# IDWR State Water Supply Meeting Mar 13, 2015

Photo taken by Ray Gadd March 11, 2015 looking east and south over Big Wood River valley illustrating lack of snow on south facing slopes.

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

NRCS Natural Resources Conservation Service

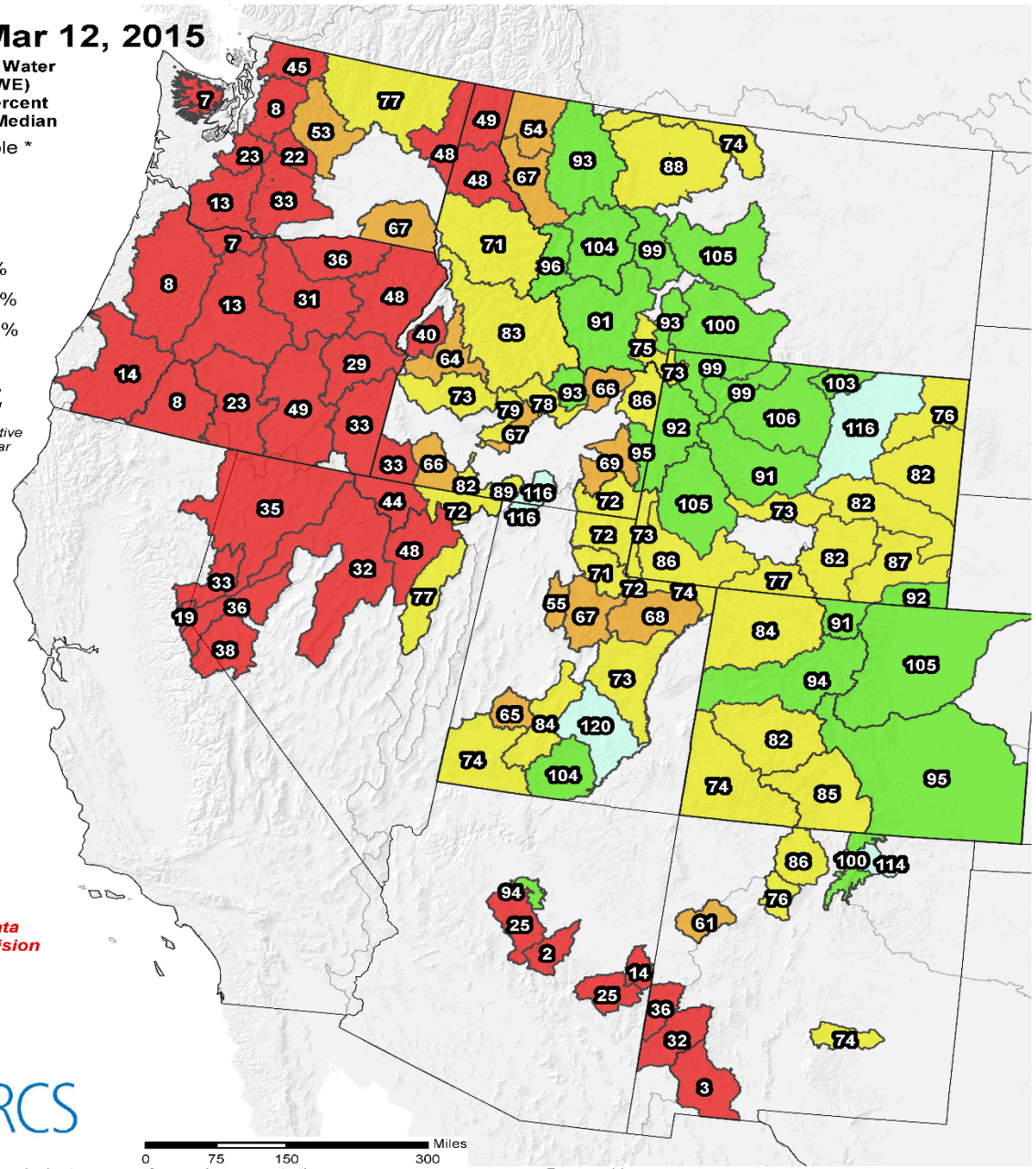
# Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

## Mar 12, 2015

**Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median**

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >= 150%

* *Data unavailable at time of posting or measurement is not representative at this time of year*



***Provisional data subject to revision***

USDA NRCS

0 75 150 300 Miles

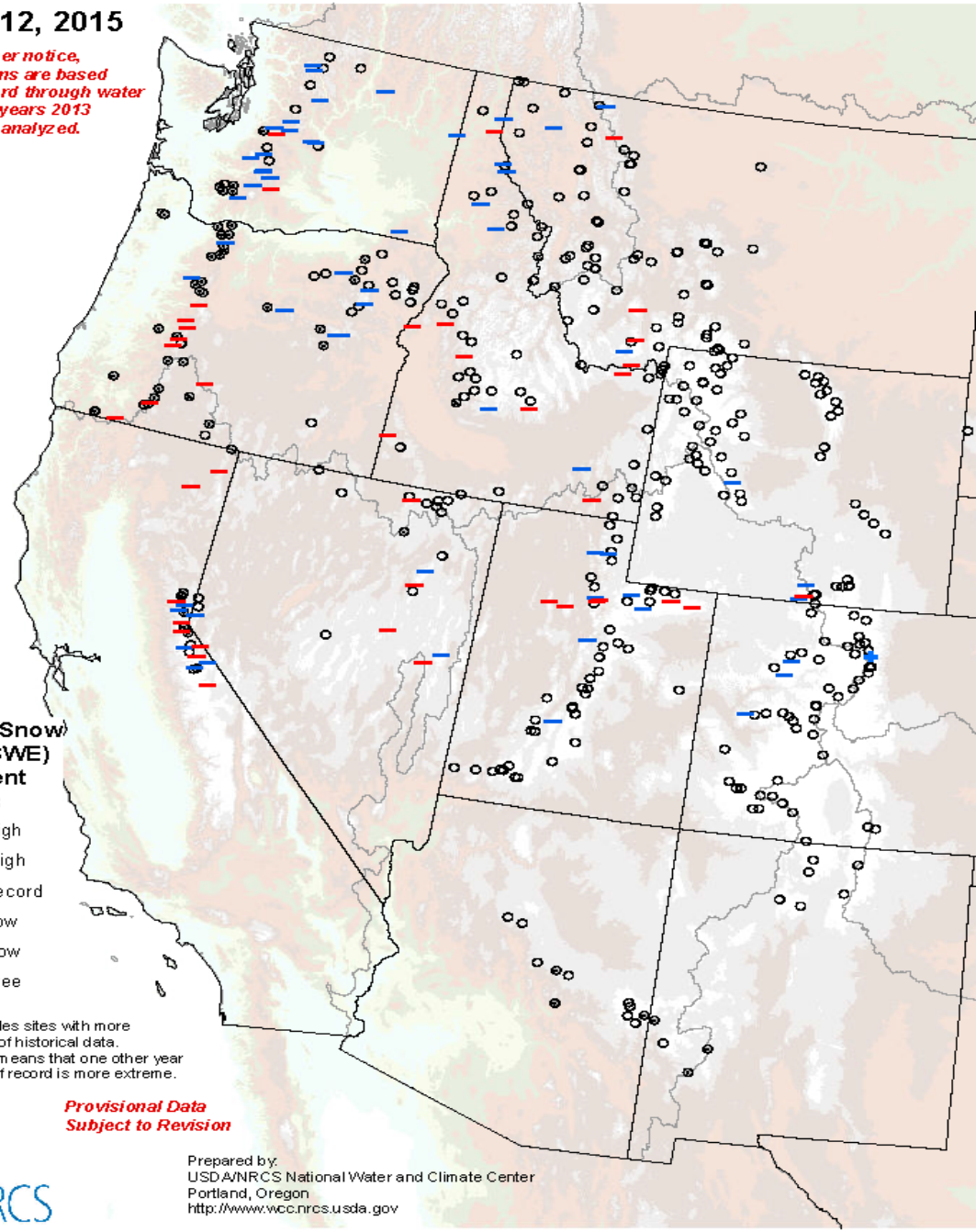
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

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

# SNOTEL Current Snow Water Equivalent (SWE) Records

## Mar 12, 2015

***NOTE: Until further notice, record calculations are based on period of record through water year 2012; water years 2013 and 2014 are not analyzed.***



**Current Snow Water (SWE) Equivalent Records**

- New High
- Near High
- Non-Record
- New Low
- Near Low
- snow free

Analysis includes sites with more than 20 years of historical data.
"Near" record means that one other year of the period of record is more extreme.

***Provisional Data Subject to Revision***

USDA NRCS

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

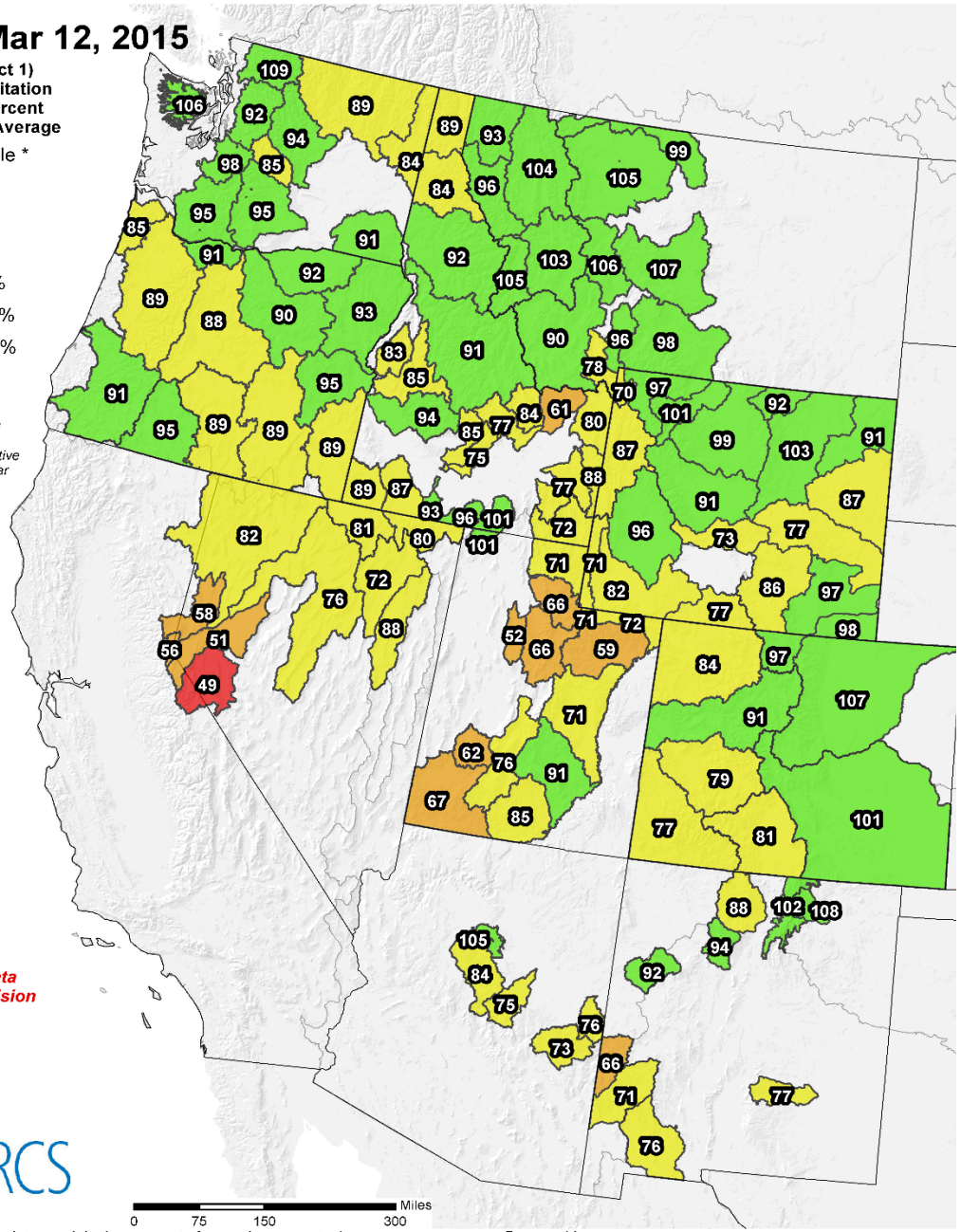
# Westwide SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal

## Mar 12, 2015

**Water Year (Oct 1) to Date Precipitation Basin-wide Percent of 1981-2010 Average**

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >= 150%

* *Data unavailable at time of posting or measurement is not representative at this time of year*




Miles: 0 75 150 300

***Provisional data subject to revision***

USDA NRCS

The water year to date precipitation percent of normal represents the accumulated precipitation 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
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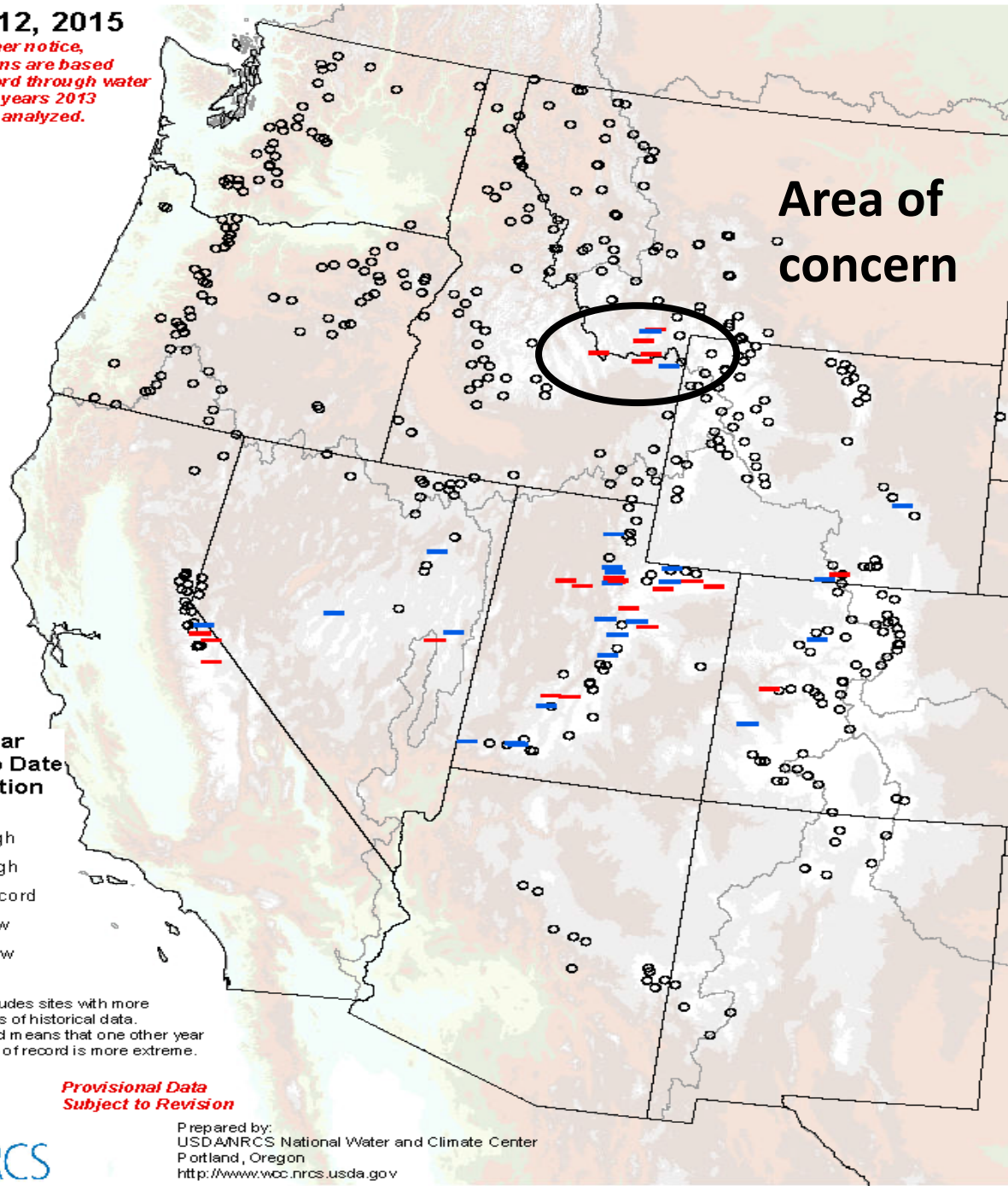
# SNOTEL Water Year (Oct 1) to Date Precipitation Records

## Mar 12, 2015

***NOTE: Until further notice, record calculations are based on period of record through water year 2012; water years 2013 and 2014 are not analyzed.***

**Area of concern**



**Water Year (Oct 1) to Date Precipitation Records**

- New High
- Near High
- Non-Record
- New Low
- Near Low

Analysis includes sites with more than 20 years of historical data.
"Near" record means that one other year of the period of record is more extreme.

USDA NRCS

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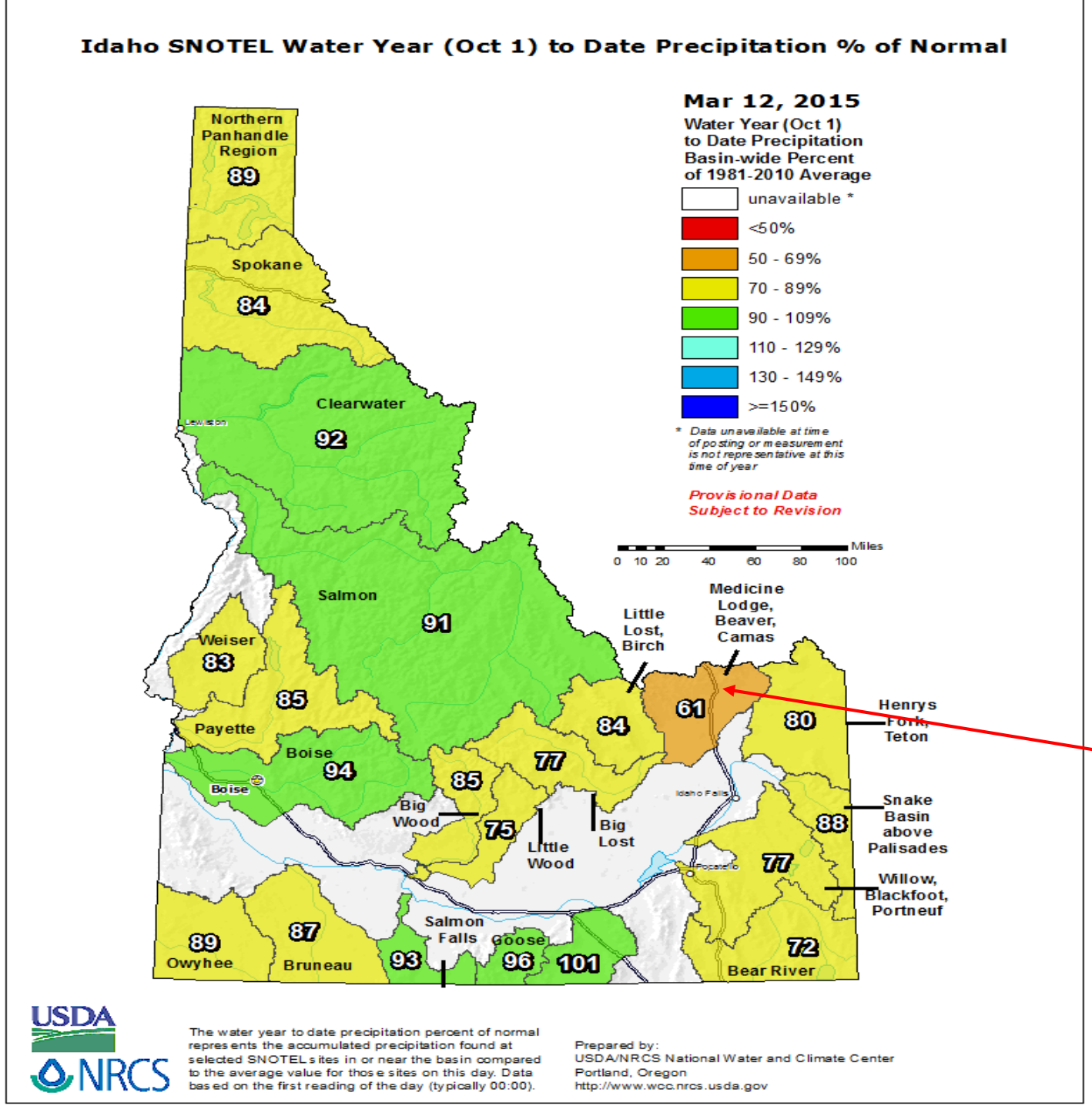



