



# BIGHORN BASIN WATER SUPPLY & RESERVOIR OPERATIONS MEETING

Billings, Montana  
April 9, 2015

## **Introduction and Purpose of Meeting**

Steve Davies, Manager, Facility Operations and Maintenance  
Division, Montana Area Office

## **Water Supply Outlook & Reservoir Operations**

WYAO - Boysen & Buffalo Bill Operations  
MTAO - Yellowtail Operations

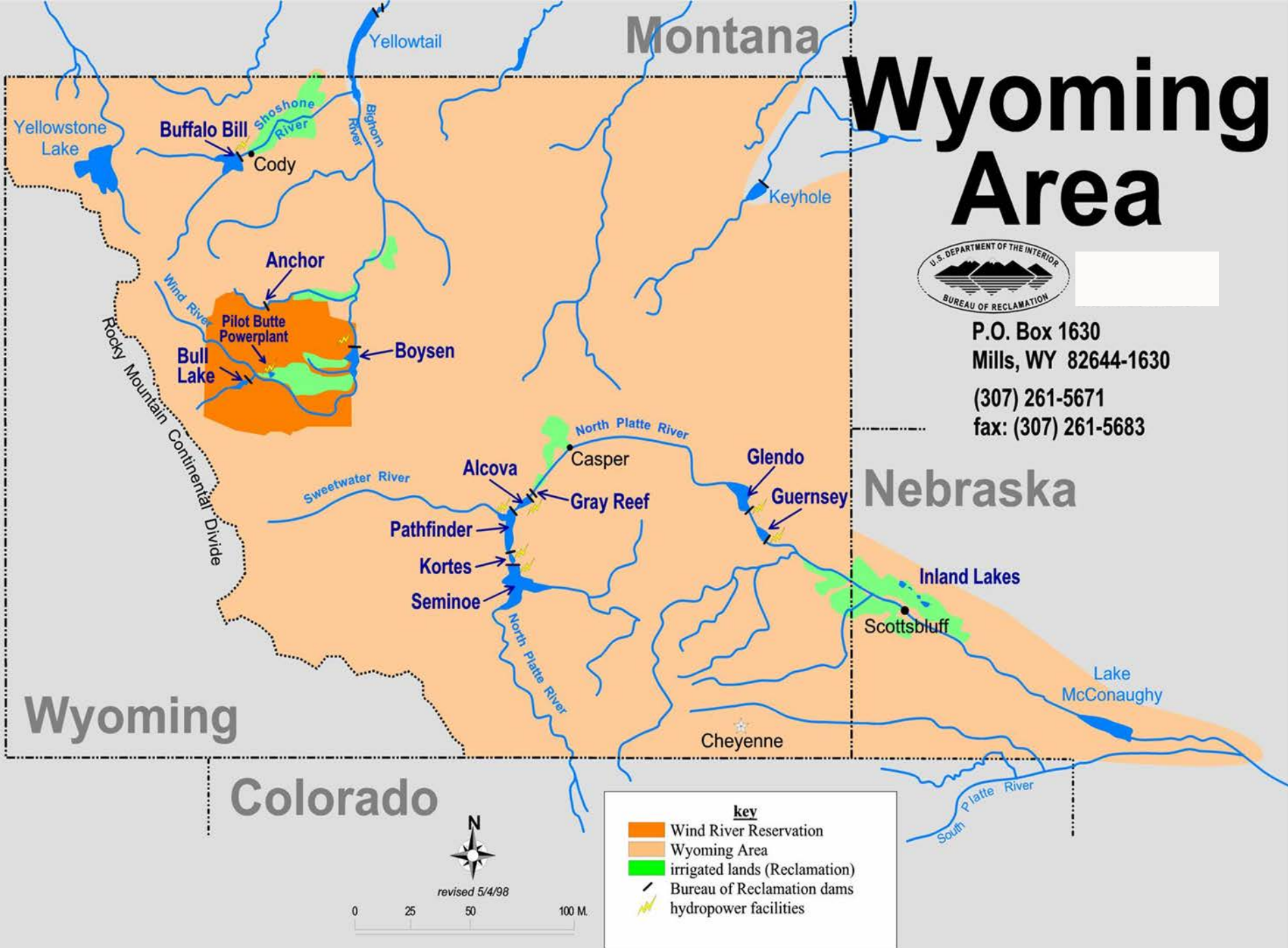
## **Next Bighorn River System Issues Group Meeting**

Public Comments on Operating Criteria

# Wyoming Area



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Nebraska

Wyoming

Colorado

Montana



# Big Horn Basin Water Supply Forecast

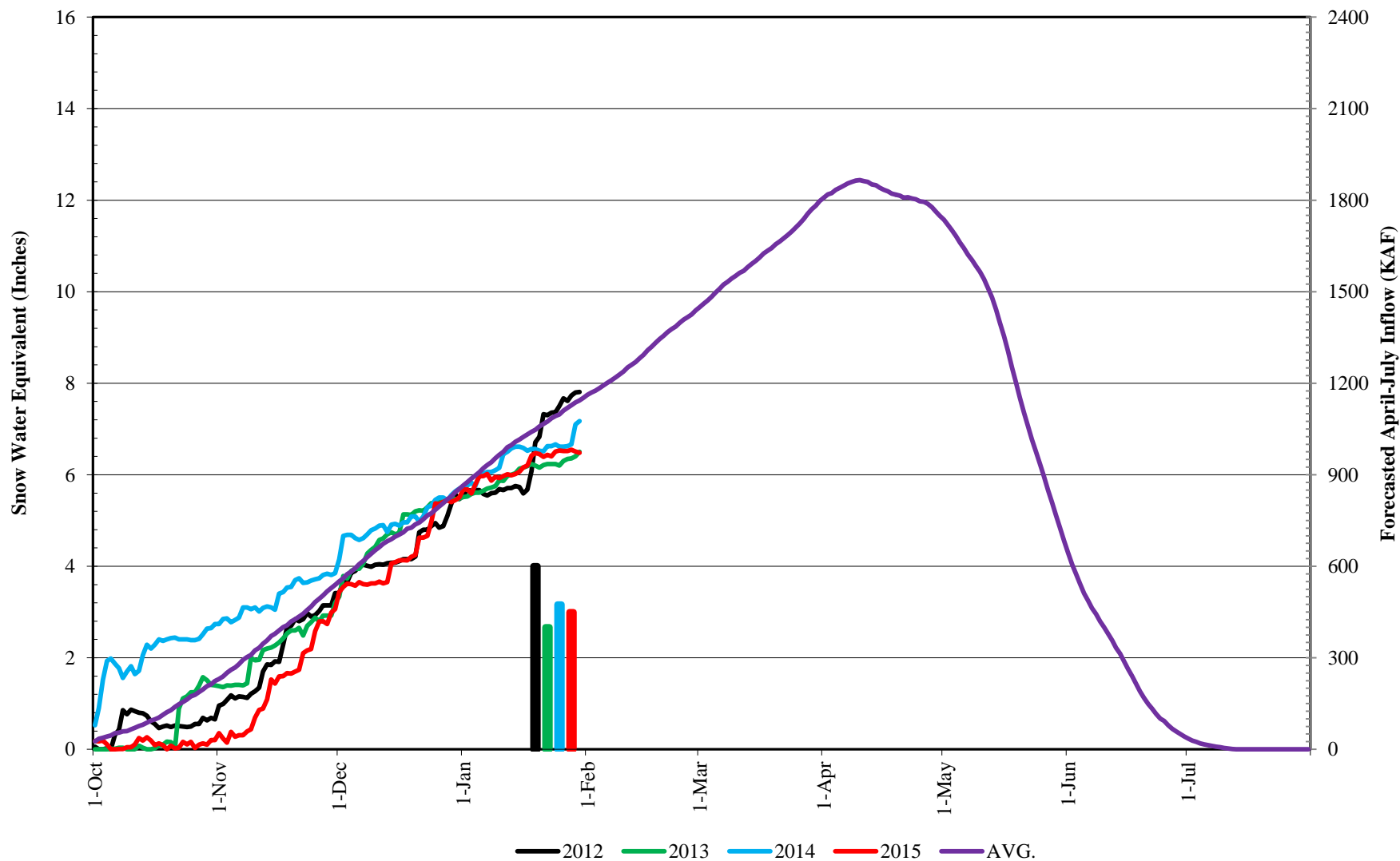
(1000 acre-feet)

Forecast Points	April 1, 2015 Forecast of April-July Runoff			30 Yr. April-July Runoff Avg. <sup>2</sup>	Expected % of Avg.	Comparative Actual April - July Runoff			
	Reasonable Minimum <sup>1</sup>	Expected	Reasonable Maximum <sup>1</sup>			W. Yr. 2014	W. Yr. 2013	W. Yr. 2012	W. Yr. 2011
Bull Lake Reservoir	90	110	130	137.3	80	148	106	118	187
Wind River above Bull Lake Creek	200	300	400	402.0	75	580	283	314	691
Boysen Reservoir	200	300	500	533.8	56	695	216	219	995
Buffalo Bill Reservoir	400	550	700	677.8	81	1062	577	592	1230

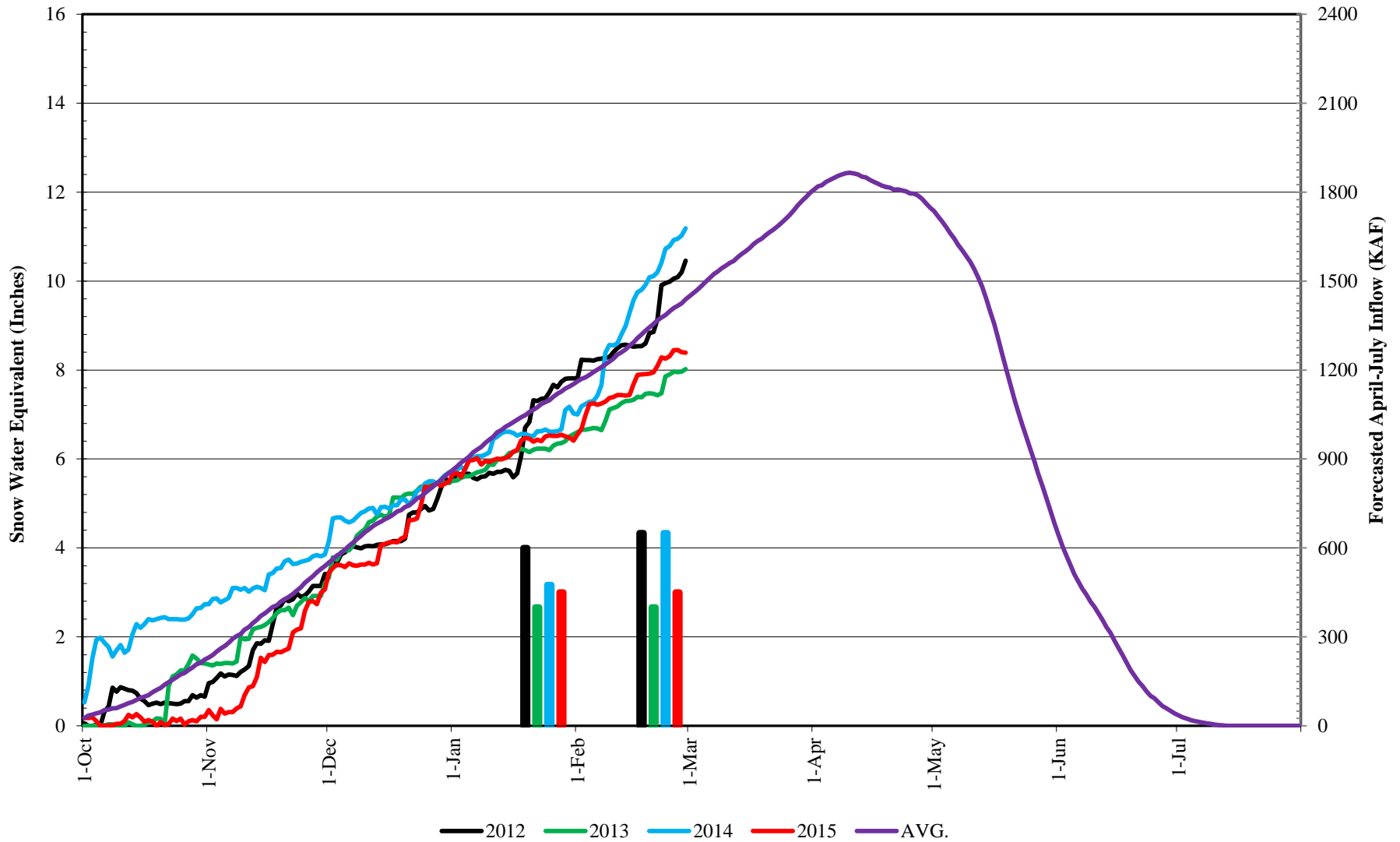
<sup>1</sup> The probability is estimated to be 9 chances in 10 that the actual volume will fall between the reasonable minimum and reasonable maximum.

<sup>2</sup> Average is based on the 1985-2014 period.

