

RECLAMATION

Managing Water in the West



**Navajo Unit Operations
January 24, 2012
Coordination Meeting**



U.S. Department of the Interior
Bureau of Reclamation

Agenda

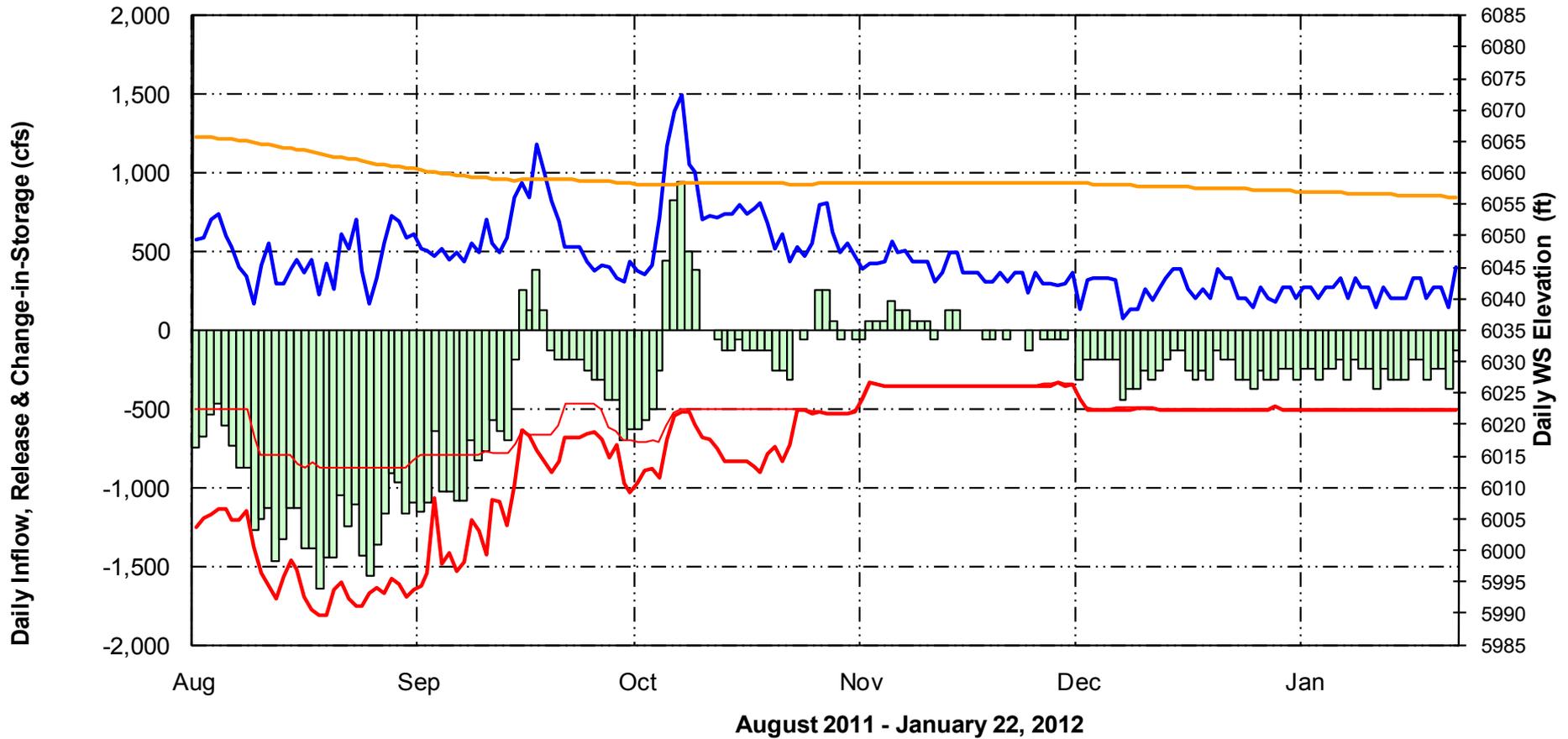
- Welcome
- Review of operations since last meeting
- Current Conditions/Snowpack
- Water Year 2012 Forecasts
- Current Reservoir Status
- Proposed Operations
- Navajo Dam Maintenance Activities
- Fish & Wildlife Service/San Juan RIP Update
- Questions from Audience
- How To Access Information
- Close

An aerial photograph of a large concrete dam and reservoir. The reservoir is filled with greenish water and has a small island in the upper right. A road curves around the reservoir, and the surrounding landscape is arid with sparse vegetation. The title text is overlaid on the image.

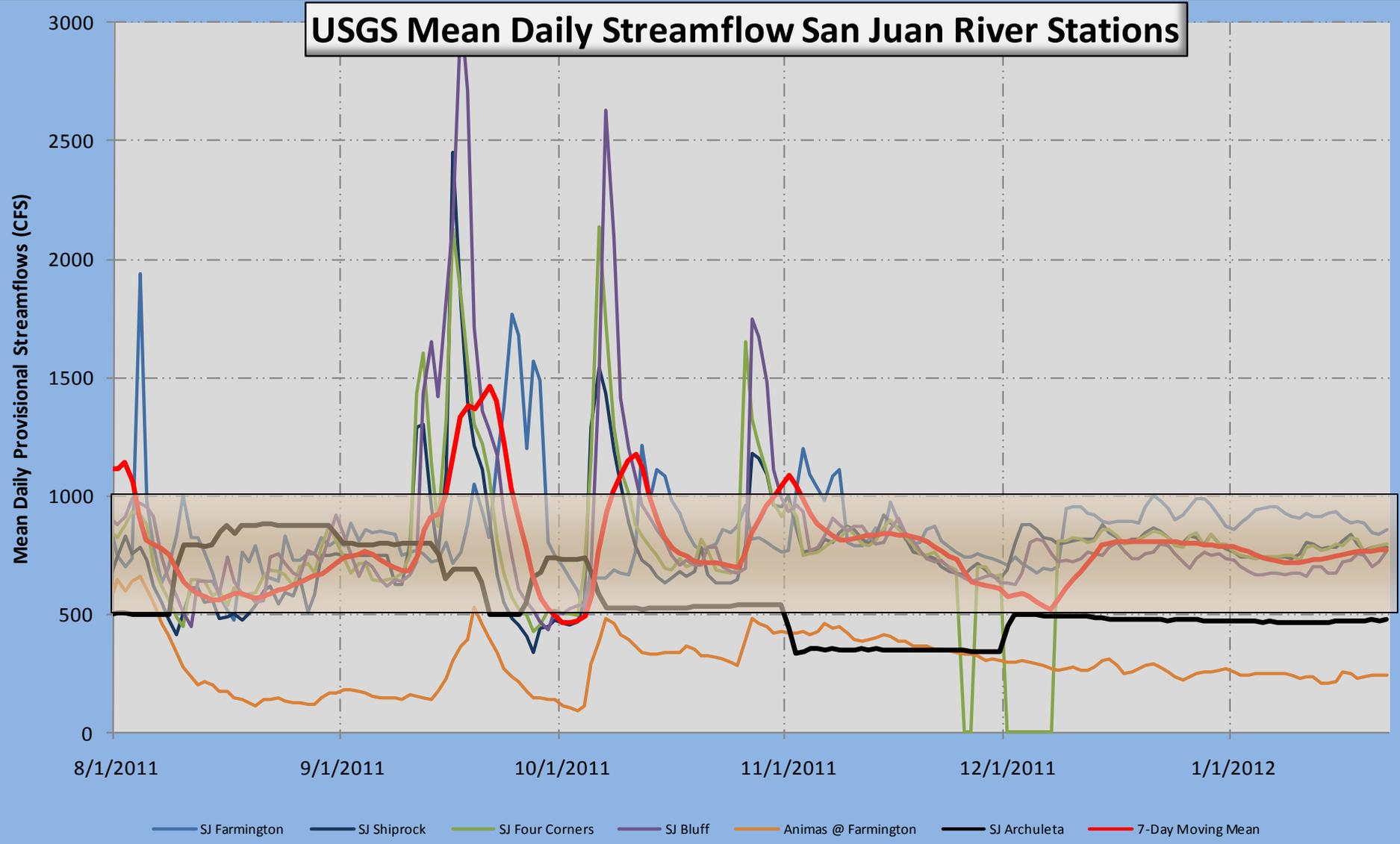
Review of Operations

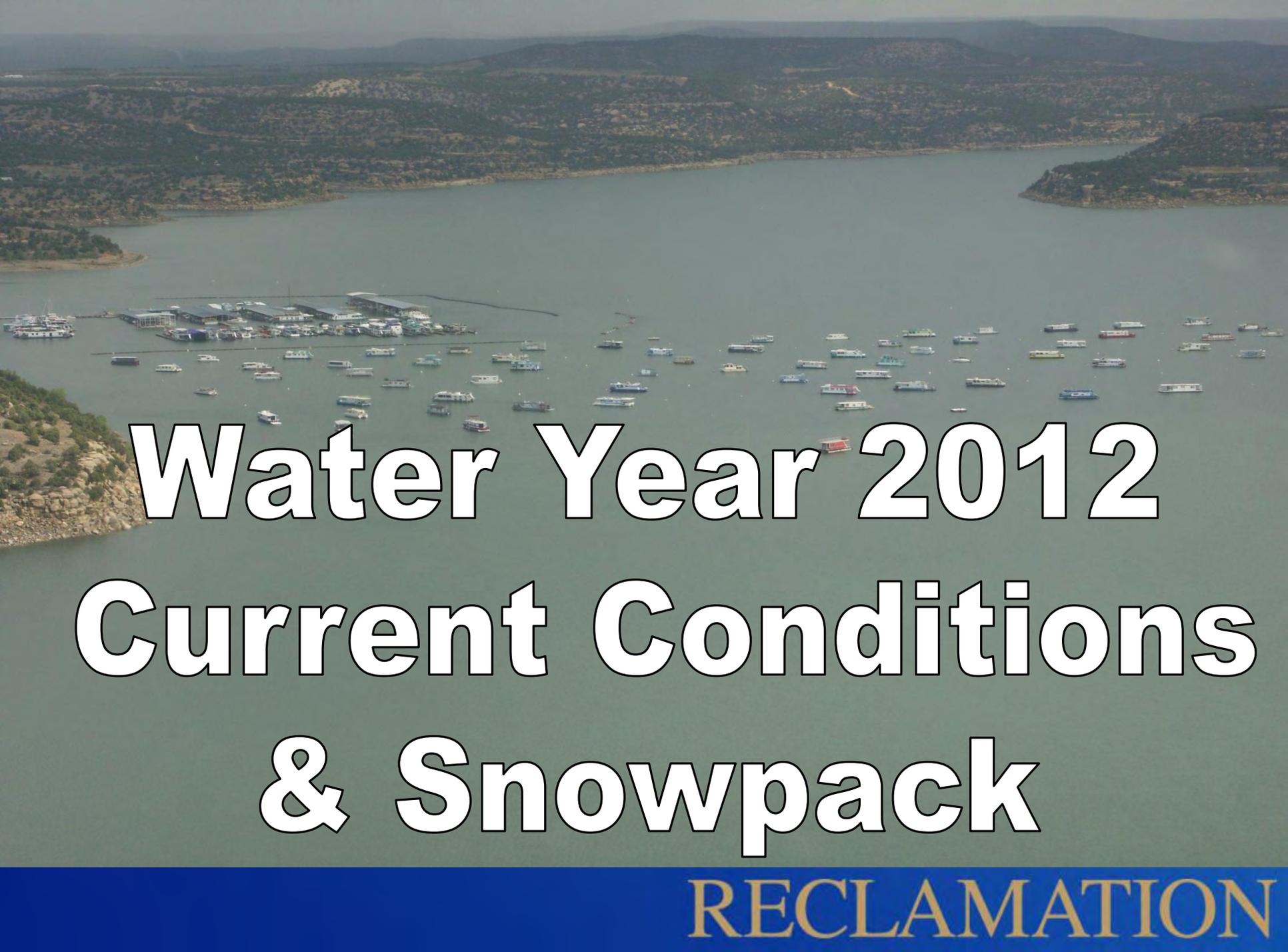
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NAVAJO RESERVOIR OPERATIONS



Chasing the Target Base Flow (500-1000 CFS)





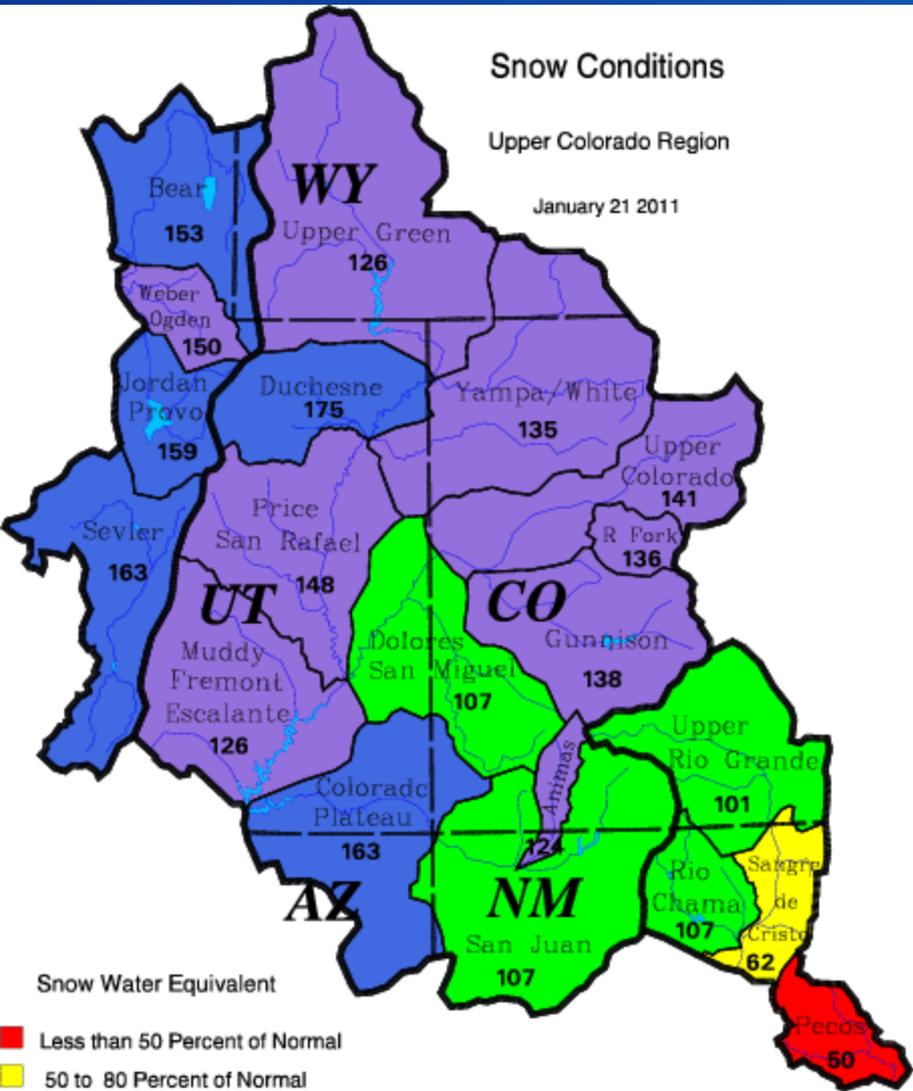
Water Year 2012 Current Conditions & Snowpack