**February Precipitation:**

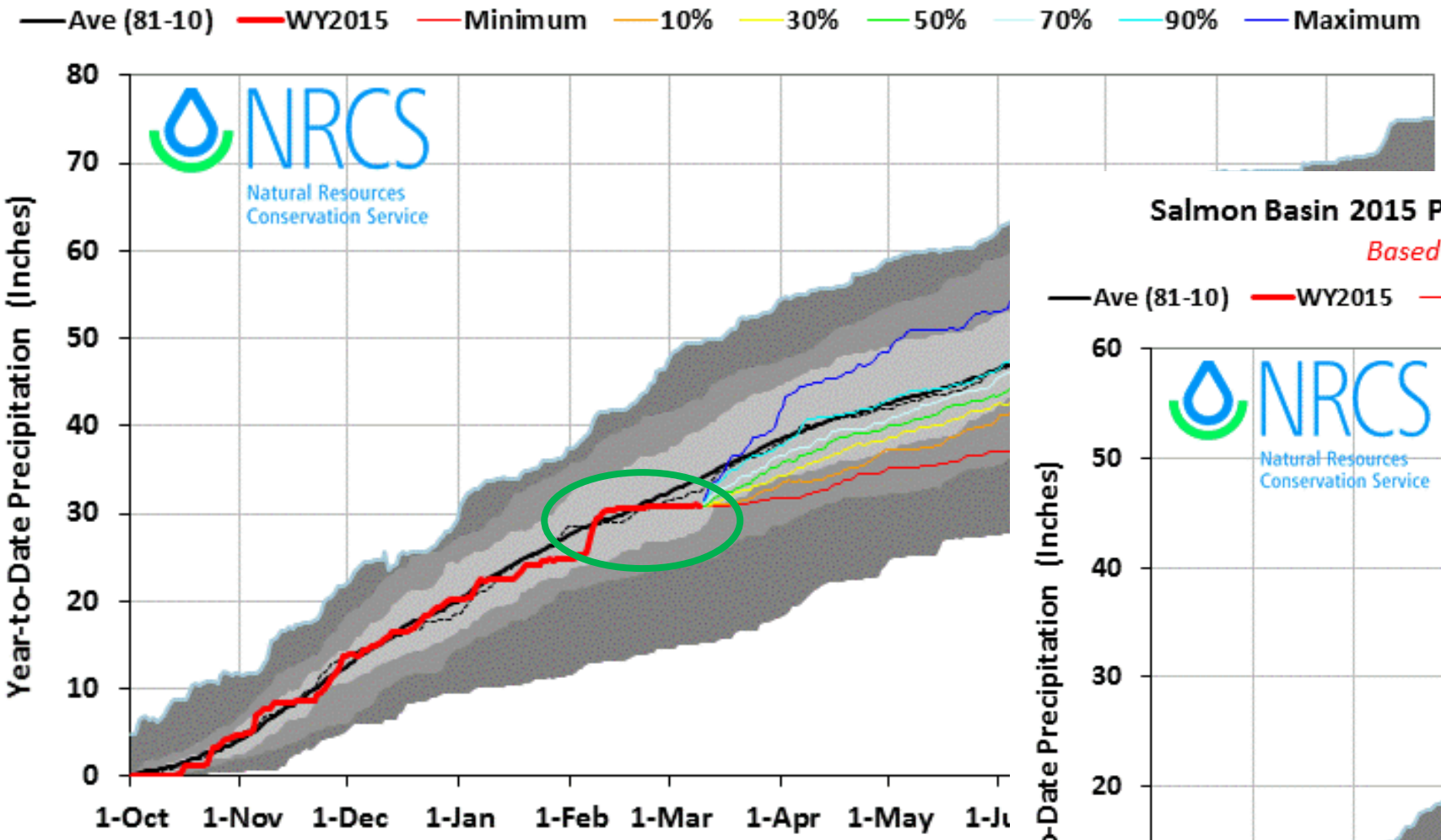
**One Atmospheric River event brought 125% of average to the Panhandle, the 2 SNOTEL sites closest to the Canadian border received 200% of normal.**

**Rest of Idaho received 50-90% of average**

**Water year to date precipitation lowest total in Mud Lake area (Medicine Lodge, Beaver, Camas basins) was 56% of average on March 1 now 53%**

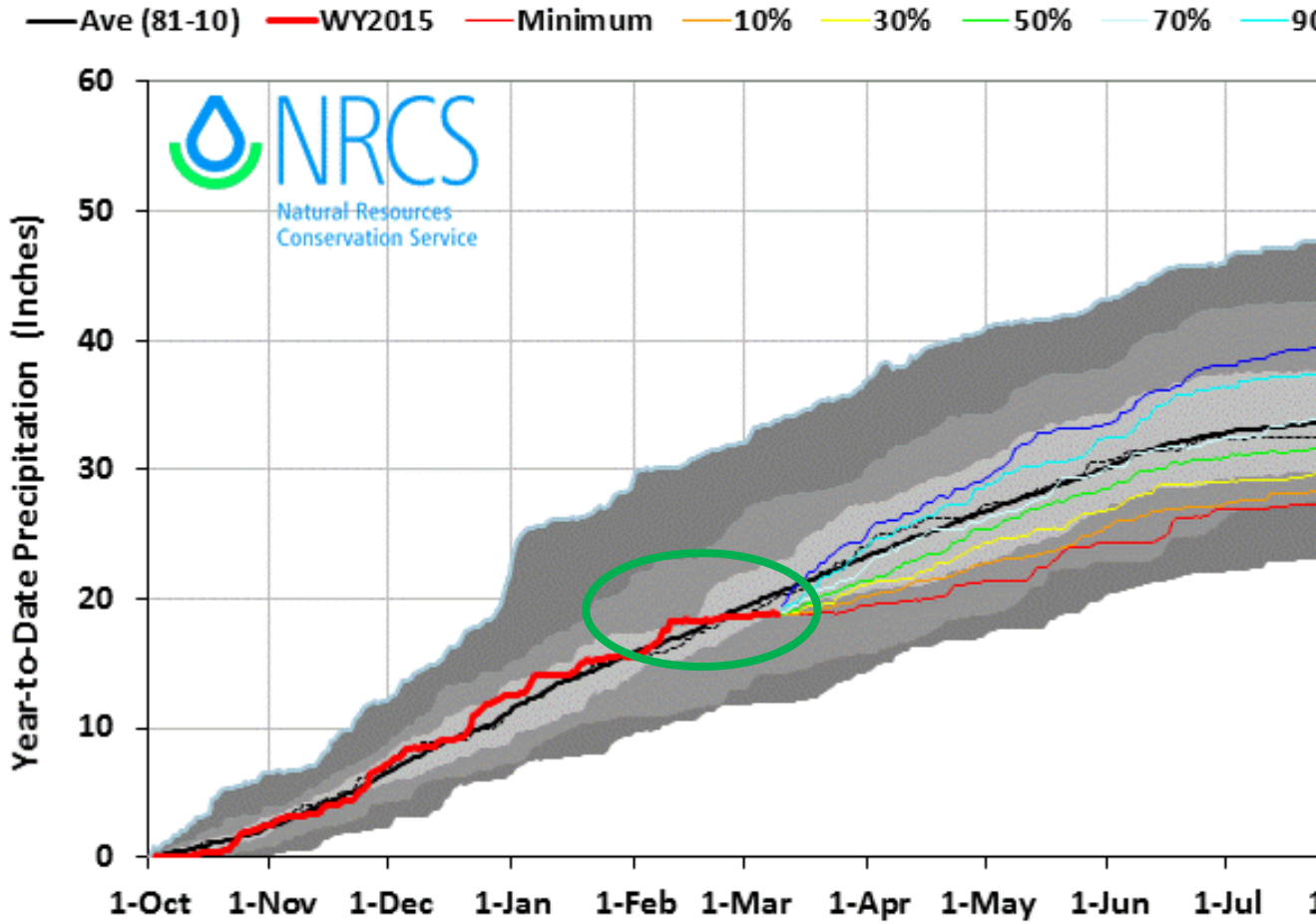
## Northern Panhandle Region 2015 Precipitation with Non-Exceedence Projections (8 sites)

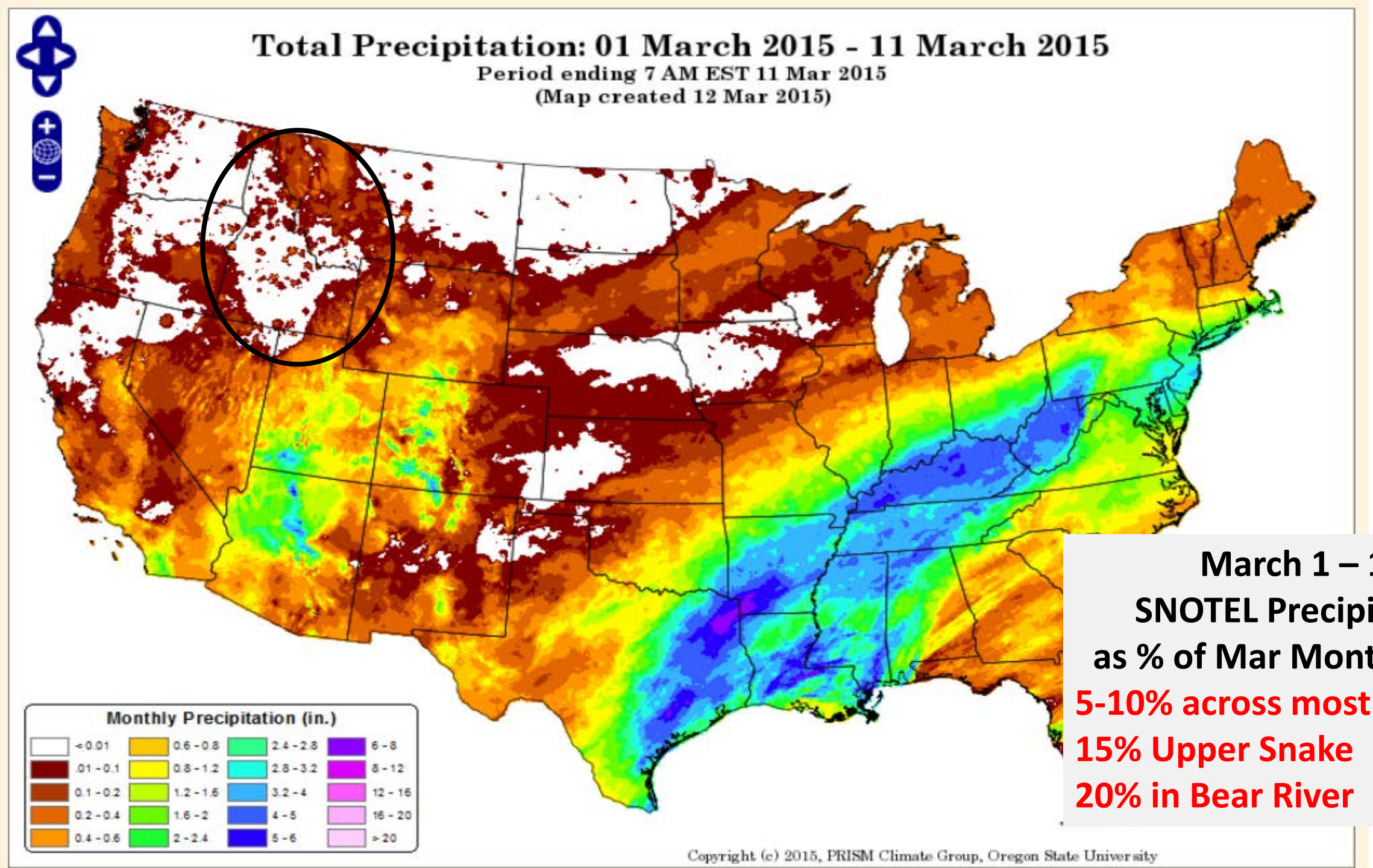
*Based on Provisional SNOTEL data as of Mar 09, 2015*




## Salmon Basin 2015 Precipitation with Non-Exceedence Projections (22

*Based on Provisional SNOTEL data as of Mar 09, 2015*






**March 1 – 12**

**SNOTEL Precipitation**

**as % of Mar Monthly Total**

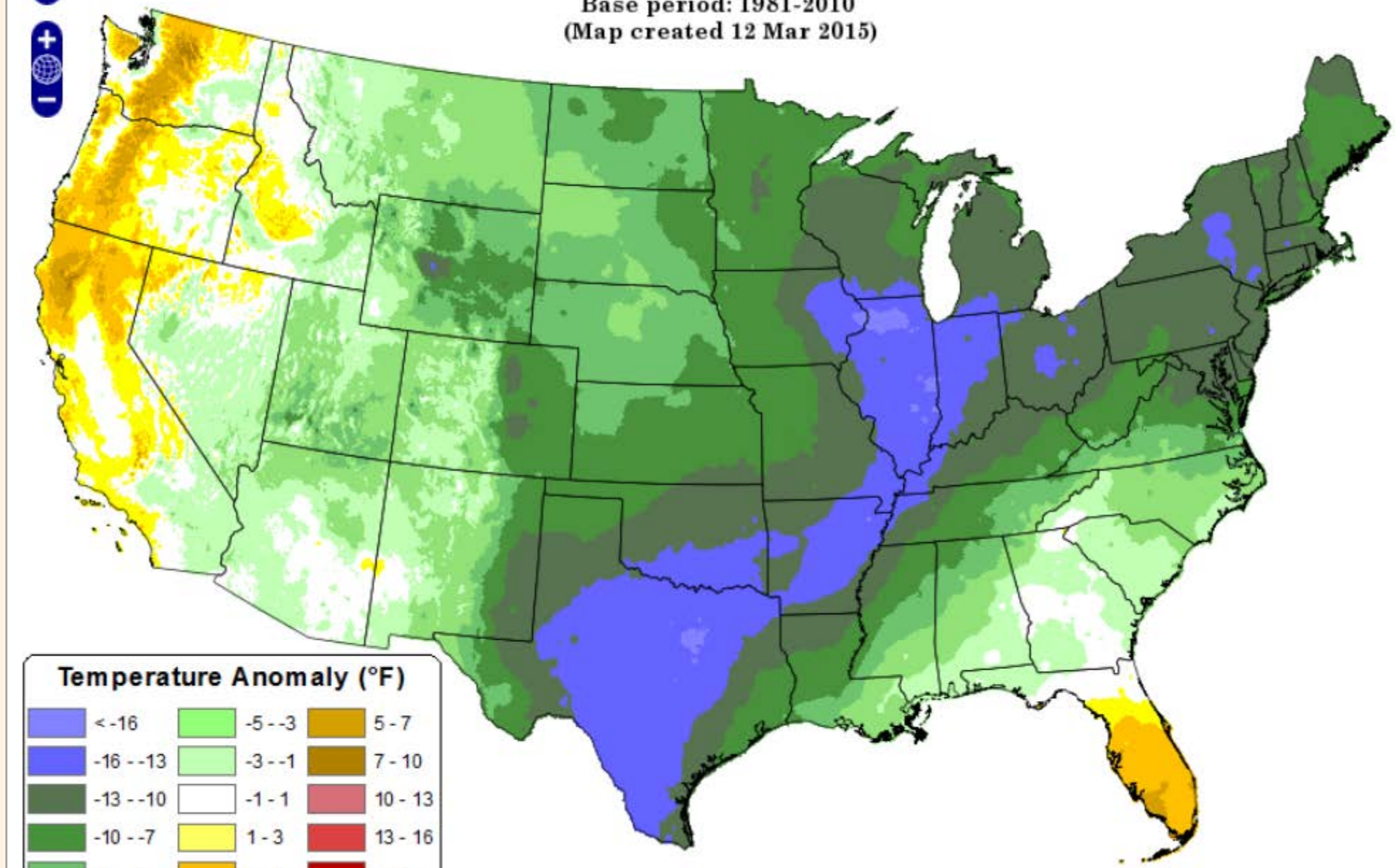
**5-10% across most of Idaho**

**15% Upper Snake**

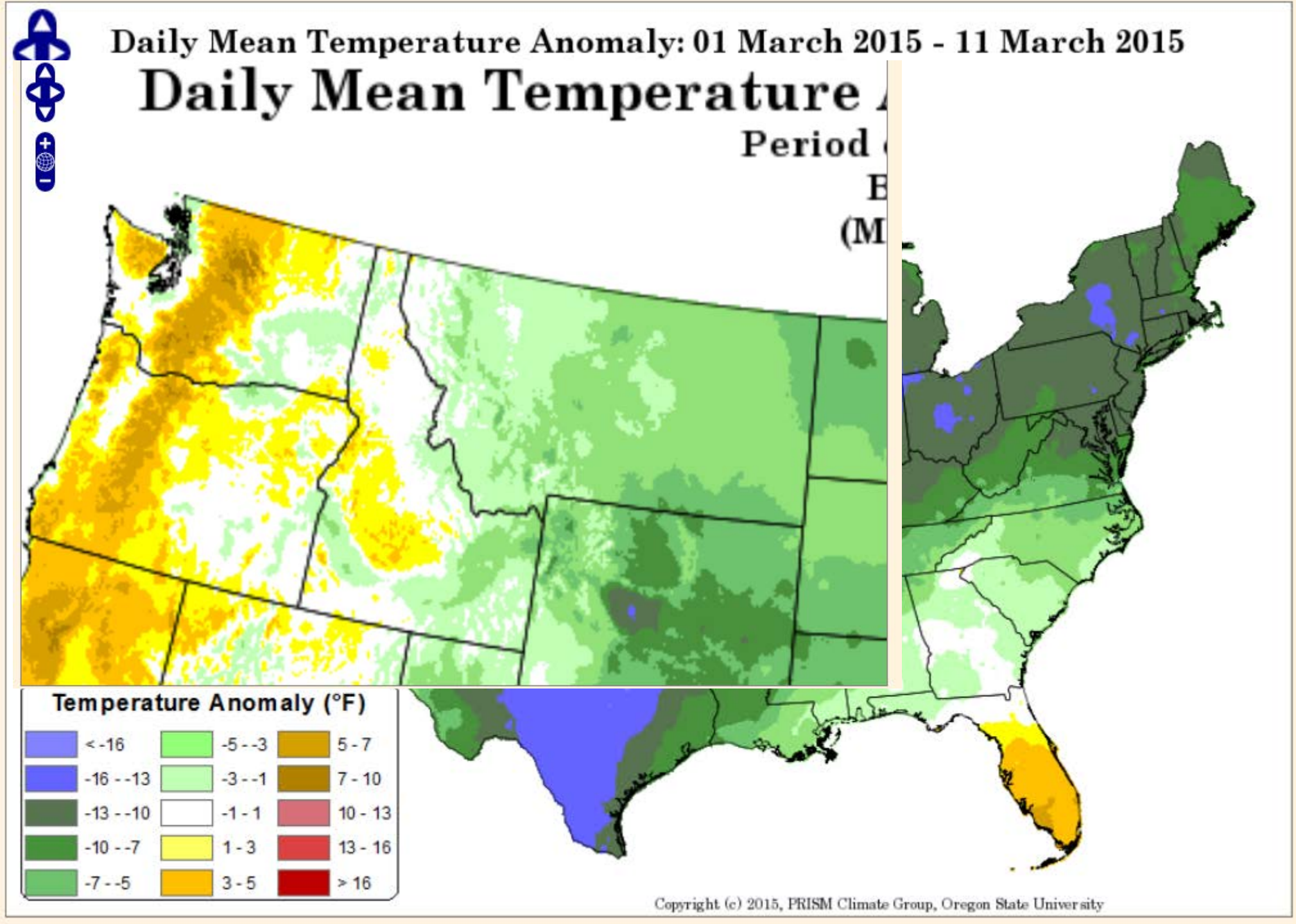
**20% in Bear River**

# Daily Mean Temperature Anomaly: 01 March 2015 - 11 March 2015

**Period ending 7 AM EST 11 Mar 2015**
**Base period: 1981-2010**
**(Map created 12 Mar 2015)**



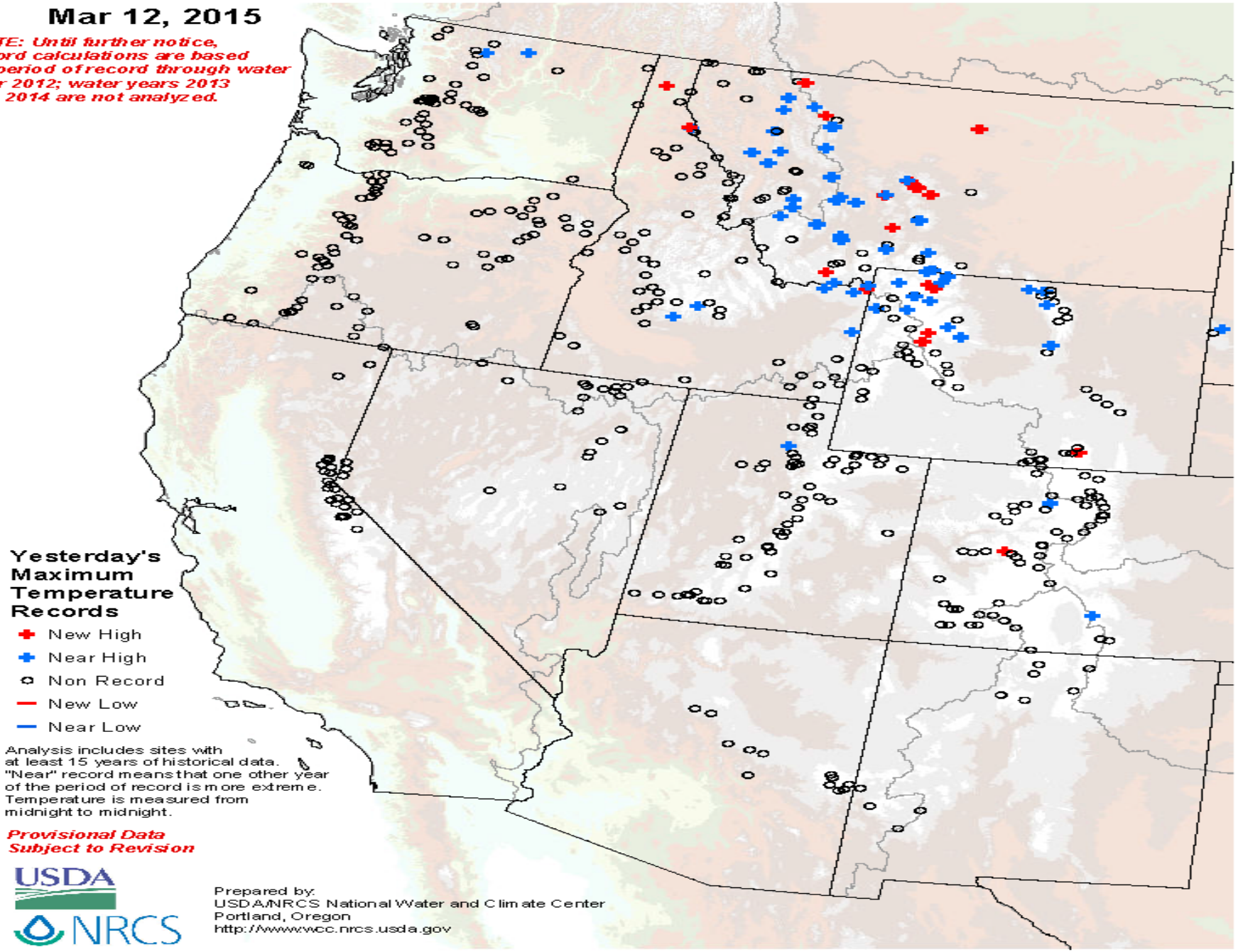

Copyright (c) 2015, PRISM Climate Group, Oregon State University


Daily Mean Temperature Anomaly: 01 March 2015 - 11 March 2015
Daily Mean Temperature
Temperature Anomaly (°F)
< -16
-16 - -13
-13 - -10
-10 - -7
-7 - -5
-5 - -3
-3 - -1
-1 - 1
1 - 3
3 - 5
5 - 7
7 - 10
10 - 13
13 - 16
> 16
Copyright (c) 2015, PRISM Climate Group, Oregon State University

