

RECLAMATION

Managing Water in the West



**Navajo Unit Operations
January 27, 2009
Coordination Meeting**



U.S. Department of the Interior
Bureau of Reclamation

Agenda

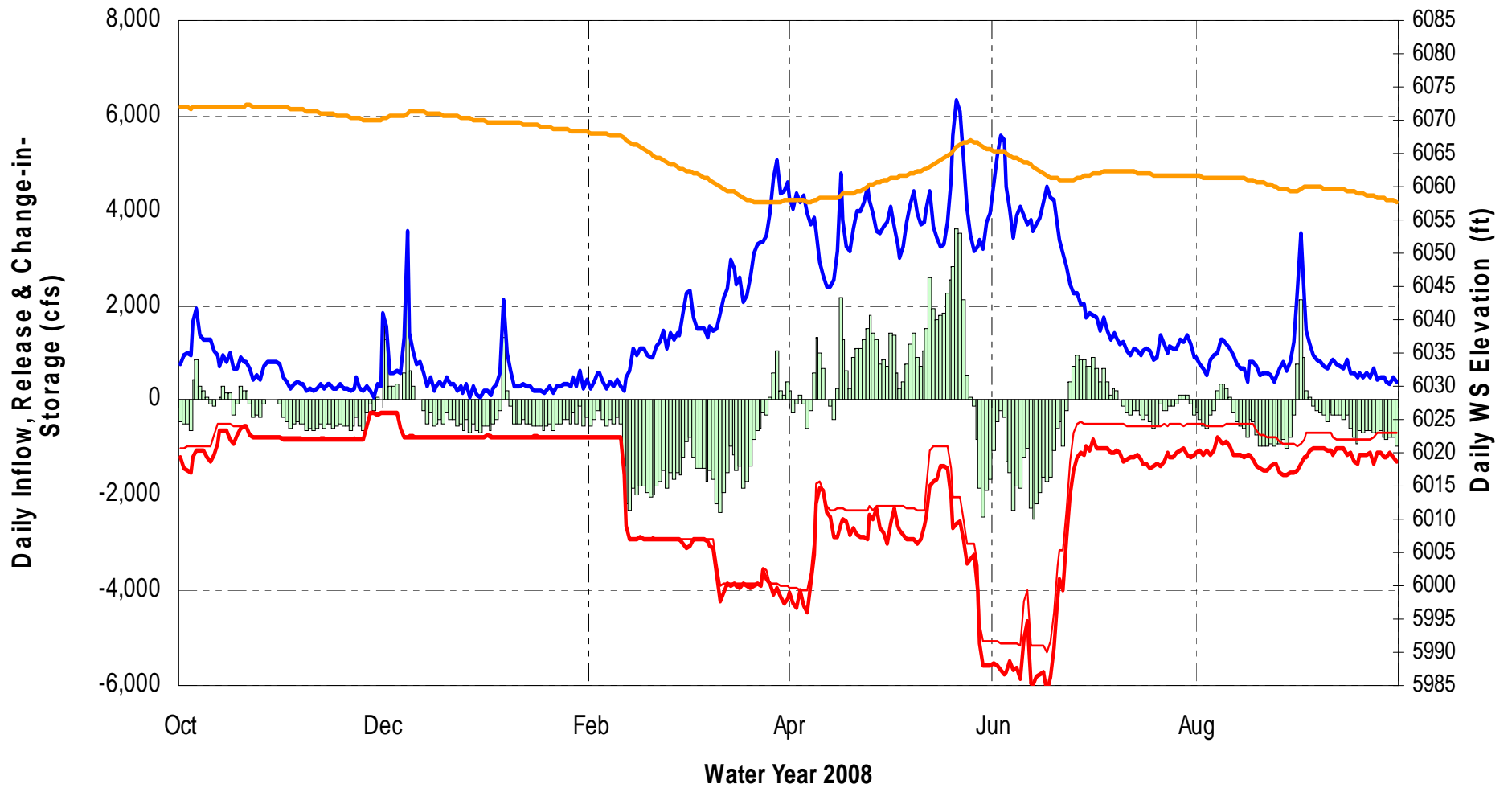
- Welcome
- Review of Past Operations
- Operations for 2009
- Recommendations for San Juan River Administration and Operation
- Navajo Dam Maintenance Activities
- Fish & Wildlife Service/San Juan RIP Update
- Reports from other Agencies
- Questions from Audience
- How To Access Information
- Close

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An aerial photograph of a large concrete dam structure. The dam is situated in a dry, hilly landscape with sparse vegetation. A road curves around the base of the dam. In the background, a reservoir is visible, with some water splashing over the dam's spillway. The overall scene is captured from a high angle, showing the scale of the infrastructure.

Review of 2008 Operations

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Change-in-Storage (cfs)
 Total Release (cfs)
 Inflow (cfs)
 River Release (cfs)
 WS Elevation

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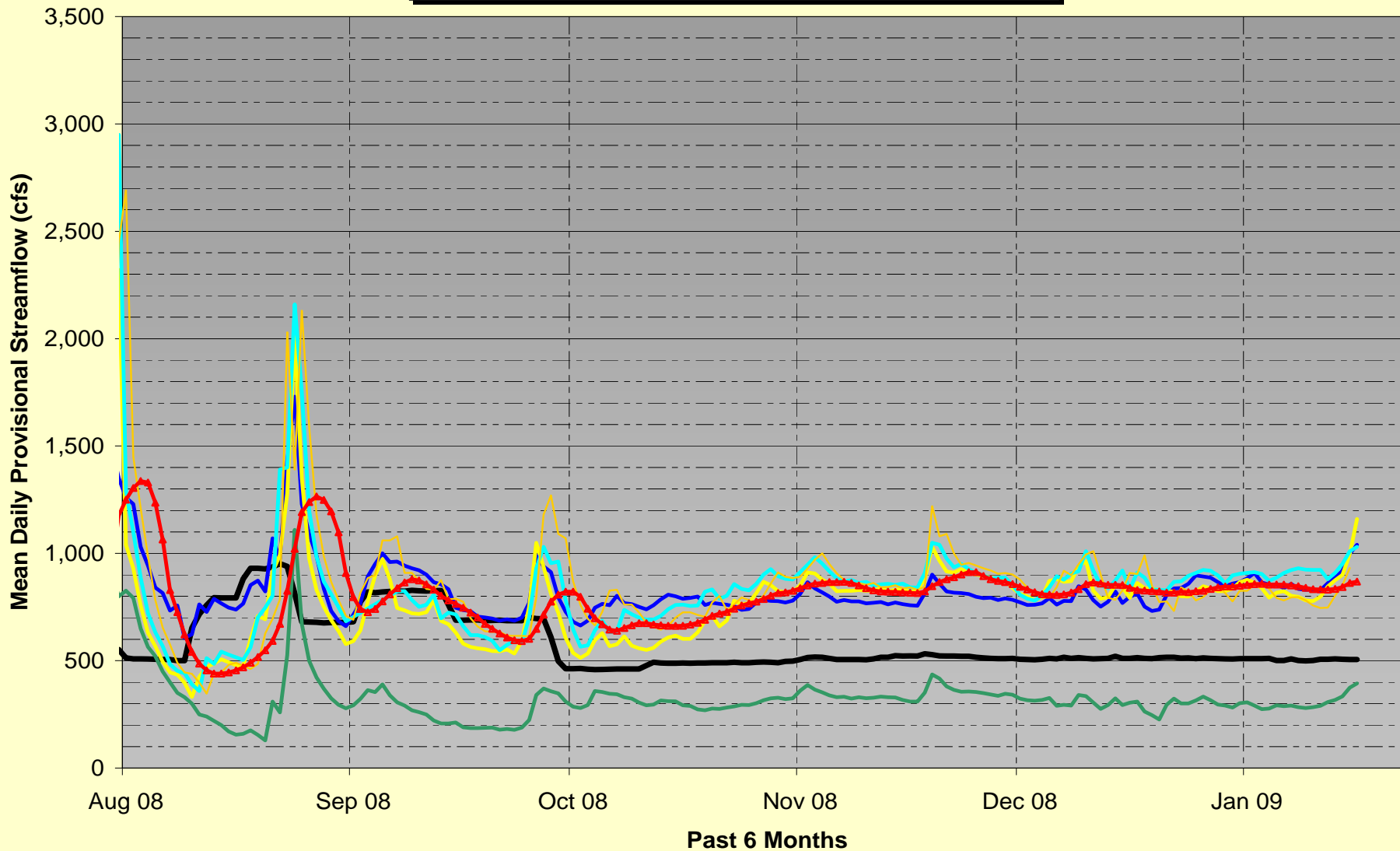
Chasing the Target Base Flow

Dates	Reservoir Release
7/2 – 8/19	500 cfs Base
8/19 – 8/26	700 cfs
8/26 – 9/2	900 cfs
9/2 – 9/11	700 cfs
9/11 – 9/23	800 cfs
9/23 – 10/7	700 cfs
10/7 - Current	500 cfs Base

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USGS PROVISIONAL MEAN DAILY STEAMFLOW SAN JUAN RIVER STATIONS

retrieved: 2009-01-26



— SJR Archuleta — SJR Farmington — SJR Shiprock — SJR Four Corners — SJR Bluff — Animas Farmington — MIN 7DMM

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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 2009" and "Conditions" is overlaid in large white font with a black outline.

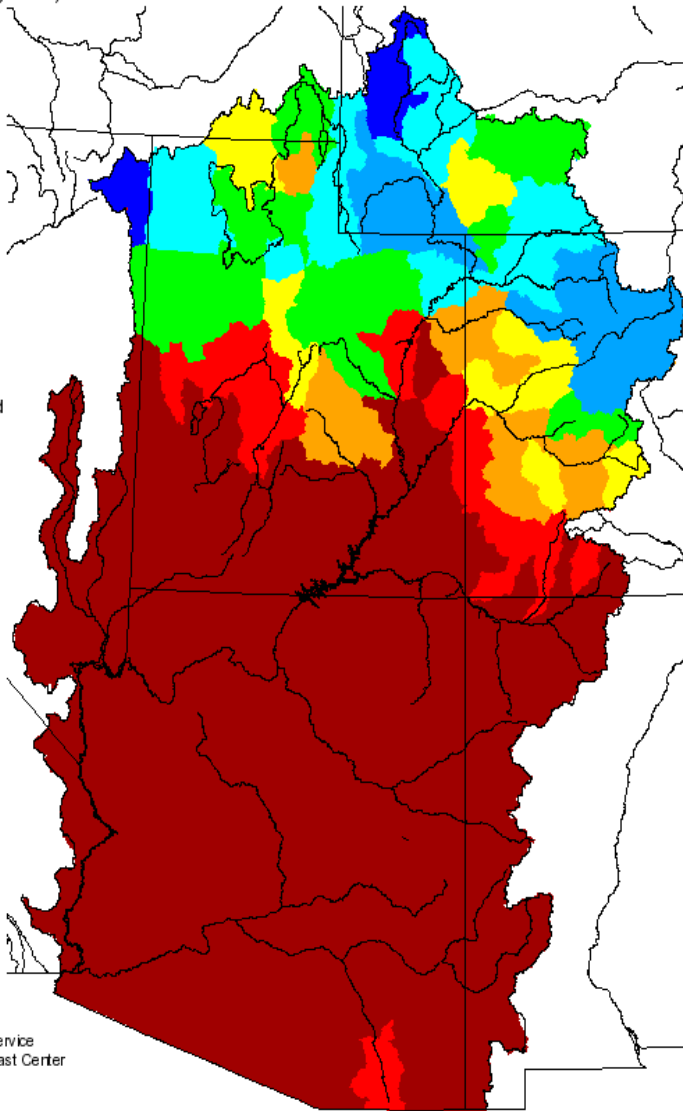
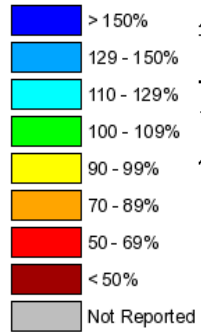
Water Year 2009 Conditions

