

# RECLAMATION

*Managing Water in the West*



**Navajo Unit Operations**

**April 27, 2010**

**Coordination Meeting**



U.S. Department of the Interior  
Bureau of Reclamation

# Agenda

- Welcome
- Review of 2010 Operations (to date)
- 2010 Hydrologic Conditions
- Proposed Operations for 2010
- Navajo Dam Maintenance Activities
- Aquatic Invasive Species
- Fish & Wildlife Service/San Juan RIP Update
- Reports from other Agencies
- Questions from Audience
- How To Access Information
- Close

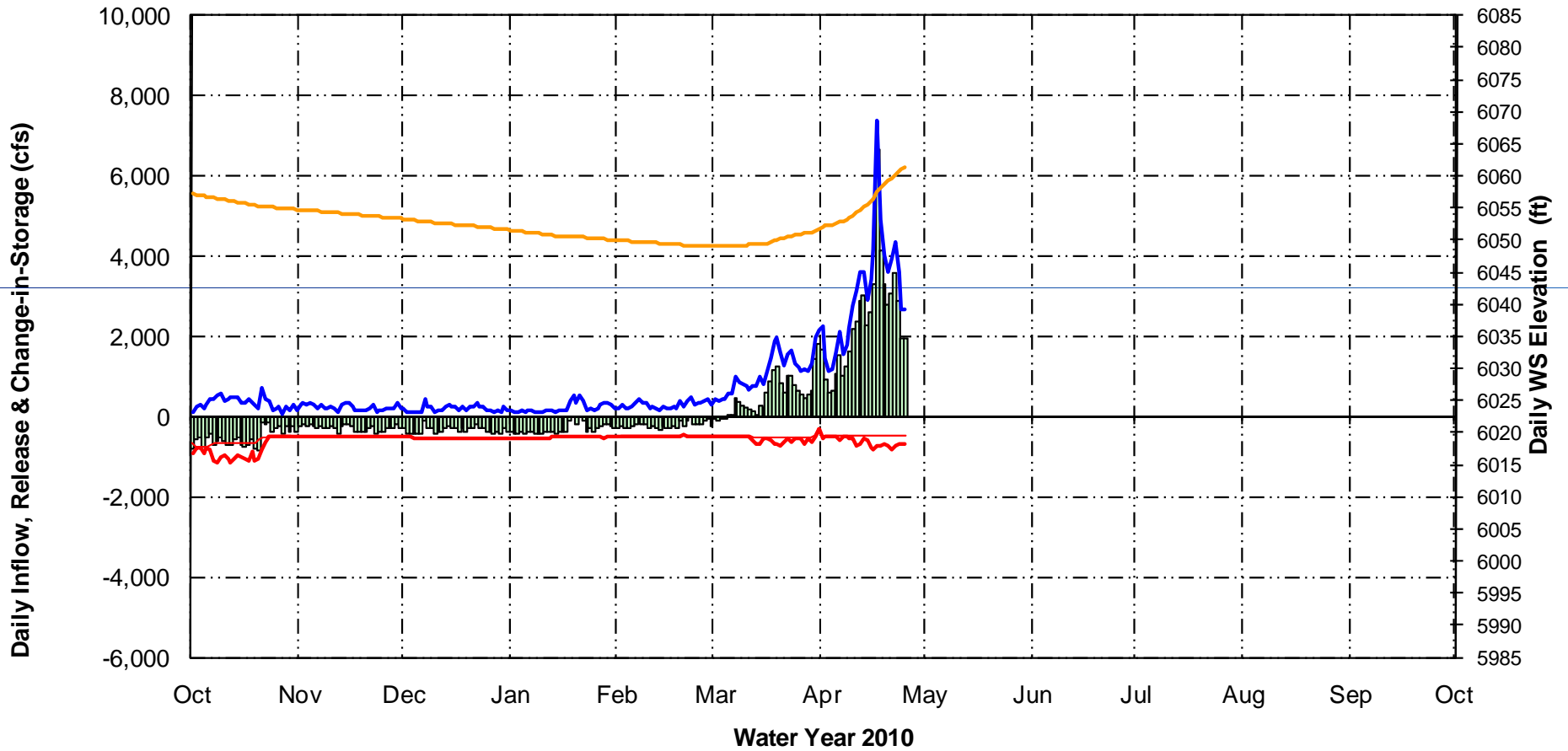
RECLAMATION

An aerial photograph of a large concrete dam with a reservoir behind it. The dam has several spillways. The surrounding landscape is arid and hilly. A road curves along the right side of the dam. The text "Review of Water Year 2010 Operations to date" is overlaid in large white letters with a black outline.

# Review of Water Year 2010 Operations to date

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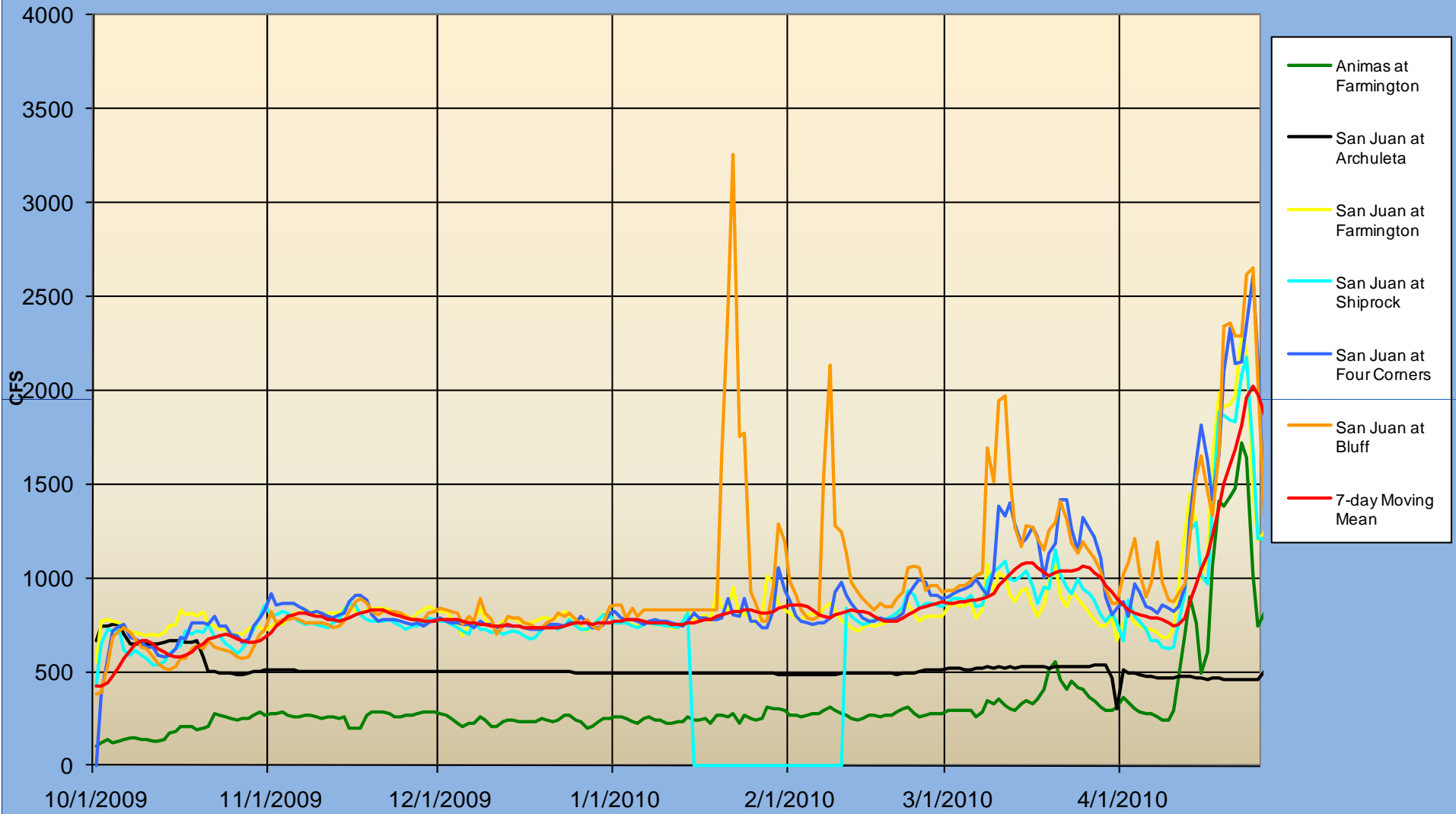
# NAVAJO RESERVOIR OPERATIONS



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# USGS Provisional Mean Daily Flows

Updated on 4/26



# RECLAMATION

An aerial photograph of a large reservoir, likely Lake Mead, showing a marina with numerous boats and a large building complex on the left side. The surrounding landscape is hilly and semi-arid. The text "Water Year 2010" and "Hydrologic Conditions" is overlaid in large white font with a black outline.

# Water Year 2010

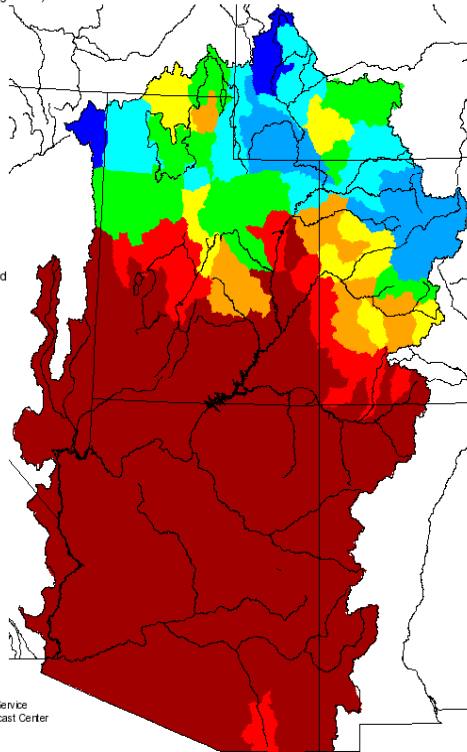
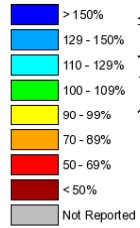
# Hydrologic Conditions

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### Monthly Precipitation for October 2007

(Averaged by Hydrologic Unit)

#### % Average

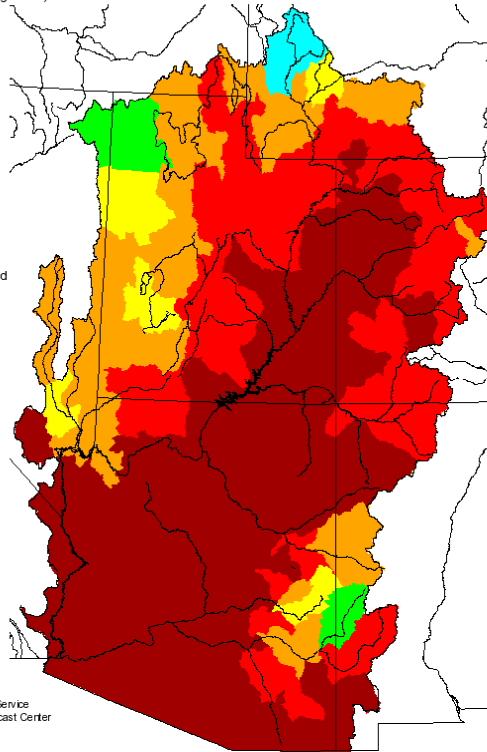
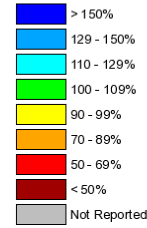


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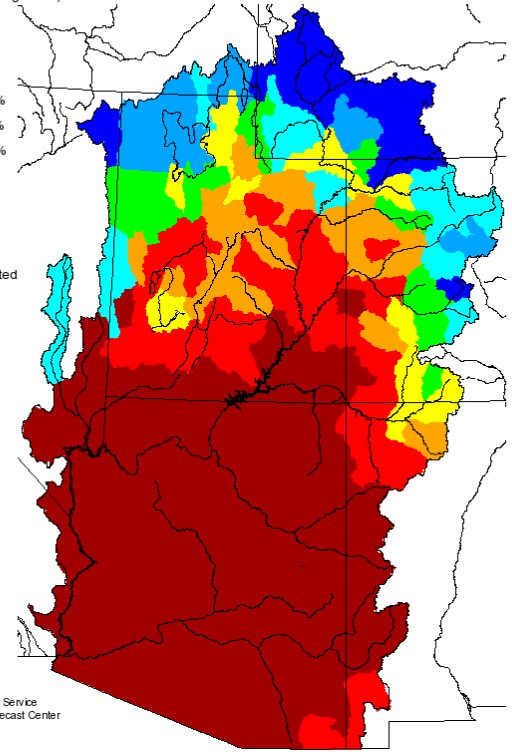
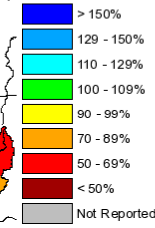