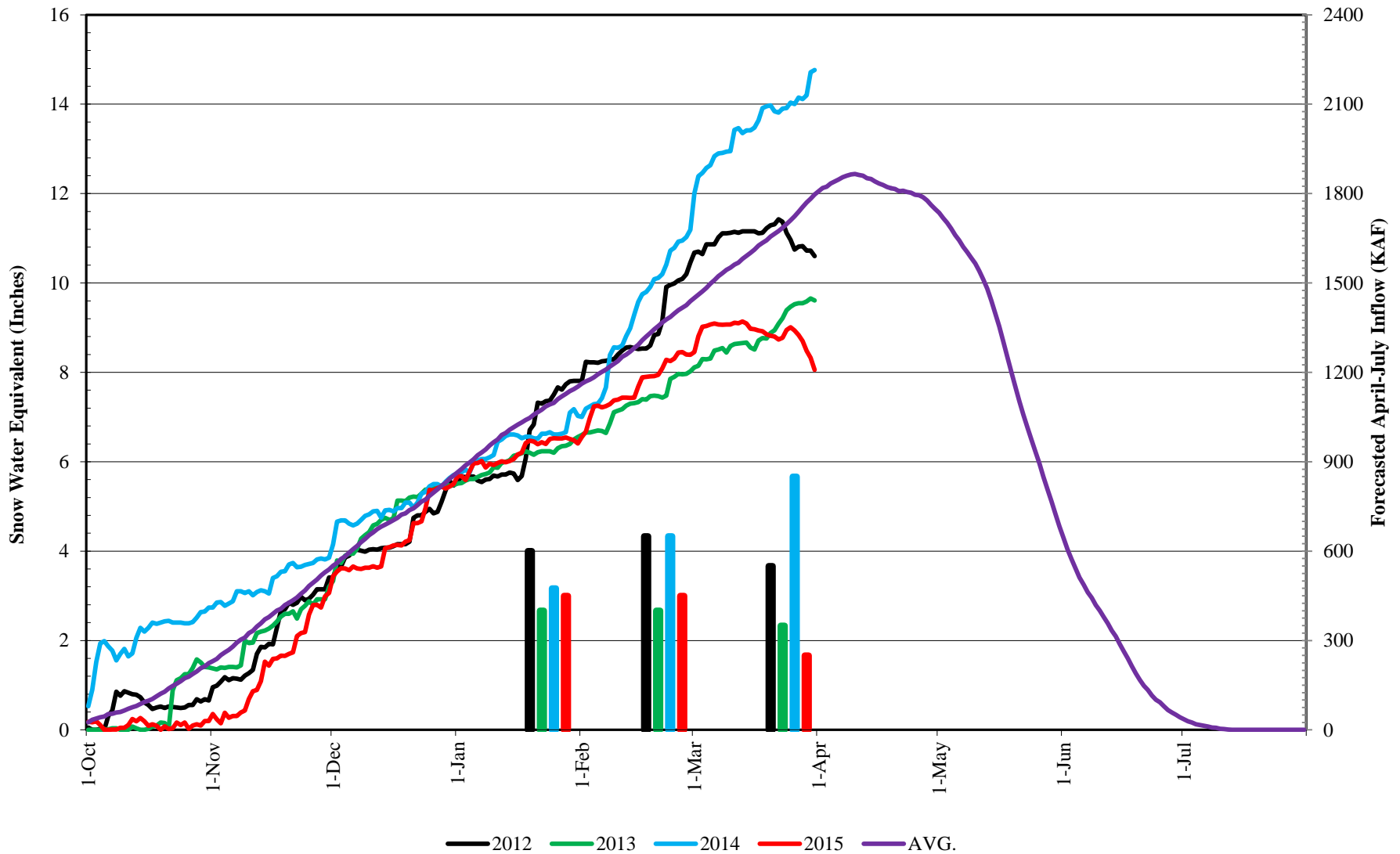
# Boysen Forecast - February



# Boysen Forecast - March

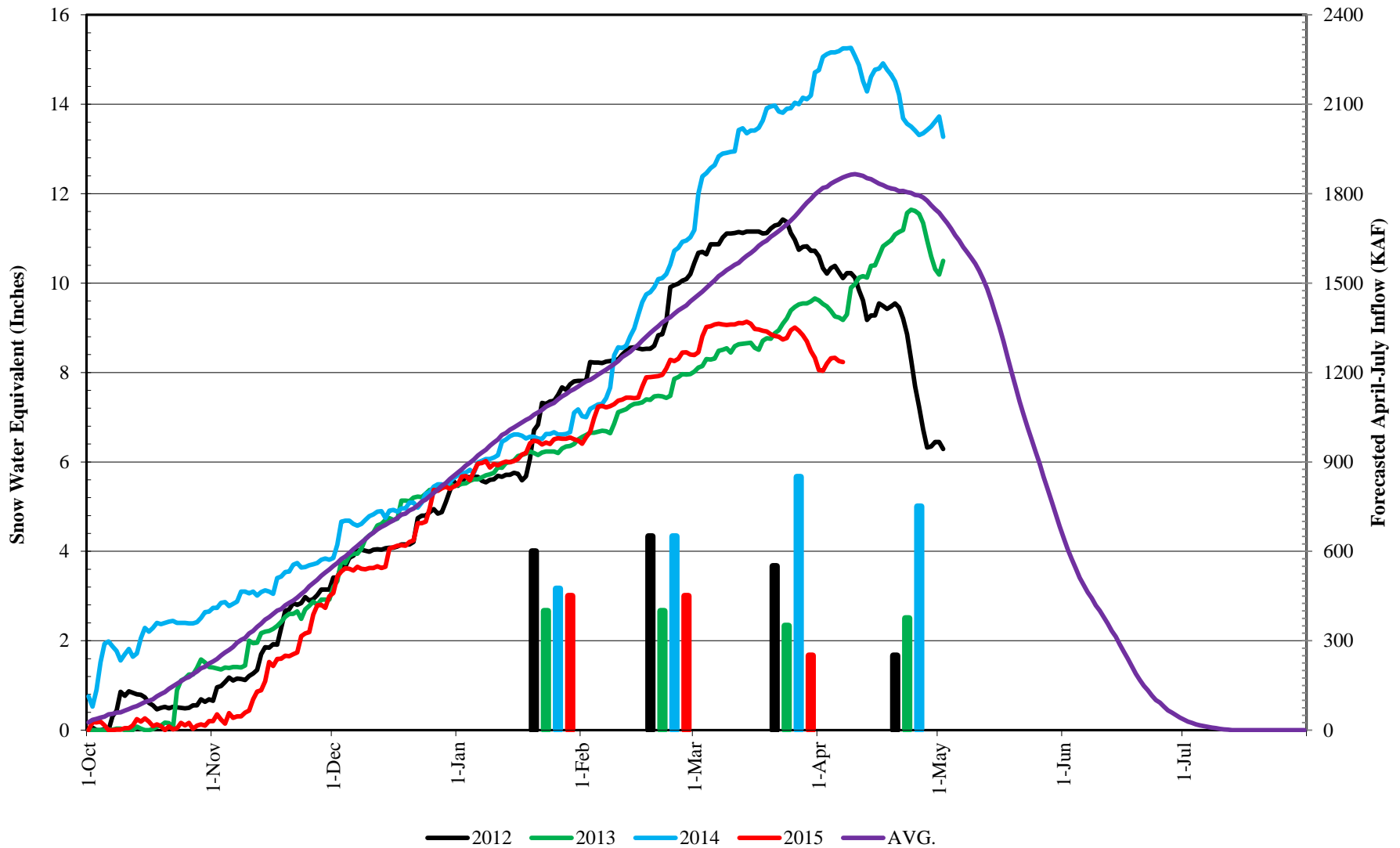


# Boysen Forecast - April

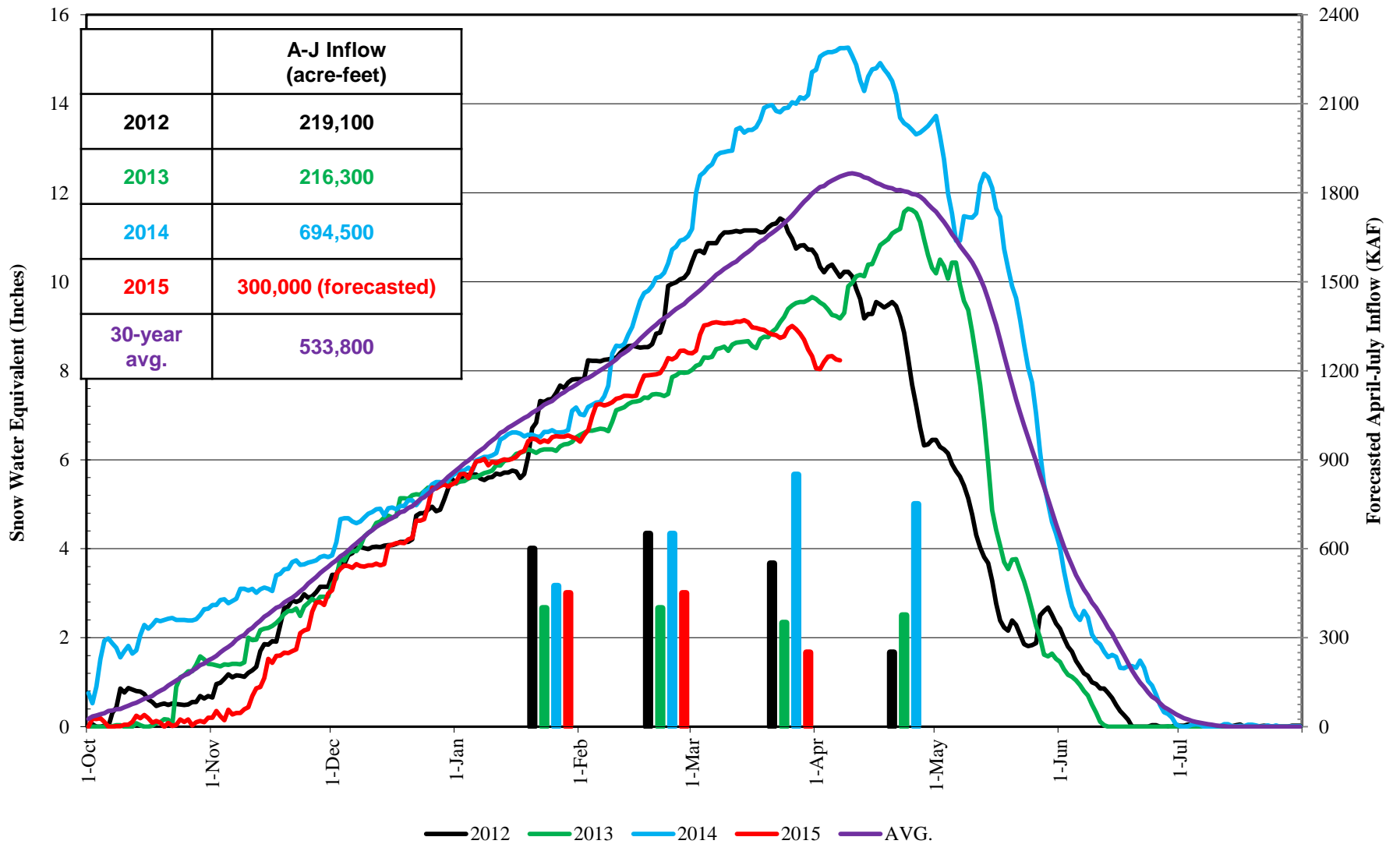




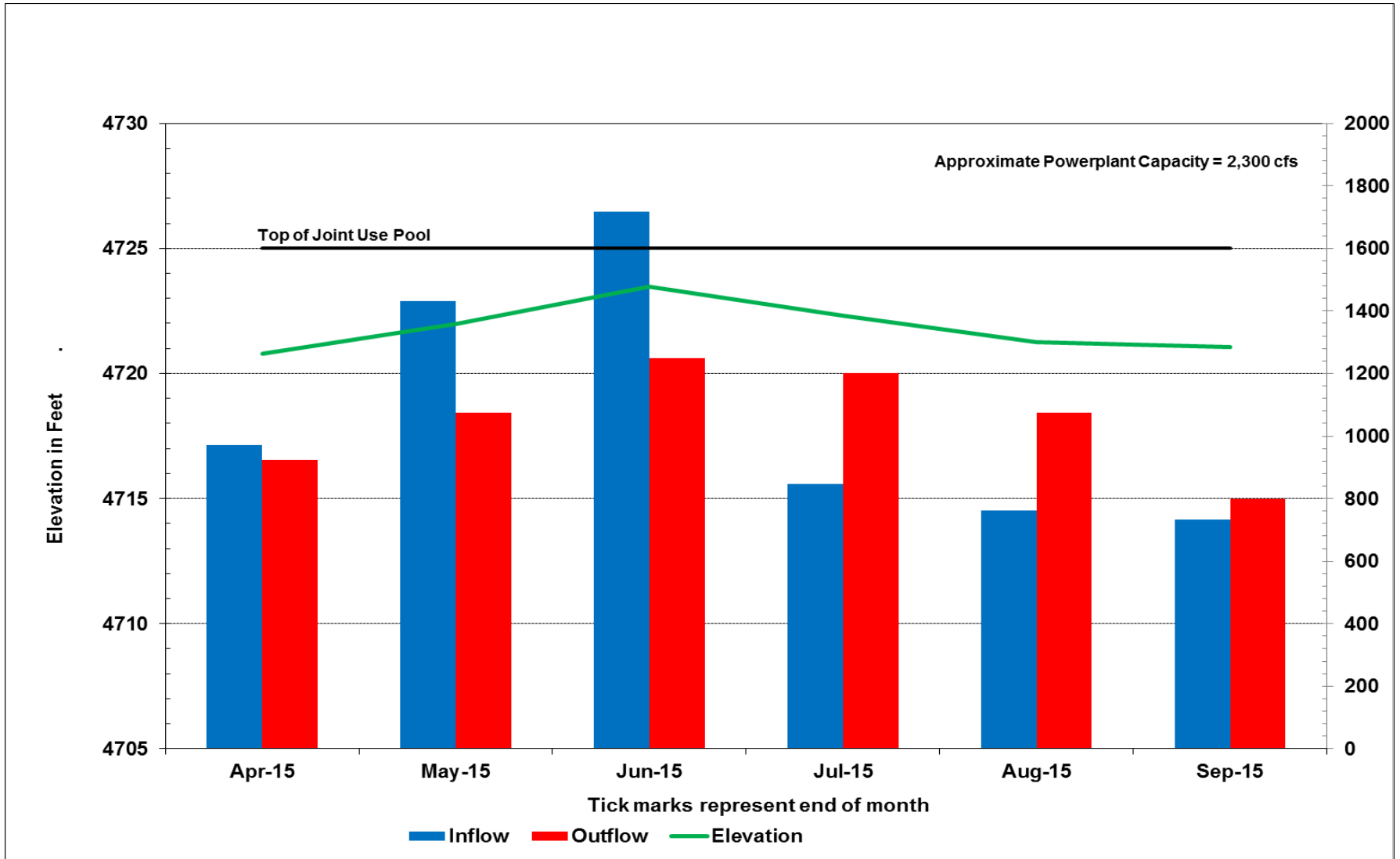
# Boysen Forecast - May



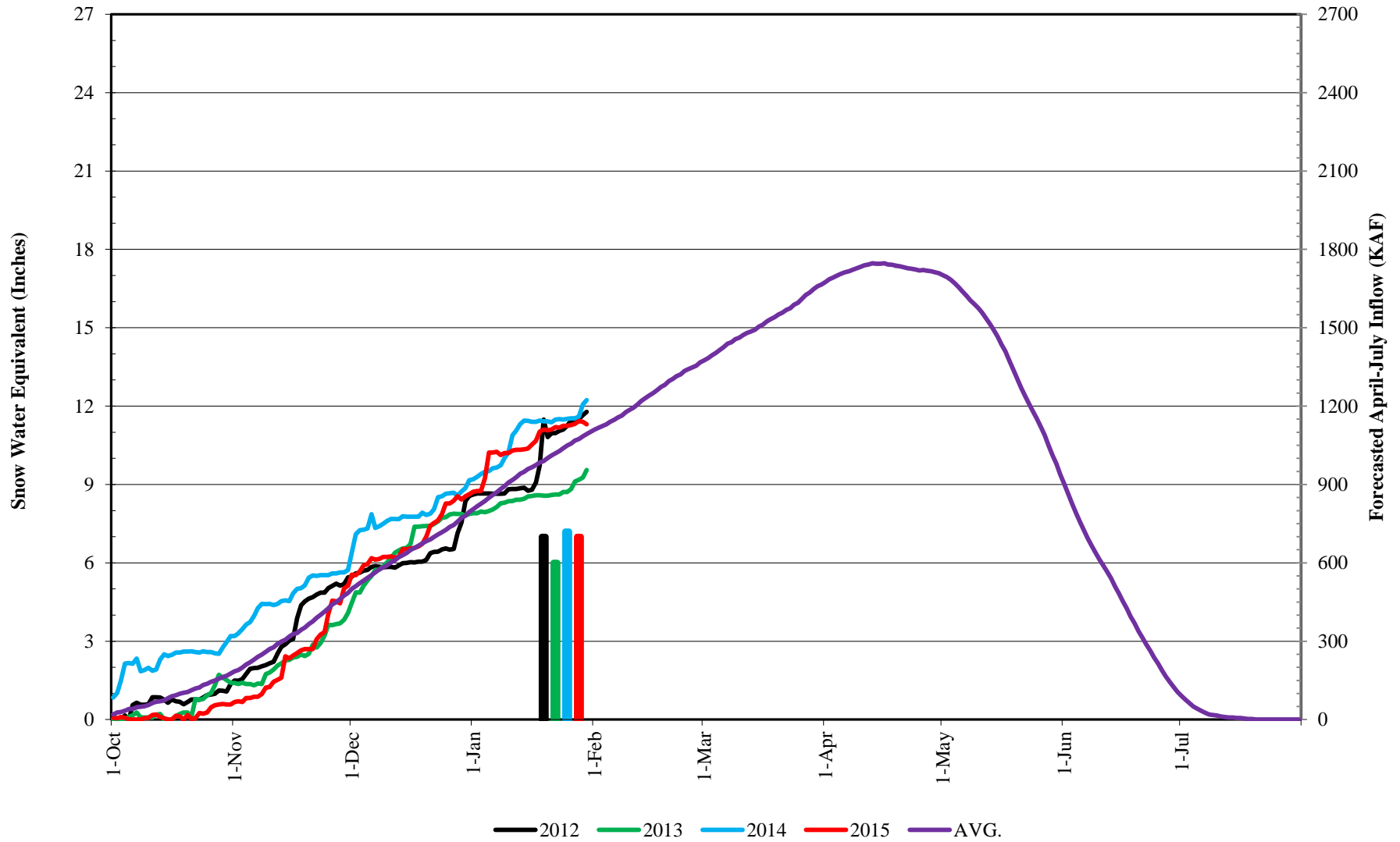
# Boysen Forecast - Full Year



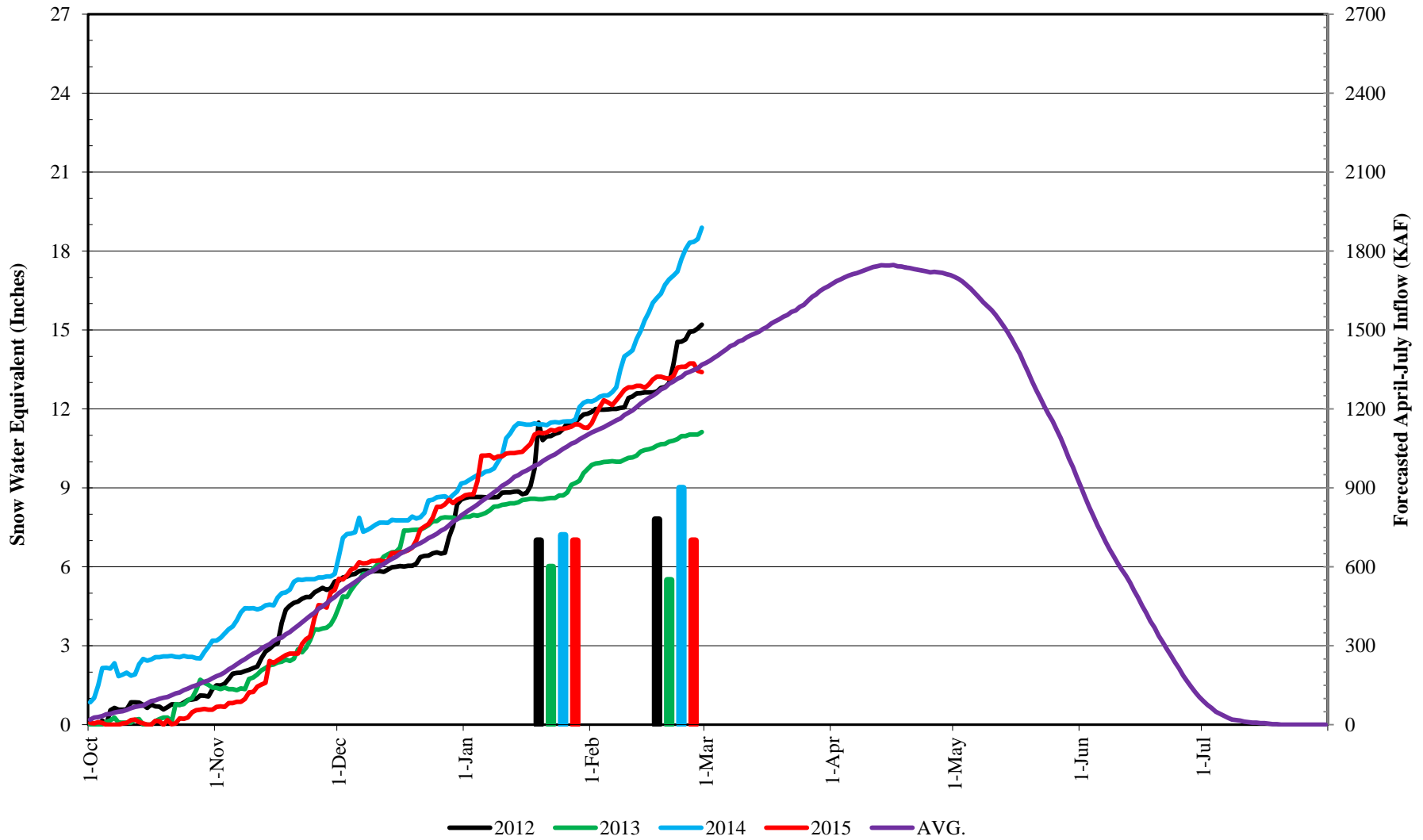
# Boysen Reservoir Operations



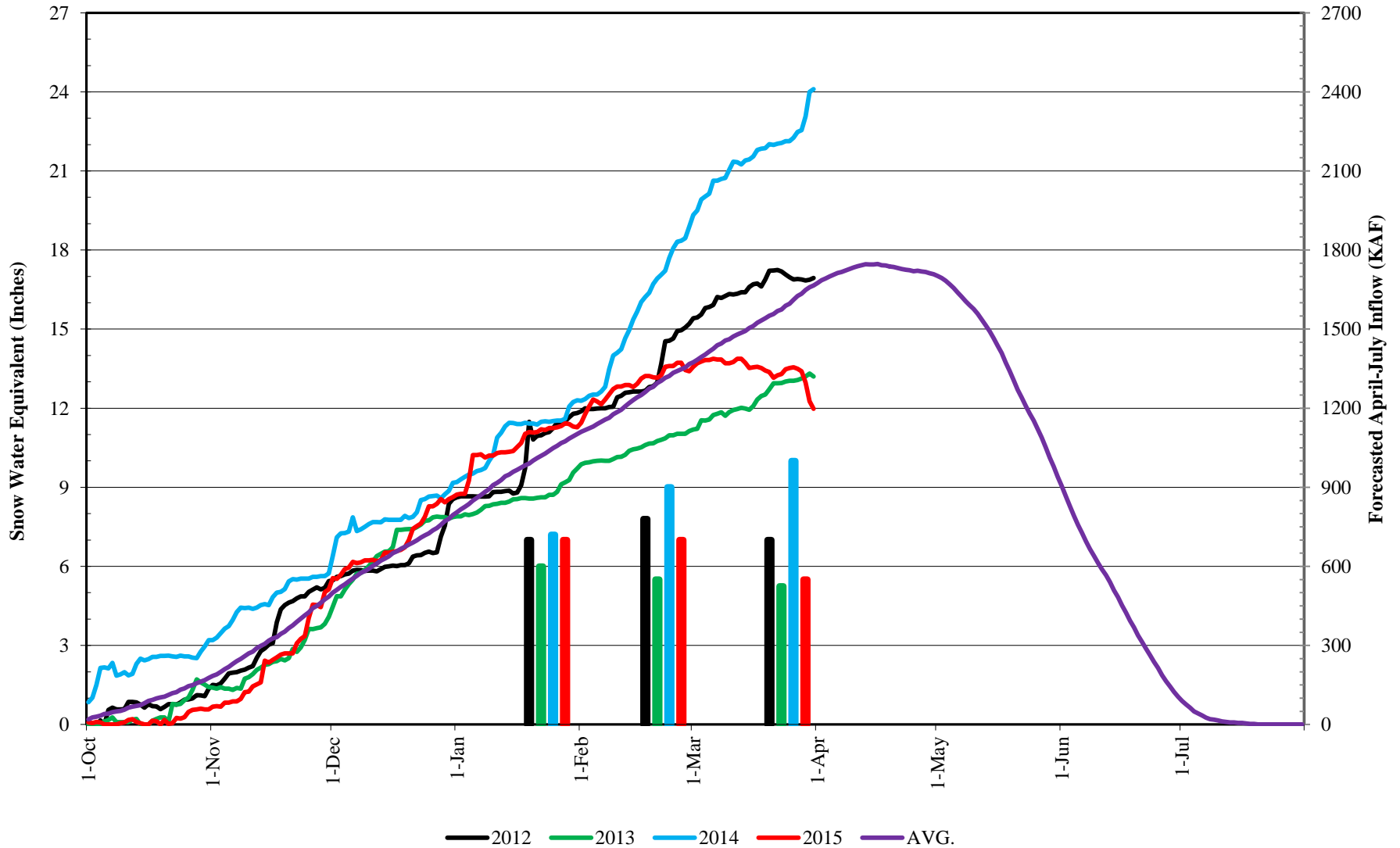
# Buffalo Bill Forecast - February



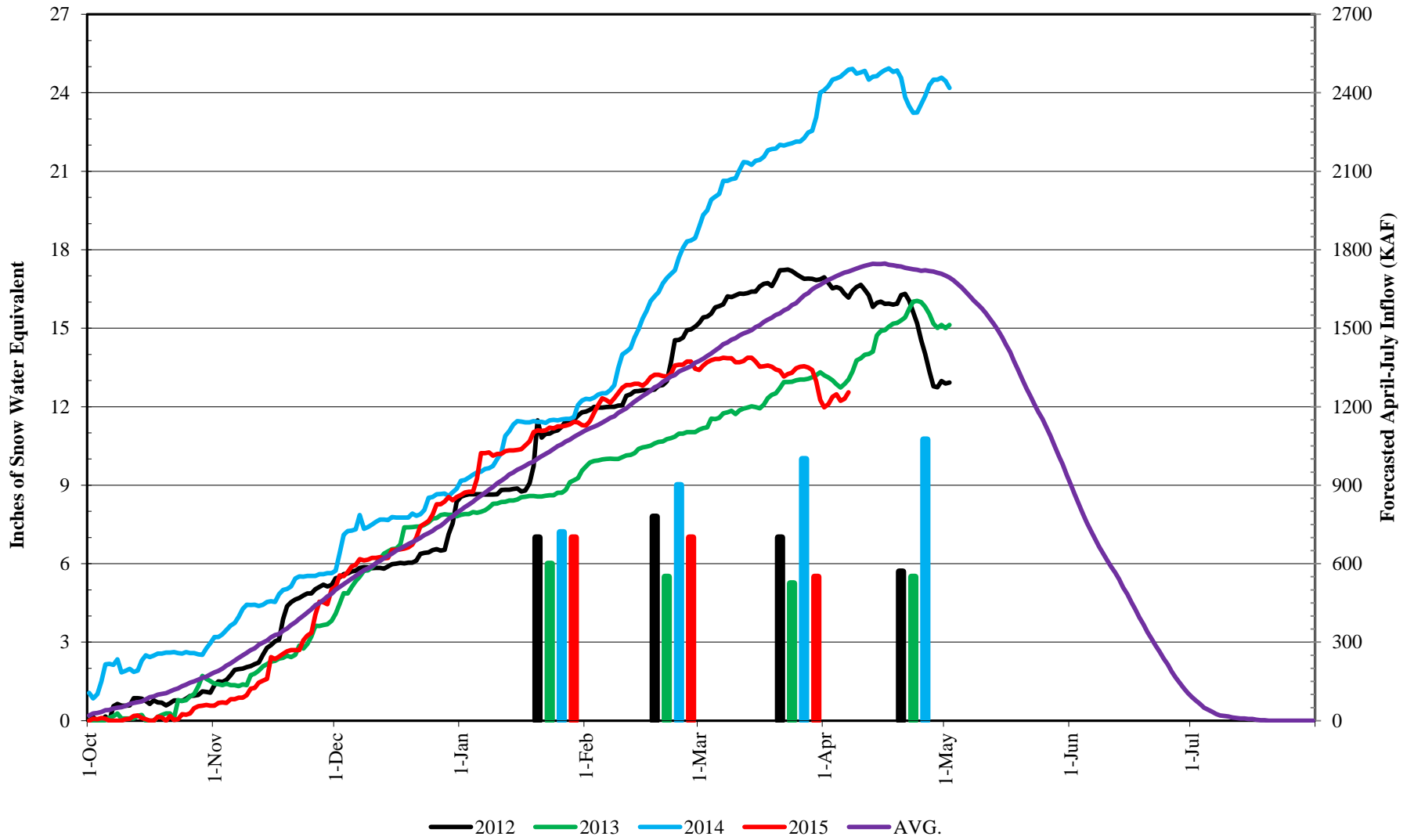
# Buffalo Bill Forecast - March



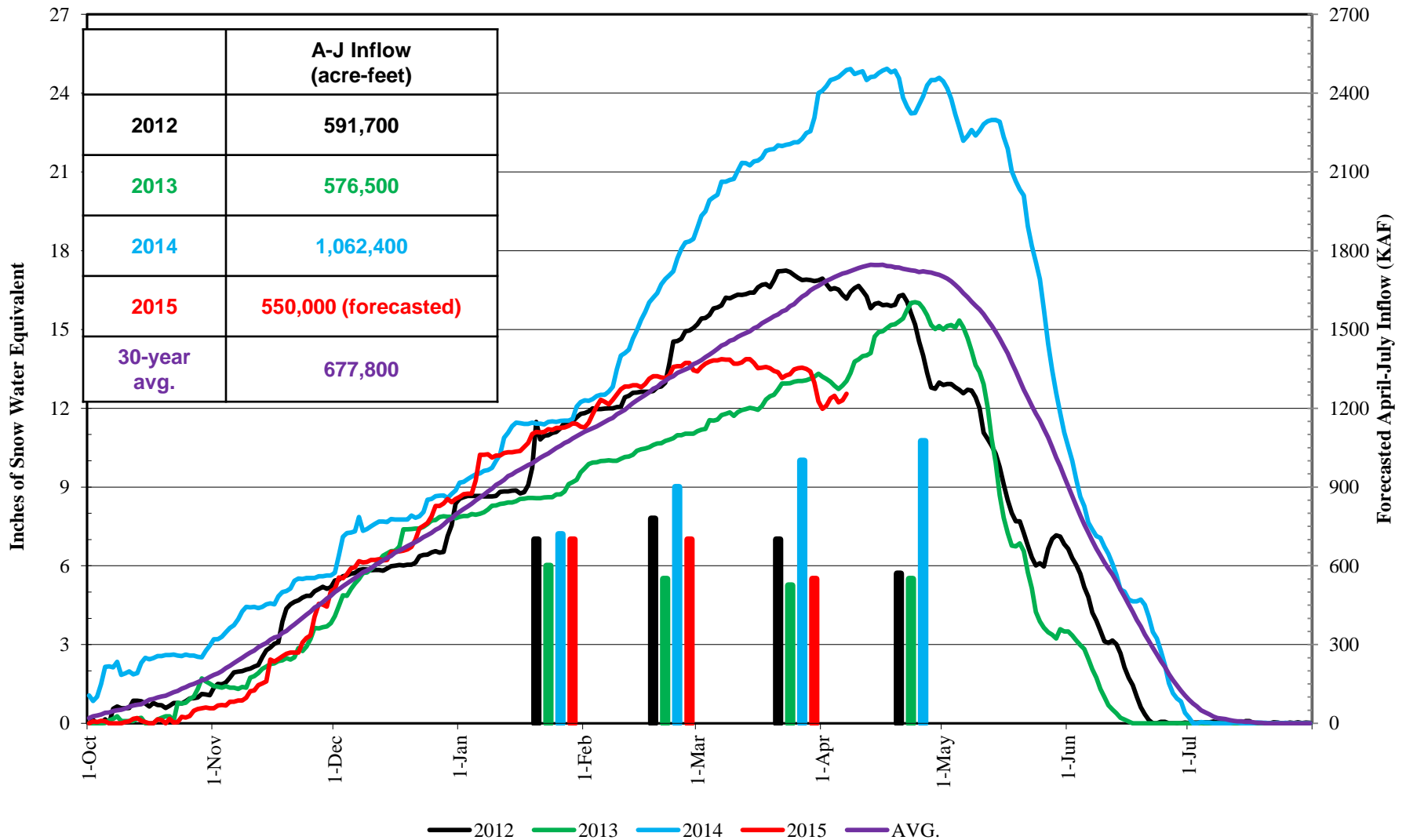
# Buffalo Bill Forecast - April



# Buffalo Bill Forecast - May

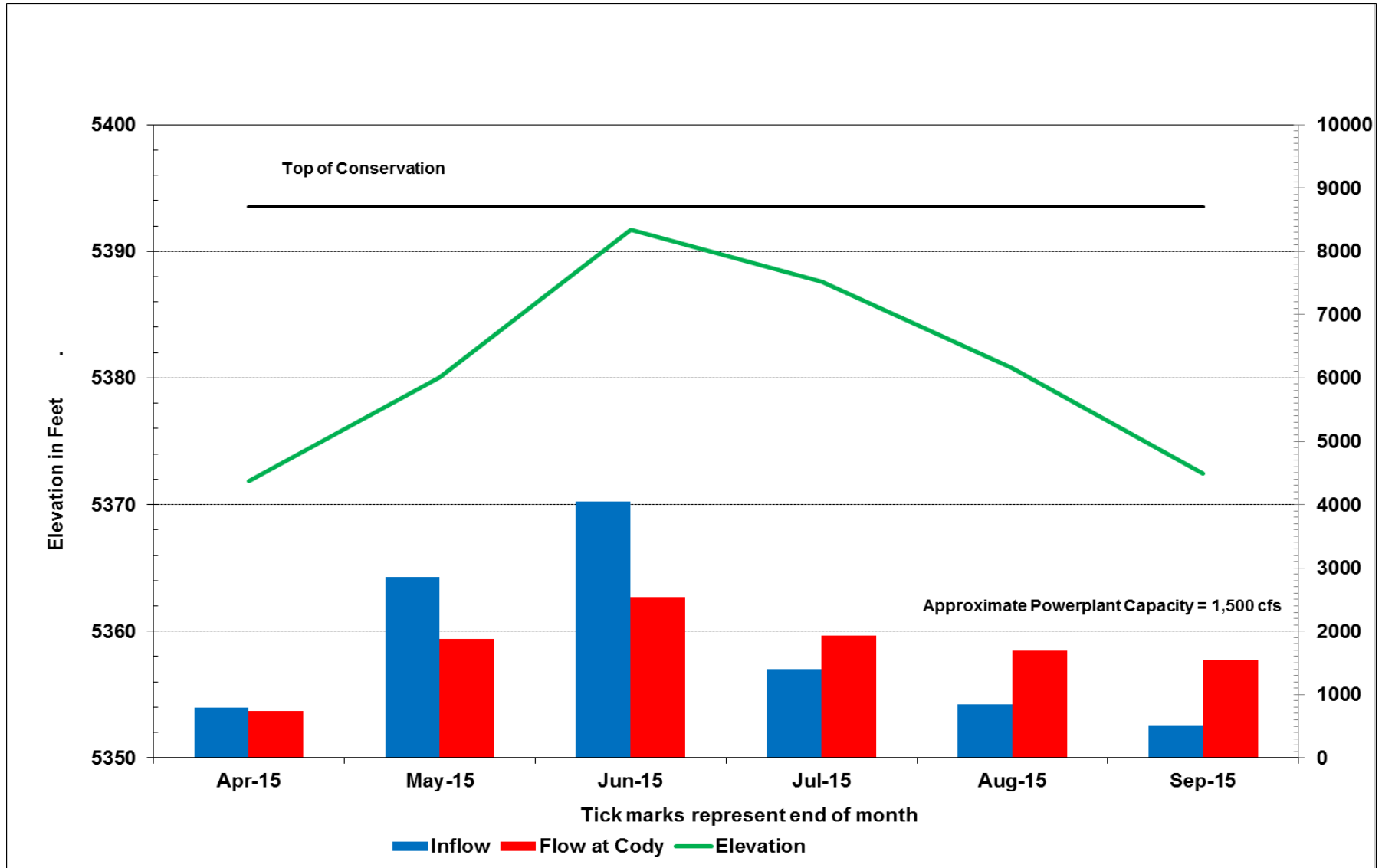