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Monthly Precipitation for October 2007

(Averaged by Hydrologic Unit)

% Average

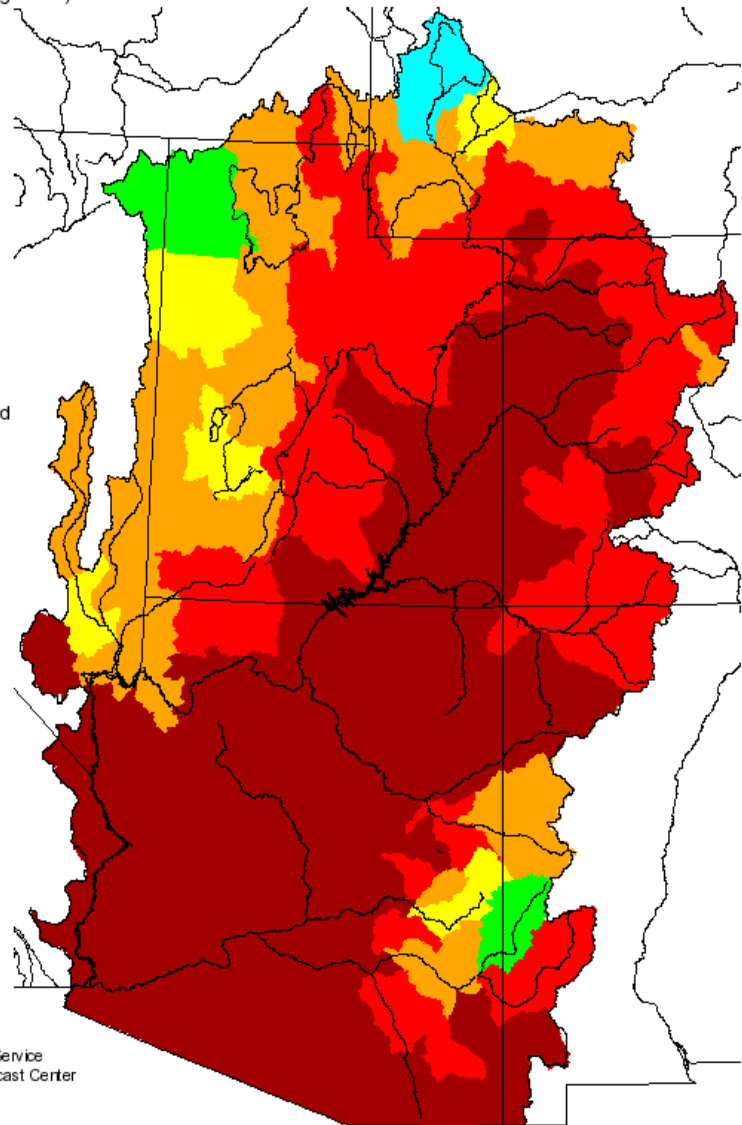
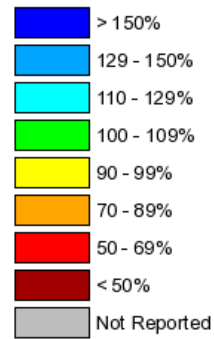


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

Monthly Precipitation for October 2008

(Averaged by Hydrologic Unit)

% Average

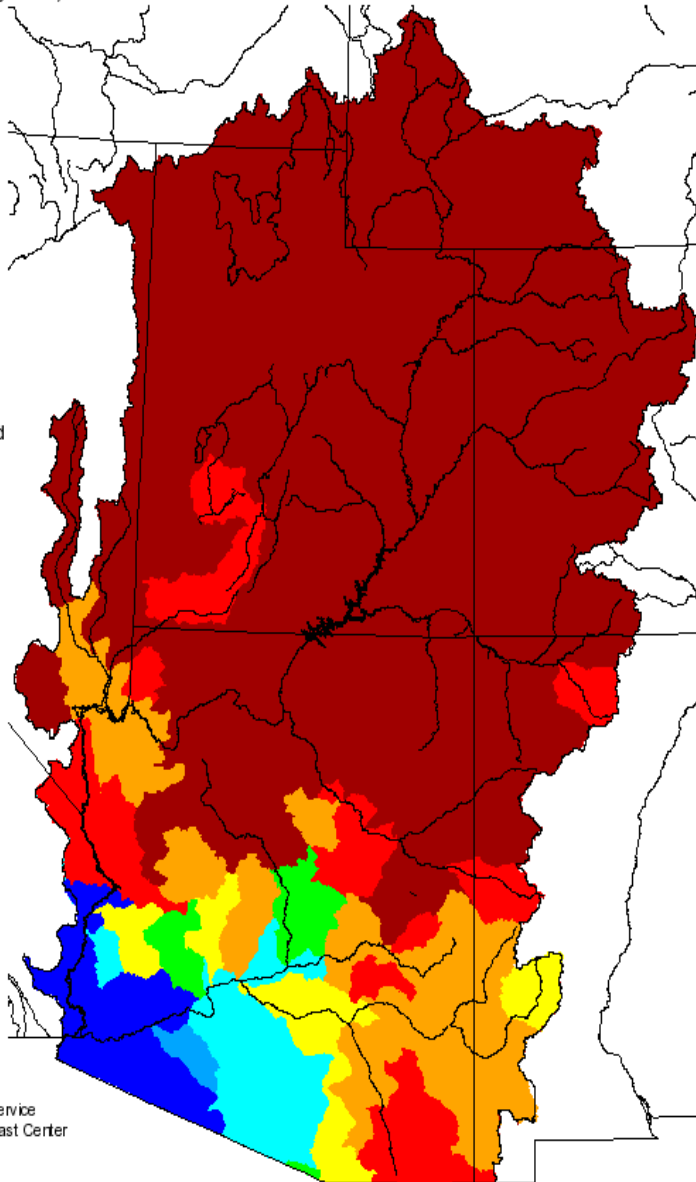
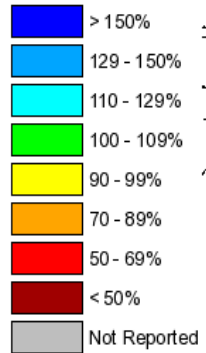


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Monthly Precipitation for November 2007

(Averaged by Hydrologic Unit)

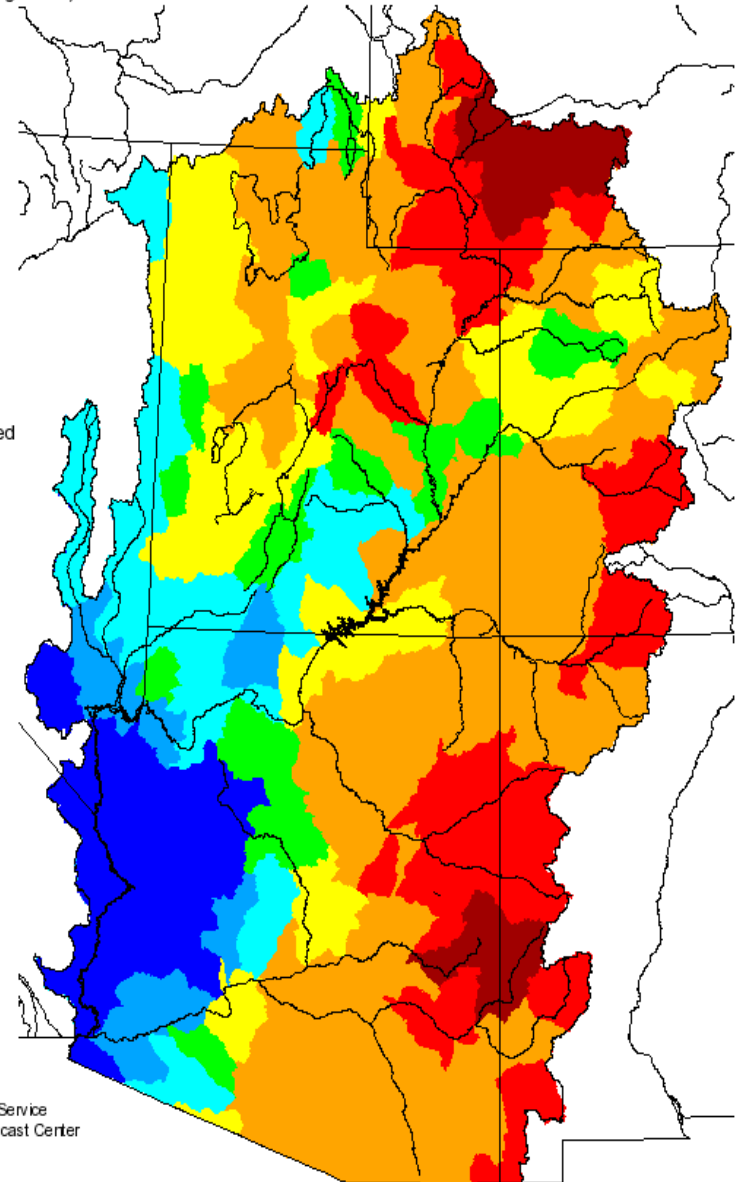
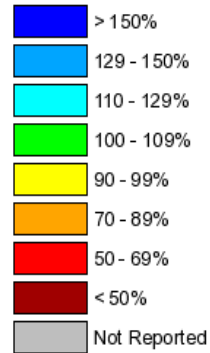
% Average