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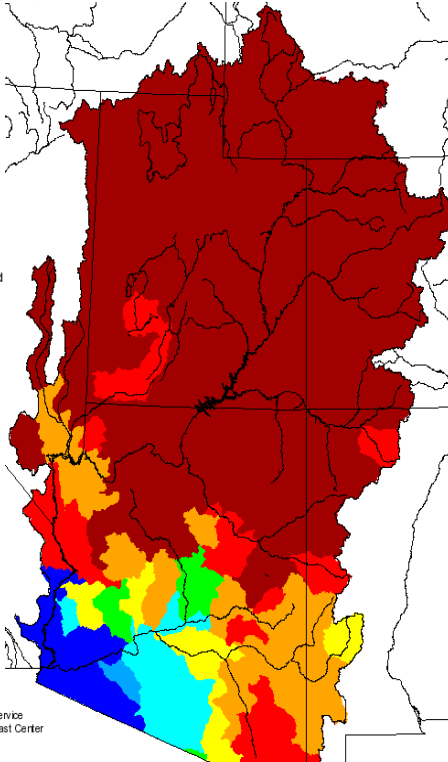
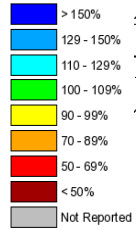
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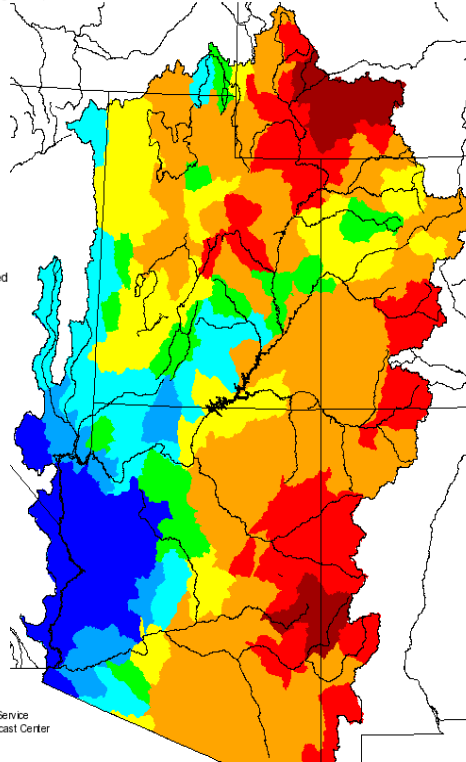
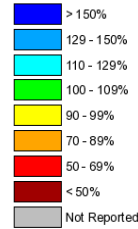


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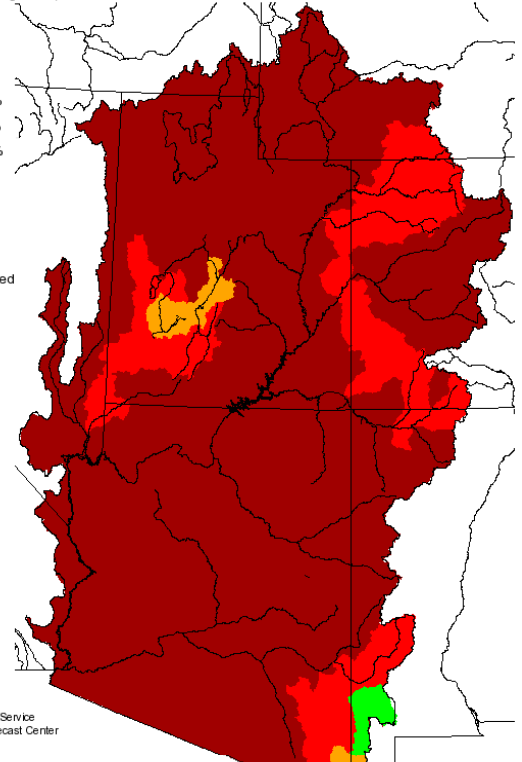
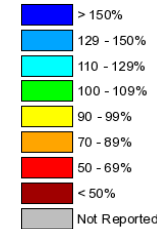


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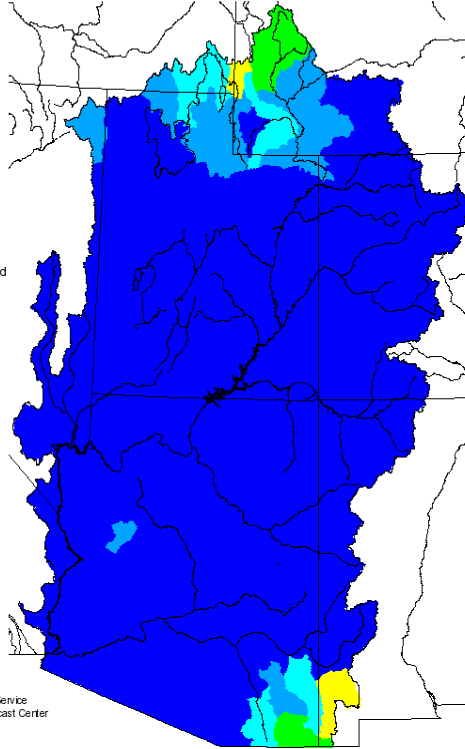
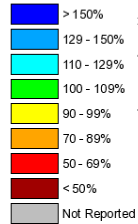
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#### % Average

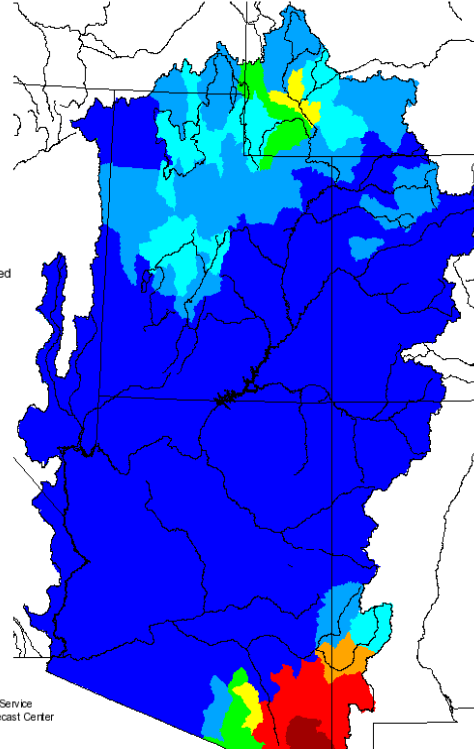
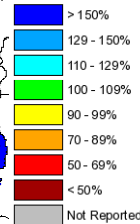


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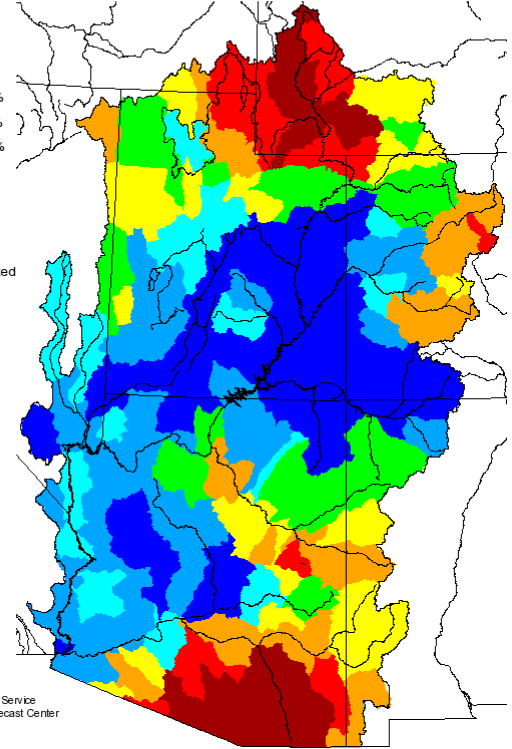
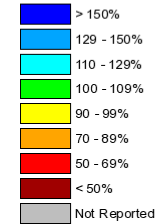


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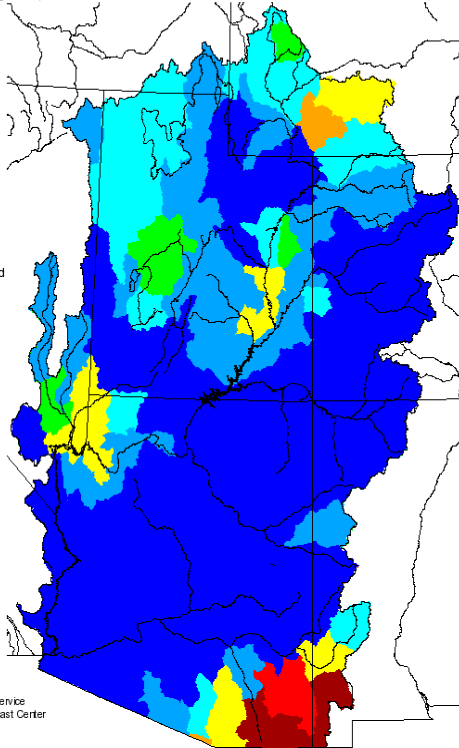
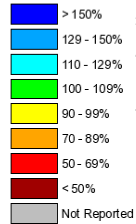
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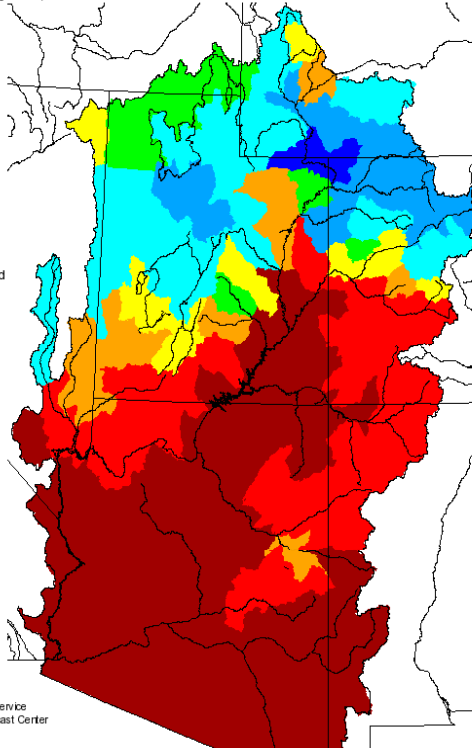
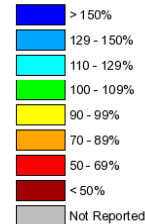


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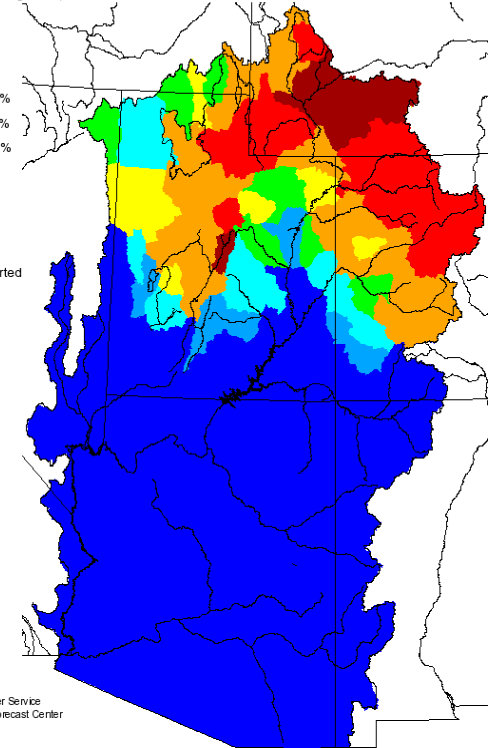
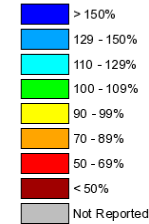


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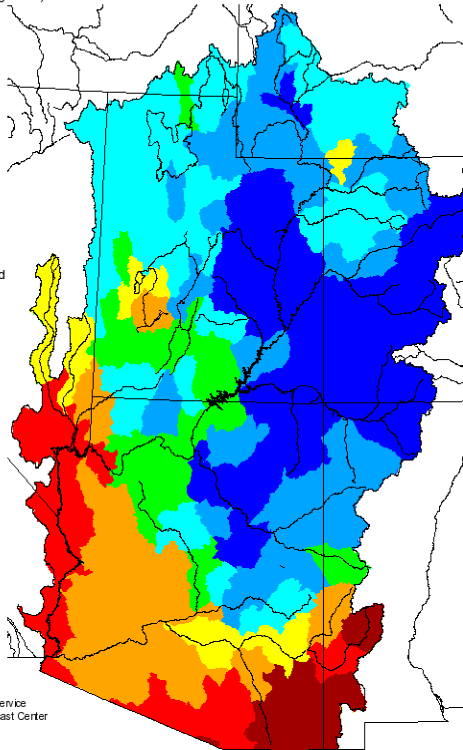
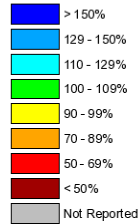
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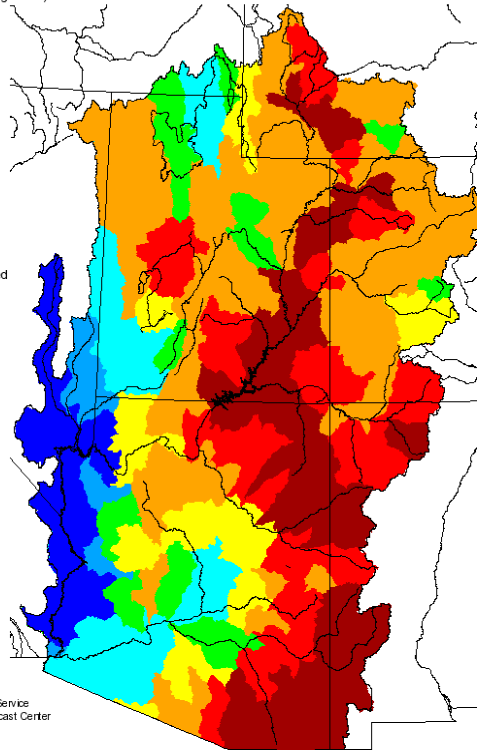
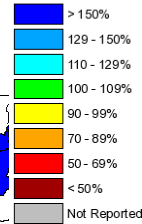