# Buffalo Bill Forecast - Full Year





# Buffalo Bill Reservoir Operations





**NOVEMBER - MARCH  
Bighorn Lake River Release Rate**

A	B	C	D	E	F	G	H	I	Month	Gain
ENTER Bighorn Lake Apr-Oct Gain in Acre-feet	CALCULATED Nov-Mar Forecasted Gain Acre-feet	ENTER Bighorn Lake Oct. 31 Storage AF	ENTER Buffalo Bill Nov-Mar Release CFS	ENTER Boysen Res Nov-Mar Release CFS	End of March Bighorn Lake Stor. Target acre-feet (2007 AC Table)	CALCULATED Release to Afterbay CFS	CALCULATED River Release From Afterbay CFS	31-Mar-10 Reservoir Level Target	April	93.6
320,800	268,918	989,700	365	940	821,949	2763	2833	3619.0	May	130.5
Min Probable	228,918								June	146.4
Max Probable	308,918								July	-111.9
									August	-6.7
									September	27
									October	41.9
									Total	320.8

**Directions:** Enter appropriate values in the Yellow Cells: A10, C10, D10, & E10.  
Bighorn Lake River Release for Nov. - Mar. is calculated in cell H10 and the end of March target elevatio is displayed in I10.

B = .145\*A+222402 R<sup>2</sup> = .6756 Forecasted Gain  
F = Desired end of March Storage  
G is determined from calculations in J through L with Checks in M  
H = Dam Release (G) + 70 cfs

Forecasted Gain Adjustments

	Elevation	Sotrage
1500-2000 cfs	3615	794,613
2000-2500 cfs	3617	807,921
> 2500 cfs	3619	821,949

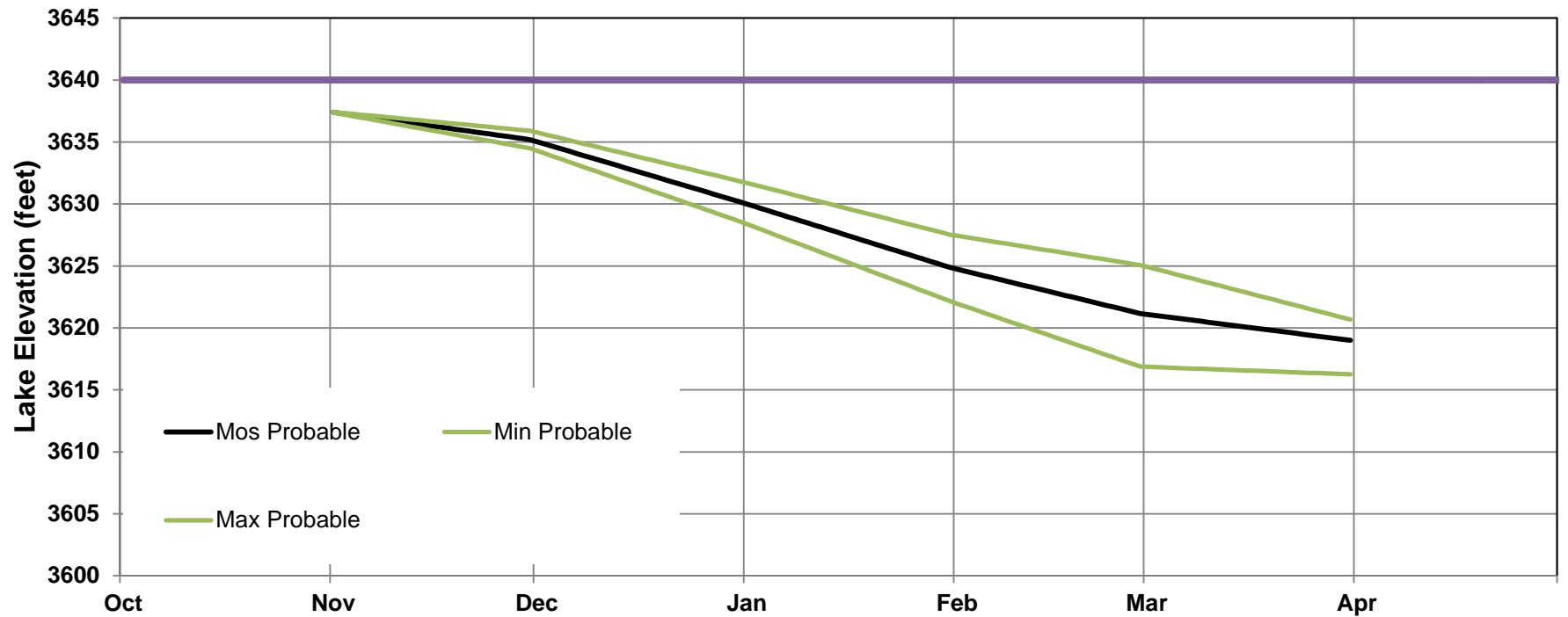
Intermediate Calculations for River Release			
J	K	L	M
CALCULATED Step One Release CFS >2500	CALCULATED Step Two Release CFS 2000-2500	CALCULATED Step Three Release CFS 1500-2000	Check Results & Adjust Release CFS
2833 2833	2880 2500 2000	2924 2000 1500 1500	2833 2833 2833 2833