Monthly Precipitation for November 2008

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% Average



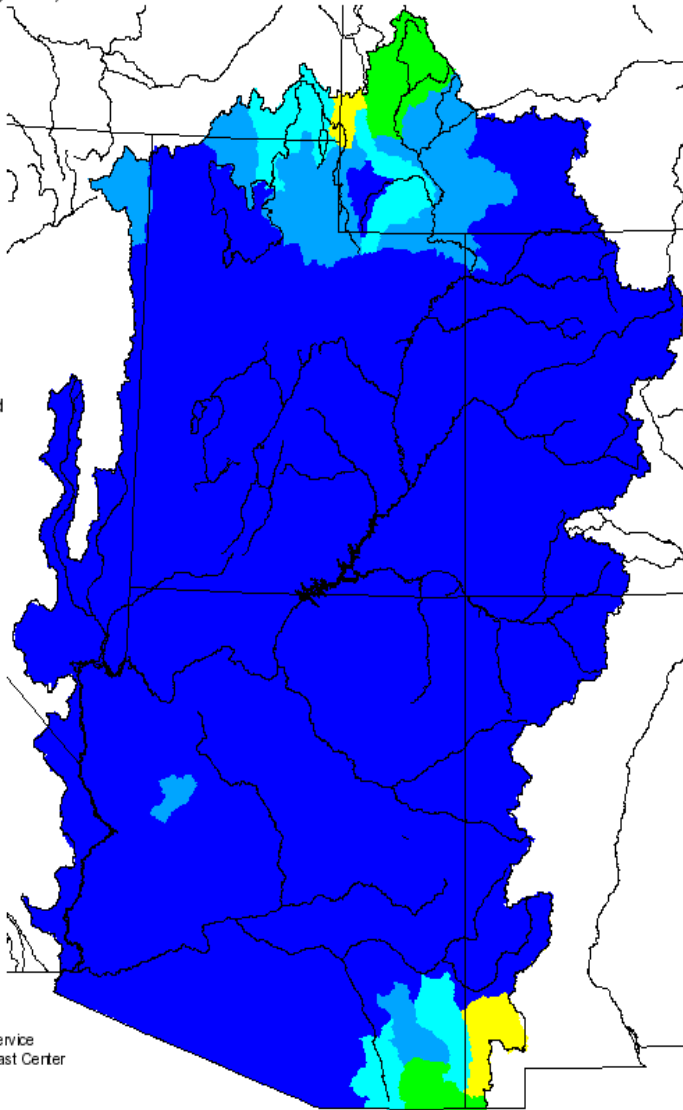
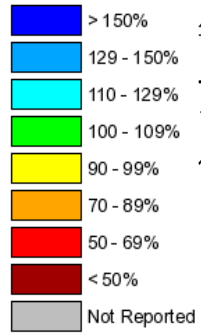
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Monthly Precipitation for December 2007

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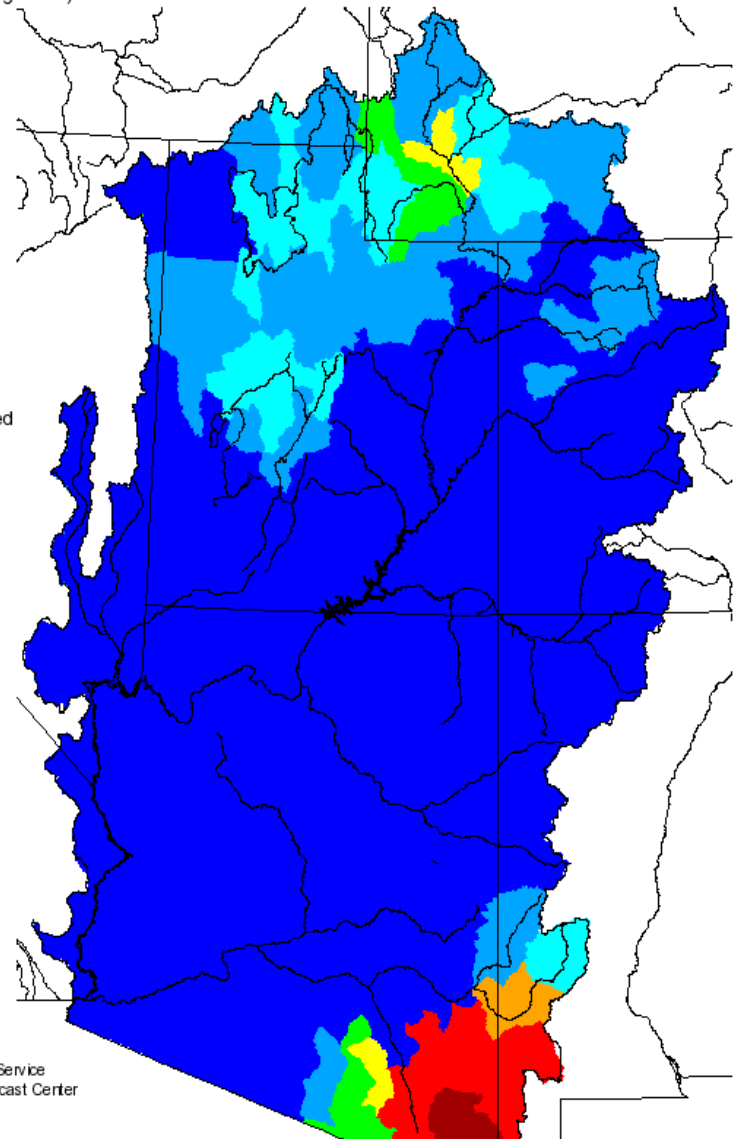
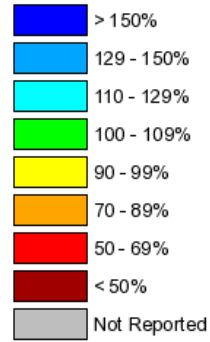


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Monthly Precipitation for December 2008

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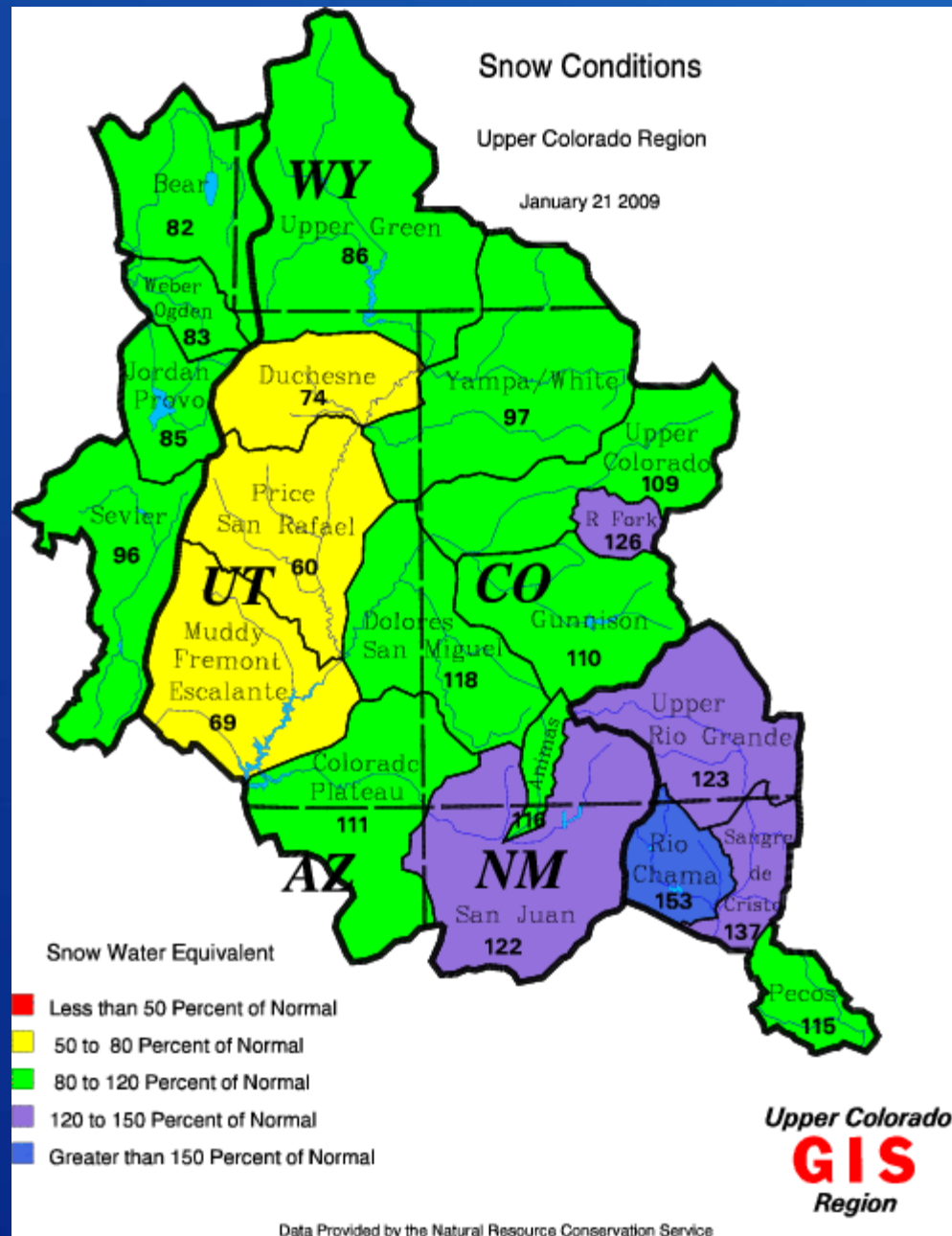


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Salt Lake City, Utah
www.cbrfc.noaa.gov

