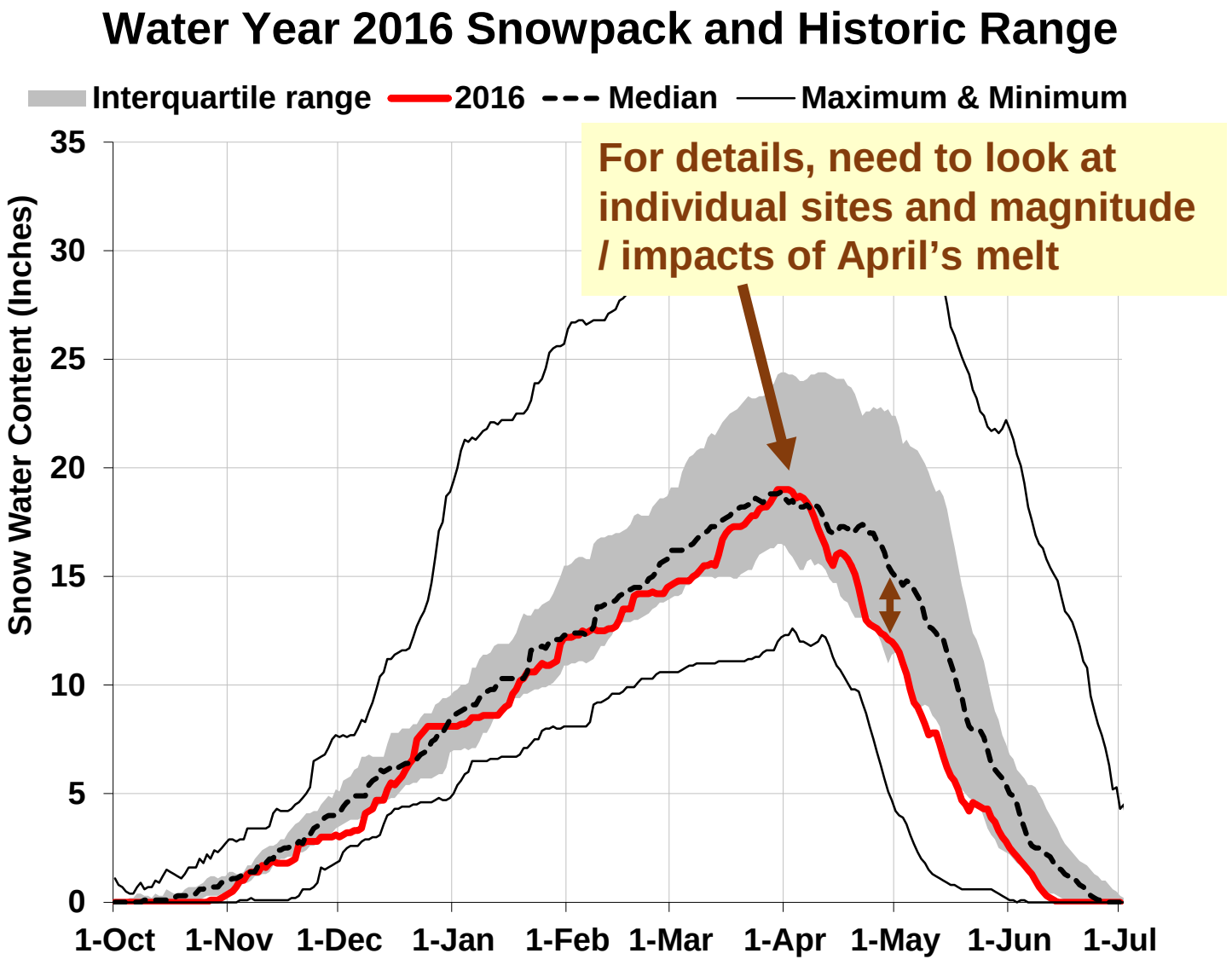
UPPER SNAKE RIVER ADVISORY COMMITTEE MEETING

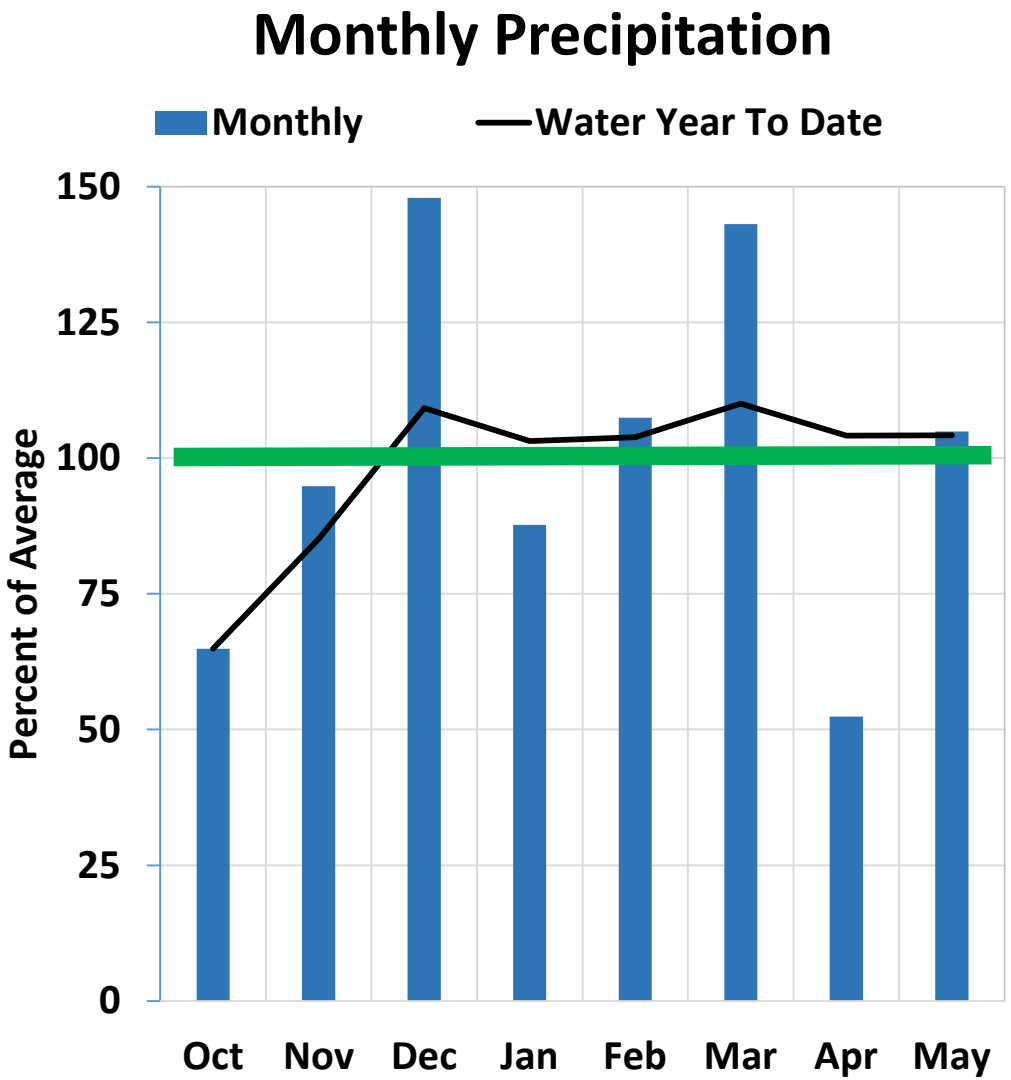
November 9, 2016 at 2:00 pm

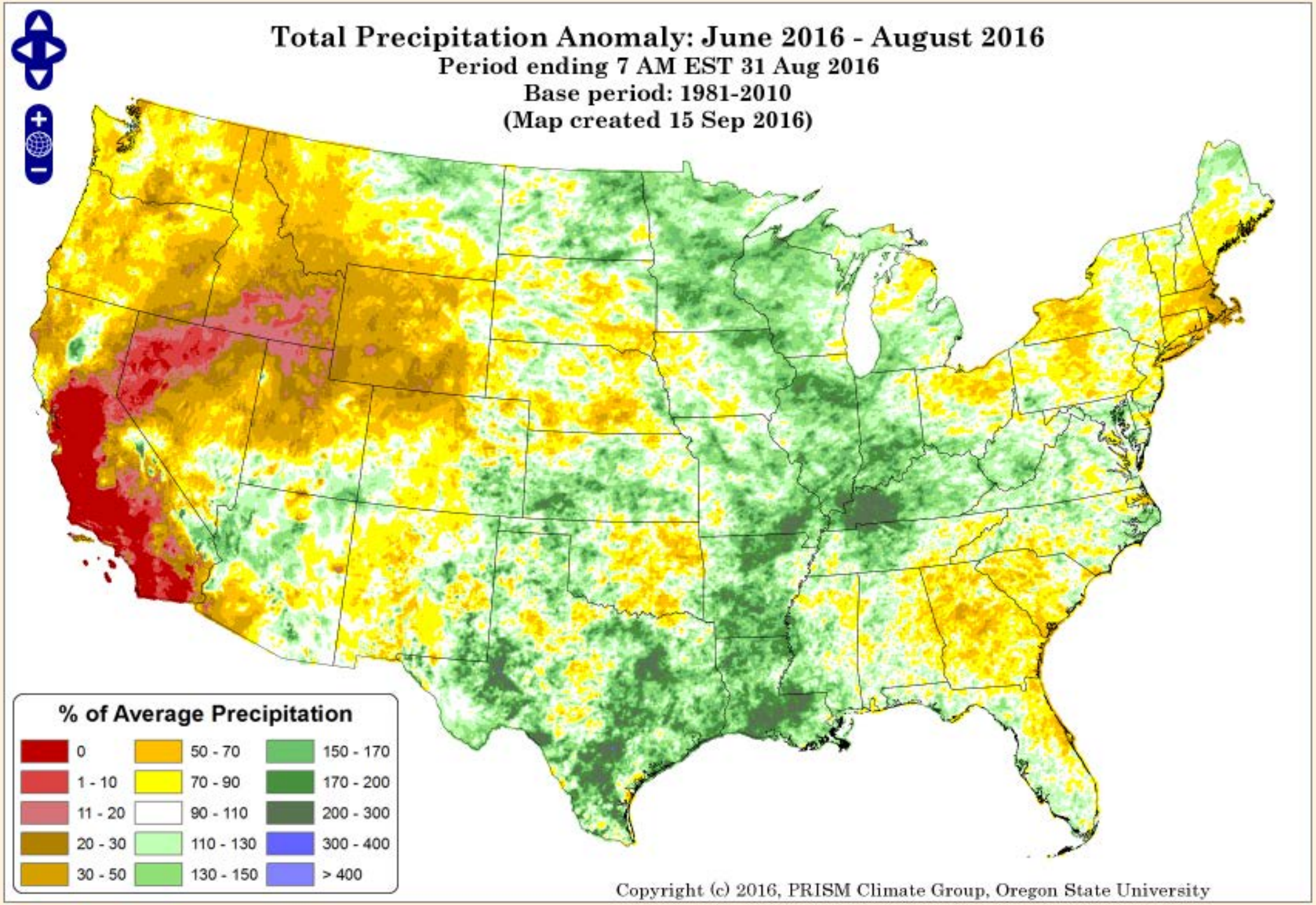
- Review of 2016: Snowpack, Precipitation & Water Supply Forecasts
- Oct 1 Surface Water Supply Index – statewide summary
- 2017 Amount Needed for Adequate Irrigation Supplies
- The start of the New Water Year brought good news and record high precipitation so far
- NOAA Outlook, Ocean Temperatures & Years Following a Strong El Nino
- Partnerships between NRCS and BSU & IWRB
- SWSI Surplus Thresholds
- Status of NRCS Snow Survey Program

Ron Abramovich
USDA NRCS Water Supply Specialist
Snow Survey Boise, Idaho

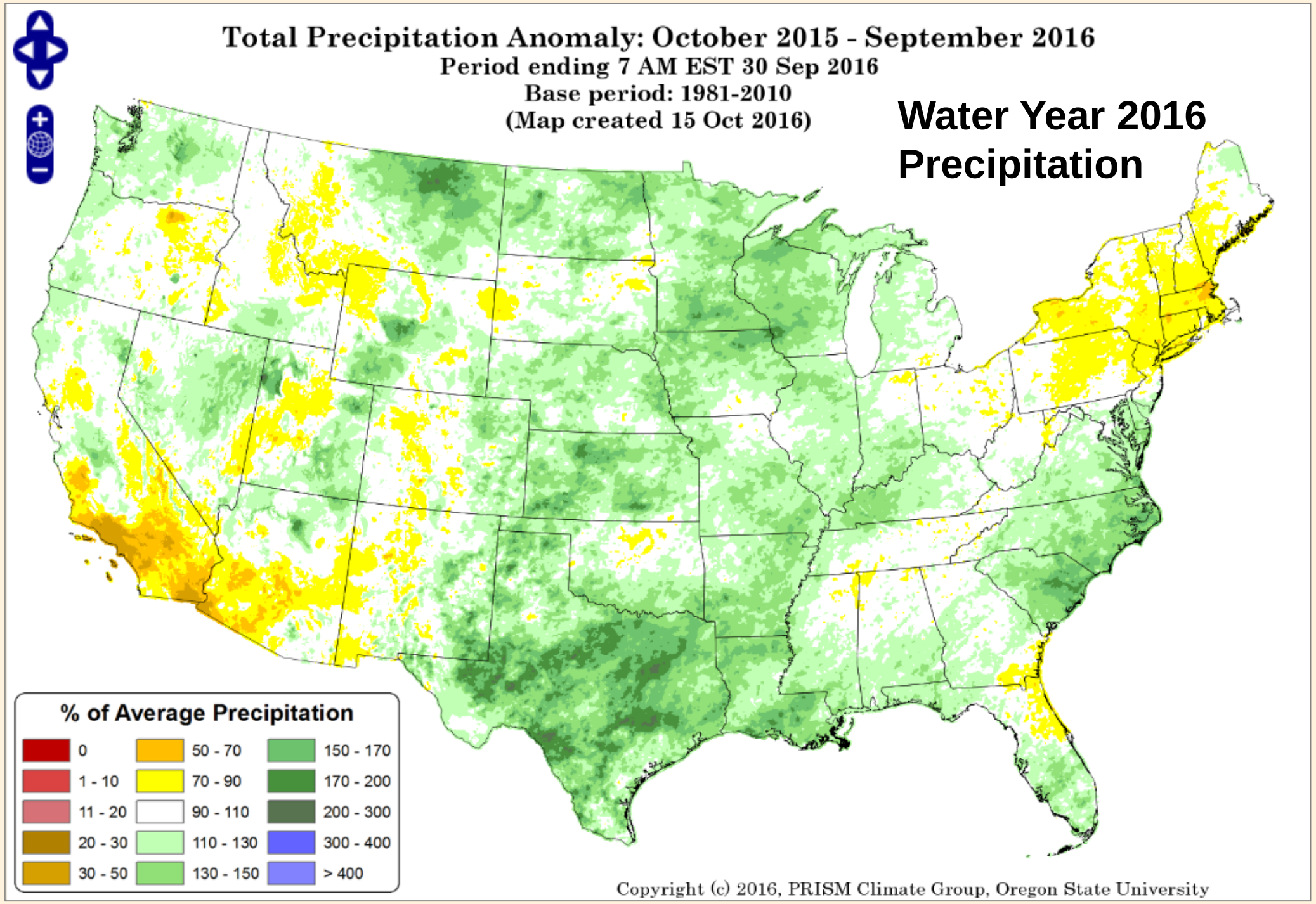
Upper Snake 2016 Snow & Precipitation







Well below normal June-August precipitation


Total Precipitation Anomaly: October 2015 - September 2016
Period ending 7 AM EST 30 Sep 2016
Base period: 1981-2010
(Map created 15 Oct 2016)
Water Year 2016
Precipitation
% of Average Precipitation
0
1 - 10
11 - 20
20 - 30
30 - 50
50 - 70
70 - 90
90 - 110
110 - 130
130 - 150
150 - 170
170 - 200
200 - 300
300 - 400
> 400
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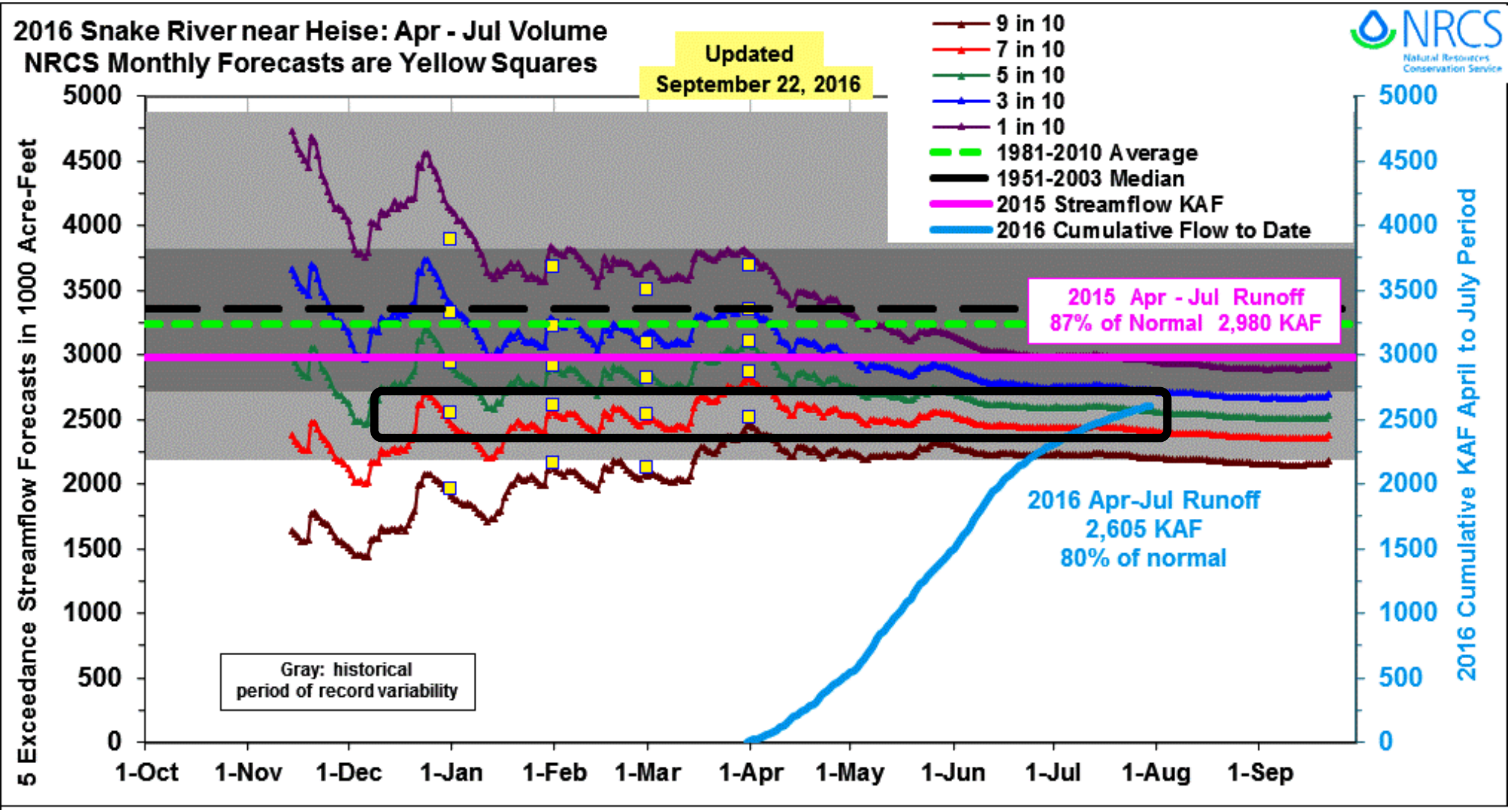
Idaho Surface Water Supply Index (SWSI) October 1, 2016

The Surface Water Supply Index (SWSI) is a predictive indicator of surface water availability within a watershed for the spring and summer water use season. The index is calculated by combining pre-runoff reservoir storage (carryover storage) with the forecast of spring and summer streamflow volumes. SWSI values are scaled from +4.0 (abundant supply) to -4.0 (extremely dry), with a value of zero indicating a median water supply as compared to historical occurrences. The SWSI index allows comparison of water availability between basins for drought or flood severity analysis. ***The SWSI analysis period is from 1981 to present.***

The **October 1 SWSI** provides an all-inclusive summary of the water available for the previous water year. It includes the Oct-Sep streamflow and September 30 reservoir storage as an indicator of the end of season conditions.