	K	L
	End of March Reservoir Elev. Target	End of March Reservoir Storage Target
If J > 2500 than set to J	3619.0	821,949
If K < 2500 than set to K	3619.0	821,949
If L < 2000 Then set to L	3619.0	821,949
If L < 1500 then set to 1500	3619.0	821,949

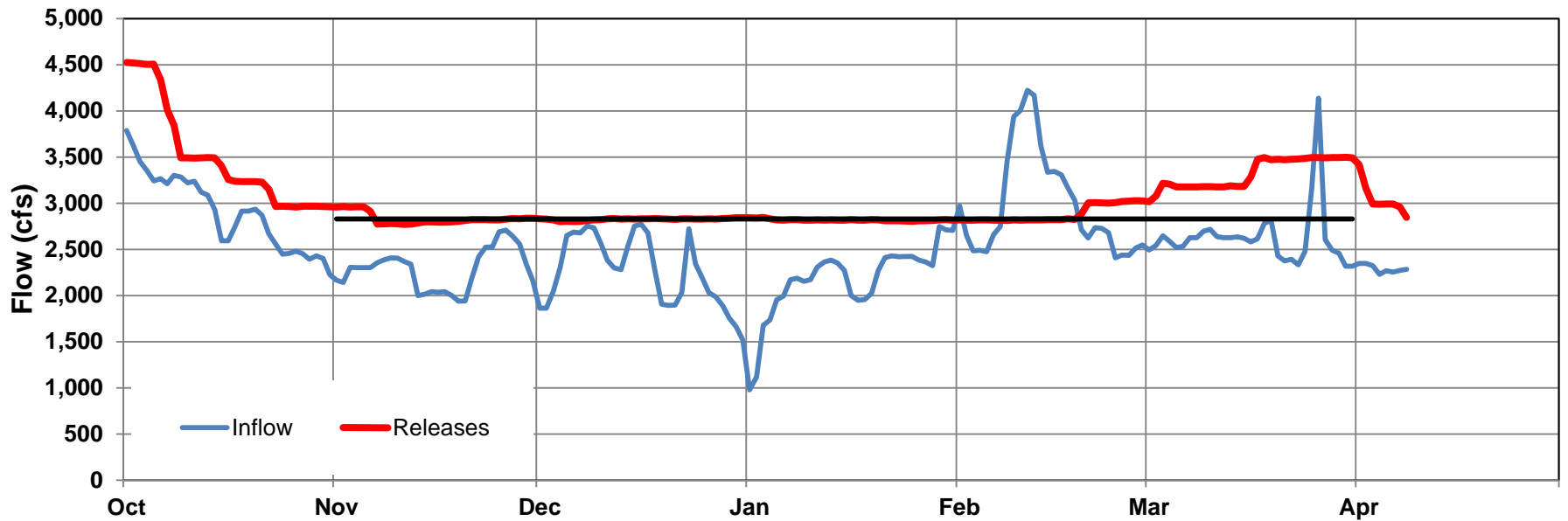
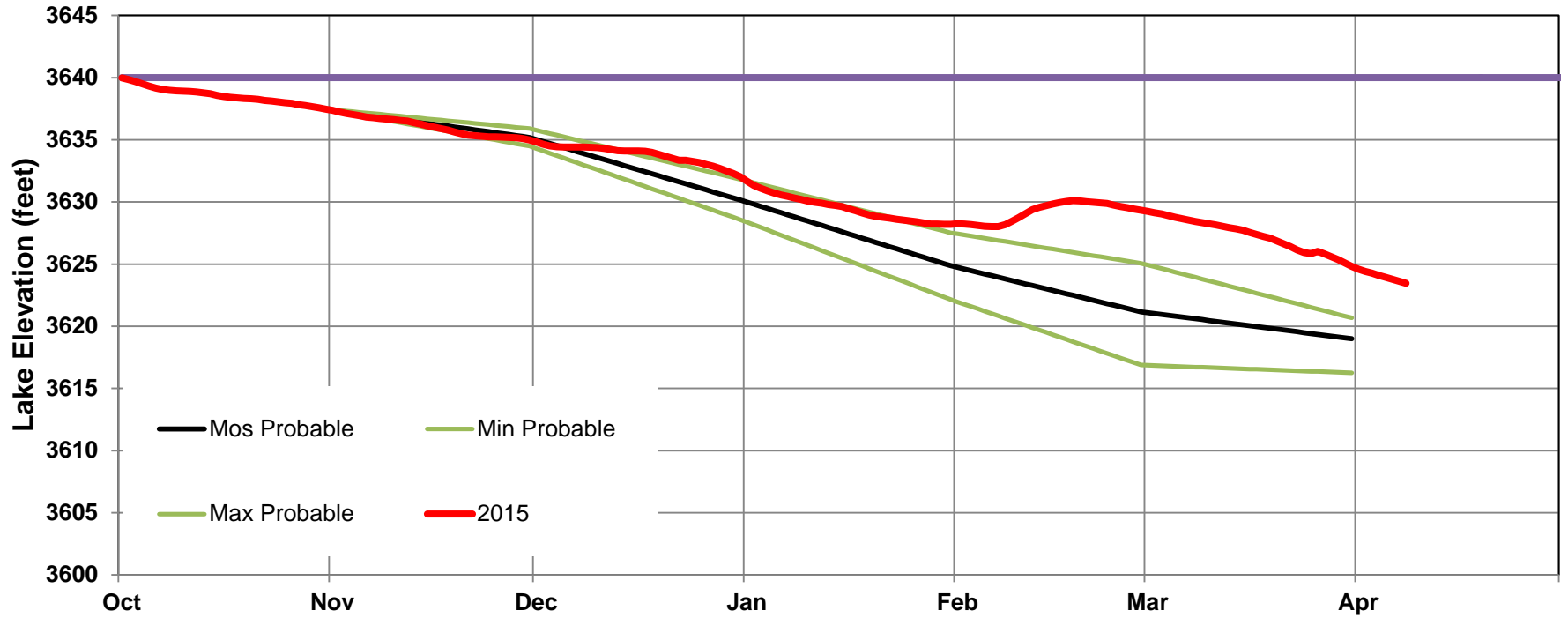
Nov-Mar Winter Release Calculation:

Nov-Mar Bighorn River Release: 2,830 cfs

# Bighorn Lake Operations



# Bighorn Lake Operations

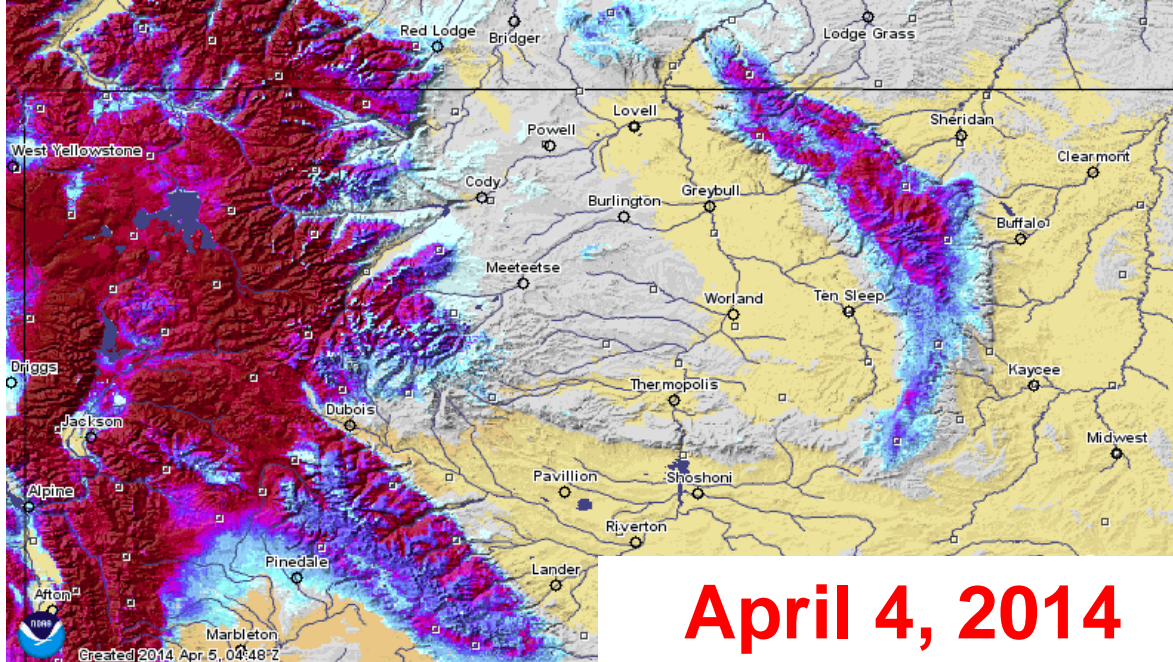


Nov-Mar Gains:

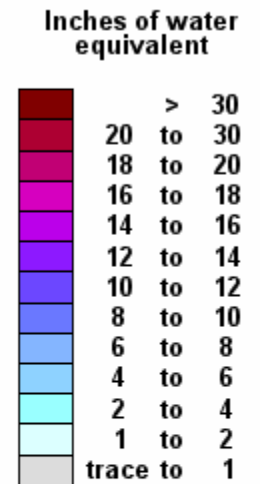
Total Nov-Mar Inflow:



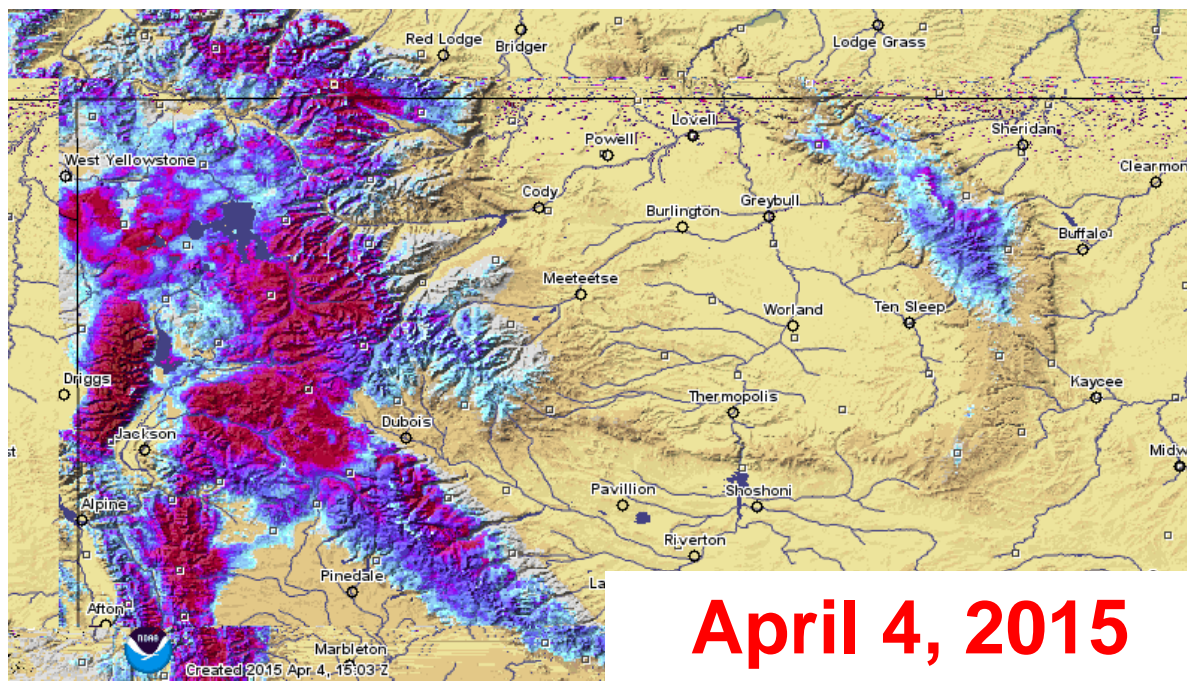
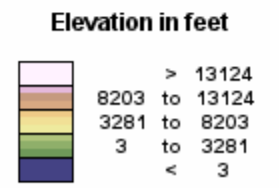




