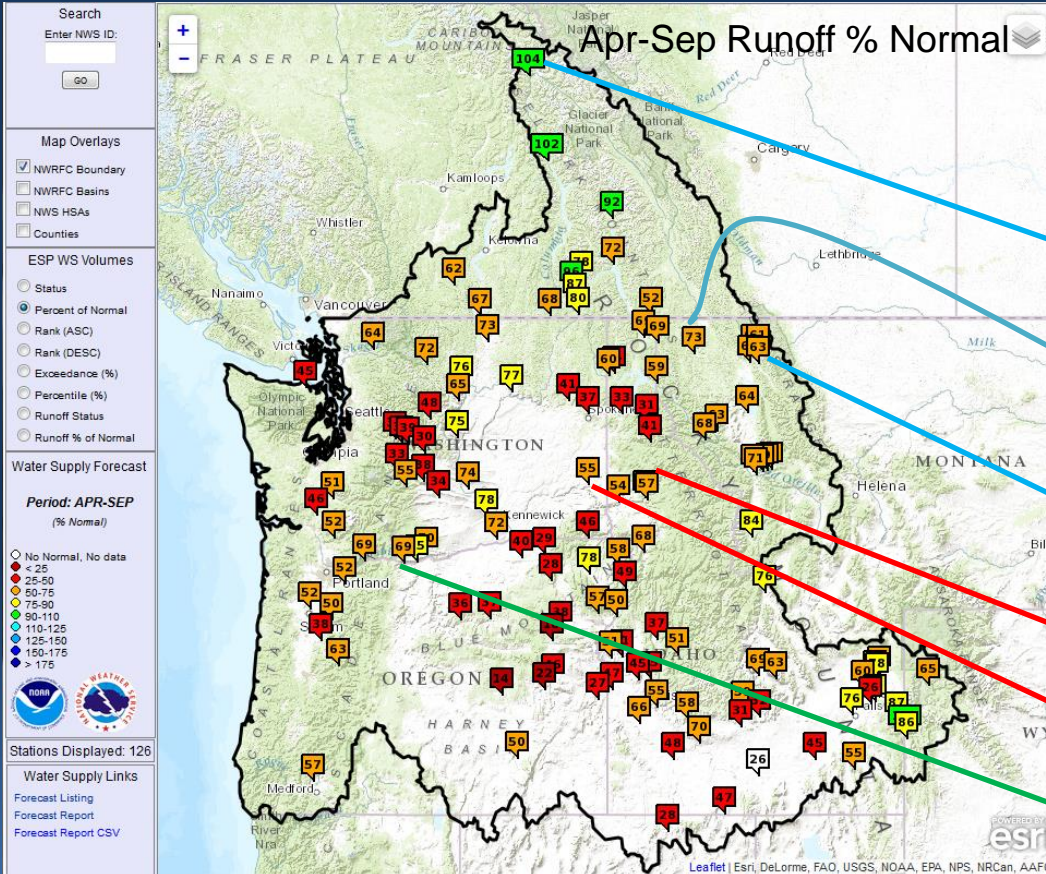
Climate  
Forcings





# 2015 Water Year Summary

## Observed Runoff % Normal

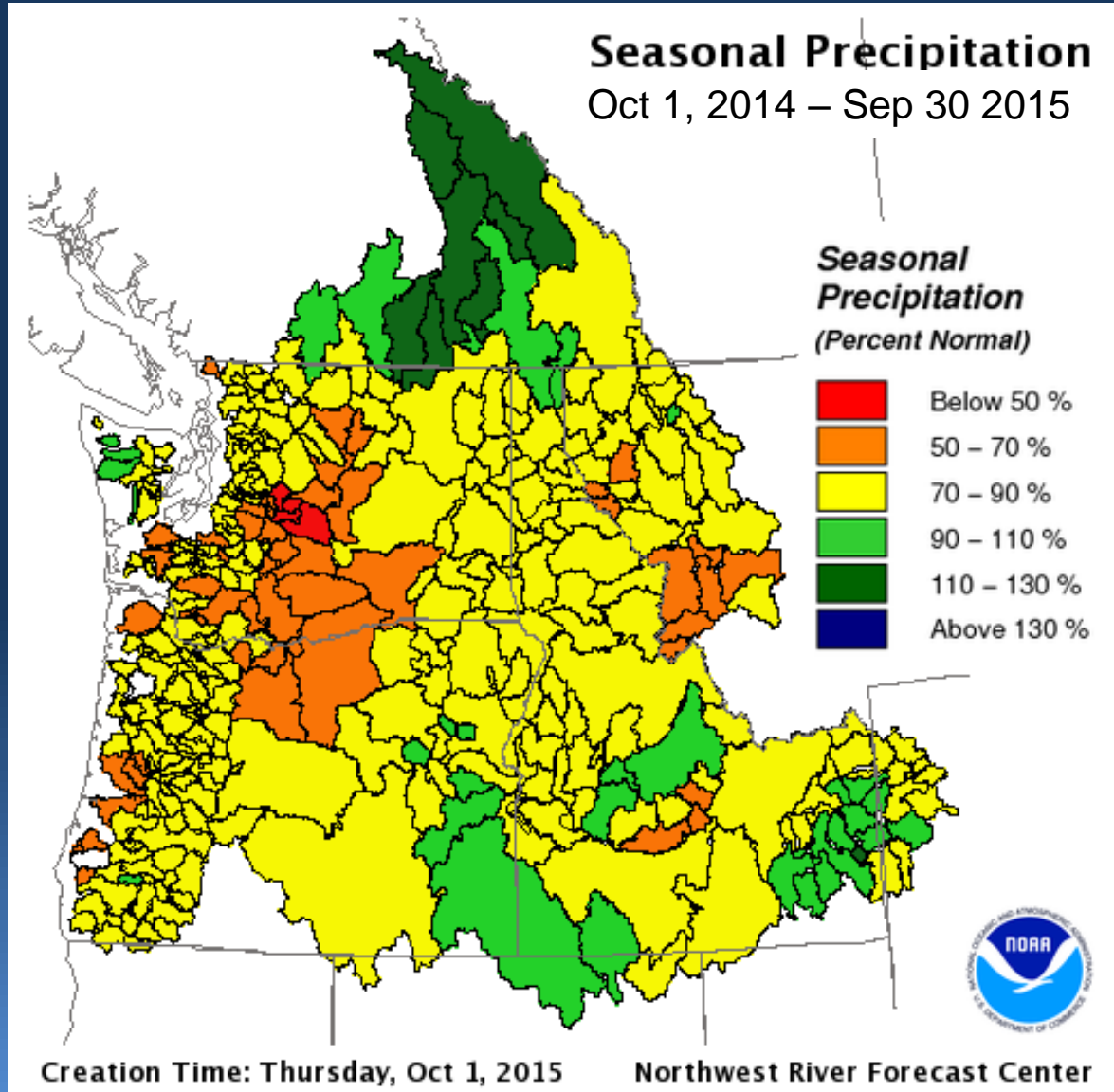


## 2015 Observed Runoff - % Normal

	Oct -Sep	Jan-Sep	Apr-Sep
Mica Dam	109	107	104
Libby Dam	85	82	73
Hungry Horse Dam	92	88	64
Dworshak Dam	79	75	45
Lower Granite Dam	73	69	55
The Dalles Dam	86	82	69



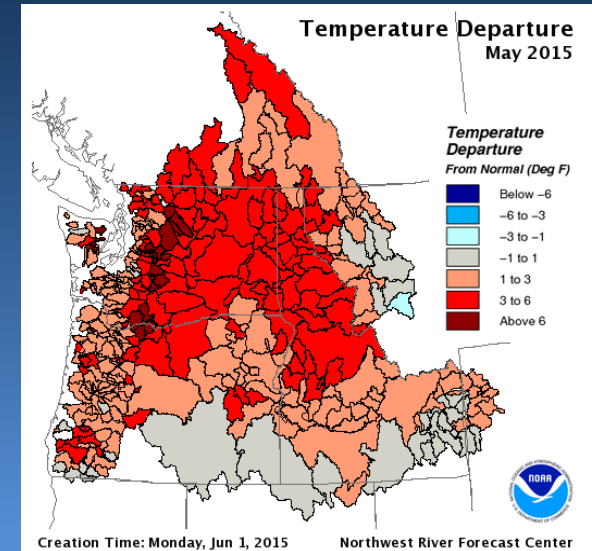
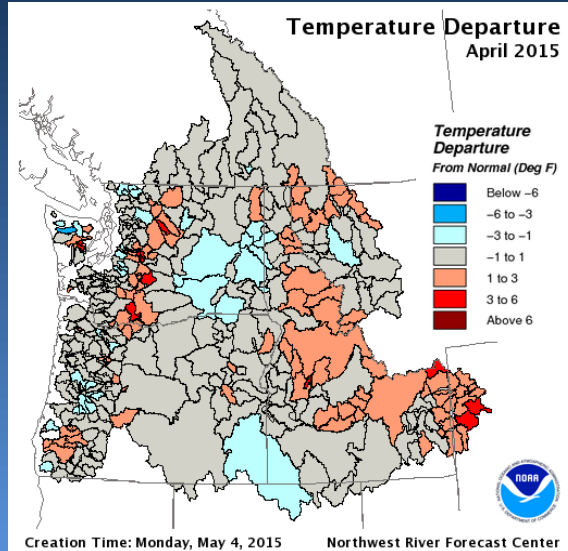
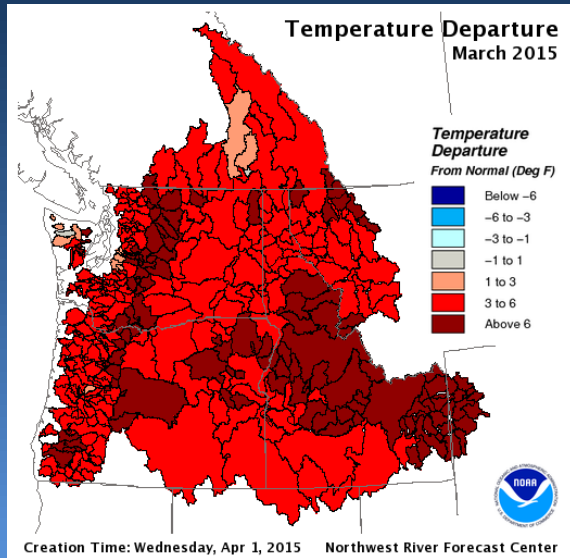
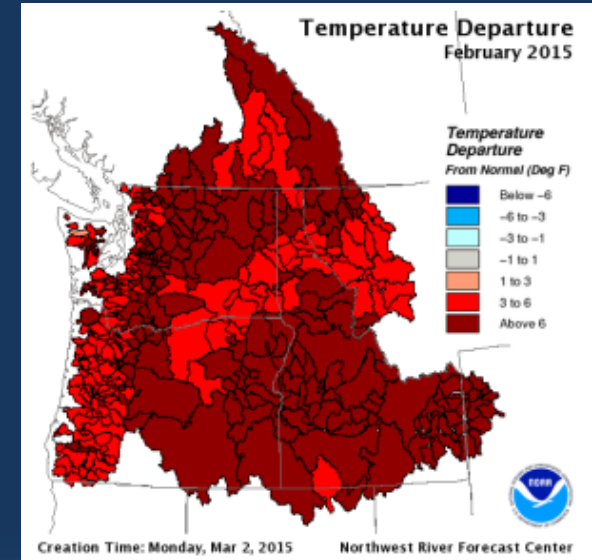
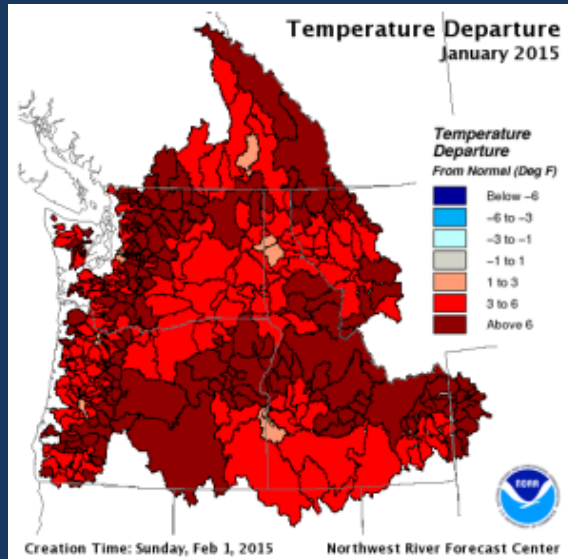
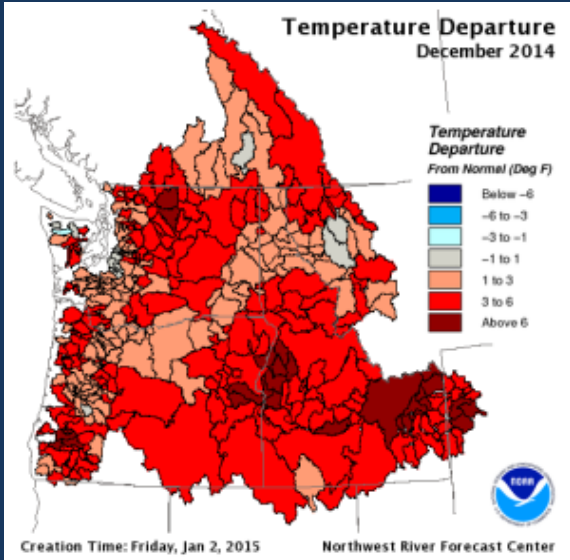
# 2015 Precipitation Summary