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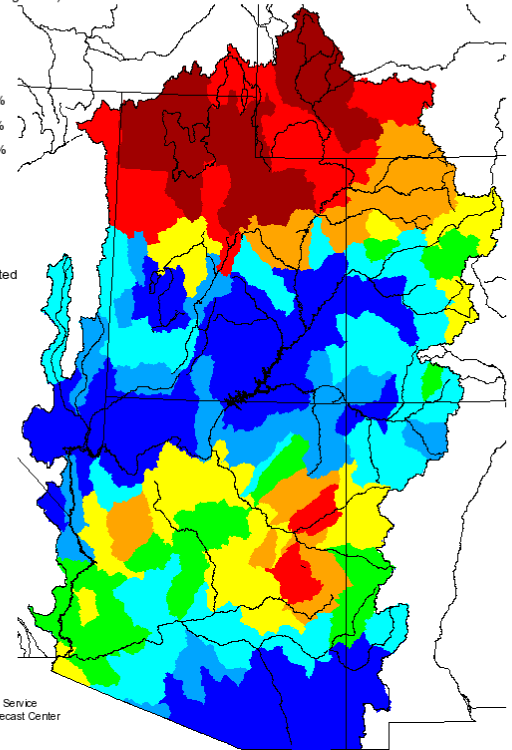
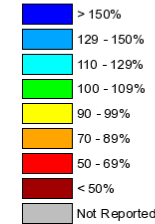


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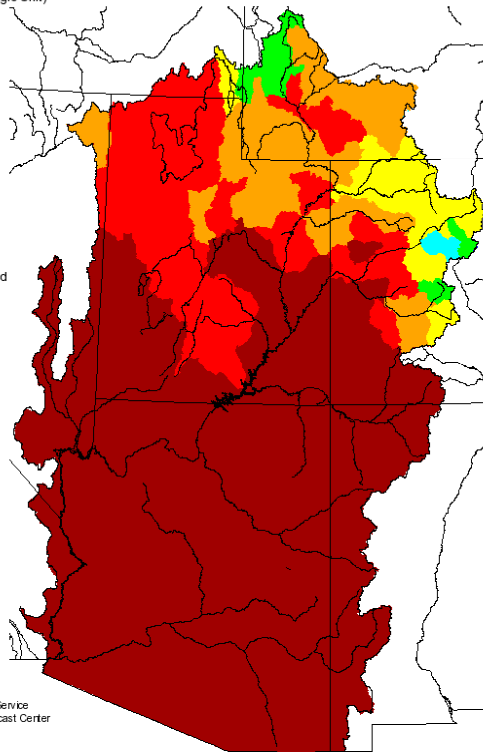
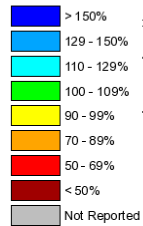
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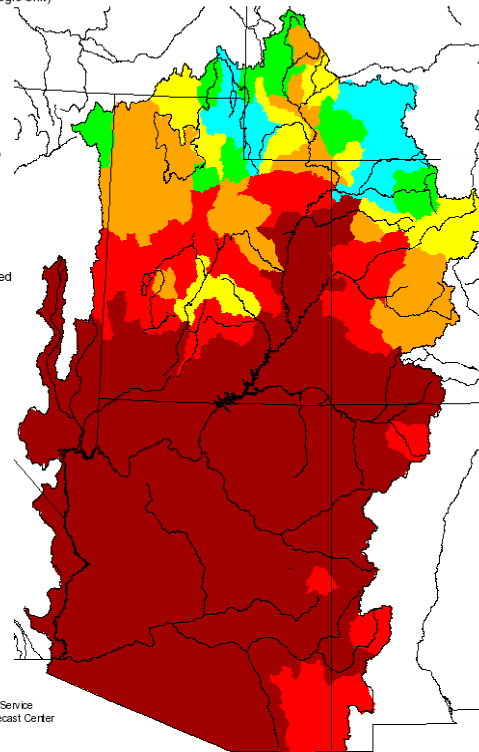
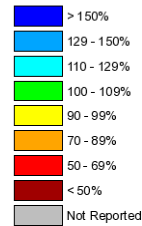


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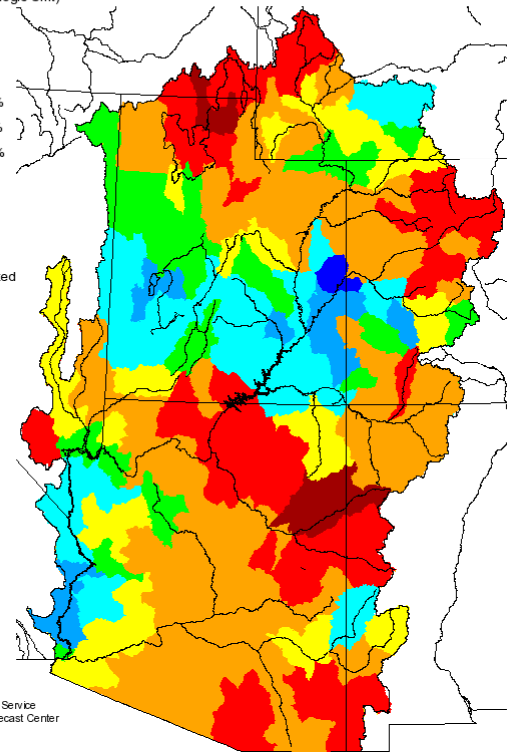
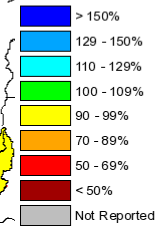


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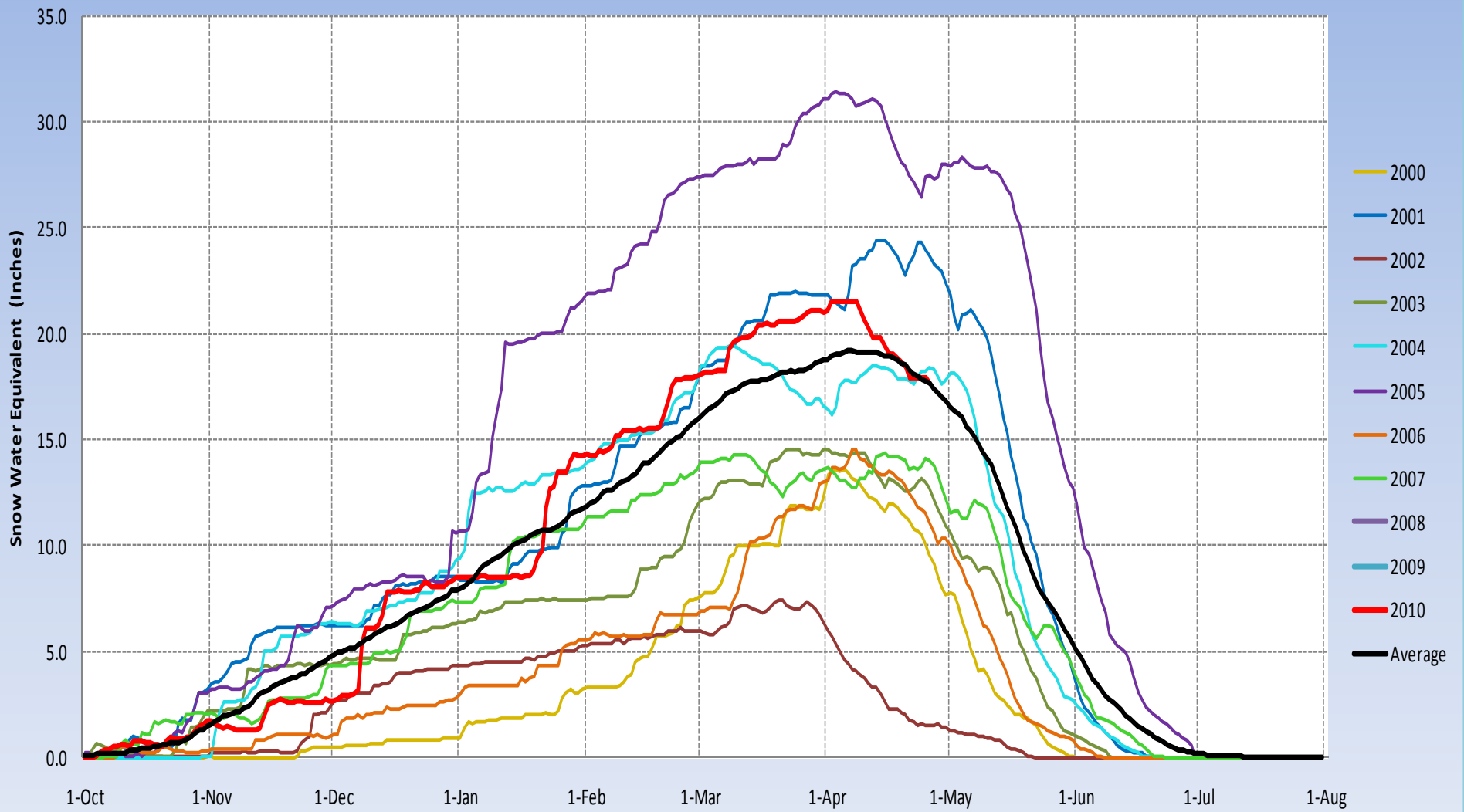
#### % Average



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# Navajo Reservoir SNOTEL SWE from 2000-2010



(as of 4/26/2010)

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# Water Year 2010 (as of 4/26/2010)

## Navajo Inflows & San Juan Basin Snowpack

<b>EOM</b>	<b>Inflow (af)</b>	<b>% Average</b>	<b>SJ SWE (in.)</b>	<b>% Average</b>
<b>October</b>	20,830	41%	1.7	116%
<b>November</b>	13,929	42%	2.7	57%
<b>December</b>	16,144	50%	8.5	107%
<b>January</b>	13,775	66%	14.2	121%
<b>February</b>	16,144	52%	18.0	113%
<b>March</b>	66,107	73%	21.0	112%
<b>April (Current)</b>	181,186	124% (estimated)	17.7	100%



# Water Year 2010 Forecasts

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# Mid April 2010 Forecast

## Navajo Reservoir Mod Unregulated

### April-July Inflow Volume

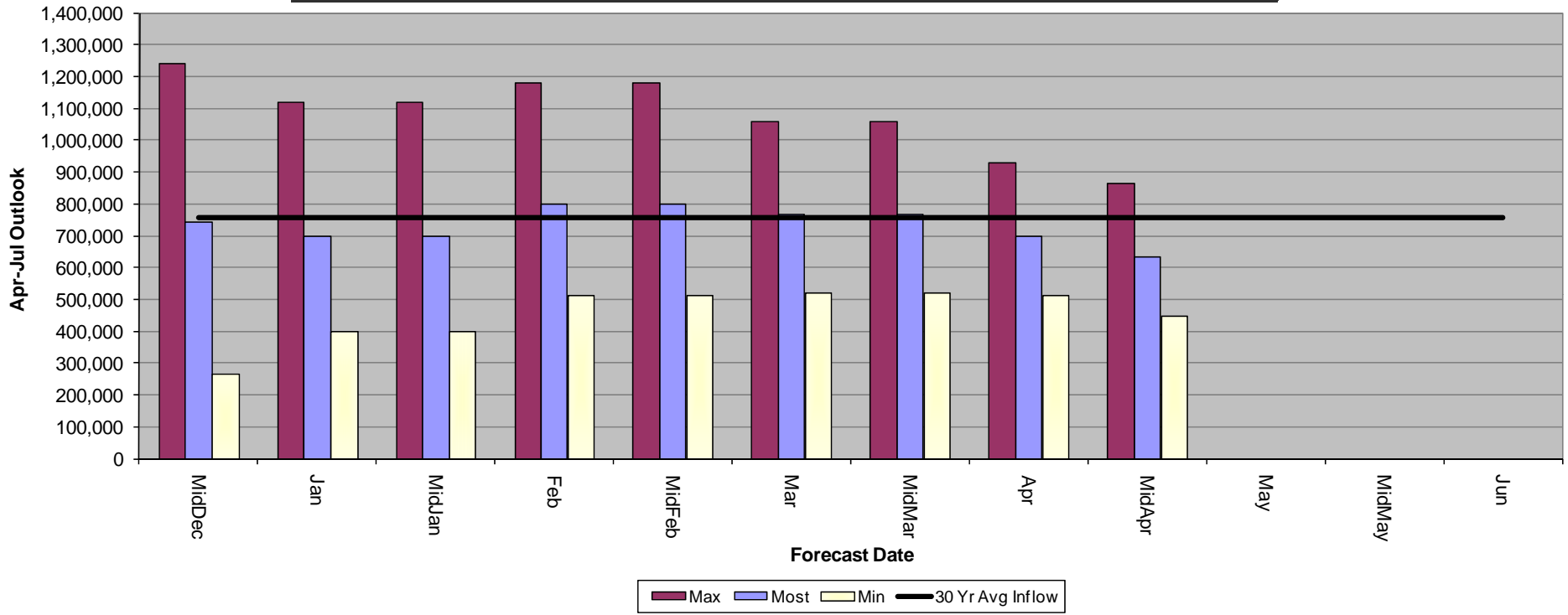
	Inflow (af)	% of Average	2009 Forecast
Most Probable	635,000	84%	720,000 (93%)
Minimum Probable	450,000	60%	505,000 (65%)
Maximum Probable	865,000	114%	975,000 (126%)