# SNOTEL Yesterday's Maximum Temperature Records

## Mar 12, 2015

*NOTE: Until further notice, record calculations are based on period of record through water year 2012; water years 2013 and 2014 are not analyzed.*




Analysis includes sites with at least 15 years of historical data. "Near" record means that one other year of the period of record is more extreme. Temperature is measured from midnight to midnight.

*Provisional Data Subject to Revision*

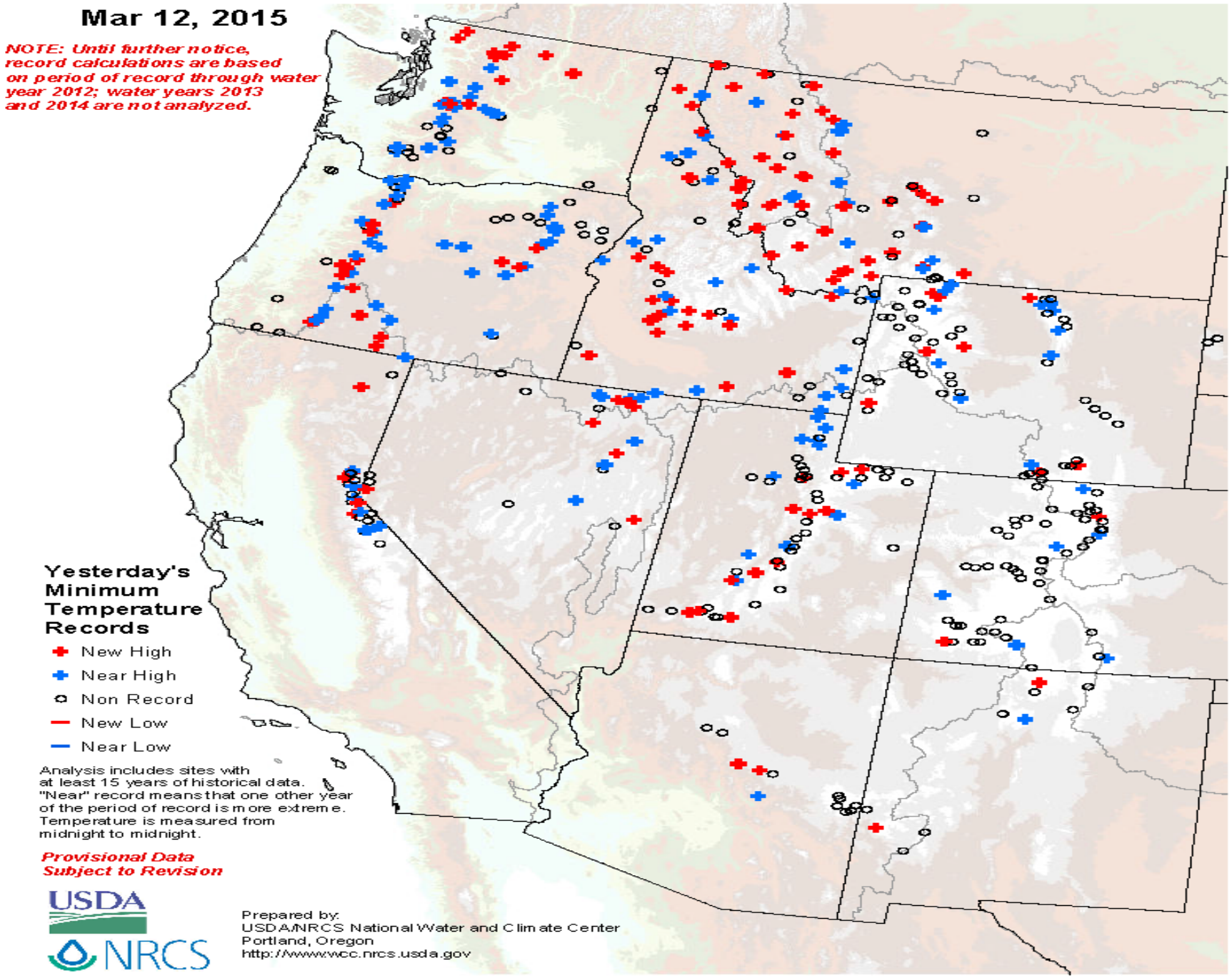
USDA NRCS

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

# SNOTEL Yesterday's Minimum Temperature Records

## Mar 12, 2015

*NOTE: Until further notice, record calculations are based on period of record through water year 2012; water years 2013 and 2014 are not analyzed.*




Analysis includes sites with at least 15 years of historical data. "Near" record means that one other year of the period of record is more extreme. Temperature is measured from midnight to midnight.

*Provisional Data Subject to Revision*

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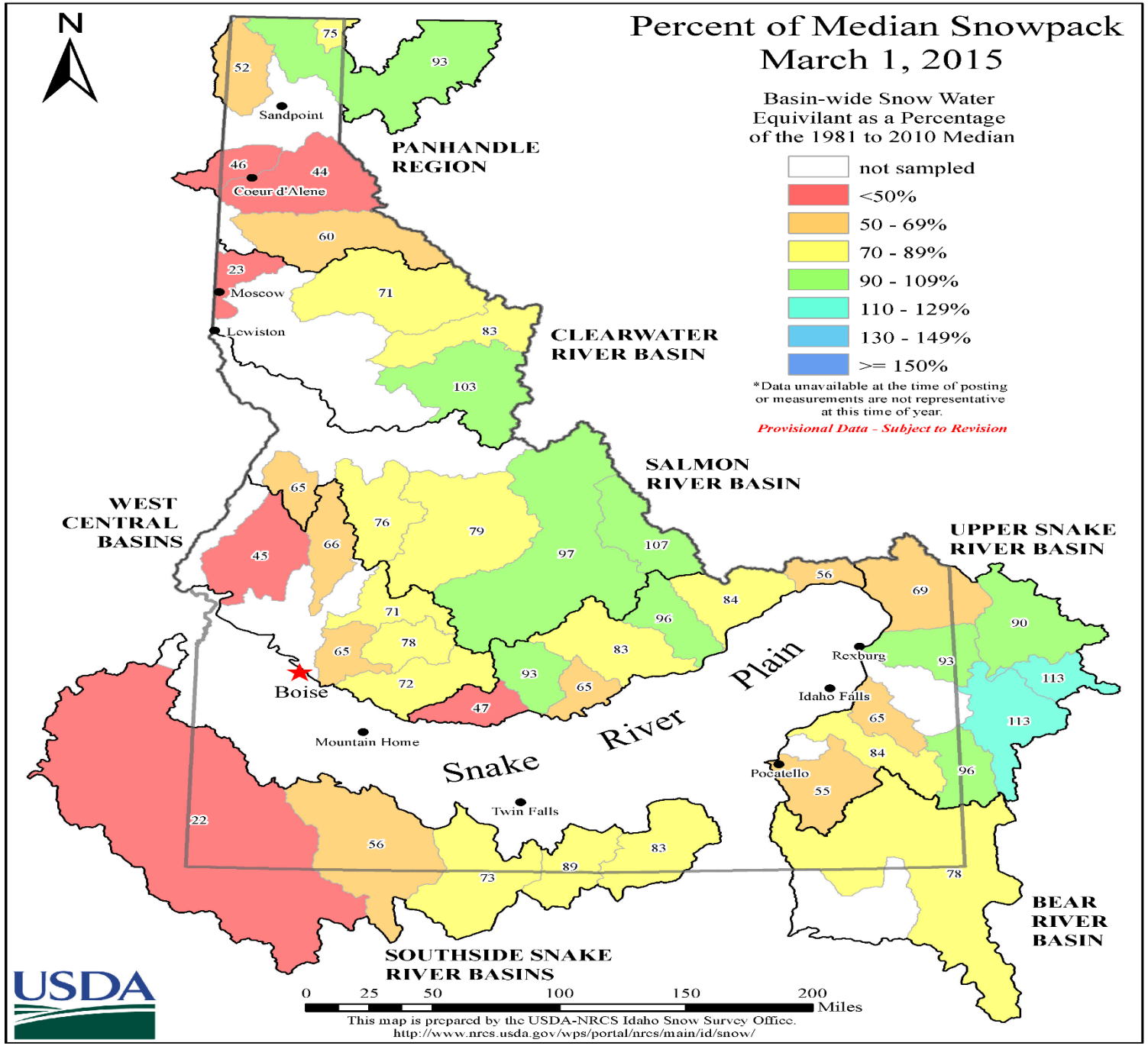
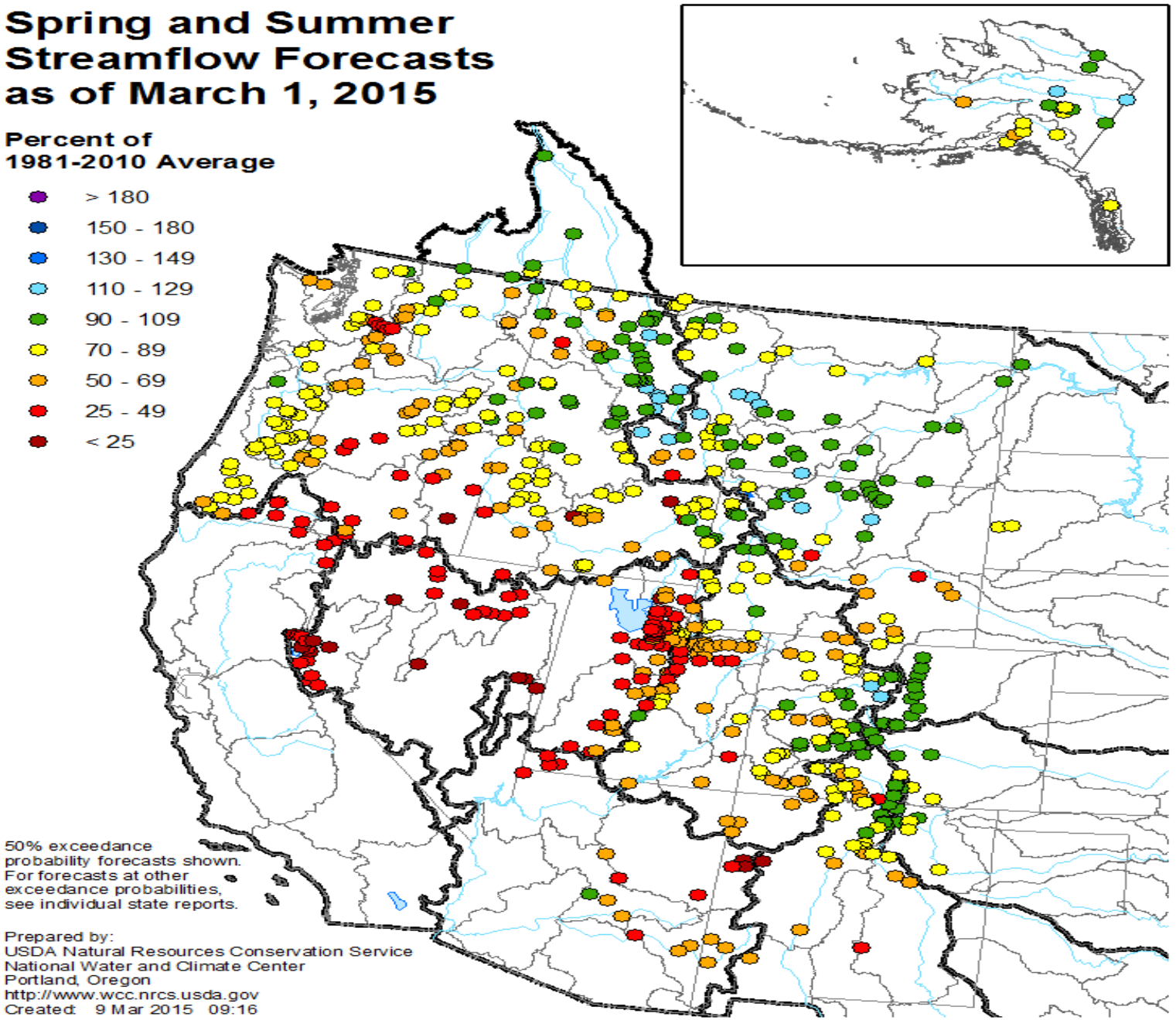


Percent of Median Snowpack
March 1, 2015
Basin-wide Snow Water Equivilant as a Percentage of the 1981 to 2010 Median
not sampled
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>= 150%
*Data unavailable at the time of posting or measurements are not representative at this time of year.
Provisional Data - Subject to Revision
N
PANHANDLE REGION
CLEARWATER RIVER BASIN
SALMON RIVER BASIN
WEST CENTRAL BASINS
UPPER SNAKE RIVER BASIN
BEAR RIVER BASIN
SOUTHSIDE SNAKE RIVER BASINS
Snake River Plain
Sandpoint
Coeur d'Alene
Moscow
Lewiston
Boise
Mountain Home
Twin Falls
Rexburg
Idaho Falls
Pocatello
75
52
93
46
44
60
23
71
83
103
65
76
79
97
107
45
66
71
78
65
72
47
93
65
83
96
84
56
69
90
93
113
113
65
84
96
55
22
56
73
89
83
78
0 25 50 100 150 200 Miles
This map is prepared by the USDA-NRCS Idaho Snow Survey Office.
http://www.nrcs.usda.gov/wps/portal/nrcs/main/id/snow/
USDA

# Spring and Summer Streamflow Forecasts as of March 1, 2015

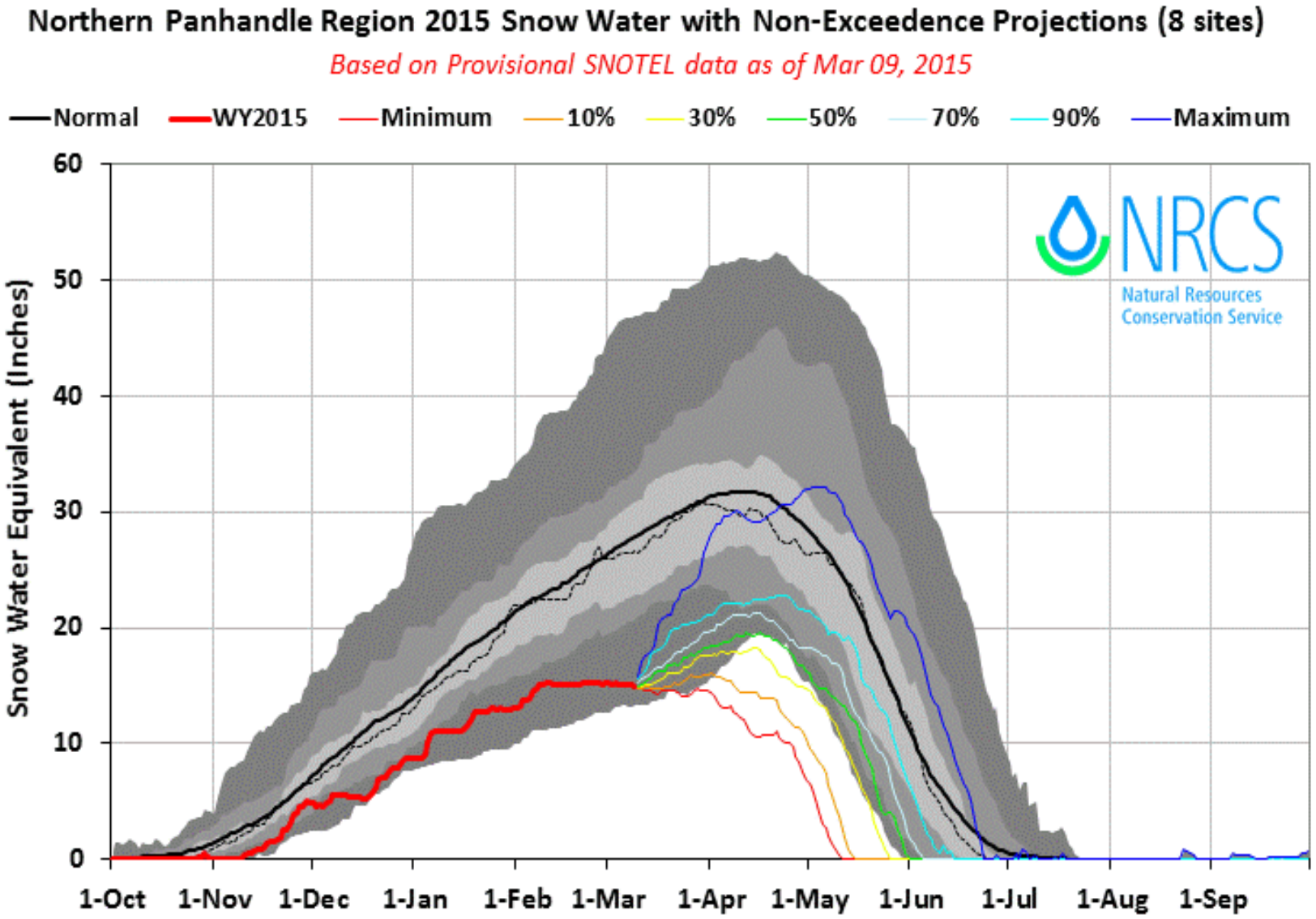



50% exceedance probability forecasts shown. For forecasts at other exceedance probabilities, see individual state reports.