# 2015 Temperature Summary

## Departure from Monthly Normal





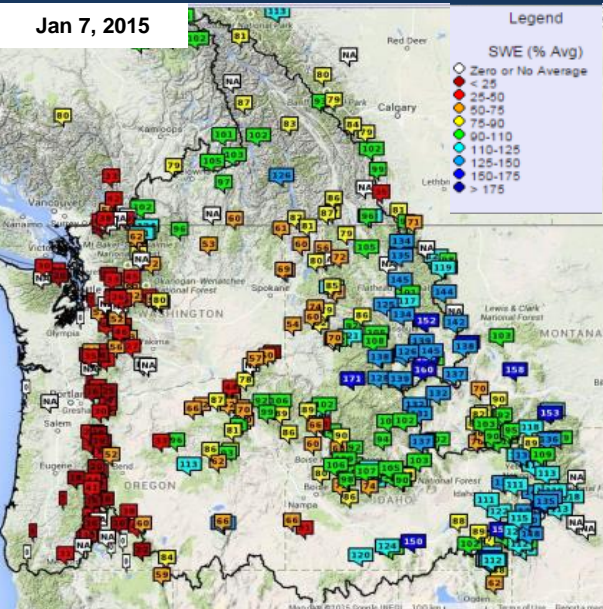


# 2015 Snowpack Summary

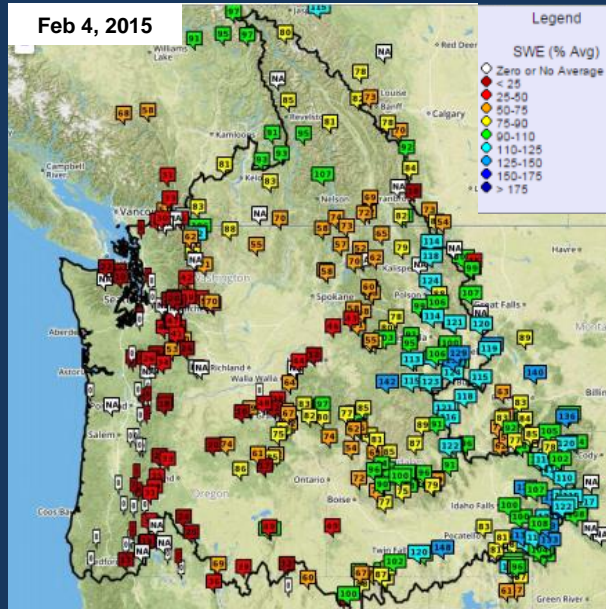
## Snotel % Normal Snow Water Equivalent (SWE)



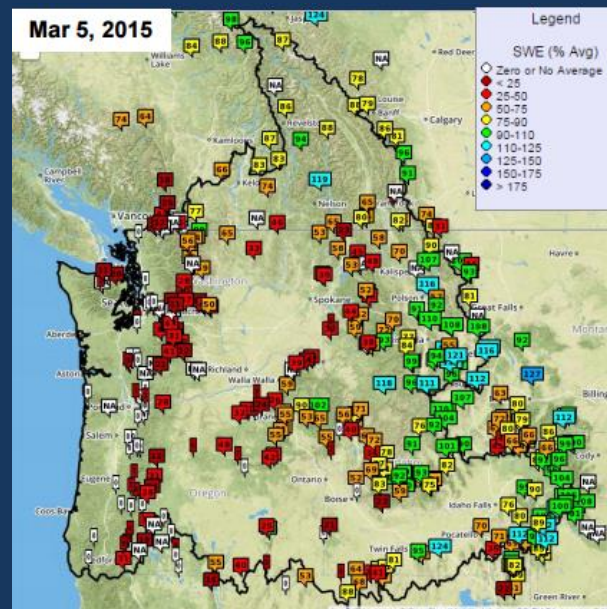
Jan 7, 2015



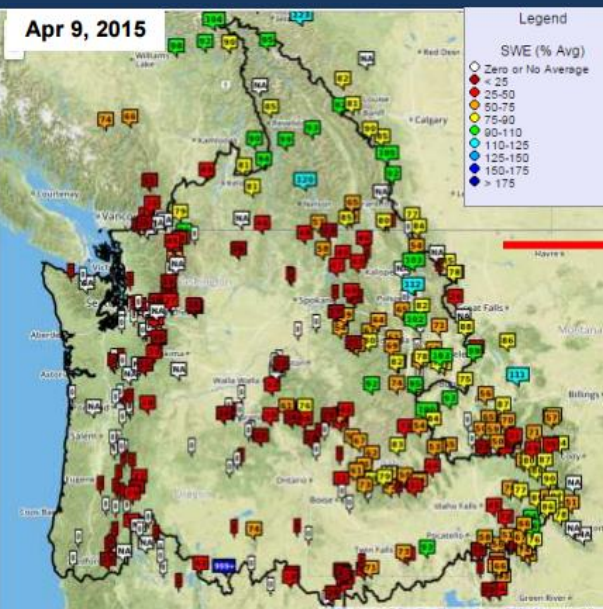
Feb 4, 2015



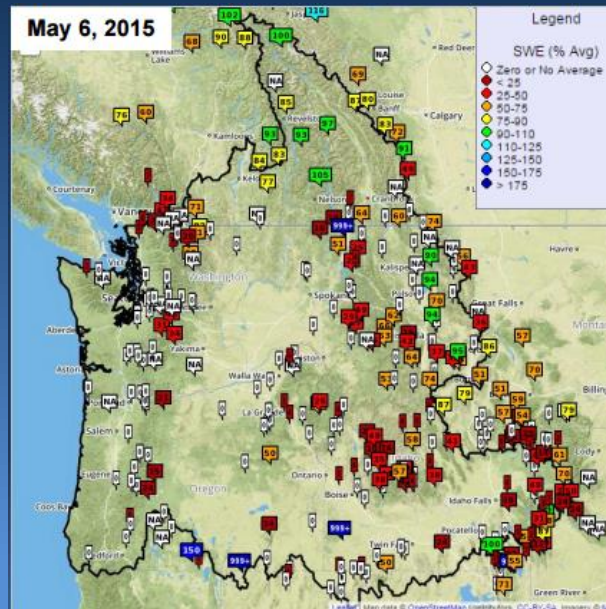
Mar 5, 2015



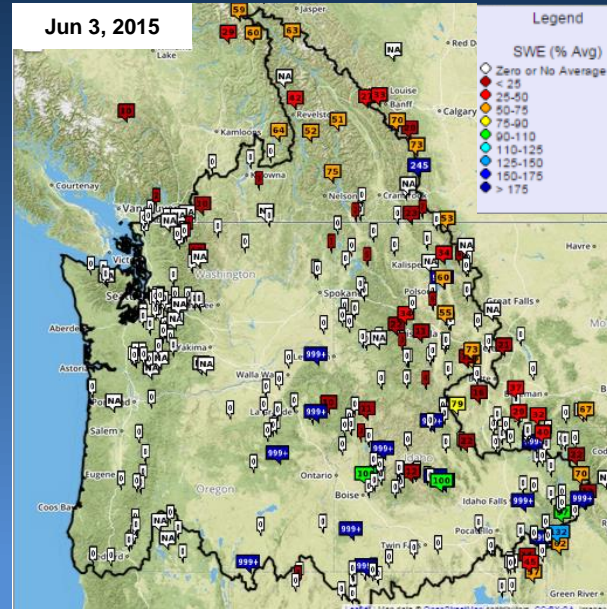
Apr 9, 2015



May 6, 2015



Jun 3, 2015







# Water Supply Forecast Briefing Outline



- Review of 2015 Water Supply Season
- Observed Conditions WY2016:
  - Precipitation
  - Temperature
  - Snowpack
  - Runoff
- Future Conditions:
  - 10 days of quantitative forecast precipitation (QPF)
  - 10 days of quantitative forecast temperature (QTF)
  - Historical climate forcings appended thereafter
  - Climate Outlook
- Modeling Changes, new products

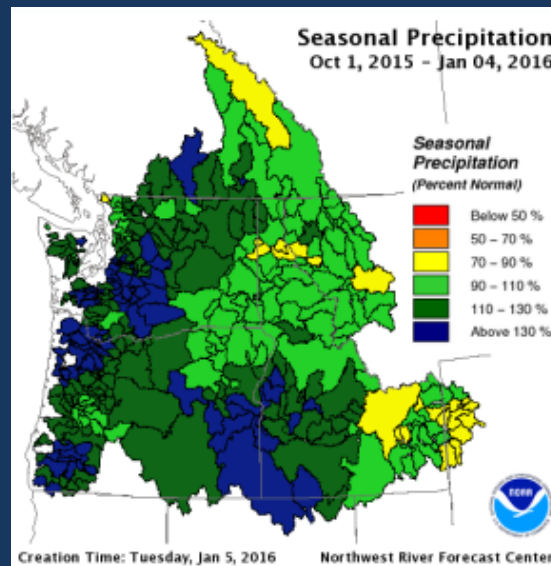
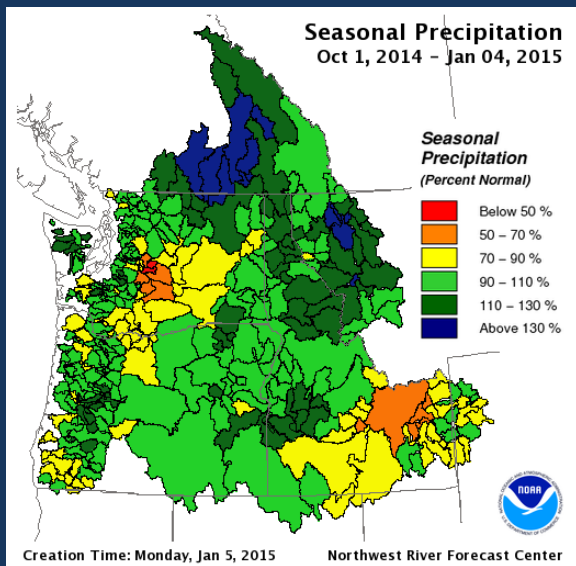
Hydrologic  
model states