Basin or Region	SWSI Value	Most Recent Year with Similar SWSI Value
Spokane	-1.0	2013
Clearwater	-0.8	2006
Salmon	0.3	2010
Weiser	0.3	2012
Payette	0.3	2014
Boise	0.8	2009
Big Wood	0.8	2009
Little Wood	0.1	2010
Big Lost	-0.1	2005
Little Lost	-1.9	2015
Teton	-1.9	2004
Henrys Fork	Need diversion data	
Snake (Heise)	-1.2	2005
Oakley	0.3	2007
Salmon Falls	1.0	2009
Bruneau	2.6	2006
Owyhee	0.6	2008
Bear River	-0.1	2013



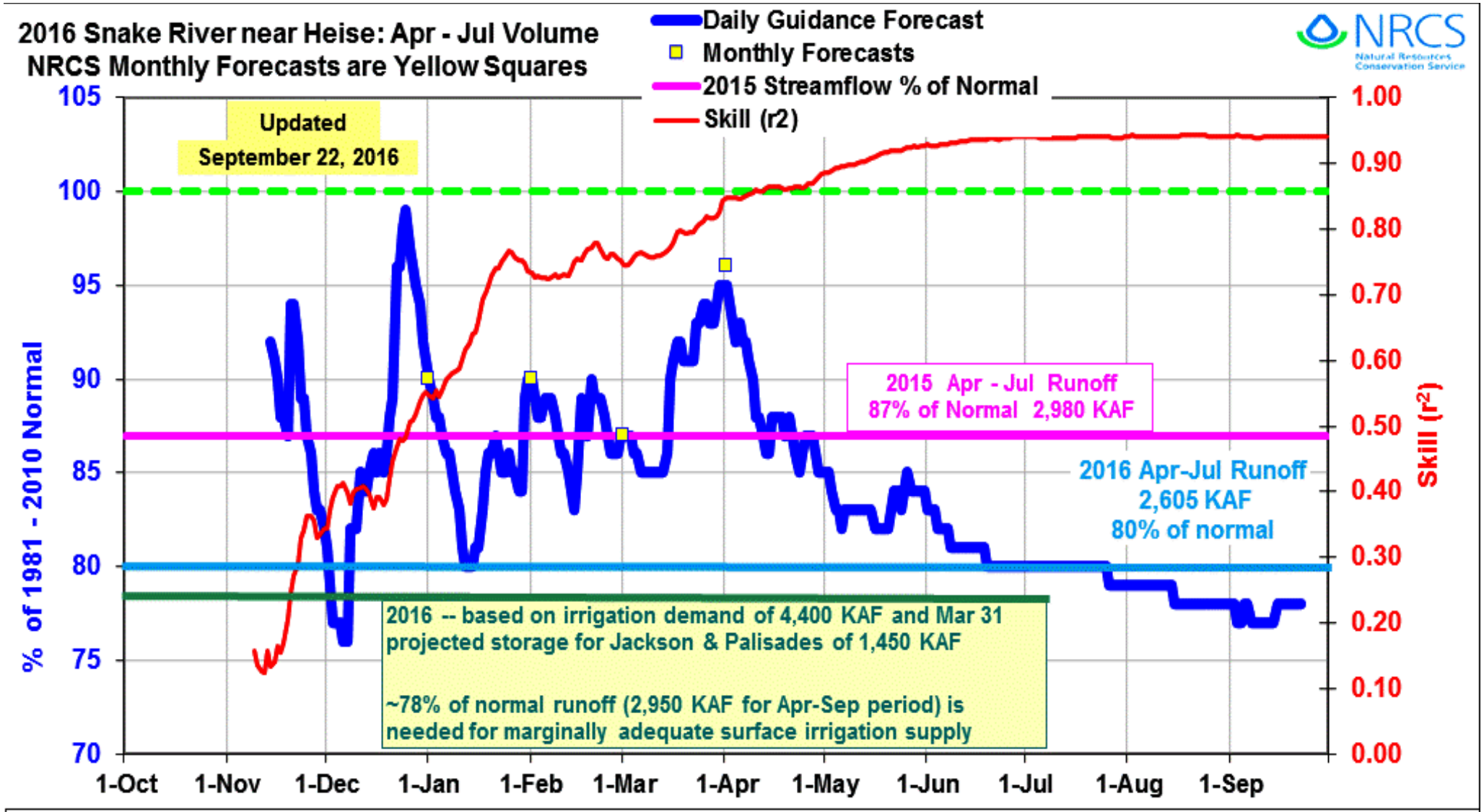
SNOTELs used: Base Camp, Blind Bull, Cottonwood Ck, Lewis Lake, Snake River Station, Slug Ck, Thumb Divide, Willow Ck

Upper Snake Forecasts

UPPER SNAKE RIVER BASIN	Forecast Period	50% (KAF)	% Avg	30yr Avg (KAF)	Observed (KAF)	Observed % Avg	% Error
Snake R at Flagg Ranch							
	APR-JUL	445	96%	465	312	67%	-42.6
Snake R nr Moran[2]							
	APR-JUL	720	94%	765	508	66%	-41.7
Pacific Ck at Moran							
	APR-JUL	150	91%	164	113	69%	-32.7
Buffalo Fk ab Lava Ck nr Moran							
	APR-JUL	270	96%	280	240	86%	-12.5
Snake R ab Reservoir nr Alpine[2]							
	APR-JUL	1980	91%	2170	1728	80%	-14.6
Snake R nr Irwin [2]							
	APR-JUL	2880	96%	3010	2511	83%	-14.7
Snake R nr Heise[2]							
	APR-JUL	3100	96%	3240	2601	80%	-19.2

- **Ag irrigation supplies were marginal in Upper Snake with the runoff at 80% of average at Heise.**
- **Dec 2015 – estimated amount needed for adequate 2016 irrigation supplies**

A volume greater than 78% of average was needed to provide marginally adequate supplies.



SNOTELs used: Base Camp, Blind Bull, Cottonwood Ck, Lewis Lake, Snake River Station, Slug Ck, Thumb Div, Willow Ck

Summary Table: Amount of streamflow needed in 2017 for adequate surface irrigation supplies.

Created November 8, 2016

Fall reservoir carryover storage is used to project spring reservoir storage levels based on current conditions and recent trends. Then, by knowing the adequate irrigation water supply needed in your basin, the projected spring reservoir volumes are subtracted from the adequate irrigation supply to determine the volume of streamflow to marginally meet adequate surface irrigation supplies in 2017.

As of November 8, 2016: Projected change in reservoir storage from Fall 2016 to target levels in Spring 2017 which is when the runoff period starts for the streamflow forecasts.

	Oct 31 storage KAF	Nov 30 storage KAF	Dec 31 storage KAF	Projected Jan 31 Storage KAF	Projected Feb 28 storage KAF	Projected Mar 31 storage KAF	Estimated change in storage KAF
Boise Reservoir System	422.0	---	---	---	---	800	378
Magic Reservoir	65.0	---	---	---	---	105	40
Little Wood Reservoir	12.4	---	---	---	24	---	12
Mackay Reservoir	14.7	---	---	---	---	40	25
Jackson & Palisades Reservoir System	800.0	---	---	---	---	1300	500
Oakley Reservoir	11.5	---	---	---	22	---	11
Salmon Falls Reservoir	35.0	---	---	---	50	---	15
Lake Owyhee	179.0	---	---	260	---	---	81
Bear Lake	440.0	---	---	---	---	500	60

For reservoir projection, there may not be a right or wrong answer, but if there is a better projection, let me know.

Total Reservior end of month storage Lucky Peak, Arrowrock and Anderson Ranch

Capacity = 1015.6 KAF

Boise Basin Reservoir data from AWDB

Scale= 1000 AF

year	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep	change in storage from Sep 30 to Mar 31	**change in storage from Oct 31 to Mar 31**	
2006	361.6	394.5	469.1	558.7	432.9	403.7	688.7	937.7	1012.7	860.7	653.7	529.1	40.9	42.1	
2007	499.0	541.0	593.9	630.5	690.5	859.9	896.0	937.2	814.5	596.5	416.0	310.7	330.8	360.9	
2008	326.7	373.7	412.2	448.6	490.7	577.9	655.6	873.5	1003.0	847.0	639.2	483.6	267.2	251.2	
2009	463.0	508.3	534.7	576.0	614.8	666.6	793.7	972.4	979.4	847.5	684.9	527.8	183.0	203.6	
2010	493.9	530.8	546.6	586.0	621.1	697.0	796.2	835.8	989.5	857.0	697.1	541.7	169.2	203.1	
2011	474.6	511.5	567.9	641.1	691.2	785.0	698.7	776.6	959.0	933.5	772.6	618.2	243.3	310.4	
2012	576.5	615.9	653.8	710.0	755.5	801.3	921.7	948.7	979.5	821.5	634.6	476.2	183.1	224.7	
2013	421.6	463.4	537.3	574.8	611.9	681.6	706.1	754.5	689.5	528.4	362.7	336.0	205.3	259.9	
2014	366.5	396.0	424.1	454.8	521.5	645.1	730.7	931.5	937.8	765.6	597.2	452.3	309.1	278.6	
2015	433.2	474.1	543.6	602.5	782.2	871.3	894.9	941.1	877.5	701.1	531.0	396.5	419.0	438.1	2nd max increase
2016	155.9	423.8	470.9	515.0	582.3	752.0	887.0	970.4	888.6	724.0	551.5	416.0	355.5	**596.1**	**max incr from record high april melt**
2017	422.6					**800.0**								378.0	800.6 projection for Mar 31
% of Average	**97**	**0**	**0**	**0**	**0**	**132**	**0**	**0**	**0**	**0**	**0**	**0**			
1981-2010 average	**433.6**	**473.8**	**510.5**	**536.8**	**555.6**	**605.3**	**695.9**	**837.7**	**885.2**	**743.3**	**562.8**	**439.1**	**163.4**	**171.7**	
all yr avg	**454.9**	**500.5**	**549.4**	**579.5**	**599.4**	**629.6**	**710.6**	**845.9**	**912.7**	**778.2**	**587.0**	**464.5**	**167.8**	**174.4**	
max	**731.7**	**783.9**	**829.4**	**884.0**	**922.1**	**961.1**	**995.3**	**1057.3**	**1060.8**	**1012.1**	**867.7**	**750.4**	**412.6**	**596.1**	
min	**132.8**	**153.8**	**172.8**	**198.7**	**232.2**	**346.5**	**417.3**	**407.3**	**280.7**	**148.5**	**110.3**	**112.2**	**-272.4**	**-255.0**	

Total Palisades + Jackson end of month storage

Jackson and Palisades Reservoir storage from AWDB

Jackson Lake only 1911-55
Jackson Lake and Palisades 1956-Present

Capacity = 182.6 KAF
Scale = 1000 AF

year	oct	nov	dec	jan	feb	mar	apr	may	jun	jul	aug	sep		change in storage from Sep 30 to Mar 31	change in storage from end of Oct to Mar 31	change in storage from end of Nov to Mar 31	
2007	1425.0	1510.0	1570.0	1619.0	1689.0	1815.0	1979.0	1952.0	1632.0	1141.0	749.0	493.0		432	390	305	
2008	525.0	638.0	734.0	822.0	902.0	989.0	1087.0	1466.0	2058.0	2113.0	1631.0	1292.0		496	464	351	
2009	1240.5	1365.3	1468.6	1569.4	1648.8	1758.5	1449.2	1686.9	2251.5	2049.2	1790.5	1555.3		467	**518**	393	
2010	1578.4	1646.7	1695.0	1747.5	1802.7	1879.8	2046.4	1879.0	2247.2	1935.9	1594.4	1350.6		325	301	233	
2011	1253.8	1361.7	1469.4	1528.5	1532.3	1493.1	919.7	878.4	1836.7	2233.5	2139.6	1905.0		142	239	131	
2012	1869.2	1864.8	1867.6	1875.3	1863.5	1779.9	1777.2	1990.0	2186.1	1735.8	1201.6	930.2		-125	**-89**	-85	
2013	880.6	992.2	1103.9	1177.5	1241.5	1327.3	1406.0	1549.6	1438.7	988.9	602.6	434.1		397	447	335	
2014	491.8	564.9	621.2	683.0	760.4	864.4	807.2	1483.9	1920.7	1778.6	1514.6	1371.6		430	373	299	
2015	1422.7	1542.2	1670.6	1782.4	1829.9	1896.5	1902.2	2041.6	2117.0	1749.2	1200.2	1097.2		525	474	354	
2016	1046.8	1158.0	1260.3	1357.2	1439.2	1550.0	1777.2	1979.1	1955.9	1470.0	958.8	739.7		453	**503**	392	
2017	803.5					**1300.0**									**500**		1303.5 projected Mar 31
% of Average	**68**	**0**	**0**	**0**	**0**	**97**	**0**	**0**	**0**	**0**	**0**	**0**					
all yr avg	**835**	**880**	**915**	**944**	**963**	**949**	**942**	**1162**	**1413**	**1229**	**978**	**836**	##	**126**	**115**	**69**	
max	1981	1990	2044	2043	1965	2023	2067	2244	2254	2234	2140	1993	0	550	**518**	393	
min	21	44	50	50	47	58	90	161	279	34	0	0	0	-783	-806	-896	
1981-2010 average	**1183**	**1256**	**1307**	**1342**	**1360**	**1334**	**1358**	**1633**	**1899**	**1656**	**1374**	**1172**		**156**	**150**	**78**	
1981-2010 maximum	1960	1990	2044	2043	1965	2023	2067	2244	2252	2220	2082	1946		496	518	393	
1981-2010 minimum	362	451	542	621	663	735	648	822	1032	847	584	410		-783	-806	-896	

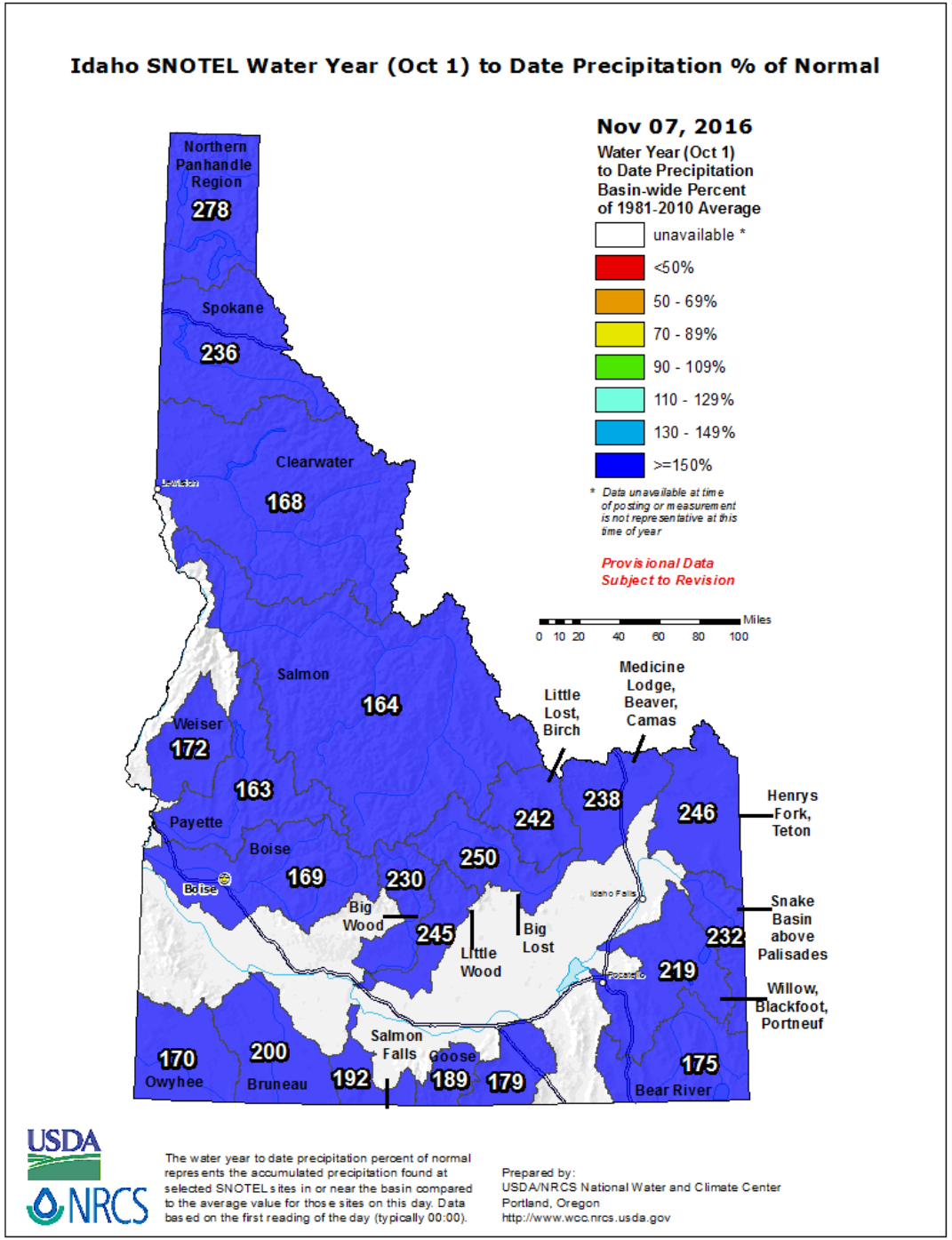
Summary Table: Amount of streamflow needed in 2017 for adequate surface irrigation supplies.