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Snow Conditions

Upper Colorado Region

January 21 2011



Snow Water Equivalent

- Less than 50 Percent of Normal
- 50 to 80 Percent of Normal
- 80 to 120 Percent of Normal
- 120 to 150 Percent of Normal
- Greater than 150 Percent of Normal

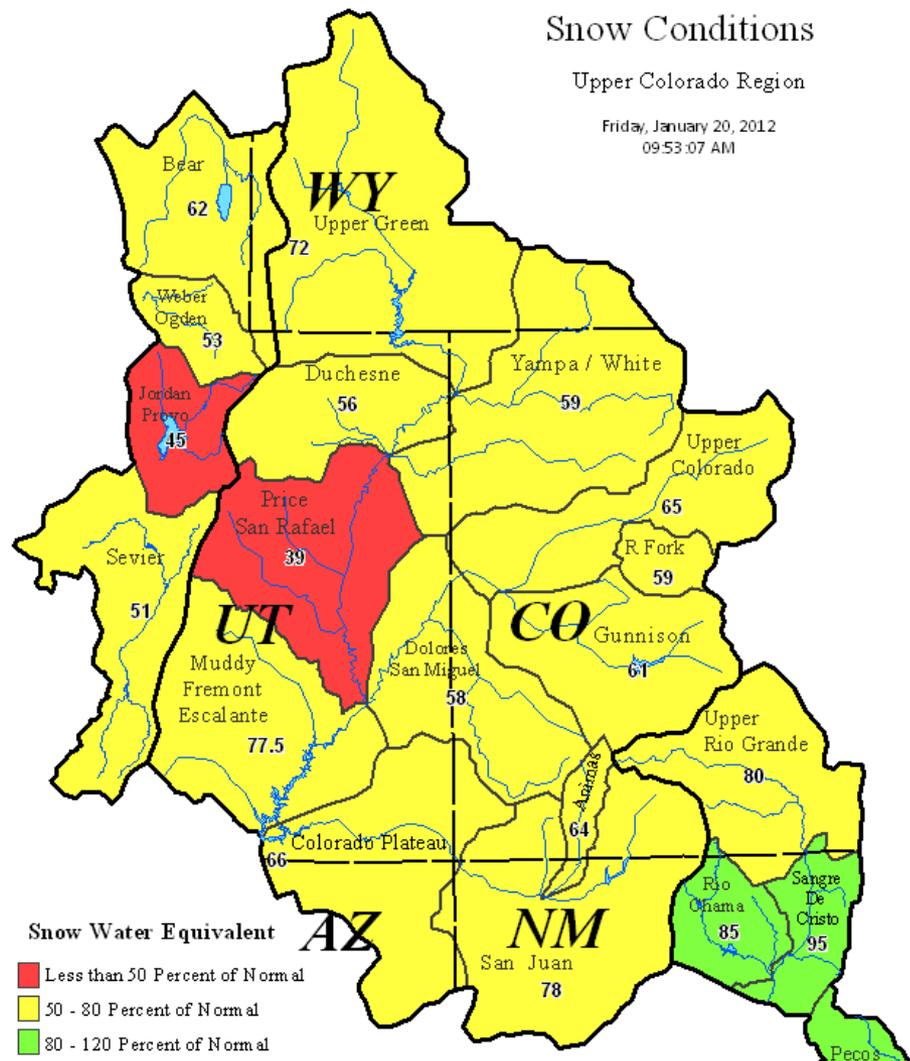
Upper Colo
GIS
Region

Data Provided by the Natural Resource Conservation Service

Snow Conditions

Upper Colorado Region

Friday, January 20, 2012
09:53:07 AM



Snow Water Equivalent

- Less than 50 Percent of Normal
- 50 - 80 Percent of Normal
- 80 - 120 Percent of Normal
- 120 - 150 Percent of Normal
- Greater than 150 Percent of Normal

Upper Colorado
GIS
Region

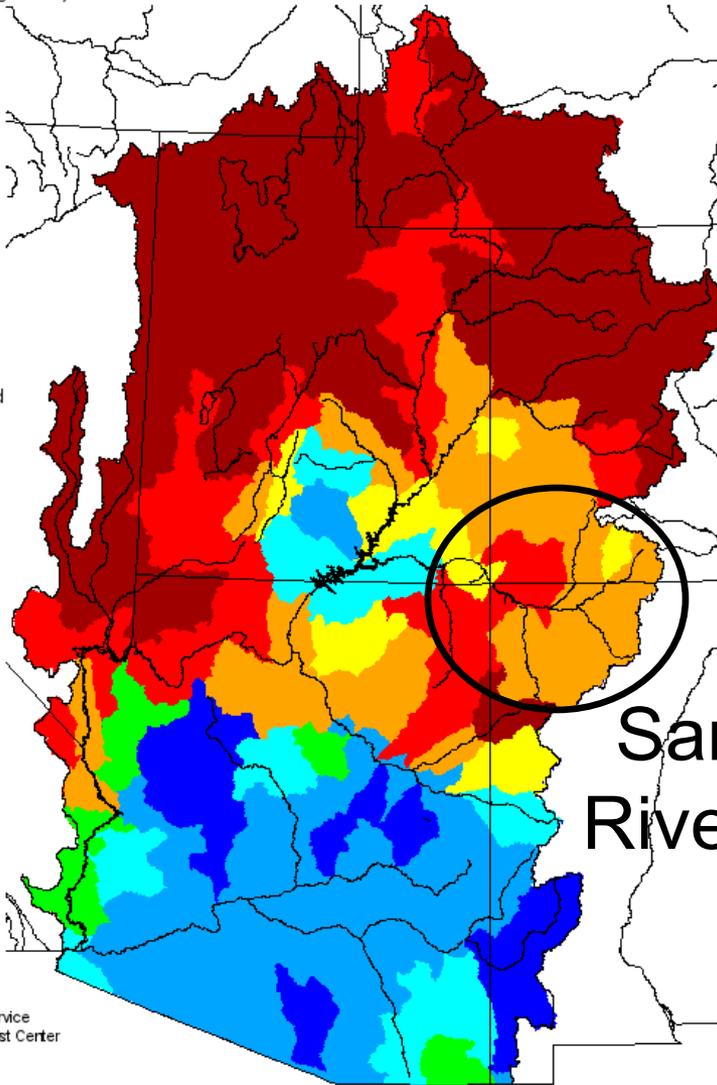
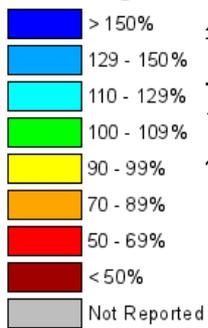
Data Provided by the Natural Resource Conservation Service

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Monthly Precipitation for December 2011

(Averaged by Hydrologic Unit)

% Average



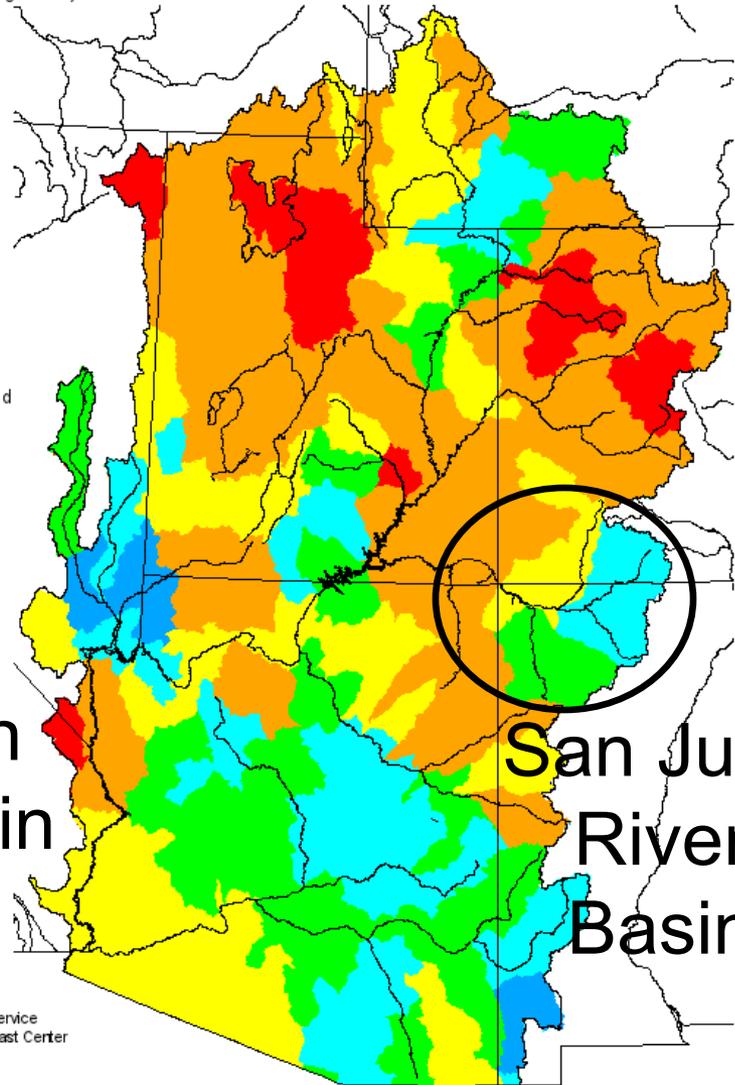
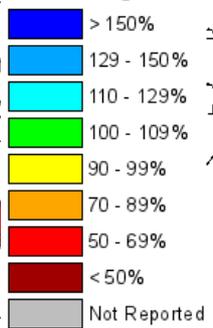
San Juan River Basin

Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

Seasonal Precipitation, October 2011 - December 2011

(Averaged by Hydrologic Unit)

% Average

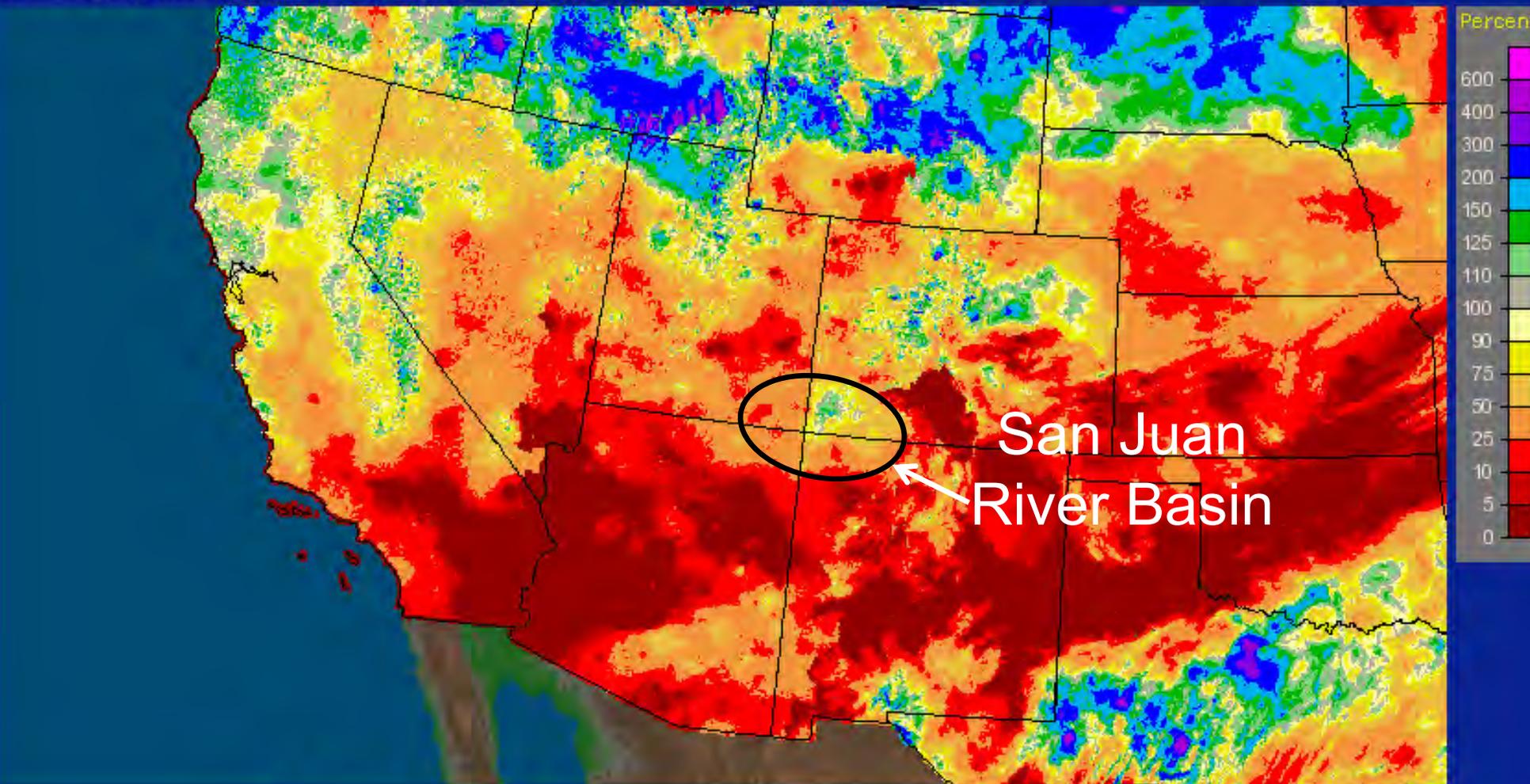


San Juan River Basin

Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

% of Average Precipitation for January

Colorado Basin RFC Salt Lake City, UT: Current Month to Date Percent of Normal Precipitation
Valid at 1/23/2012 1200 UTC - Created 1/23/12 19:45 UTC