Prepared by:
USDA Natural Resources Conservation Service
National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov
Created: 9 Mar 2015 09:16

# Idaho Surface Water Supply Index March 1, 2015

| *BASIN or REGION* | *SWSI Value* | *Most Recent Year With Similar SWSI Value* | *Agricultural Water Supply Shortage May Occur When SWSI is Less Than* |
|---|---|---|---|
| Northern Panhandle | Not Available | --- | --- |
| Spokane | -3.3 | 2005 | NA |
| Clearwater | 1.0 | 2006 | NA |
| Salmon | -0.3 | 2002 | NA |
| Weiser | -1.9 | 2004 | NA |
| Payette | -1.4 | 2014 | NA |
| Boise | 1.0 | 2009 | -1.5 |
| Big Wood | -0.2 | 2010 | 0.1 |
| Little Wood | -0.6 | 2008 | -1.3 |
| Big Lost | -0.2 | 2008 | 0.6 |
| Little Lost | -1.7 | 2014 | 1.3 |
| Teton | -0.5 | 2005 | -3.9 |
| Henrys Fork | -0.1 | 2010 | -3.4 |
| Snake (Heise) | 1.1 | 2014 | -1.5 |
| Oakley | -0.9 | 2013 | 0.4 |
| Salmon Falls | -1.8 | 2004 | -0.8 |
| Bruneau | -0.7 | 2013 | NA |
| Owyhee | -3.3 | 2003 | -3.2 |
| Bear River | -0.5 | 2014 | -3.7 |



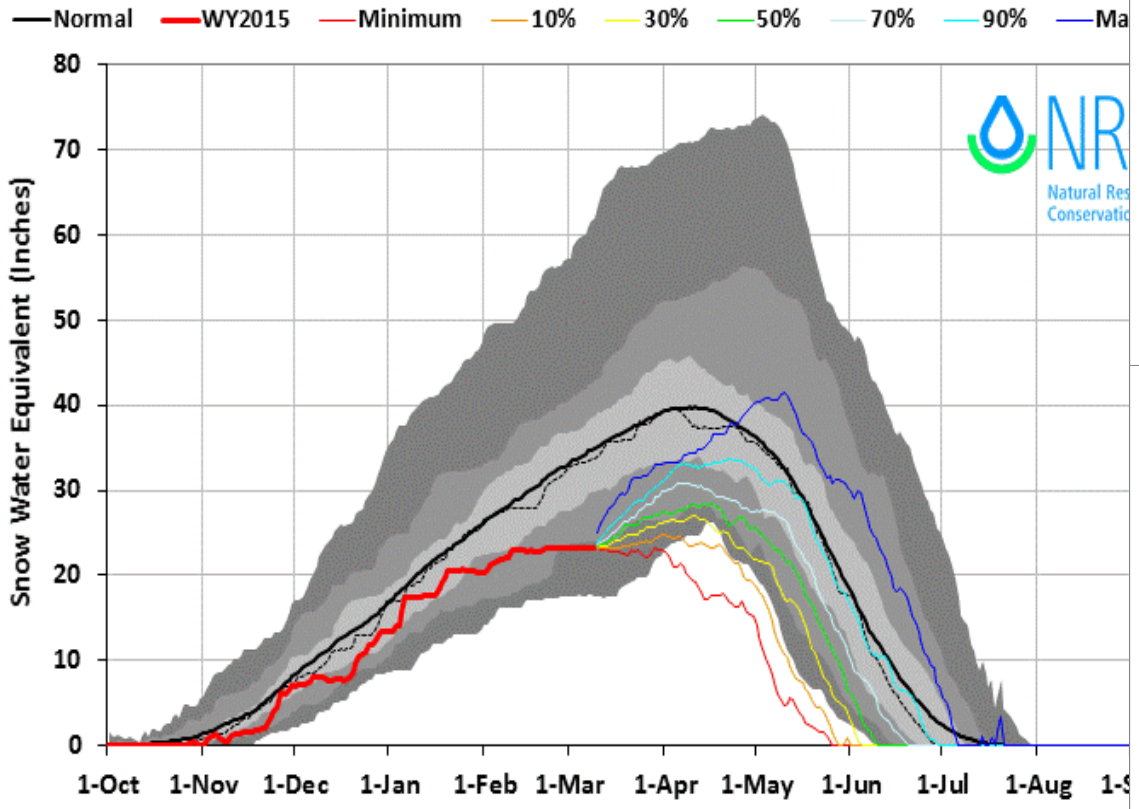

## Boundary Creek

| Year | Runoff |
|---|---|
| 1959 | 109% |
| 2014 | 104% |
| 2015 | 82% |

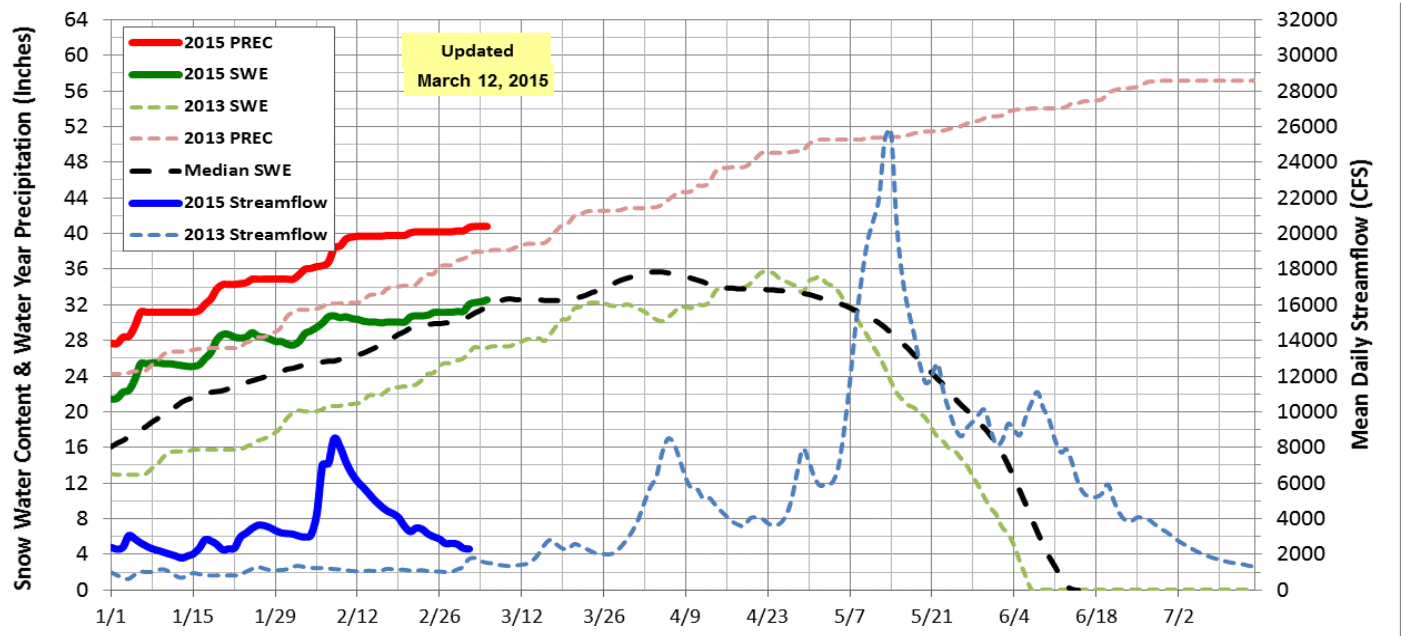
Forecast

## North Fork Clearwater Basin 2015 Snow Water with Non-Exceedence Projections (8 sites)

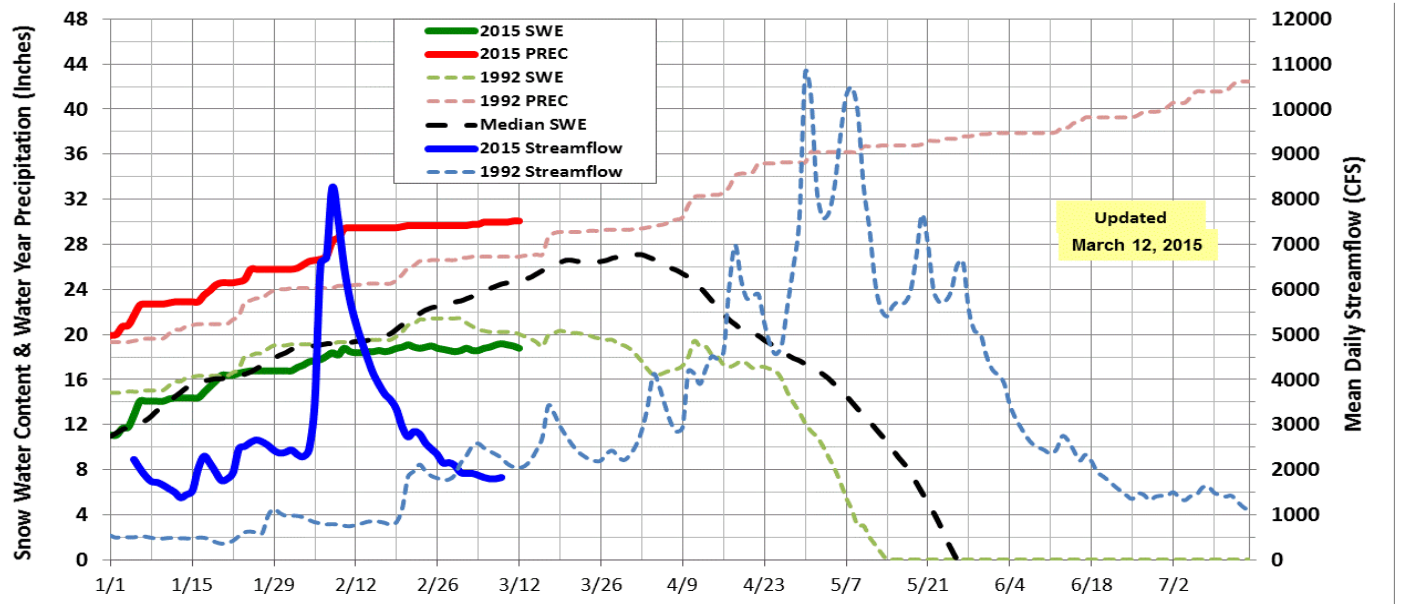
*Based on Provisional SNOTEL data as of Mar 09, 2015*




## 2015 & 2013 Twin Lakes SNOTEL and Selway River near Lowell



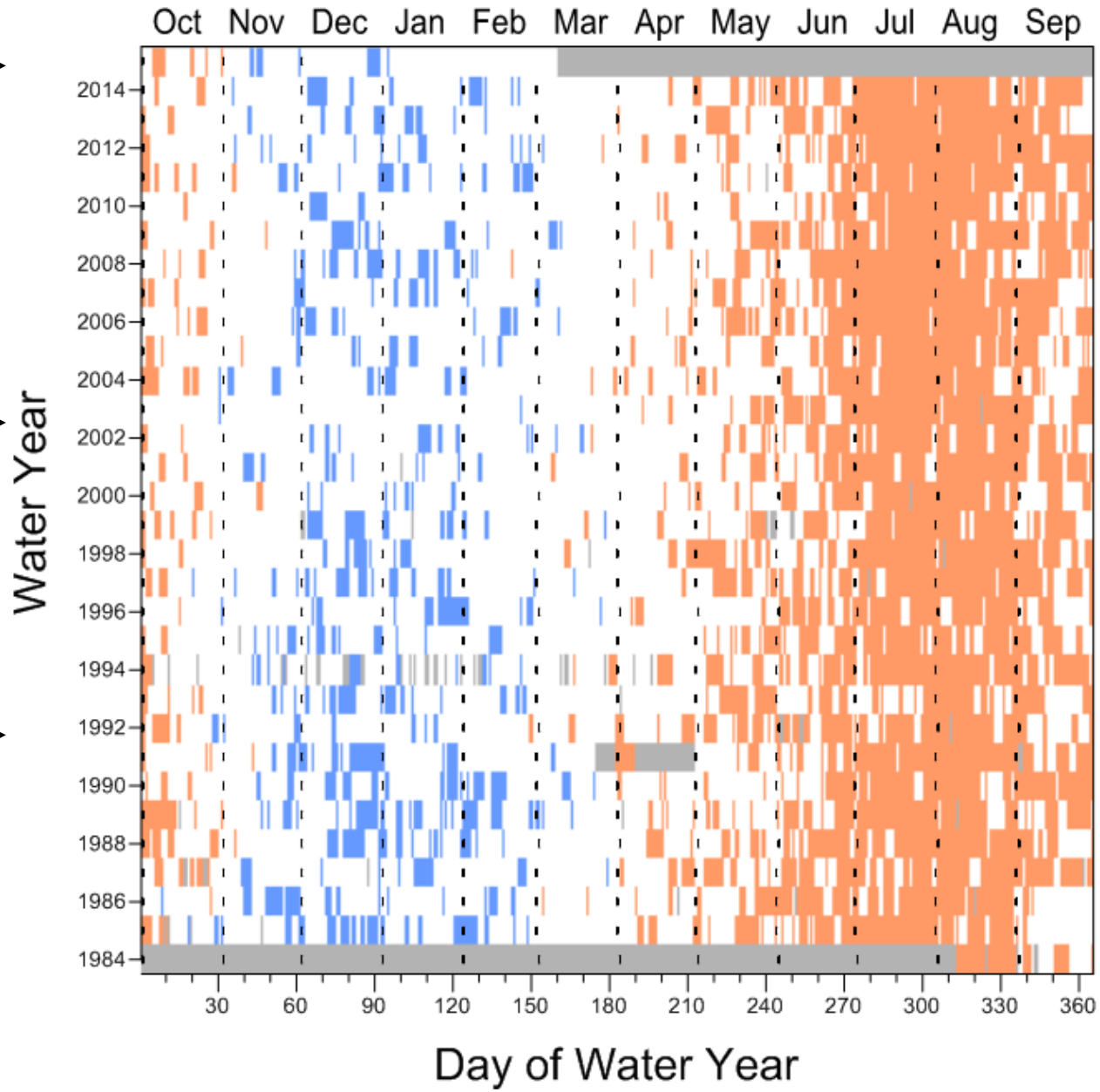

## 2015 & 1992 Lolo Pass SNOTEL and Lochsa River near Lowell



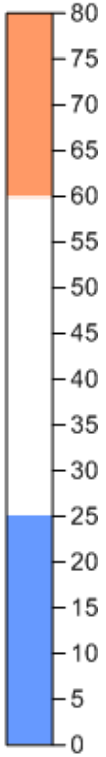
**From NOAA NWS Crater Meadows, ID SNOTEL site**

http://www.wcc.nrcs.usda.gov/nwcc/site?sitenum=425

**Other warm years**
**2015**
**2003**
**1992**



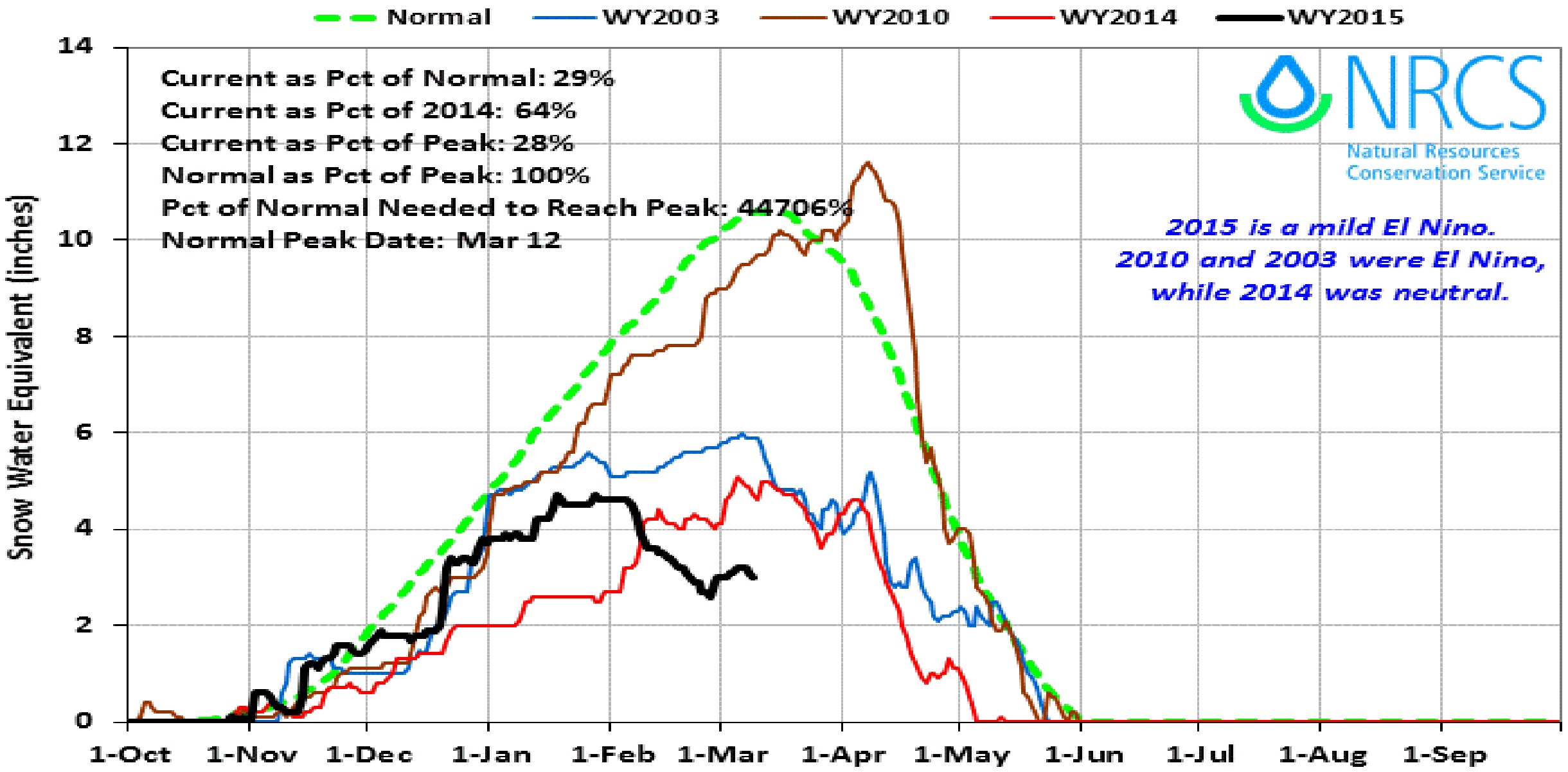

**Max air temp (° F)**




**Missing**

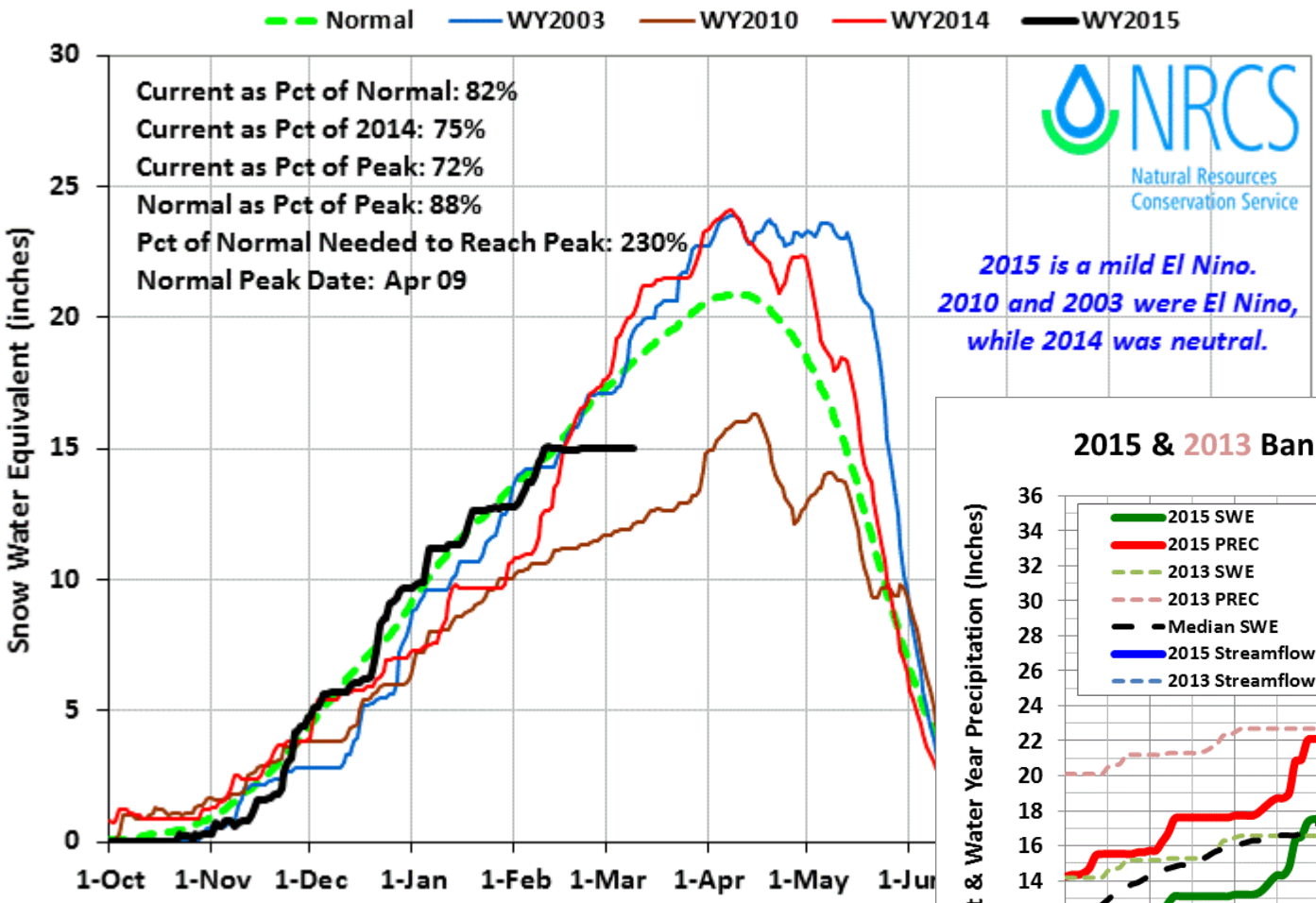
# Owyhee Basin 2015 Snowpack Comparison Graph (7 sites)