Created November 8, 2016

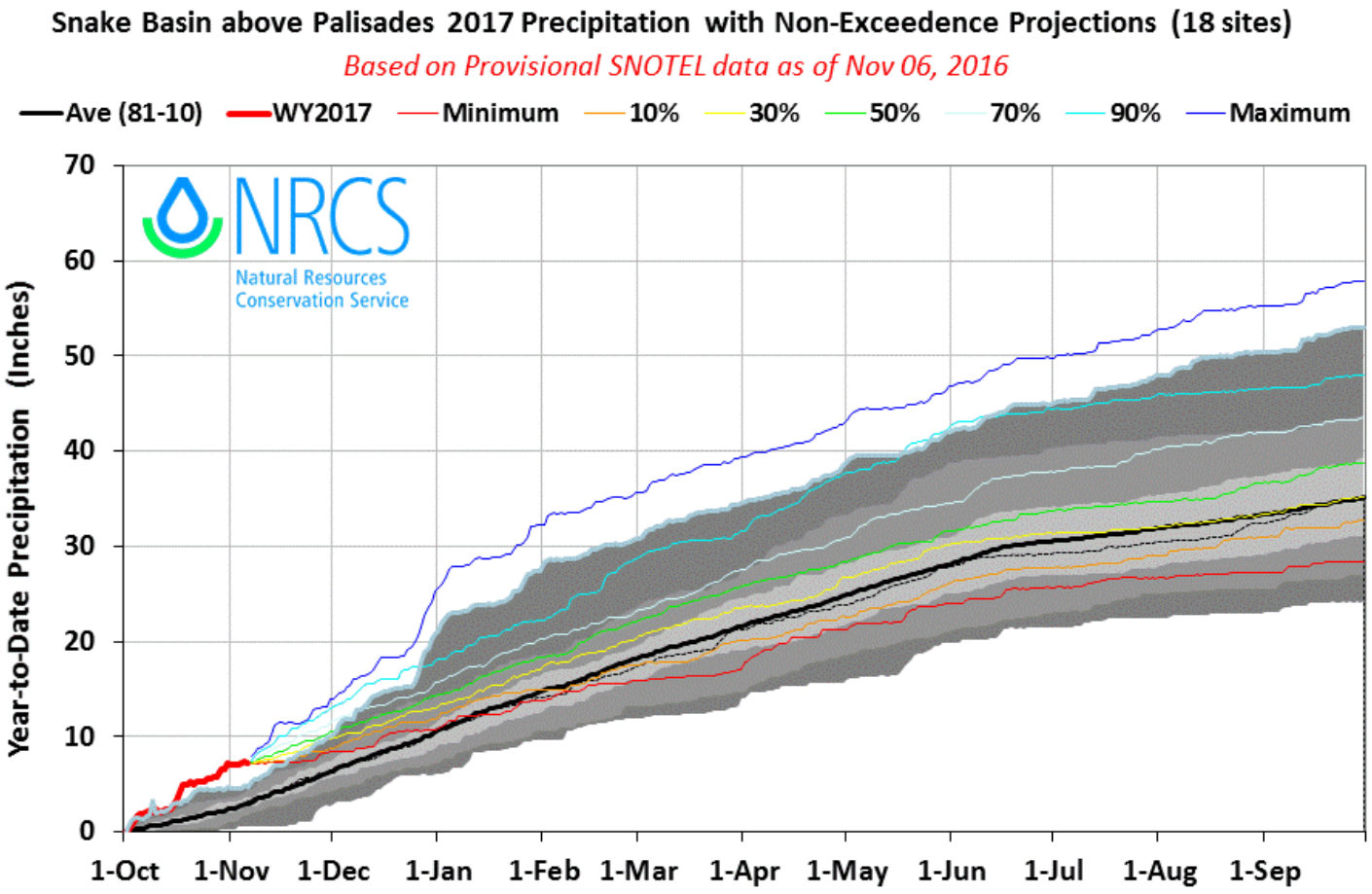
Fall reservoir carryover storage is used to project spring reservoir storage levels based on current conditions and recent trends. Then, by knowing the adequate irrigation water supply needed in your basin, the projected spring reservoir volumes are subtracted from the adequate irrigation supply to determine the volume of streamflow to marginally meet adequate surface irrigation supplies in 2017.

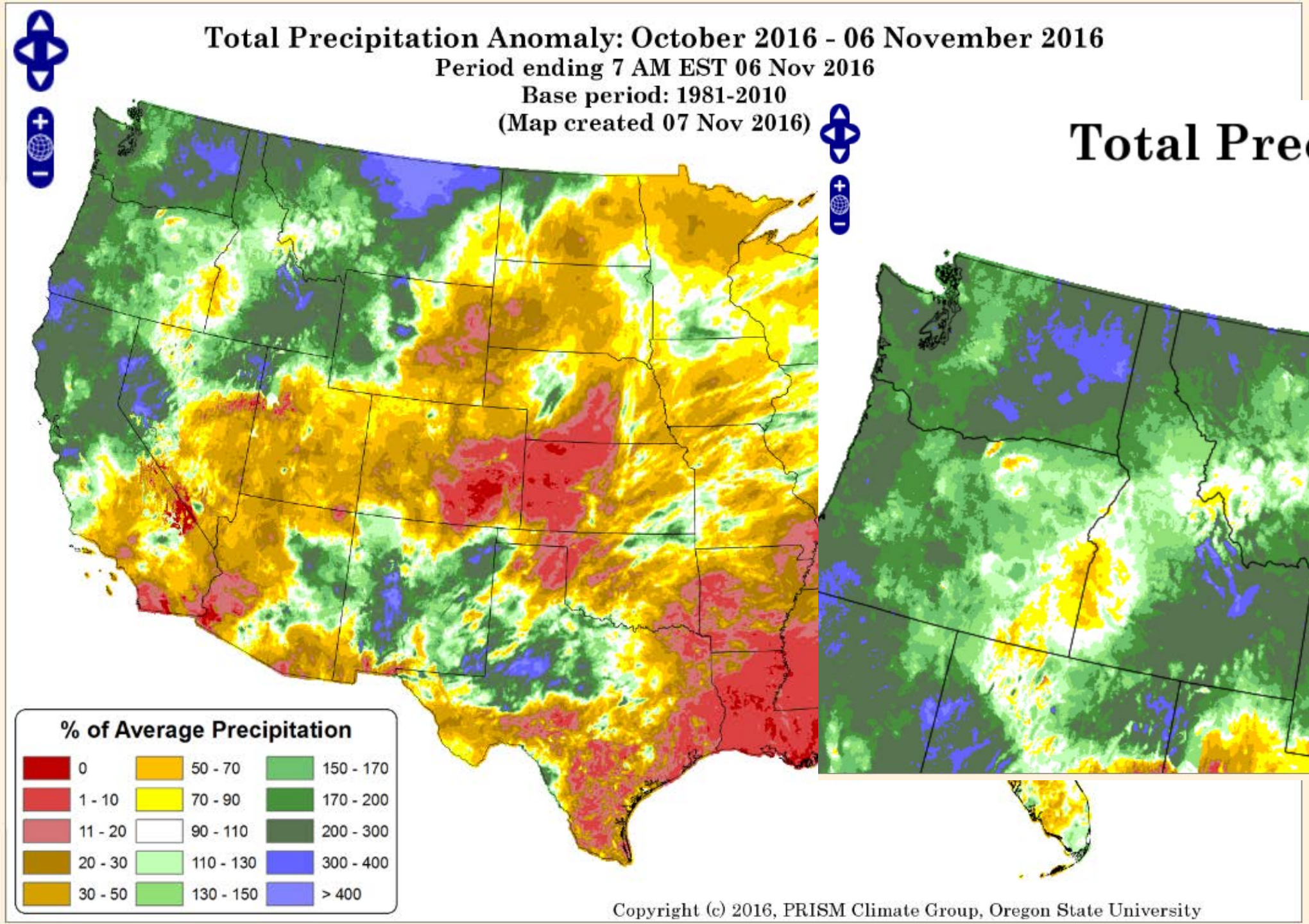
Column 2 - Column 3 = Column 4 Col4/Col6 X 100= Col 5

Column 1 Basin	2 Amount needed for adequate irrigation water supply KAF	3 Projected end of month reservoir storage (Jan, Feb or Mar) KAF	**4** **2017 streamflow volume needed for adequate water supply KAF**	**5** **% of average streamflow to meet adequate irrigation supply in 2017 KAF**	6 1981-2010 average streamflow KAF	7 Streamflow runoff period used in the analysis	9 2016 Streamflow Runoff KAF	/ % of average
Boise	1500	800	**700**	**51%**	1360	Apr-Sep	1255	92%
Big Wood	275	105	**170**	**64%**	265	Apr-Sep	186	70%
Little Wood	60	24	**36**	**39%**	92	**Mar-Sep**	66.4	72%
Big Lost	180	40	**140**	**93%**	150	Apr-Sep	119.4	80%
Little Lost	40	---	**40**	**118%**	34	Apr-Sep	26.9	79%
Teton	85	---	**85**	**44%**	193	Apr-Sep	140	73%
Snake (Heise)	4,400	1300	**3100**	**82%**	3,780	Apr-Sep	3000	79%
Oakley	50	22	**28**	**90%**	31	**Mar-Sep**	27.4	88%
Salmon Falls	110	50	**60**	**71%**	85	**Mar-Sep**	109	128%
Owyhee	575	260	**315**	**47%**	665	**Feb-Sep**	545	82%
Bear River	280	500	**0**	**0%**	205	Apr-Sep	145.5	71%



- **The start of the New Water Year brought good news and record high precipitation so far… and improved streamflows and soil moisture.**




Total Precipitation Anomaly: October 2016 - 06 November 2016
Period ending 7 AM EST 06 Nov 2016
Base period: 1981-2010
(Map created 07 Nov 2016)
% of Average Precipitation
0
1 - 10
11 - 20
20 - 30
30 - 50
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130 - 150
150 - 170
170 - 200
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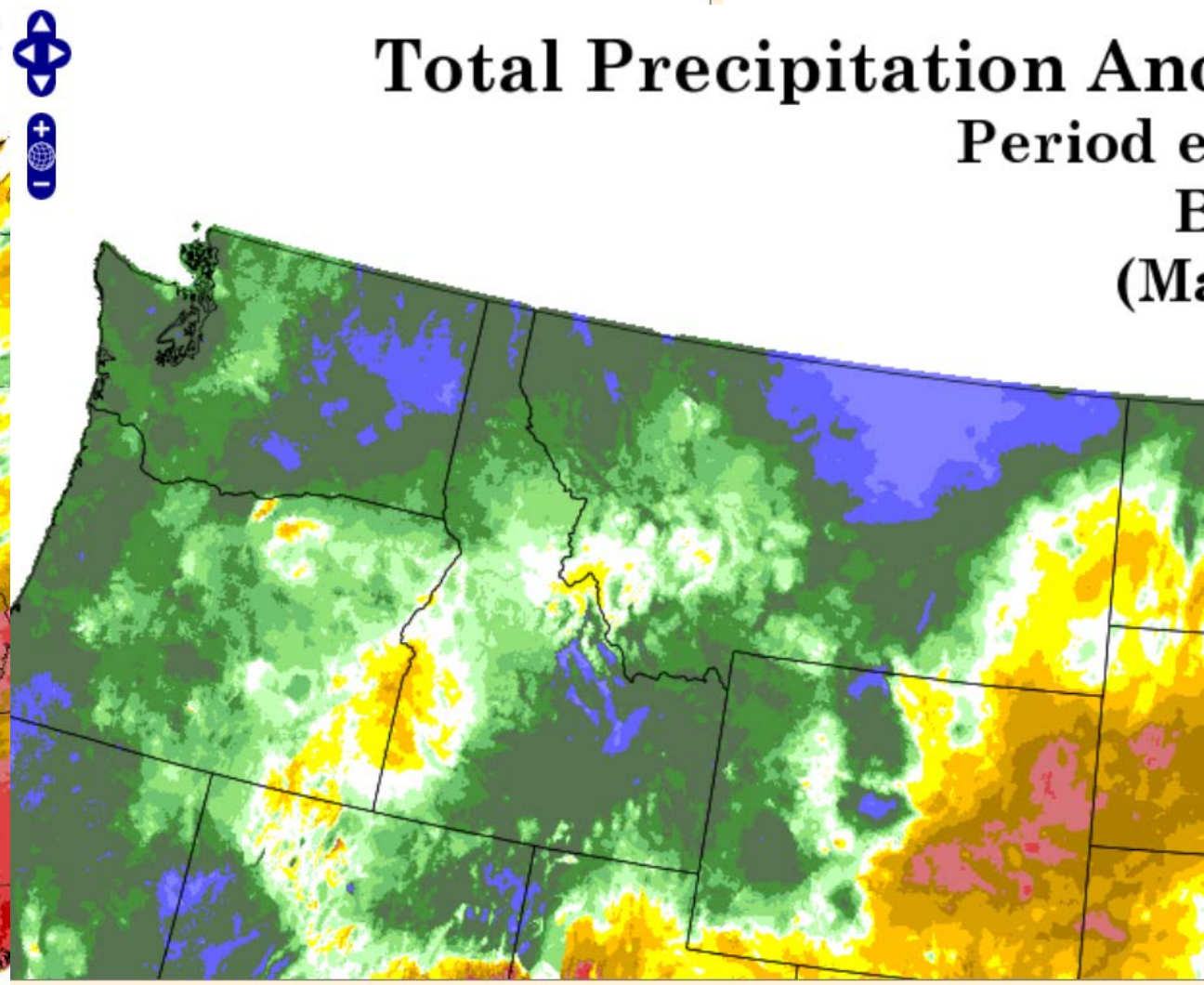
300 - 400
> 400
Copyright (c) 2016, PRISM Climate Group, Oregon State University


Total Precipitation An
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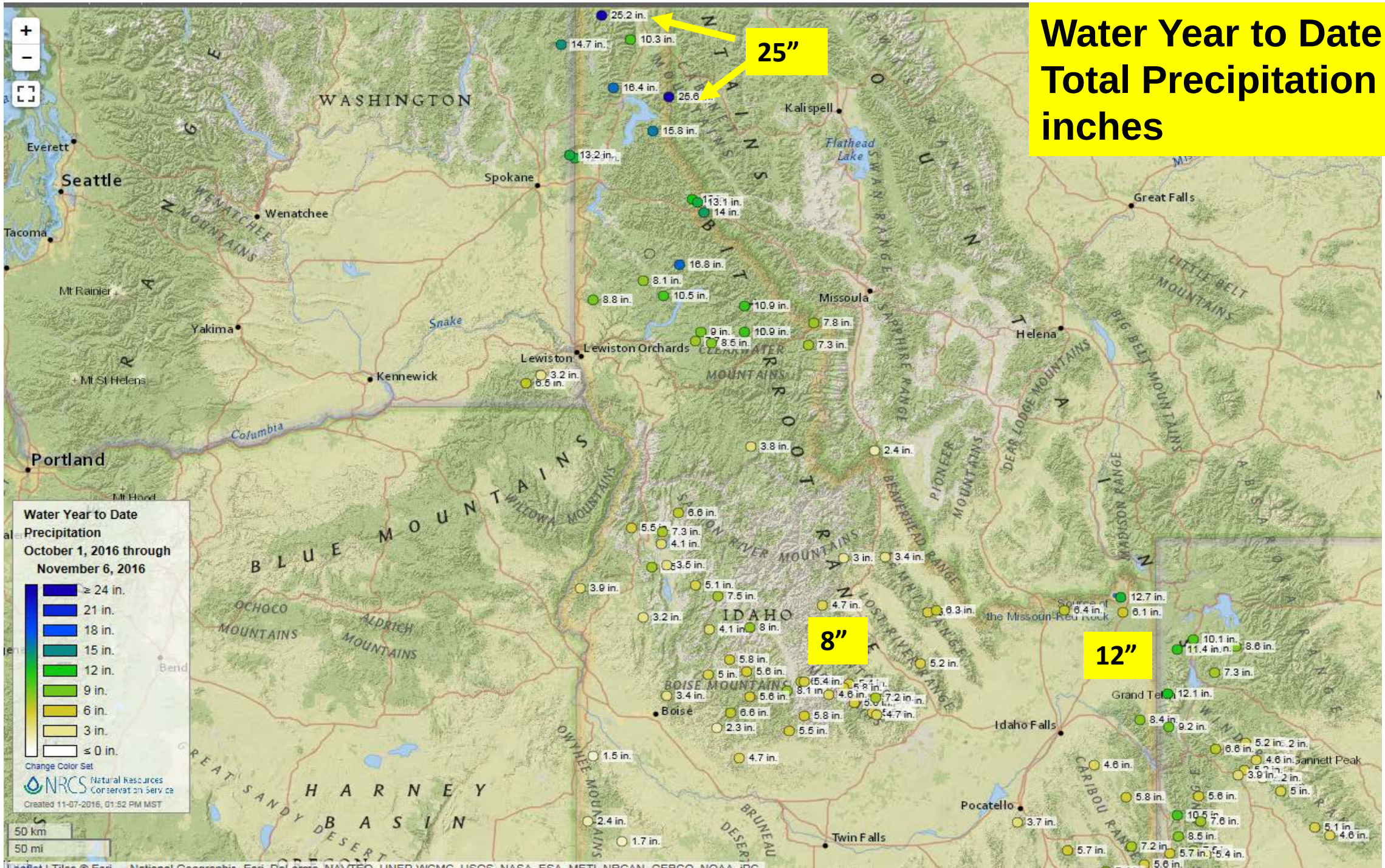
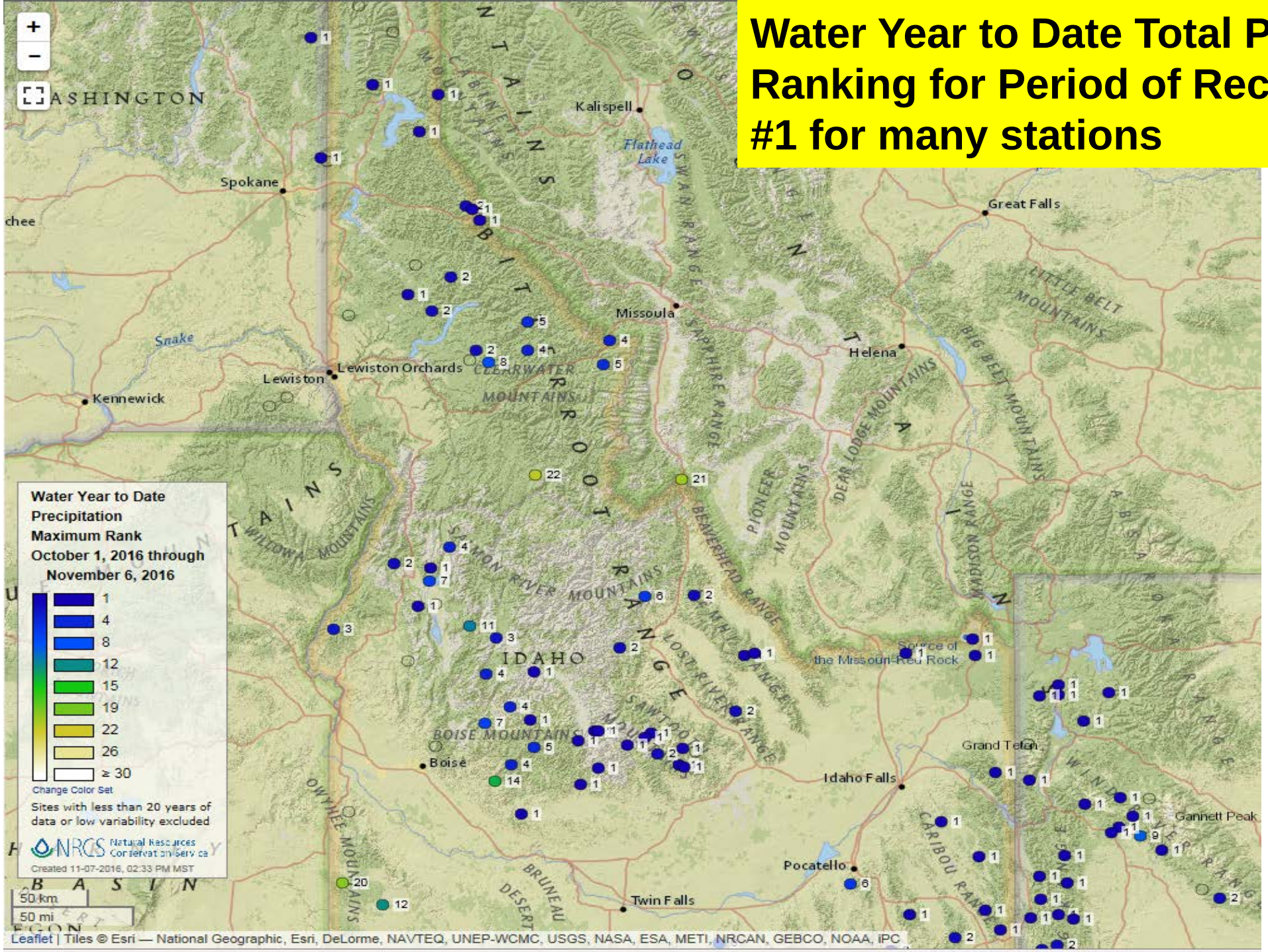
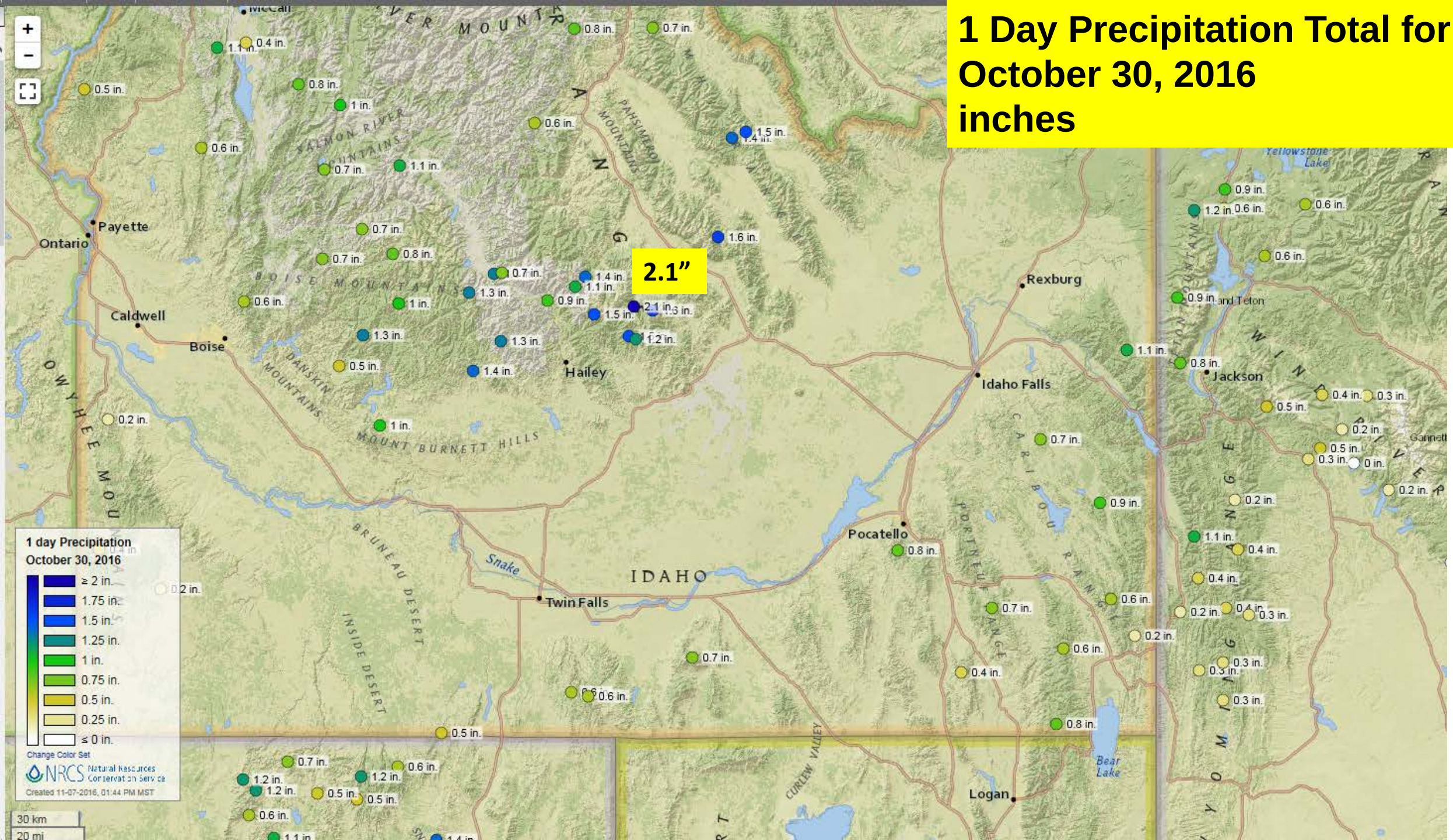
Water Year to Date Total Precipitation inches

