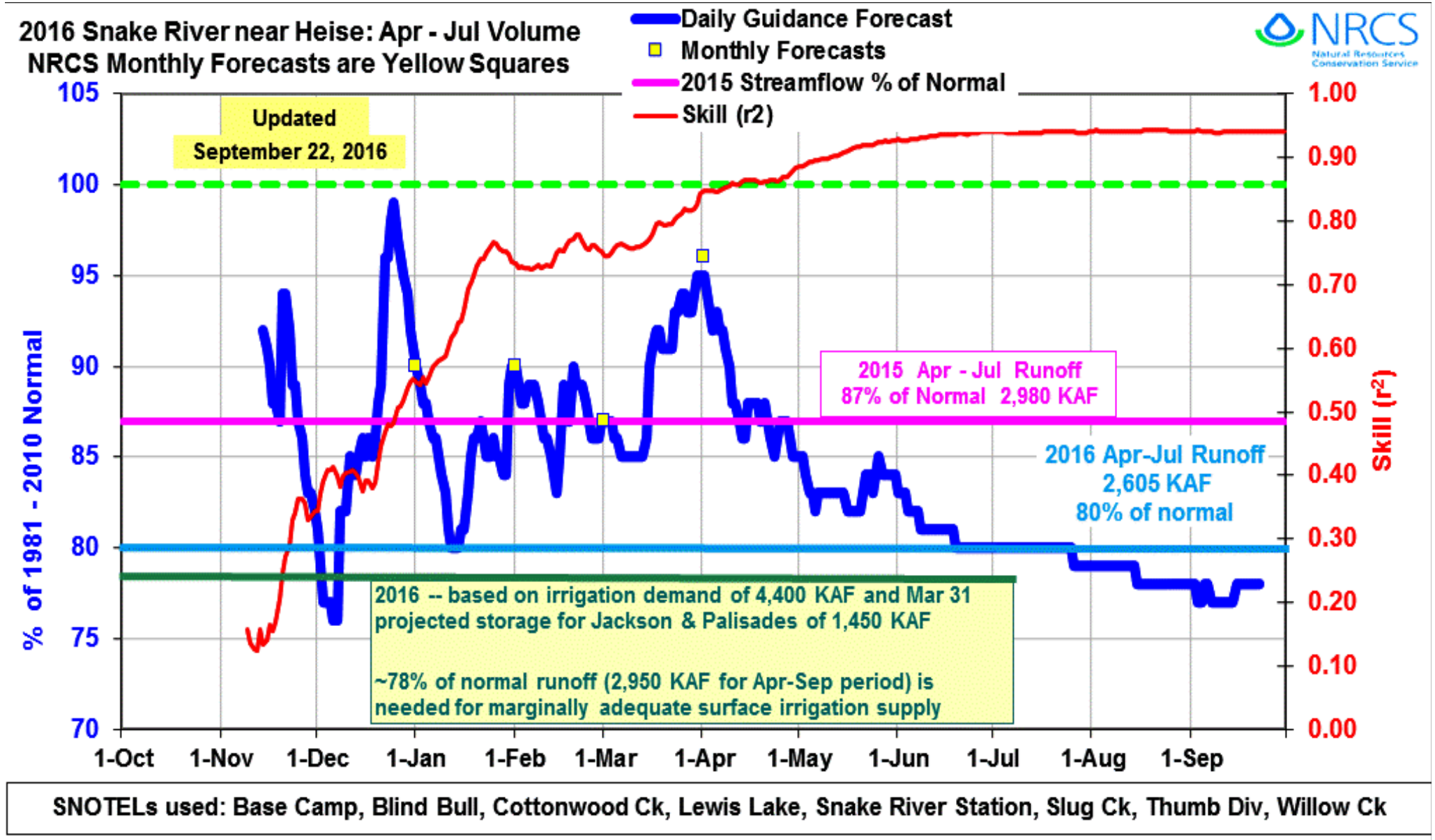
Water Year 2017 Outlook, Agency, Update and New Research Discussion
November 10, 2016

- 2017 Amount Needed for Adequate Irrigation Supplies
- Agency Update:
  - Partnerships between NRCS and BSU & IWRB
  - Surface Water Supply Index Surplus Thresholds
  - Status of NRCS Snow Survey Program

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

- **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.