Snow Conditions

Upper Colorado Region

January 21 2009



Data Provided by the Natural Resource Conservation Service

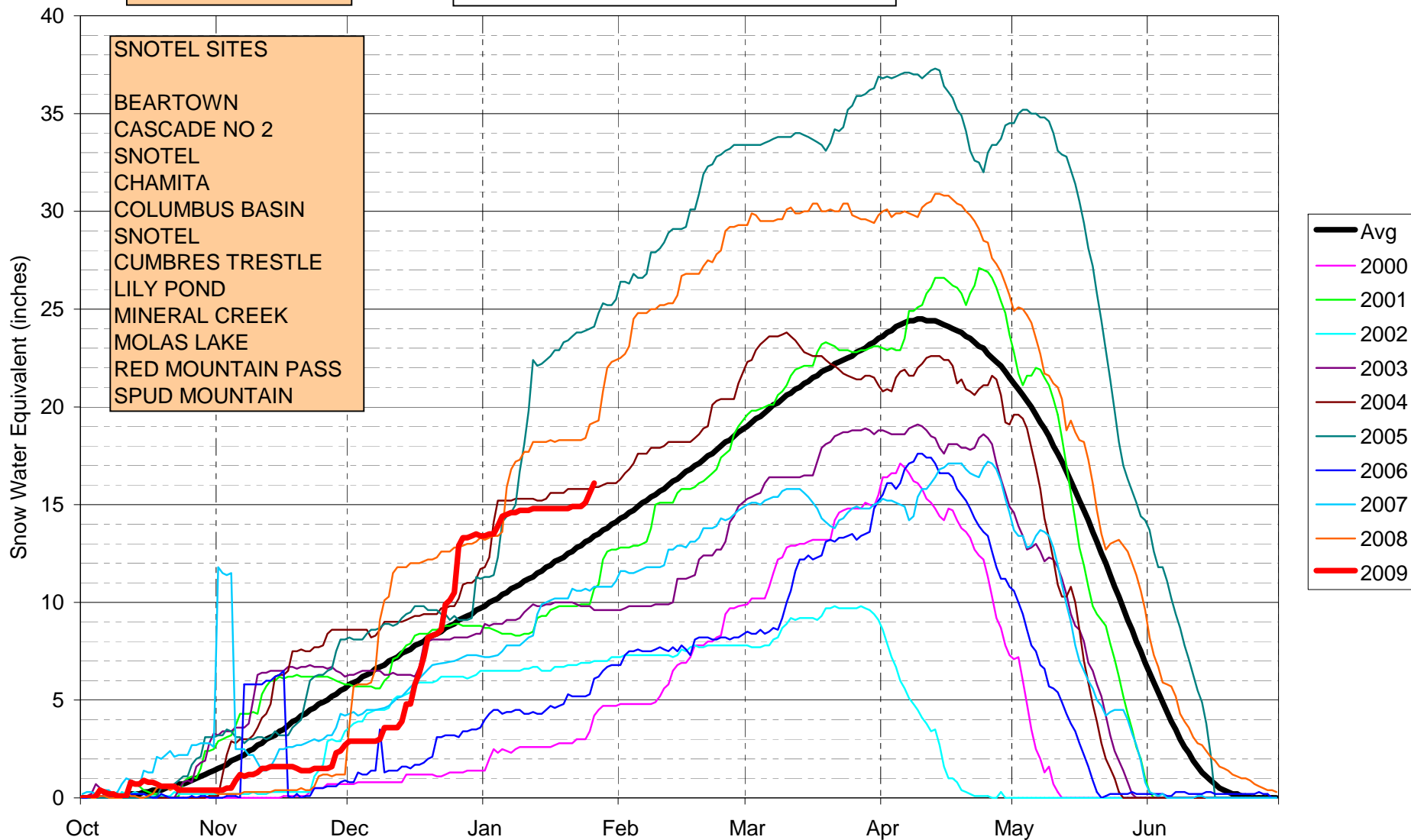
Upper Colorado
GIS
Region

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San Juan Basin Multiple Station Snotel Plot

January 26, 2009

Current Snowpack is $(16.1/13.1) = 123\%$ of Average



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Water Year 2009 (as of 1/26/2009)

Navajo Inflows & San Juan Basin Snowpack

EOM	Inflow (af)	% Average	SJ SWE (in.)	% Average
October	34,188	68%	0.4	20%
November	16,996	48%	2.7	44%
December	16,311	69%	13.4	135%
January (Current)	13,307	84%	16.1	123%



Water Year 2009 Forecasts

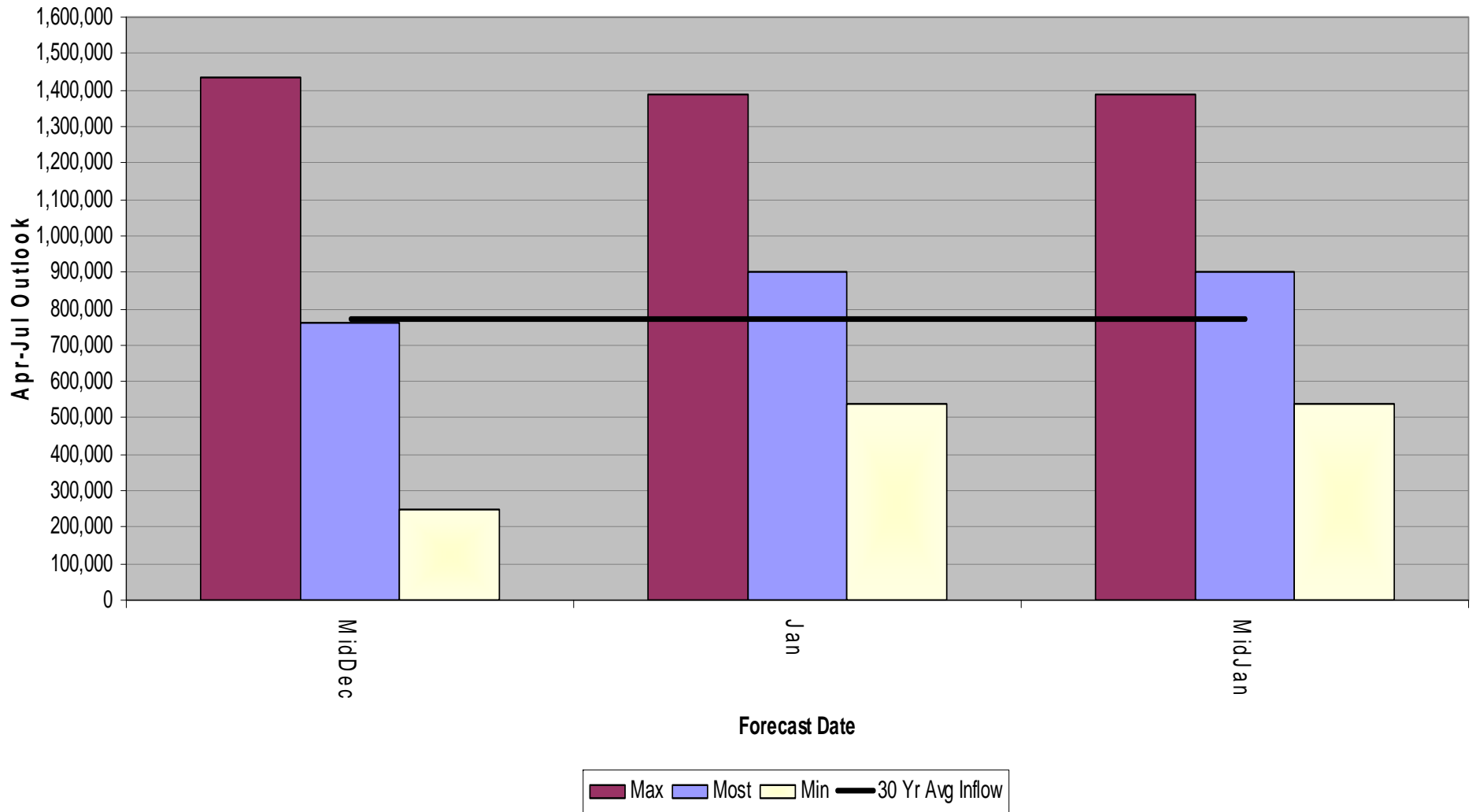
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Mid January 2009 Forecast Navajo Reservoir Unregulated April-July Inflow Volume

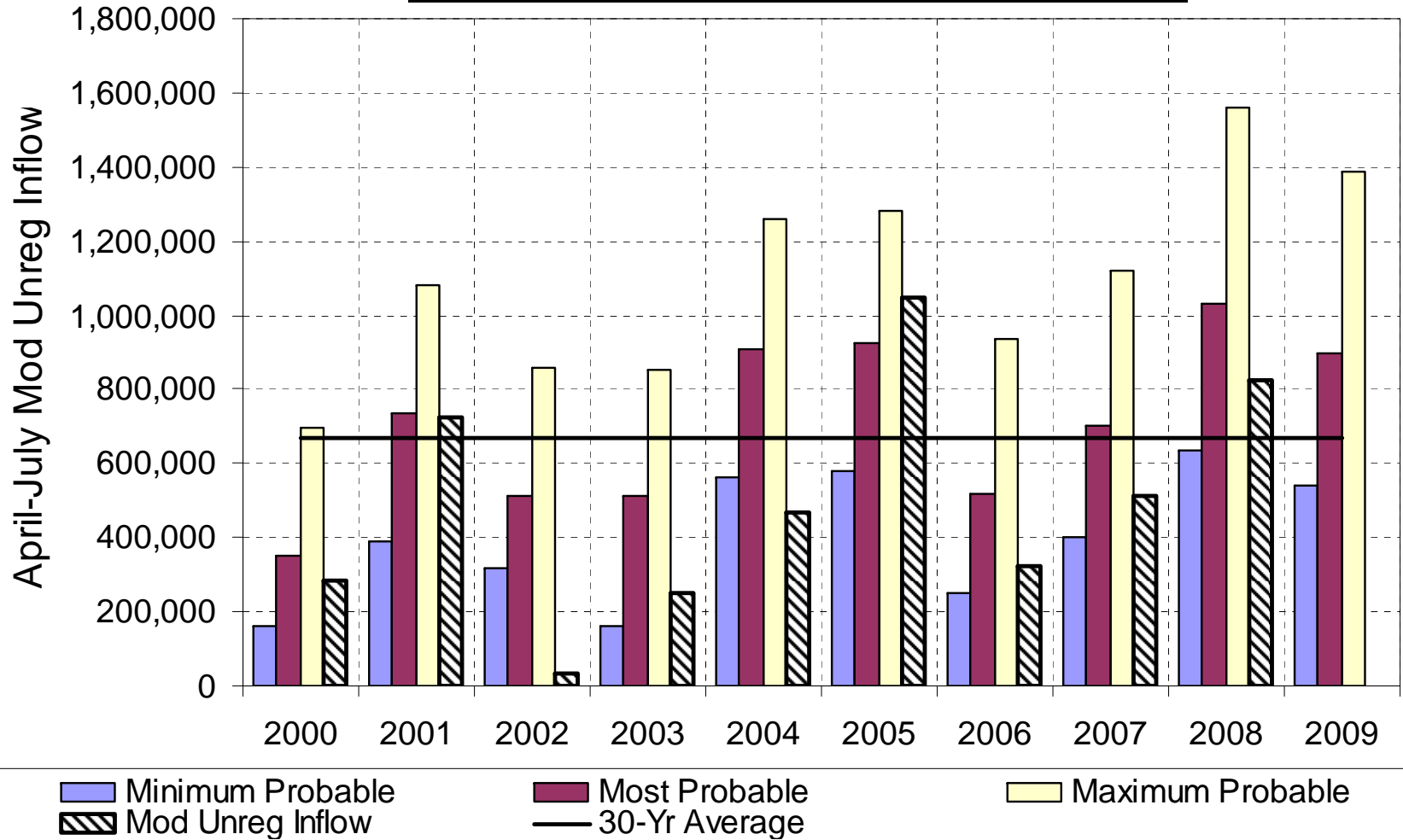
	Inflow (af)	% of Average	2008 Forecast
Most Probable	900,000	117%	1,030,000 (133%)
Minimum Probable	540,000	70%	635,000 (82%)
Maximum Probable	1,390,000	180%	1,560,000 (202%)

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WY2009 CBRFC - Navajo Reservoir Most, Max and Min Inflow Forecasts (acre-feet)



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



Water Year 2009 Operations

- For WY2009, the reservoir is at a more manageable elevation to handle variable conditions and large fluctuations in the forecast
- 500 cfs base release until Spring Peak Release
- Under the current Most Probable Forecast, the Maximum Hydrograph as defined by the Flow Recommendations will be released.
- It is only January, and a lot can still change!