*Based on Provisional SNOTEL data as of Mar 09, 2015*



## Salmon Basin 2015 Snowpack Comparison Graph (22 sites)

*Based on Provisional SNOTEL data as of Mar 09, 2015*

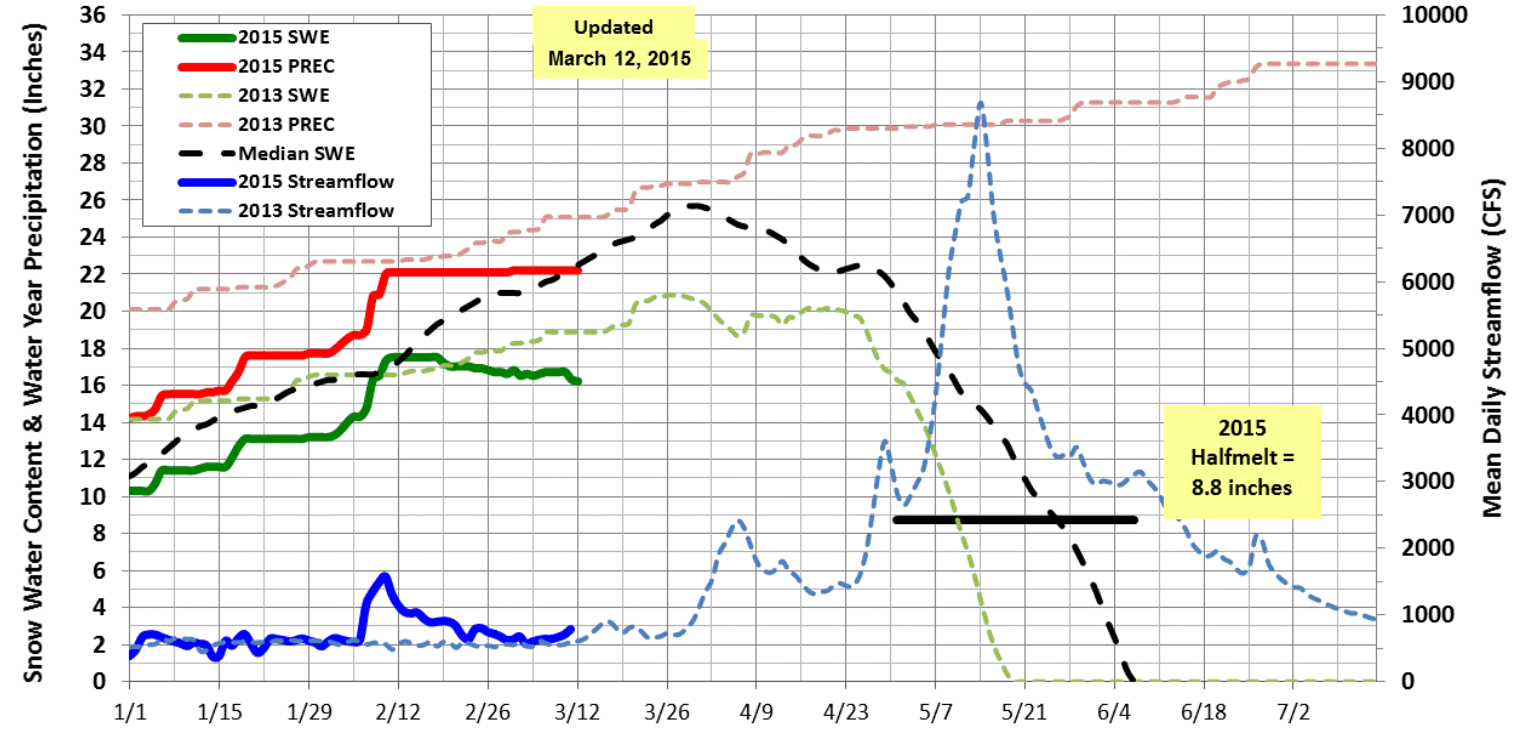



NRCS Natural Resources Conservation Service

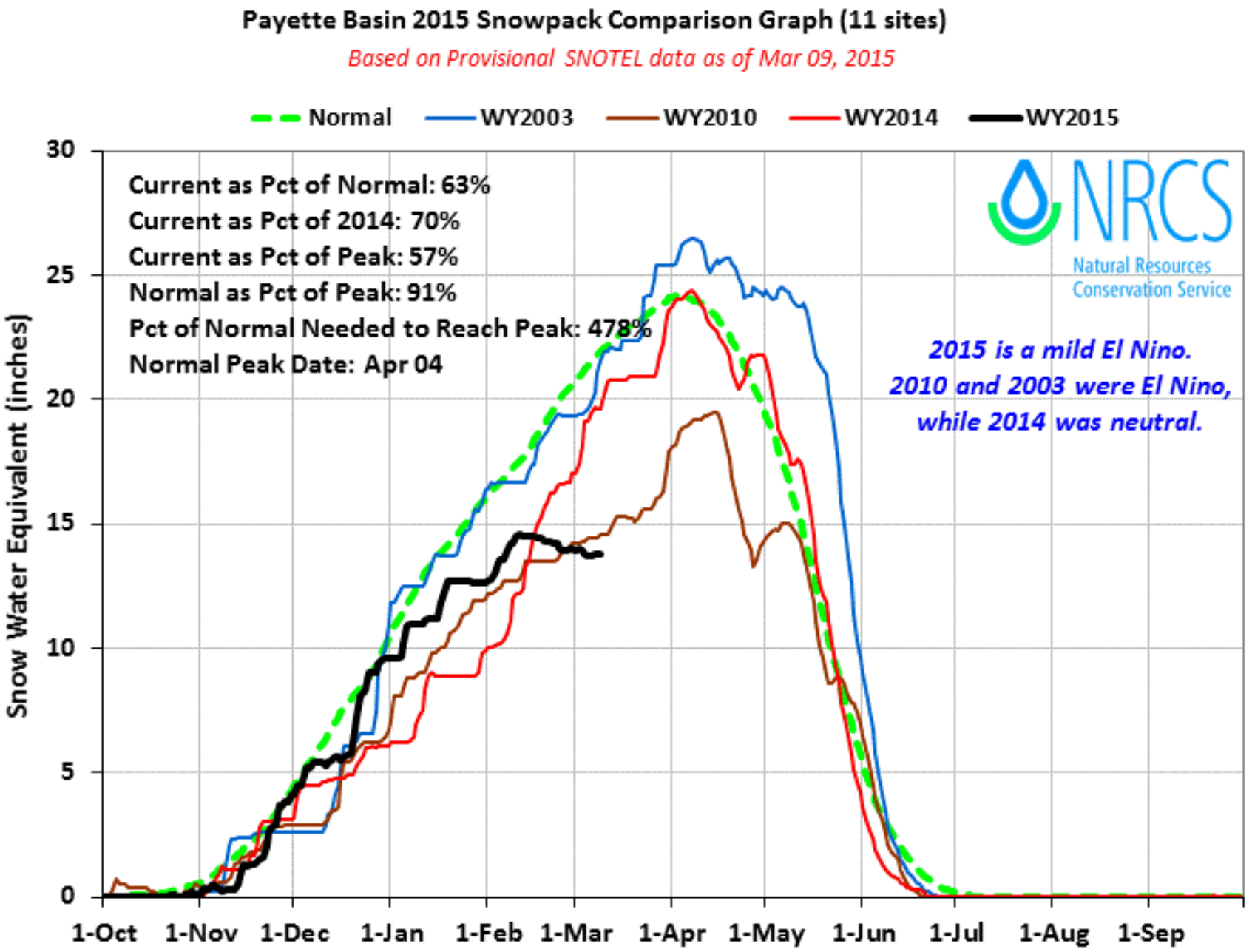
*2015 is a mild El Nino.*
*2010 and 2003 were El Nino,*
*while 2014 was neutral.*

## 2015 & 2013 Banner Summit SNOTEL and MF Salmon River at MF Lodge

USDA NRCS United States Department of Agriculture Natural Resources Conservation Service

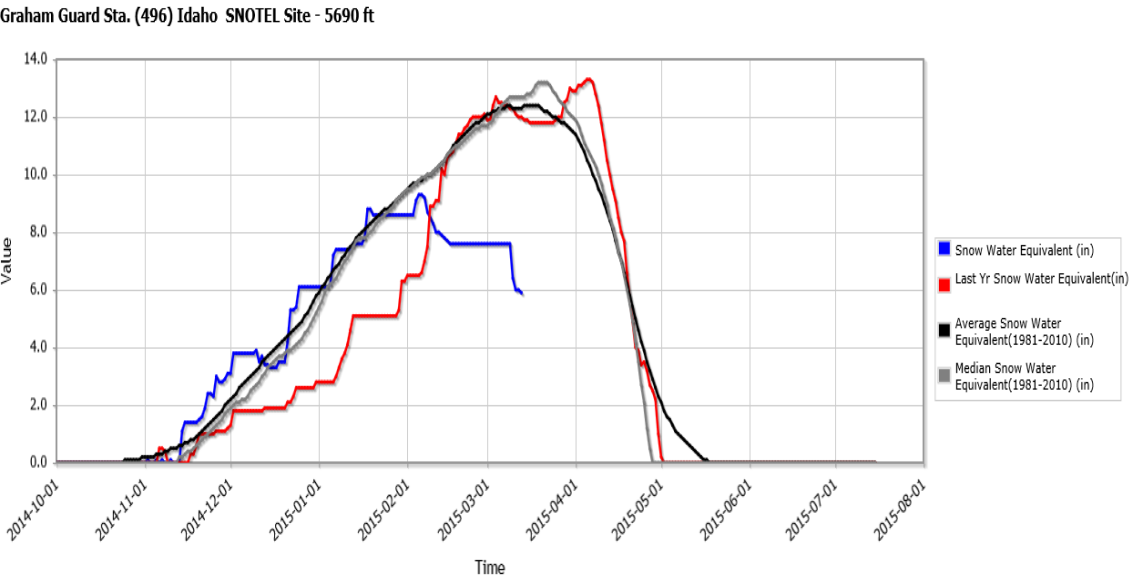



On average MF Salmon River experiences a snowmelt streamflow peak, or increase in flow, when Banner Summit SNOTEL is half-melted.

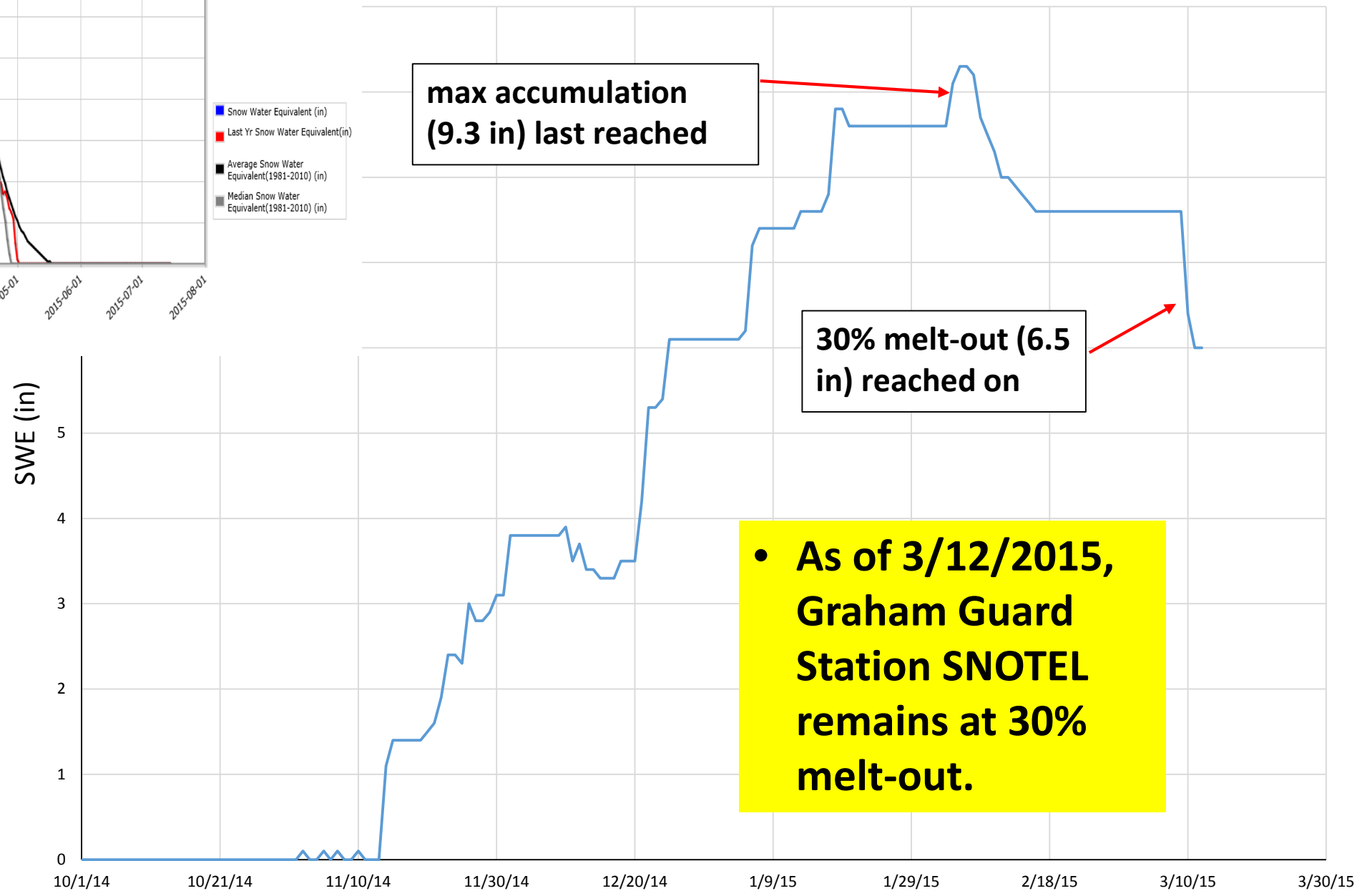



**Following are Boise River Snow to Flow Analysis by BSU to help predict the peak snowmelt streamflow**

**Caution – it maybe challenging this year due to early melting that is occurring**




Graham Guard Station SNOTEL site WY2015

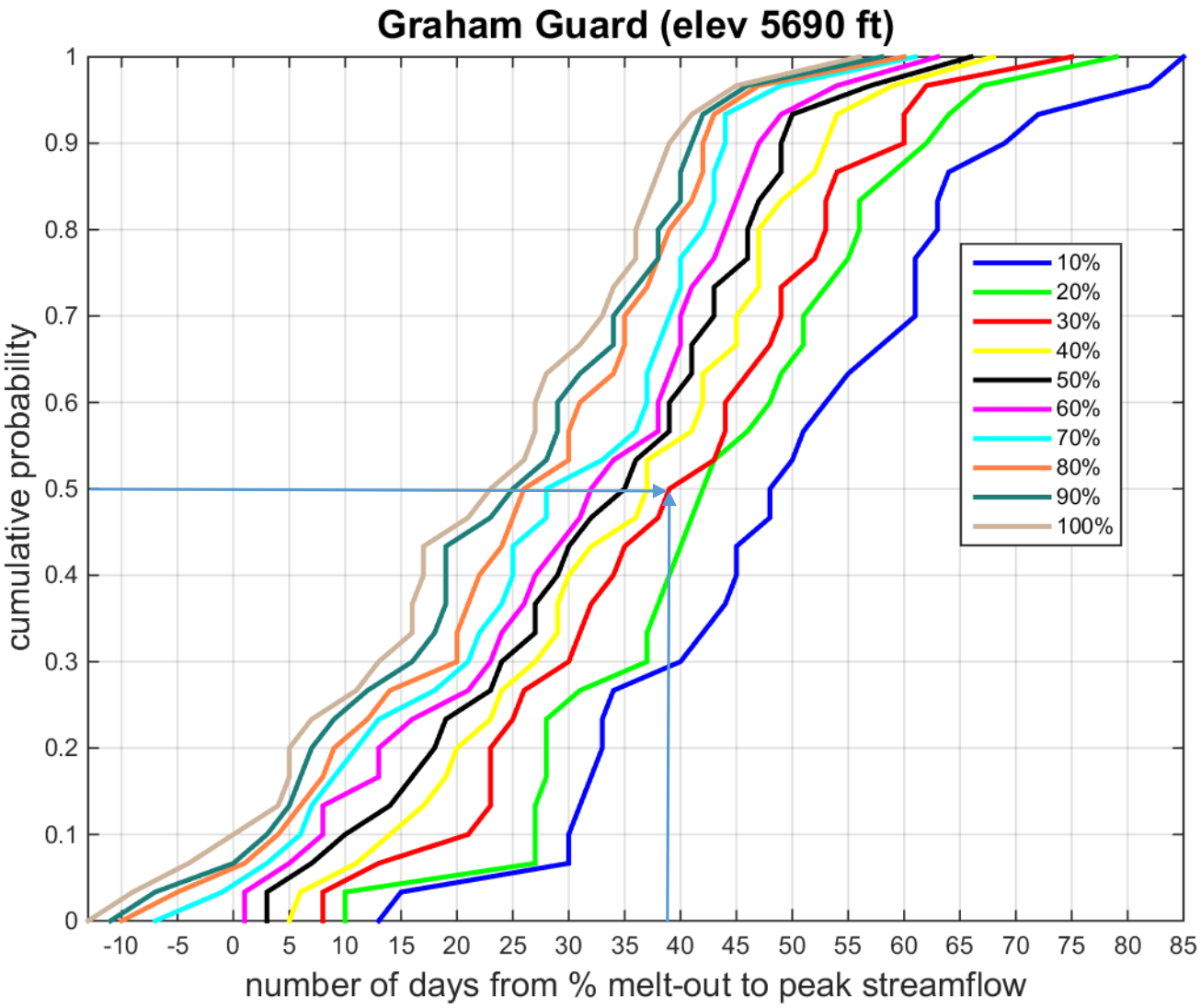



- **As of 3/12/2015, Graham Guard Station SNOTEL remains at 30% melt-out.**

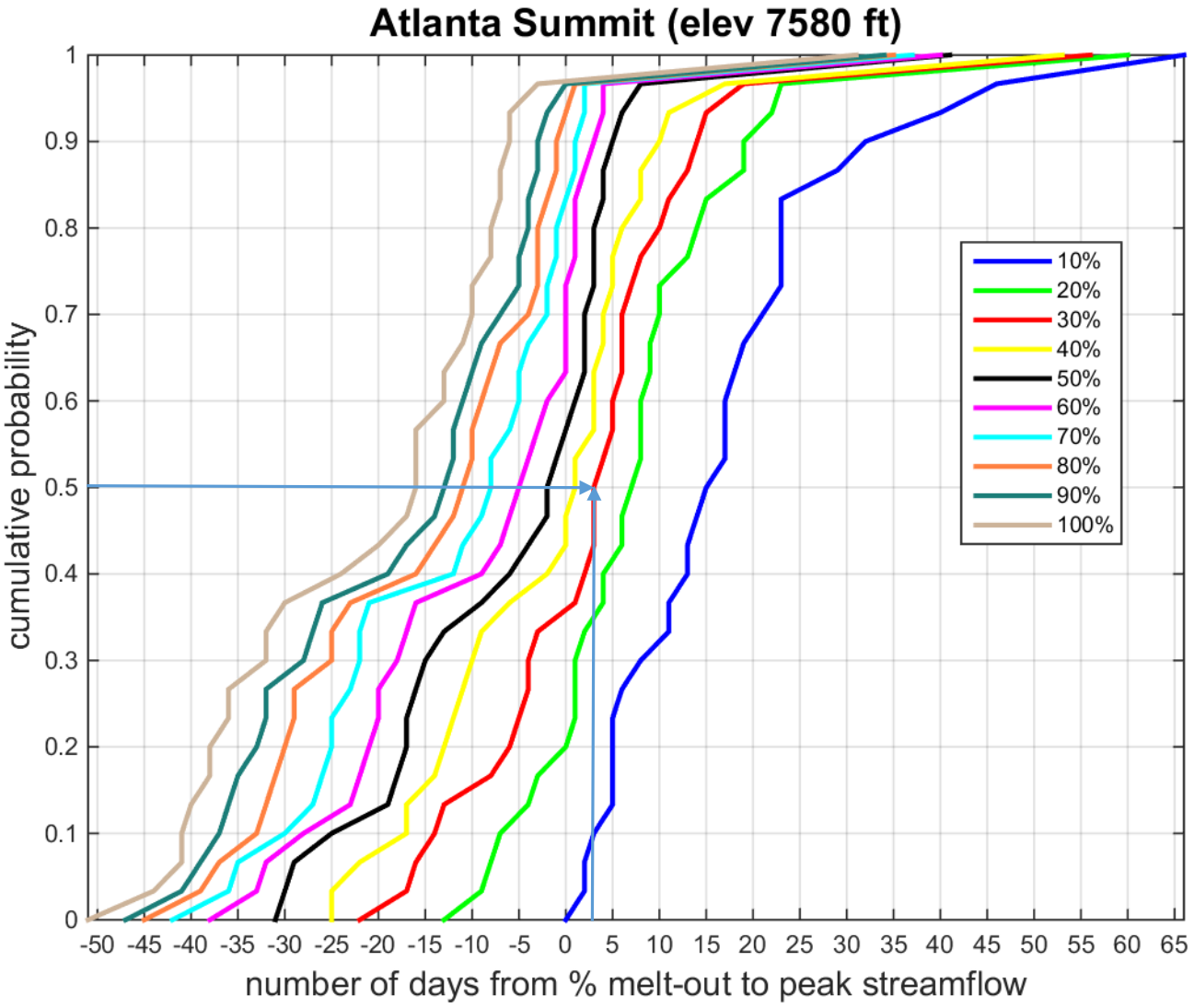
- **We are currently at 30% melt-out (70% of SWE remaining) at the Graham Guard SNOTEL site. The 30% melt-out probability curve is indicated by the RED line.**