2009 Actual = 657,000 acre-feet

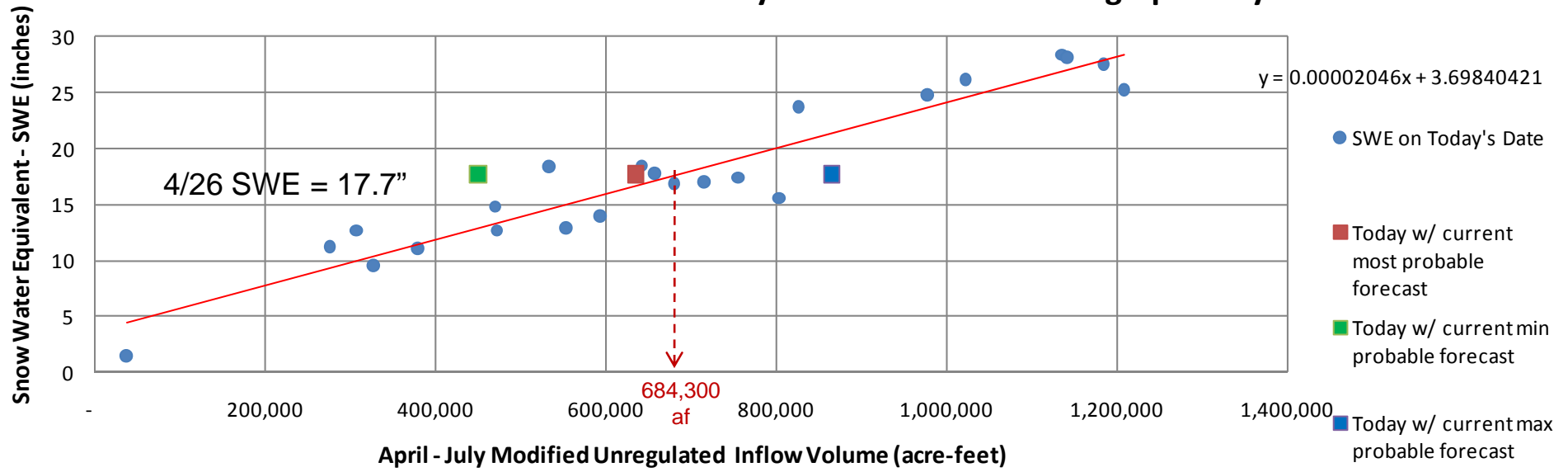
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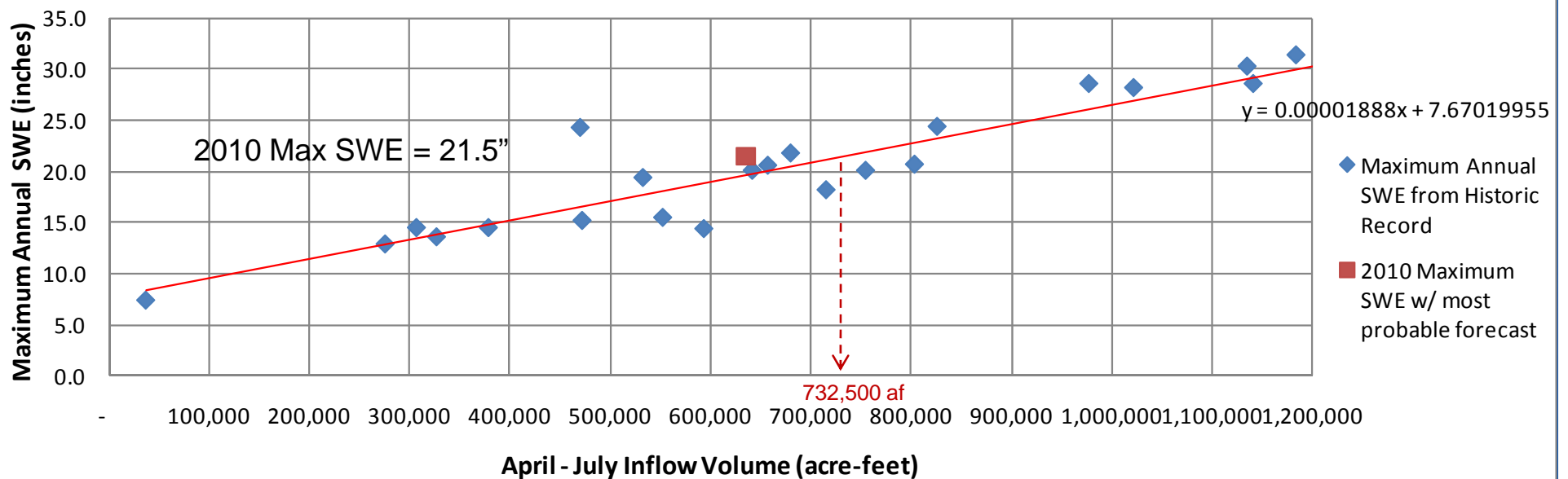
**WY2010 CBRFC - Navajo Reservoir Most, Max and Min Inflow Forecasts (acre-feet)**



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



### Historical April-July Inflows compared to Maximum Annual SWE

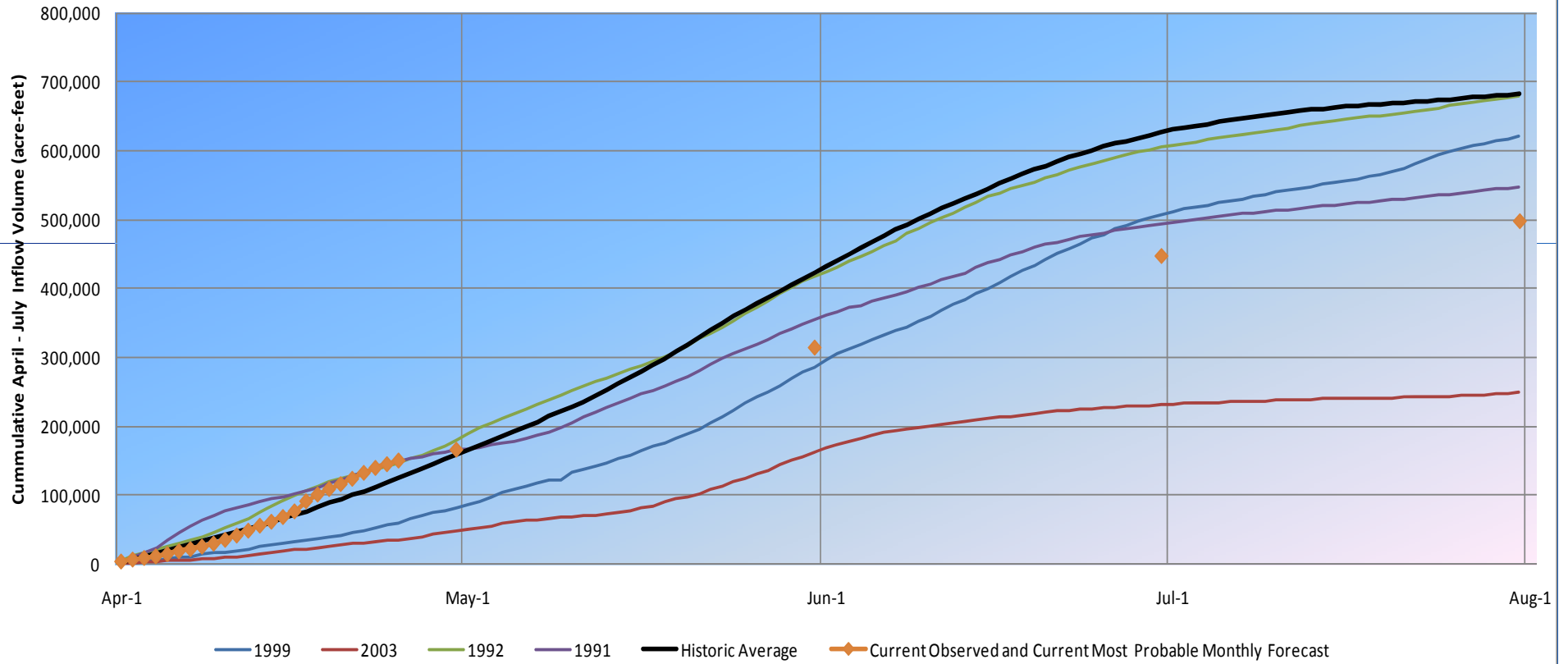


# Navajo Reservoir SNOTEL – SWE on 4/26

	1999	2003	2010	1992	1991
SWE	17	17.4	<b>17.70</b>	17.8	18.4
Percentile	48%	52%	57%	61%	65%
Rank (wet)	13	12	11	10	9
Rank (dry)	12	13	14	15	16
April-July Inflow	754,853	306,809	635,000	803,651	680,093

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### Cumulative April - July Observed Inflow of Representative SWE Years



# How much is influenced by dust on snow and soil moisture?



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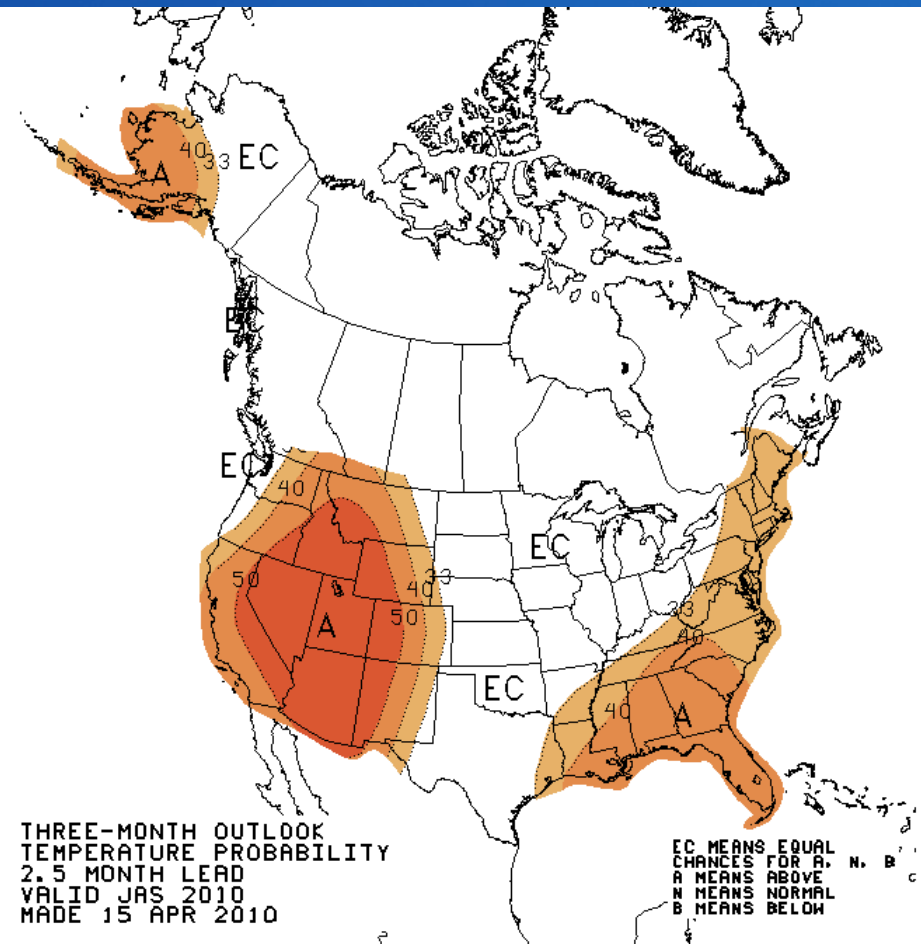
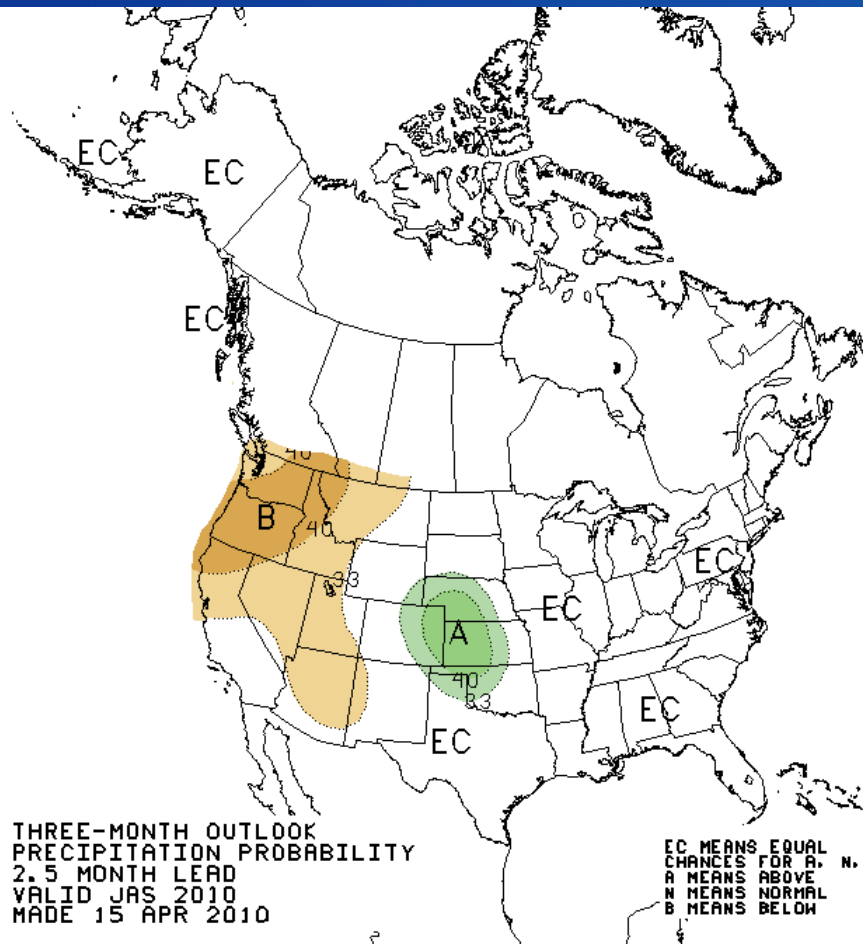
# Looking Ahead to Summer/Fall

EOM	Forecasted Most Probable Mod Unreg Inflow (af)	% Average	Predicted Observed Inflow (af)	% Average
April	190,000	111%	166,769	114%
May	205,000	73%	148,308	67%
June	200,000	85%	132,946	69%
July	40,000	59%	50,547	67%
August*	32,175	72%	46,404	75%
September*	38,069	86%	49,146	91%

\*August & September volumes are based on a linear regression between July and 100% of Average for October.