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2009 Spring Release Decision Tree Values Based on the MidJan Forecast for the Most, Minimum and Maximum Probable Inflows

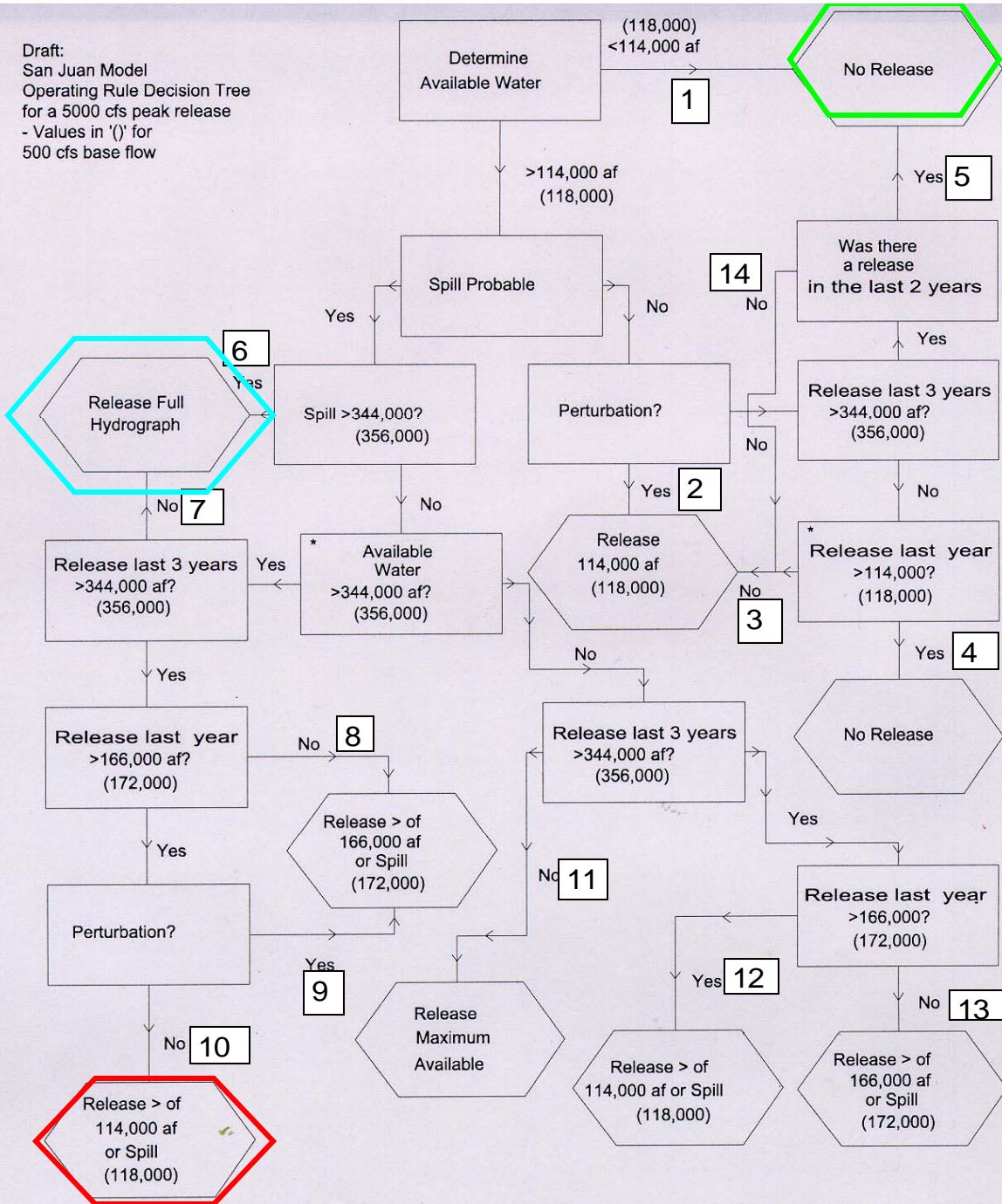
Flow Chart Parameters	Most Probable	Minimum Probable	Maximum Probable
1 *Available Water (acre-feet):	783,000	377,000	1,333,000
2 **Spill (acre-feet):	82,000	(324,000)	631,000
3 Fish Releases: 2006 140,000 (acre-feet) 2007 233,000 (acre-feet) 2008 744,000 (acre-feet)			
4 Was there a perturbation? No			
5 Spring Release Volume (acre-feet) (above the base flow)	118,000	-	356,000

* Available Water = Predicted Inflow + Available Storage - NIIP Diversions - EVAP - Base Release
 where: Available Storage = End of March Storage - Minimum Carryover Storage (1,000,000 af)

** Spill = Predicted inflow - NIIP Diversions - Base Release - EVAP - Remaining Storage
 (Set to zero if computed value goes negative)

where: Remaining Storage = Maximum Content (Elev 6082) - End of March Content

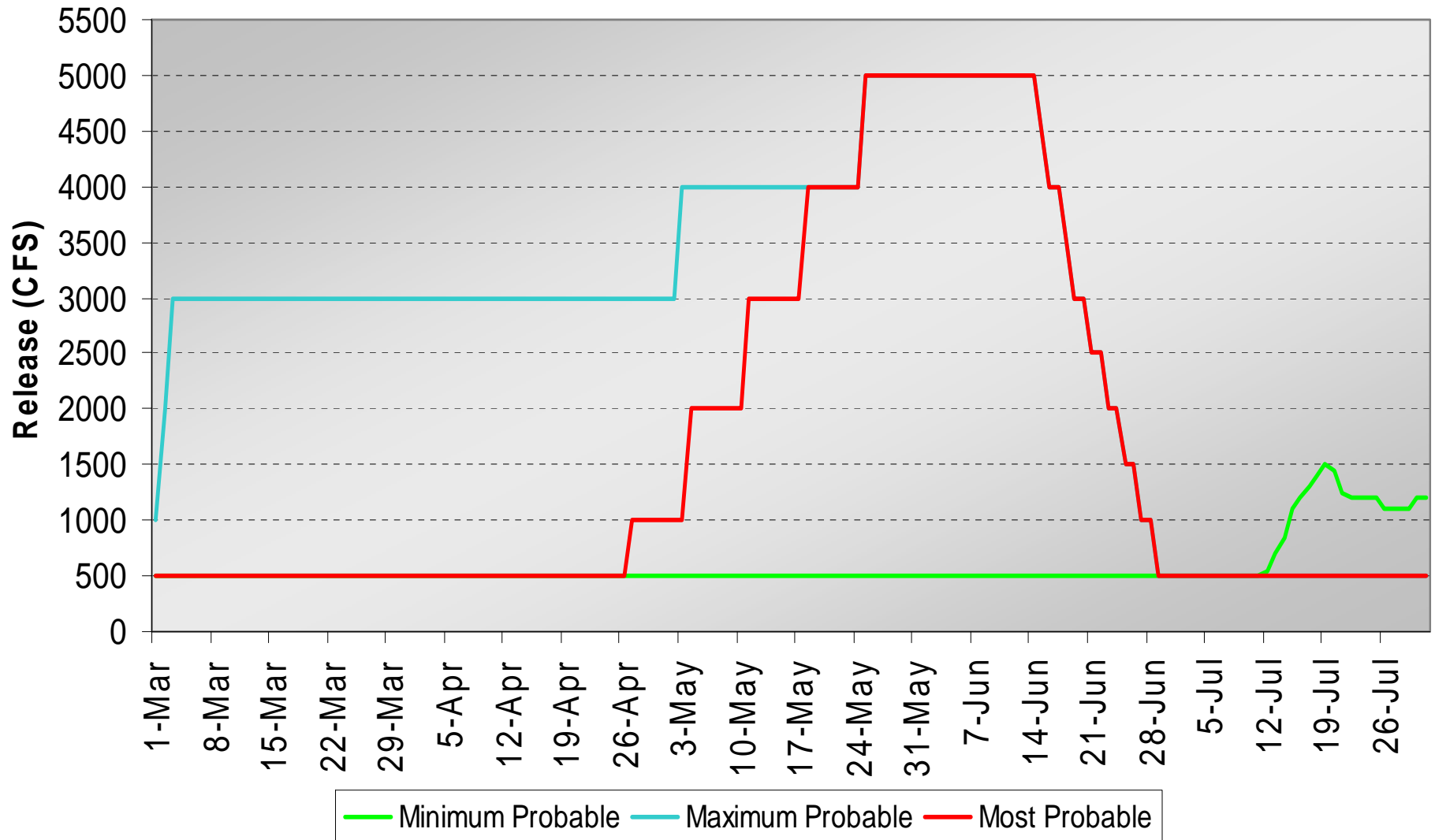
Draft:
 San Juan Model
 Operating Rule Decision Tree
 for a 5000 cfs peak release
 - Values in '()' for
 500 cfs base flow



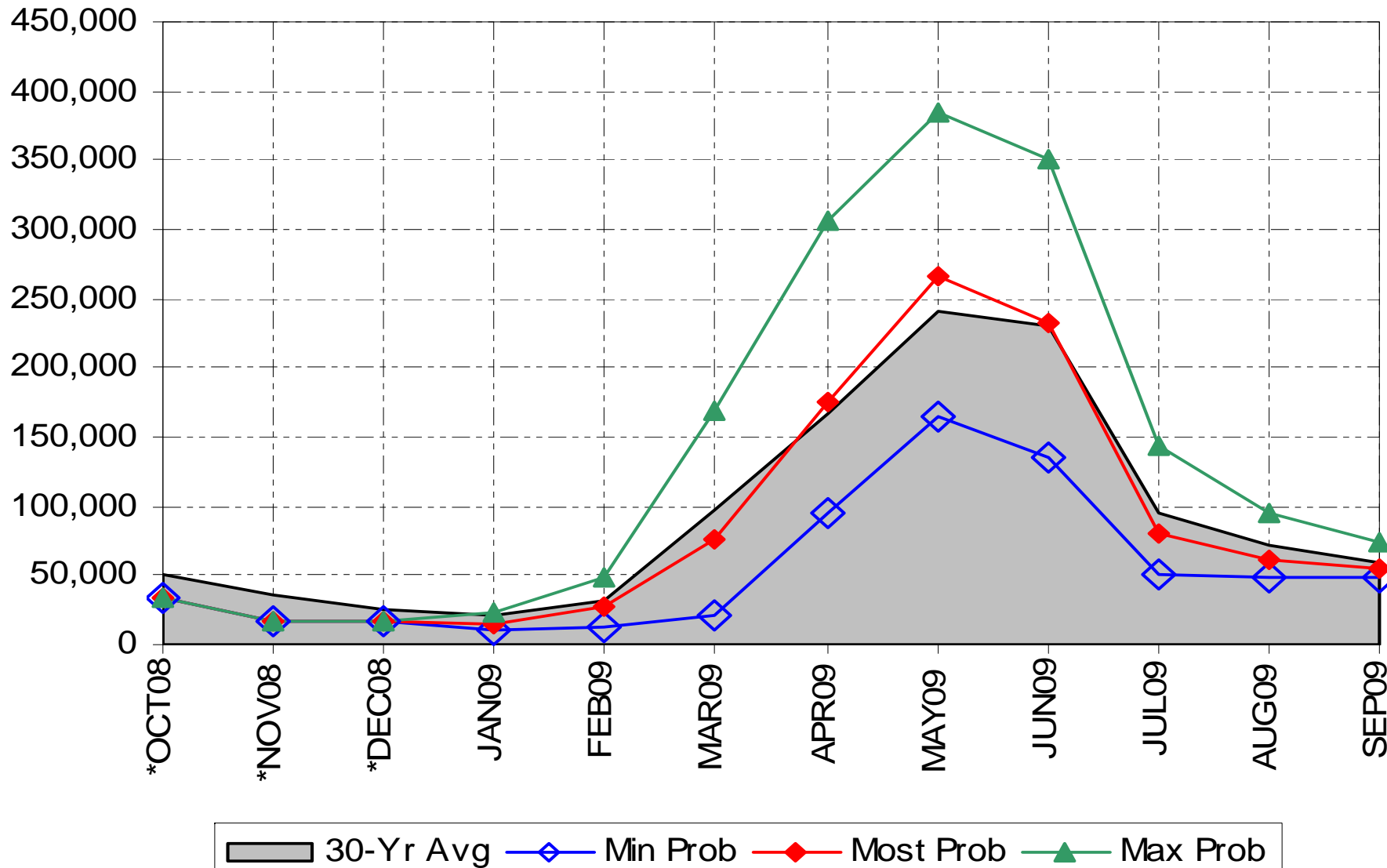
AVAILABLE WATER	PATH
Min Prob: 377,000 af	#5
Most Prob: 783,000 af	#10
Max Prob: 1,333,000 af	#6