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

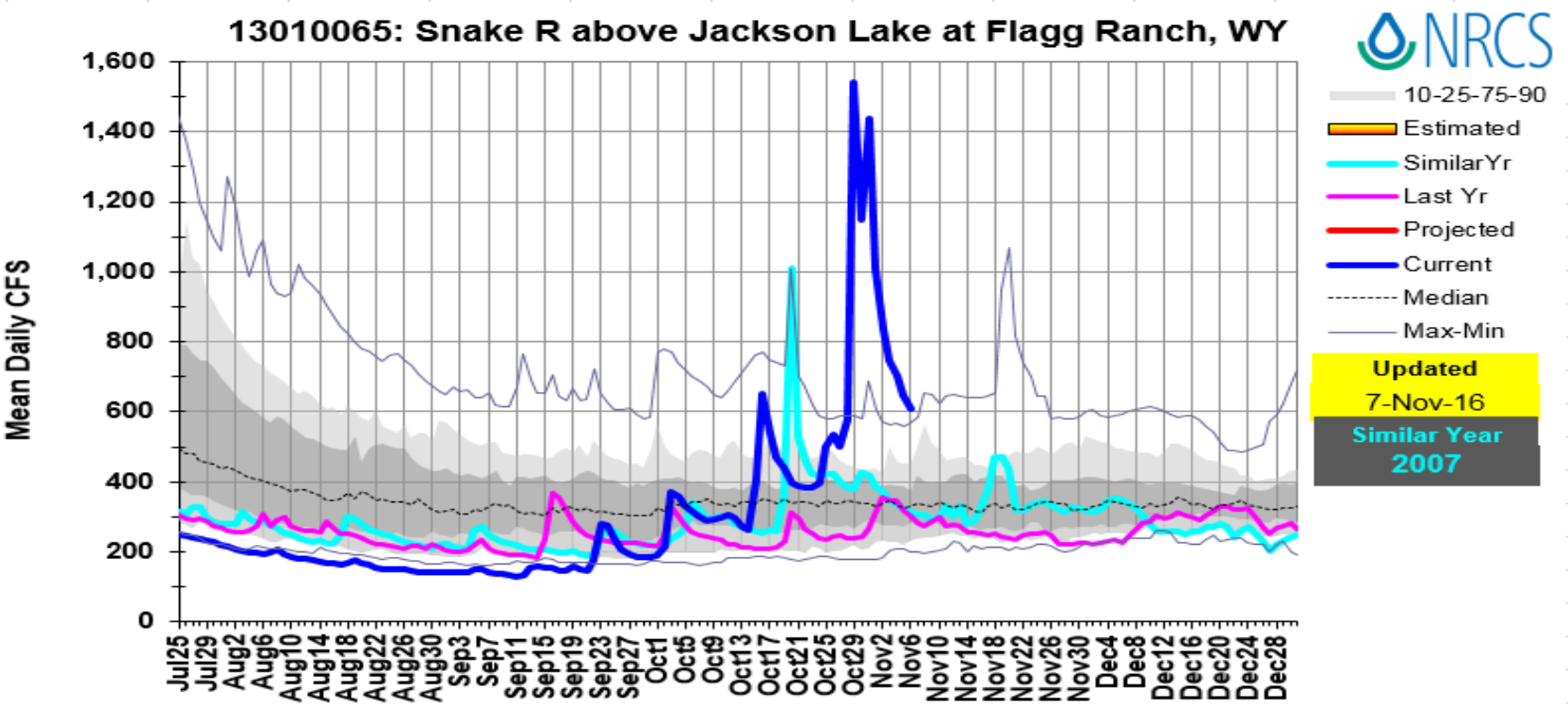
Created November 8, 2016

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.

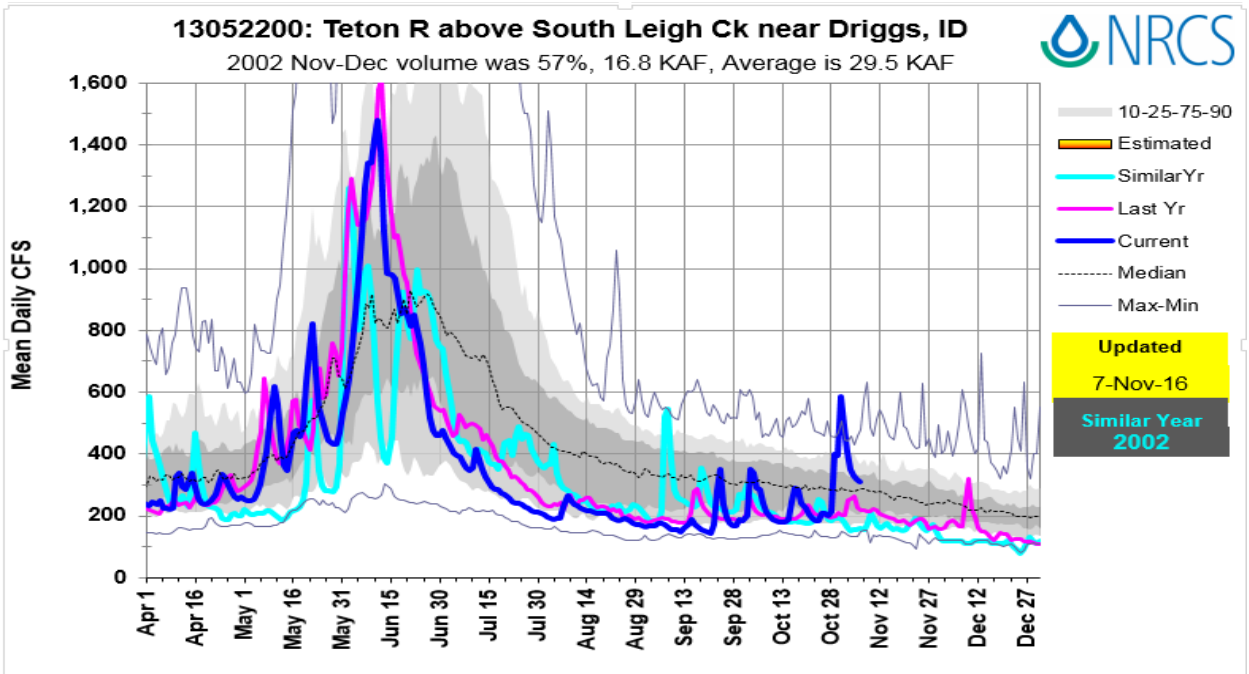
As of November 8, 2016: Projected change in reservoir storage from Fall 2016 to target levels in Spring 2017 which is when the runoff period starts for the streamflow forecasts.