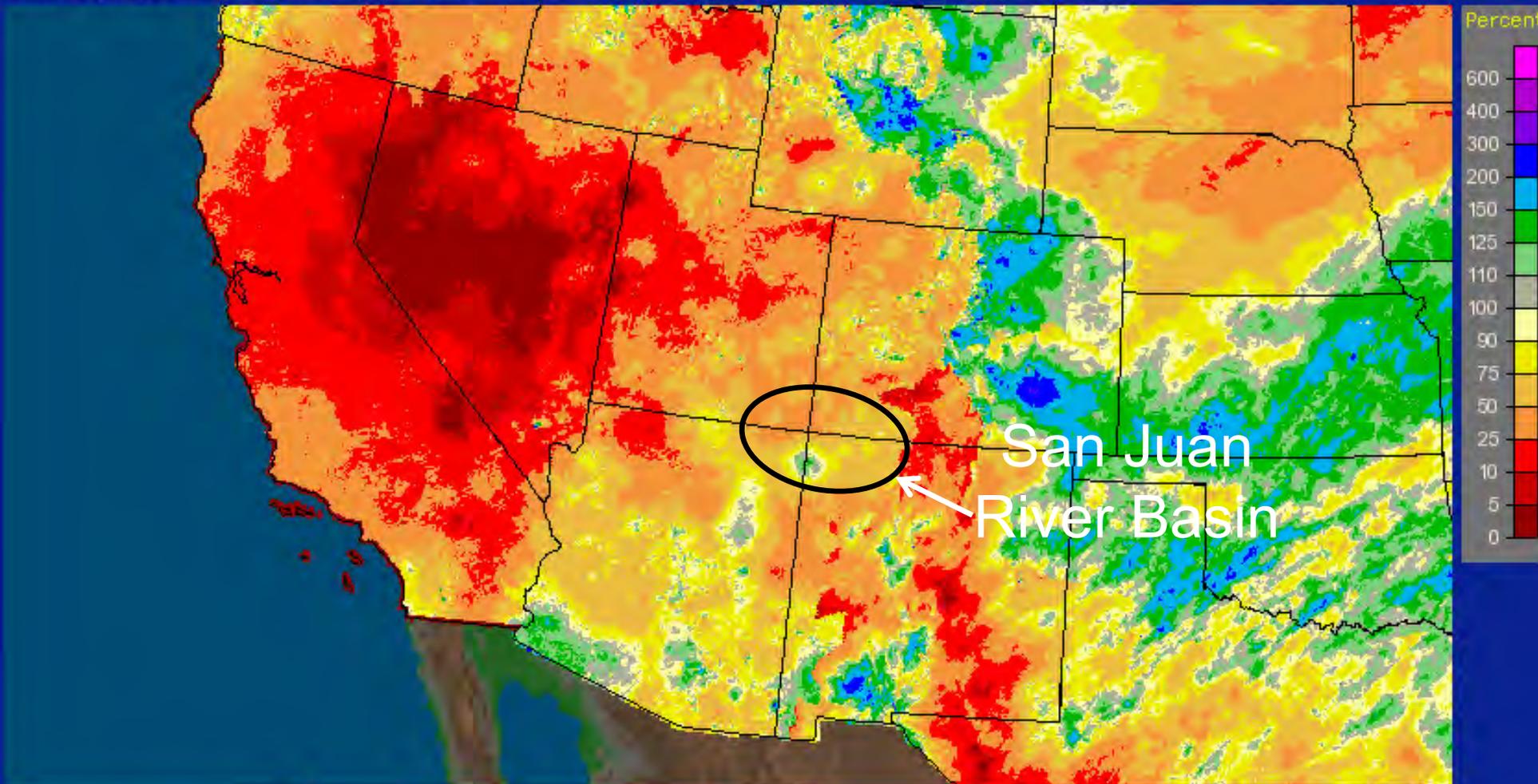


Topo Prec Amount Counties Rivers States Highway/City RFC Boundary

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% of Average Precipitation for the last 90 days

Colorado Basin RFL Salt Lake City, UT: Current 90-Day Percent of Normal Precipitation
Valid at 1/20/2012 1200 UTC - Created 1/20/12 20:17 UTC



Tonn Precip Amount Counties Rivers States Highway/City RFL Boundary

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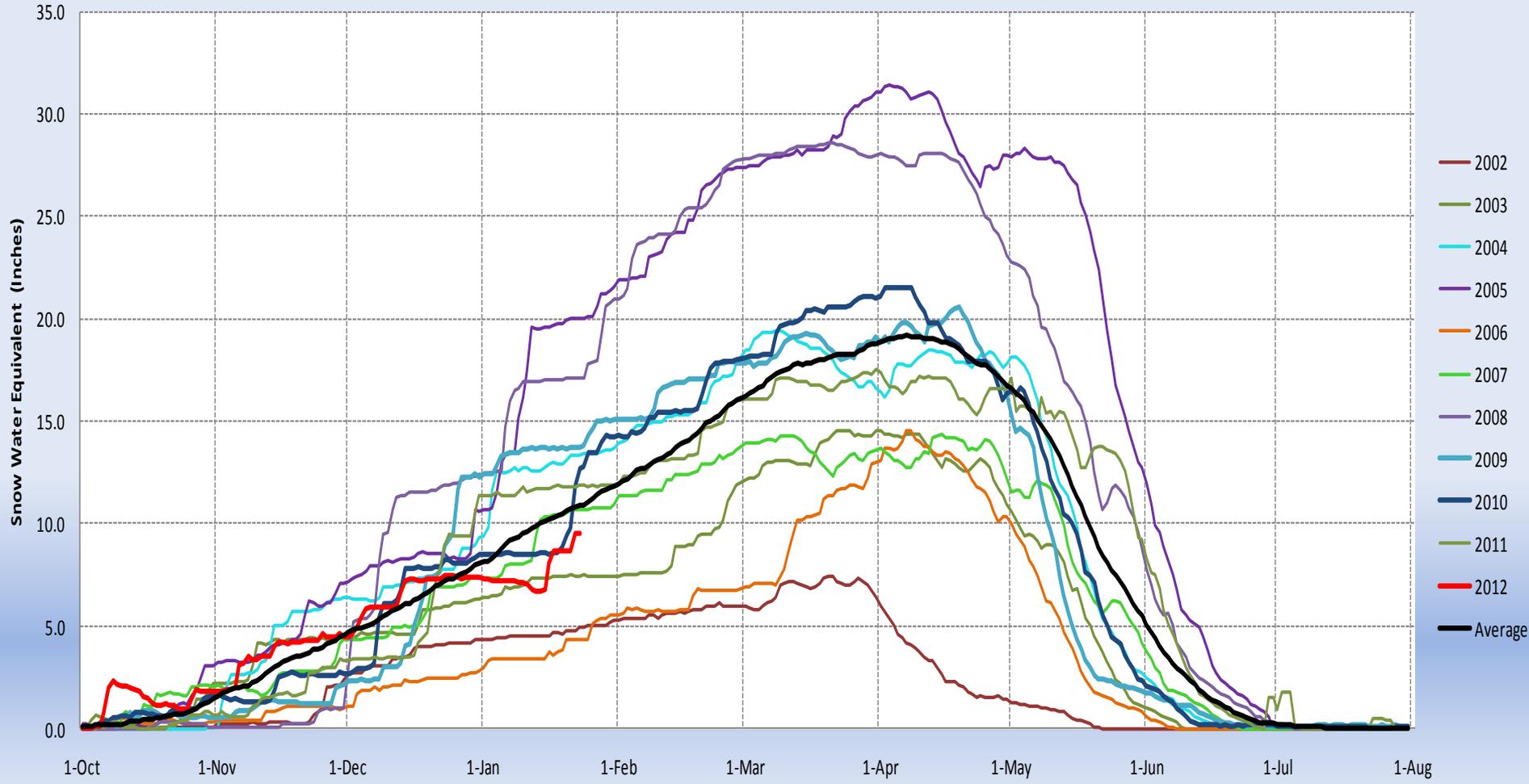
Water Year 2012

San Juan Basin Snowpack Summary

(as of 1/23/2012)

Locations	Average of Applicable SNOTEL Stations (SWE – inches)	% Average
San Juan (Bluff)	8.7	77%
Navajo Reservoir	9.5	87%
Vallecito Reservoir	8.6	80%
Animas @ Durango	8.3	80%

Navajo Reservoir SNOTEL SWE from 2002-2012



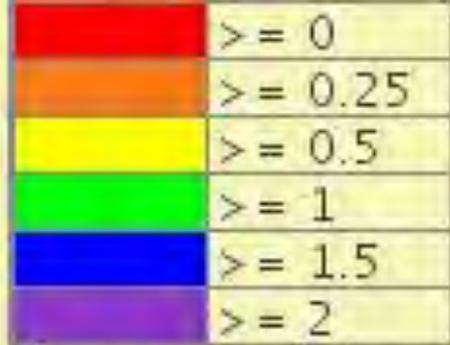
Water Year 2012 (as of 1/23/2012)

Navajo Inflows & Representative Snowpack

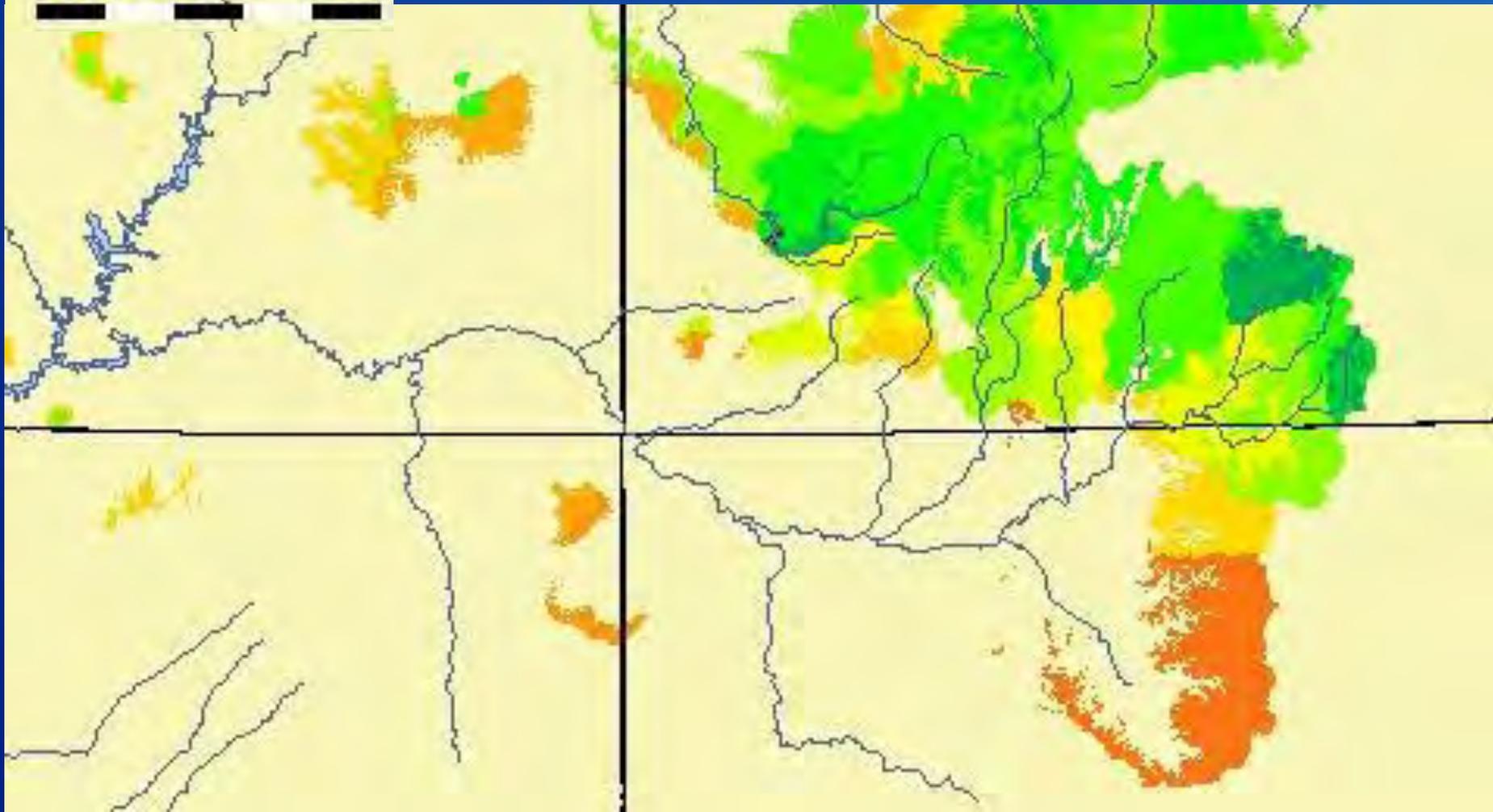
EOM	Observed Inflow (af)	% Average	SJ SWE (in.)	% Average
October	44,162	87%	1.8	120%
November	22,770	70%	4.5	94%
December	15,616	64%	7.4	88%
January (Current)	11,261	78%	9.5	86%

Sac-SMA Soil Moisture Model

December 1, 2011



100.0 km



An aerial photograph of a river winding through a landscape. The river flows from the top center towards the bottom left. On the left bank, there are green fields and some buildings. On the right bank, there are brown, hilly areas with sparse vegetation. The text "Water Year 2012 Forecasts" is overlaid in the center of the image.