Climate  
Forcings





# Observed Seasonal Precipitation



## DIVISION NAME

Columbia River Basin above Grand Coulee Dam

Snake River Basin above Ice Harbor Dam

Middle Columbia Lower Tributaries

Columbia River Basin above The Dalles Dam

\*Western Washington

\*Western Oregon

\*Average of contributing divisions

WY 2015  
% NORM

WY 2016  
% NORM

WY 2016  
OBS

115

101

13 in

100

110

7.9 in

99

116

9.9 in

104

108

10.2 in

94

121

46 in

101

138

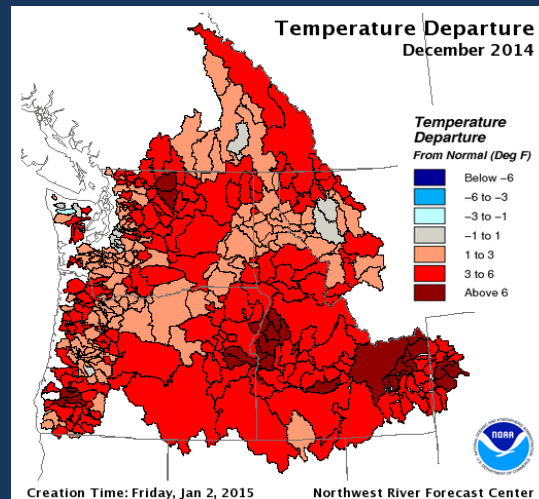
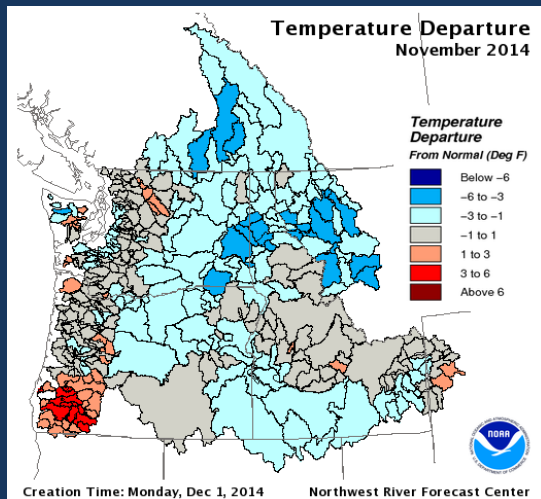
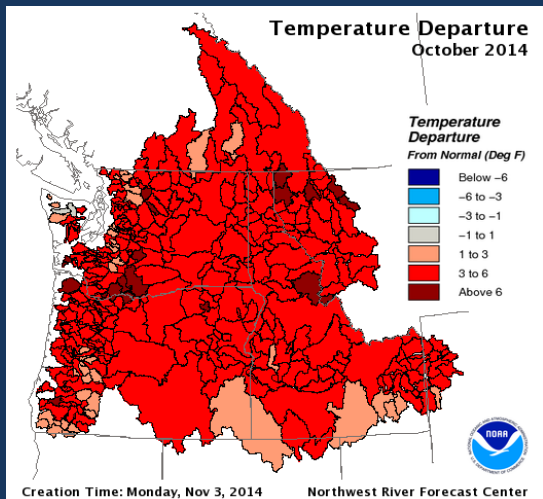
34 in



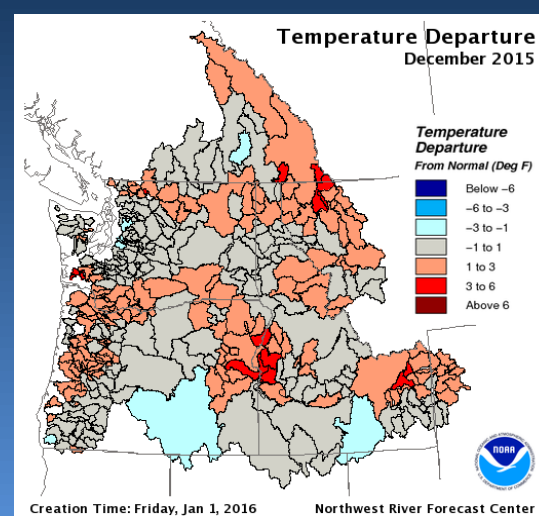
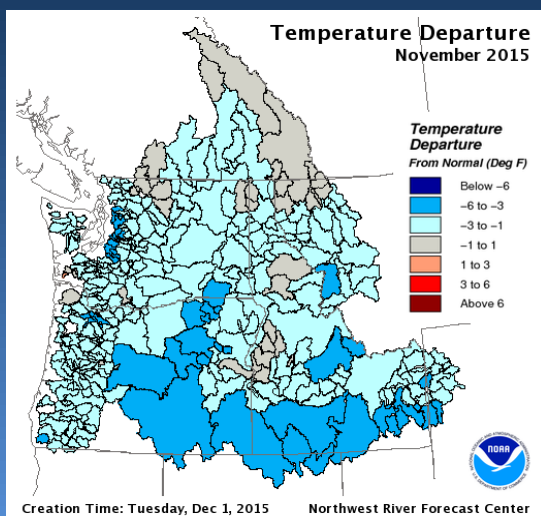
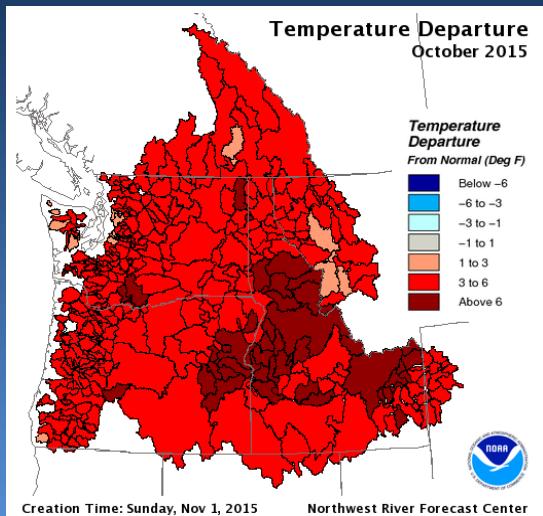
# Temperature Departure from Monthly Normal