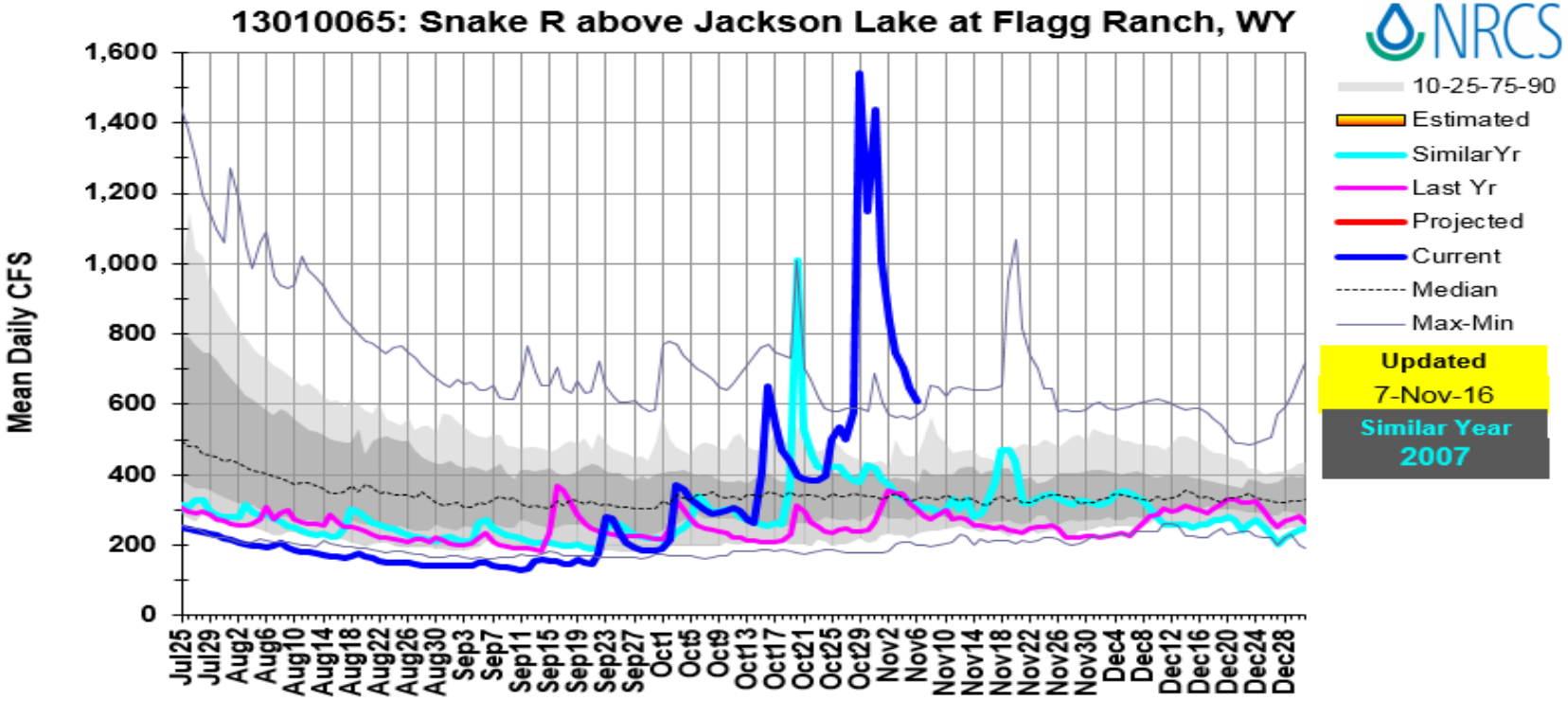


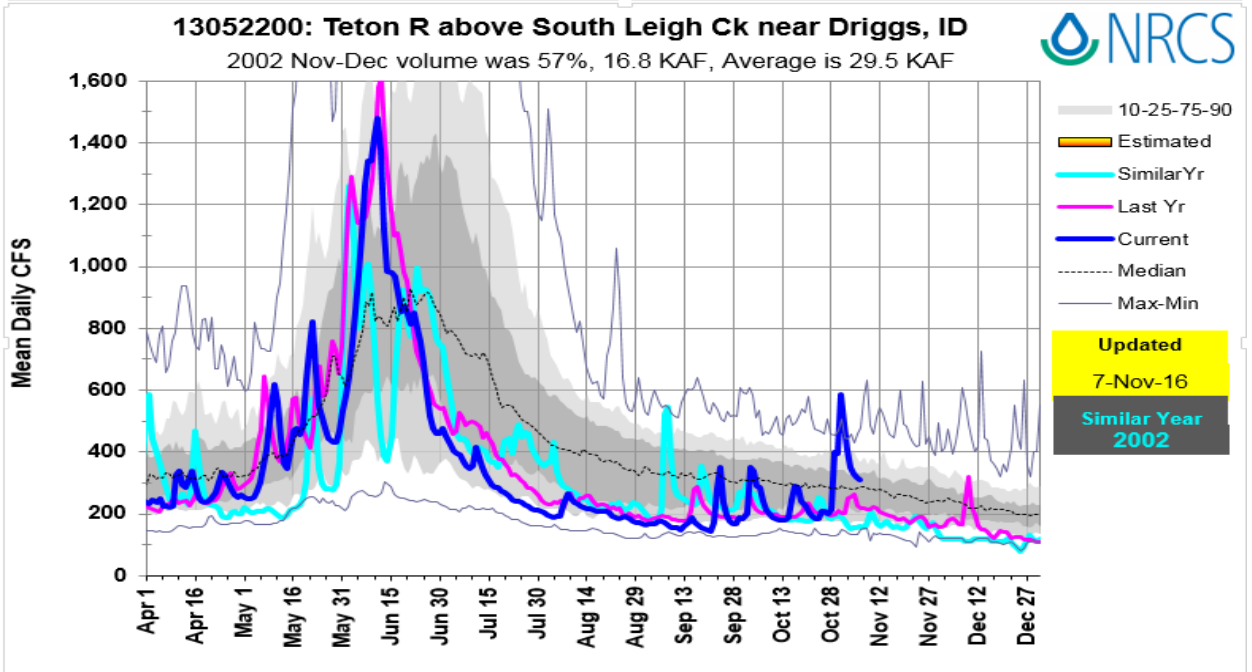
Water Year to Date Total Precipitation Ranking for Period of Record
#1 for many stations

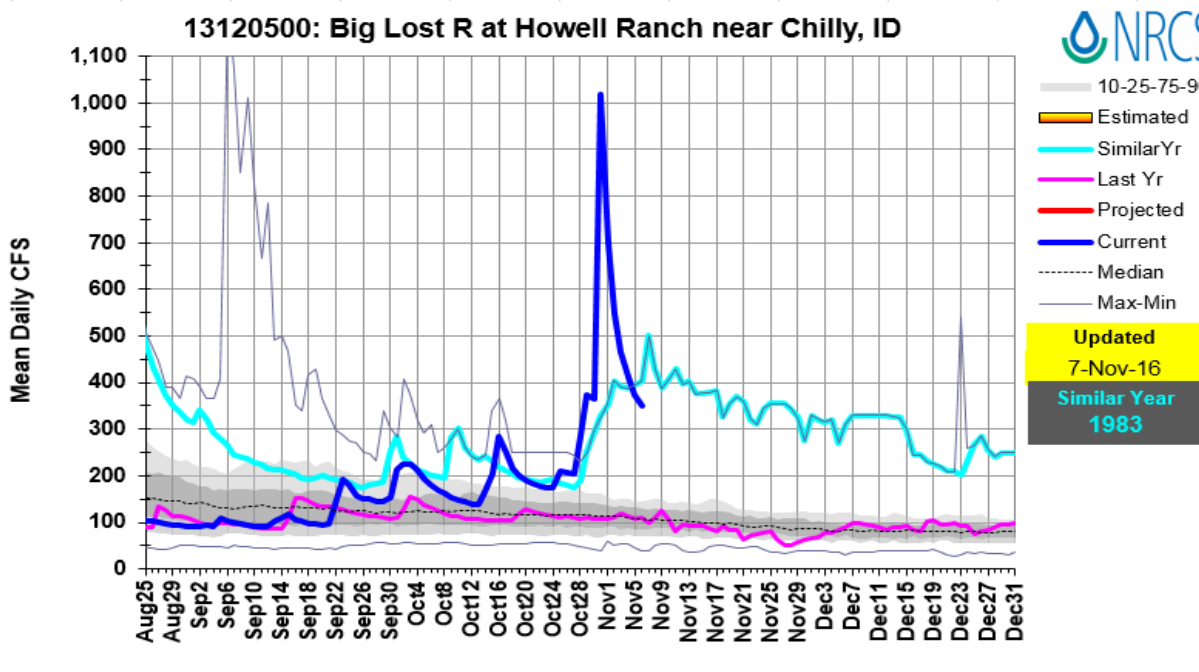


1 Day Precipitation Total for October 30, 2016 inches



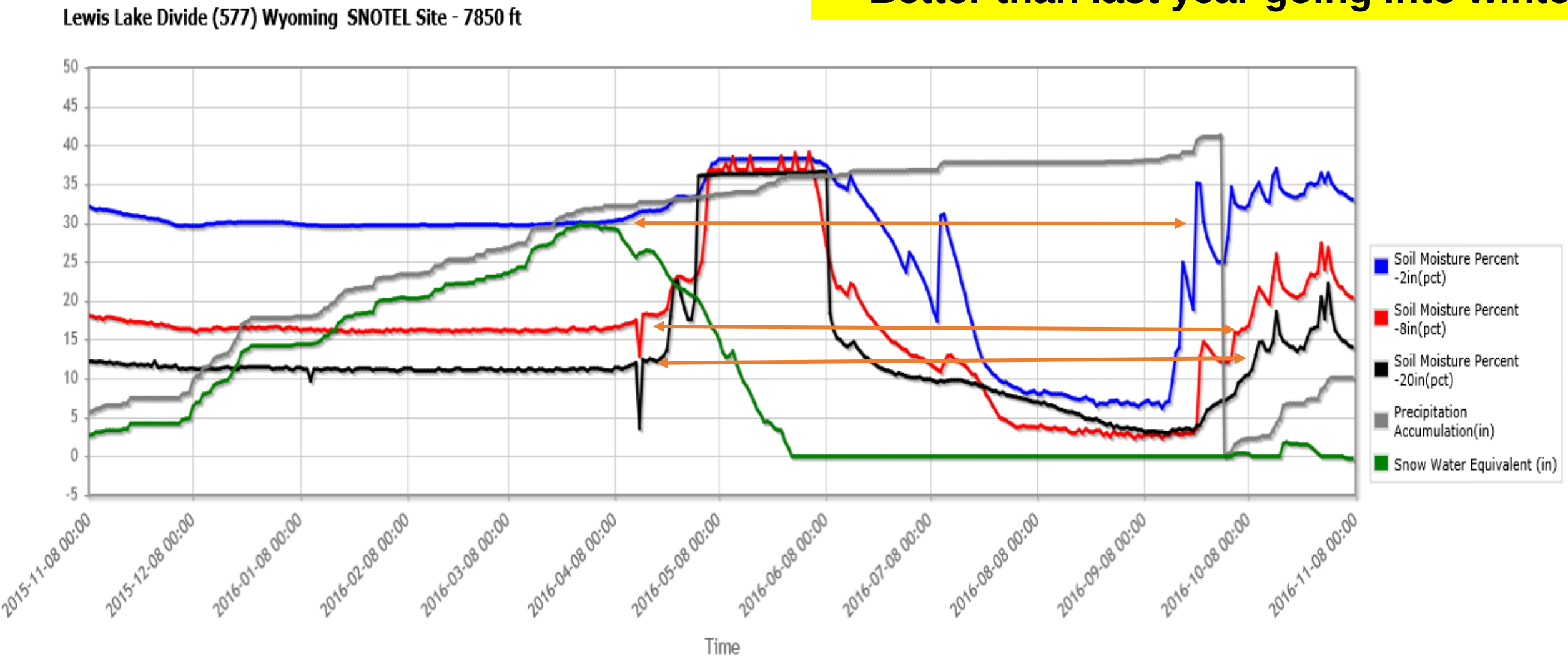

13010065: Snake R above Jackson Lake at Flagg Ranch, WY
NRCS
Mean Daily CFS
10-25-75-90
Estimated
SimilarYr
Last Yr
Projected
Current
Median
Max-Min
Updated
7-Nov-16
Similar Year
2007


13052200: Teton R above South Leigh Ck near Driggs, ID
2002 Nov-Dec volume was 57%, 16.8 KAF, Average is 29.5 KAF
NRCS
Mean Daily CFS
10-25-75-90
Estimated
SimilarYr
Last Yr
Current
Median
Max-Min
Updated
7-Nov-16
Similar Year
2002

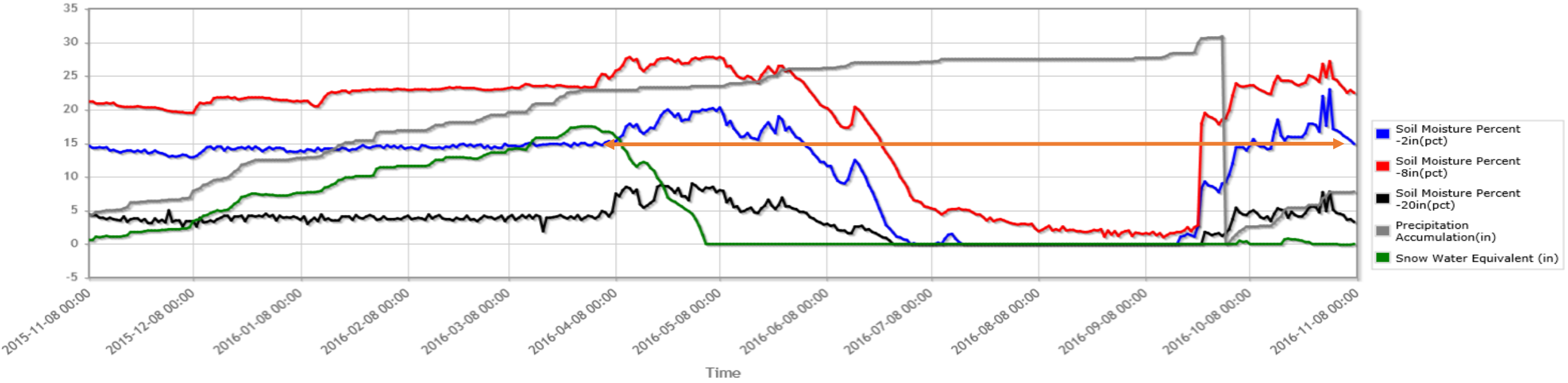

13120500: Big Lost R at Howell Ranch near Chilly, ID
Mean Daily CFS
Estimated
SimilarYr
Last Yr
Projected
Current
Median
Max-Min
Updated
7-Nov-16
Similar Year
1983