MATION

Spring Peak Hydrographs for WY2009 as of the January Mid Month Forecast

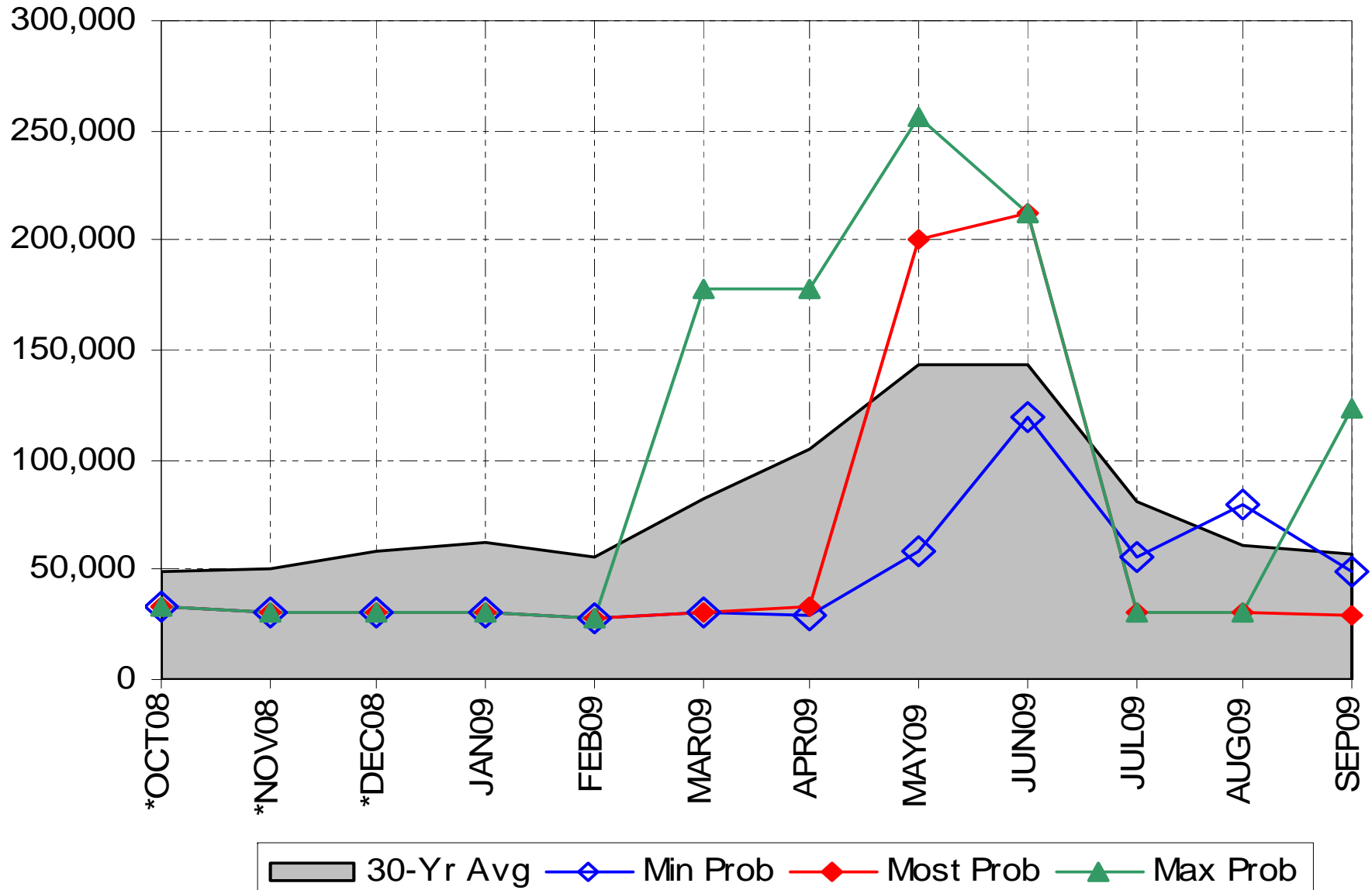


Inflow (af) as of January 2009 Mid Month Forecast



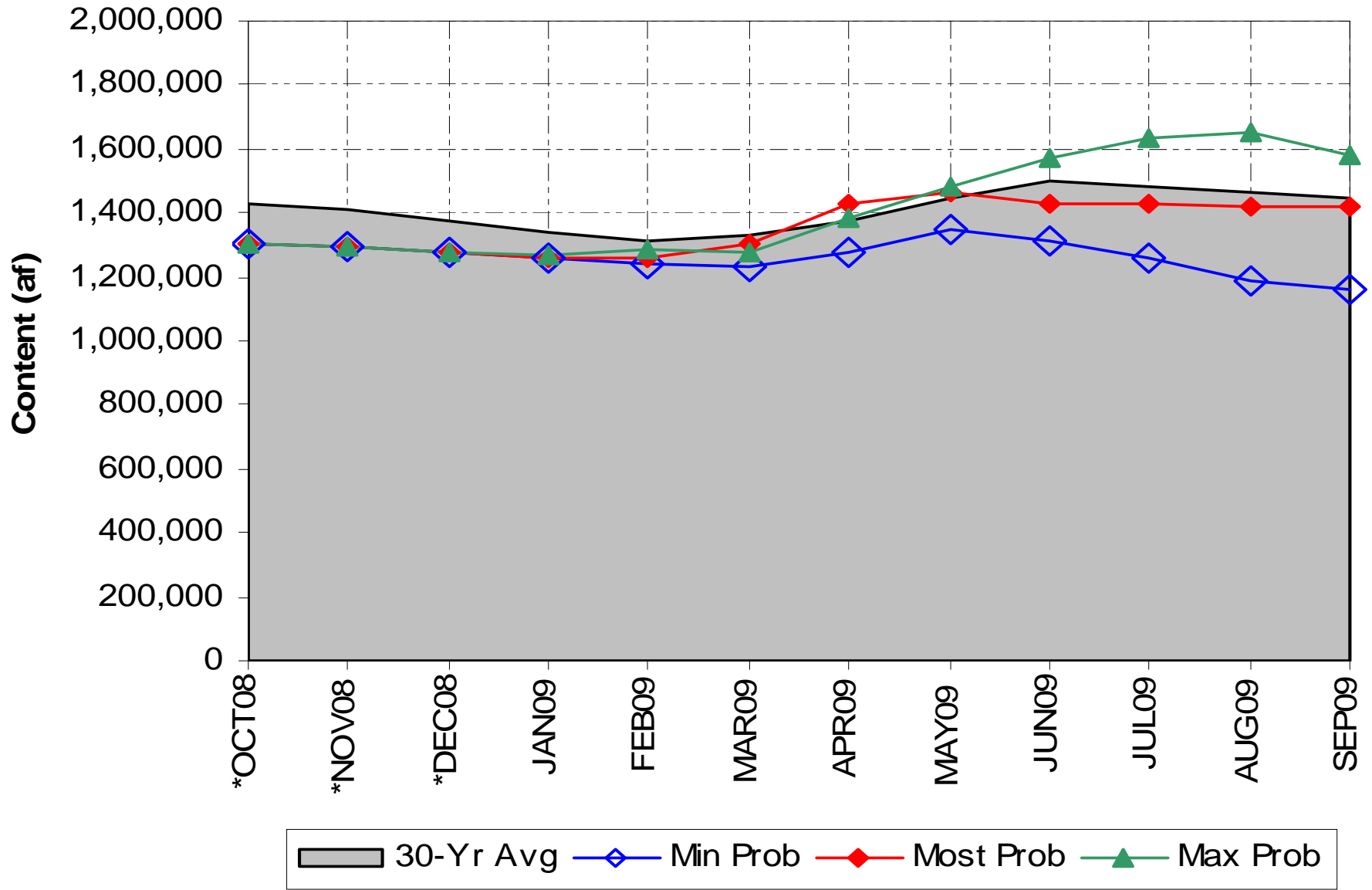
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Release (af) as of January 2009 Mid Month Forecast