wy2015



wy2016



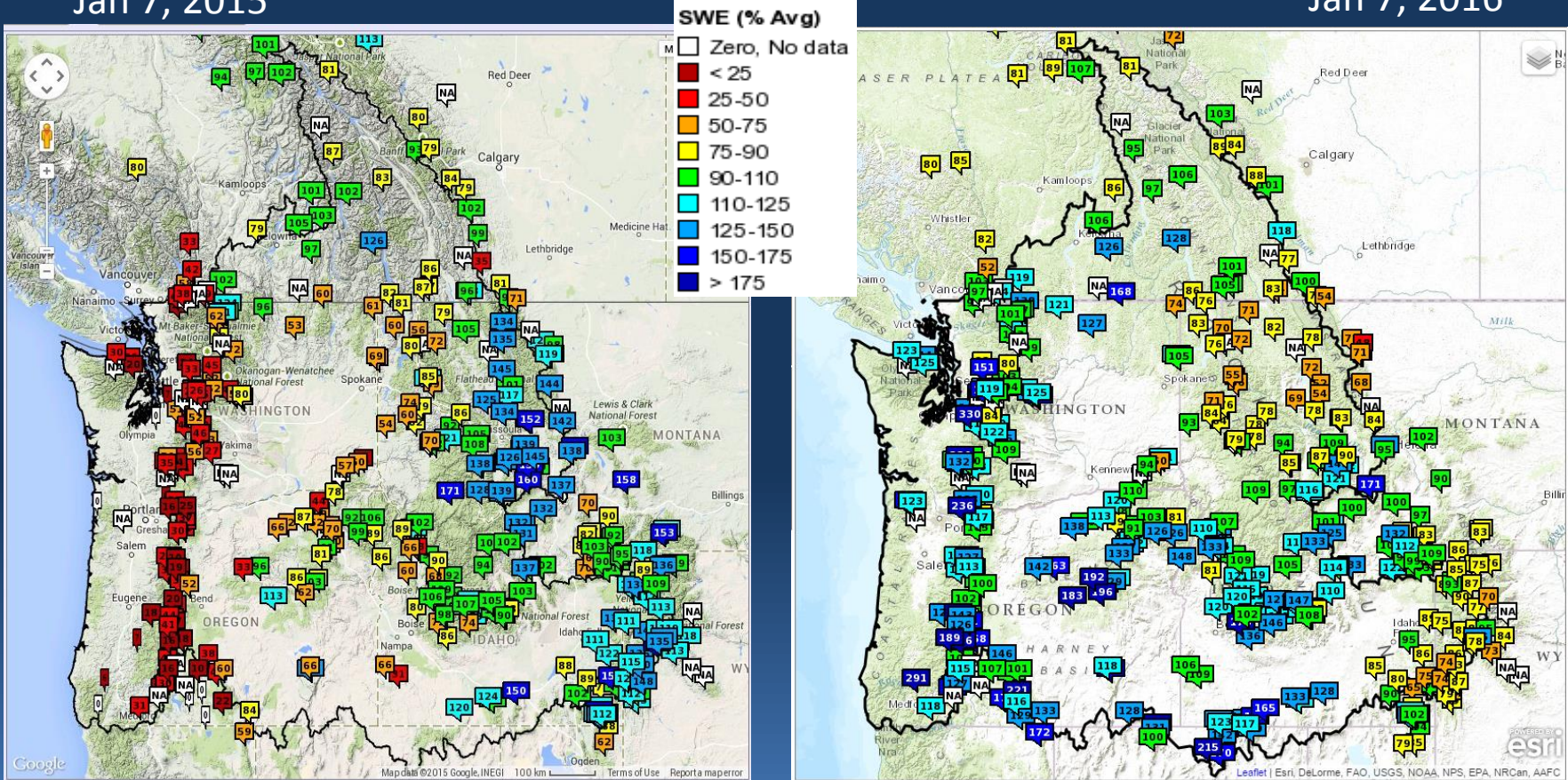


# Current Snow Conditions

## % Snow Water Equivalent (SWE)

Jan 7, 2015

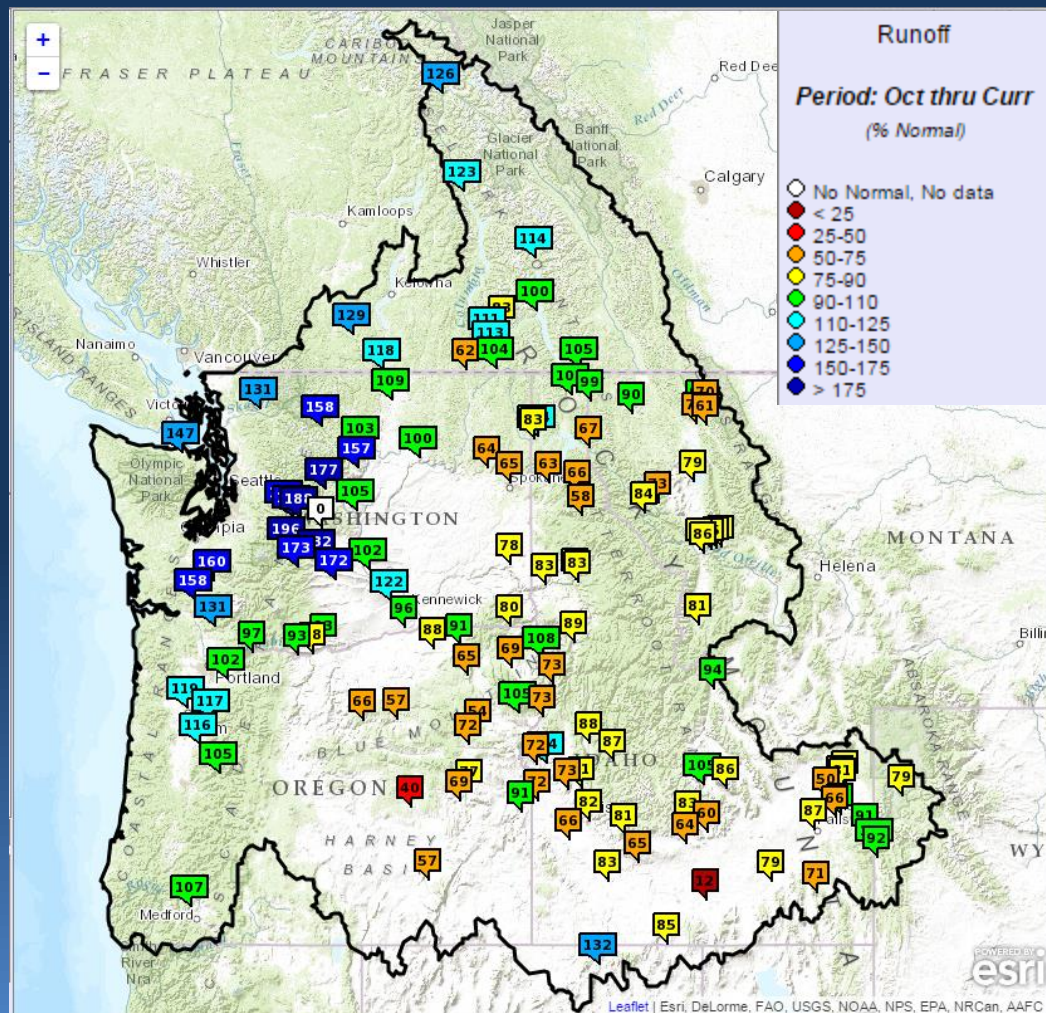
Jan 7, 2016







# Current Adjusted Runoff Conditions



Percent of Normal

Oct 1– Jan 5

## UPPER COLUMBIA BASIN

MICA	127
DUNCAN	113
QUEENS BAY	101
LIBBY	91
HUNGRY HORSE	62
GRAND COULEE	101

## SNAKE RIVER BASIN

JACKSON LAKE	80
PALISADES	92
DWORSHAK	77
LOWER GRANITE	79

## LOWER COLUMBIA BASIN

THE DALLES	94
------------	----



# Water Supply Forecast Briefing Outline



- Review of 2015 Water Supply Season
- Observed Conditions WY2016:
  - Precipitation
  - Temperature
  - Snowpack
  - Runoff

Hydrologic  
model states

- **Future Conditions:**

- 10 days of quantitative forecast precipitation (QPF)
- 10 days of quantitative forecast temperature (QTF)
- Historical climate forcings appended thereafter
- Climate Outlook

Climate  
Forcings

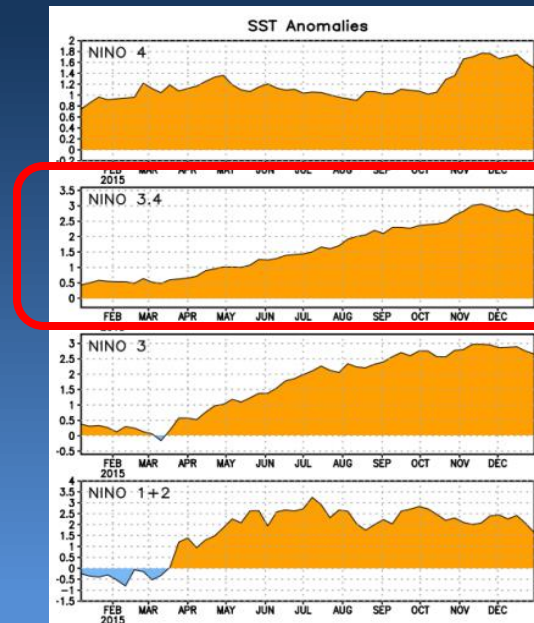
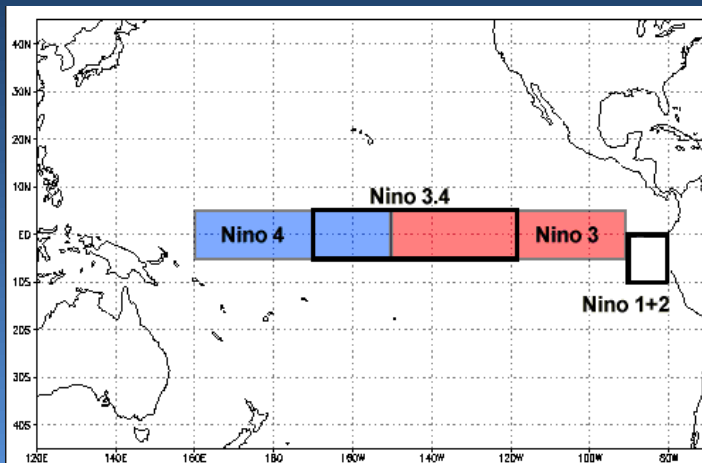
- **Modeling Changes, new products**



# Current ENSO Discussion

## ENSO Alert Status: El Nino Advisory

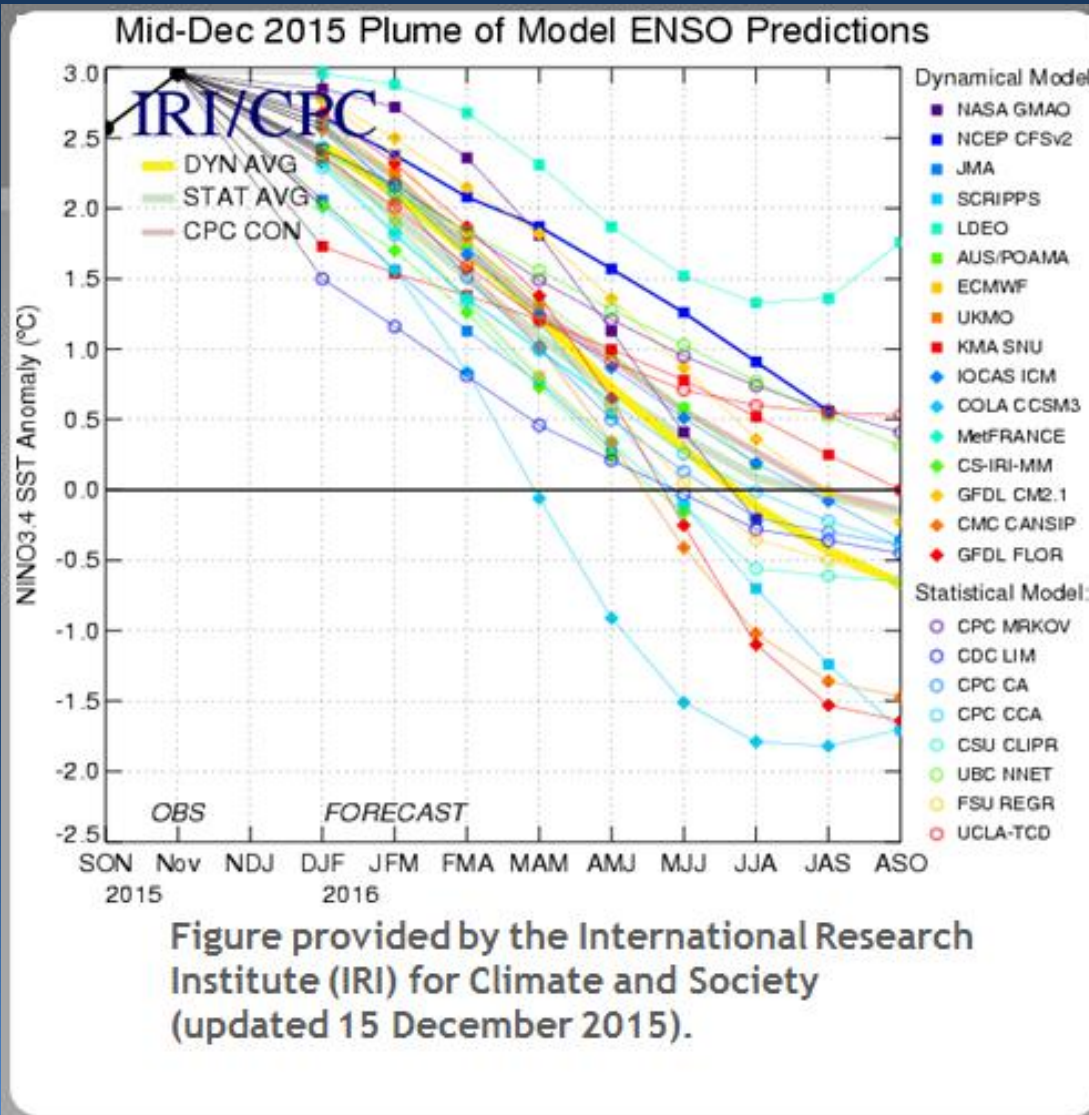
- Positive equatorial sea surface temperature (SST) anomalies continue across most of the Pacific Ocean
- El Nino is expected to remain strong through the Northern Hemisphere winter 2015-16, with a transition to ENSO neutral anticipated during late spring/early summer 2016