Lewis Lake Divide Soil Moisture

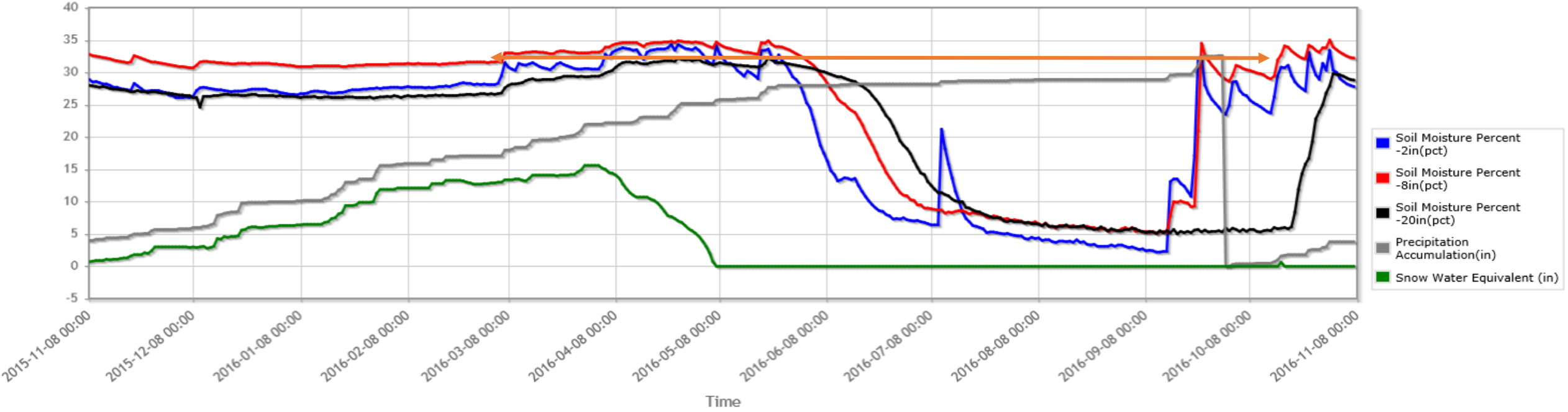
- Not at saturation levels but
- Better than last year going into winter



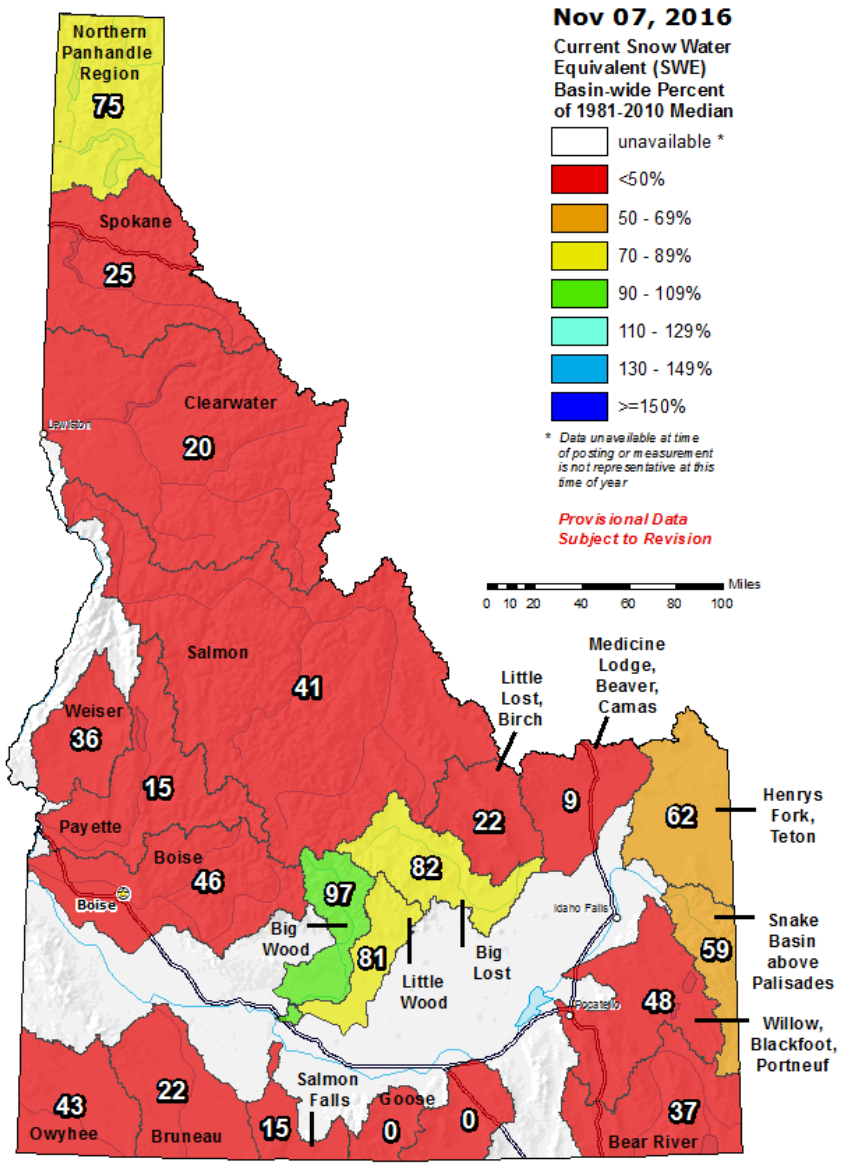
Snake River Station (764) Wyoming SNOTEL Site - 6920 ft



Wildhorse Divide (867) Idaho SNOTEL Site - 6490 ft



Idaho SNOTEL Current Snow Water Equivalent (SWE) % of Normal

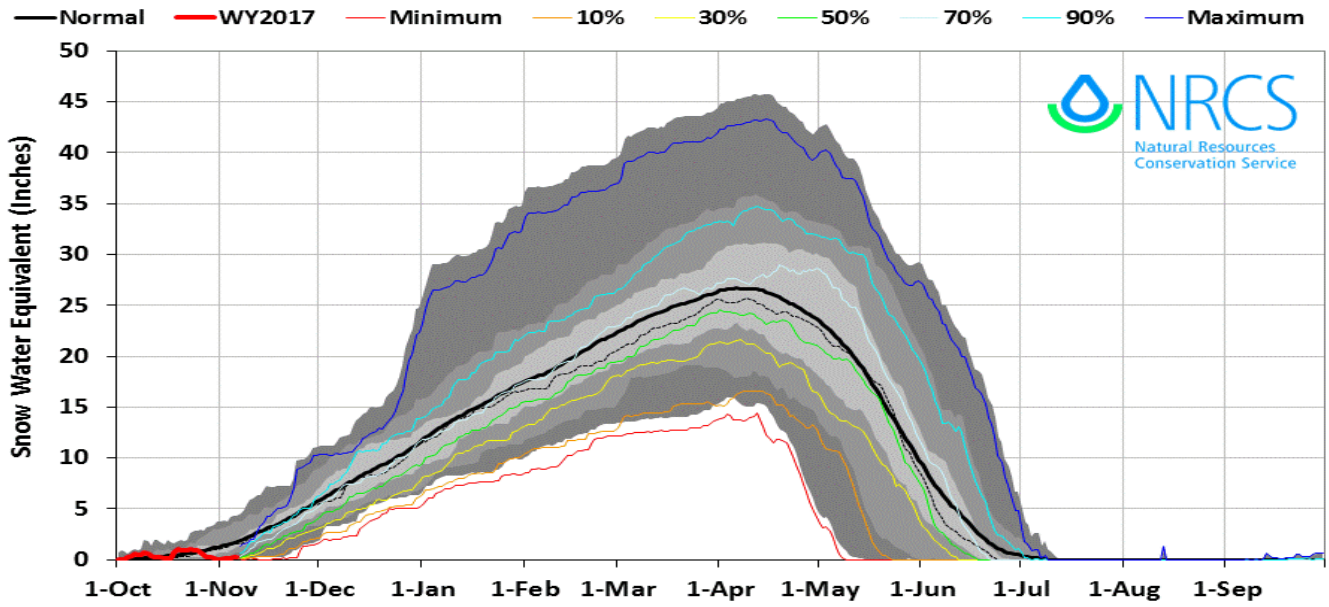


The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

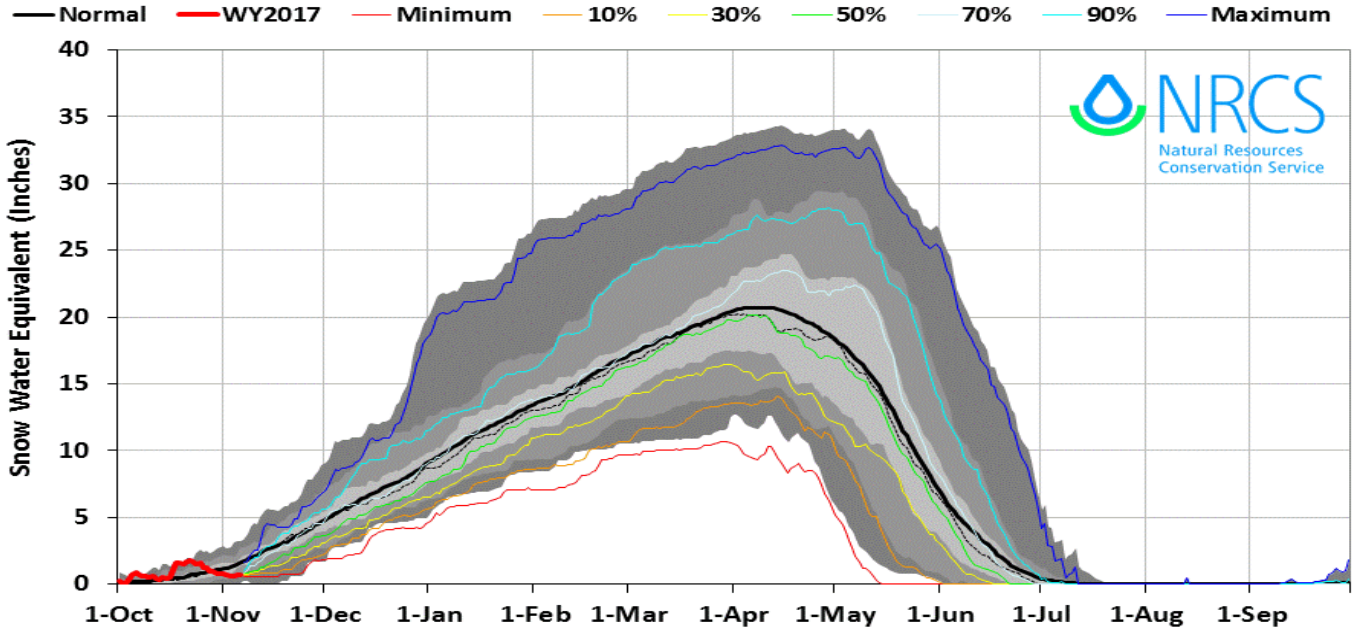
Henrys Fork & Teton Basins 2017 Snow Water with Non-Exceedence Projections (7 sites)

Based on Provisional SNOTEL data as of Nov 06, 2016

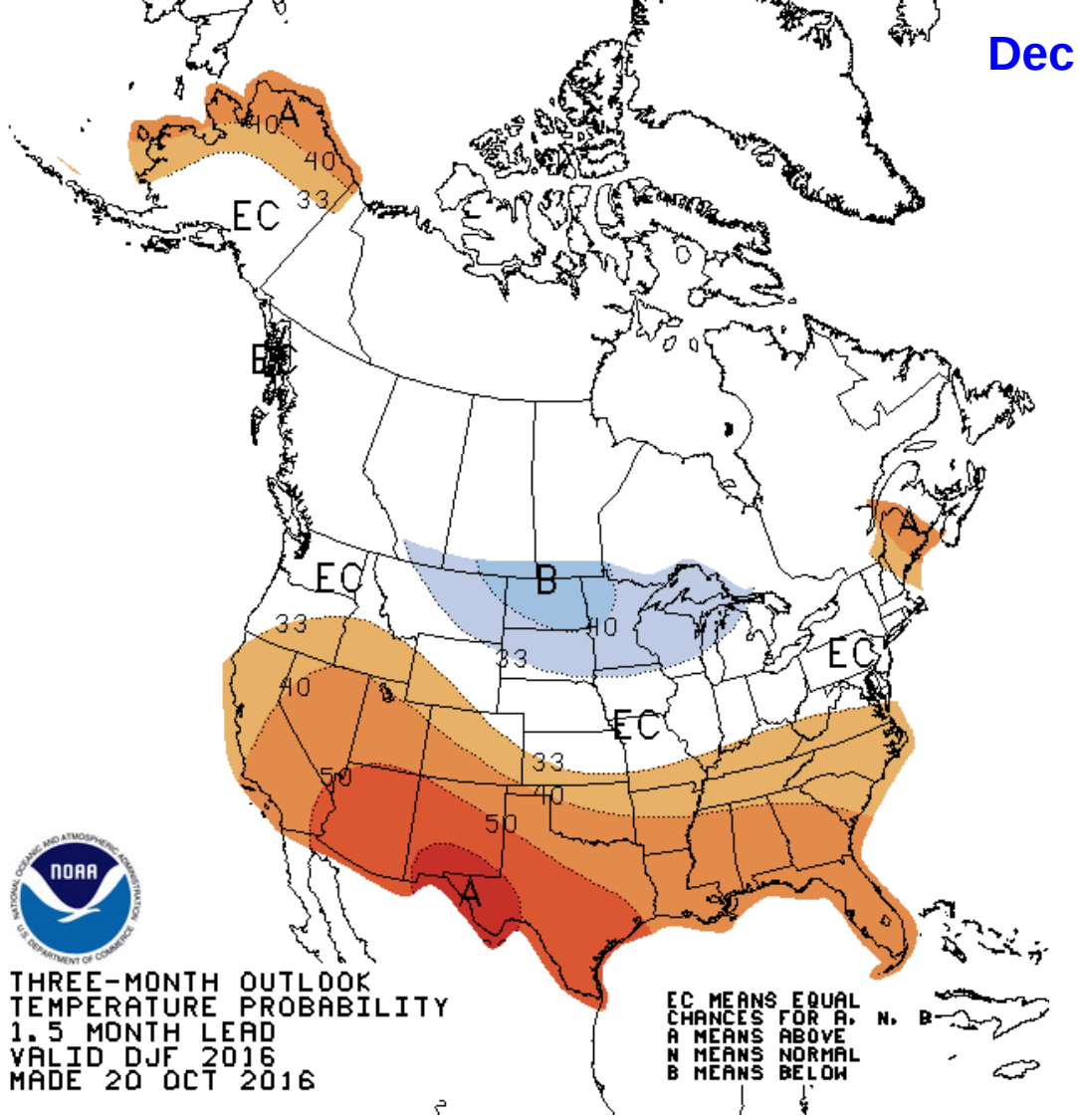


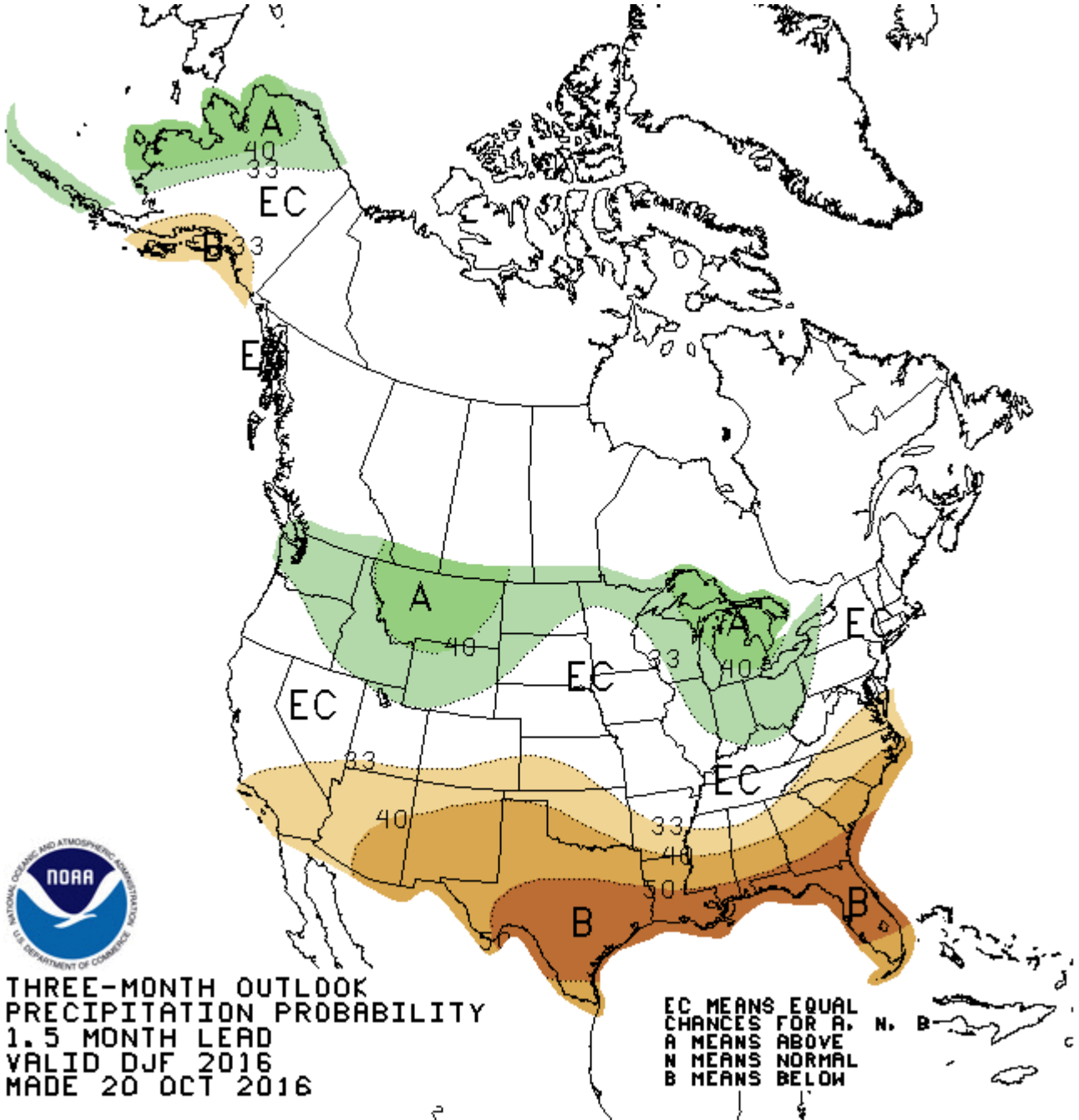
Snake Basin above Palisades 2017 Snow Water with Non-Exceedence Projections (18 sites)