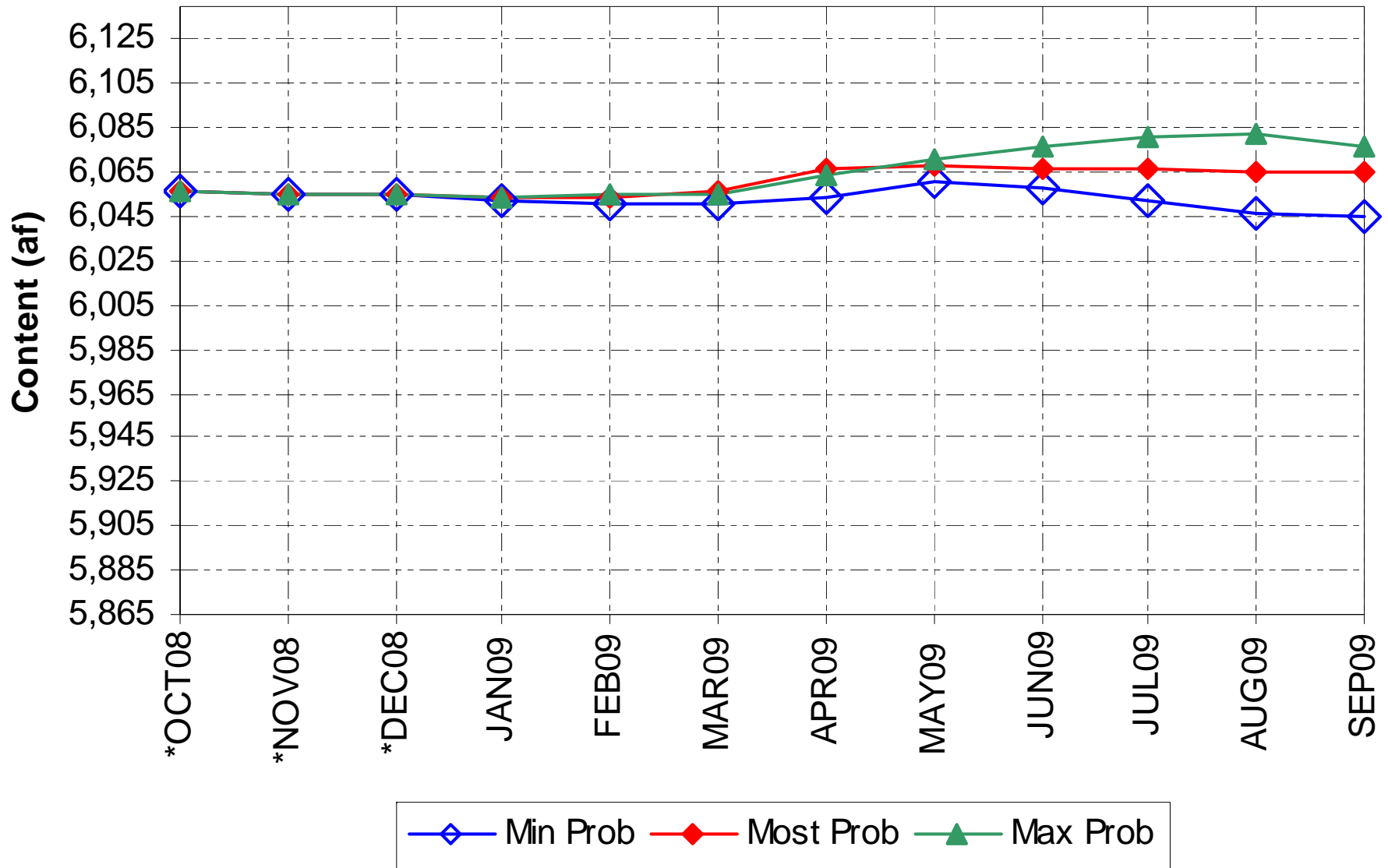
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Content (af) as of January 2009 Mid Month Forecast



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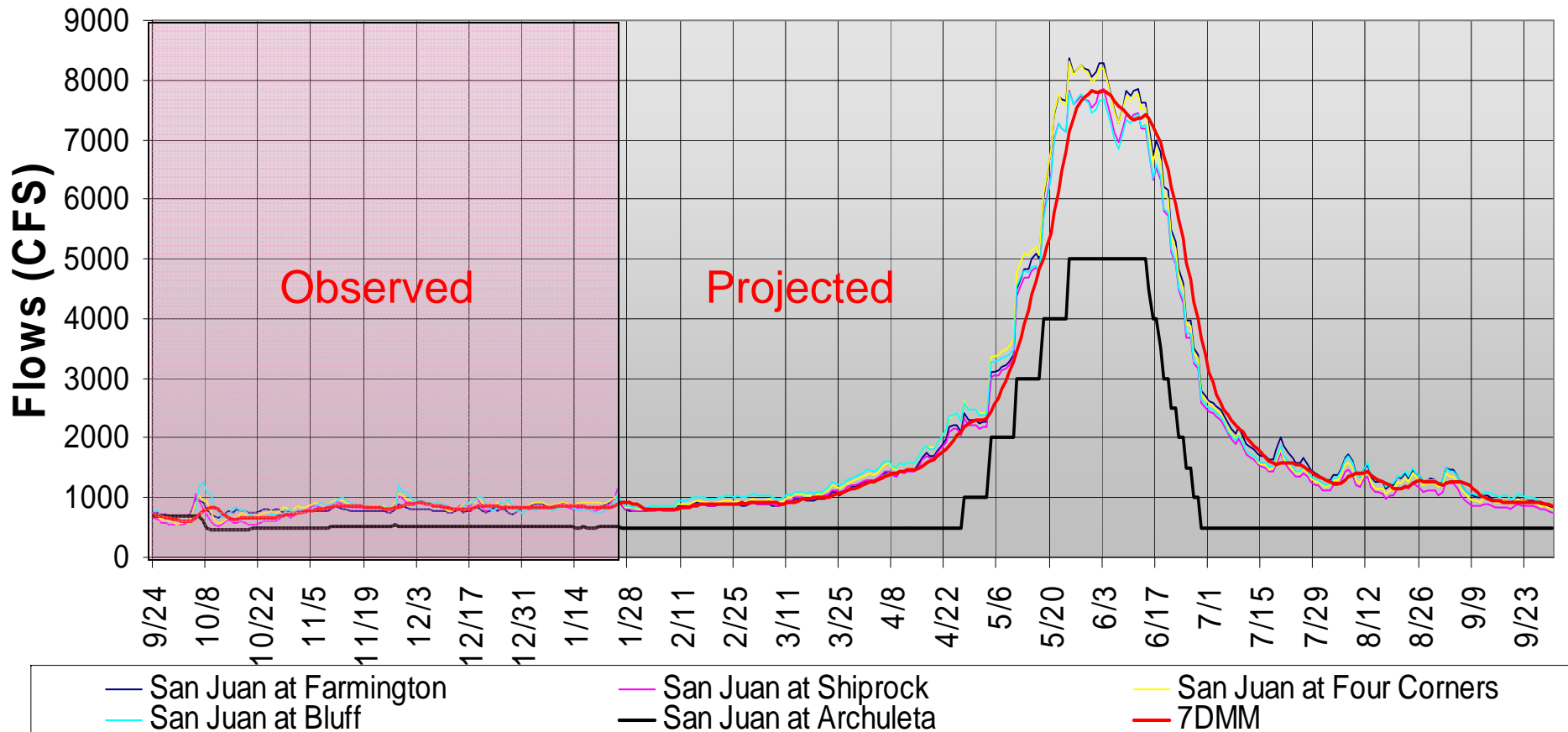
Elevation as of January 2009 Mid Month Forecast



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San Juan River Downstream Flows

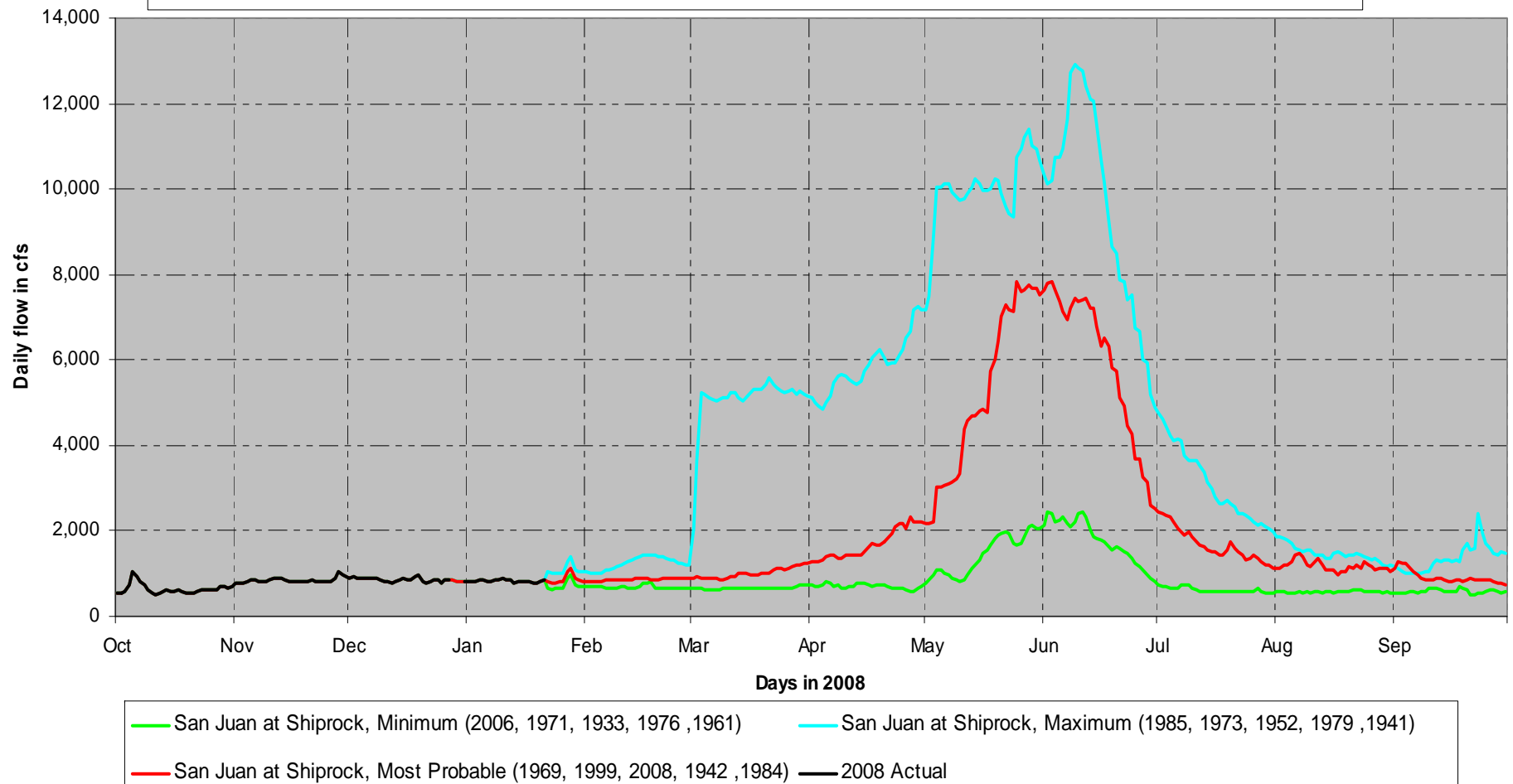
San Juan Flows based on Most Probable Navajo Release
and Animas @ Farmington Flows as of 1/26/2009