# IRI/CPC Plume Forecast



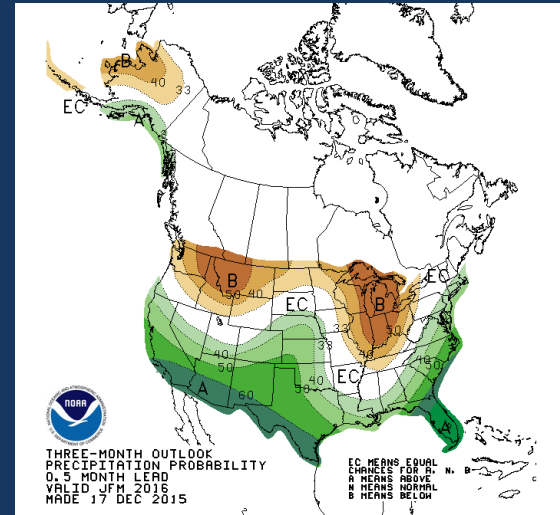
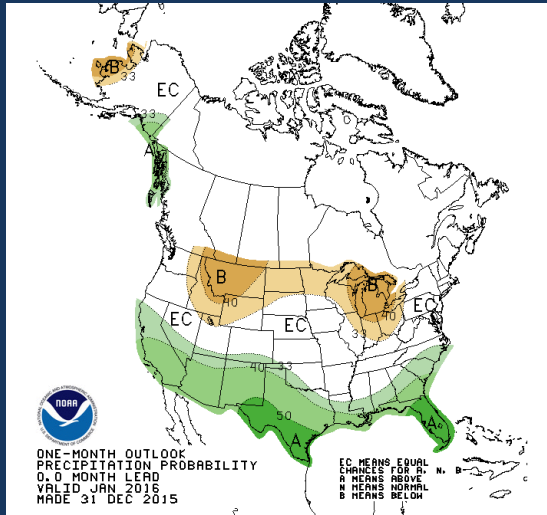
- Most models indicate that Nino 3.4 will remain strongly positive into early 2016
- Positive anomalies are predicted to weaken through the Northern Hemisphere Spring 2016

# CPC Climate Outlook

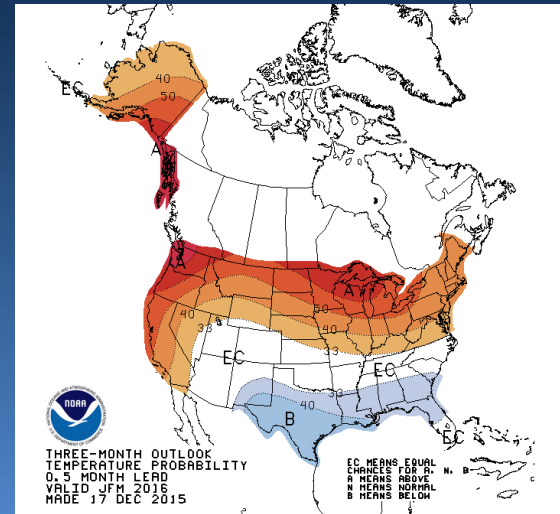
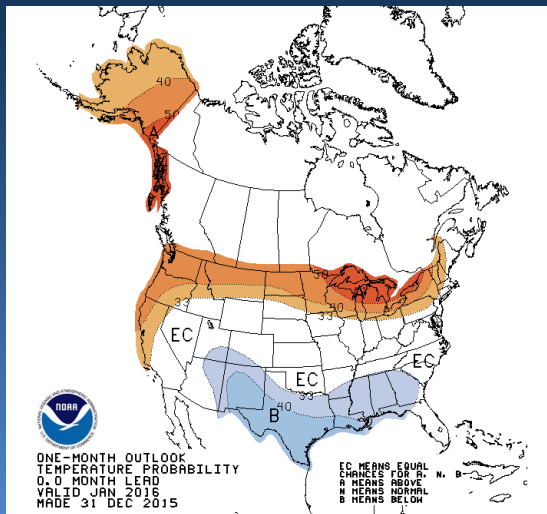
## Current Month Outlook

## Three Month Outlook

### Precipitation



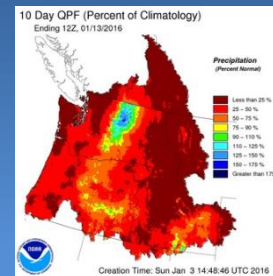
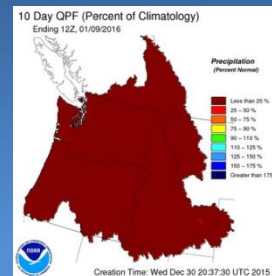
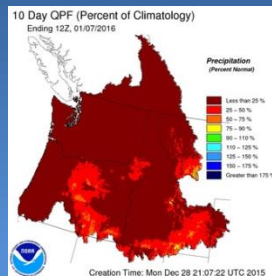
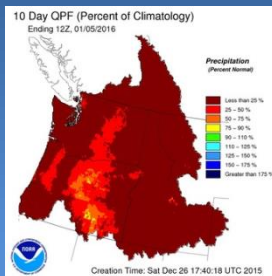
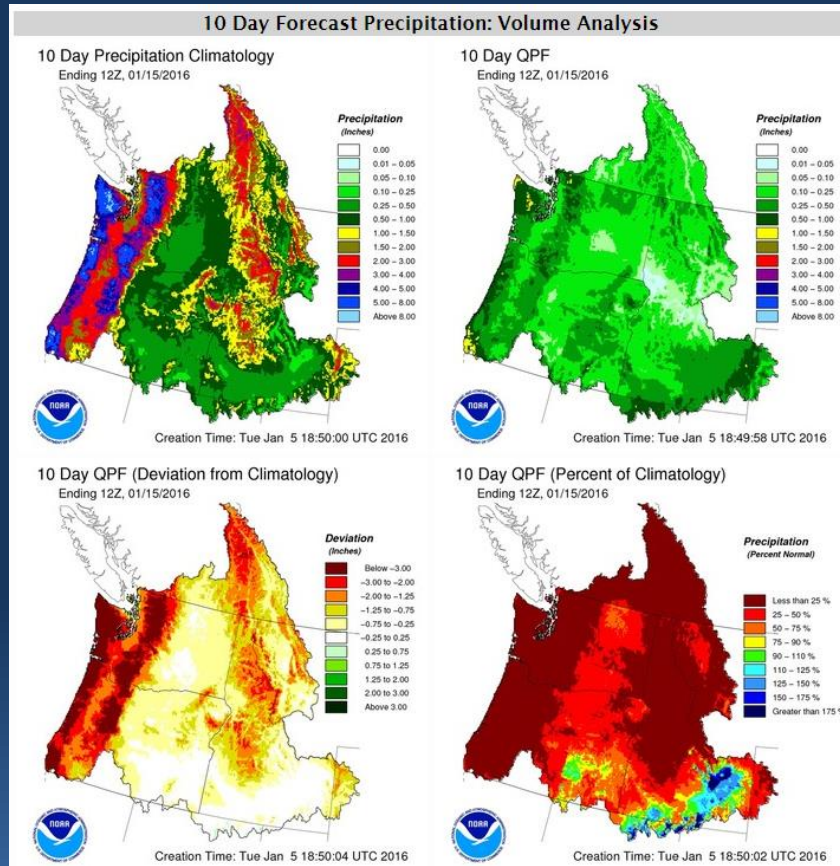
### Temperature