Water Year 2012 Forecasts

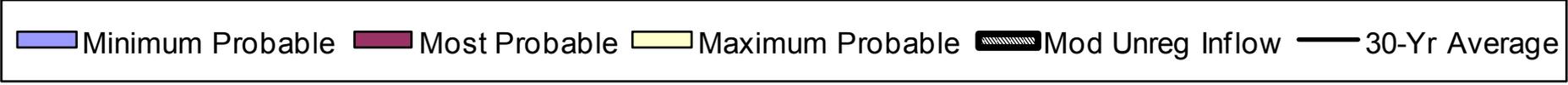
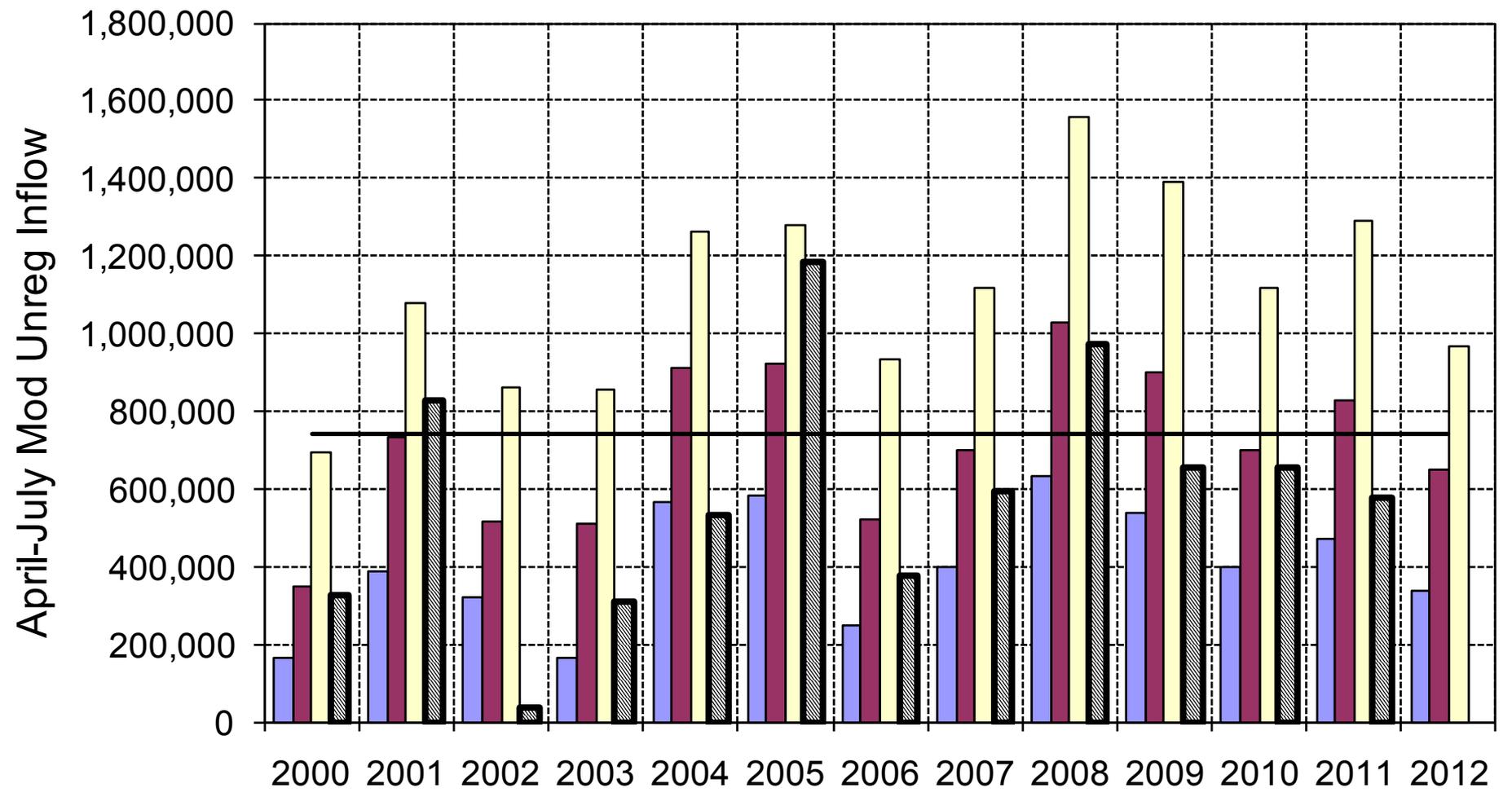
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Mid-January 2012 Forecast
Navajo Reservoir
Modified Unregulated
April-July Inflow Volume

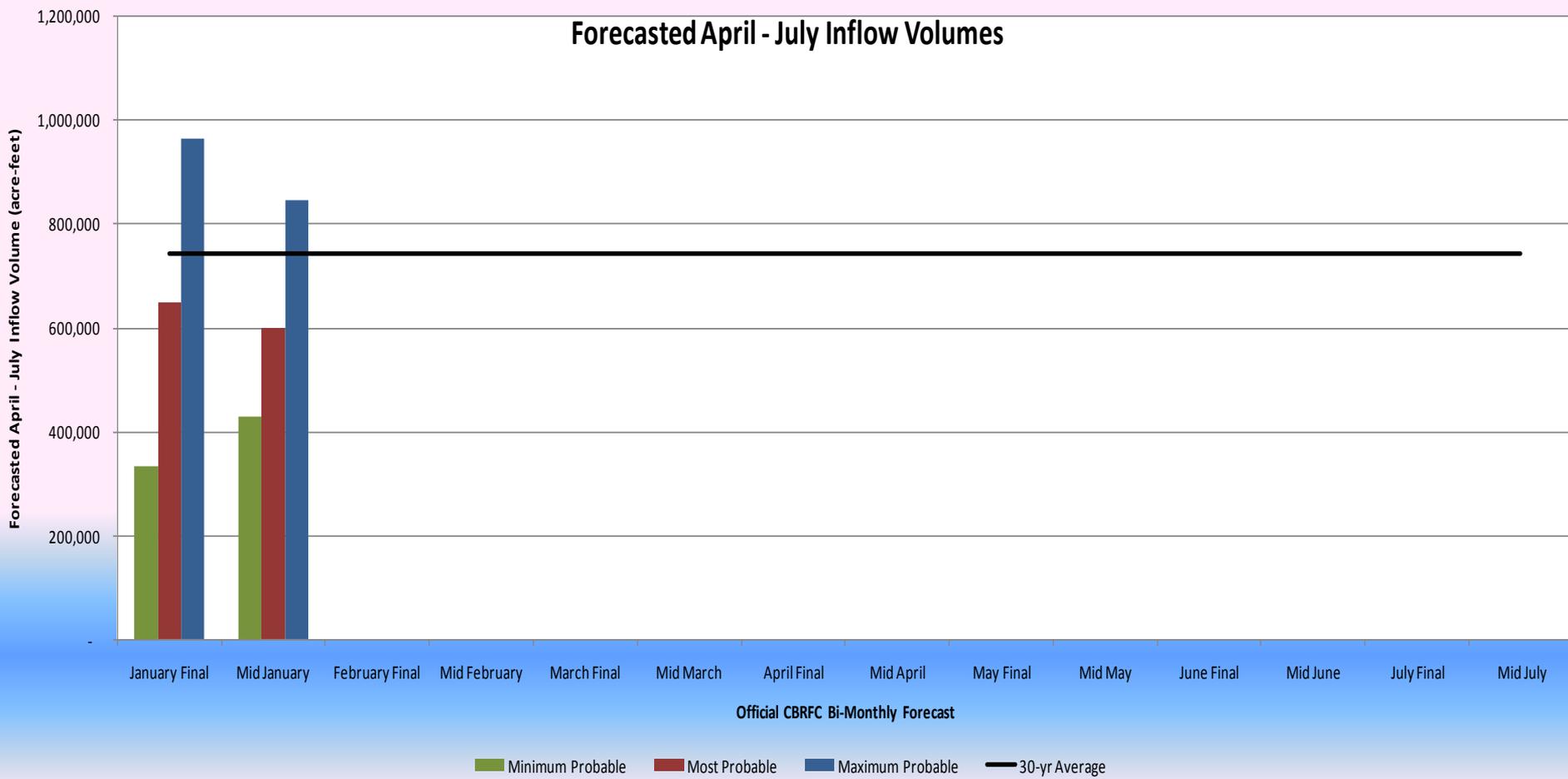
	Inflow (af)	% of Average	2011 Forecast
Most Probable	600,000	81%	800,000 (106%)
Minimum Probable	430,000	58%	500,000 (66%)
Maximum Probable	845,000	114%	1,170,000 (155%)

Last Year's SWE above Navajo = 11.9" (9.5" this year) on 1/23

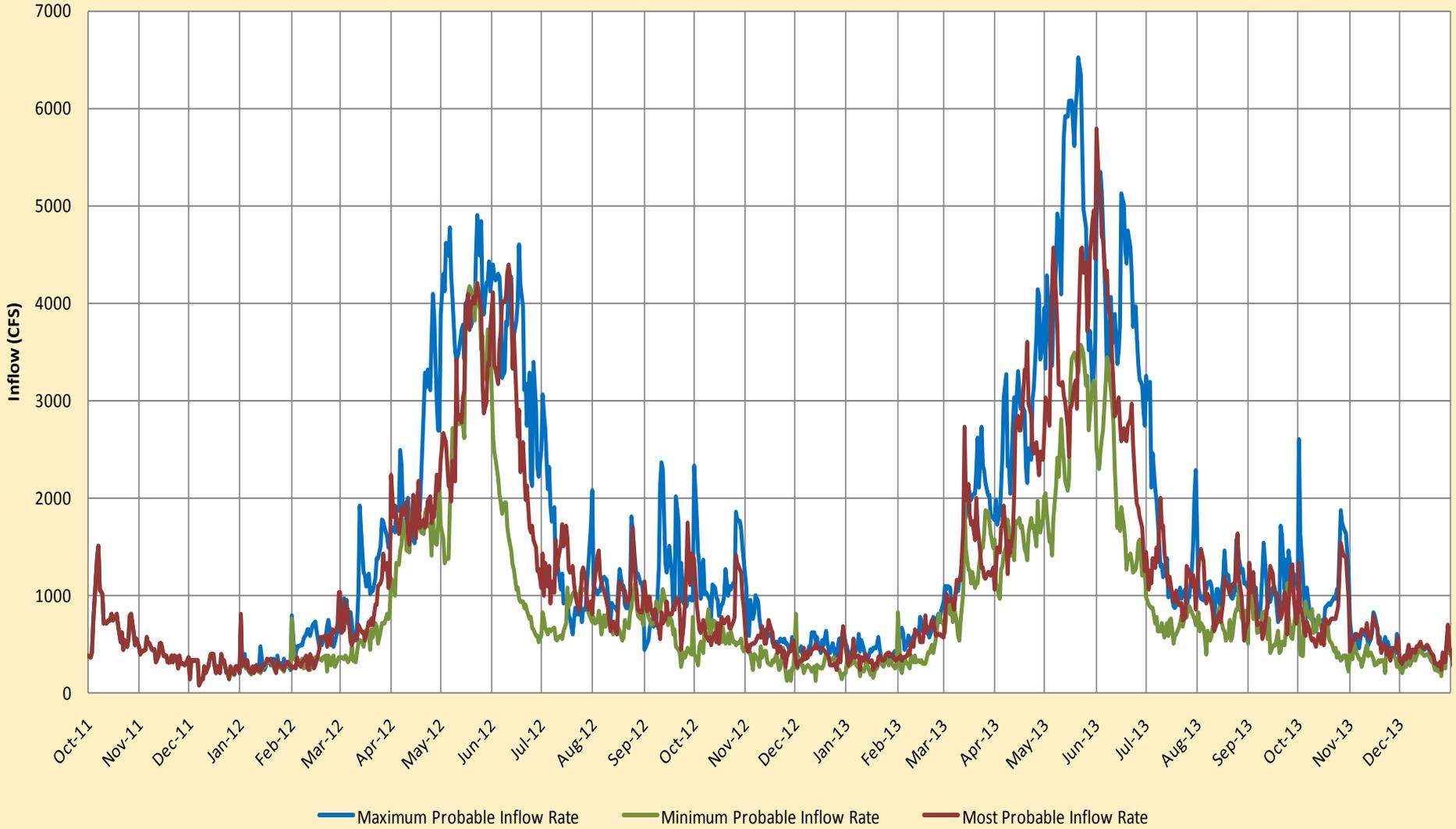
April-July Mod Unreg Forecast from January vs Actual Mod Unreg Inflow