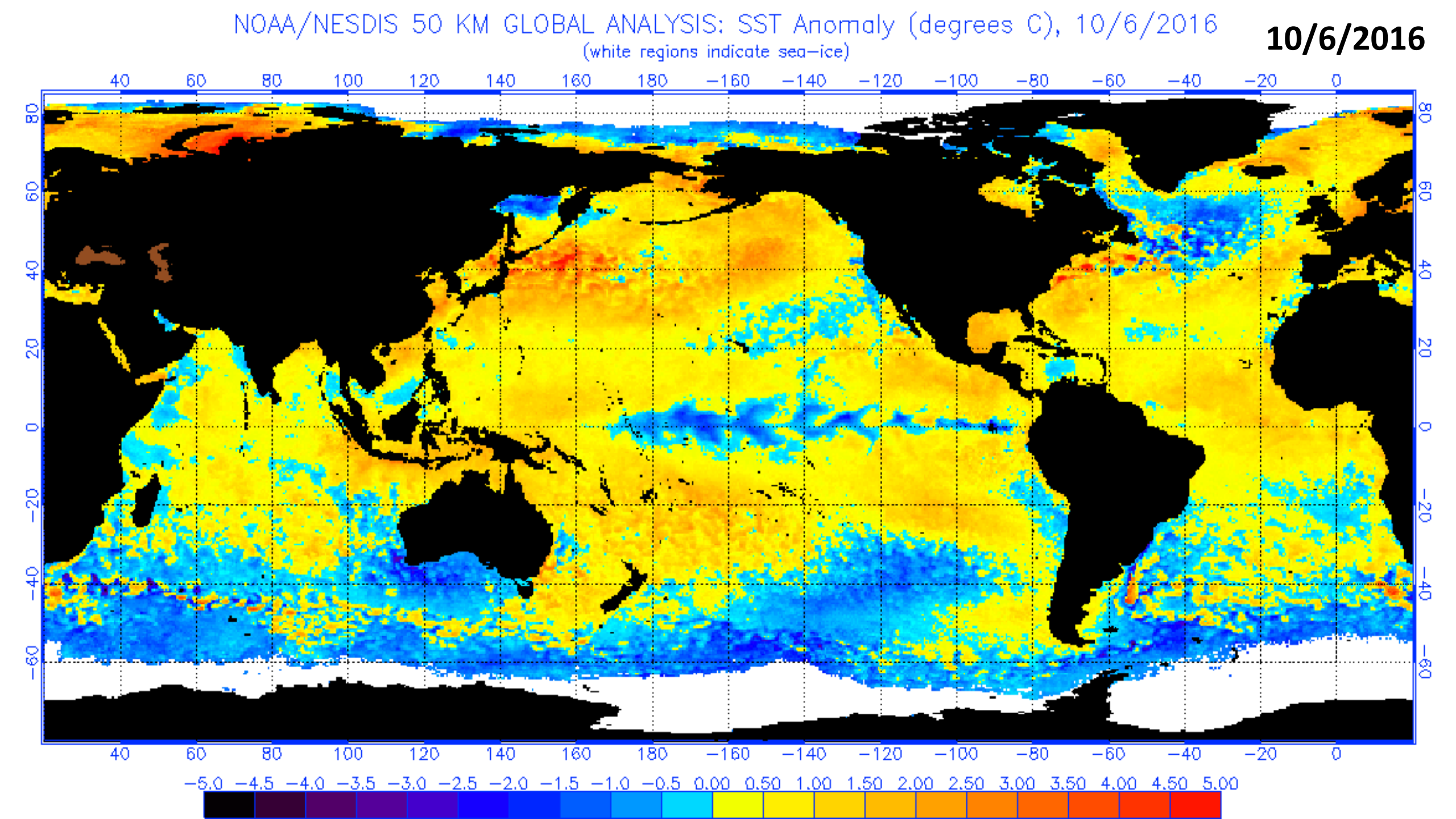
Based on Provisional SNOTEL data as of Nov 06, 2016

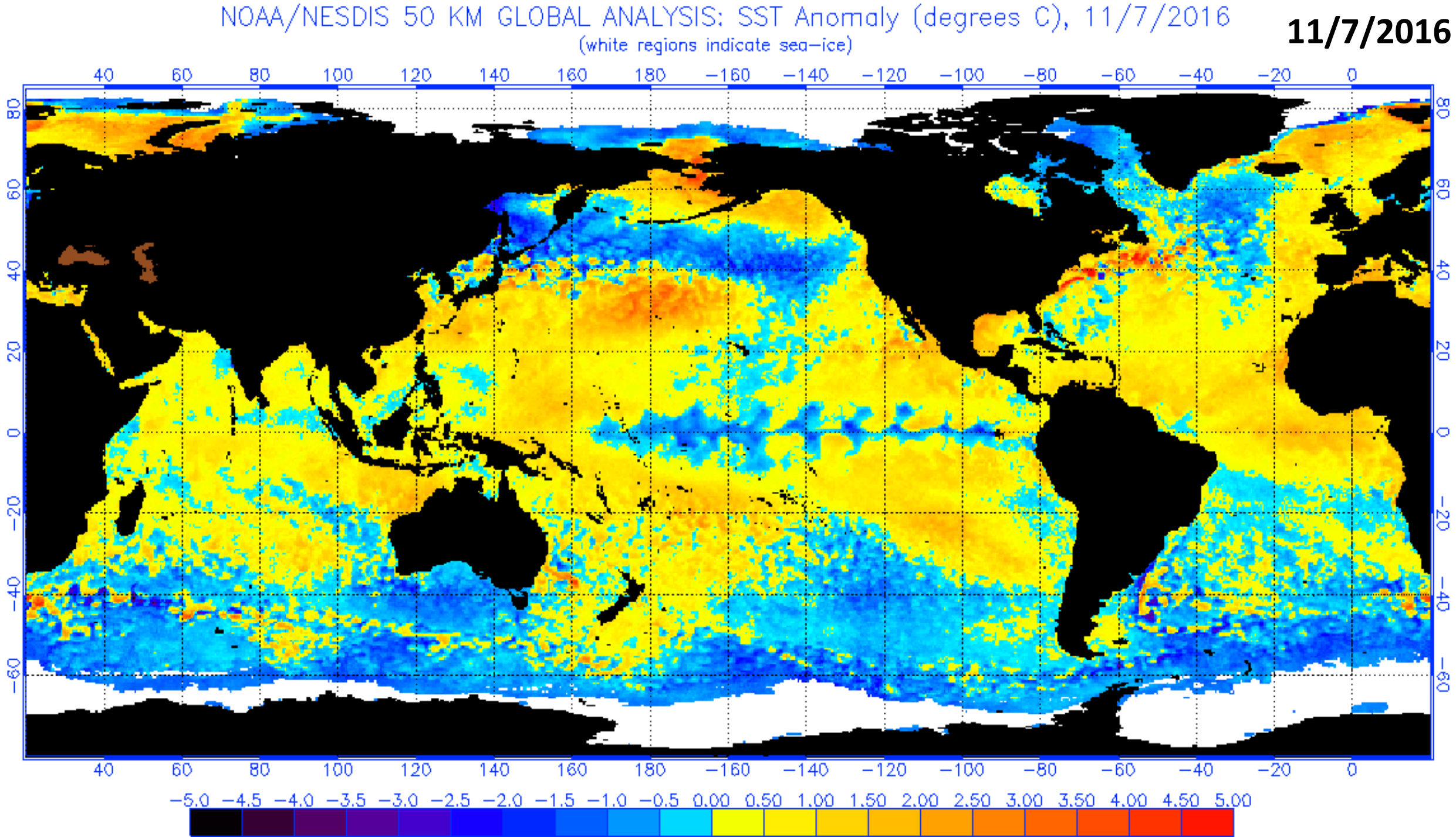


Dec – Jan – Feb Temperature & Precipitation Forecasts






NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 10/6/2016
(white regions indicate sea-ice)
10/6/2016
40 60 80 100 120 140 160 180 −160 −140 −120 −100 −80 −60 −40 −20 0
80 60 40 20 0 −20 −40 −60
−5.0 −4.5 −4.0 −3.5 −3.0 −2.5 −2.0 −1.5 −1.0 −0.5 0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00


NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 11/7/2016
(white regions indicate sea-ice)
11/7/2016
40 60 80 100 120 140 160 180 −160 −140 −120 −100 −80 −60 −40 −20 0
80 60 40 20 0 −20 −40 −60
−5.0 −4.5 −4.0 −3.5 −3.0 −2.5 −2.0 −1.5 −1.0 −0.5 0.00 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00

Analysis of Streamflow in Strong El Nino Years like 2016

			Streamflow as % of 1981-2010 Average				
	ENSO	PDO	Feb-Sep	Apr-Sep	Apr-Sep	Apr-Sep	Apr-Sep
Year	SE Strong El Nino	pos or neg	Owyhee River blw Dam	Salmon Falls Creek	Big Wood River blw Magic Dam	Snake River nr Heise	Spokane River nr Post Falls
1994	SE	pos	23	36	12	61	51
1988	SE	pos	30	65	24	70	71
1941	SE	pos	83	53	69	73	45
1966	SE	neg	28	39	51	78	90
1973	SE	pos / neg	61	114	51	79	45
1942	SE	pos	122	173	117	86	77
1947	SE	pos / neg	44	50	59	108	90
1952	SE	neg	246	178	263	116	123
1995	SE	pos	124	135	195	118	70
1998	SE	pos	135	138	161	119	82
1983	SE	pos	221	157	282	132	91
1978	SE	pos	110	112	140	133	99
2016	SE	pos	82	122	70	80	66

sorted

	<60
	60-90
	90-110
	~111-130
	>130

Analysis of Streamflow for a year like 2017 that follows a Strong El Nino Year

				Streamflow as % of 1981-2010 Average				
	ENSO		ENSO	Feb-Sep	Apr-Sep	Apr-Sep	Apr-Sep	Apr-Sep
Year	SE Strong El Nino	Year Folowing a Strong El Nino		Owyhee River blw Dam	Salmon Falls Creek	Big Wood River blw Magic Dam	Snake River nr Heise	Spokane River nr Post Falls
1941	SE	1942	SE	122	173	117	86	77
1978	SE	1979	N	97	116	34	90	105
1952	SE	1953	N	56	76	92	92	108
1947	SE	1948	LN	58	86	66	97	176
1988	SE	1989	SL	145	100	75	102	116
1966	SE	1967	N	89	88	151	109	113
1994	SE	1995	SE	124	135	195	118	70
1998	SE	1999	SL	100	108	158	131	129
1983	SE	1984	N	363	369	206	133	112
1942	SE	1943	N	137	150	259	144	150
1973	SE	1974	SL	120	111	184	147	193
1995	SE	1996	N	124	115	132	148	116
2016	SE	2017	N or LN	?	?	?	?	?
12 years							sorted	

<60
60-90
90-110
~111-130
>130

Partnerships between NRCS & BSU

BOISE STATE UNIVERSITY

1. **Estimating timing of snowmelt peak streamflow using snowmelt relationships at SNOTEL sites**

   (Kara Ferguson & Dr. Jim McNamara)

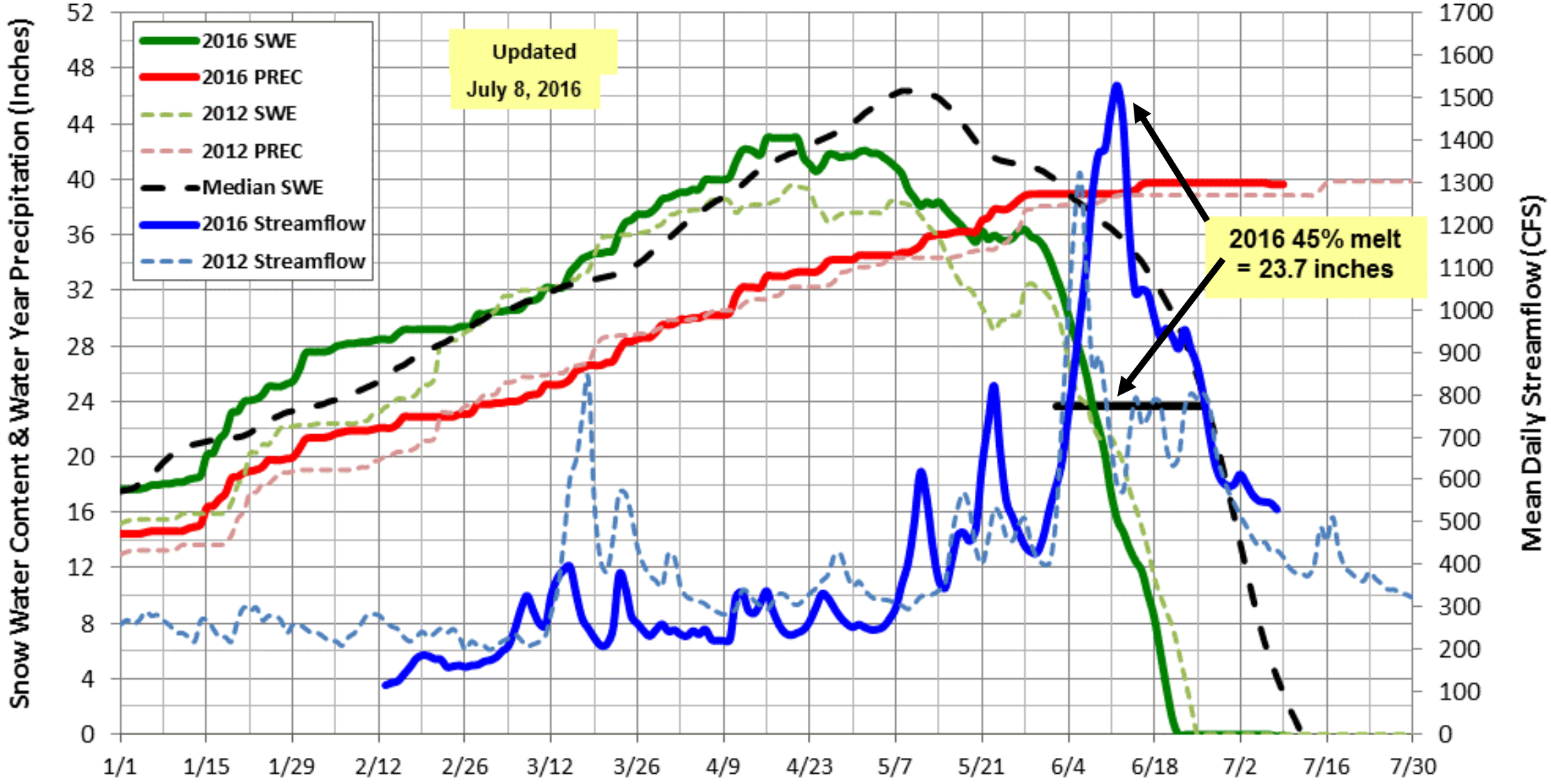
2. **Estimating critical flow magnitudes using SNOTEL data**

   (Becca Garst & Dr. Jim McNamara)

Day of Allocation Prediction for the Boise, Payette & Upper Snake

2016 & 2012 Grand Targhee SNOTEL and Teton River above Leigh Ck near Driggs

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service



Teton River has an increase or the snowmelt peak occurs when Grand Targhee SNOTEL site is about 45% melted.

Boise River
Day of Allocation Prediction

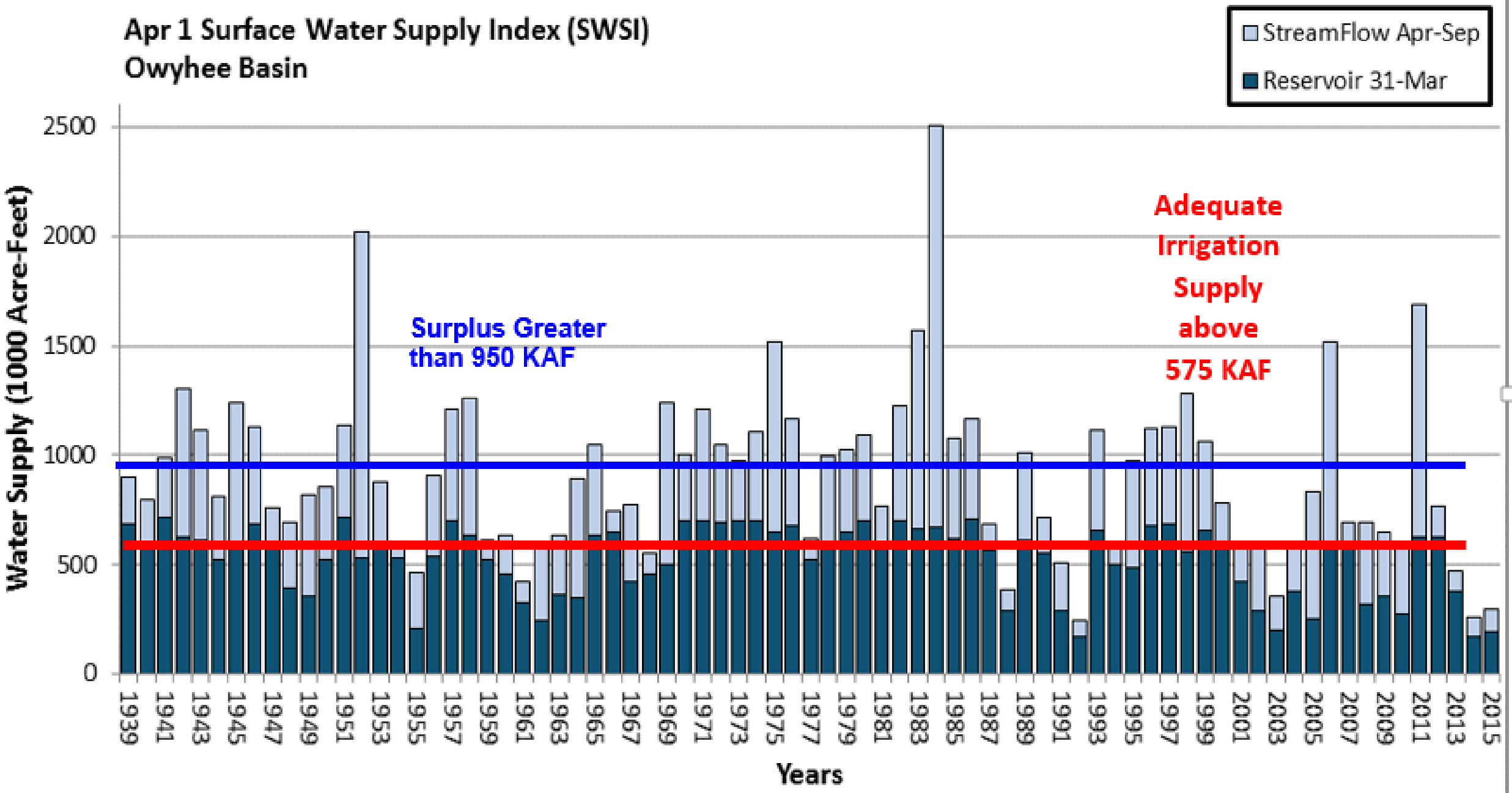
Time for Use	Inputs	Goodness of Fit
Early Season	• Maximum SWE Values	R^2 = .61 Adjusted R^2 = .50
After April	• Maximum SWE Values • April Melt Ratios	R^2 = .89 Adjusted R^2 = .81
After May	• Maximum SWE Values • April and May Melt Ratios	R^2 = .94 Adjusted R^2 = .81
After June	• Maximum SWE Values • April, May, and June Melt Ratios	R^2 = .99 Adjusted R^2 = .92

Increasing Confidence

Upper Snake River
Day of Allocation Prediction (without April Melt)

Time for Use	Inputs	Goodness of Fit
Early Season	• Maximum SWE Values	R^2 = .72 Adjusted R^2 = .66
After April	• Maximum SWE Values • April Melt Ratios	R^2 = Adjusted R^2 = .63
After May	• Maximum SWE Values • April and May Melt Ratios	R^2 = .86 Adjusted R^2 = .79
After June	• Maximum SWE Values • April, May, and June Melt Ratios	R^2 = .92 Adjusted R^2 = .84