- **The x-axis shows the number of days from each melt-out percent to peak streamflow.**

- **On average (50% probability), peak streamflow will occur within the next 39 days.**



- We often use the highest elevation SNOTEL sites for predictive purposes since these sites still have snow remaining at the time of peak streamflow.
- As of 3/12, Atlanta Summit, the highest elevation SNOTEL site, is at 99% of max accumulation (~1% melt-out).
- The probability graph for Atlanta Summit shows that on average (50% probability), peak streamflow occurs:
  - 3 days after reaching 30% melt-out (or 1 day after 40% melt-out)

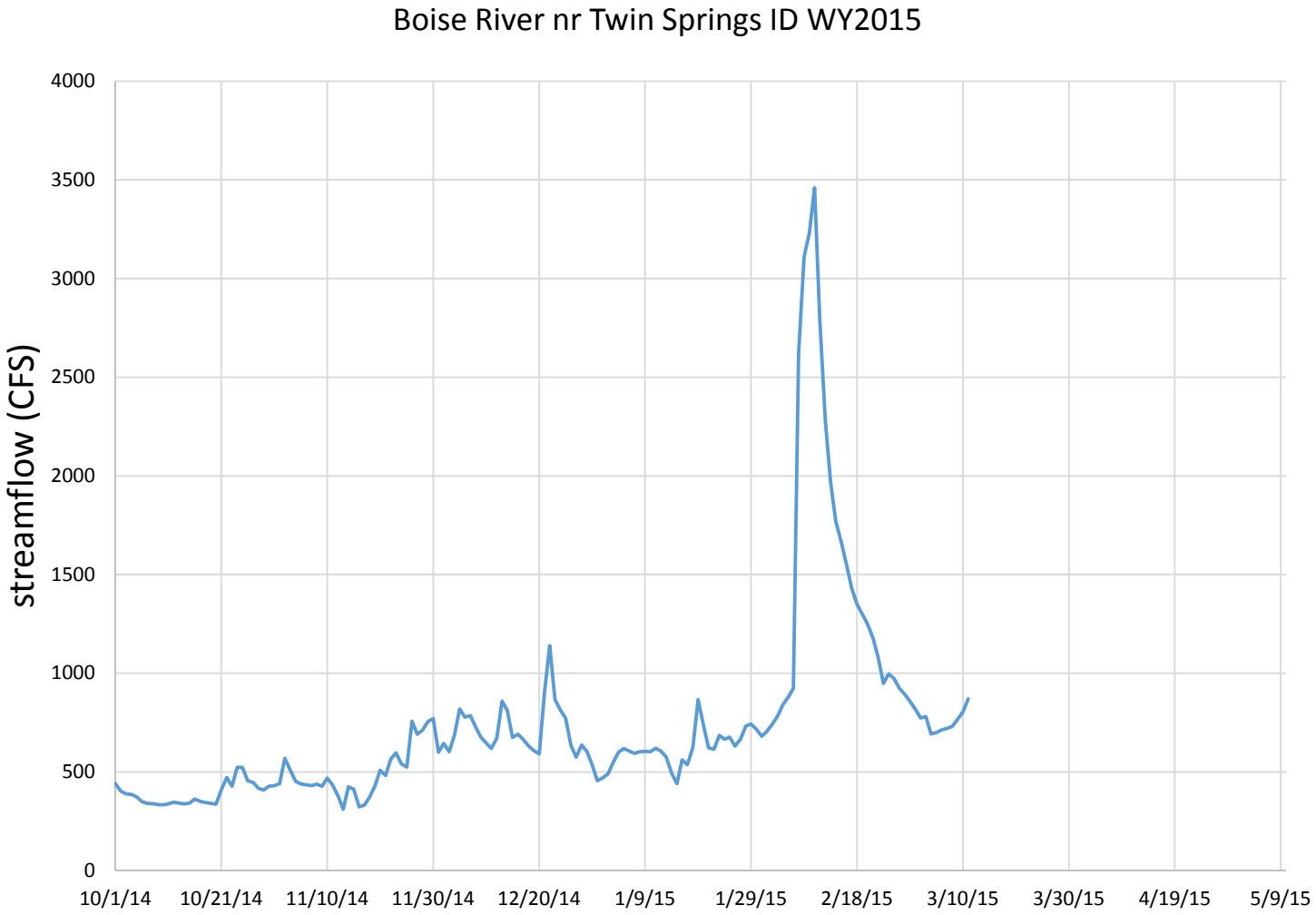


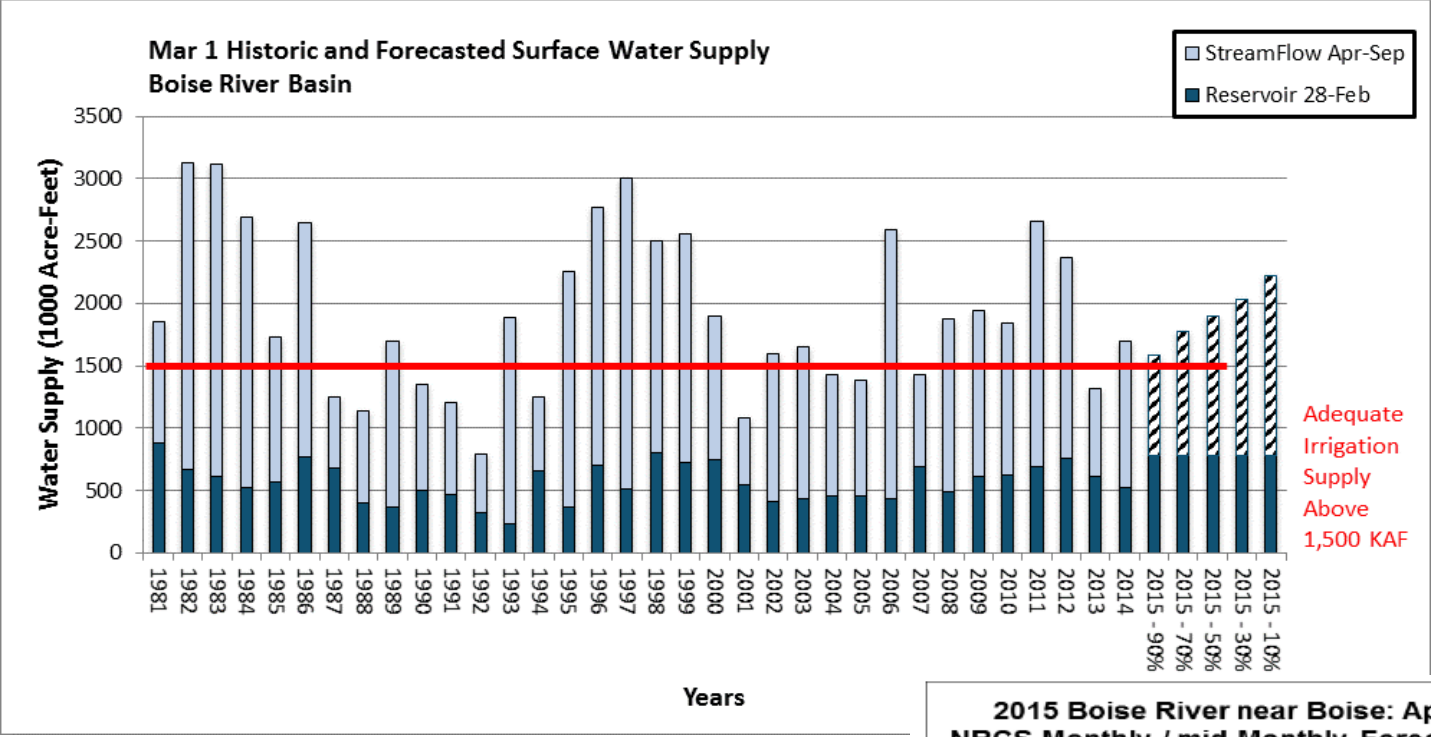
- **We can use melt-out timing from the Graham Guard, the lower elevation SNOTEL site, to predict melt-out timing at Atlanta Summit.**

- **Graham Guard reached 30% melt-out on 3/10, we estimate Atlanta Summit will reach 30% melt-out on 4/15 (± 4 days).**

- **We can use this information in combination with the 30% melt-out probability curve for Atlanta Summit to estimate that there is a 50% probability that peak streamflow for the Boise River nr Twin Springs ID, will occur on or before 4/18 (± 4 days).**

## Feb peak was rain on snow and not the snow melt peak




Mar 1 Historic and Forecasted Surface Water Supply
Boise River Basin
StreamFlow Apr-Sep
Reservoir 28-Feb
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 - 90% 2015 - 70% 2015 - 50% 2015 - 30% 2015 - 10%
Years
Adequate Irrigation Supply Above 1,500 KAF

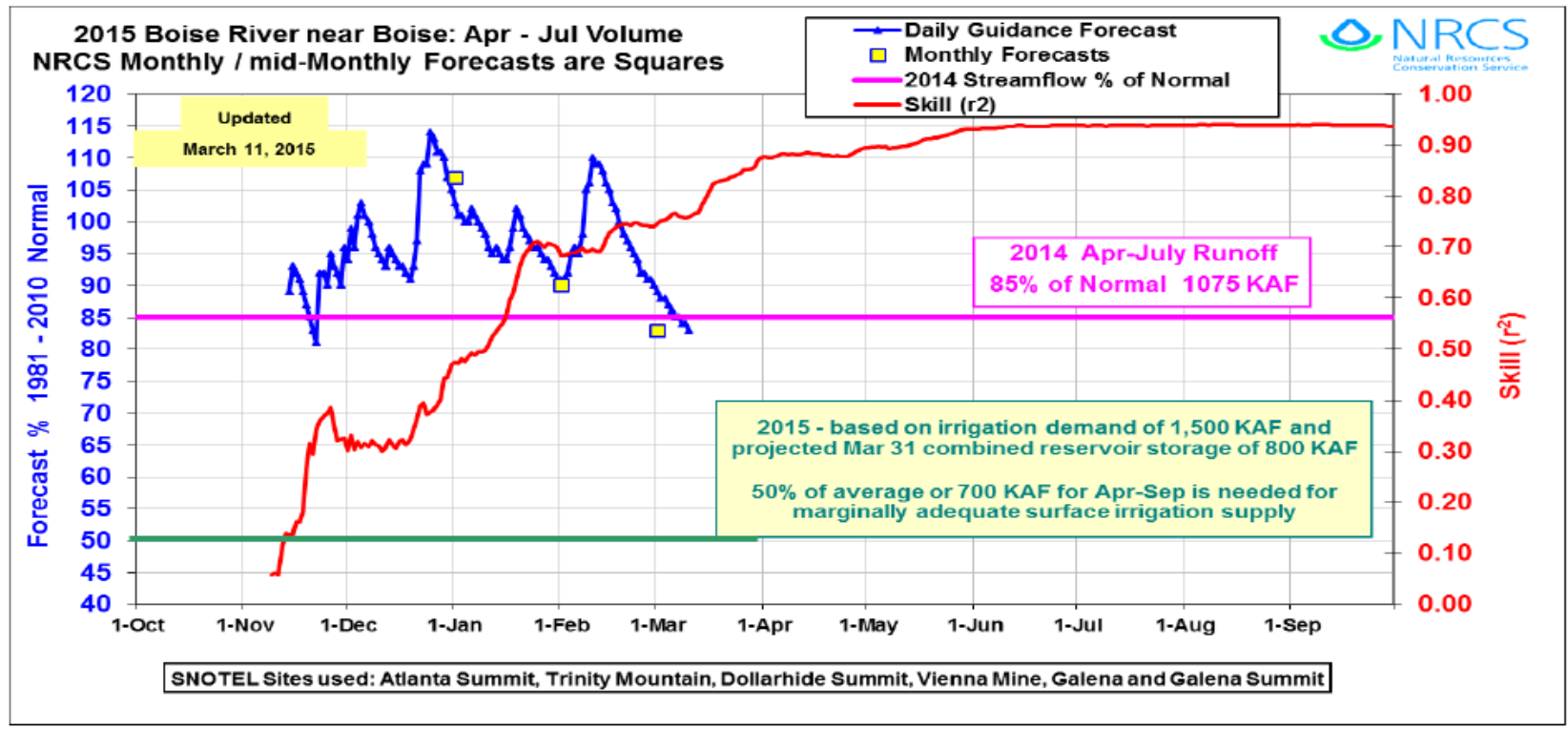
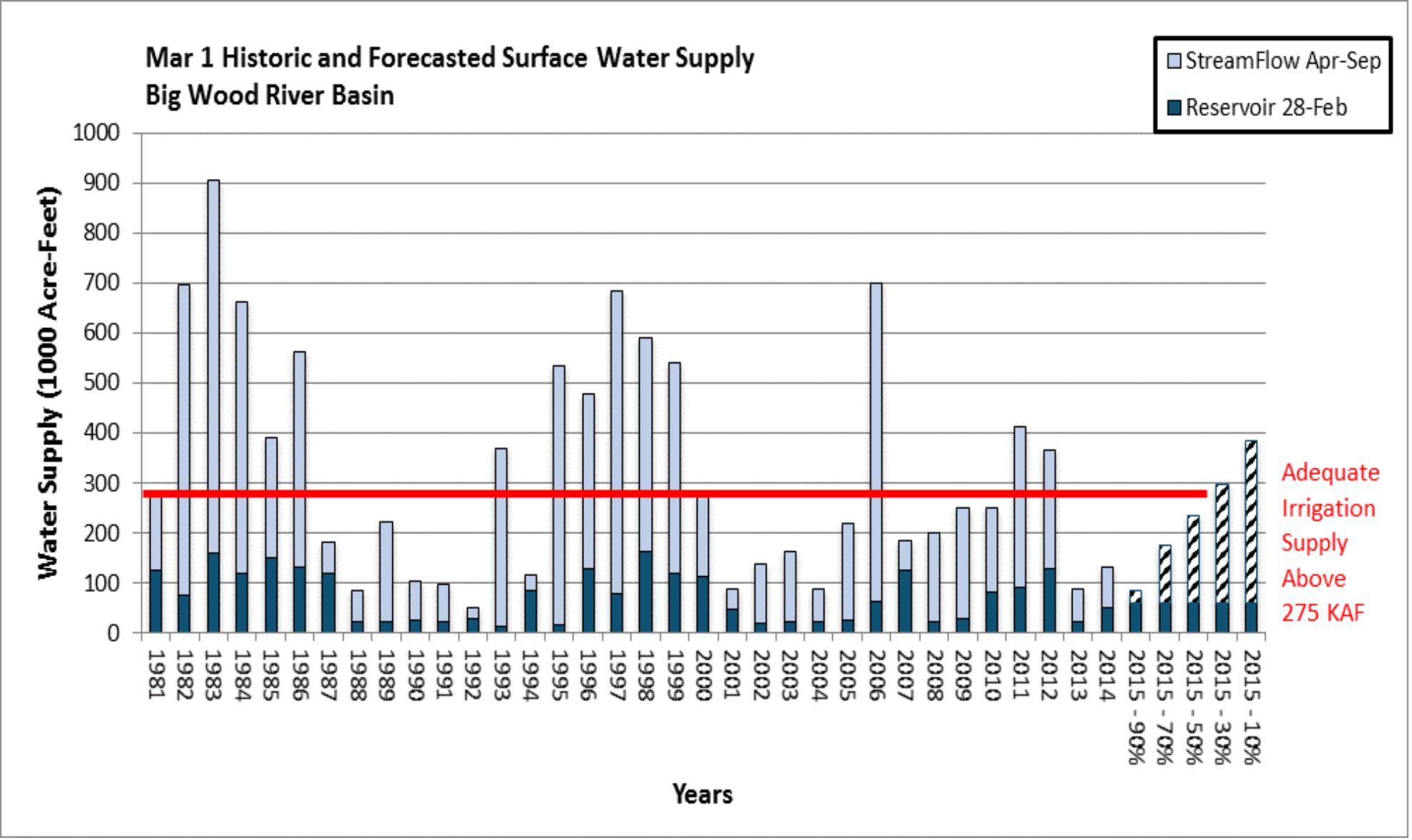

2015 Boise River near Boise: Apr - Jul Volume
NRCS Monthly / mid-Monthly Forecasts are Squares
Daily Guidance Forecast
Monthly Forecasts
2014 Streamflow % of Normal
Skill (r2)
NRCS
Natural Resources Conservation Service
Updated
March 11, 2015
Forecast % 1981 - 2010 Normal
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
Skill (r²)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
2014 Apr-July Runoff
85% of Normal 1075 KAF
2015 - based on irrigation demand of 1,500 KAF and projected Mar 31 combined reservoir storage of 800 KAF
50% of average or 700 KAF for Apr-Sep is needed for marginally adequate surface irrigation supply
1-Oct 1-Nov 1-Dec 1-Jan 1-Feb 1-Mar 1-Apr 1-May 1-Jun 1-Jul 1-Aug 1-Sep
SNOTEL Sites used: Atlanta Summit, Trinity Mountain, Dollarhide Summit, Vienna Mine, Galena and Galena Summit

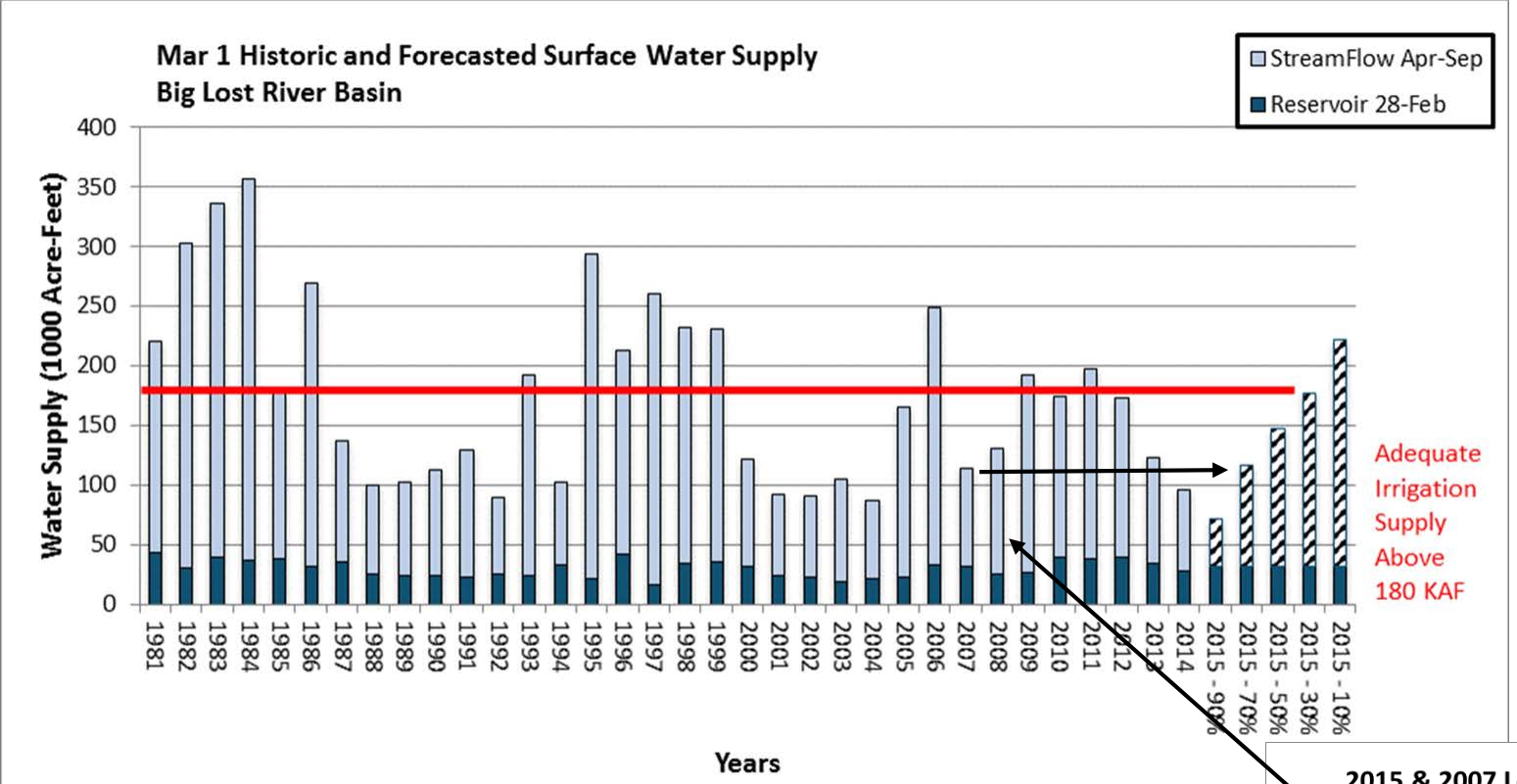
Photo taken by Ray Gadd March 11, 2015 looking east over Ketchum in Big Wood River valley illustrating lack of snow on south facing slopes.