Forecasted April - July Inflow Volumes

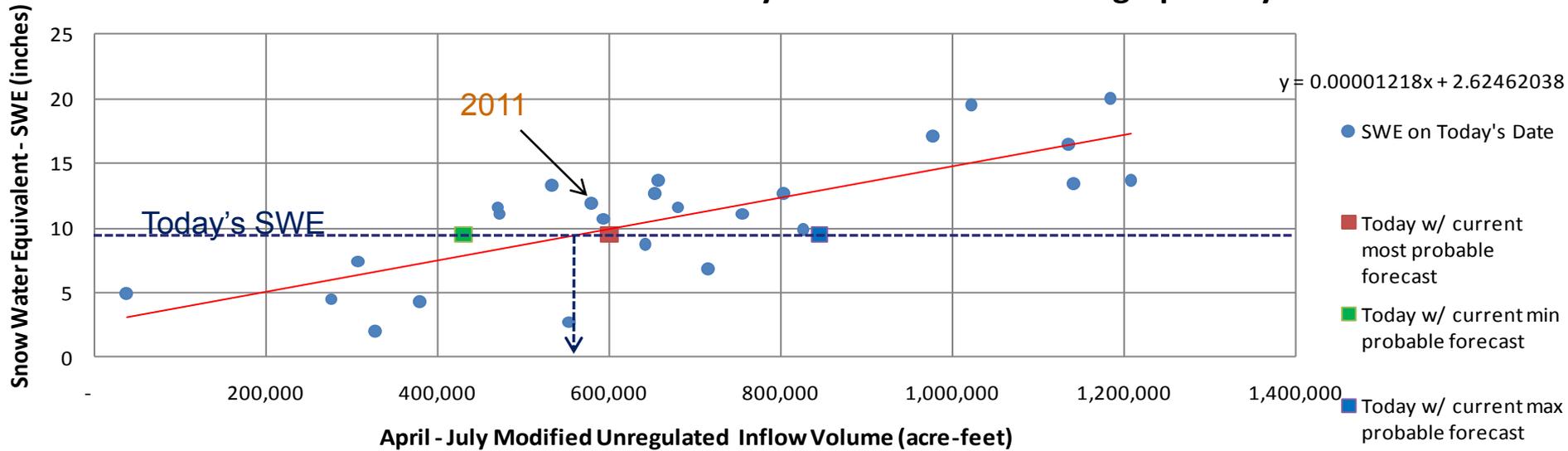


Navajo Inflow Rate

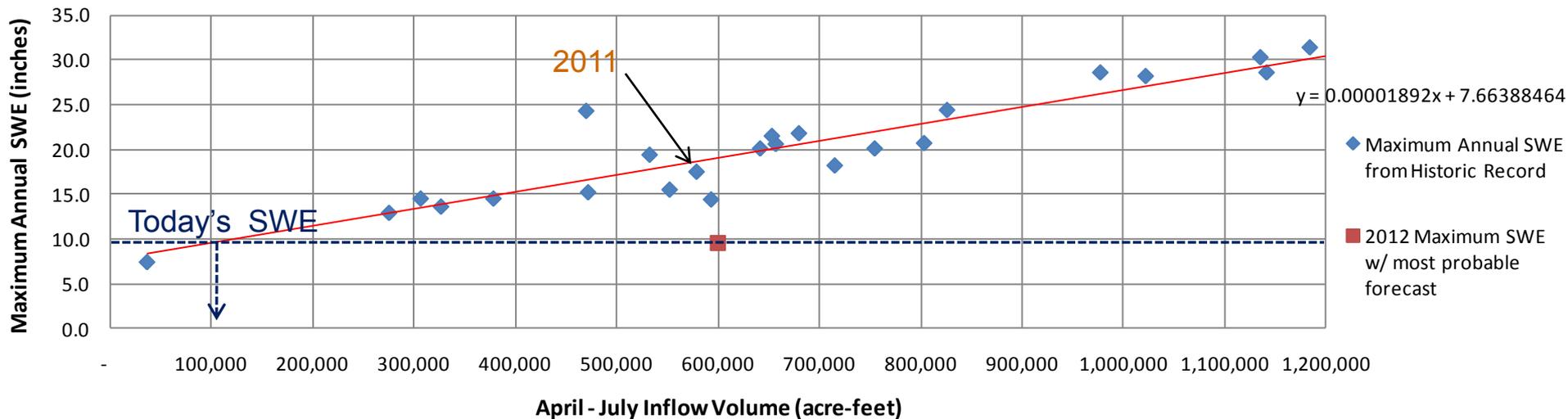


SNOTEL above Navajo vs. Inflow Forecast

Correlation of Historical SWE from Today's Date and Mod Unreg April-July Inflow



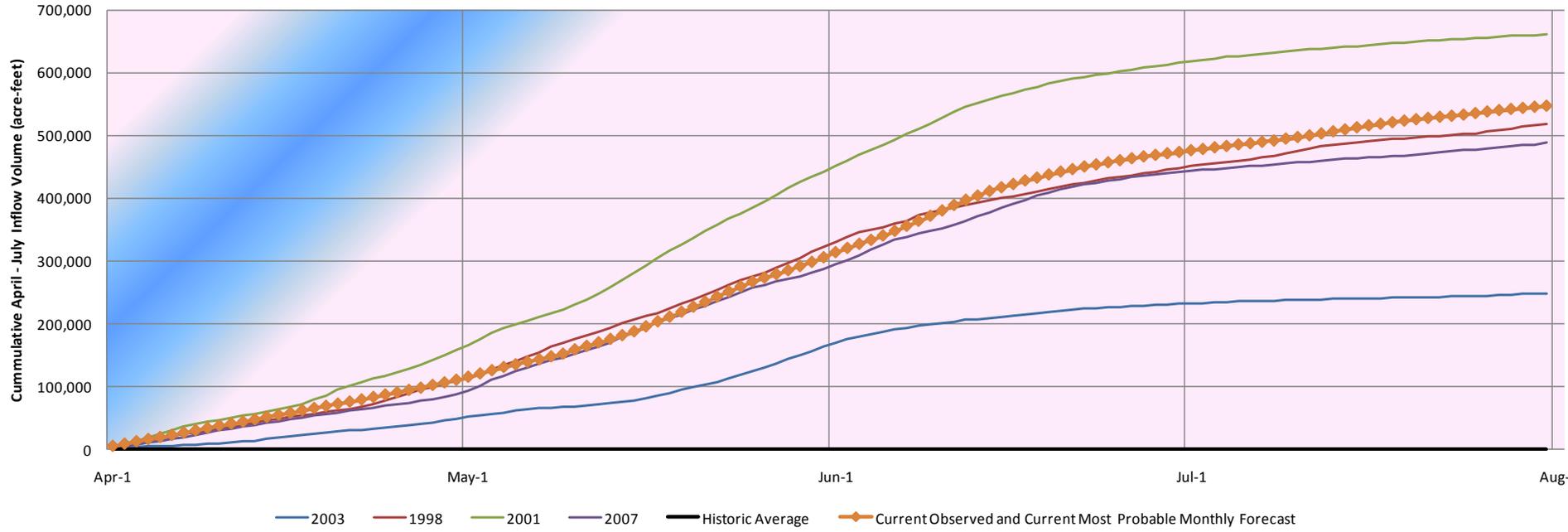
Historical April-July Inflows compared to Maximum Annual SWE



87%	2000	1990	2006	1996	2002	1994	2003	1998	Current	2001	2007
	2	2.7	4.3	4.5	4.9	6.8	7.4	8.7	9.50	9.9	10.7
Percentile of Historical Record	0%	4%	8%	12%	16%	20%	24%	28%	32%	36%	40%
Rank (Wettest)	26	25	24	23	22	21	20	19	18	17	16
Rank (Driest)	1	2	3	4	5	6	7	8	9	10	11
Modified Unregulated April-July Inflow	326,843	552,470	378,589	275,589	36,741	715,458	306,809	641,825	600,000	826,273	593,479
Total April-July Mod Unreg Inflow on this Date	-	-	-	-	-	-	-	-	0	-	-
Total April-July Mod Unreg Inflow Remaining	326,843	552,470	378,589	275,589	36,741	715,458	306,809	641,825	600,000	826,273	593,479
Observed as a percent of April-July Total	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

1988	1999	1989	1991	2011	2010	1992	2004	1995	2009	1987	1993	2008	1997	2005
11.1	11.1	11.6	11.6	11.9	12.7	12.7	13.3	13.4	13.7	13.7	16.5	17.1	19.5	20
44%	44%	52%	52%	60%	64%	64%	72%	76%	80%	80%	88%	92%	96%	100%
14	14	12	12	11	9	9	8	7	5	5	4	3	2	1
13	13	15	15	16	18	18	19	20	22	22	23	24	25	26
472,055	754,853	470,125	680,093	579,084	653,418	803,651	532,747	1,141,609	657,267	1,208,662	1,135,466	977,548	1,022,287	1,184,293
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
472,055	754,853	470,125	680,093	579,084	653,418	803,651	532,747	1,141,609	657,267	1,208,662	1,135,466	977,548	1,022,287	1,184,293
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Cummulative April - July Observed Inflow of Representative SWE Years



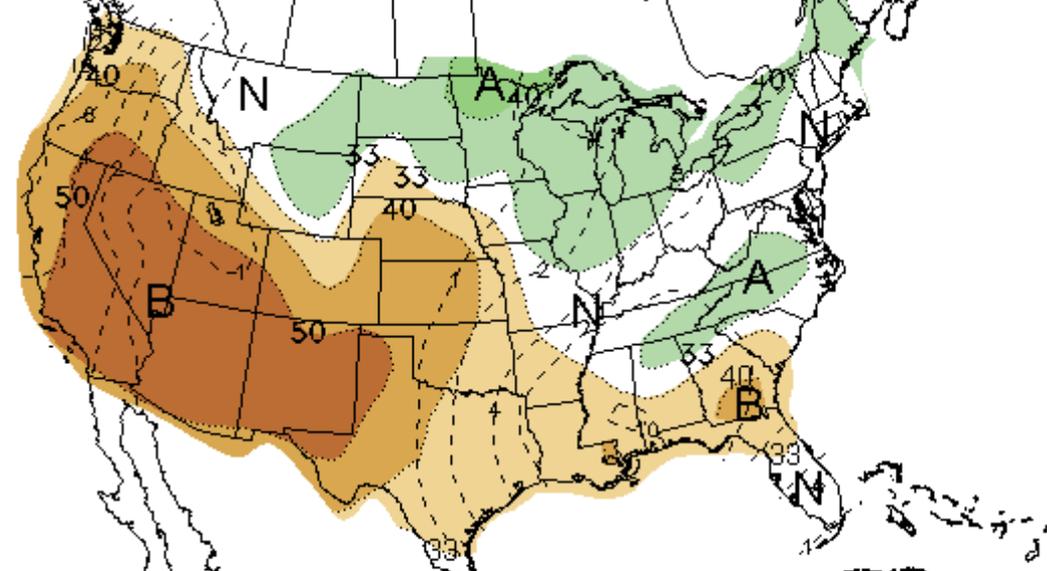
Climate Prediction Center Precip. Outlooks

8-14 Day



8-14 DAY OUTLOOK
PRECIPITATION PROBABILITY
MADE 22 JAN 2012
VALID JAN 30 - FEB 05, 2012

DASHED BLACK LINES ARE CLIMATOLOGY
(TENTH OF INCHES) SHADED AREAS ARE FCS
VALUES ABOVE (A) OR BELOW (B) NORMAL
UNSHADED AREAS ARE NEAR-NORMAL

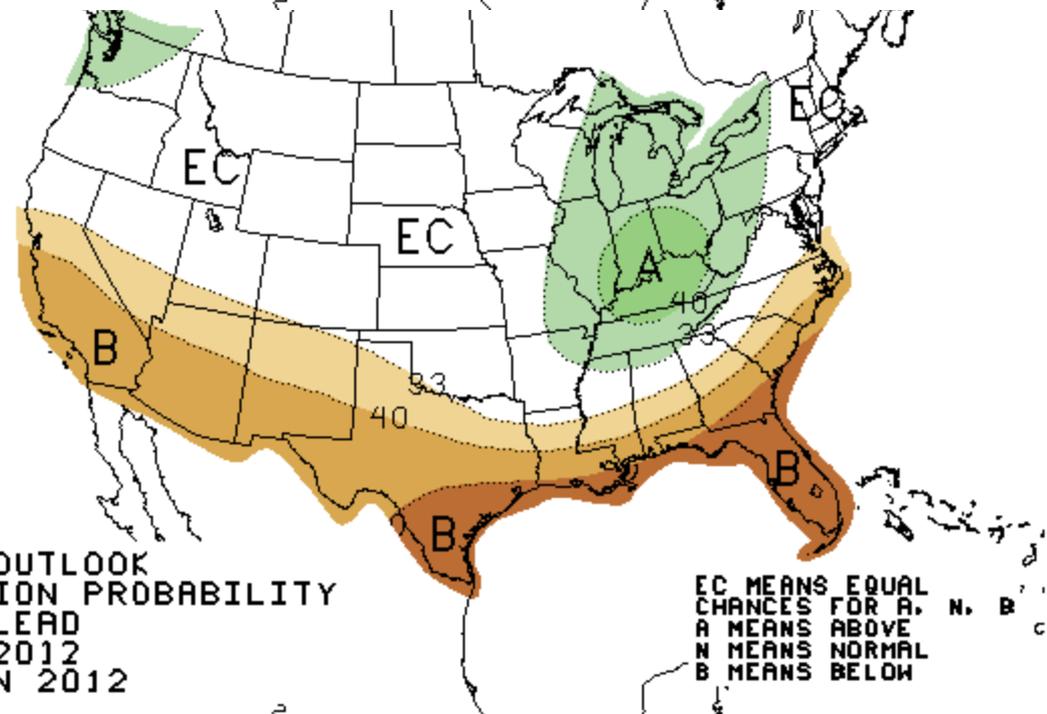


February
Monthly



ONE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID FEB 2012
MADE 19 JAN 2012

EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

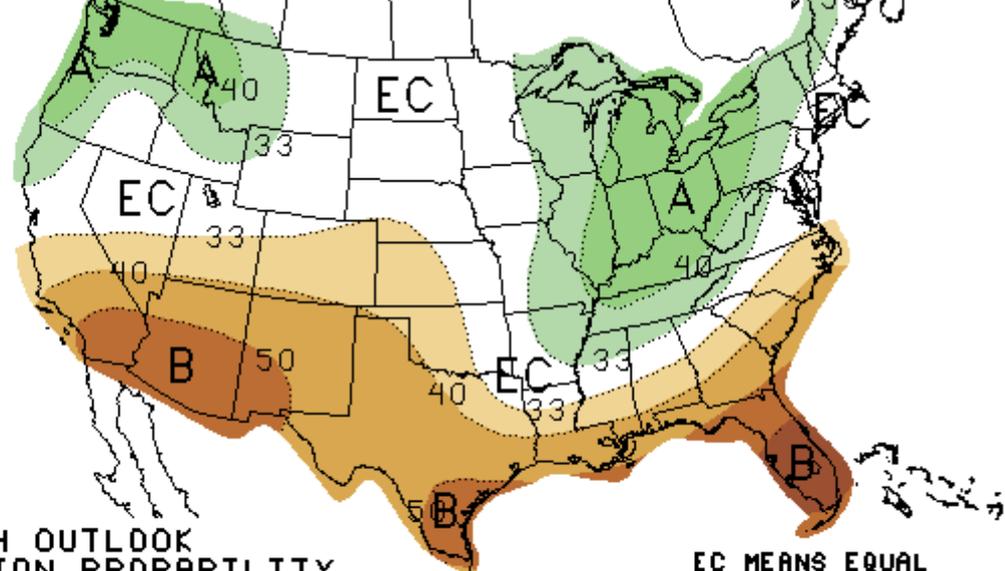


Climate Prediction Center Seasonal Precipitation Outlooks

February-March-April



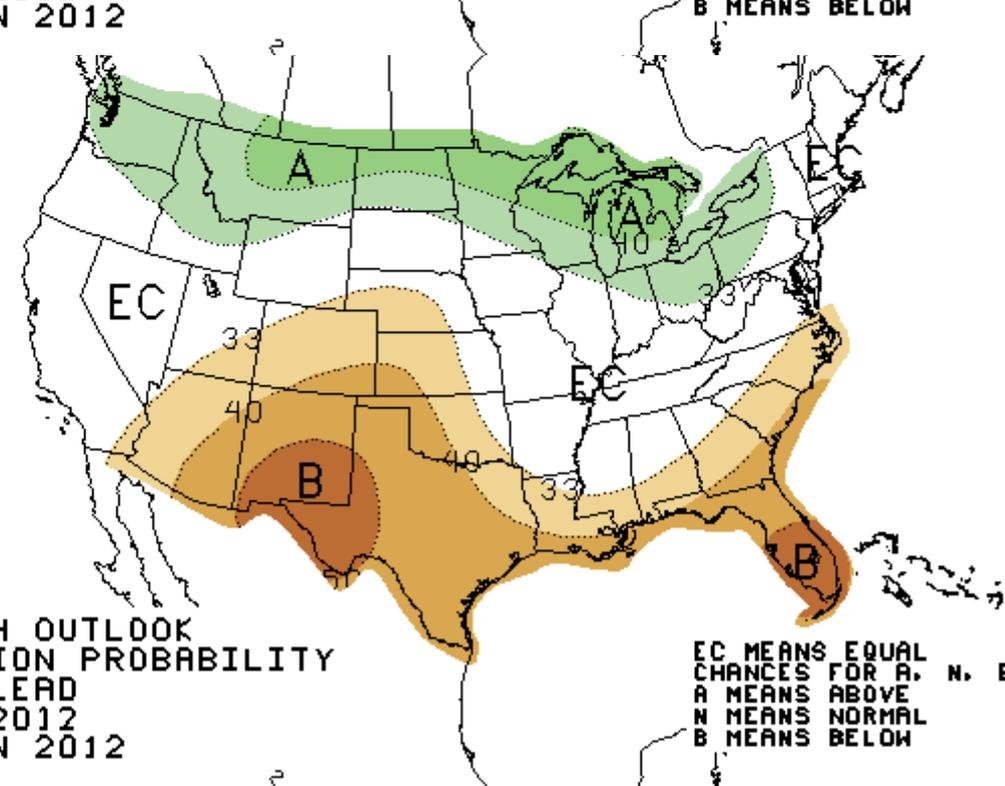
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID FMA 2012
MADE 19 JAN 2012