**April 4, 2014**

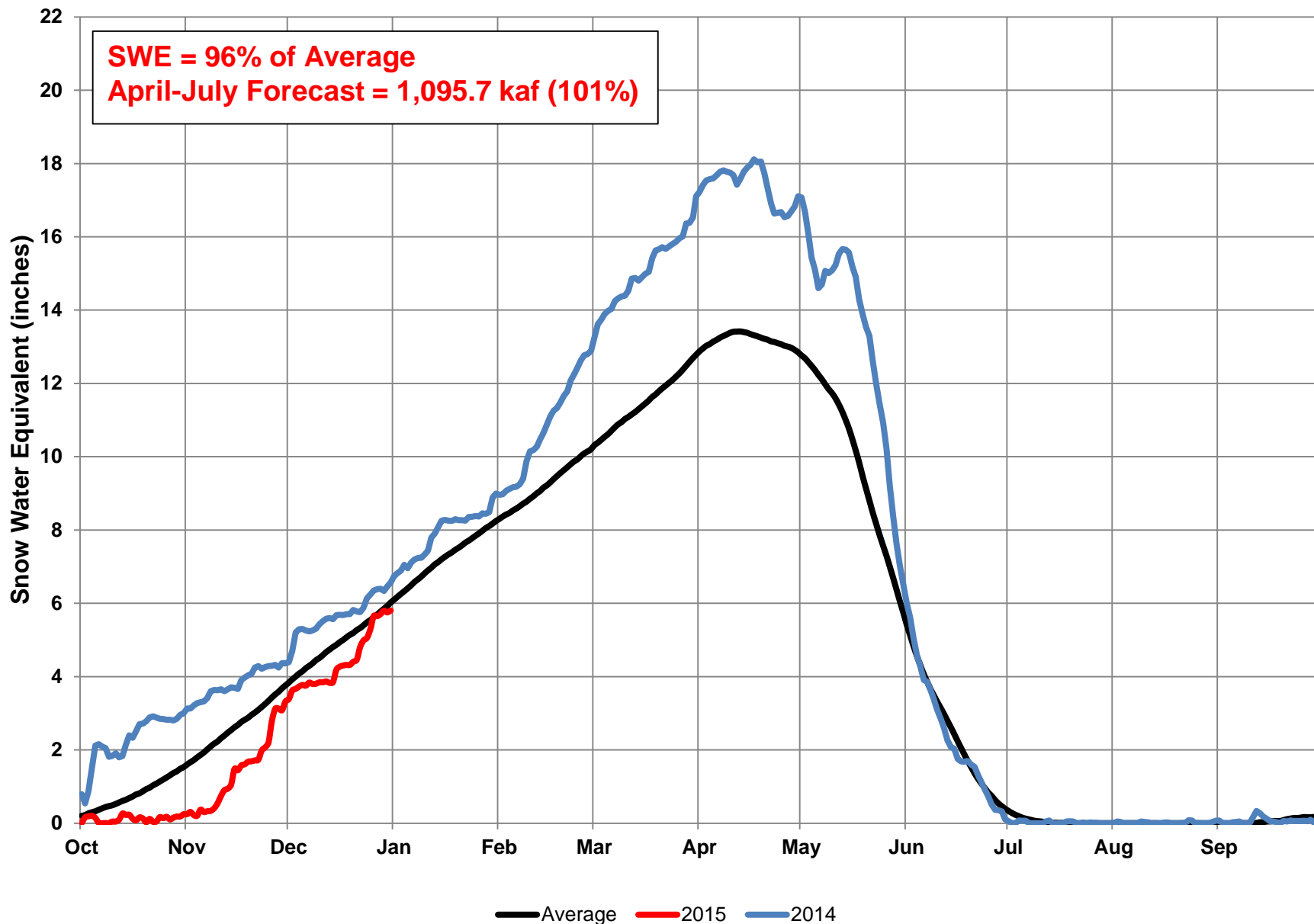


Not Estimated

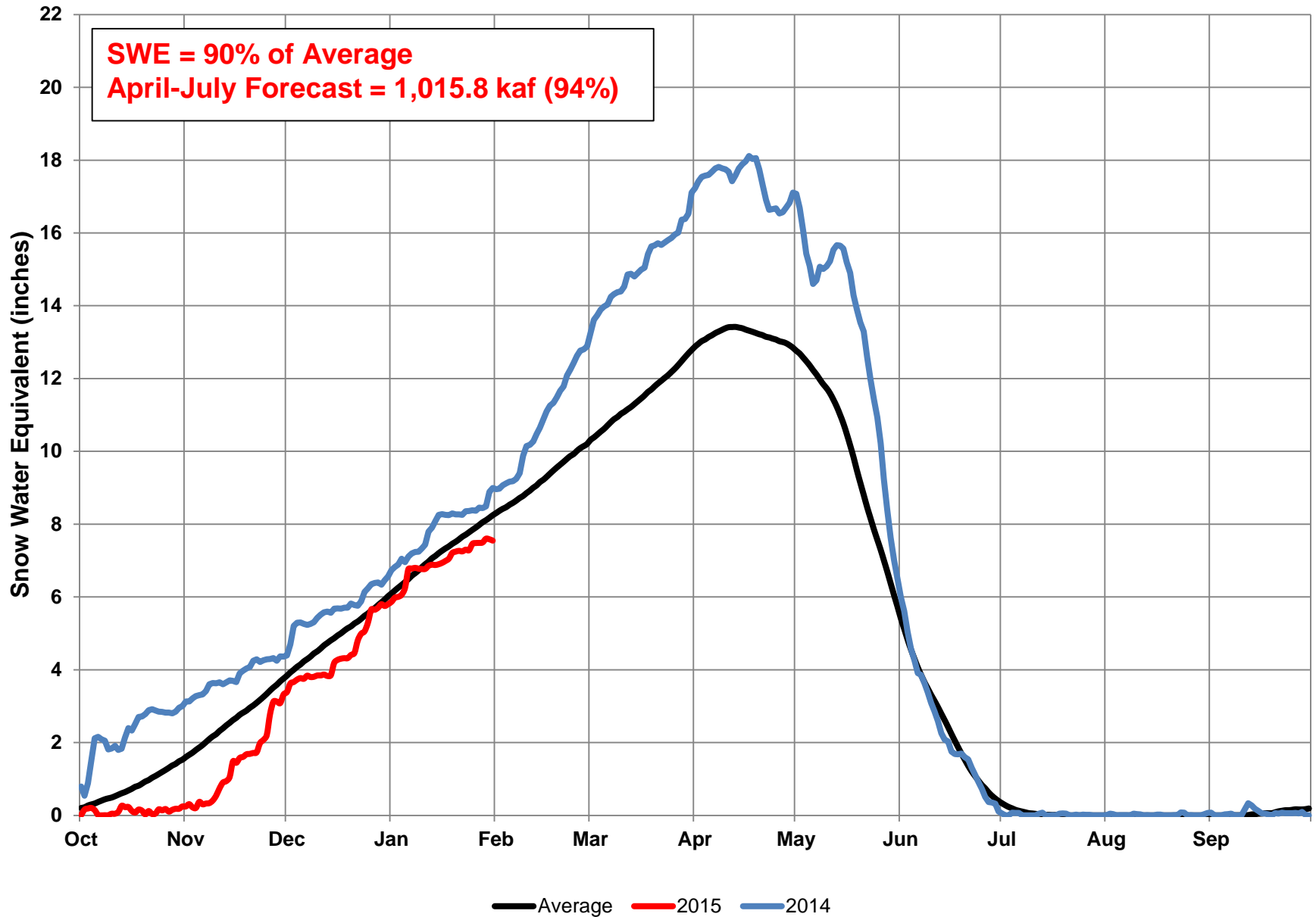


**April 4, 2015**

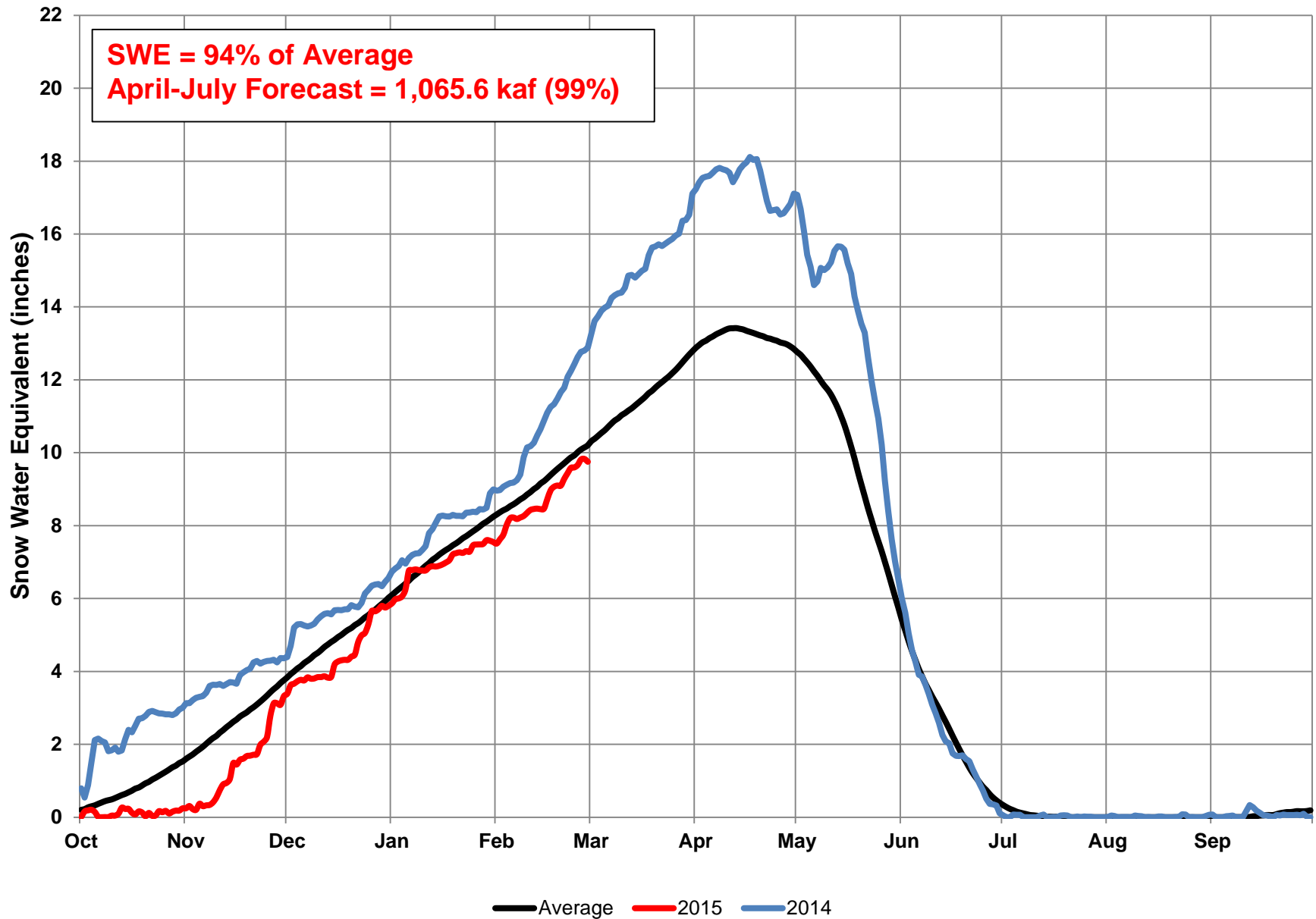
# Mountain Snowpack Conditions on January 1



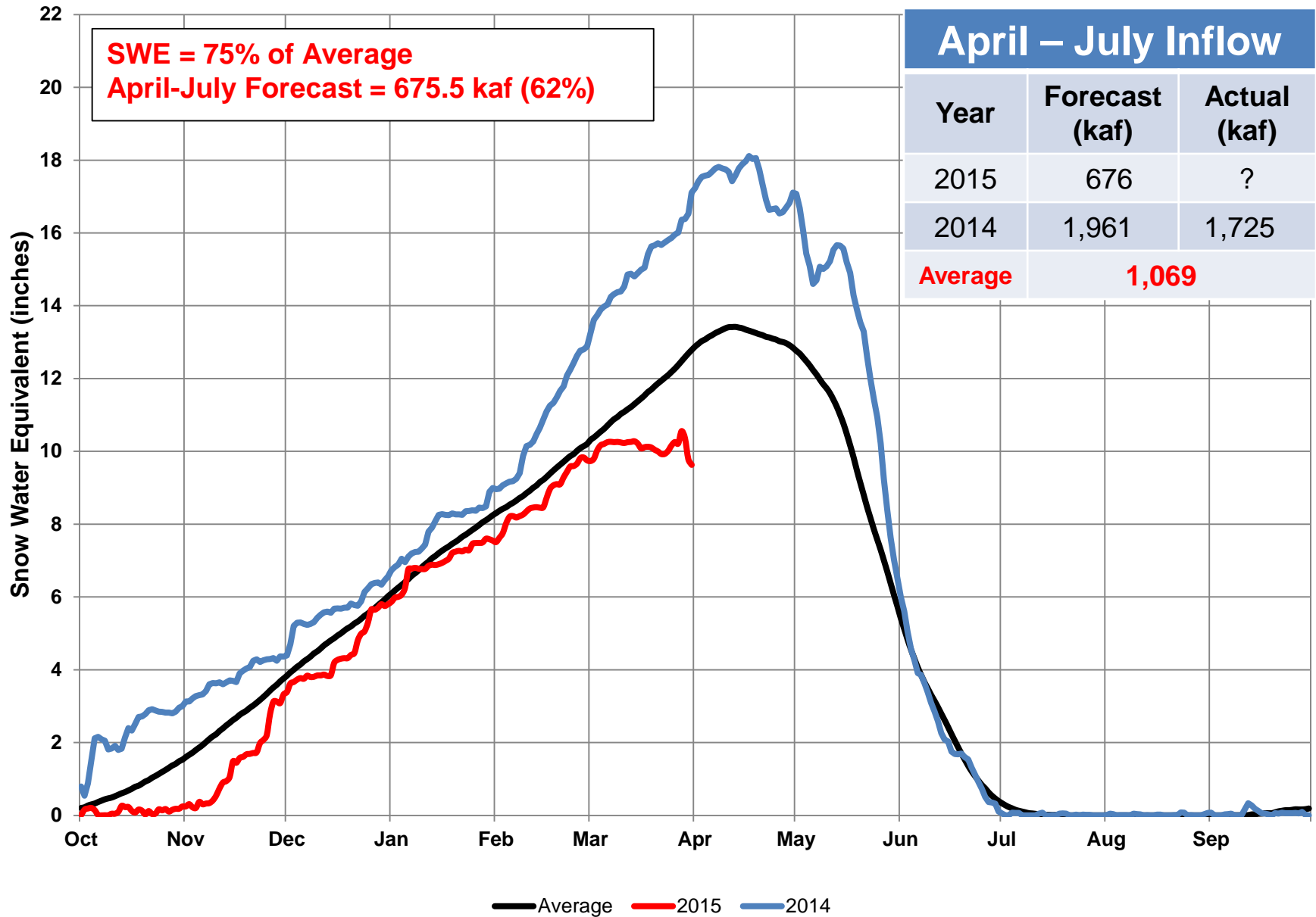
# Mountain Snowpack Conditions on February 1