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San Juan River at Shiprock

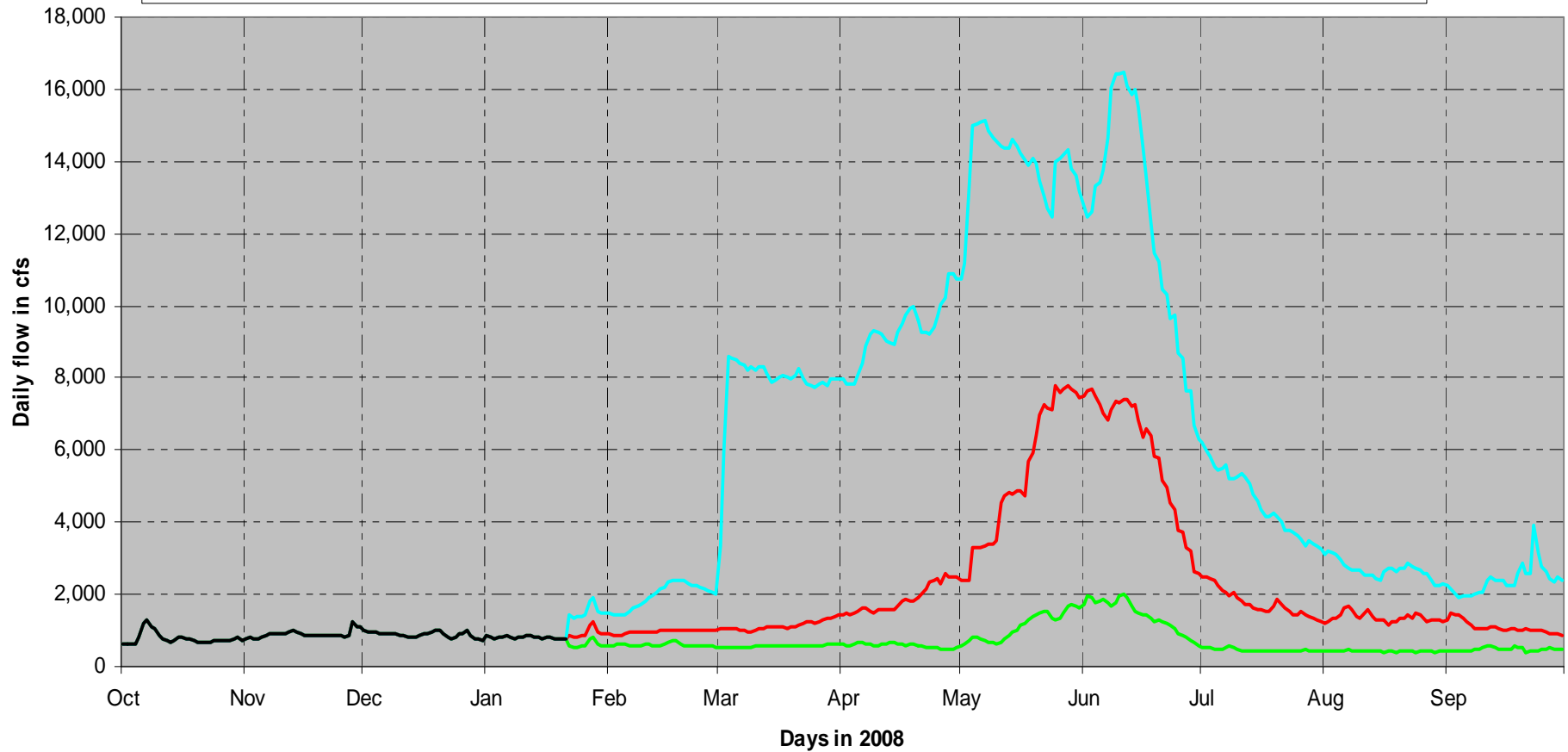
Based on the Jan Mid Month Forecast , Estimate of the San Juan River at Shiprock, Representative Daily Historic Flows



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San Juan River at Bluff

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



San Juan at Bluff, Minimum (2006, 1971, 1933, 1976 ,1961)

San Juan at Bluff, Most Probable (1969, 1999, 2008, 1942 ,1984)

San Juan at Bluff, Maximum (1985, 1973, 1952, 1979 ,1941)

2008 Actual

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An aerial photograph of a river system. A dam is visible in the upper portion of the image, with a road crossing it. The river flows through a valley with some green vegetation along its banks and a more arid, hilly landscape in the foreground and background. The text "Current Conditions" is overlaid in the center of the image.

Current Conditions

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Navajo Reservoir Current Conditions

(as of 1/26/09)

Elevation = 6053.46 (94% of Average)

Storage = 1,266,774 af (74% Full)

Inflow = 524 cfs

Release = 500 cfs

NIIP = Not currently diverting water

San Juan-Chama Diversion = 1.2 cfs

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Nearby Reservoirs

(1/26/2009)

Vallecito

- Elevation = 7644.2 (59% Full, 118% of average)
- Storage = 73,400 af
- Release = 40 cfs
- Inflow = 96 cfs

Lemon

- Elevation = 8106.2 (46% Full, 86% of average)
- Storage = 18,107 af
- Release = 11 cfs
- Inflow = 15 cfs

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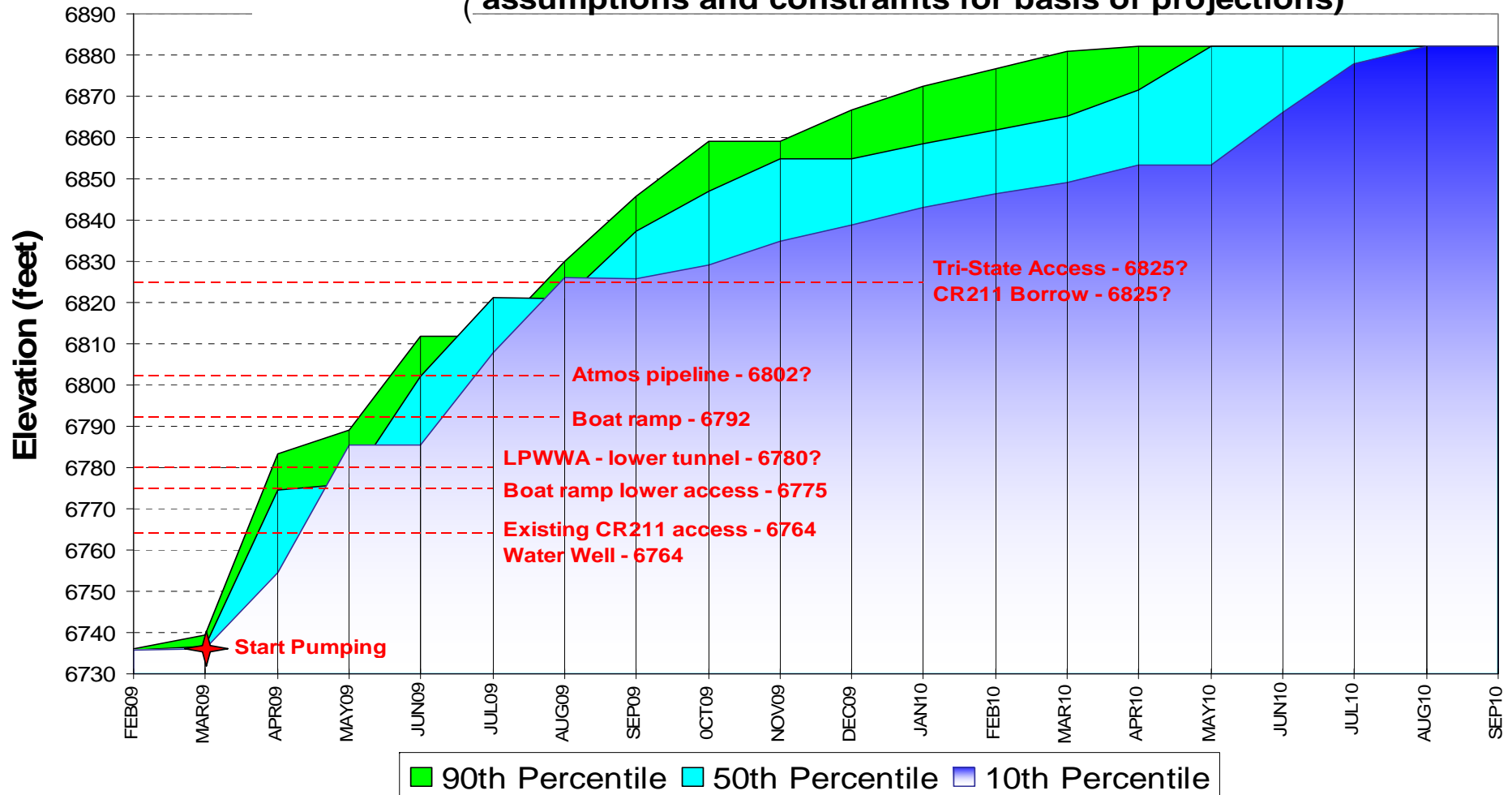
Animas-La Plata Project

- The project is 66% complete
- Testing of pumps to begin soon
- First Fill is scheduled to begin March 1st, 2009
- Navajo Nation Municipal Pipeline is currently under construction

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Animas-La Plata Project

Projected First Fill Schedule
 based on the January 09 Final Forecast
 (assumptions and constraints for basis of projections)



An aerial photograph of the San Juan River. The river flows from the top left towards the bottom right. In the center, there is a dam with water cascading over it. The surrounding landscape is a mix of green shrubs and brown, arid hills. The text is overlaid on the image in a stylized, yellow, bubbly font with a blue outline.

*Recommendations
for the San Juan River
Operation and Administration*

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Navajo Dam Maintenance Activities

Routine Maintenance

- Hydraulic system valve work
- Left abutment drainage
- Instrumentation system
- Tunnel cleaning
- Spillway cleaning
- Vegetation removal
- Shop maintenance
- Road maintenance
- Tunnel lighting

Navajo Outlet Works Inspections

- Required with releases > 3400 cfs
- Auxiliary outlet works – every 15 days
(max release cut to 3400 cfs)
- Main outlet works – every 30 days
(max release cut to 1600 cfs)
- Duration between inspections may be slightly less to avoid weekends, holidays

Future Navajo Dam Maintenance Activities

- Muck-out Stilling Basin (late 2009/10)
- Replace Bolts on Penstocks (2010)



Fish & Wildlife Service
San Juan RIP Update

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Reports from other Agencies

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Questions from the Audience

???



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How You Can Access Information



Bureau of Reclamation
www.usbr.gov/uc

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

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

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Summary

- WY2008 had highly variable conditions (dry/wet/dry)
- For WY2009, the reservoir is at a more manageable elevation to handle variable conditions and large fluctuations in the forecast
- Forecasts are very preliminary!
- Most Probable April – July Inflow Forecast is 116% of average
- A Maximum Fish Spring Hydrograph is anticipated to be released under the Most Probable Forecast (21 days @ 5000 cfs)
- Required Gate Inspections will continue at releases >3000 cfs
- Likely Minimum (Base) Release = 500 cfs
- Target Baseflow is 500 -1000 cfs in Critical Habitat

- Next Operations Meeting: April ?, 2009

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An aerial photograph of a large dam and hydroelectric power plant. The dam is a long, concrete structure with water cascading over its spillways. Below the dam, there is a powerhouse with several large, rectangular buildings and a complex of electrical transmission towers and lines. The surrounding landscape is arid and hilly, with sparse vegetation. The text "Thanks For Coming!" is overlaid in a large, bold, orange-to-yellow gradient font with a white outline.

Thanks For Coming!

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