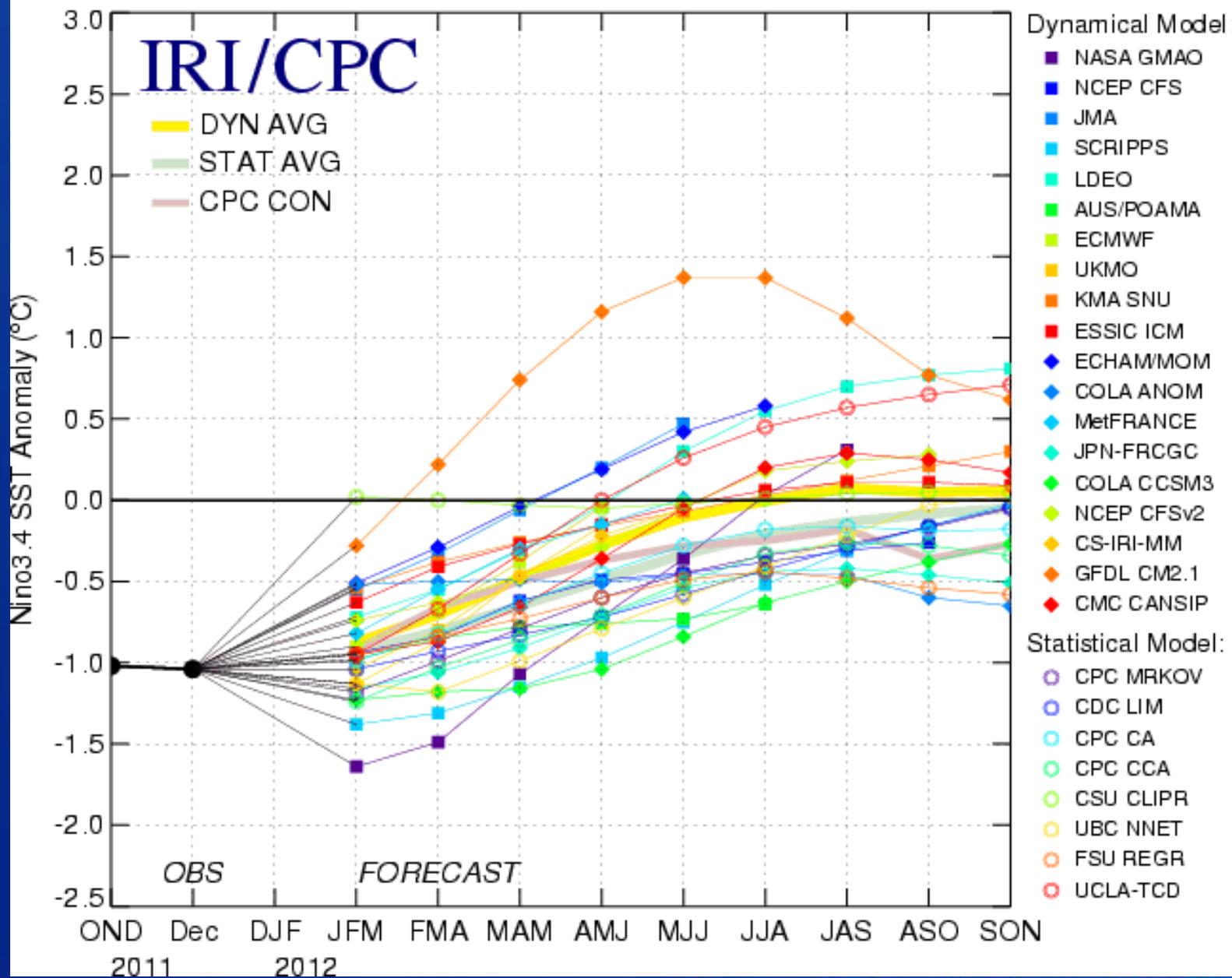
March-April-May



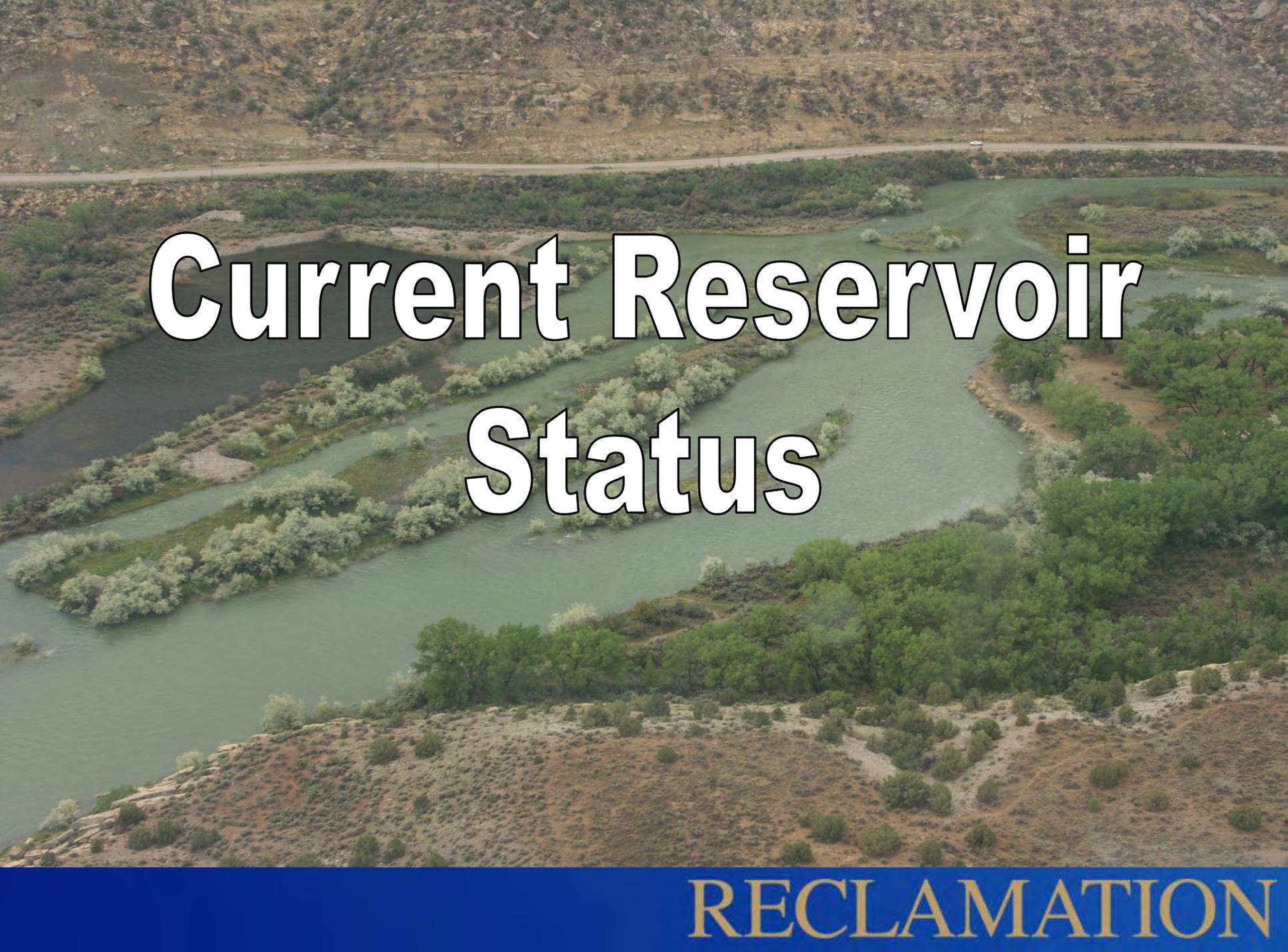
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
1.5 MONTH LEAD
VALID MAM 2012
MADE 19 JAN 2012



Mid-Jan 2012 Plume of Model ENSO Predictions



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An aerial photograph of a reservoir with a winding path of water. The water is a light greenish-brown color. The surrounding land is a mix of dry, brownish hills and green vegetation. A road is visible at the top of the image. The text "Current Reservoir Status" is overlaid in large white letters with a black outline.

Current Reservoir Status

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Navajo Current Conditions

(as of 1/22/12)

Elevation = 6056.2 (99% of Average)

Storage = 1,299,979 af (76% Full)

Inflow = 258 cfs (January Average)

Release = 500 cfs

NIIP = 9.5 cfs

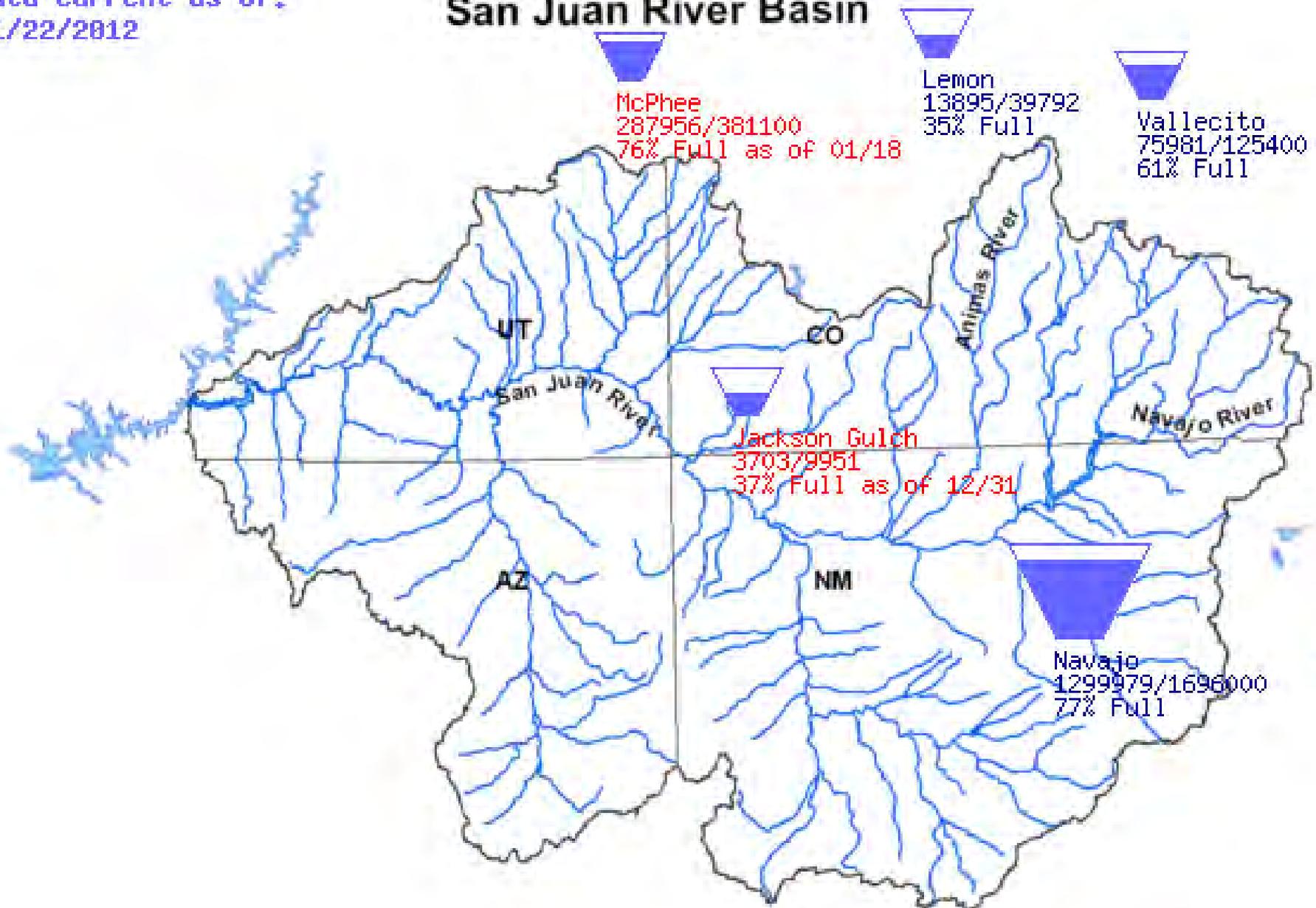
San Juan-Chama Diversion = 2 cfs

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San Juan Basin Reservoirs

Data Current as of:
01/22/2012

San Juan River Basin



Nighthorse

- Elevation = 6880.1 (98% Full)
- Storage = 112,230 af
- Release = 0 cfs
- Pumping = 0 cfs

Vallecito

- Elevation = 7645.31 (61% Full, 120% of average)
- Storage = 75,981 af
- Release = 60 cfs
- Inflow = 82 cfs (January Average)

Lemon

- Elevation = 8094.7 (35% Full, 66% of average)
- Storage = 13,895 af
- Release = 11 cfs
- Inflow = 13 cfs (January Average)



Water Year 2012 Proposed Operations

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Water Year 2012 Proposed Operations

- Navajo Reservoir is at a manageable elevation, but lower than desired (water conservation mode)
- 500 cfs base release until Spring Peak Release
- A spring peak release is very likely (as long as water is available)
- It is only January, and a lot can still change!