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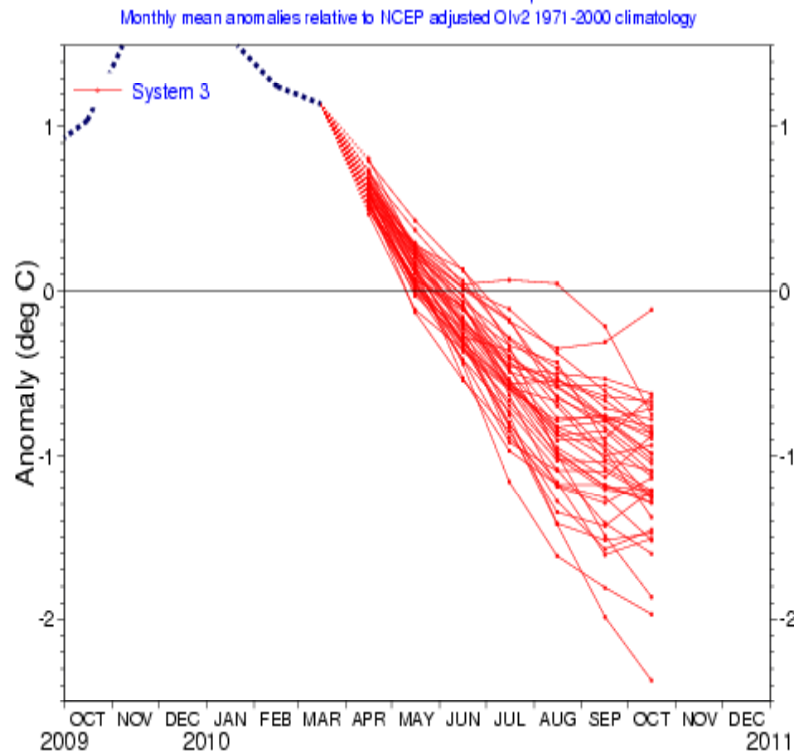
# July-August-September Outlook (CPC):



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# What about El Niño ?

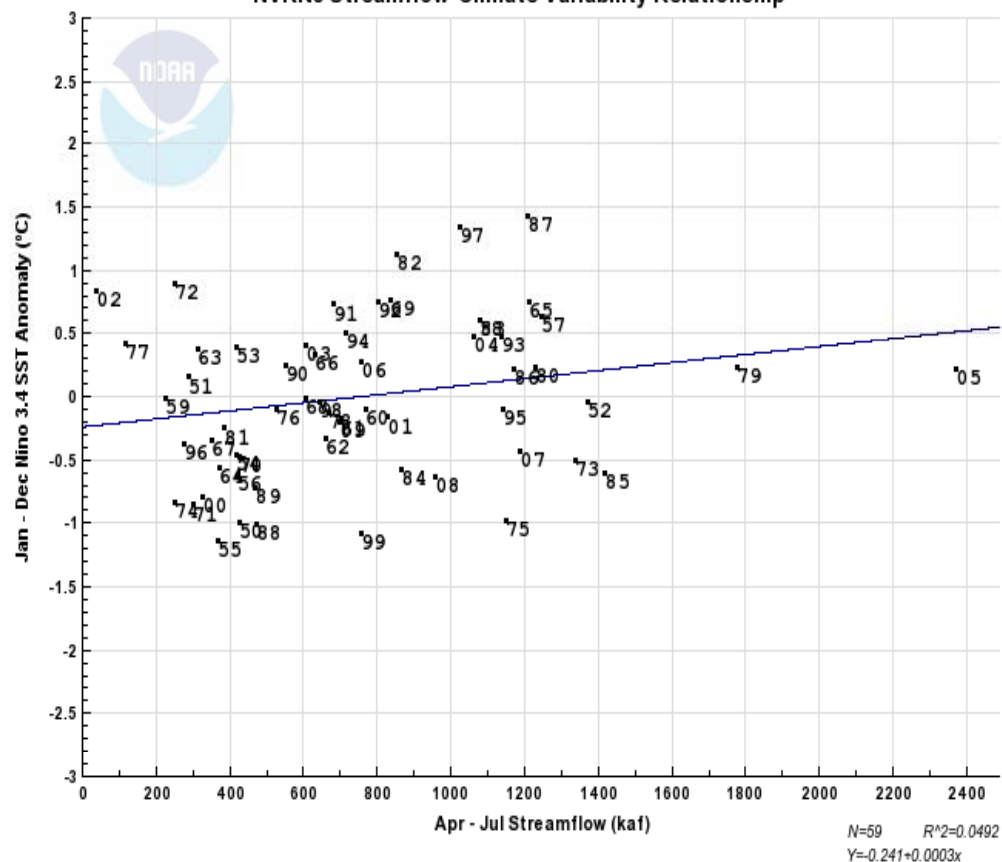
NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Apr 2010



Forecast issue date: 15 Apr 2010



NVRN5 Streamflow-Climate Variability Relationship



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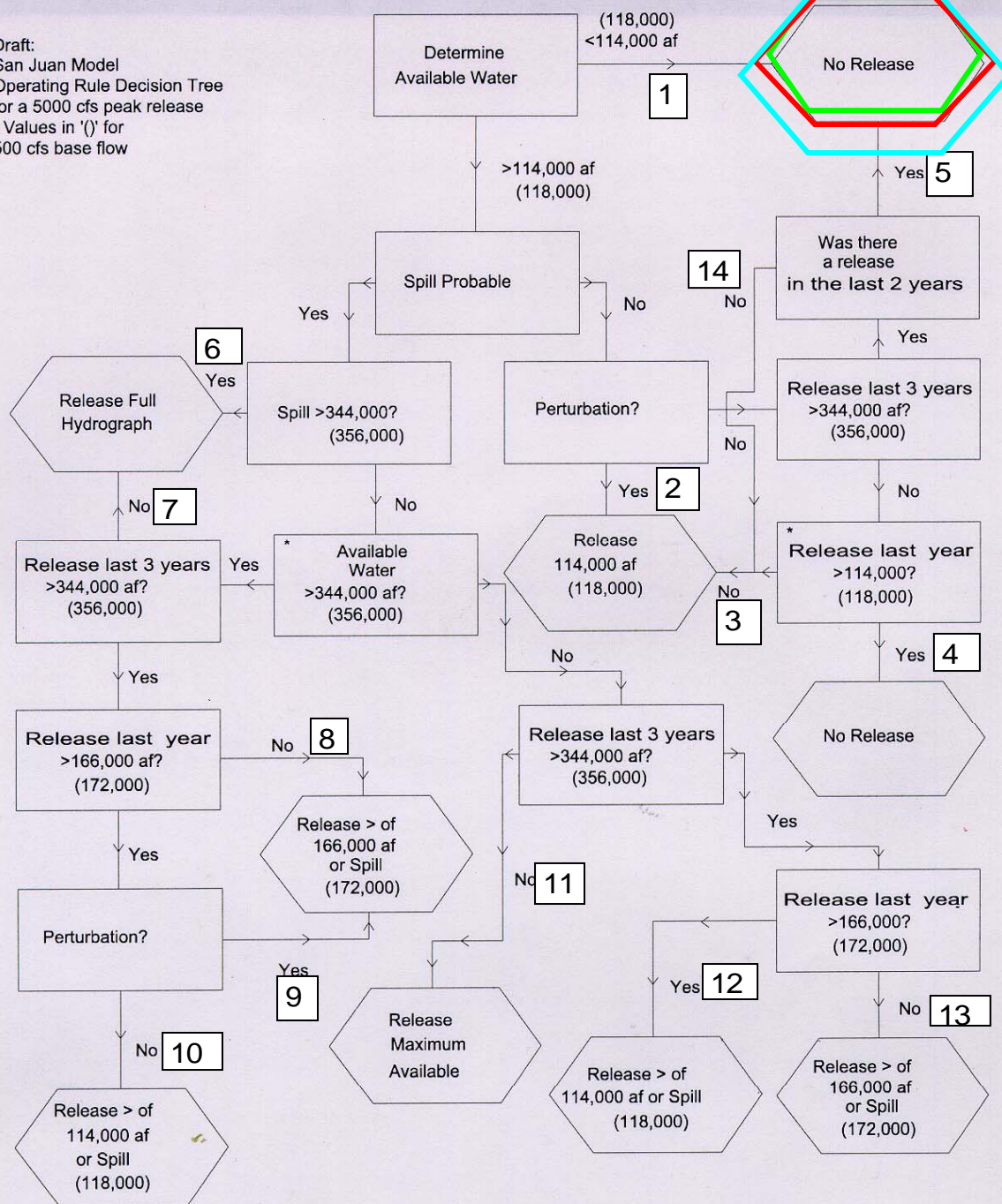


# Water Year 2010 Operations

- Based on the most probable forecasts and anticipated operations, Navajo Reservoir will be near target elevation without a Spring Peak Release
- 500 cfs base until further notice
- San Juan RIP Flow Recommendations call for no Spring Peak Release this year
- A Spring Peak Release is still a possibility if the forecast increases (~35% probability) Some adjustments may still be necessary!

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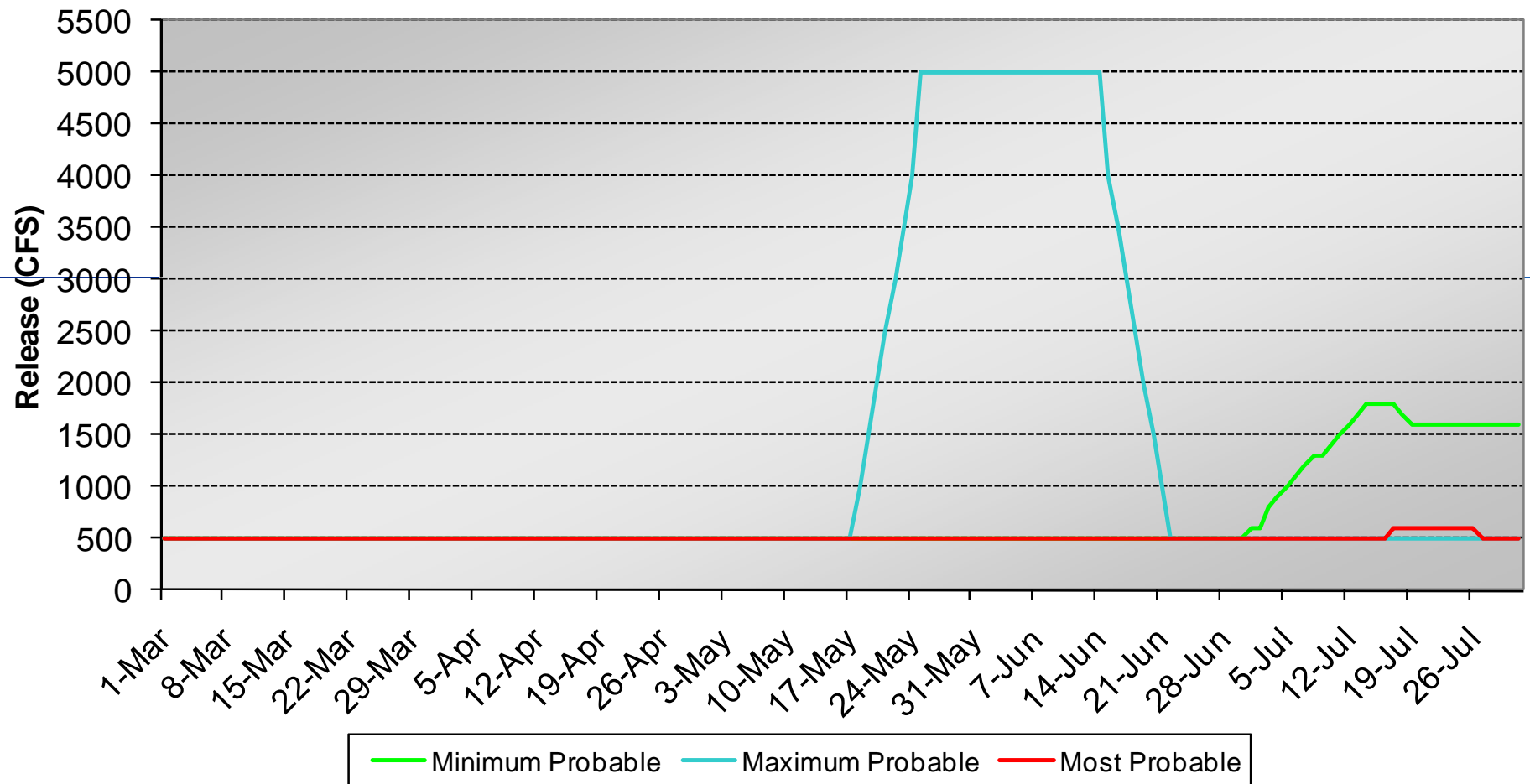
Draft:  
 San Juan Model  
 Operating Rule Decision Tree  
 for a 5000 cfs peak release  
 - Values in '()' for  
 500 cfs base flow