# Cumulative 10 Day Precipitation

1/5/2016 – 1/15/2016







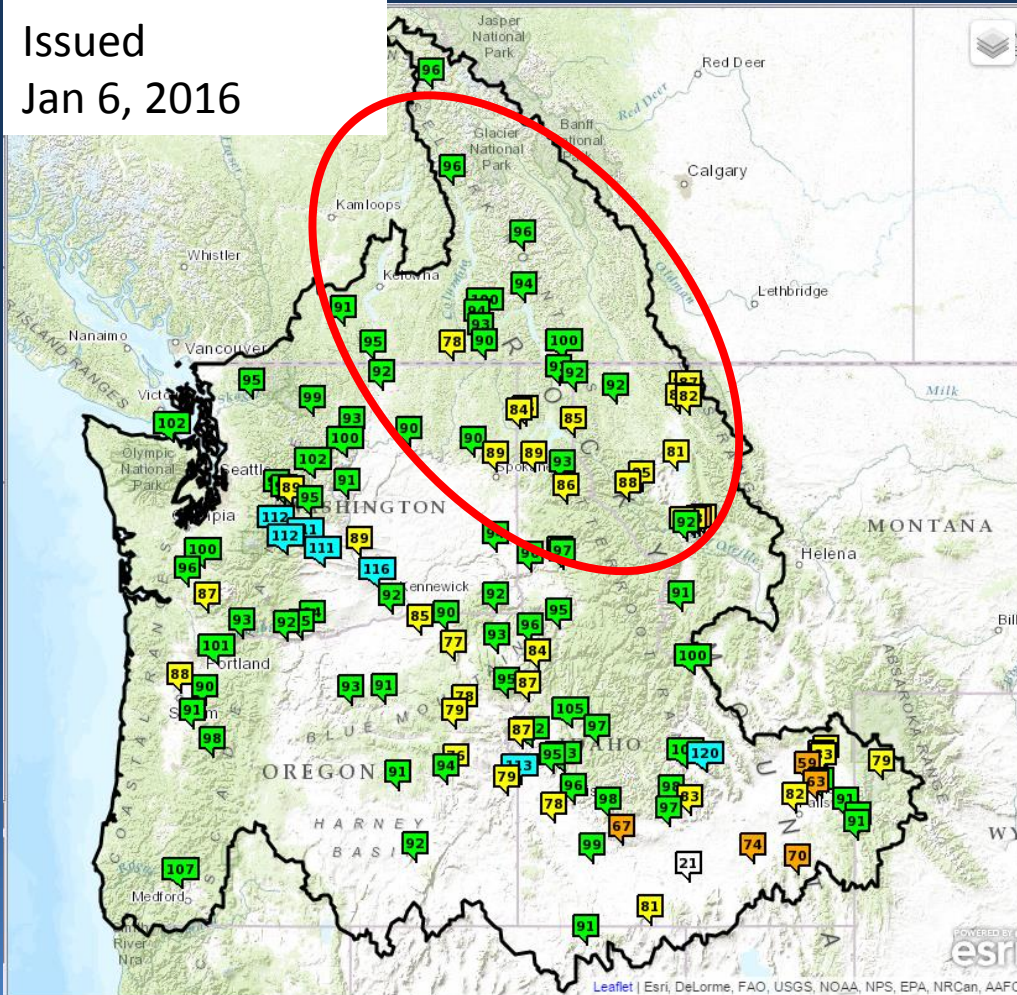
# Water Supply Forecasts

## Upper Columbia Basin



### Jan 2016 Apr – Sep Forecast

Issued  
Jan 6, 2016



Kootenai River  
- Libby Dam 92%

Coeur d'Alene River  
- Coeur d'Alene Lake 89%

SF Flathead River  
- Hungry Horse Dam 82%

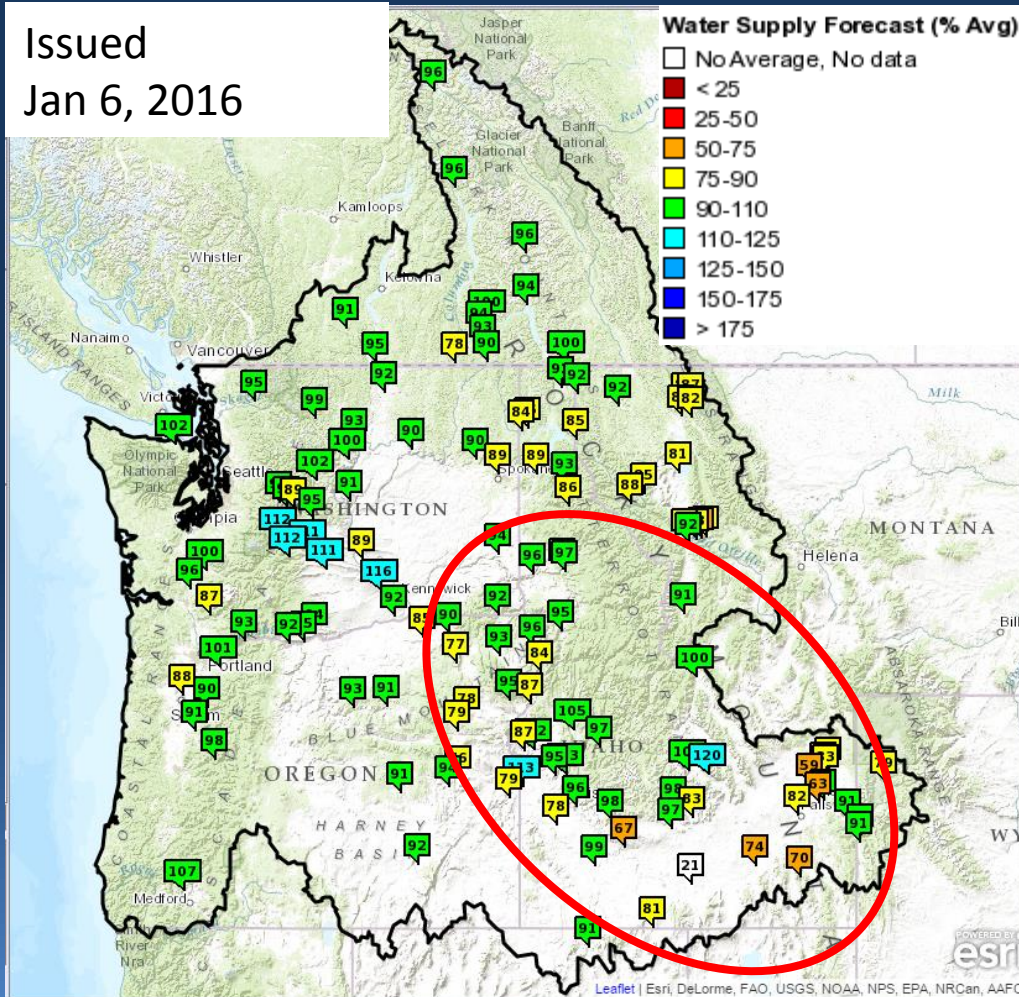
Columbia River  
- Grand Coulee Dam 90%



# Water Supply Forecasts Snake River Basin



Issued  
Jan 6, 2016



## Jan 2016 Apr – Sep Forecast

- Upper Snake River  
- Jackson Lake Dam 79%
- Upper Snake River  
- near Shelley 82%
- NF Clearwater River  
- Dworshak Dam 92%
- Lower Snake River  
- Lower Granite Dam 94%



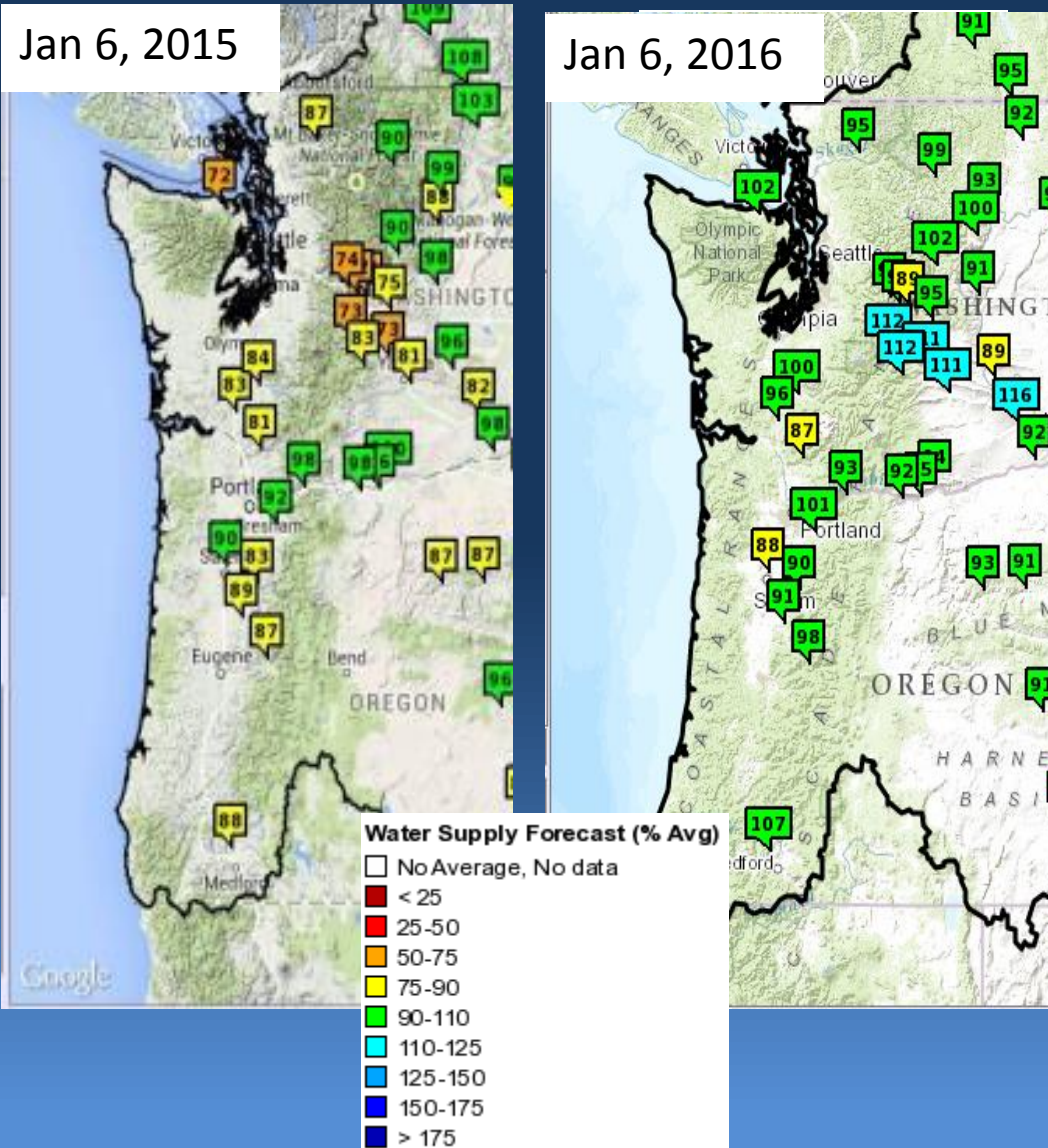


# Water Supply Forecasts

## Western Oregon and Washington Cascades



### Jan 2016 Apr – Sep Forecast



- Skagit River  
- near Concrete 95%
- Cowlitz River  
- Mayfield Reservoir 100%
- North Santiam  
- At Mehama 90%
- Willamette River  
- At Salem 88%





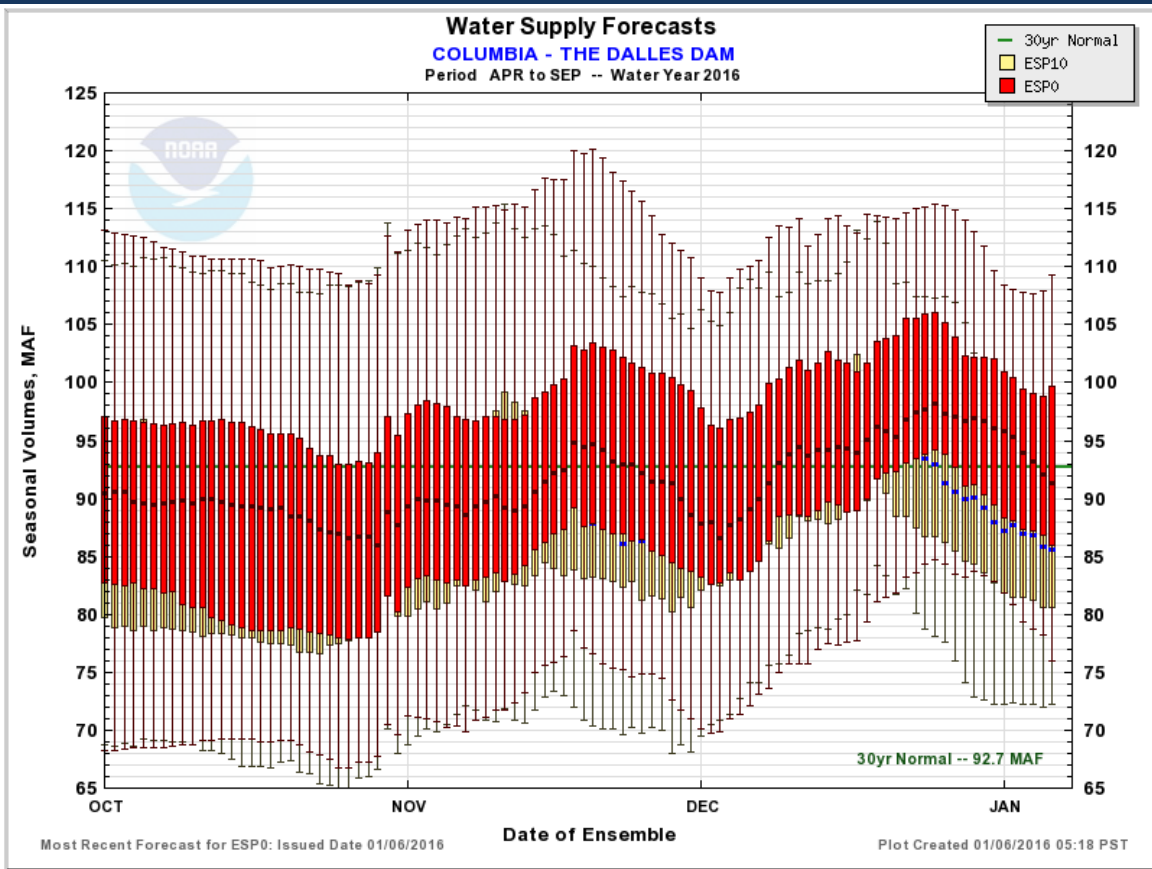
# NWRFC Water Supply Product

## Columbia River at The Dalles



COLUMBIA - THE DALLES DAM (TDAO3) Forecasts for Water Year 2016					
Official Forecast					
10 days QPF: Ensemble: 2016-01-06 Issued: 2016-01-06					
Forecast Period	Forecasts Are in KAF				30 Year Average (1981-2010)
	90 %	50 %	% Average	10 %	
APR-SEP	72223	85612	92	97470	92704
APR-JUL	61318	72595	91	83846	79855
APR-AUG	67798	80385	92	91312	87532
JAN-SEP	88683	103664	91	118130	114216
JAN-JUL	78437	91510	90	104719	101368
OCT-SEP	104198	119178	91	133644	130518
5 days QPF: Ensemble: 2016-01-06 Issued: 2016-01-06					
APR-SEP	73262	88518	95	102964	92704
APR-JUL	62451	75914	95	88187	79855
APR-AUG	69043	83171	95	97092	87532
JAN-SEP	91200	107042	94	124110	114216
JAN-JUL	80475	94675	93	111018	101368
OCT-SEP	106714	122557	94	139624	130518
0 days QPF: Ensemble: 2016-01-06 Issued: 2016-01-06					
APR-SEP	76014	91332	99	109267	92704
APR-JUL	65752	78228	98	94228	79855
APR-AUG	71840	86208	98	103575	87532
JAN-SEP	94172	110177	96	131902	114216
JAN-JUL	83170	97140	96	116753	101368
OCT-SEP	109687	125691	96	147416	130518