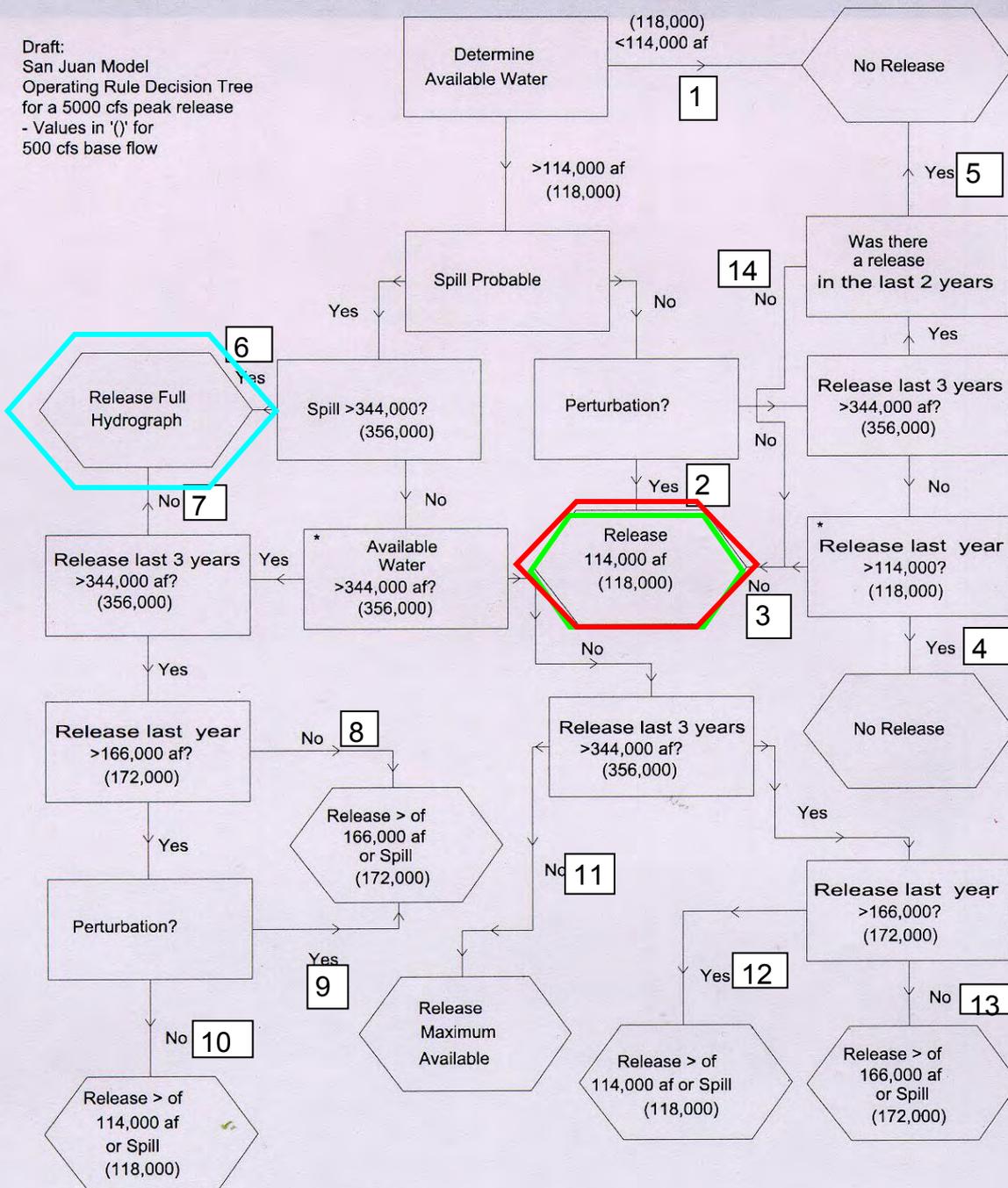
Available Water Calculation

(all units in acre-feet)

$$\begin{aligned} & \text{Forecasted April-July Inflow} + \\ & \text{Projected End of March Navajo Storage} - \\ & \text{Projected April-July Navajo Release} - \\ & \text{Est. Level of Development (1M)} - \\ & \text{Anticipated April-July NIIP Diversions} - \\ & \text{Estimated April - July Navajo Evaporation} \\ & = \text{Available Water for Spring Peak Release} \end{aligned}$$

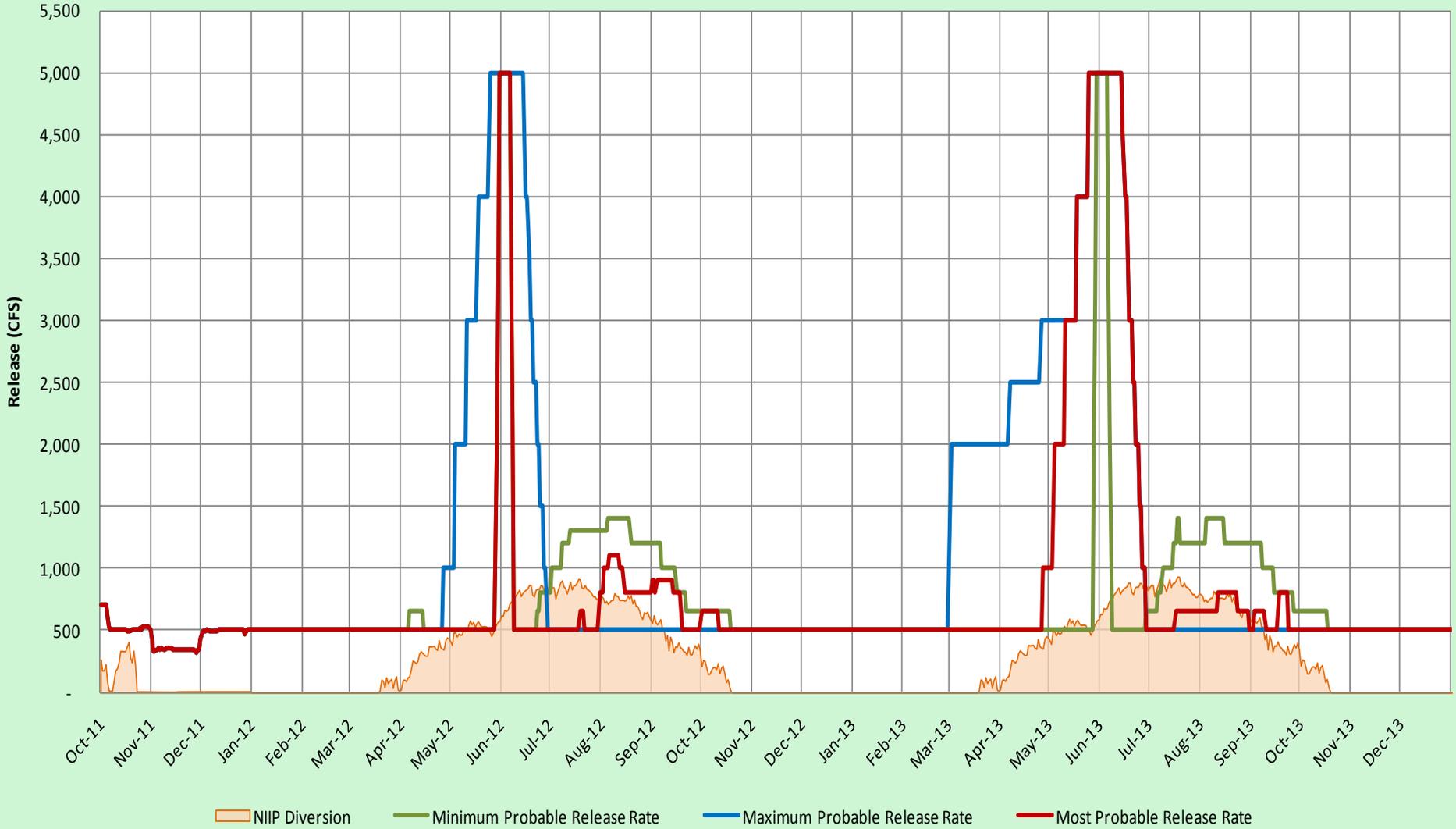
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Draft:
 San Juan Model
 Operating Rule Decision Tree
 for a 5000 cfs peak release
 - Values in '()' for
 500 cfs base flow

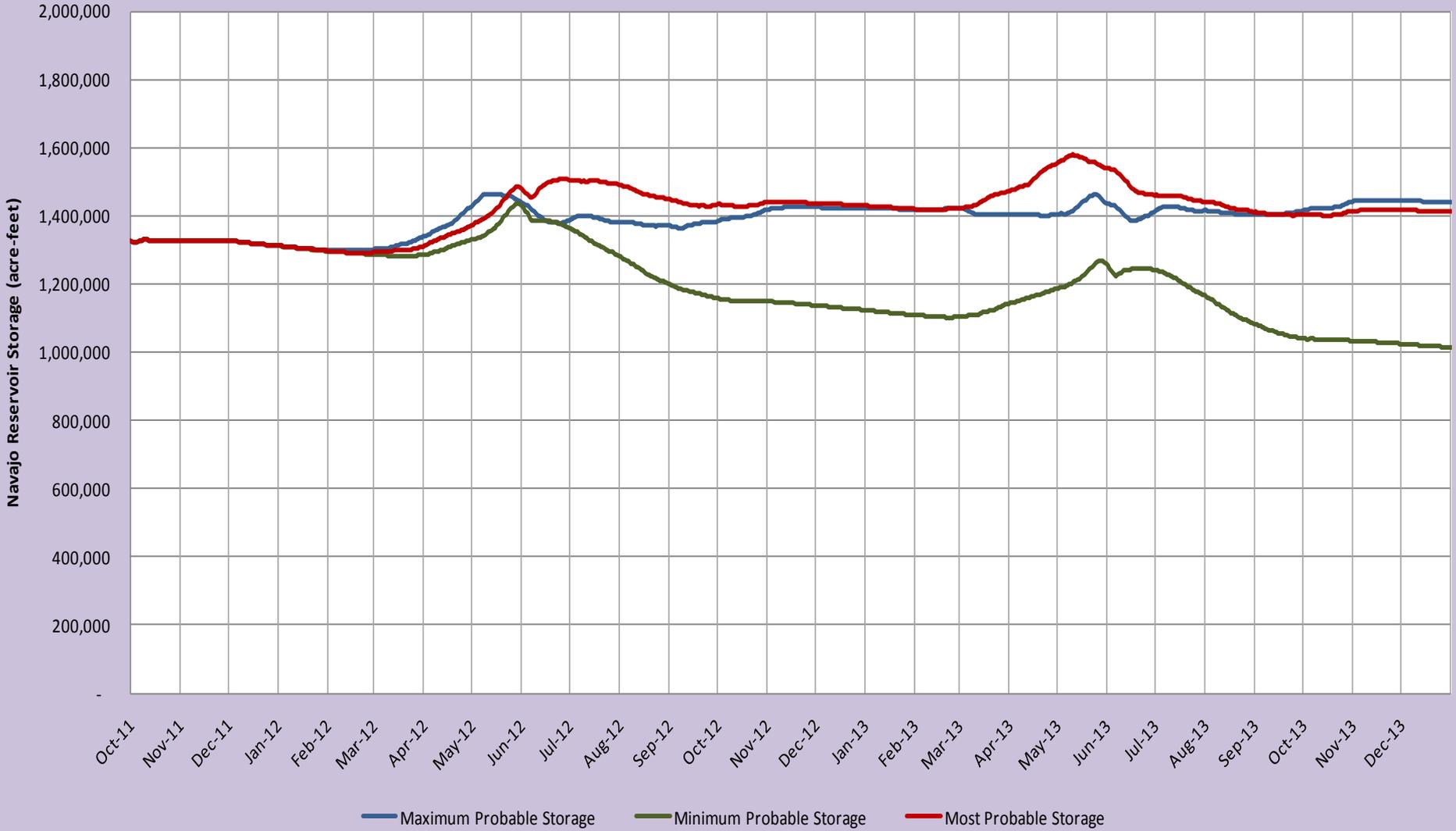


AVAILABLE WATER	PATH
Min Prob: 362,000 af	#3
Most Prob: 571,000 af	#3
Max Prob: 709,000 af	#7