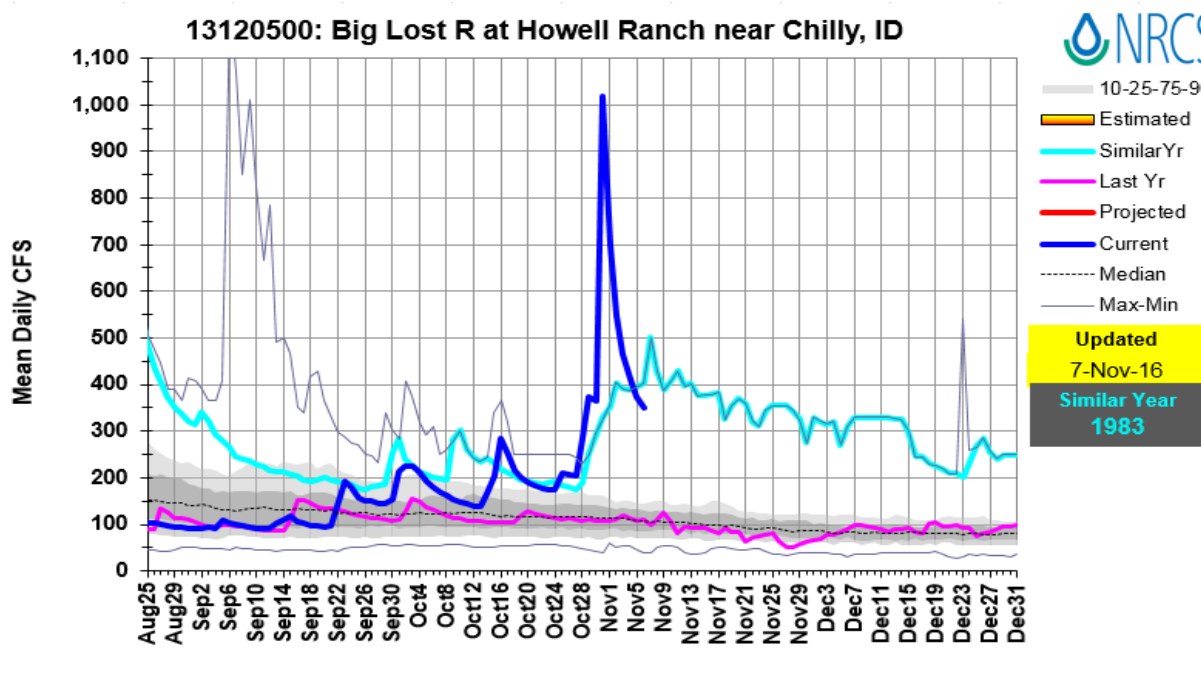
	Oct 31 storage KAF	Nov 30 storage KAF	Dec 31 storage KAF	Projected Jan 31 Storage KAF	Projected Feb 28 storage KAF	Projected Mar 31 storage KAF	Estimated change in storage KAF
Boise Reservoir System	422.0	---	---	---	---	800	378
Magic Reservoir	65.0	---	---	---	---	105	40
Little Wood Reservoir	12.4	---	---	---	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.



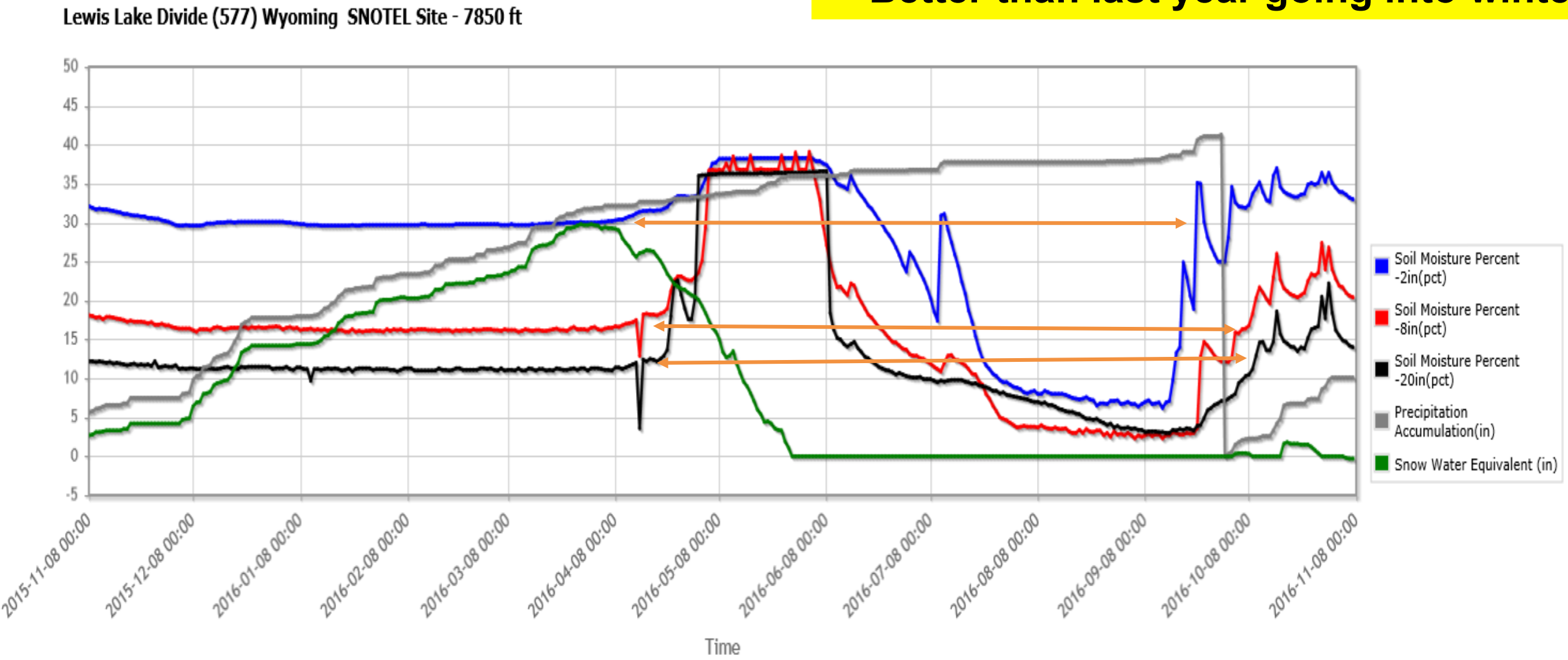
Water Year to Date Precipitation at / near record high across our region