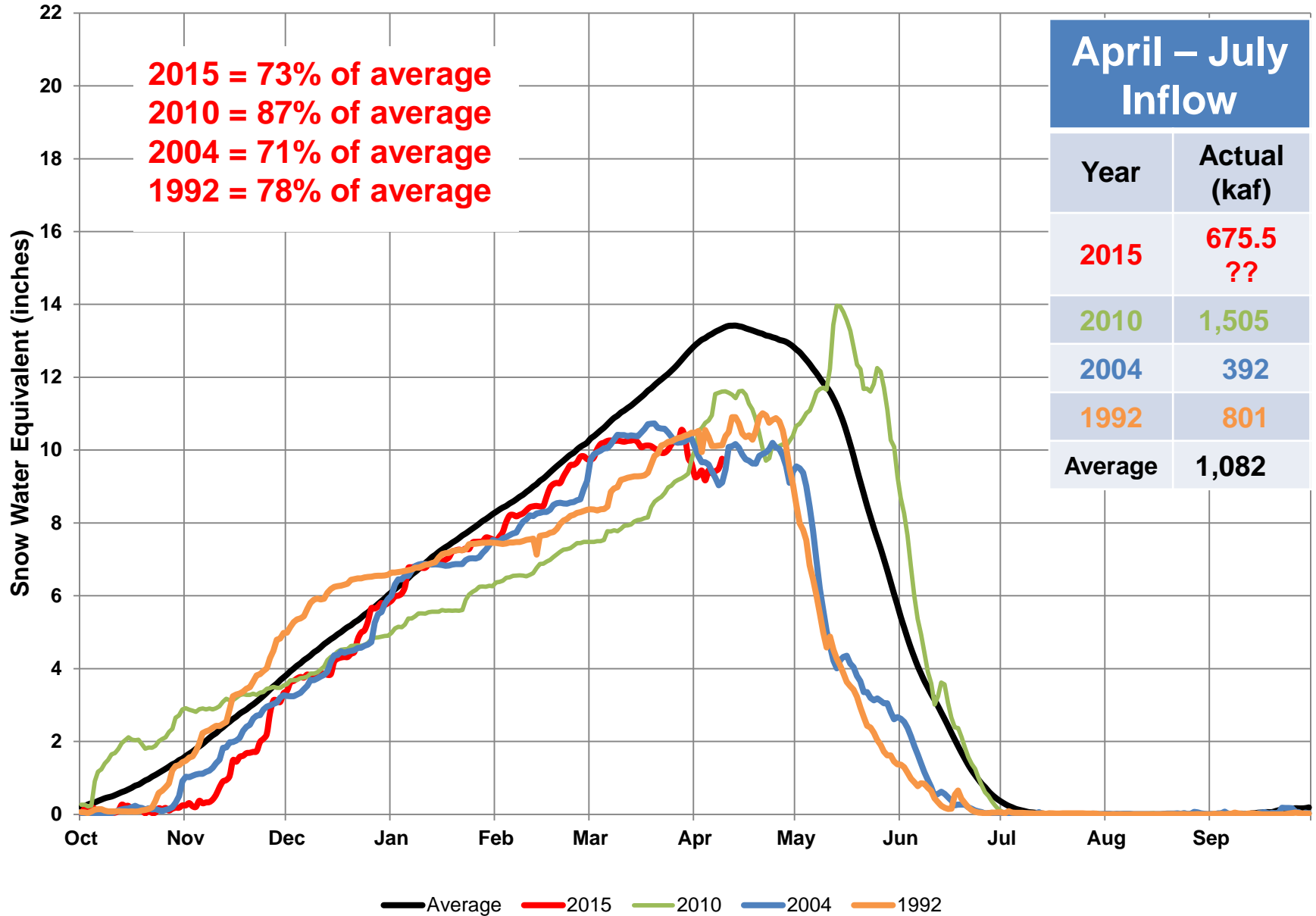
# Mountain Snowpack Conditions on March 1



# Mountain Snowpack Conditions on April 1



# Mountain Snowpack on April 9





Most Probable Inflow

Minimum Probable Inflow

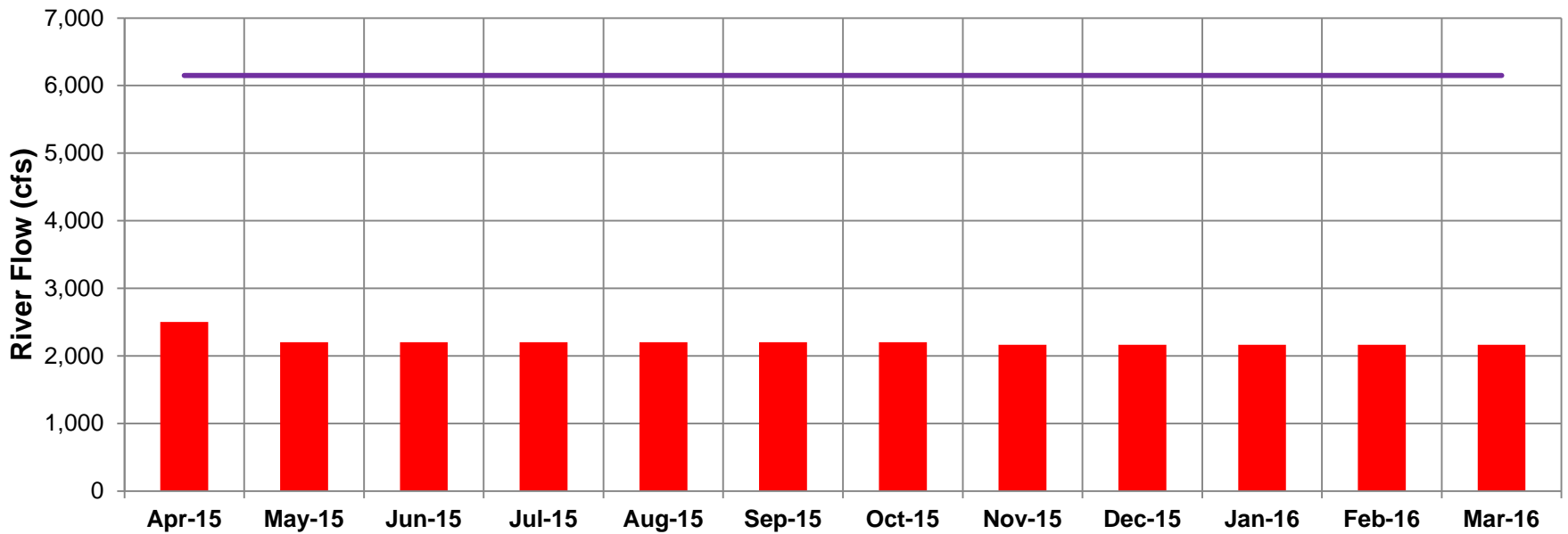
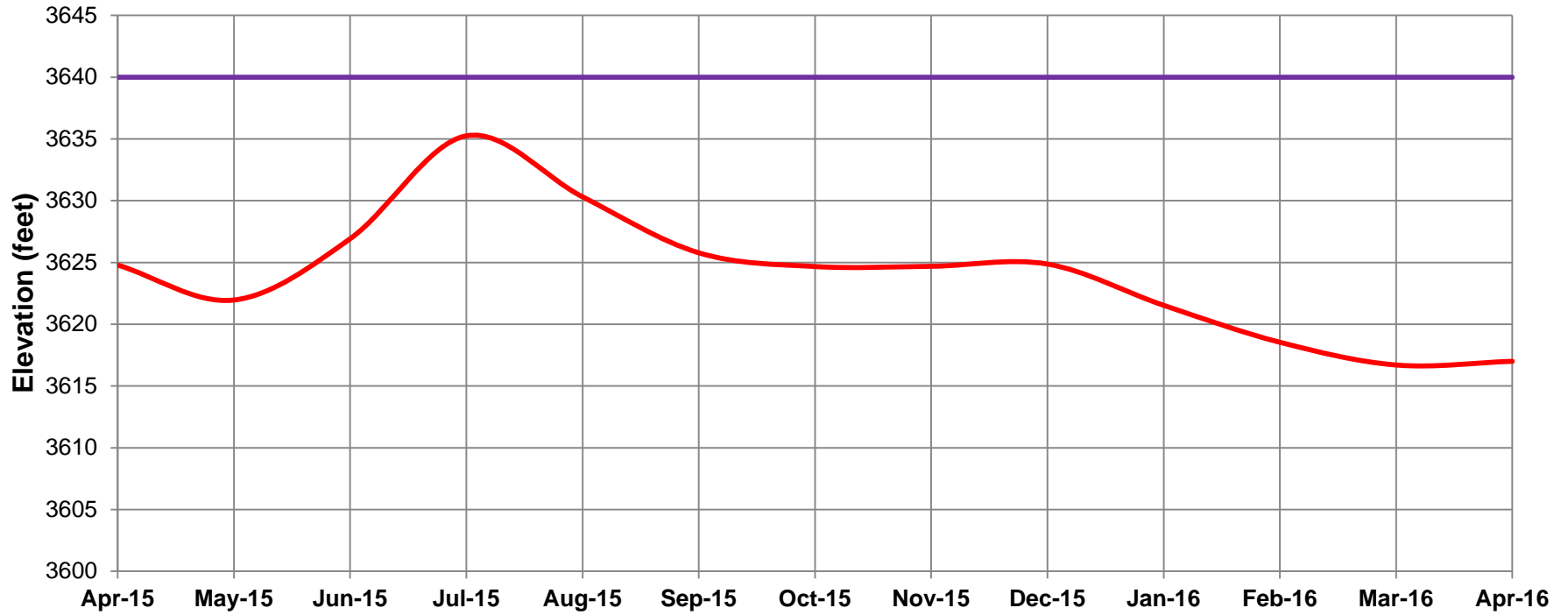
Maximum Probable Inflow

April – July Inflow		
Year	Forecast (kaf)	Actual (kaf)
2015	676	?
2014	1,967	1,725
2013	661	628
2012	1,064	693
2011	1,400	2,572
2010	625	1,504
<b>Average</b>	<b>1,082</b>	

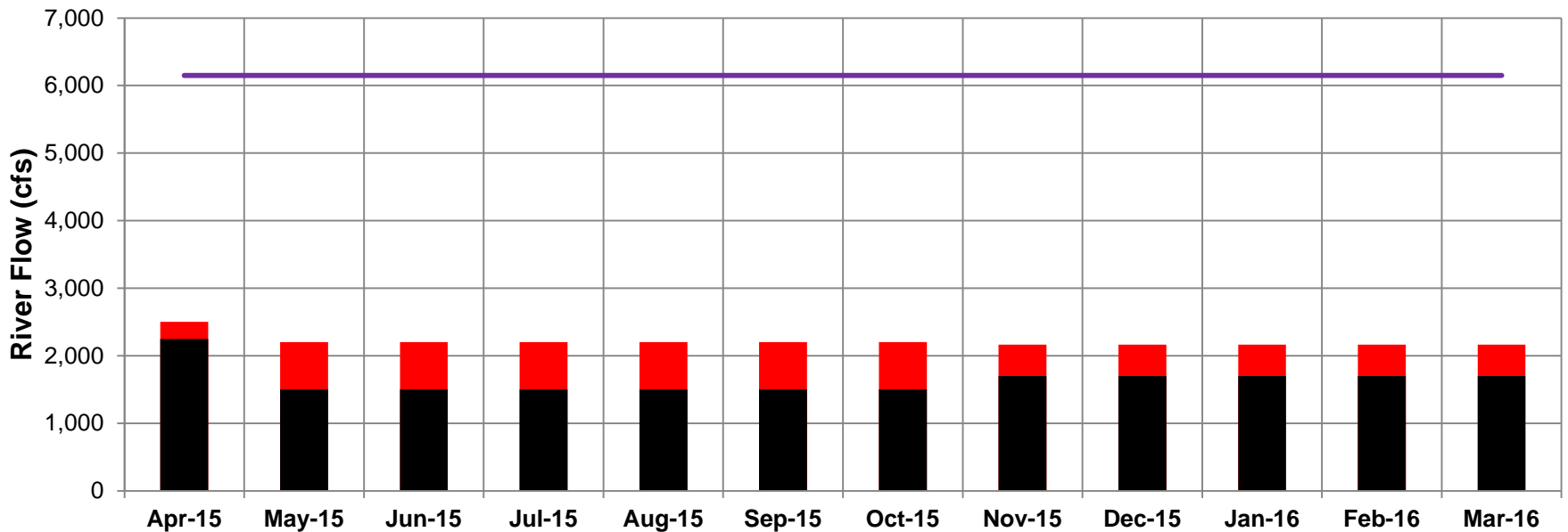
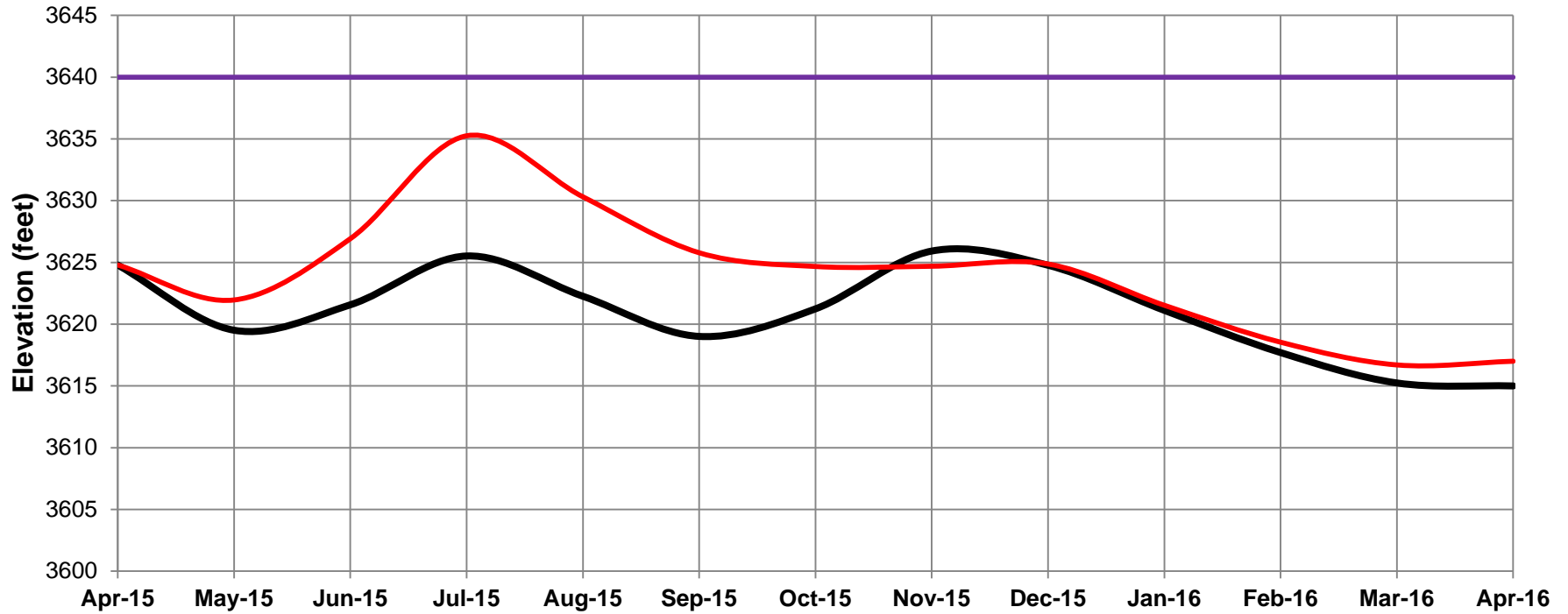