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



Max Scale 
  Scale To Data 
  Scale To Last 45 Days

**Overlay**

ESP10 
  ESP5 
  ESP0

**Data Files**



# 2016 ESP Volume Forecast Products



## Northwest River Forecast Center Water Supply Forecasts

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

### NF CLEARWATER - DWORSHAK DAM (DWR11) Forecasts for Water Year 2016

#### Official Forecast

10 days QPF: Ensemble: **2015-10-19** Issued: 2015-10-19

Forecasts Are in KAF

Select Period:  
APR-SEP ▾ Select

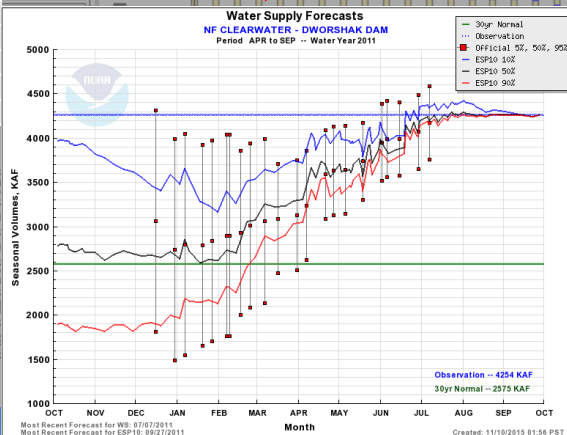
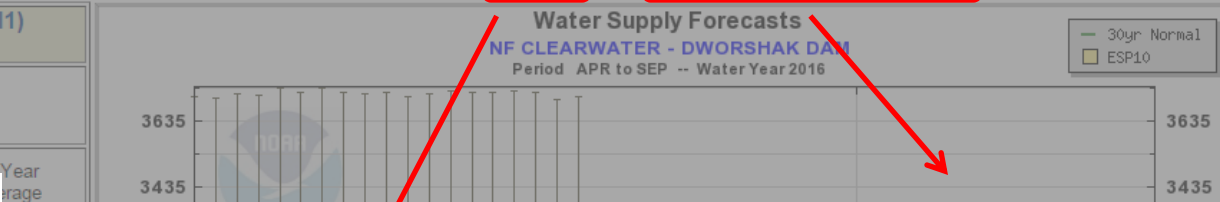
#### NF CLEARWATER - DWORSHAK DAM (DWR11) Period Rankings - 1960 to 2016 APR-SEP Normal - 2575 (KAF)

Rank	Year	Period Volume (KAF)	Percent of Normal	Exceedance Probability*
23	1989	2740.00	106	46.000 %
24	2009	2711.00	105	48.000 %
25	1991	2658.00	103	50.000 %
26	2004	2647.00	103	52.000 %
27	2016	2641.23	103	54.000 %
28	1978	2537.00	99	56.000 %
29	1981	2432.00	94	58.000 %
30	1993	2424.00	94	60.000 %
31	1983	2386.00	93	62.000 %
32	1980	2333.00	91	64.000 %

0 days QPF: Ensemble: 2015-10-19 Issued: 2015-10-19

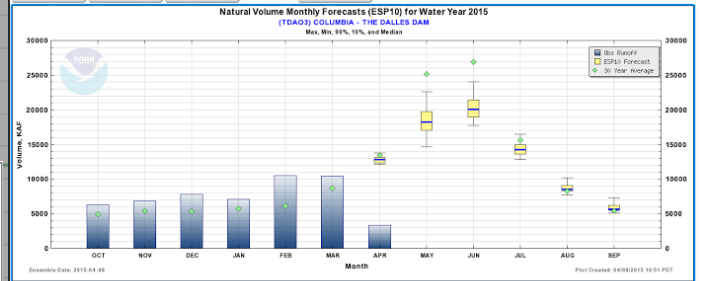
APR-SEP	1706	2634	102	3706	2
APR-JUL	1590	2486	103	3509	2
JAN-JUL	2145	3249	94	4551	3
JAN-JUL	2037	3100	94	4379	3
OCT-SEP	2288	3488	90	4831	3

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



### Water Supply Forecasts NF CLEARWATER - DWORSHAK DAM Period APR to SEP -- Water Year 2016

### Northwest River Forecast Center ESP Monthly Natural Volumes Monthly Natural Forecasts Beta



COLUMBIA - THE DALLES DAM Forecasts For Water Year 2015					COLUMBIA - THE DALLES DAM Forecasts For Water Year 2015					COLUMBIA - THE DALLES DAM Forecasts For Water Year 2016				
ESP Natural Forecast					ESP Natural Forecast					ESP Natural Forecast				
10 days QPF: Ensemble: 2015-04-08 Issued: 2015-04-08					5 days QPF: Ensemble: 2015-04-08 Issued: 2015-04-08					0 days QPF: Ensemble: 2015-04-08 Issued: 2015-04-08				
Forecast Period	90 %	50 %	Average	%	Forecast Period	90 %	50 %	Average	%	Forecast Period	90 %	50 %	Average	%
OCT					OCT					OCT				
NOV					NOV					NOV				
DEC					DEC					DEC				
JAN					JAN					JAN				
FEB					FEB					FEB				
MAR					MAR					MAR				
APR					APR					APR				
MAY					MAY					MAY				
JUN					JUN					JUN				
JUL					JUL					JUL				
AUG					AUG					AUG				
SEP					SEP					SEP				



# New Products

## Historic ESP ensembles, Climate Forcings, Runoff



### Northwest River Forecast Center Water Supply Forecasts



River and Hydrology

Water Supply

Observations

Weather Forecasts

Climate

NWRFC

Forecast Map

Forecast Listing

Forecast Report

Forecast Text Product

Live Briefing Schedule

Precipitation/Temperature

Snow

Runoff

Runoff Text Product

ESP Natural Forecast

ESP Interactive

Documentation

Downloads **NEW**



### Northwest River Forecast Center Data Download

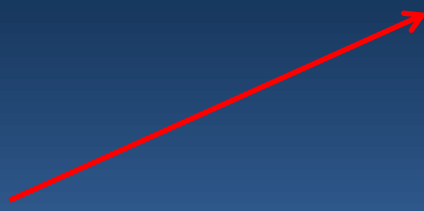
Home Close

- ESP Ensembles
- Forcings
- Runoff

Filter Clear

Show Links

	Water Supply	Date
1	WOD11W_SQIN.ESPF5.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
2	WOD11W_SQIN.ESPF0.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
3	<b>WLDN2W_SQIN.ESPF5.4909.KCFS.csv</b>	Dec 31, 2015 11:16:24 PST
4	WLDN2W_SQIN.ESPF10.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
5	WSRI1W_SQIN.ESPF0.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
6	WOD11W_SQIN.ESPF10.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
7	WTLO3W_SQIN.ESPF10.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
8	WSRI1W_SQIN.ESPF10.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
9	WTLO3W_SQIN.ESPF0.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
10	WTLO3W_SQIN.ESPF5.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
11	WSRI1W_SQIN.ESPF5.4909.KCFS.csv	Dec 31, 2015 11:16:24 PST
12	WEIIIW_SQIN.ESPF0.4909.KCFS.csv	Dec 31, 2015 11:16:23 PST
13	WEIIIW_SQIN.ESPF10.4909.KCFS.csv	Dec 31, 2015 11:16:23 PST
14	WID03W_SQIN.ESPF5.4909.KCFS.csv	Dec 31, 2015 11:16:23 PST



DWR11W\_SQIN.ESPF0.4909.KCFS - Microsoft Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	DATE_TIME(UTC)	WV1949	WV1950	WV1951	WV1952	WV1953	WV1954	WV1955	WV1956	WV1957	WV1958	WV1959	WV1960	WV1961	WV1962	WV1963	WV1964
1	DATE_TIME(UTC)	WV1949	WV1950	WV1951	WV1952	WV1953	WV1954	WV1955	WV1956	WV1957	WV1958	WV1959	WV1960	WV1961	WV1962	WV1963	WV1964
2	11/9/2015 18:00	1.006786	1.162135	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.006786	1.119899	1.077415
3	11/10/2015 00:00	1.260875	2.052171	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.260875	1.895339	1.599966
4	11/10/2015 6:00	1.260875	2.871295	1.260875	1.275248	1.260875	1.275248	1.260875	1.275248	1.260875	1.275248	1.260875	1.275248	1.260875	1.260875	2.88535	1.981259
5	11/10/2015 12:00	1.261158	3.337272	1.261158	1.303111	1.261158	1.260875	2.30626	2.856957	1.260875	1.274966	4.071993	1.317449	1.261158	1.317449	3.591643	2.150946
6	11/10/2015 18:00	1.232482	3.648217	1.218391	1.331787	1.218391	1.260875	3.210386	4.043848	1.232765	1.260875	5.202063	1.303394	1.24682	1.317449	3.704791	2.10501
7	11/11/2015 00:00	1.238674	3.973218	1.204619	1.339963	1.204619	1.218674	3.019789	4.580453	1.190246	1.232765	5.230208	1.274966	1.430279	1.345595	3.450384	2.150946
8	11/11/2015 6:00	1.204336	4.269826	1.147762	1.515282	1.161853	1.232482	3.478813	4.594827	1.17619	1.204336	4.750141	1.24682	2.207485	1.515282	3.097238	2.150946
9	11/11/2015 12:00	1.162135	4.312027	1.119616	2.066226	1.148045	1.374023	3.181958	4.439195	1.162135	1.218674	4.100139	1.204336	3.690418	1.769653	2.659406	2.136573
10	11/12/2015 00:00	1.133969	4.071993	1.05361	2.800665	1.148045	1.529337	2.813003	4.086049	1.163853	1.458708	3.450384	1.148045	5.075142	1.868146	2.292204	2.066226
11	11/12/2015 6:00	1.119616	3.77542	1.06336	3.111328	1.204336	1.585911	2.433181	3.577588	1.148045	2.122518	3.757239	1.148045	5.428006	1.840283	2.052171	1.939058
12	11/12/2015 12:00	1.077415	4.298219	1.048987	2.984407	1.388078	1.557483	2.023742	2.659406	1.105561	2.899723	2.122518	1.204336	3.902589	1.64245	2.150946	1.656541
13	11/12/2015 18:00	1.063077	4.580453	1.034932	3.181958	1.62425	1.543392	2.50381	2.30626	1.077415	2.659406	1.967168	1.148045	3.097238	1.486854	2.150663	1.515282
14	11/13/2015 00:00	1.034932	4.42514	1.049269	3.492903	2.037798	1.487136	3.450667	2.037798	1.063077	2.461574	1.939058	1.105561	2.433463	1.374023	2.1228	1.416224
15	11/13/2015 6:00	1.077415	4.057938	1.034932	3.84605	3.026609	1.430279	4.128285	1.82591	1.133707	2.659406	2.504093	1.077133	1.981259	1.289021	2.277811	1.345877
16	11/13/2015 12:00	1.24882	3.633879	1.048987	4.227307	4.170768	1.416507	4.213252	1.856541	1.374023	3.29507	3.813677	1.048987	1.769653	1.218674	2.617205	1.331504
17	11/14/2015 00:00	1.339963	3.210386	1.020676	4.42514	4.665456	1.388078	3.930734	1.557765	1.585911	4.114477	5.018602	1.034932	1.75528	1.162135	2.758181	1.303394
18	11/14/2015 6:00	1.289303	2.800665	1.020594	4.42514	4.792342	1.388078	3.506959	1.472763	1.656541	4.905207	5.272629	1.006786	2.051888	1.119616	2.588777	1.274966
19	11/14/2015 12:00	1.190246	2.447518	1.006786	4.42514	4.679512	1.388078	3.012553	1.402134	1.698742	5.41395	4.9336	1.006786	2.588777	1.091506	2.348743	1.260875
20	11/14/2015 18:00	1.119816	2.179056	0.992448	4.261161	4.227807	1.374023	2.588777	1.345595	1.603895	5.30112	4.227907	1.005053	2.88535	1.048987	2.080317	1.218674
21	11/15/2015 00:00	1.077415	1.967451	0.992731	3.817622	3.690418	1.317449	3.0626	1.317449	1.486854	4.820488	3.464757	0.992731	2.758464	1.048987	1.868146	1.232765
22	11/15/2015 6:00	1.05361	1.811854	0.978358	3.305126	3.29507	1.260875	2.207485	1.275248	1.359933	4.283881	2.828811	0.992448	2.489719	1.048987	1.684934	1.486854
23	11/15/2015 12:00	1.303394	1.684531	0.928358	2.913278	3.306408	1.204336	2.263276	1.260875	1.333482	4.011364	2.405035	0.928358	2.278144	1.091506	1.529337	2.433463