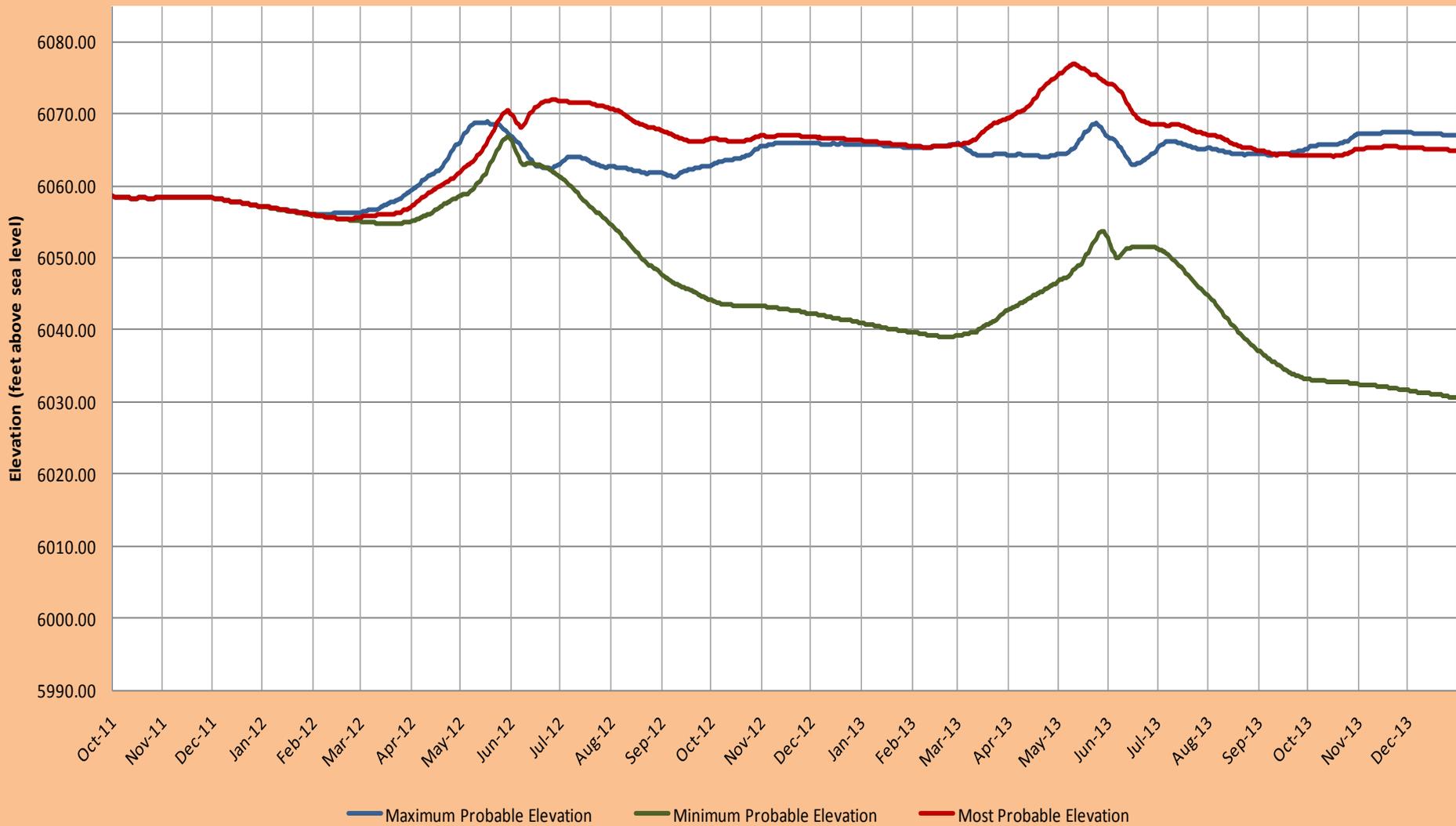
Navajo Release Rate



Navajo Reservoir Storage

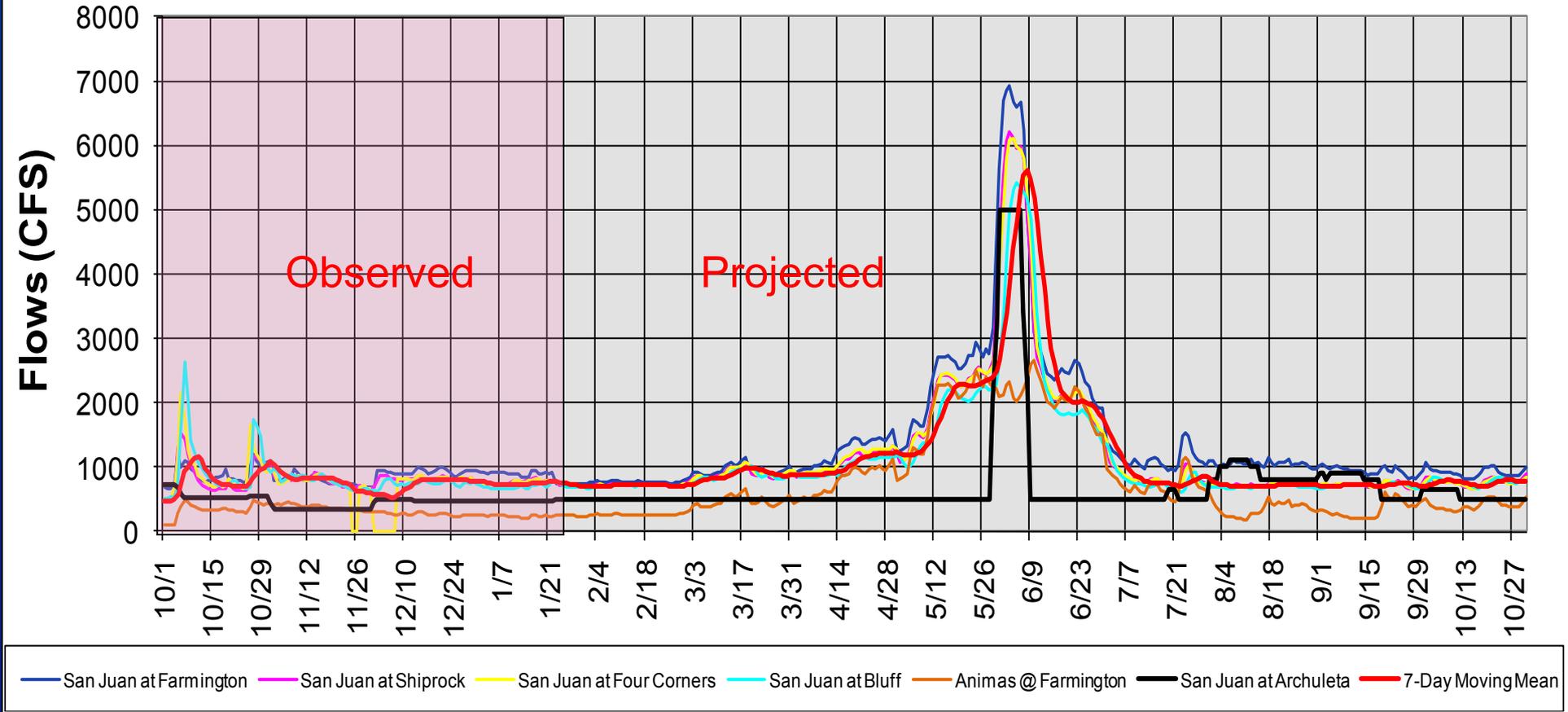


Navajo Reservoir Elevation



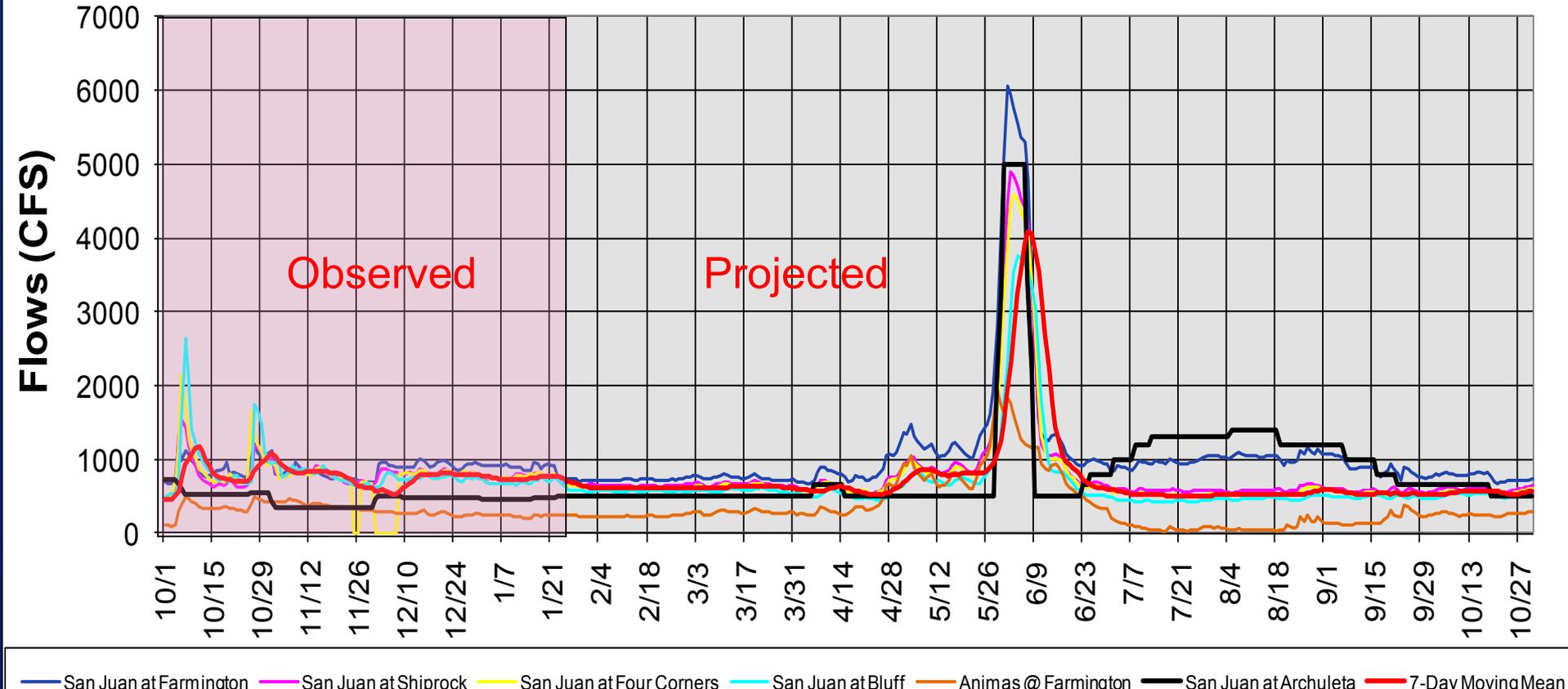
San Juan River Downstream Flows based on Most Probable Forecast and Median Losses

San Juan Flows based on Most Probable Inflow Forecasts for Corresponding Navajo Operations and the Animas River at Farmington



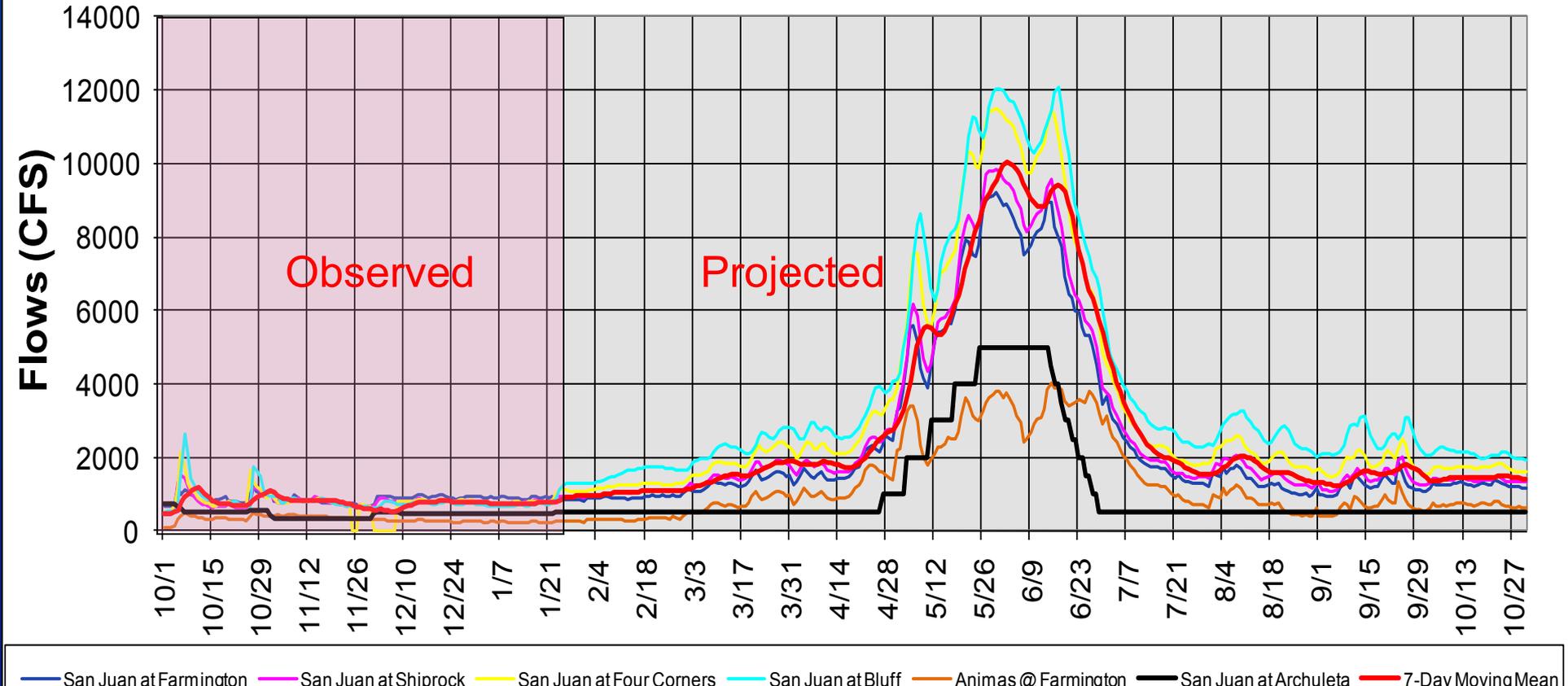
San Juan River Downstream Flows based on Min Probable Forecast and 90% Ex. Losses

San Juan Flows based on Minimum Probable Inflow Forecasts for Corresponding Navajo Operations and the Animas River at Farmington



San Juan River Downstream Flows based on Max Probable Forecast and 10% Ex. Losses

San Juan Flows based on Maximum Probable Inflow Forecasts for Corresponding Navajo Operations and the Animas River at Farmington



350 cfs base release?

- To be used only when projections show reservoir elevation will be less than target
- SJRIP target base flows will still be met
- Likely would occur November – March
- Trout habitat improvement project may minimize impacts to trout fishery
- Water savings of approximately 45,000 af
- Goal base release in ROD (ROD allows 250 cfs)



Navajo Dam Maintenance Activities

6x13 Gate Bonnet Maintenance



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Fish & Wildlife Service
San Juan RIP Update

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Questions from the Audience

How You Can Access Information



**Bureau of Reclamation
(Presentation & Meeting Minutes)
[www.usbr.gov/uc/
wcao/water/rsvrs/mtgs/nmcurrnt.html](http://www.usbr.gov/uc/wcao/water/rsvrs/mtgs/nmcurrnt.html)**

**USGS
<http://water.usgs.gov/nwis>**

**Colorado Basin River Forecast Center
www.cbrfc.noaa.gov**

Reclamation Contacts:

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Ruth Swickard

970-385-6523, rswickard@usbr.gov

**New Hydrologic Engineer/Hydrologist should be hired soon
Vacancy is announced on USAjobs.com – open until Feb. 1**

RECLAMATION

Summary

- The current snowpack is below average.
- CPC outlook indicates greater chance of below average precipitation
- Most Probable April – July Inflow Forecast is 81% of average
- Historic snowpack and climate outlooks suggest less inflow
- Based on the most probable forecast, a 1-week at 5000 cfs spring peak release hydrograph is anticipated
- Very little probability of not having a spring peak release this year
- Downstream river flows are anticipated to be near normal
- Only 1 SJRIP flow goal is expected (>2500 cfs for 10 days)
- Likely Minimum (Base) Release = 500 cfs before and after the spring peak release
- Target Baseflow is 500 -1000 cfs in Critical Habitat
- Next Operations Meeting: April 24?, 2012



Thanks For Coming!

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