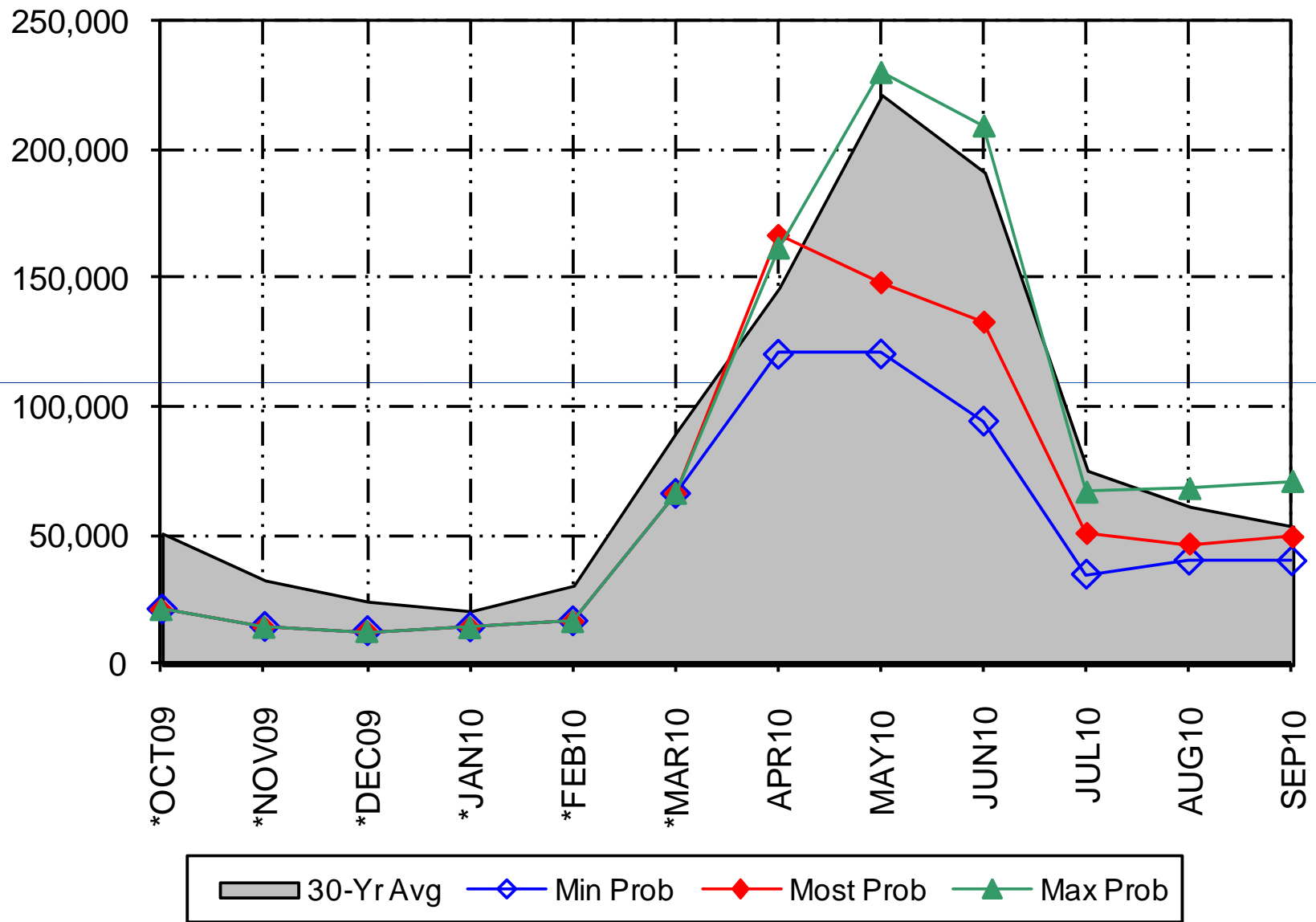
AVAILABLE WATER	PATH
Min Prob: 291,100 af	#5
Most Prob: 474,500 af	#5
Max Prob: 644,300 af	#5

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### Spring Peak Hydrographs for WY2010 as of the Mid April Forecast

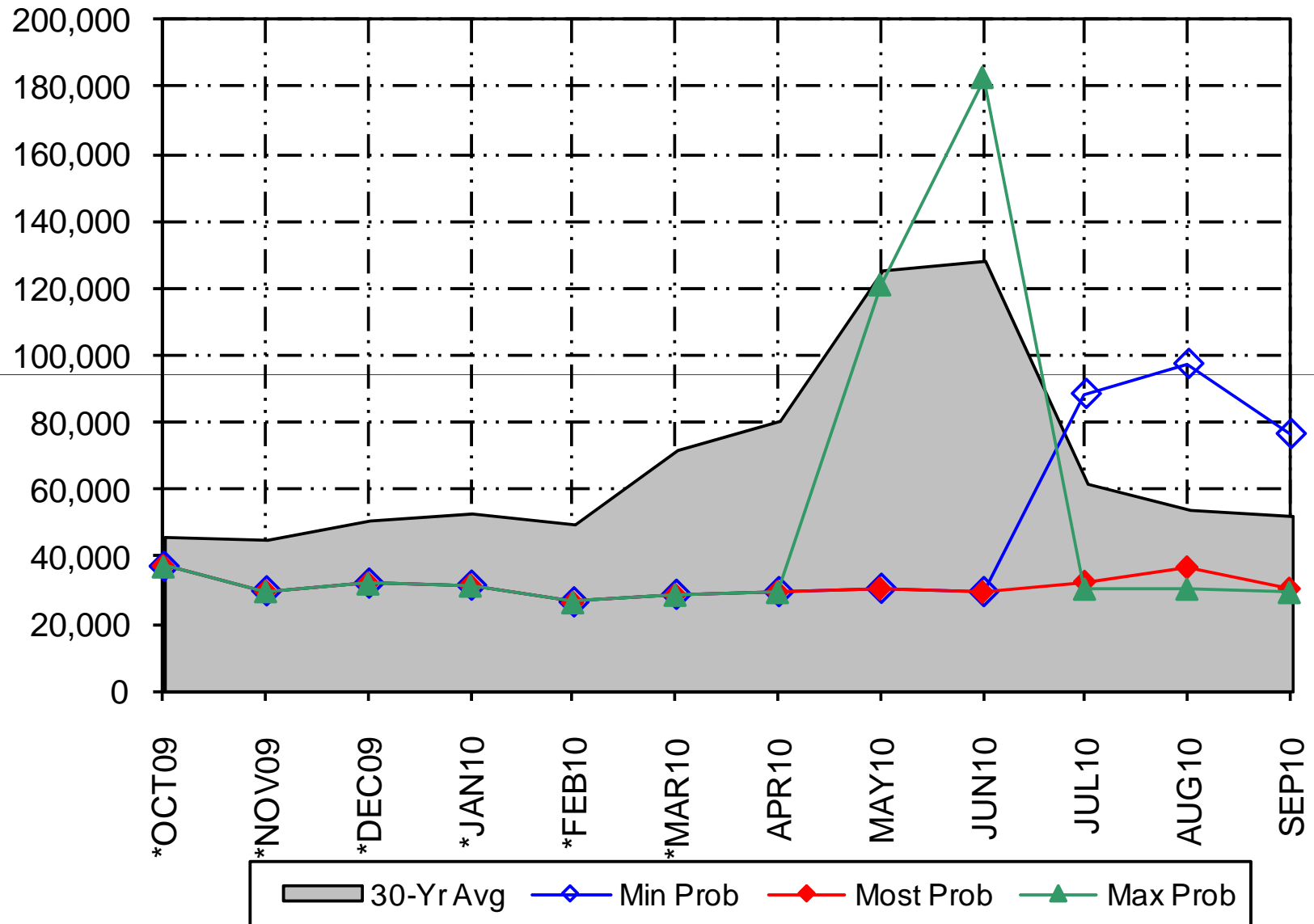


## Inflow (af) as of April 2010 Mid Month Forecast



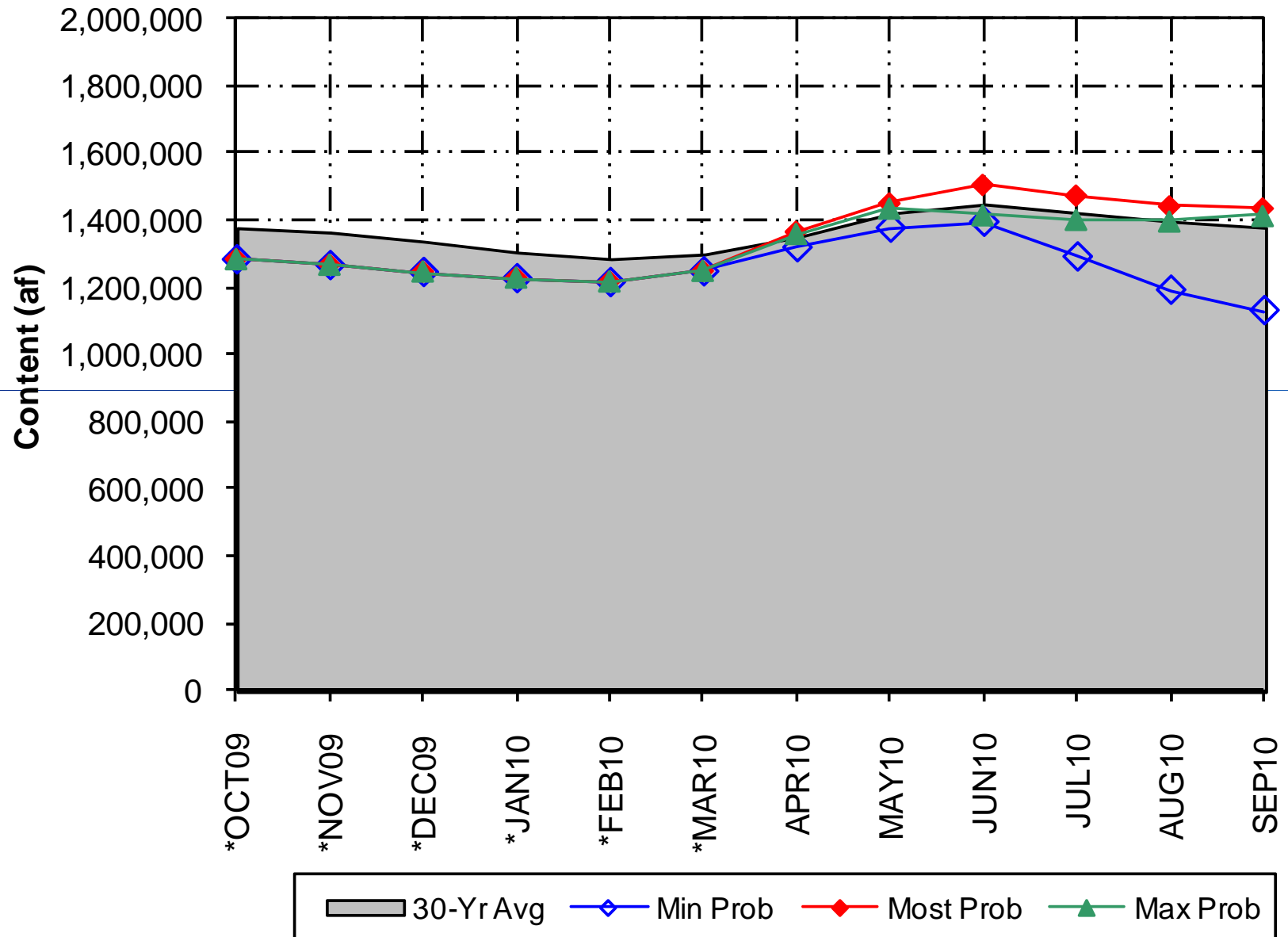
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## Release (af) as of April 2010 Mid Month Forecast



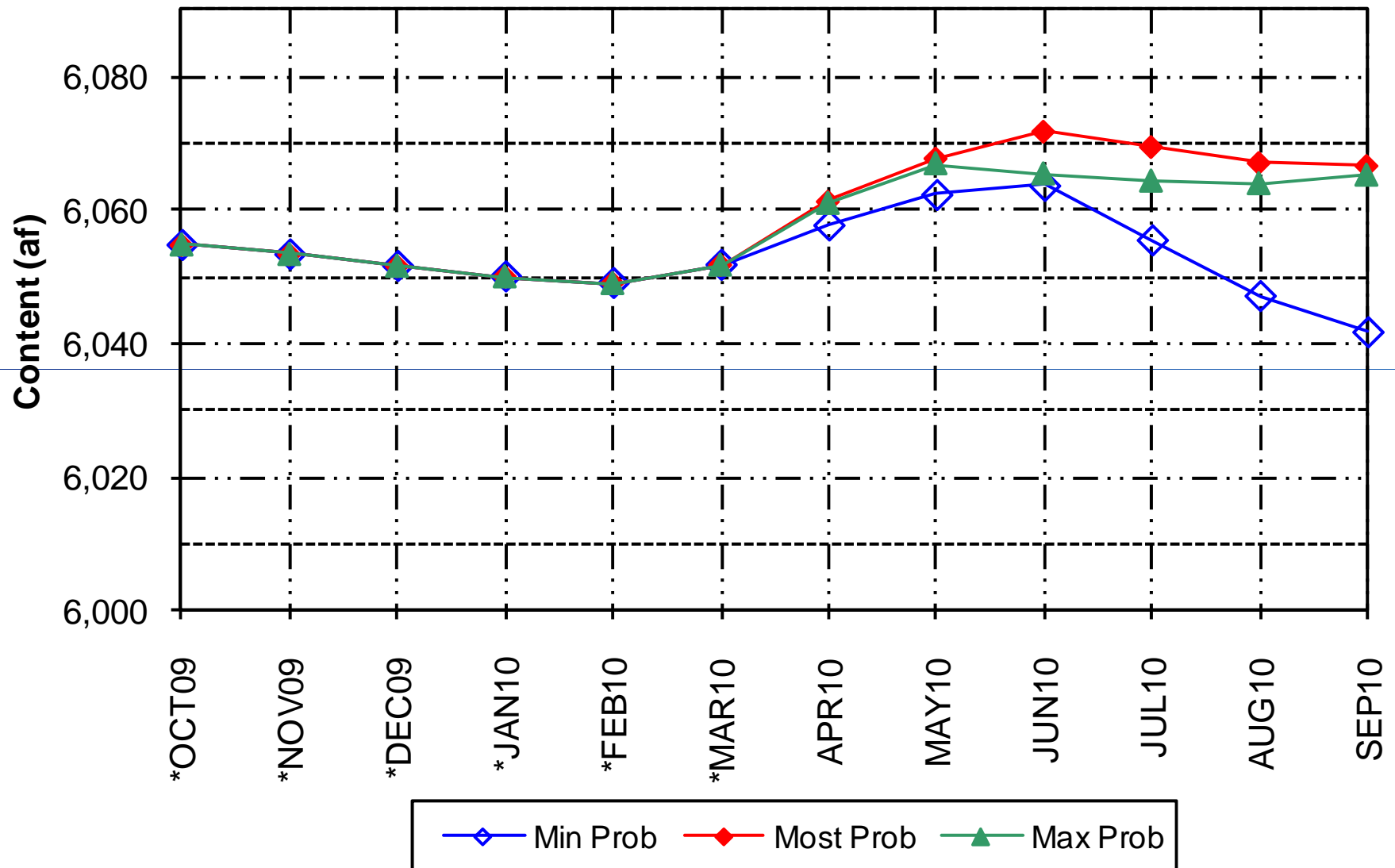
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## Content (af) as of April 2010 Mid Month Forecast



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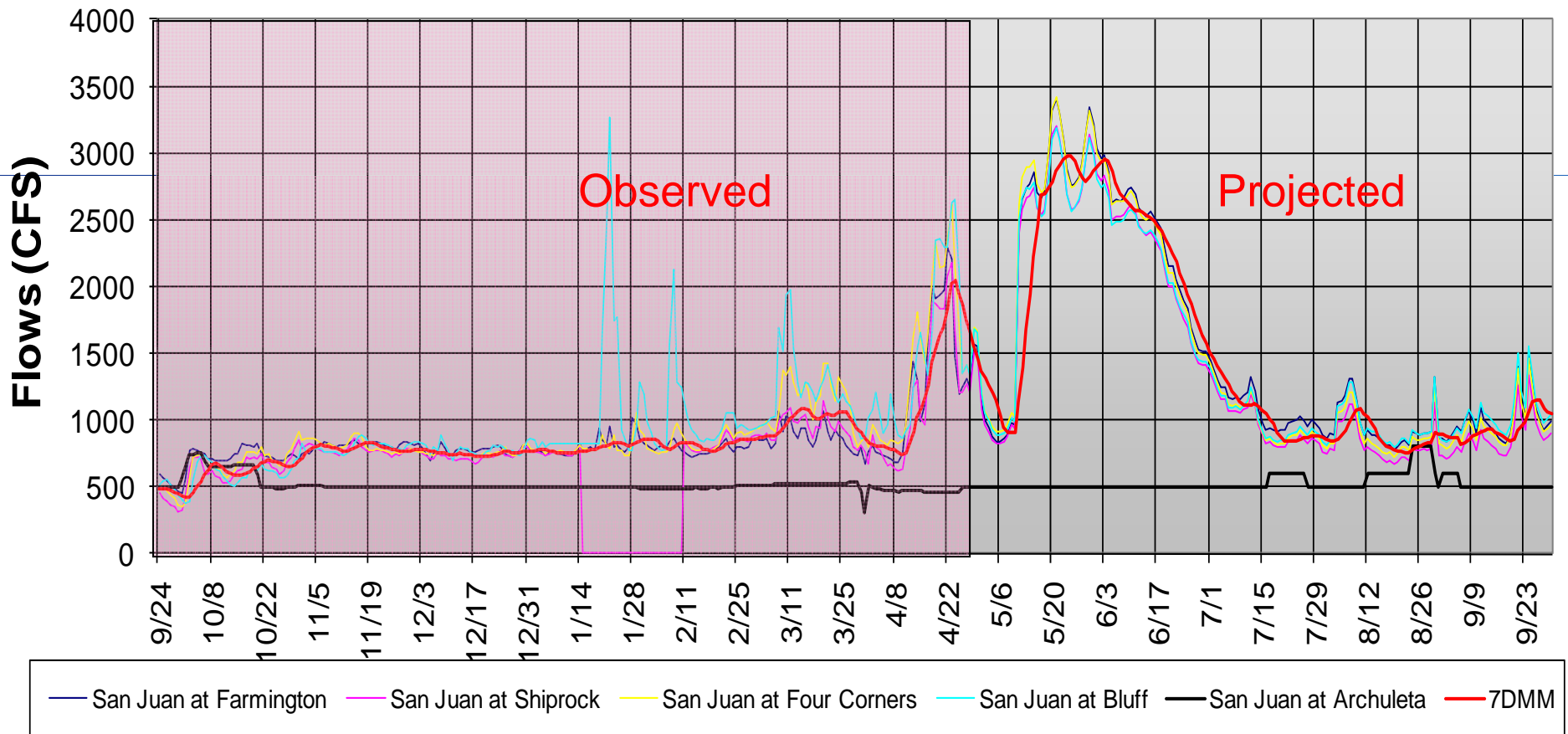
## Elevation as of April 2010 Mid Month Forecast



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# San Juan River Downstream Flows

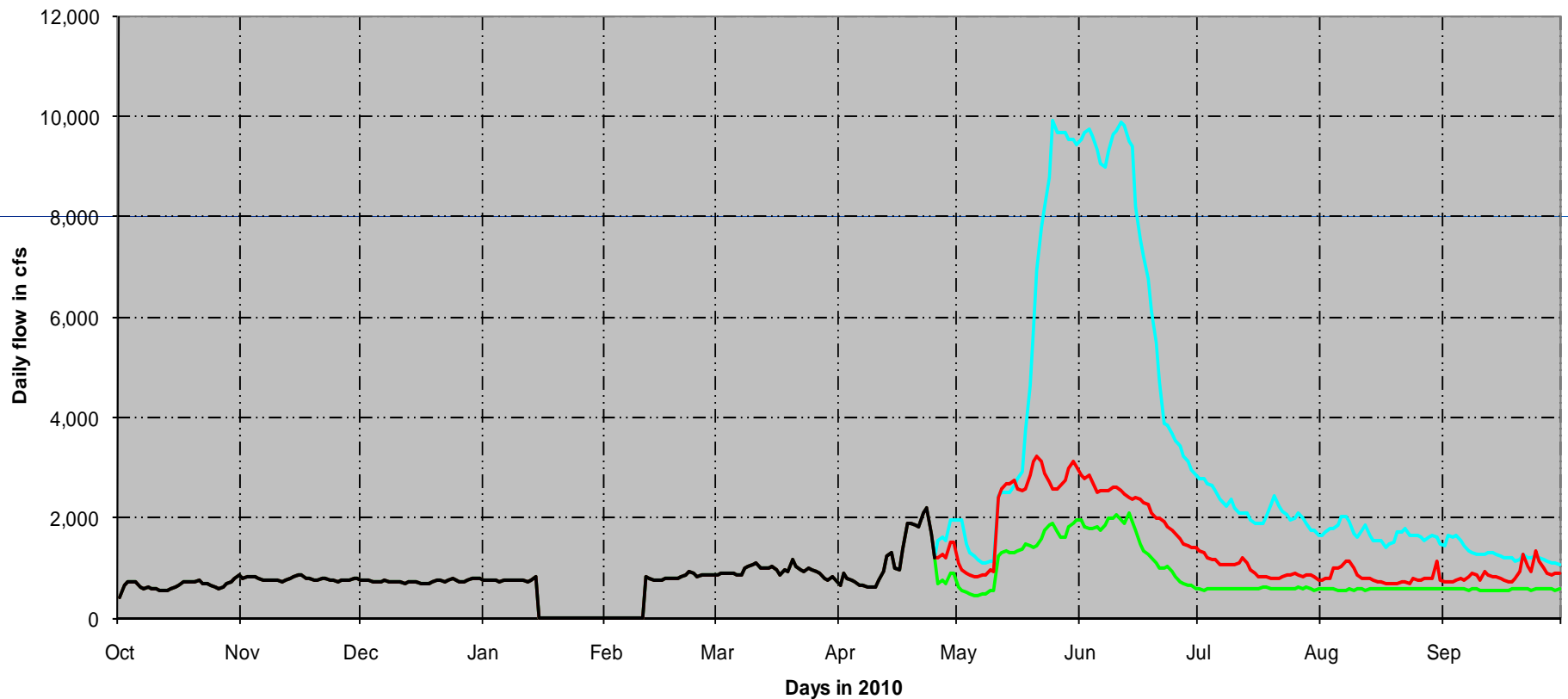
San Juan Flows based on Most Probable Navajo Release  
and Animas @ Farmington Flows as of 4/25/2010





# San Juan River at Shiprock

Based on the Apr Mid Month Forecast, Estimate of the San Juan River at Shiprock, Representative Daily Historic Flows



San Juan at Shiprock, Minimum (1955, 1996, 1956, 1953, 2000)

San Juan at Shiprock, Maximum (1978, 1969, 1999, 2008, 1942)

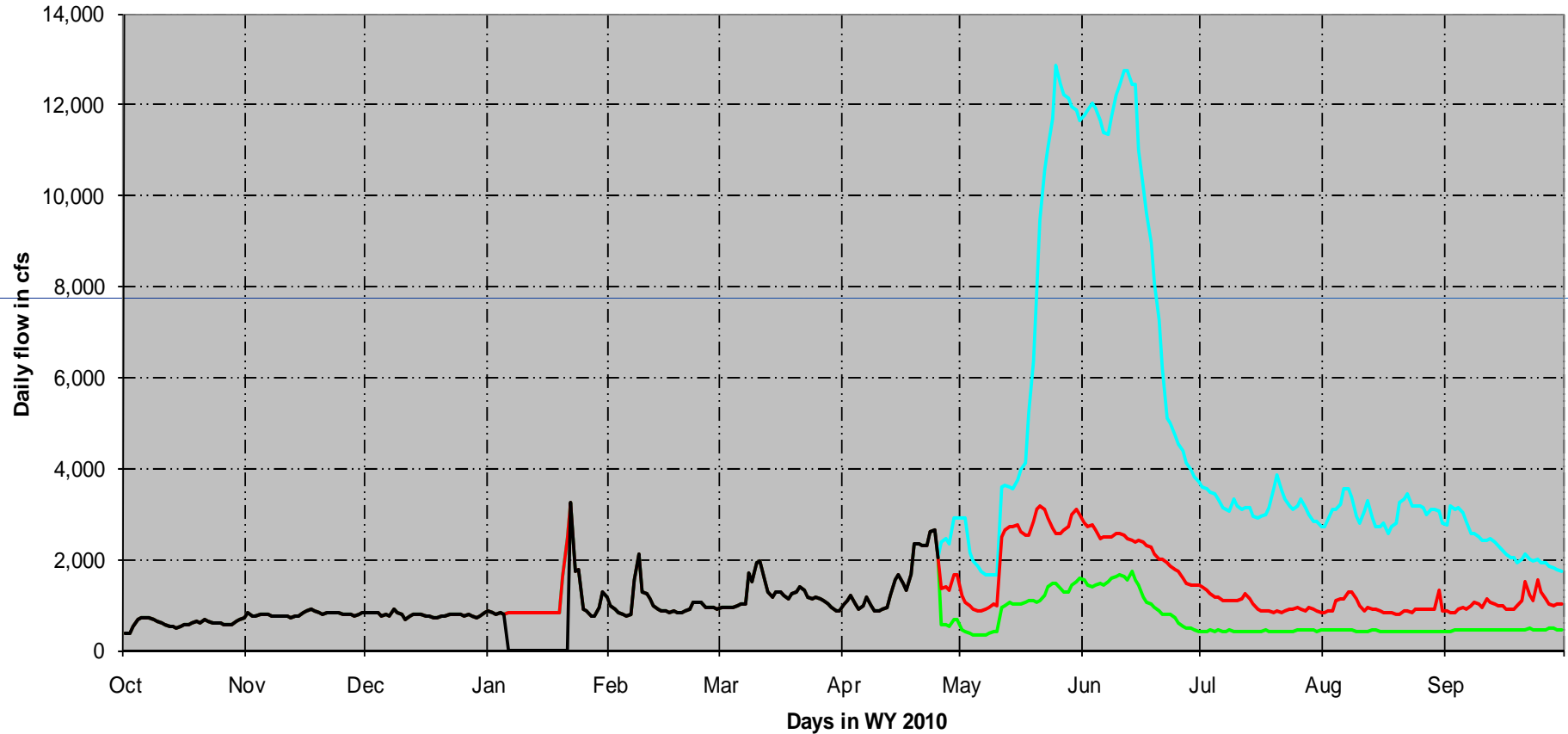
San Juan at Shiprock, Most Probable (1991, 2004, 1936, 1998, 2007)

2010 Actual

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# San Juan River at Bluff

Based on the Apr Mid Month Forecast, Estimate of the San Juan River at Bluff, Representative Daily Historic Flows



San Juan at Bluff, Minimum (1955, 1996, 1956, 1953, 2000)

San Juan at Bluff, Most Probable (1991, 2004, 1936, 1998, 2007)

San Juan at Bluff, Maximum (1978, 1969, 1999, 2008, 1942)

2010 Actual

# RECLAMATION

An aerial photograph of a river system. A large dam is visible in the upper left, with water flowing through a series of channels and islands. The river is surrounded by a mix of green trees and shrubs, and a road runs along the top edge of the frame. The overall scene depicts a managed waterway in a semi-arid environment.

# Current Conditions

RECLAMATION

# Navajo Current Conditions

(as of 4/25/10)

Elevation = 6061.3 (101% of Average)

Storage = 1,364,407 af (80% Full)

Inflow = 3550 cfs\*

Release = 500 cfs\*

NIIP = 260 cfs\*

SJ-Chama Diversion = 530 cfs\*

\* Weekly Average from (4/19 – 4/25)

RECLAMATION

# Nearby Reservoirs

(4/25/2010)

## Vallecito

- Elevation = 7637.0 (46% Full, 79% of average)
- Storage = 58,051 af
- Release = 60 cfs
- Inflow = 722 cfs\*

## Lemon

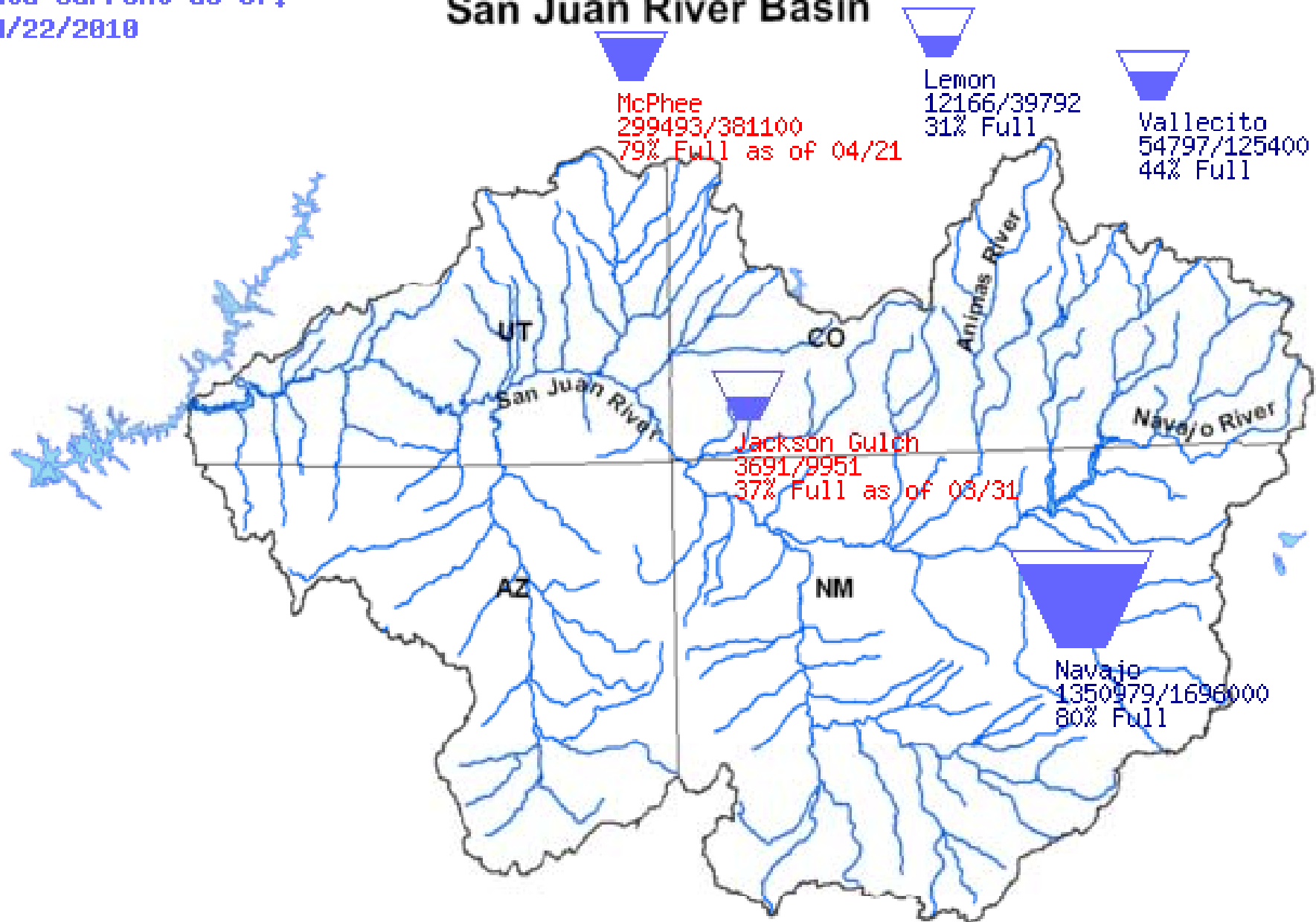
- Elevation = 8091.3 (32% Full, 53% of average)
- Storage = 12,793 af
- Release = 9 cfs
- Inflow = 136 cfs\*

\* Weekly Average from (4/19 – 4/25)

RECLAMATION

Data Current as of:  
04/22/2010

## San Juan River Basin



RECLAMATION

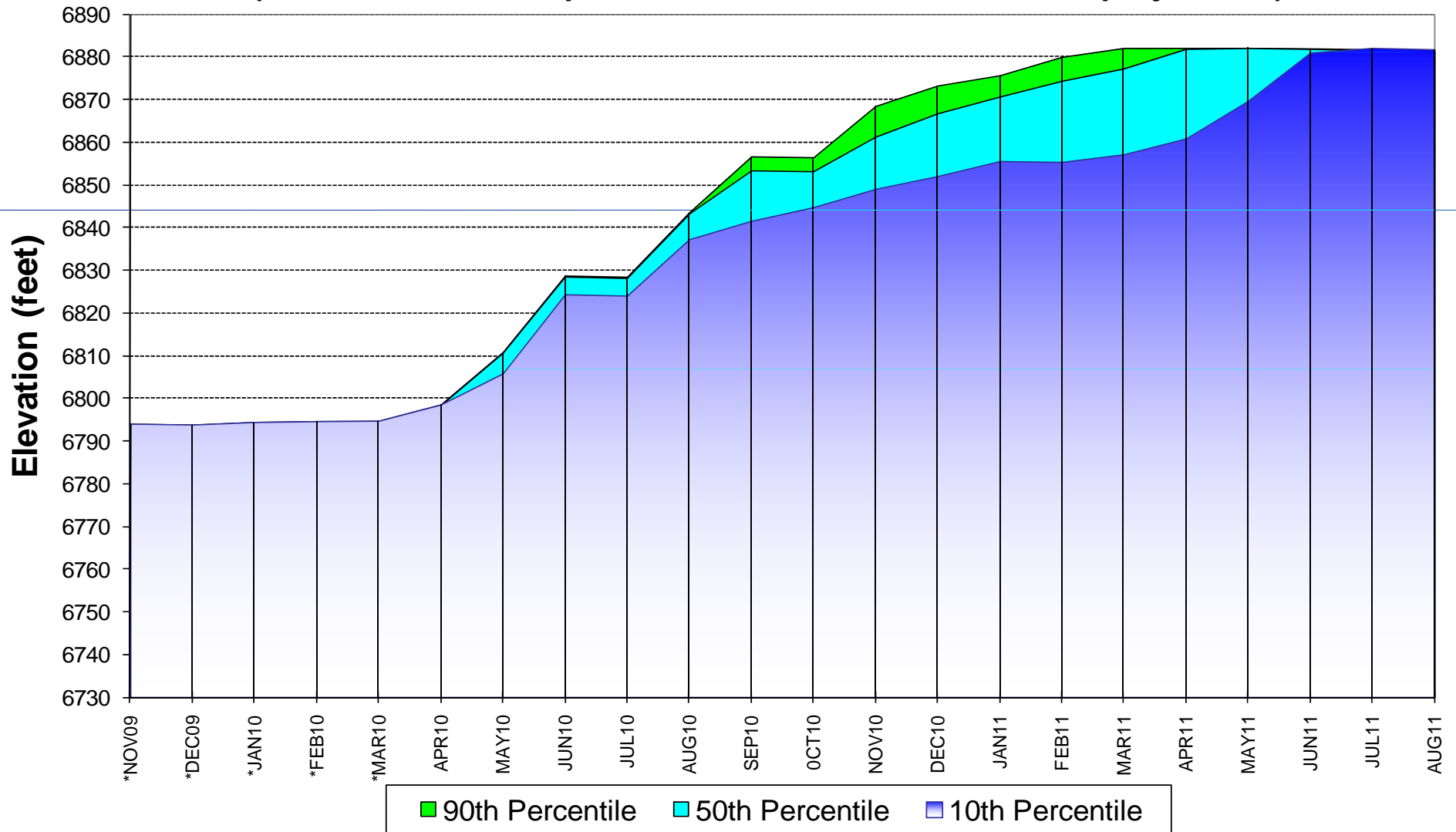
# Animas-La Plata Project

- Pumping began March 2<sup>nd</sup>
- ~8000 acre-feet pumped this year
- Maximum diversion this year = 285 cfs
- Reservoir is 29% Full (35,500 af stored)
- Holding period anticipated for June
- Navajo Nation Municipal Pipeline is currently under construction

RECLAMATION

# Animas-La Plata Project

**Projected First Fill Schedule**  
based on the April 10 Mid Month Forecast  
(see attached assumptions and constraints for basis of projections)





An aerial photograph of the Navajo Dam, showing a large concrete spillway with water cascading down. The dam is situated in a valley with a reservoir behind it and a river below. The surrounding landscape is arid with sparse vegetation. The text "Navajo Dam" and "Maintenance Activities" is overlaid in large, white, bold letters with a black outline.

# Navajo Dam

## Maintenance Activities

# Future Navajo Dam Maintenance Activities:

- **Muck-out Stilling Basin**
  - Contract will be issued this summer
  - Work planned for late Aug – early Sept
- **Repair 6x13 Emergency Gate Bonnet**
  - Will occur after Stilling Basin muck-out
  - Flow will be diverted through auxiliary gate for ~1 month
- **Auxiliary Outlet Works Gates**
  - Gates will not be tested except for base flow diversion during 6x13 gate repair

RECLAMATION

# Invasive Aquatic Species

# ALERT!

Stop the spread of

# ZEBRA MUSSELS

CLEAN • DRAIN • DRY

**Before moving your boat to another body of water:**

**CLEAN** → Remove all plants, animals, mud, and thoroughly wash everything coming into contact with the water.

**DRAIN** → Drain all water before leaving the area, including wells, bilge, ballast, and any other areas of your boat holding water.

**DRY** → Allow everything to completely dry before launching into another body of water.

# RECLAMATION

# Public Law 111-11

- Non-Navajo ditch improvements
  - Ten ditches expressed interest
  - Site visits scheduled for May



**Fish & Wildlife Service  
San Juan RIP Update**

**RECLAMATION**



*Reports from other Agencies*

RECLAMATION

The background of the slide features a light gray, textured surface with several large, black, stylized question marks scattered across it. The text is centered over this background.

# Questions from the Audience

# How You Can Access Information



Bureau of Reclamation  
[www.usbr.gov/uc](http://www.usbr.gov/uc)

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

Colorado Basin River Forecast Center  
[www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

RECLAMATION



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**Ruth Swickard**

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RECLAMATION

# Upcoming Meetings of Importance

- SJRIP Biology Committee Meeting 5/11
- SJRIP Annual Meeting 5/12
- SJRIP Coordination Committee Meeting 5/13

RECLAMATION

# Summary

- For 2010, the reservoir is at a manageable elevation and can store all forecasted spring runoff inflows
- Most Probable April–July Inflow Forecast is 84% of average
- No Spring Peak Release is anticipated, but still possible
- Likely Minimum (Base) Release = 500 cfs
- Increased releases may be necessary to meet Target Base Flows
- Target Base Flow is 500 -1000 cfs in Critical Habitat (Farmington-Lake Powell)
  
- Next Operations Meeting: August 24, 2010

An aerial photograph of a large dam and hydroelectric power plant. The dam is a long, concrete structure with a spillway where water is cascading down. Below the dam, there is a powerhouse building and a substation with electrical equipment. The surrounding landscape is arid with sparse vegetation and a dirt road. The text "Thanks For Coming!" is overlaid in large, bold, orange-to-yellow gradient letters with a drop shadow.

**Thanks For Coming!**

**RECLAMATION**