Lewis Lake Divide Soil Moisture

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



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%

Partnerships between NRCS & BSU

BOISE STATE UNIVERSITY

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

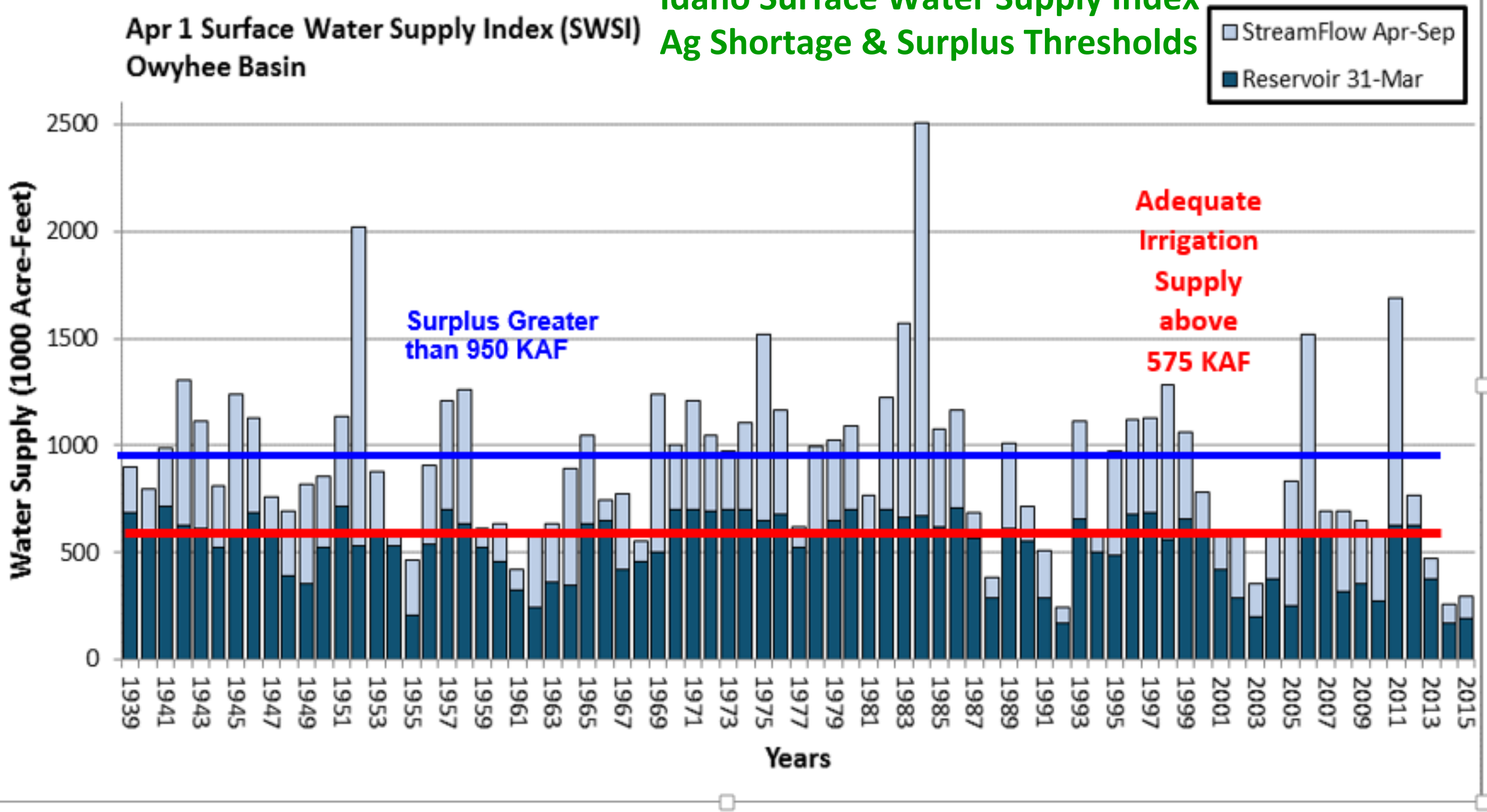
   (Kara Ferguson & Dr. Jim McNamara)

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

   (Becca Garst & Dr. Jim McNamara)