# Big Wood River at Hailey

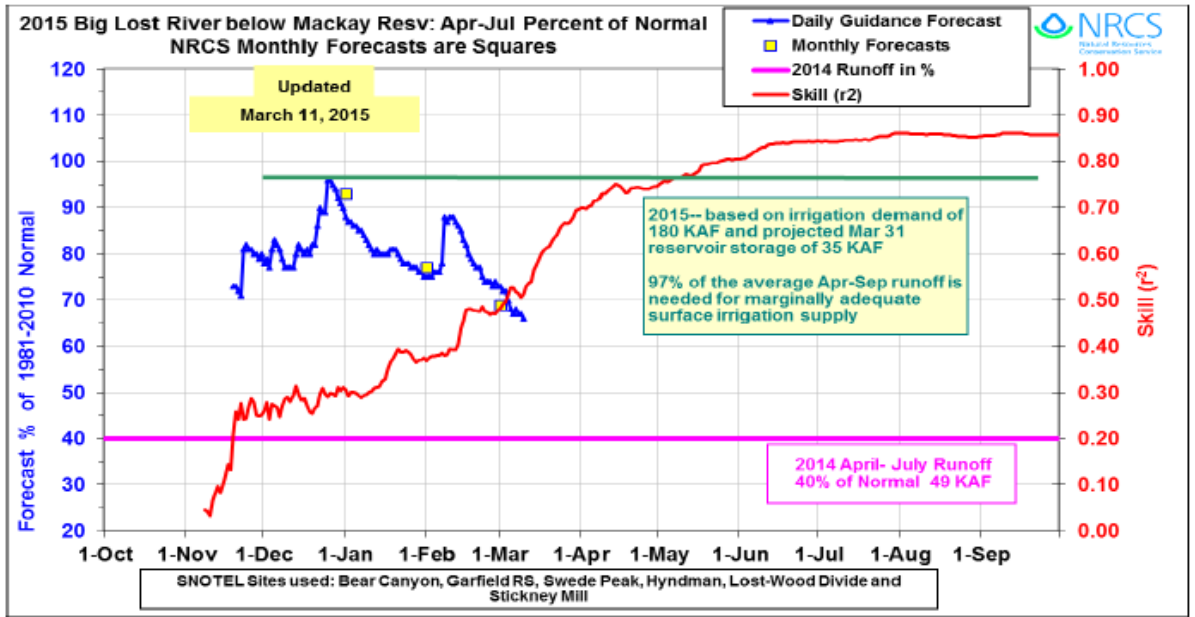
| Year | Runoff |
|---|---|
| 2007 | 44% |
| 1959 | 57% |
| 1977 | 30% |
| 2014 | 59% |
| 2015 | 77% |

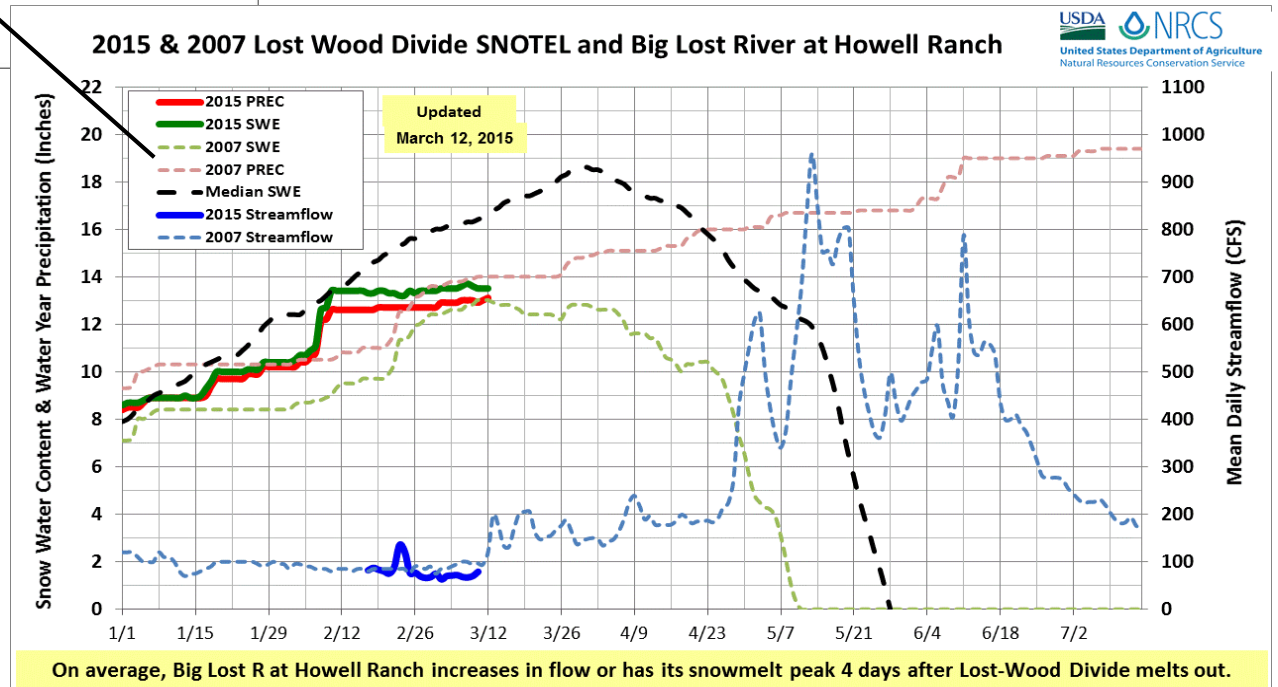
Forecast

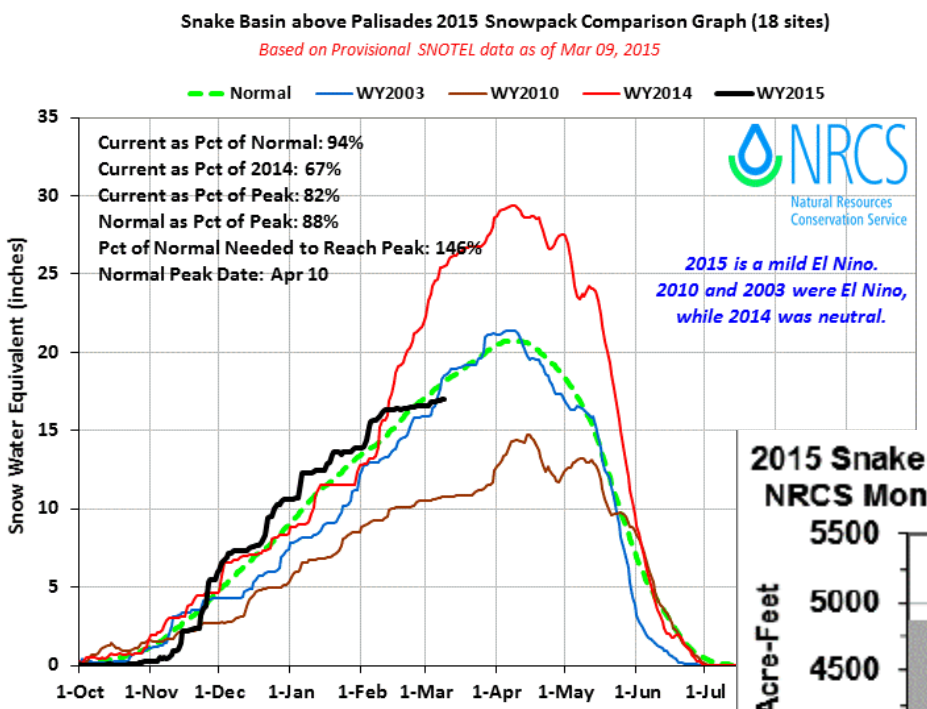


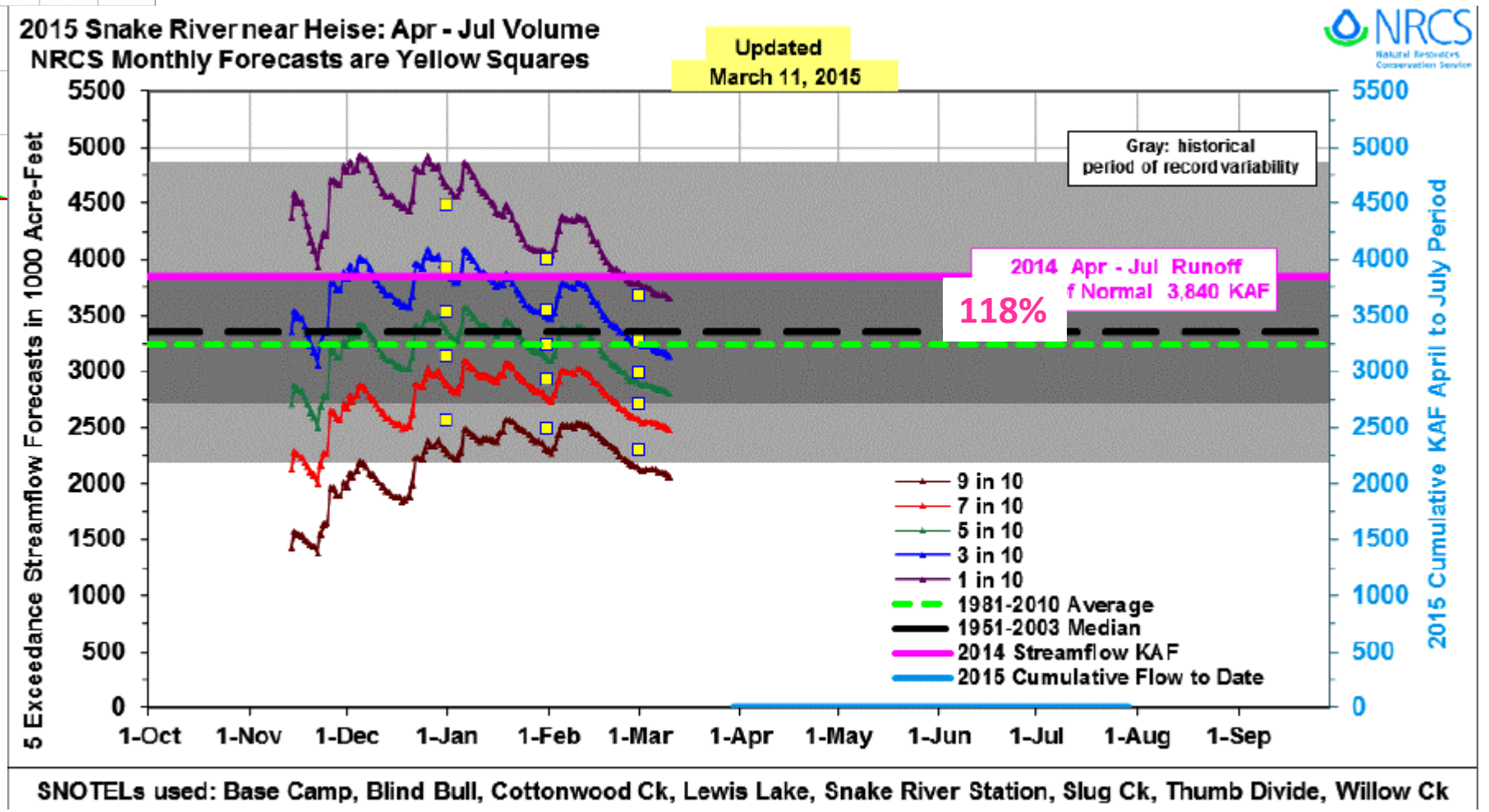

# Big Lost River below Mackay Reservoir

| Year | Runoff | |
|---|---|---|
| 2007 | 55% | |
| 1959 | 59% | |
| 1977 | 51% | |
| 2014 | 40% | |
| 2015 | 69% | Forecast |

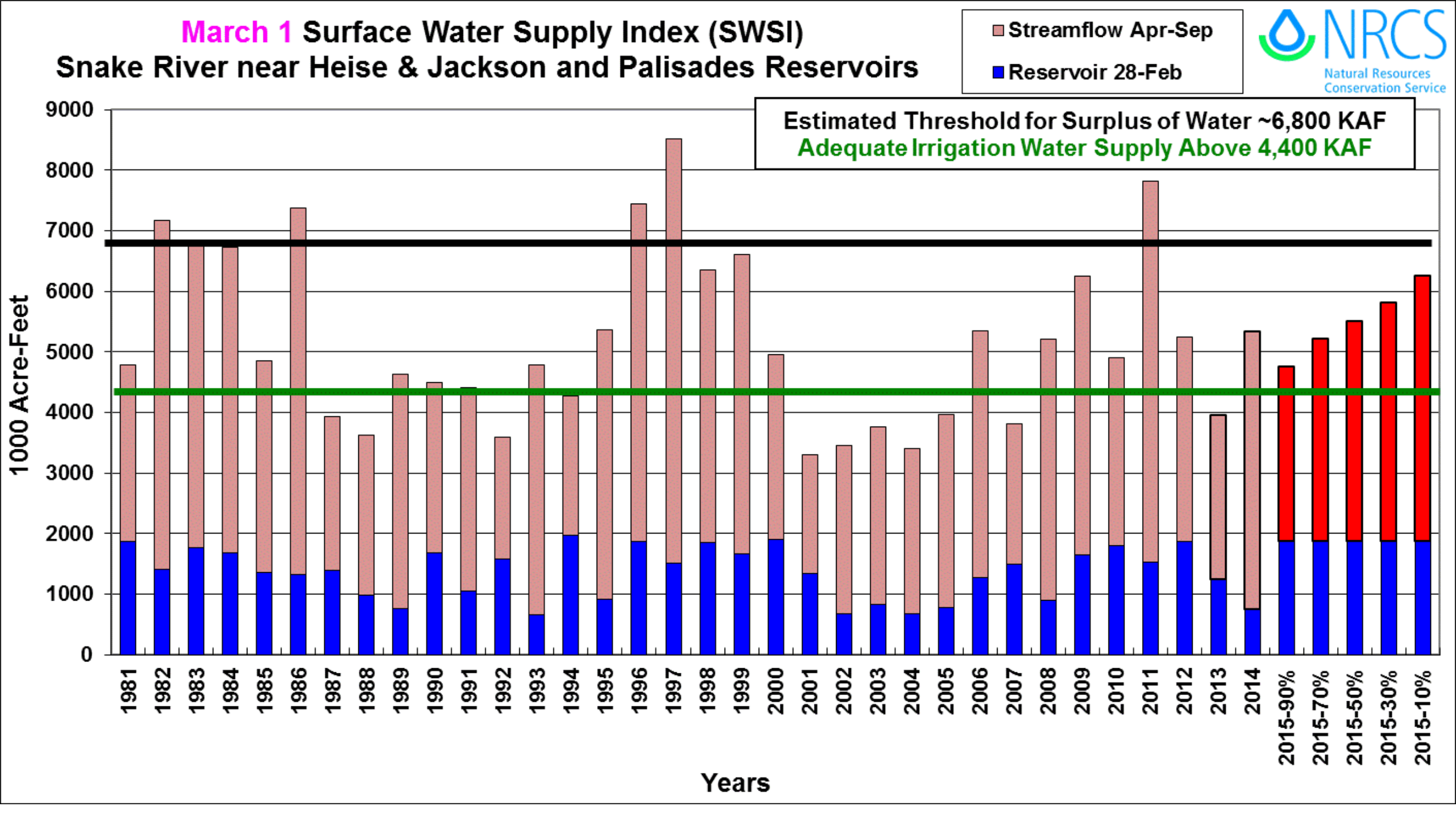



Snake Basin above Palisades 2015 Snowpack Comparison Graph (18 sites)
Based on Provisional SNOTEL data as of Mar 09, 2015
Normal
WY2003
WY2010
WY2014
WY2015
Snow Water Equivalent (inches)
Current as Pct of Normal: 94%
Current as Pct of 2014: 67%
Current as Pct of Peak: 82%
Normal as Pct of Peak: 88%
Pct of Normal Needed to Reach Peak: 146%
Normal Peak Date: Apr 10
NRCS
Natural Resources Conservation Service
2015 is a mild El Nino.
2010 and 2003 were El Nino,
while 2014 was neutral.
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul

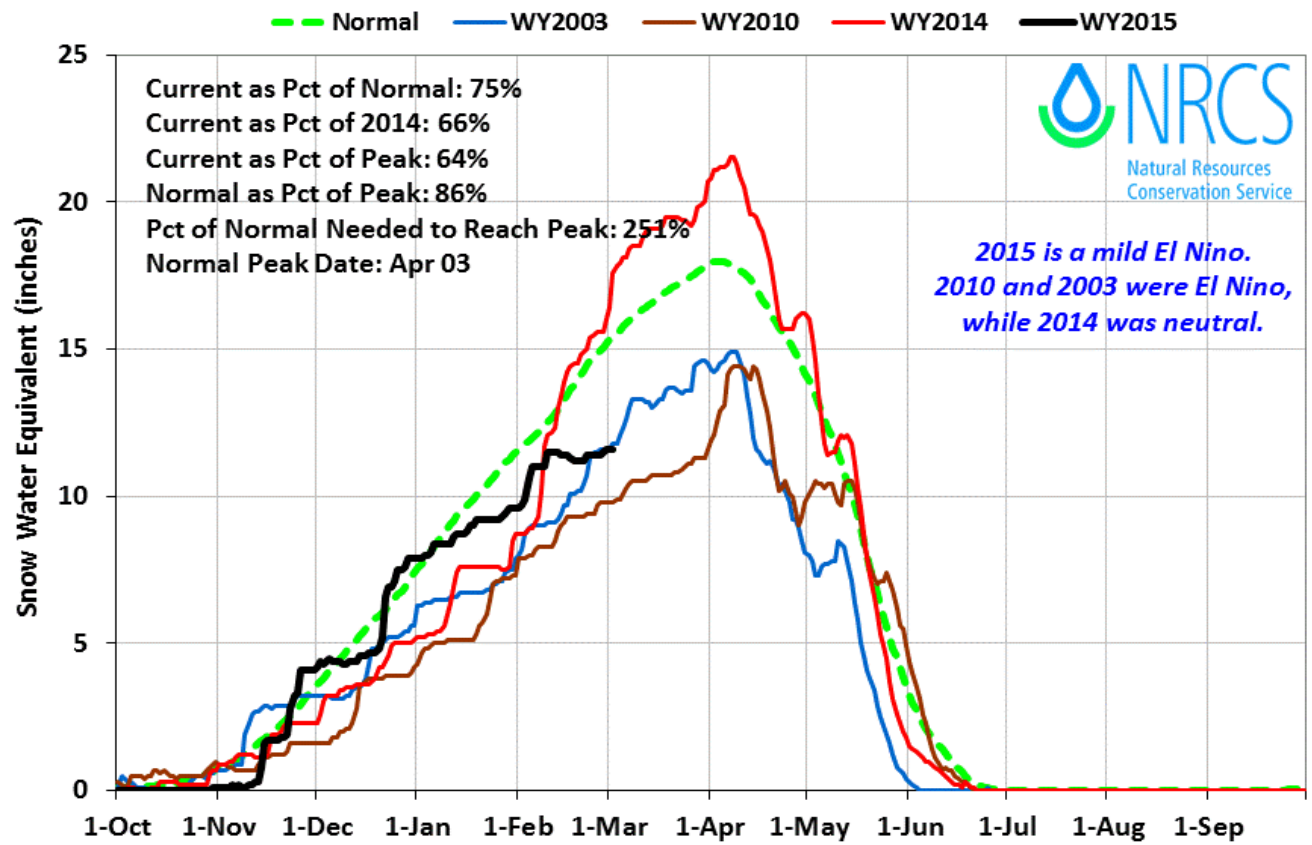

2015 Snake River near Heise: Apr - Jul Volume
NRCS Monthly Forecasts are Yellow Squares
Updated
March 11, 2015
NRCS
Natural Resources Conservation Service
5 Exceedance Streamflow Forecasts in 1000 Acre-Feet
2015 Cumulative KAF April to July Period
Gray: historical period of record variability
2014 Apr - Jul Runoff
f Normal 3,840 KAF
118%
9 in 10
7 in 10
5 in 10
3 in 10
1 in 10
1981-2010 Average
1951-2003 Median
2014 Streamflow KAF
2015 Cumulative Flow to Date
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
SNOTELs used: Base Camp, Blind Bull, Cottonwood Ck, Lewis Lake, Snake River Station, Slug Ck, Thumb Divide, Willow Ck