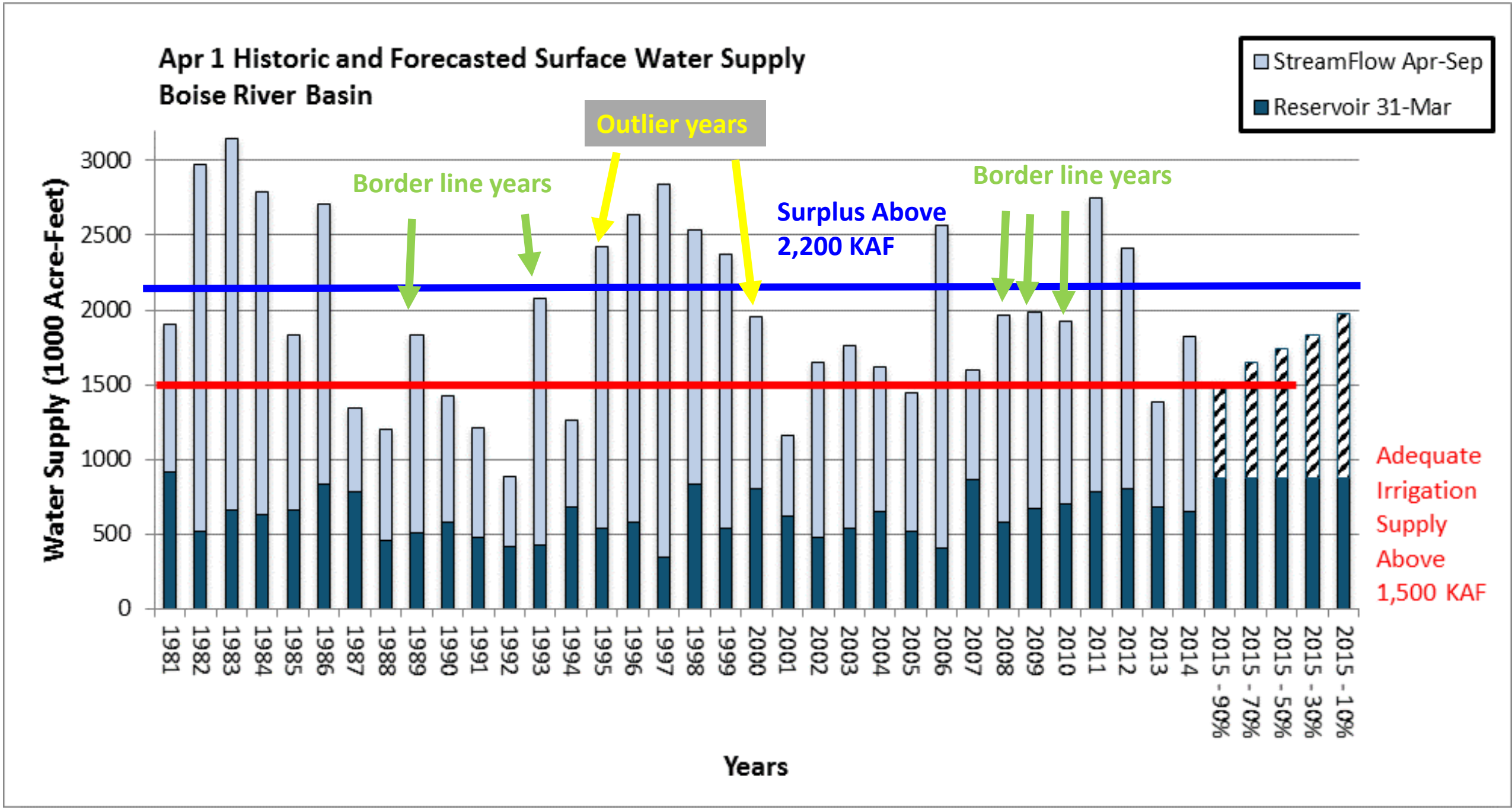
Increasing Confidence

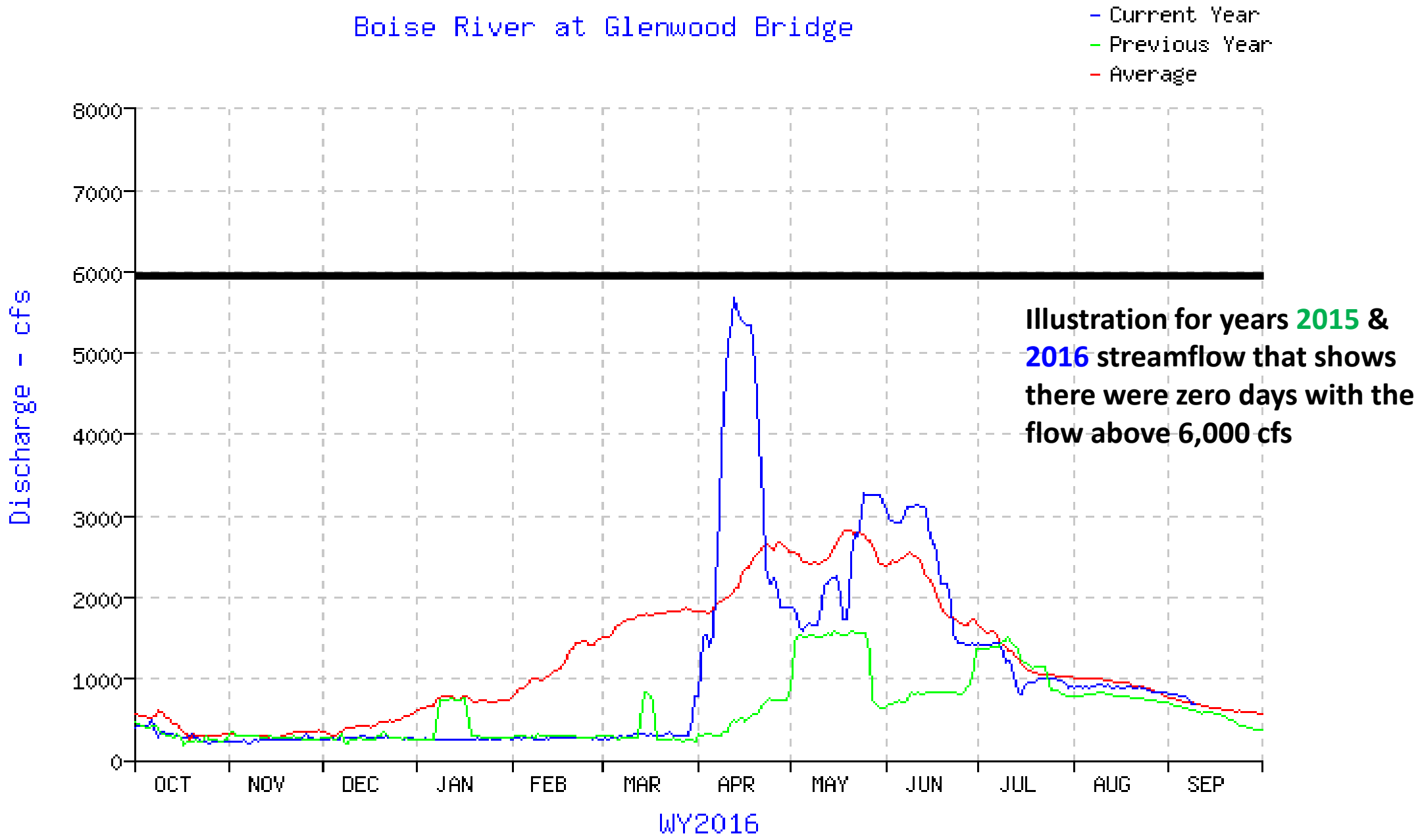

Apr 1 Surface Water Supply Index (SWSI)
Owyhee Basin
StreamFlow Apr-Sep
Reservoir 31-Mar
Water Supply (1000 Acre-Feet)
2500
2000
1500
1000
500
0
Surplus Greater than 950 KAF
Adequate Irrigation Supply above 575 KAF
1939
1941
1943
1945
1947
1949
1951
1953
1955
1957
1959
1961
1963
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
Years

Idaho Surface Water Supply Index Ag Shortage & Surplus Thresholds

Basin	Ag Shortage Threshold	Surplus Threshold
Big Wood	275 KAF	350 KAF with 1,500 cfs release from the dam.
Boise Basin	1,500 KAF	2,200 KAF with a flow > 6,000 cfs passing the Glenwood gage for more than 5 days and approaching 25 days is considered the surplus threshold.
Little Wood	50-60 KAF	70 KAF was determined as the surplus volume based on the reservoir capacity of 30.0 KAF and potential to fill the reservoir.
Owyhee	575 KAF (updated value)	950 KAF with a flow greater than 1,800 cfs for 8 or more days meets the surplus threshold.
Oakley	50 KAF	60 KAF was determined as the surplus volume based primarily on the reservoir capacity of 76.6 KAF and the ability to rent water when volumes are above 60 KAF.
Salmon Falls	110 KAF	180 KAF was determined as the surplus volume based primarily on reservoir capacity of 182.65 KAF and potential to fill the reservoir.
Payette	Shortages not common	1,400 KAF based primarily on 2015 total water supply.

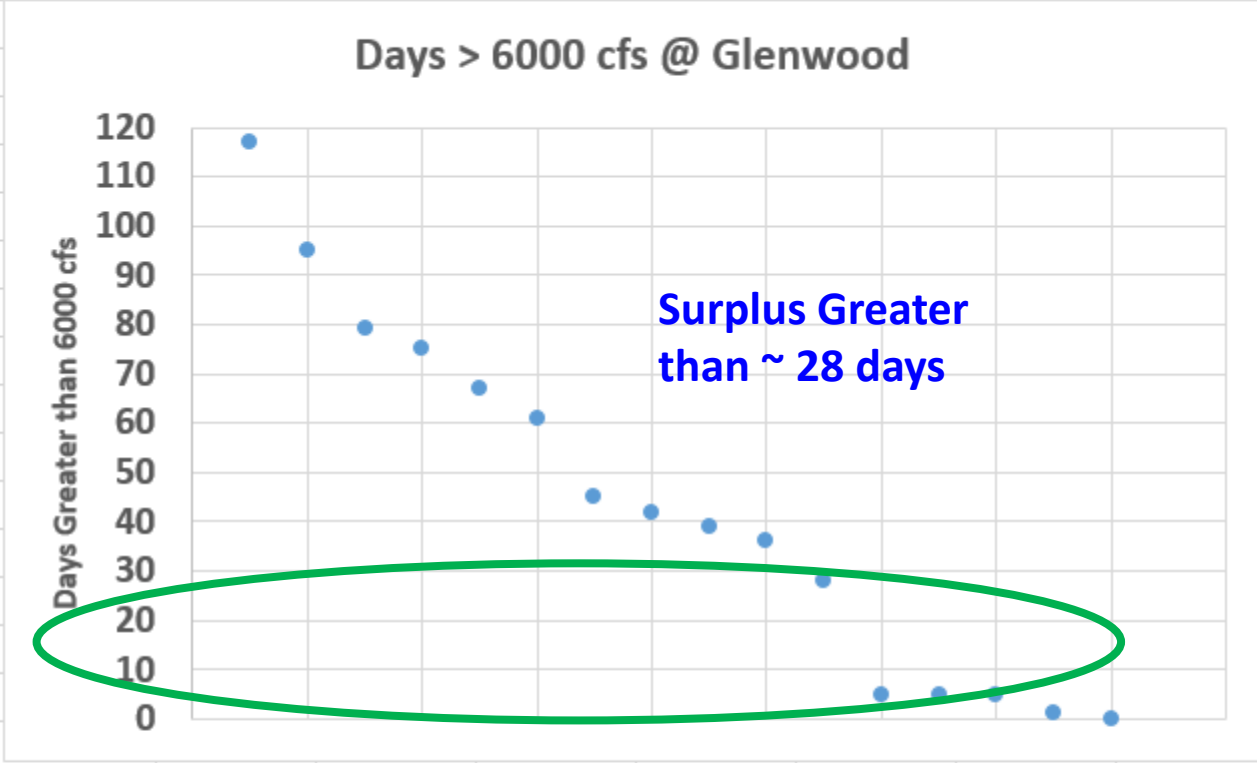
Not completed: Snake at Heise, Teton, Big Lost, Little Lost, Bear


Apr 1 Historic and Forecasted Surface Water Supply
Boise River Basin
StreamFlow Apr-Sep
Reservoir 31-Mar
Outlier years
Border line years
Border line years
Surplus Above
2,200 KAF
Adequate
Irrigation
Supply
Above
1,500 KAF
Water Supply (1000 Acre-Feet)
0
500
1000
1500
2000
2500
3000
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015 - 90%
2015 - 70%
2015 - 50%
2015 - 30%
2015 - 10%
Years



09/09/2016 05:43

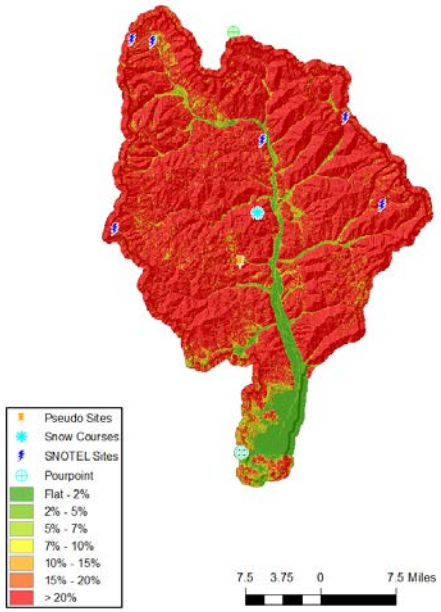
Year	Days > 6000 cfs @ Glenwood
1997	**117**
1983	**95**
1986	**79**
1982	**75**
1996	**67**
2011	**61**
2012	**45**
1984	**42**
2006	**39**
1999	**36**
1998	**28**
1993	**5**
2008	**5**
1989	**5**
2009	**1**
1995	**0**
2000	0
2010	0
1985	0
2014	0
2003	0
2002	0
2004	0
2007	0
2005	0
1990	0



The years with days above 6000 cfs on the Boise River at Glenwood Bridge are plotted. In the table, the years are in bold. The years in blue are surplus, and the years in green are borderline (defined above). The red years correspond to years of water supply shortage.

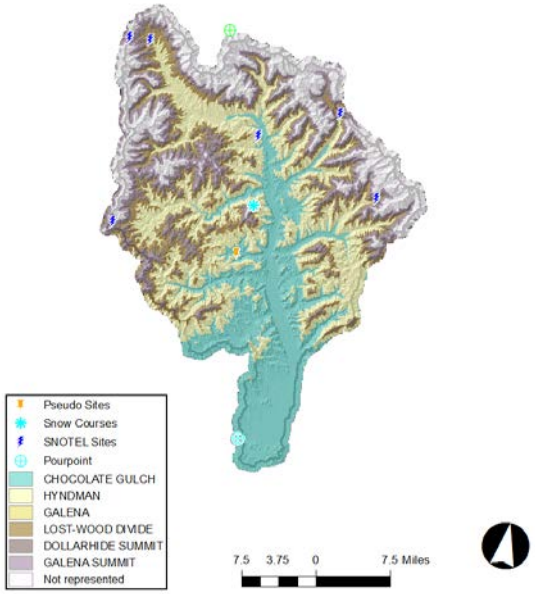
BIG WOOD BAGIS TEST #1

SLOPE



BIG WOOD BAGIS TEST #1

SNOTEL ELEVATION ZONES



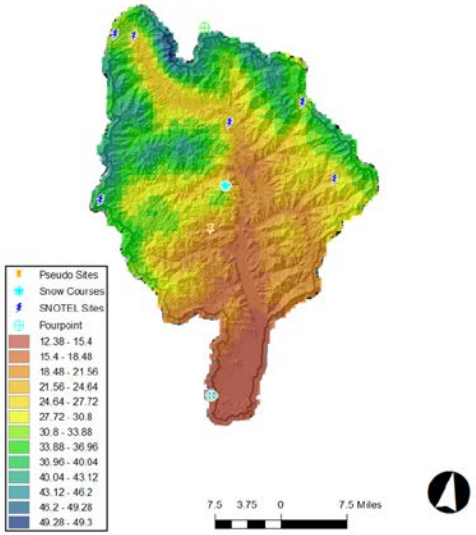
NRCS Partnership with Idaho Water Resource Board

Primary Goal:

GIS watershed analysis to assist in determining data collection needs, data voids and need for mid-elevation snow measuring stations with the hope to improve streamflow forecasts.

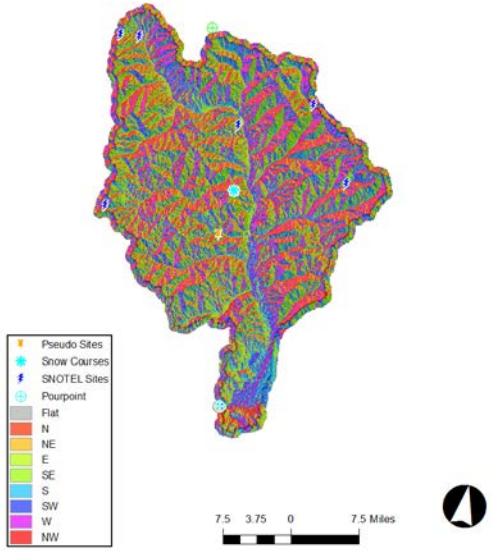
BIG WOOD BAGIS TEST #1

PRECIPITATION ZONES



BIG WOOD BAGIS TEST #1

ASPECT



Snow Survey

Staff Directory

Program Manager and Staff Supervisor

Name	Position	Phone	Email
Shawn Nield	State Soil Scientist	208-378-5728	Shawn Nield

Office Staff

Office Staff

Name	Position	Phone	Email
Ron Abramovich	Water Supply Specialist	208-378-5741	Ron Abramovich
Vacant	Hydrologist		
Phil Morrisey	Data Collection Officer	208-685-6983	Phil Morrisey
Daniel Tappa	Hydrologist	208-378-5740	Daniel Tappa

Retiring Dec 30

Field Staff

Name	Position	Phone	Email
John Wilford	Electronics Technician	208-685-6943w	John Wilford
Vacant	Hydrologist	208-685-6942w	
Vacant	Hydrologic Technician	208-685-6942w	

Hydrologist position opens today, closes Wed Nov 16

85th Annual Western Snow Conference
April 17-20, 2017 Boise, Idaho
A Joint Meeting with the Weather Modification Association

Questions, Comments, Corrections

WESTERN SNOW CONFERENCE

Western Snow Conference Web Site: www.westernsnowconference.org

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westernsnowconference@gmail.com