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

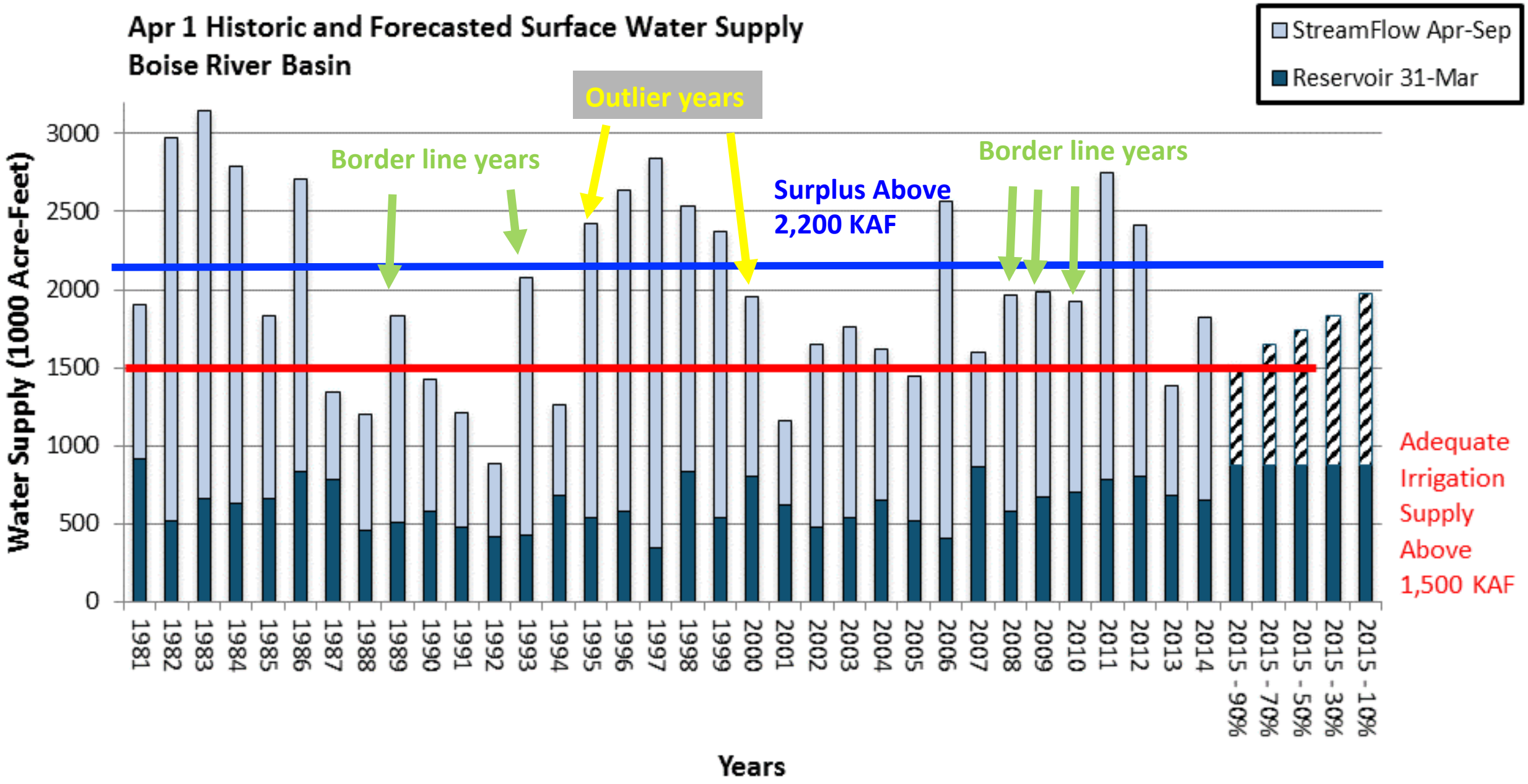
Idaho Surface Water Supply Index
Ag Shortage & Surplus Thresholds