# March 1 Surface Water Supply Index (SWSI)
## Snake River near Heise & Jackson and Palisades Reservoirs

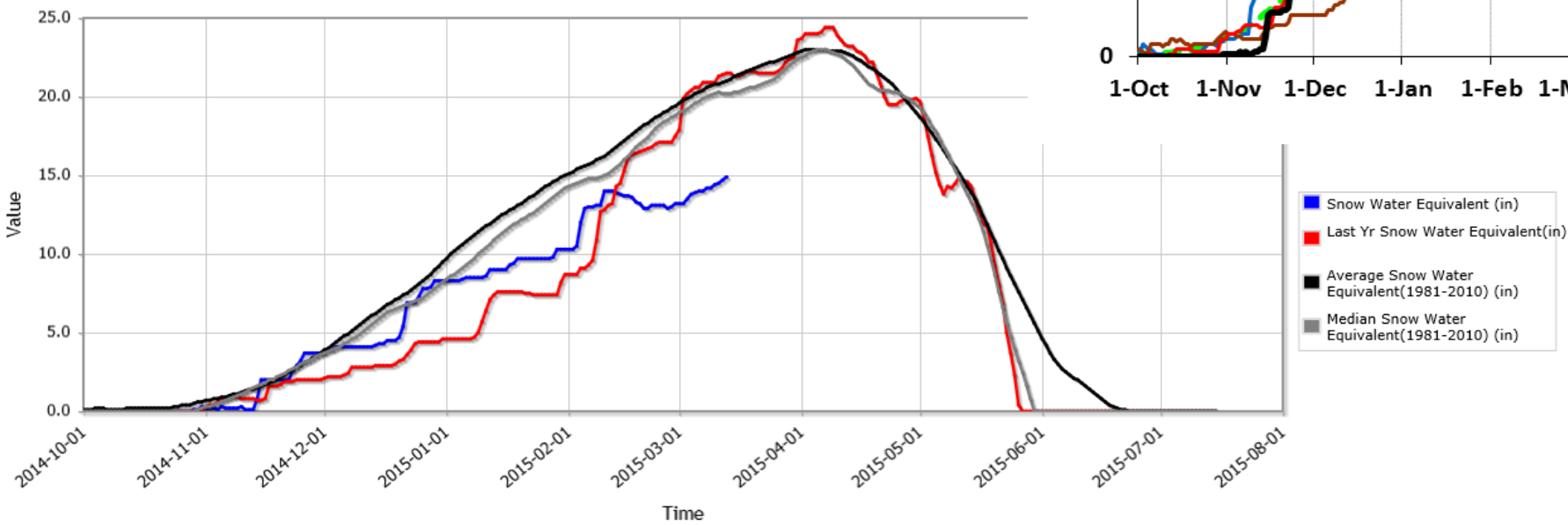


## Bear Basin 2015 Snowpack Comparison Graph (15 sites)

*Based on Provisional SNOTEL data as of Mar 02, 2015*

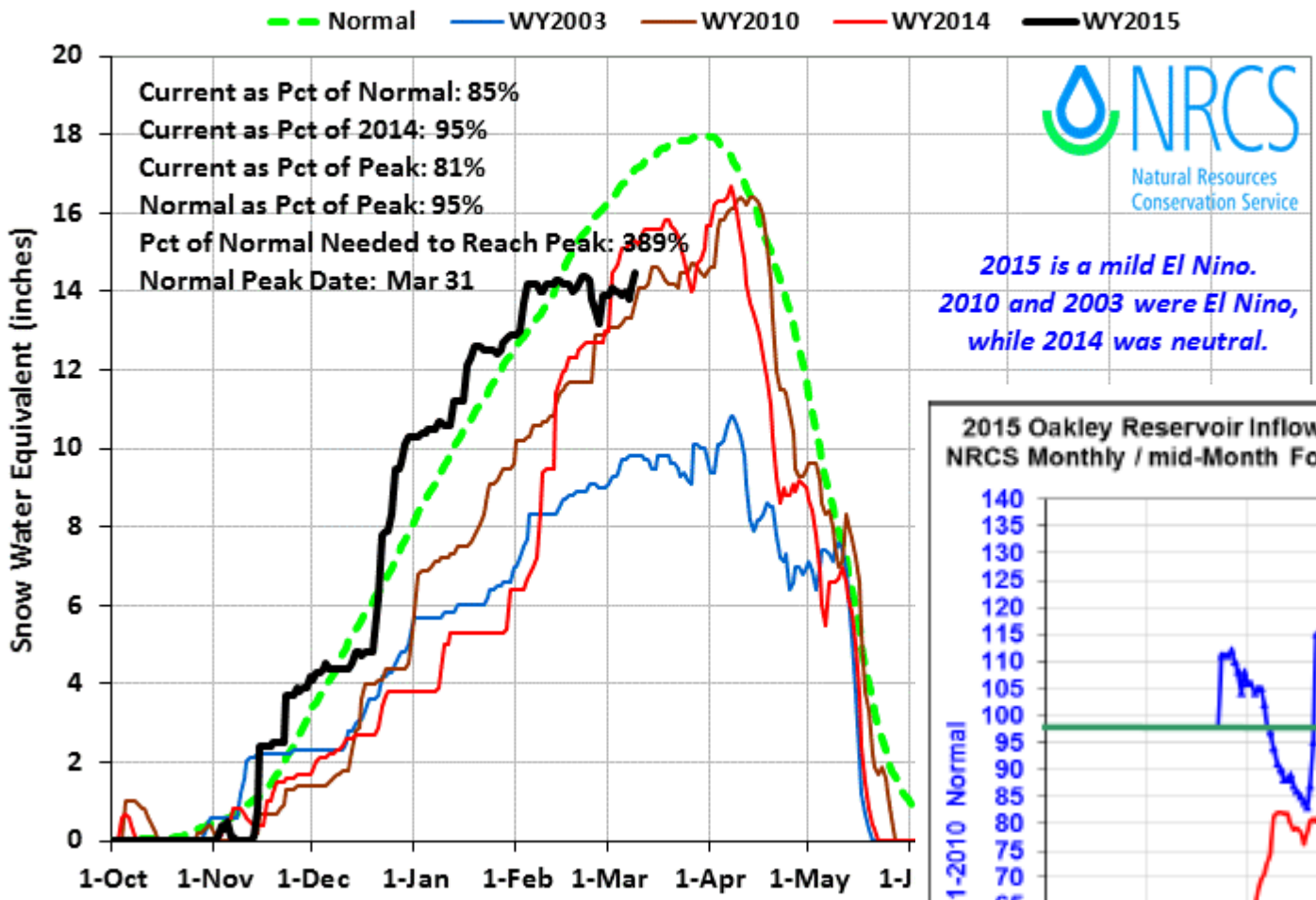



## Emigrant Summit (471) Idaho SNOTEL Site - 7390 ft



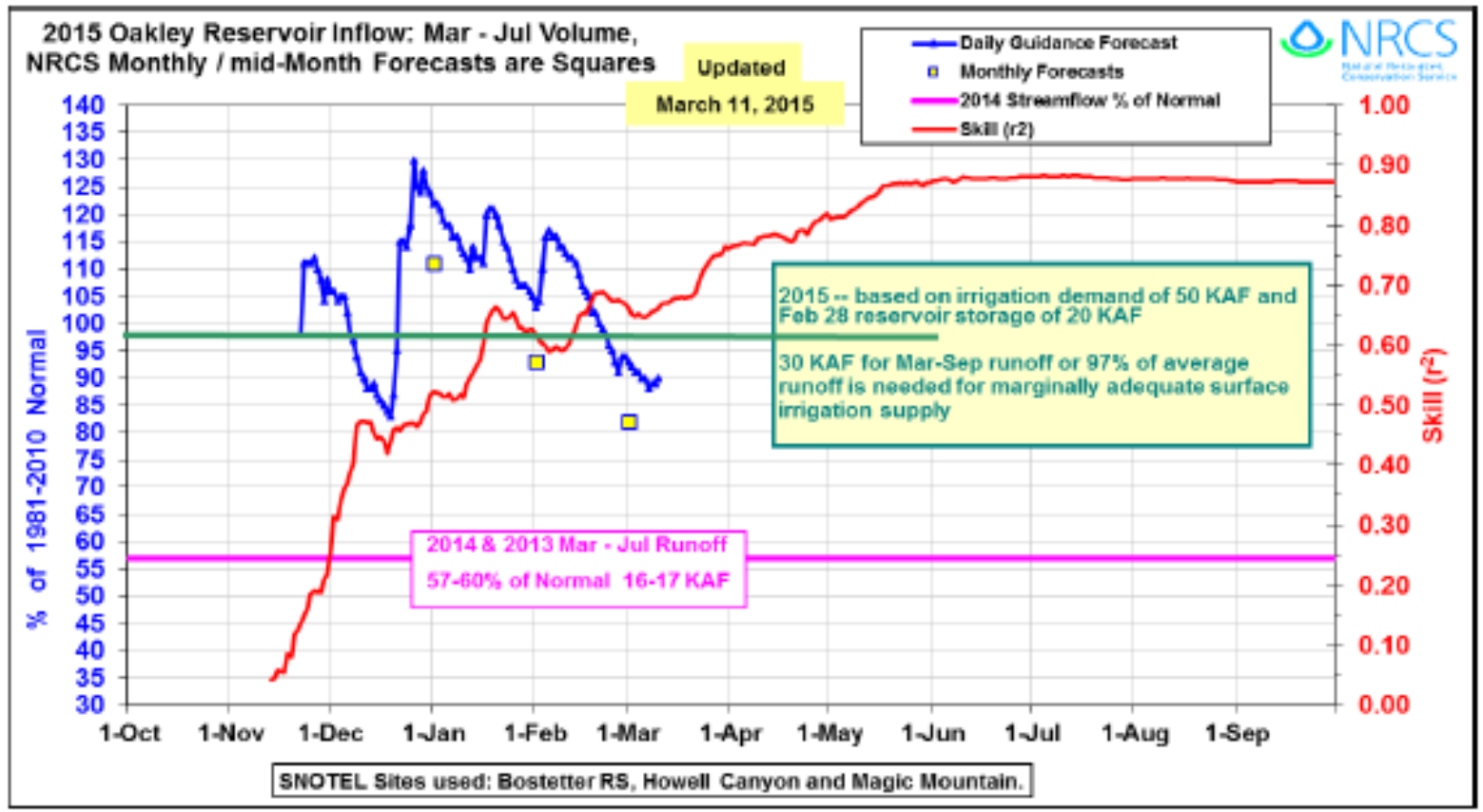
## Goose Creek Basin 2015 Snowpack Comparison Graph (2 sites)

*Based on Provisional SNOTEL data as of Mar 09, 2015*

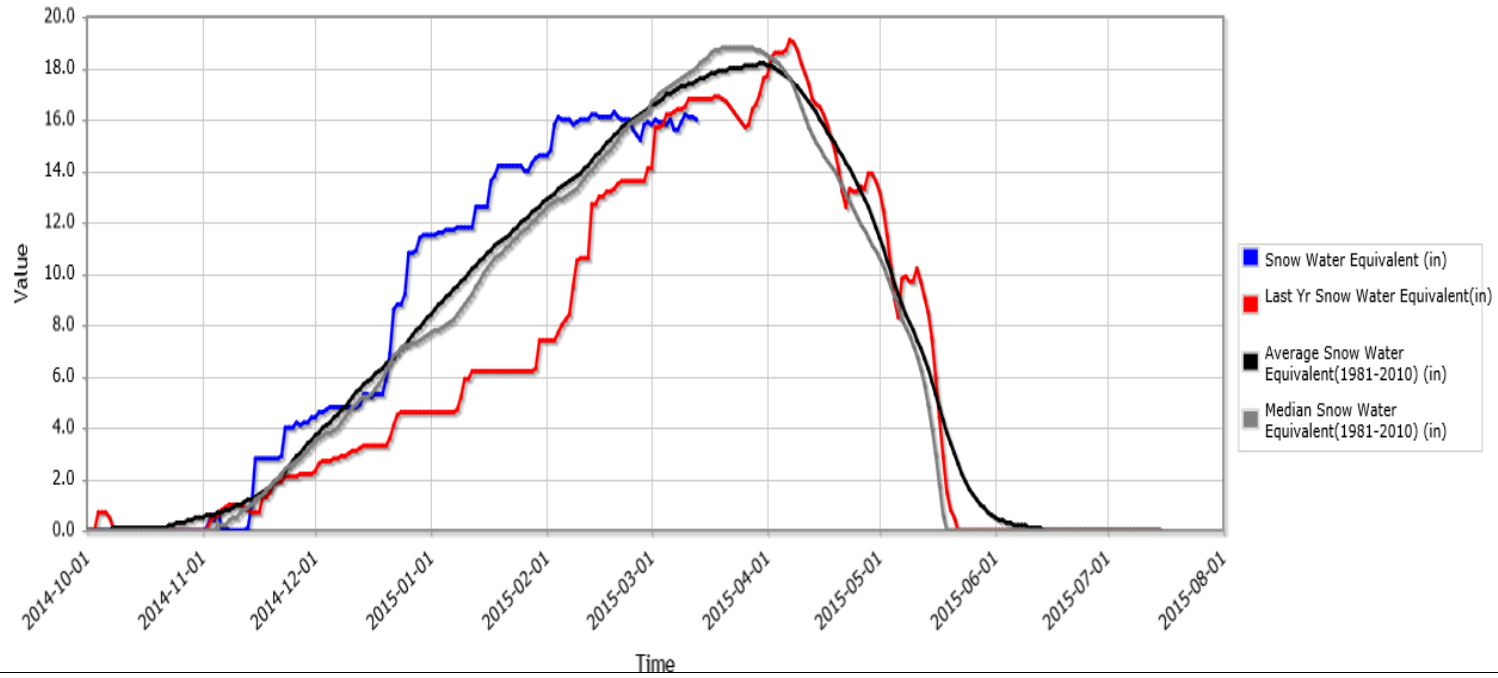


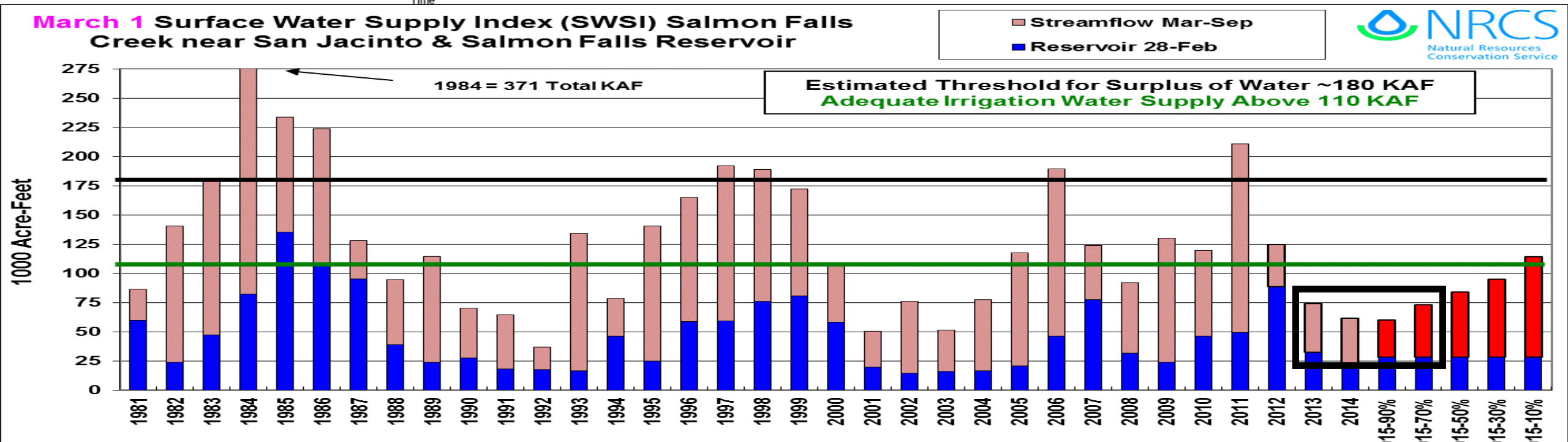

NRCS Natural Resources Conservation Service

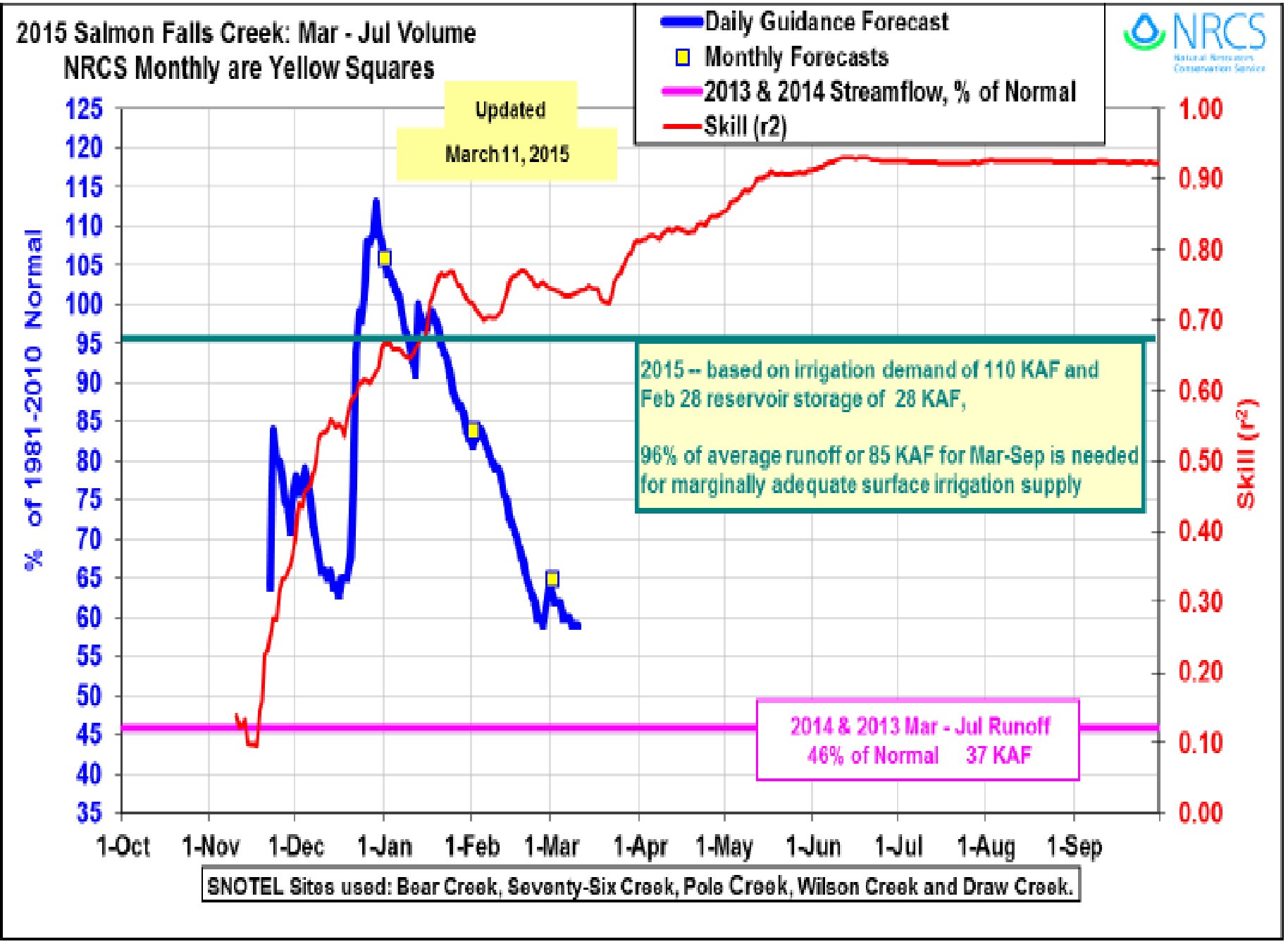
***2015 is a mild El Nino. 2010 and 2003 were El Nino, while 2014 was neutral.***



Magic Mountain (610) Idaho SNOTEL Site - 6880 ft






## Salmon Falls Creek

| Year | Runoff |
|---|---|
| 2007 | ~54% |
| 1959 | 39% |
| 1977 | 39% |
| 2014 | 46% |
| 2015 | 65% |
| | Forecast |

**Questions – Comments**

**Photo taken by Ray Gadd March 11, 2015 looking east over Big Wood River valley illustrating lack of snow on south facing slopes.**