October 25, 2016

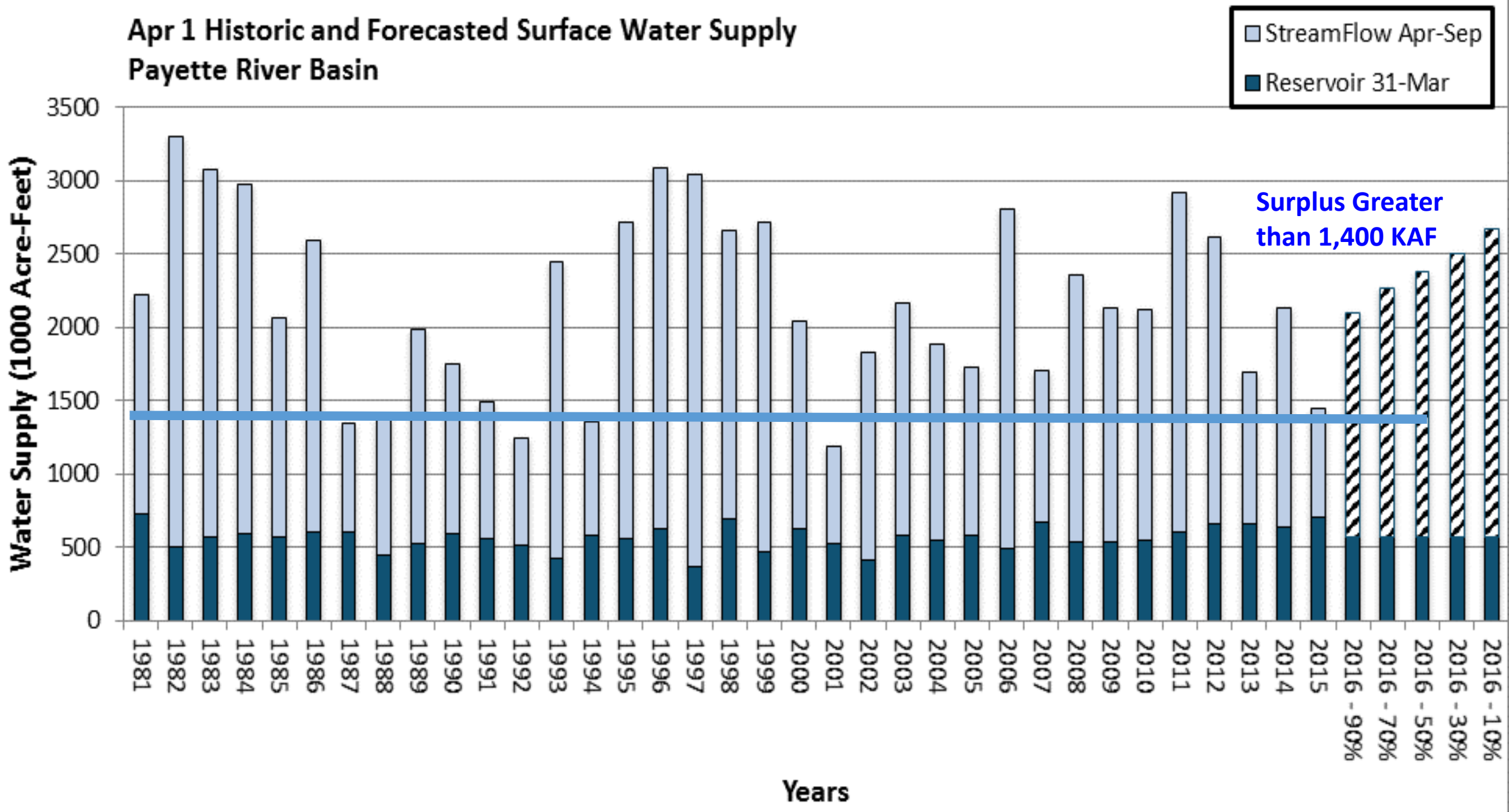
First Call for Papers
Joint Meeting of the Western Snow Conference and the Weather Modification Association

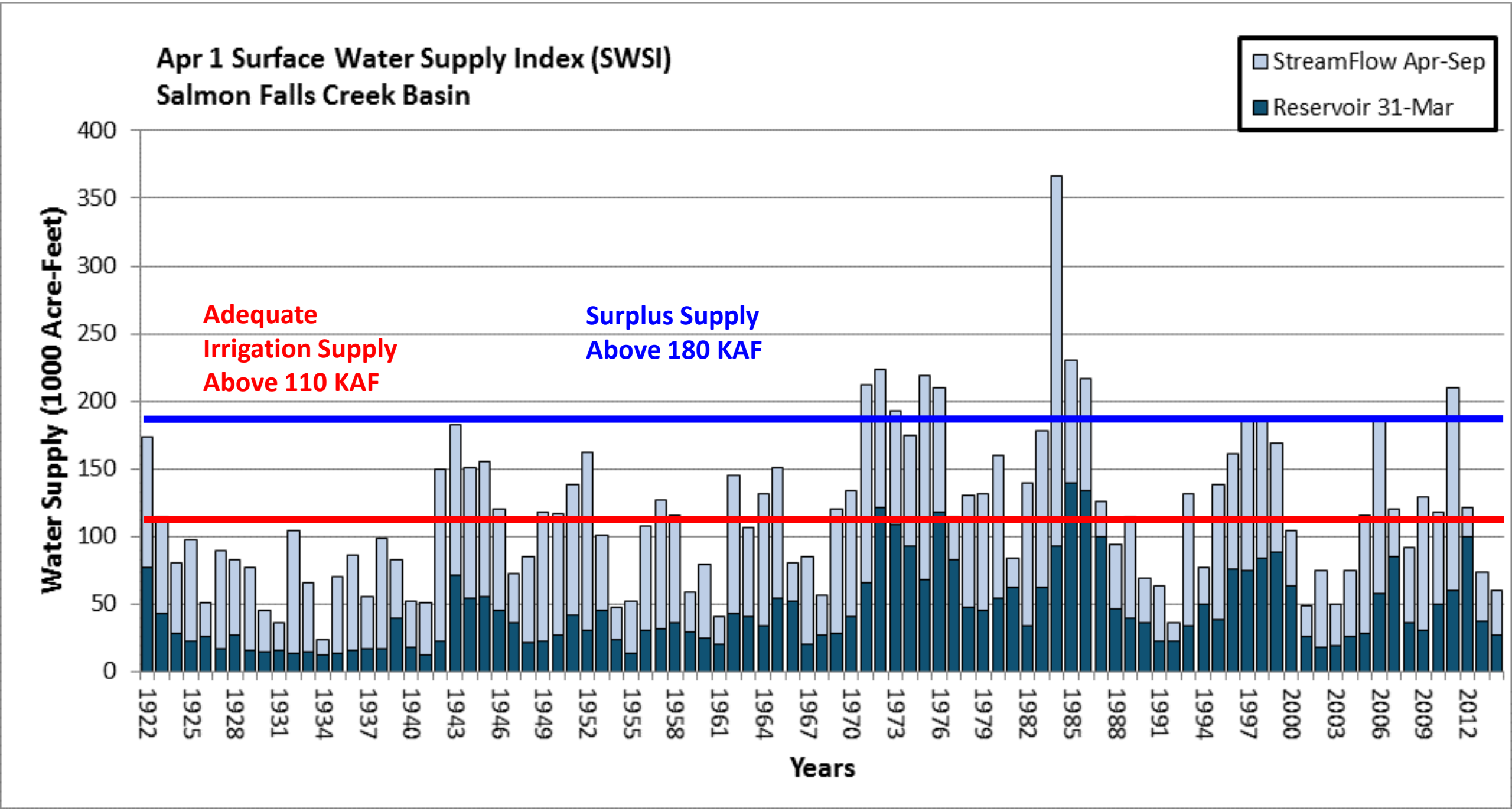
Members and Friends of the Western Snow Conference:

Please join us on April 17 – 20, 2017 for a joint meeting of the 85th Annual Western Snow Conference and the Weather Modification Association in Boise, Idaho. The conference venue offers the opportunity to interact with other professionals while enjoying one of the most vibrant cities in the Intermountain West.

You are invited to submit an abstract of 150 – 300 words for either oral or poster presentation by January 31, 2017. Submit abstracts by filling out the online submission form at:

Extra slides explaining Surplus determination


Apr 1 Historic and Forecasted Surface Water Supply
Payette River Basin
StreamFlow Apr-Sep
Reservoir 31-Mar
Surplus Greater than 1,400 KAF
Water Supply (1000 Acre-Feet)
3500
3000
2500
2000
1500
1000
500
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016 - 90%
2016 - 70%
2016 - 50%
2016 - 30%
2016 - 10%
Years


Apr 1 Surface Water Supply Index (SWSI)
Salmon Falls Creek Basin
StreamFlow Apr-Sep
Reservoir 31-Mar
Adequate
Irrigation Supply
Above 110 KAF
Surplus Supply
Above 180 KAF
Water Supply (1000 Acre-Feet)
400
350
300
250
200
150
100
50
0
1922
1925
1928
1931
1934
1937
1940
1943
1946
1949
1952
1955
1958
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
Years

Boise Basin			Based on Glenwood Gauge Data 1982 - 2014				
Year	Apr - Sep Volume [KAF]	March 31 Res Storage [KAF]	Sum Volume + Storage [KAF]	Max Q at Glenwood [cfs]	Days > 6000 cfs @ Glenwood	Max Q Unreg @ LUC [cfs]	
1983	2494.7	655.5	3150.2	9560	95	24255	
1982	2460.5	515.9	2976.4	7410	75	19020	
1997	2490.6	346.5	2837.1	7160	117	24052	
1984	2160.6	630.0	2790.6	6900	42	22541	
2011	1965.4	785.0	2750.4	7130	61	18787	
1986	1881.1	831.3	2712.4	7960	79	17992	
1996	2065.5	574.1	2639.6	6690	67	20570	
2006	2162.4	403.7	2566.1	7050	39	22066	
1998	1700.6	837.0	2537.6	8350	28	14186	
1995	1887.1	535.8	2422.9	4970	0	13350	Outlier
2012	1610.9	801.3	2412.1	8050	45	22787	
1999	1838.1	537.5	2375.6	6770	36	16445	
Surplus above 2200 KAF							
1993	1656.5	421.7	2078.2	6560	5	16339	Borderline Surplus
2009	1323.0	666.6	1989.6	6040	1	10973	
2008	1382.1	577.9	1960.0	6860	5	17201	
2000	1154.6	801.5	1956.1	3330	0	8867	Outlier
2010	1223.8	697.0	1920.8	6000	0	17686	Borderline Surplus
1989	1324.2	507.5	1831.7	6130	5	13151	
1985	1165.6	664.0	1829.6	2360	0	9842	Peak Flows below 6000 cfs
2014	1178.3	645.1	1823.4	1880	0	9776	
2003	1218.6	538.4	1757.0	1480	0	16023	
2002	1178.4	471.8	1650.2	1340	0	14216	
2004	973.5	647.1	1620.6	1320	0	7247	
2007	736.4	859.9	1596.3	1480	0	6441	
Shortages below 1500 KAF							
2005	931.1	517.2	1448.3	1230	0	13233	
1990	840.6	579.3	1419.9	875	0	7881	
2013	703.8	681.6	1385.3	1440	0	7517	
1987	561.8	784.6	1346.4	1470	0	5625	
1994	588.4	677.9	1266.3	1280	0	5573	
1991	734.4	477.5	1211.9	968	0	6308	
1988	745.6	451.3	1196.9	939	0	6234	
2001	544.9	619.5	1164.4	947	0	6209	
1992	470.8	412.3	883.1	830	0	4317	

Boise Basin:

Determination of the 2,200 KAF Surplus Level: The surplus threshold of 2200 KAF for the Boise Basin was determined based the following analysis for years 1982-2014. The Boise River at Glenwood Bridge gage was installed in 1982.

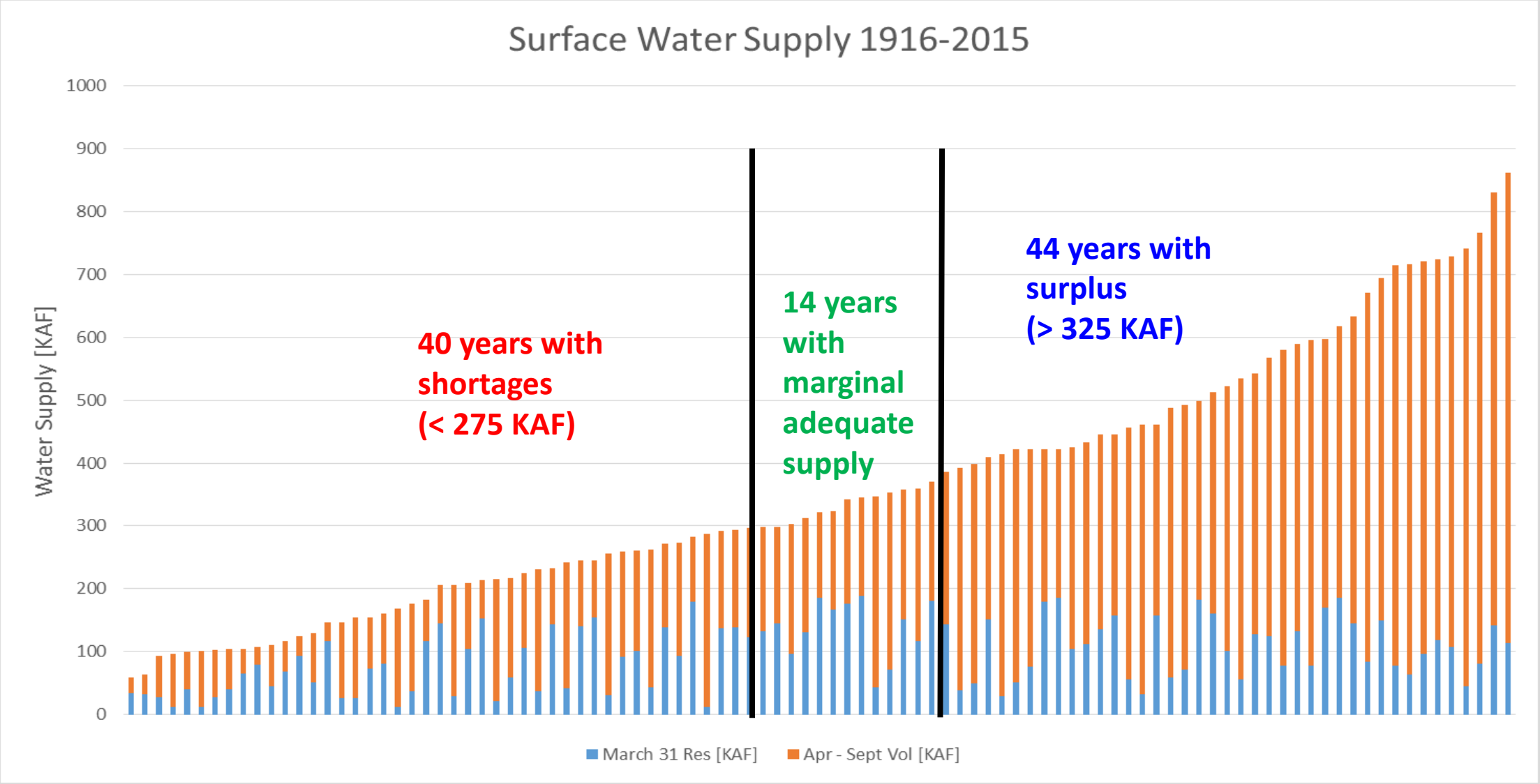
SWSI volumes greater than 2,200 KAF, which is the summation of the Mar 31 combined reservoir storage plus Apr-Sep runoff volume, was sorted high to low.

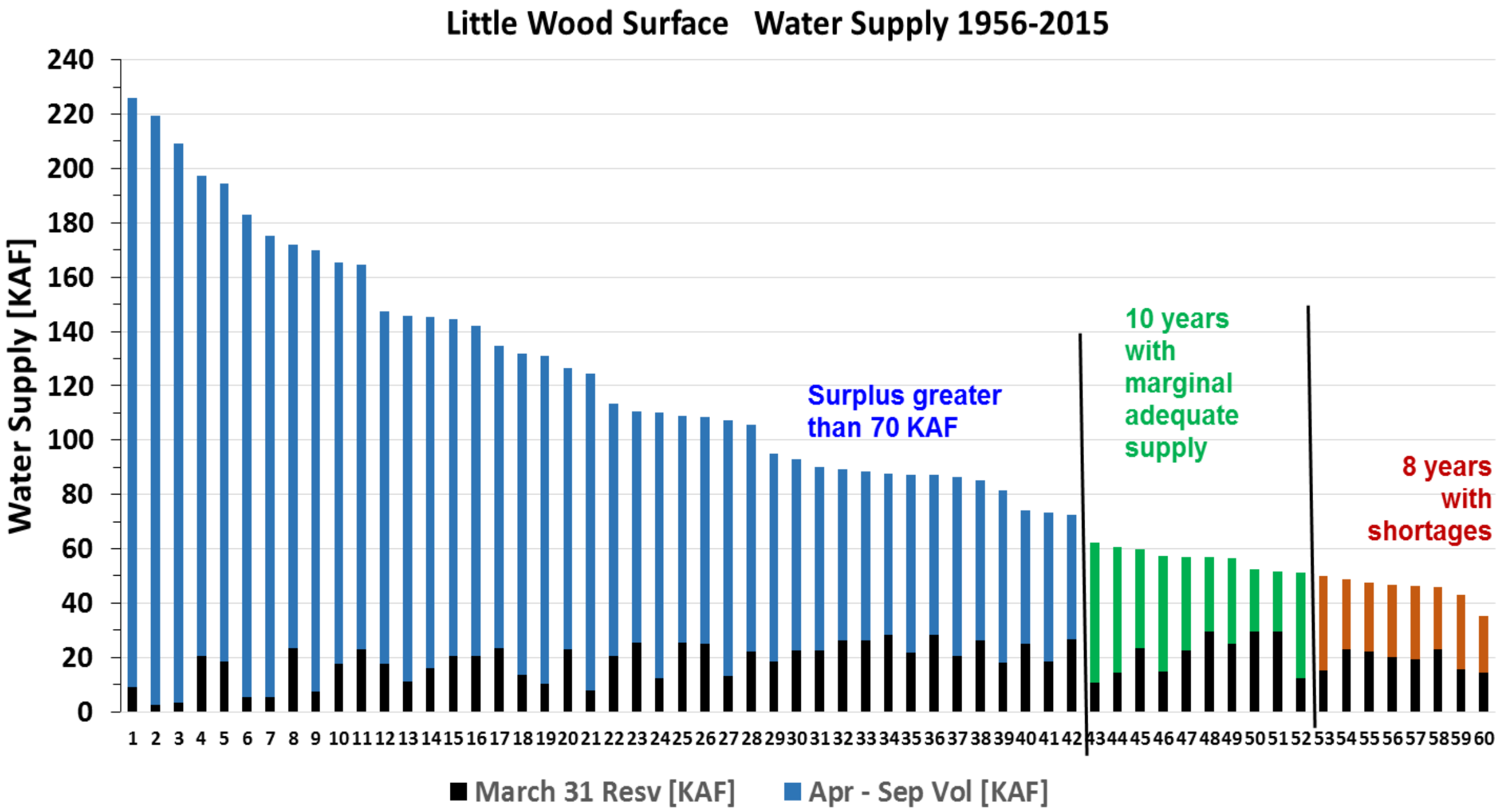
Peak flows at the Glenwood gage were determined along with the number of days above 6000 cfs. There seems to be a distinct cutoff in the maximum flow at Glenwood. **Only one year, 1995, had a maximum discharge between 3330 to 6000 cfs.**

Natural inflow peaks were used as a guide but the amount released from the reservoir is primarily a function of the storage in the reservoir system. **The total volume is then compared to the Glenwood maximum flow and duration of high flows.**

A volume greater than 2,200 KAF with a flow > 6,000 cfs passing the Boise River at Glenwood gage for more than 5 days and approaching 25 days is considered the surplus threshold.

Big Wood Basin Water Supply Threshold




Little Wood Surface Water Supply 1956-2015
Water Supply [KAF]
240
220
200
180
160
140
120
100
80
60
40
20
0
Surplus greater than 70 KAF
10 years with marginal adequate supply
8 years with shortages
March 31 Resv [KAF]
Apr - Sep Vol [KAF]