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

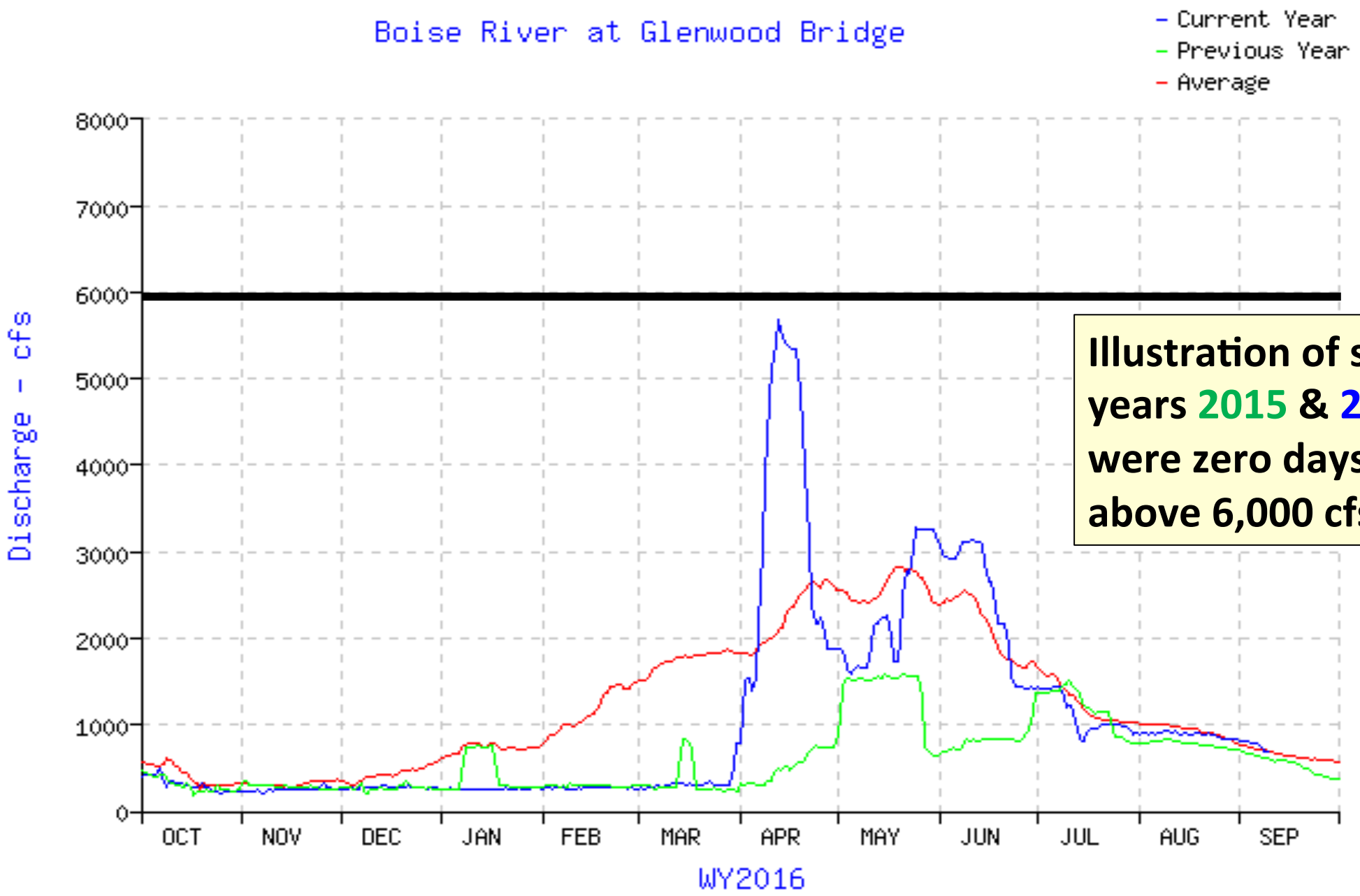
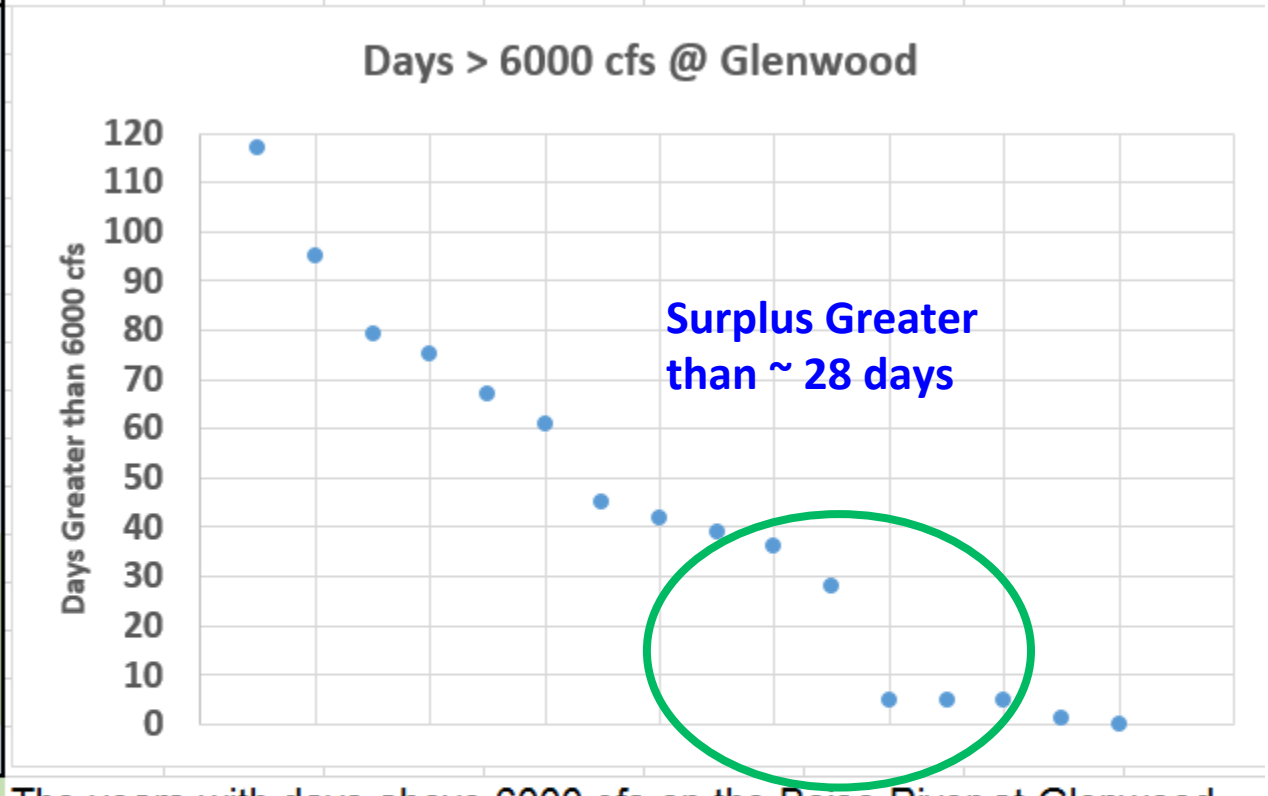