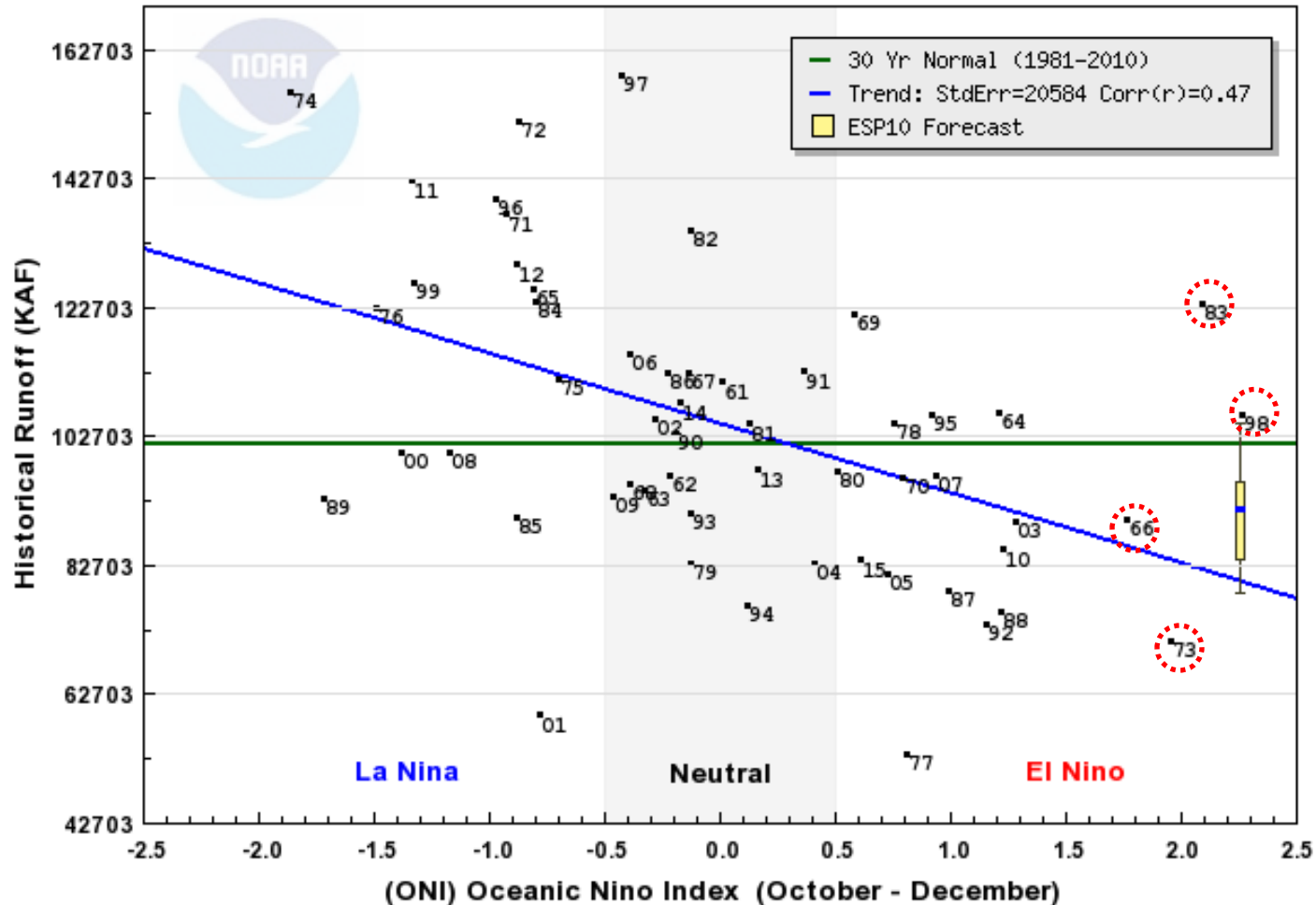


# New Products

## Historic Runoff vs ONI



Historical Runoff vs (ONI) Oceanic Nino Index  
(TDAO3) COLUMBIA-THE DALLES DAM (JAN-JUL)



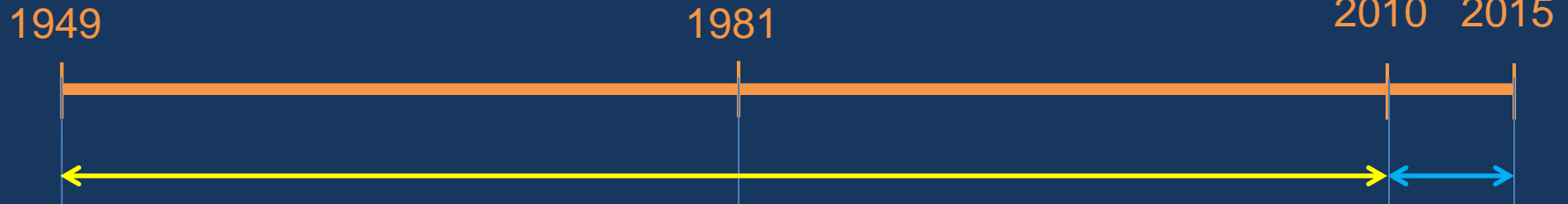
Index Date: 11/01/2015

ESP Forecast Date: 01/06/2016

Created: 01/07/2016 11:23 PST



# Climate Forcings Extension



## 1949 - 2010

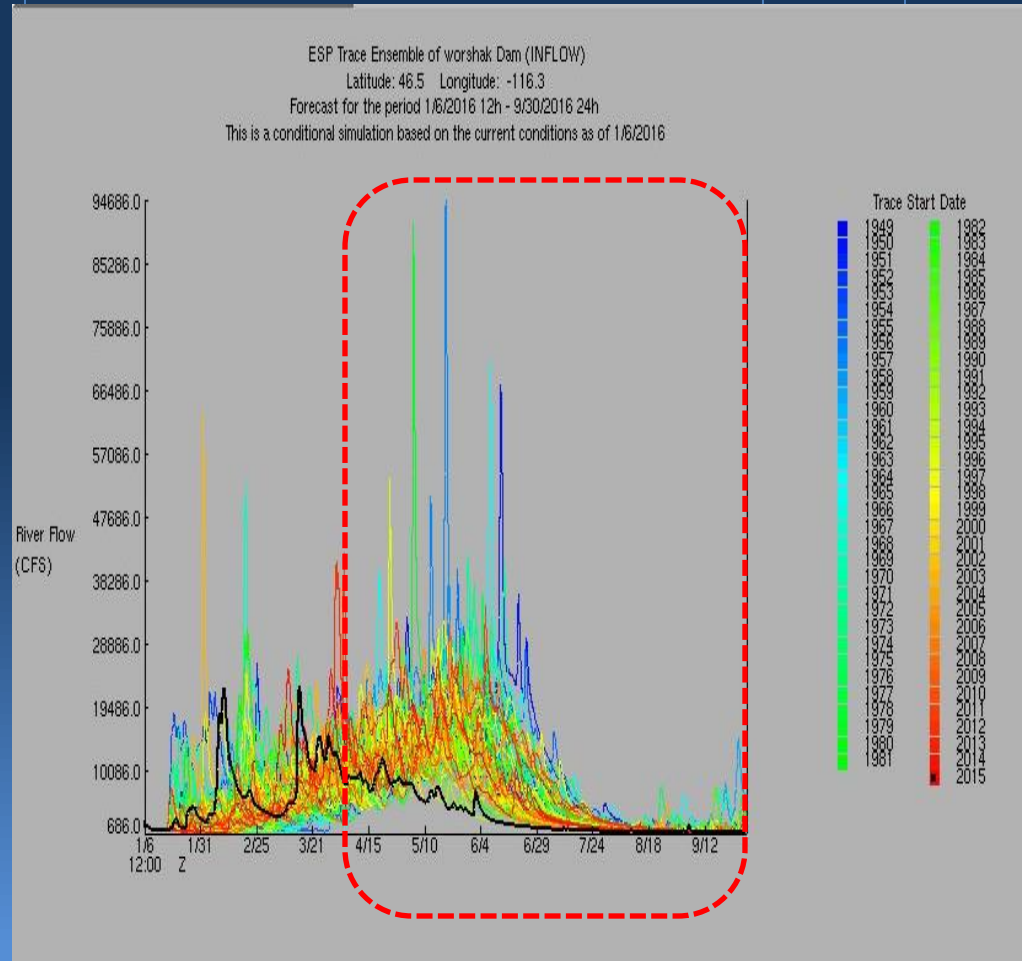
- MAP and MAT climate forcings based on observed data 1949 – 2010

## 2010 – 2015

- These data will now be appended to the existing historic record annually

## Climate Forcings Period of Record

- Previously used 1949 – 2010
- Will now be using 1949 – 2015





# NWRFC Water Supply Webpage

[http://www.nwrfc.noaa.gov/water\\_supply/ws\\_schd.cgi?version=20160107v1](http://www.nwrfc.noaa.gov/water_supply/ws_schd.cgi?version=20160107v1)



2016 Schedule for <i>Live Water Supply Briefings</i>					
Jan	Feb	Mar	Apr	May	Jun
7	4	3	7	5	TBD
<i>All presentations held at 10am PDT/PST, unless noted otherwise</i>					
<a href="#">Click here for Registration Information</a>					

<http://www.nwrfc.noaa.gov/presentations/presentations.cgi>

Kevin Berghoff, NWRFC  
W-ptr.Webmaster@noaa.gov  
(503)326-7291





## Northwest River Forecast Center Water Supply Forecasts



River and Hydrology

Water Supply

Observations

Weather Forecasts

Climate

NWRFC

[www.nwrfc.noaa.gov](http://www.nwrfc.noaa.gov)

# Questions?

Kevin Berghoff, NWRFC  
W-ptr.Webmaster@noaa.gov  
(503)326-7291