# Bighorn Lake Rule Curve

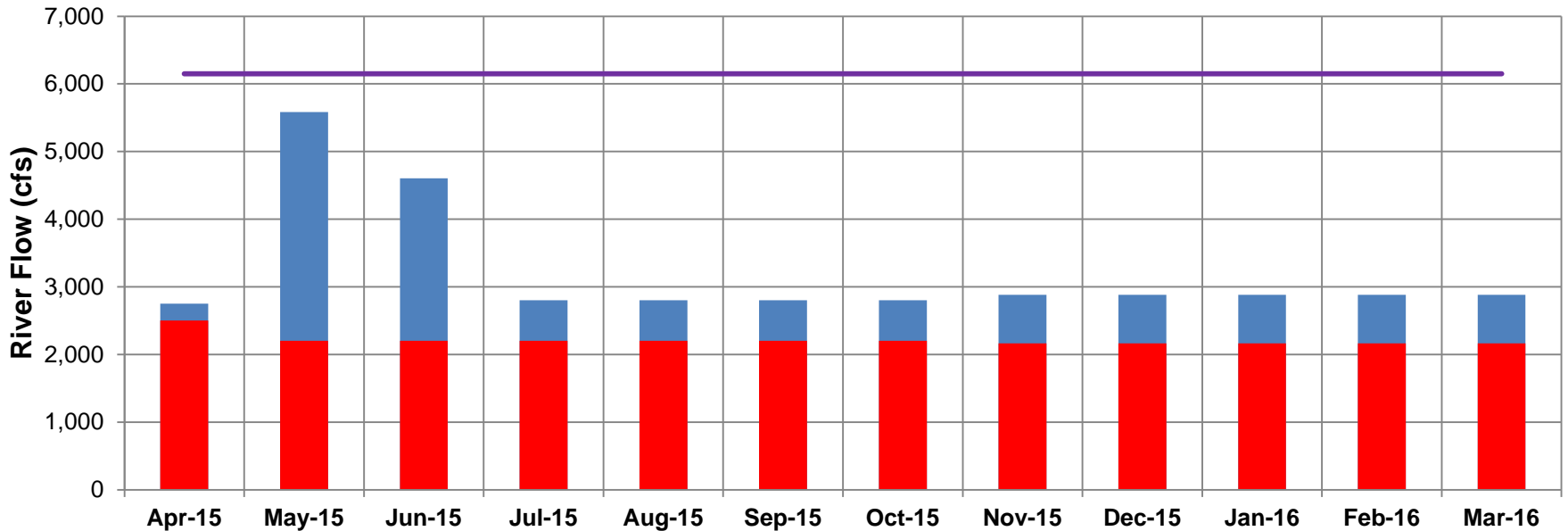
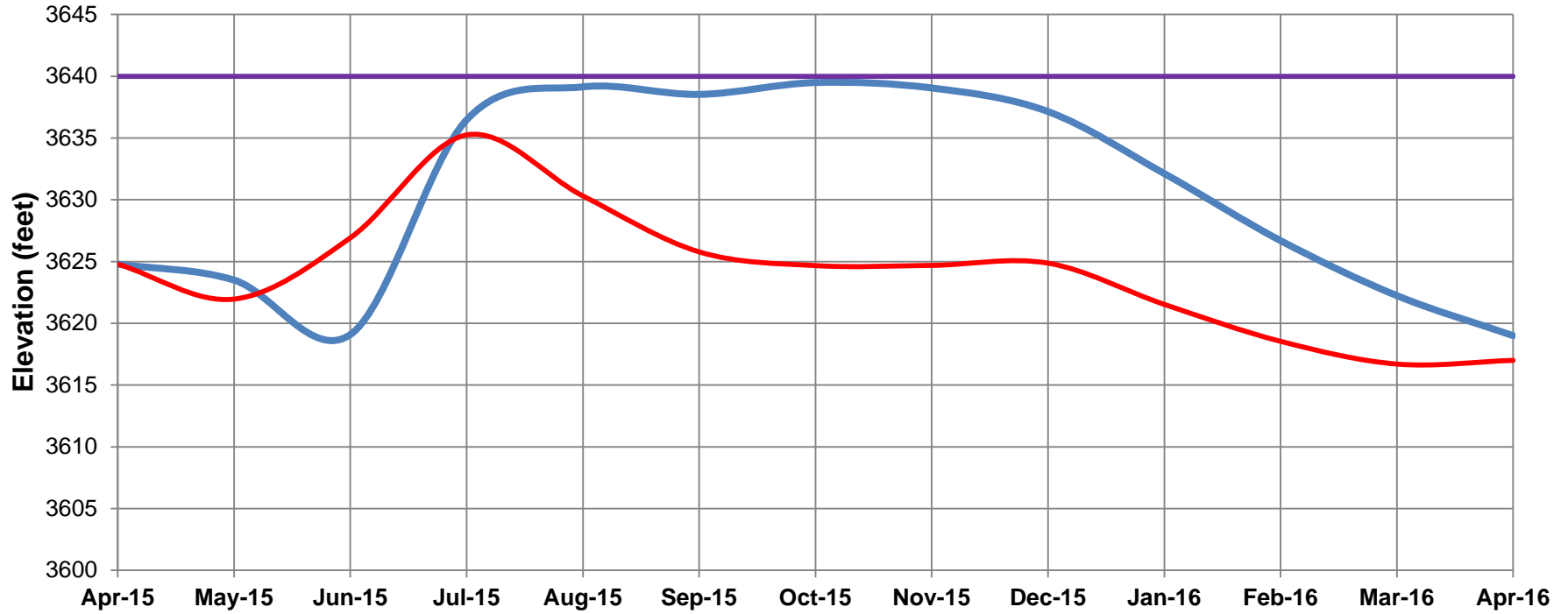
# Most Probable Inflow Operations



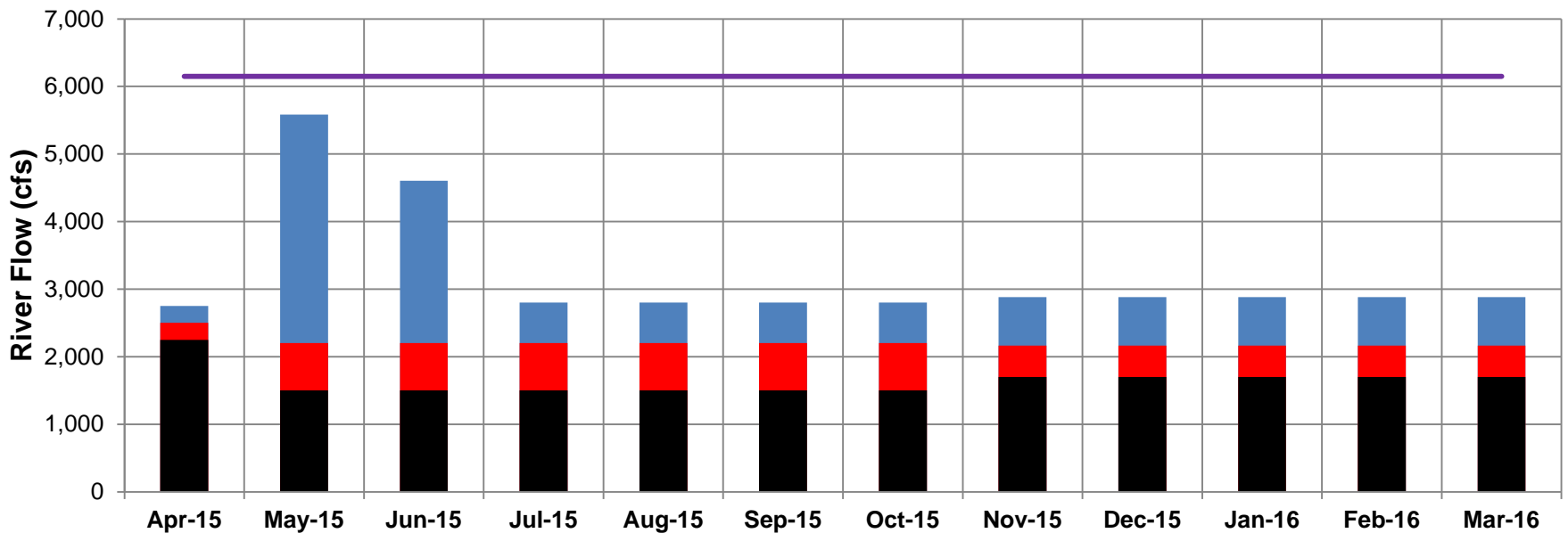
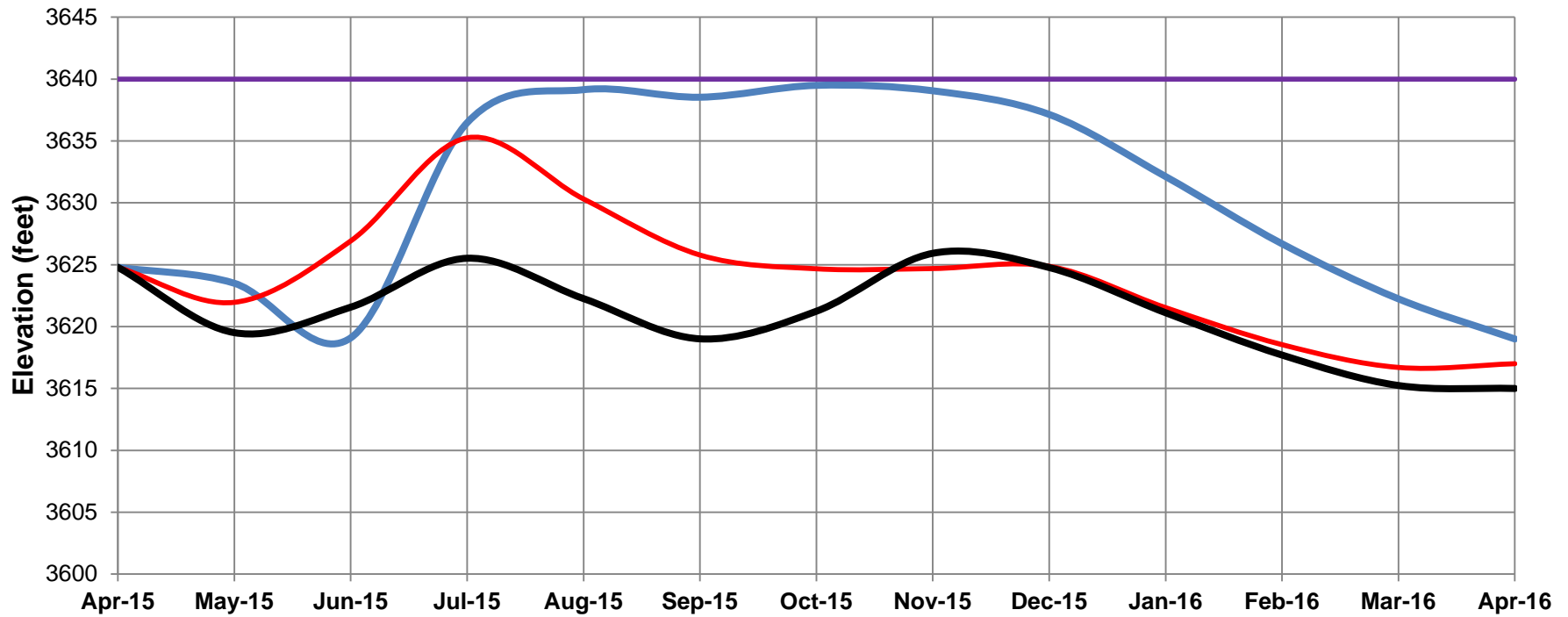
# Most and Minimum Probable Inflow Operations



# Most and Maximum Probable Inflow Operations



# Most, Minimum, and Maximum Probable Inflow Operations



# Questions and Feedback

The information presented at this meeting can be found on the Montana Area Office website at:

[www.usbr.gov/gp/mtao/yellowtail/index.html](http://www.usbr.gov/gp/mtao/yellowtail/index.html)