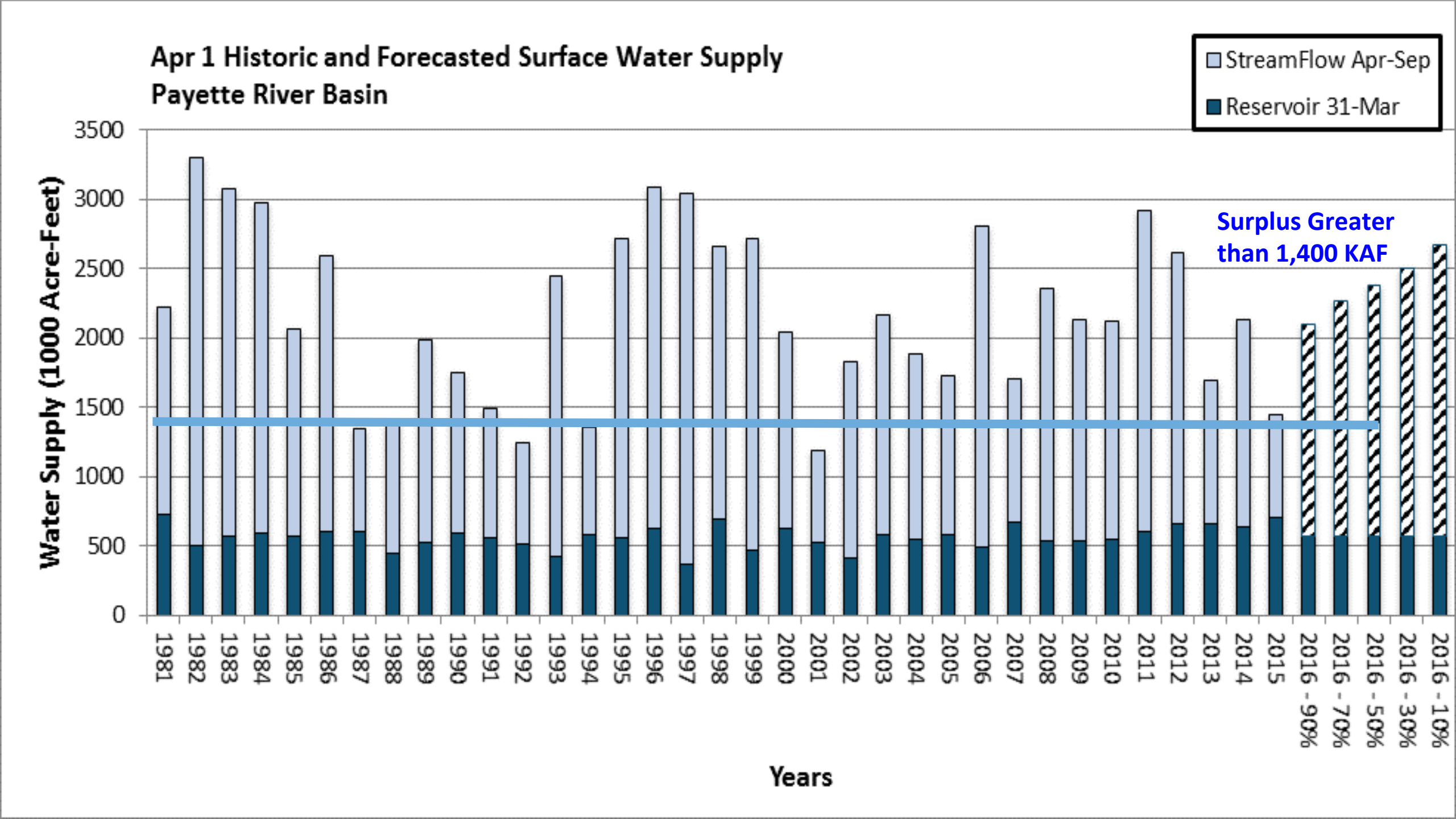
Illustration of streamflow for years 2015 & 2016 shows there were zero days with the flow above 6,000 cfs

09/09/2016 05:43

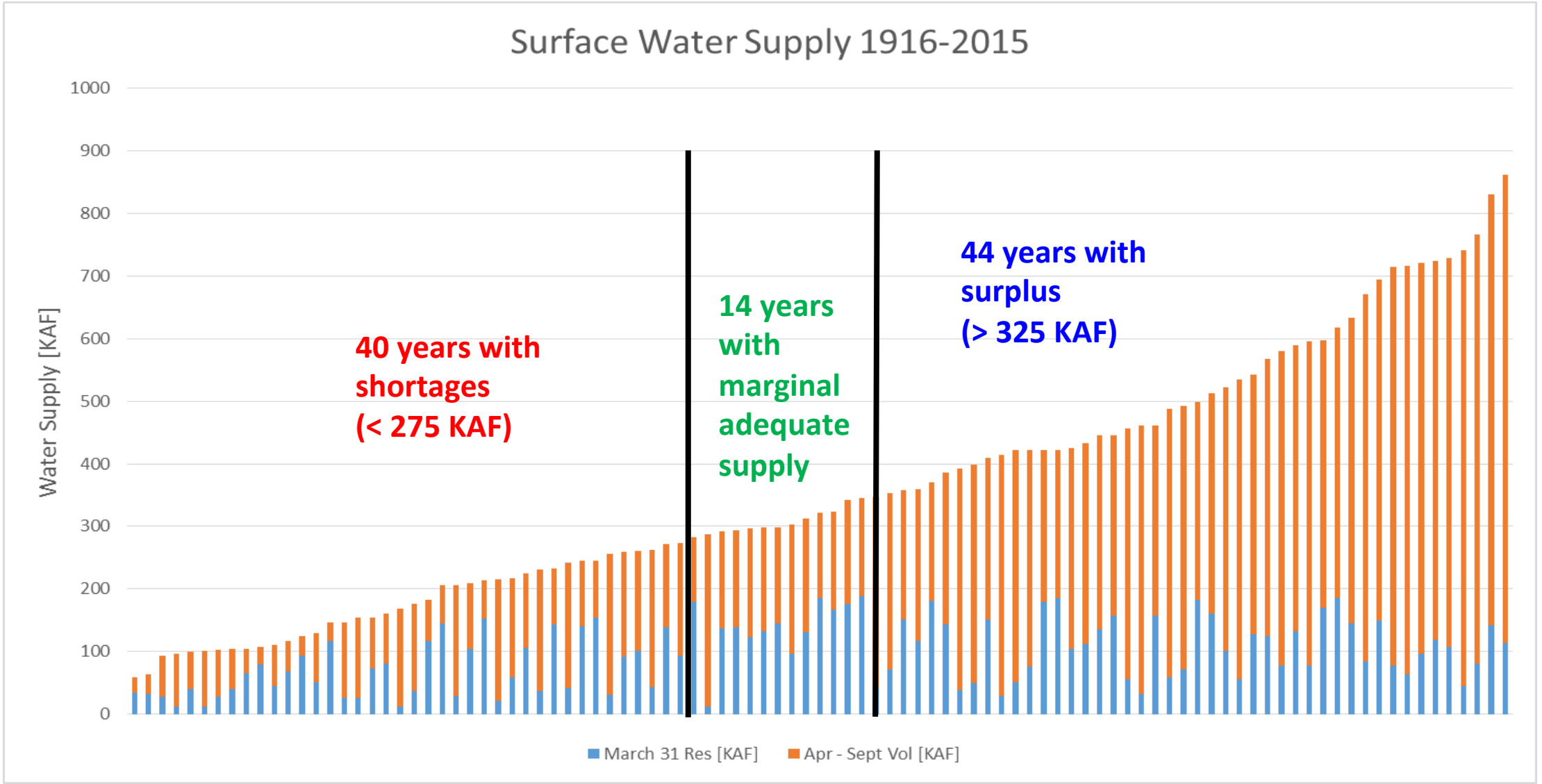
Year	Days > 6000 cfs @ Glenwood
1997	**117**
1983	**95**
1986	**79**
1982	**75**
1996	**67**
2011	**61**
2012	**45**
1984	**42**
2006	**39**
1999	**36**
1998	**28**
1993	**5**
2008	**5**
1989	**5**
2009	**1**
1995	**0**
2000	0
2010	0
1985	0
2014	0
2003	0
2002	0
2004	0
2007	0
2005	0
1990	0



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.

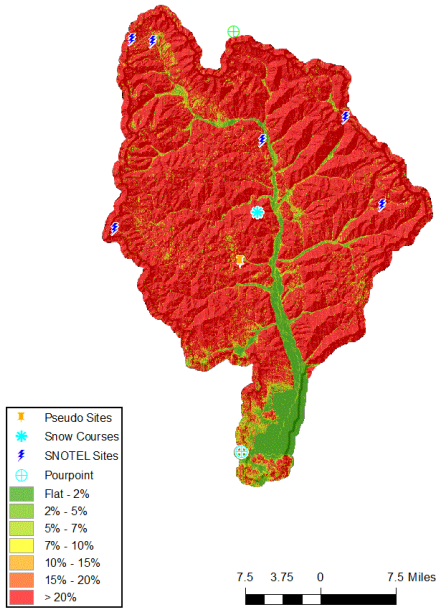

Apr 1 Historic and Forecasted Surface Water Supply
Payette River Basin
StreamFlow Apr-Sep
Reservoir 31-Mar
Surplus Greater than 1,400 KAF
Water Supply (1000 Acre-Feet)
3500
3000
2500
2000
1500
1000
500
0
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
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

Big Wood Basin Water Supply Threshold



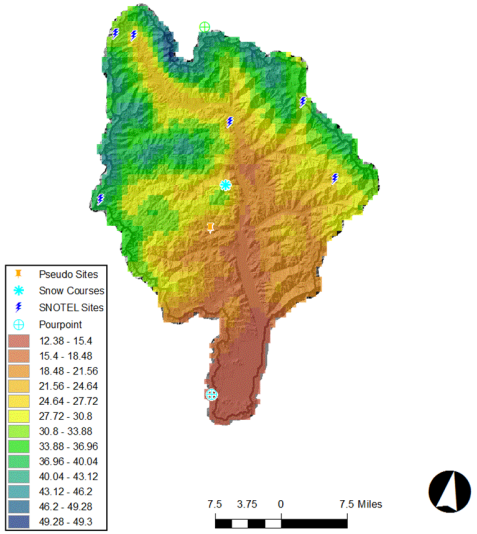
BIG WOOD BAGIS TEST #1

SLOPE



BIG WOOD BAGIS TEST #1

PRECIPITATION ZONES



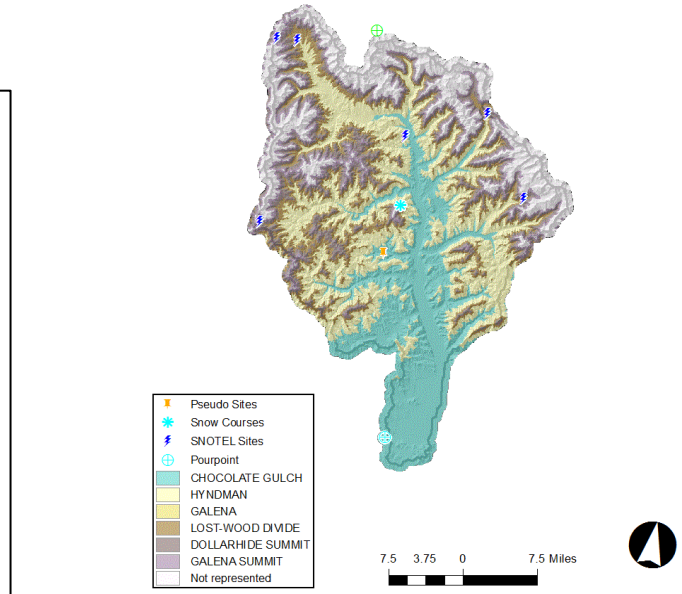
NRCS Partnership with Idaho Water Resource Board

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.

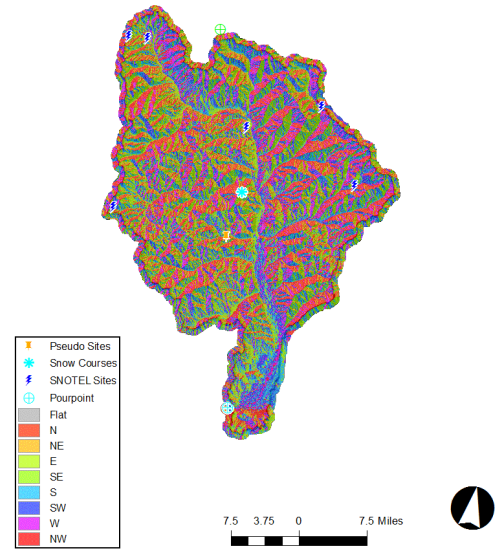
BIG WOOD BAGIS TEST #1

SNOTEL ELEVATION 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

Save the Date – Call for Papers
Questions, Comments, Corrections

WESTERN SNOW CONFERENCE

Western Snow Conference Web Site: www.westernsnowconference.org

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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: