RECLAMATION

Managing Water in the West

Navajo Unit Operations
April 20, 2011
Coordination Meeting

U.S. Department of the Interior
Bureau of Reclamation

Agenda

- Welcome
- Special Presentation – Colorado River Basin 24-mo Study
- Review of Water Year 2011 Operations (to date)
- Water Year 2011 Current Conditions/Snowpack
- Water Year 2011 Forecasts & Proposed Operations
- Modeled Results of Operation Plan
- Nearby Projects Update
- 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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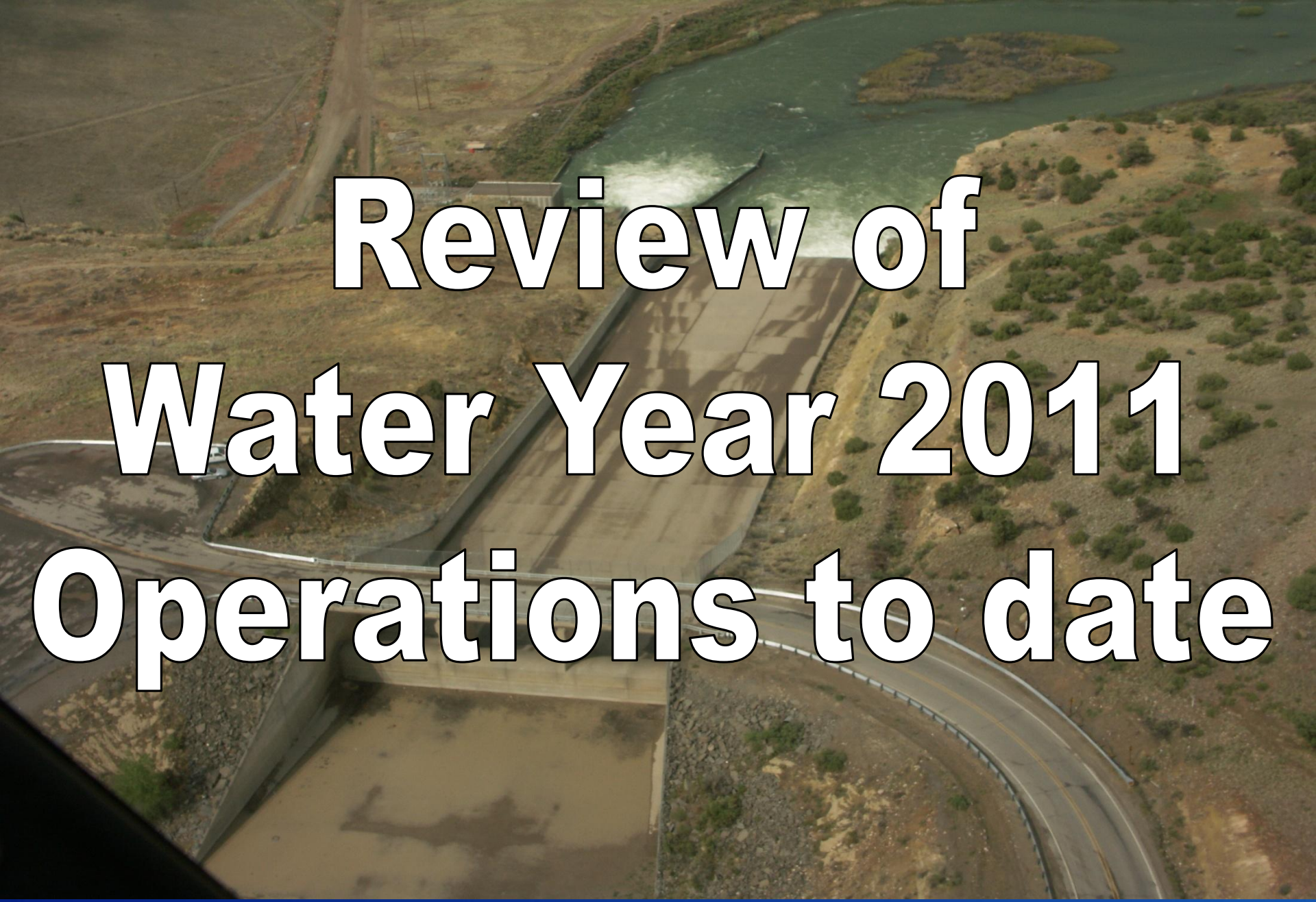
Review of Water Year 2011 Operations to date



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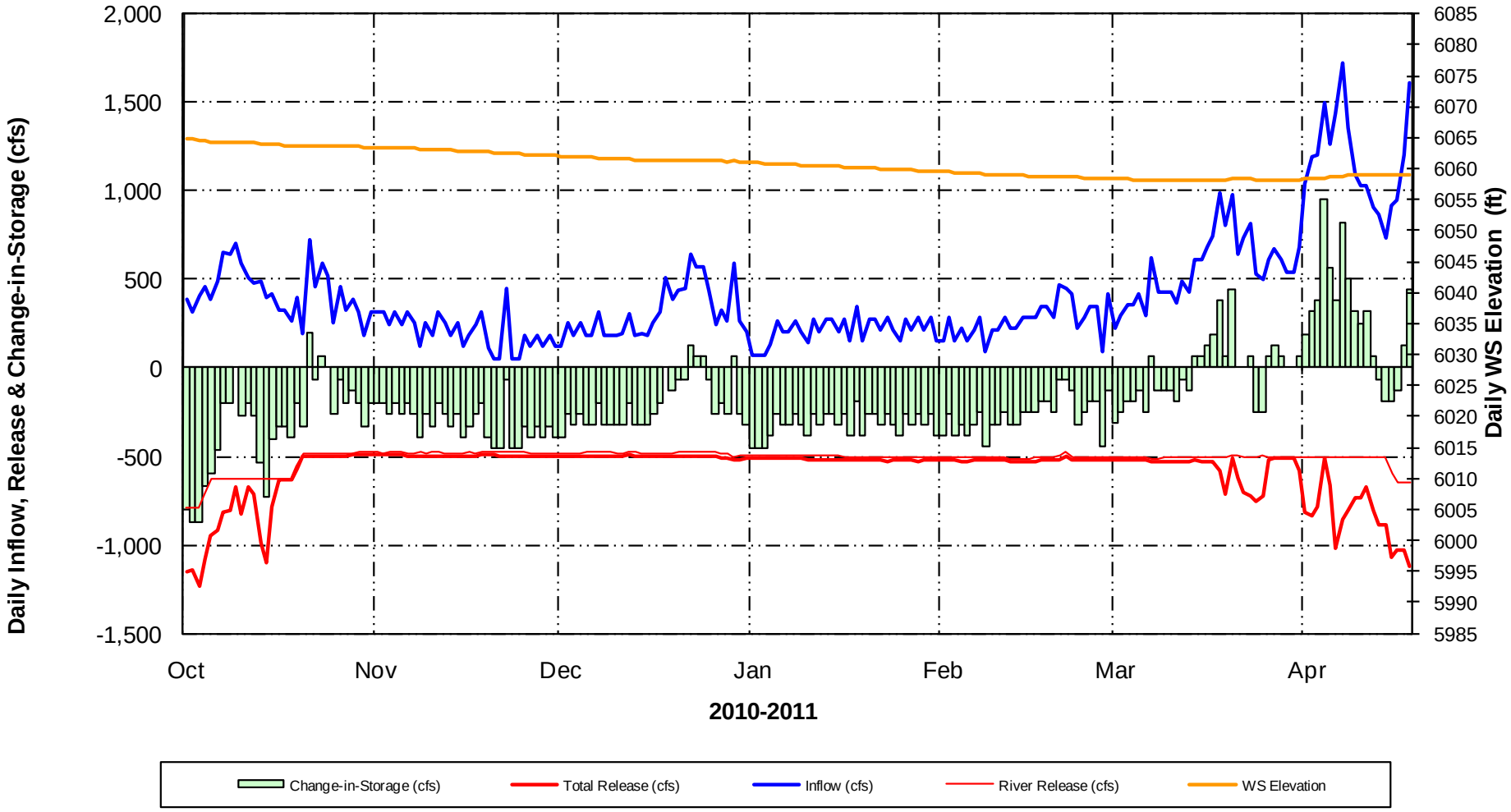
NAVAJO RESERVOIR OPERATIONS



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Navajo Current Conditions

(as of 4/18/11)

Elevation = 6059.1 (99% of Average)

Storage = 1,336,156 af (79% Full)

Inflow = 1611 cfs

Release = 500 cfs

NIIP = 480 cfs

SJ-Chama Diversion = 385 cfs

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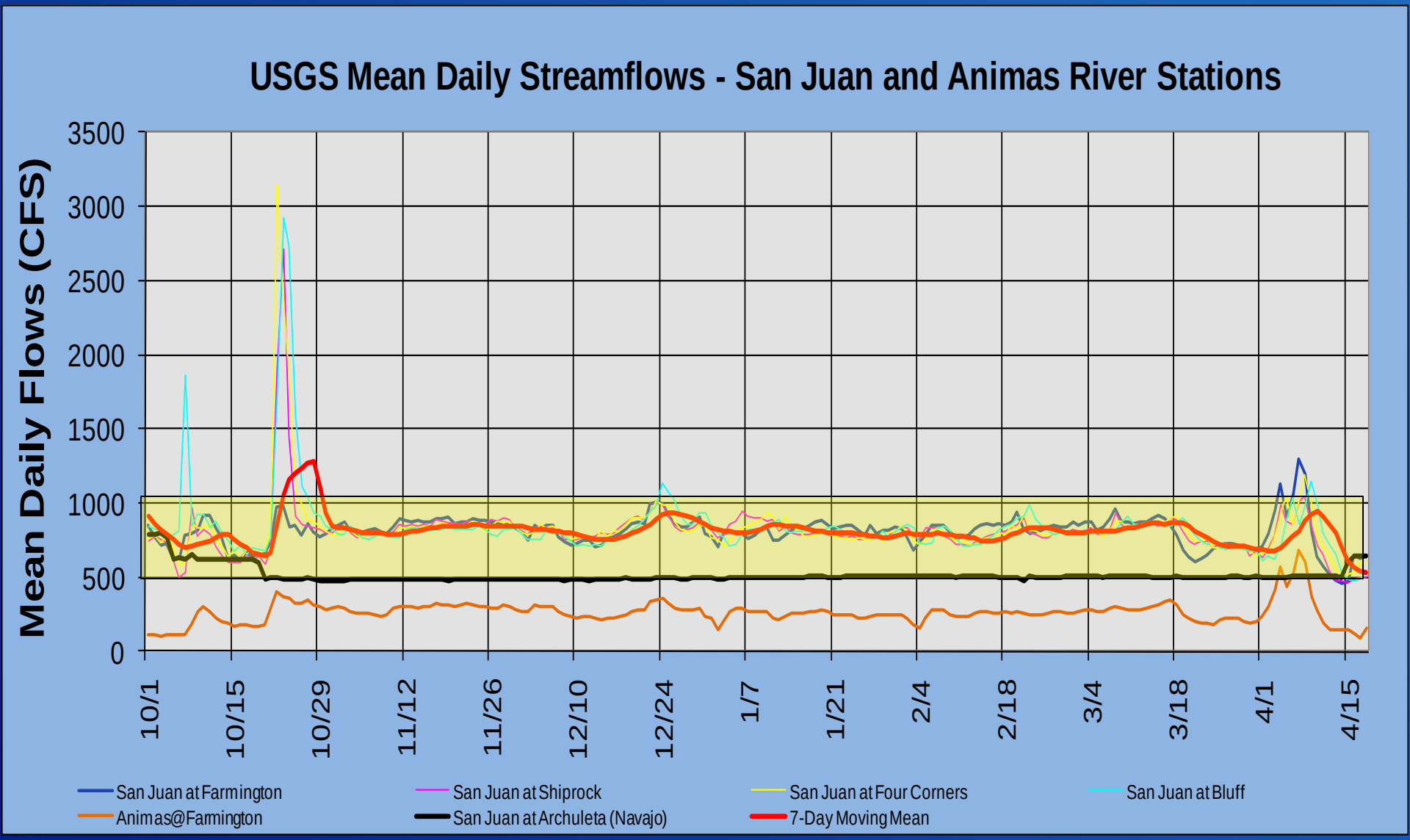
Downstream Flows



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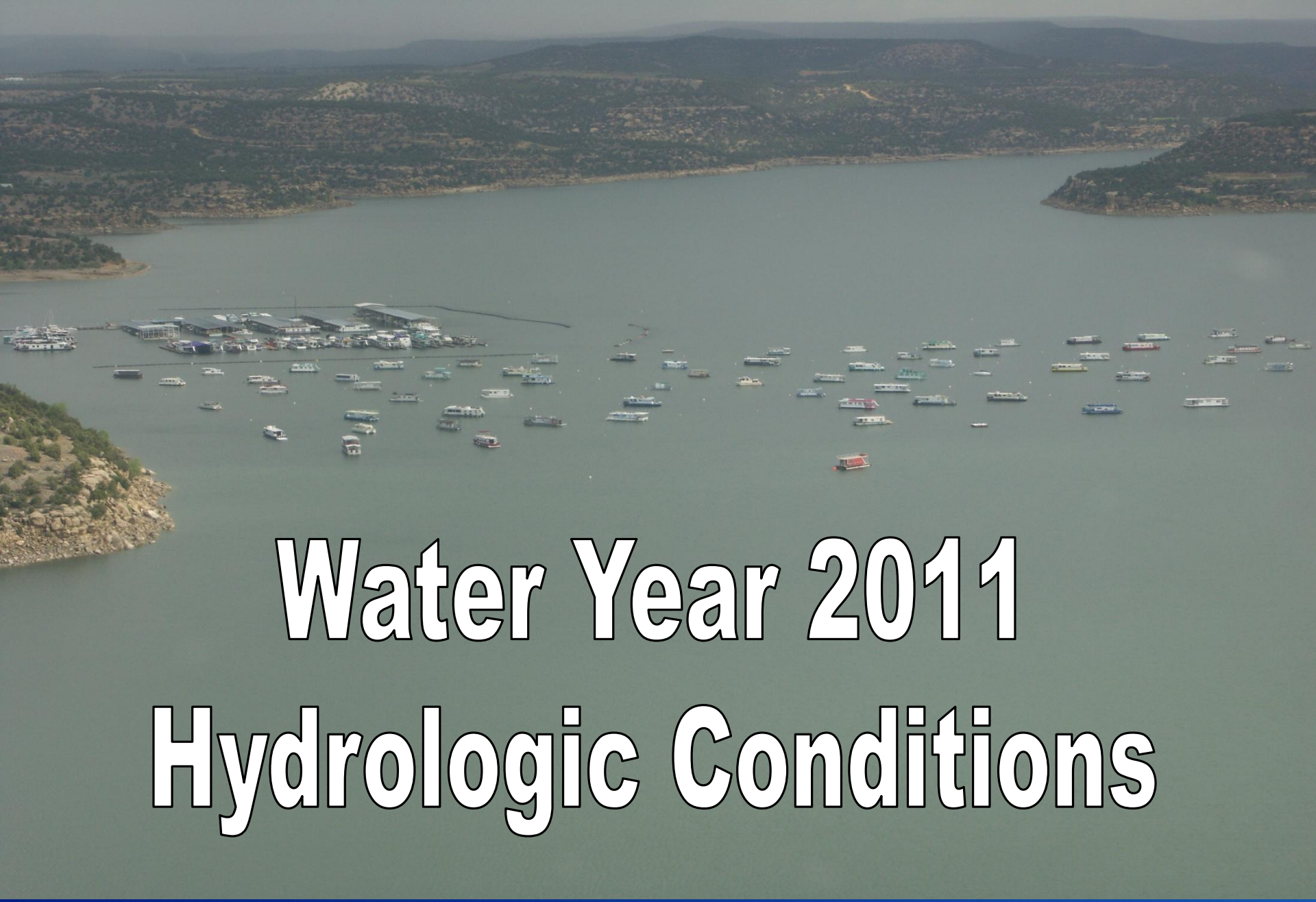

Water Year 2011 Hydrologic Conditions

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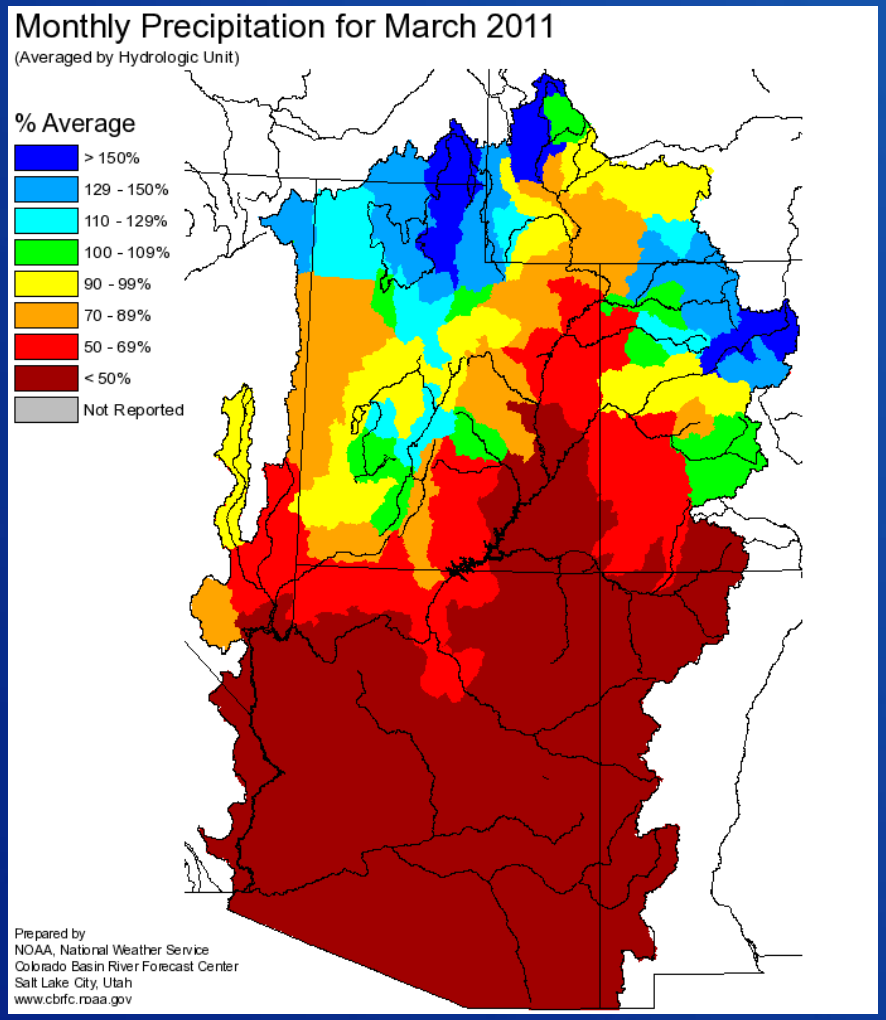

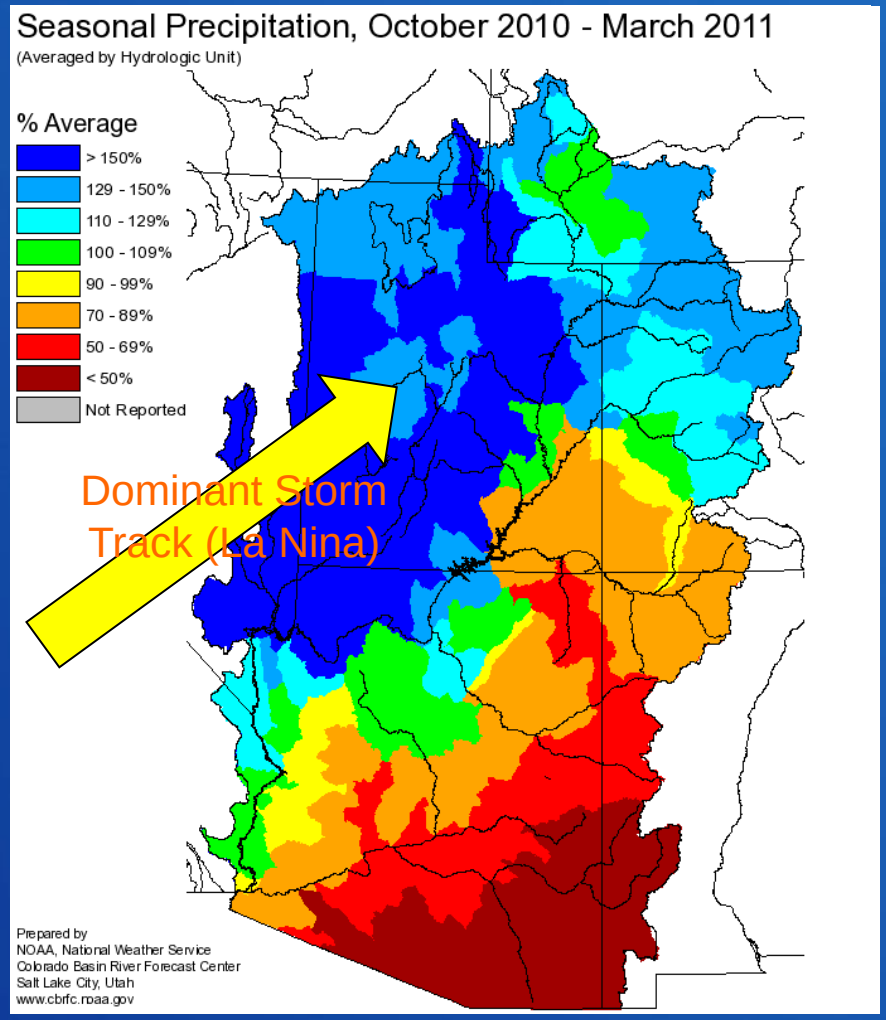

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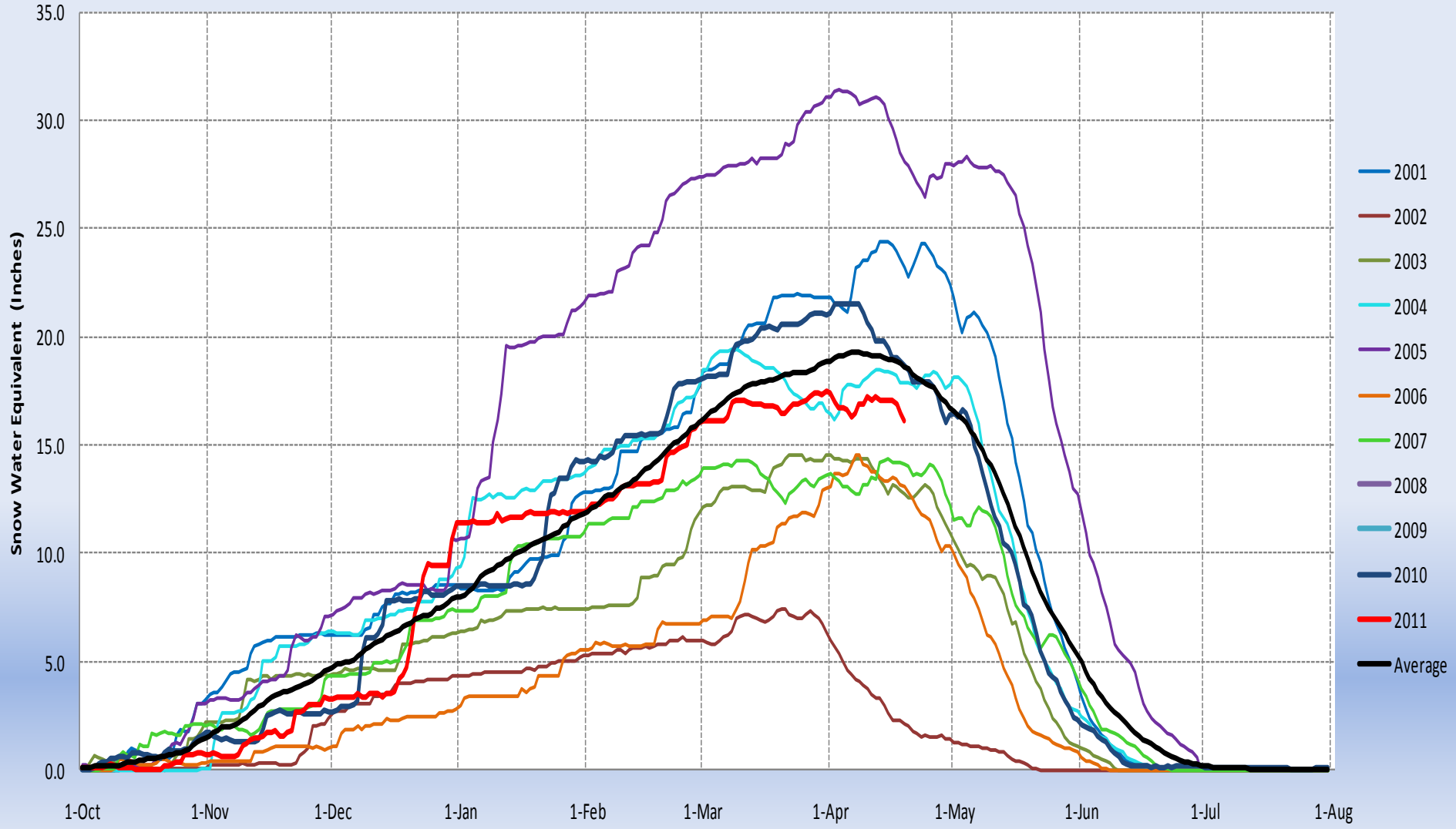
Navajo Reservoir SNOTEL SWE from 2001-2011



(as of 4/19/2011)

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Water Year 2011 (as of 4/19/2011)
Navajo Inflows & Snowpack above Navajo

EOM	Inflow (af)	% Average	Navajo SWE (in.)	% Average
October	26,460	52%	0.7	47%
November	12,096	37%	3.3	72%
December	18,987	78%	11.4	143%
January	13,096	63%	11.9	101%
February	15,094	50%	16.0	100%
March	34,577	38%	17.5	93%
April (Current Forecast)	67,562	47%	16.1	86%

Water Year 2011 Forecasts

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Mid-April 2011 Forecast
Navajo Reservoir Mod Unregulated
April-July Inflow Volume

	Inflow (af)	% of Average	2010 Forecast
Most Probable	550,000 (ESP=480,000)	75% (65%)	635,000 (84%)
Minimum Probable	395,000 (ESP=375,000)	54% (51%)	450,000 (60%)
Maximum Probable	725,000 (ESP=660,000)	98% (90%)	865,000 (114%)

2010 Actual = 652,000 acre-feet

NOTE: Colorado Basin RFC ESP Model Run Date was 4/12/2011

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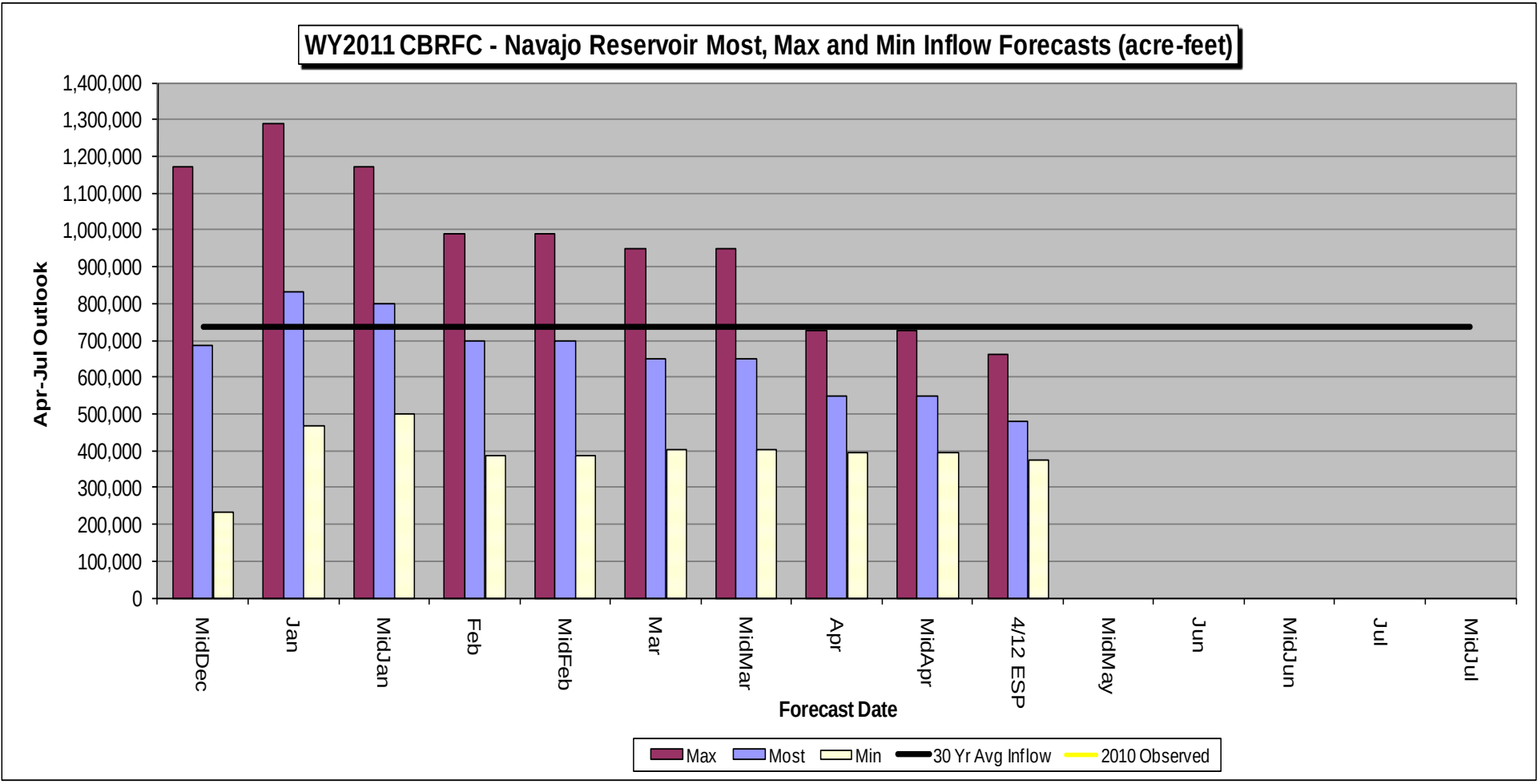
WY2011 CBRFC - Navajo Reservoir Most, Max and Min Inflow Forecasts (acre-feet)
Apr-Jul Outlook
1,400,000
1,300,000
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
MidDec
Jan
MidJan
Feb
MidFeb
Mar
MidMar
Apr
MidApr
4/12 ESP
MidMay
Jun
MidJun
Jul
MidJul
Forecast Date
Max
Most
Min
30 Yr Avg Inflow
2010 Observed

Comparing the current snowpack to year's past & the resultant April-July inflow observed:

86%	2002	1990	2000	1996	1988	2003	2006	2007	1999	Current
	2.1	12.4	11.5	12.6	12.5	12.7	13.1	14.1	16.1	**16.10**
Percentile of Historical Record	0%	8%	4%	17%	13%	21%	25%	29%	33%	33%
Rank (Wettest)	25	23	24	21	22	20	19	18	16	16
Rank (Driest)	1	3	2	5	4	6	7	8	10	10
Modified Unregulated April-July Inflow	36,741	552,470	326,843	275,589	472,055	306,809	378,589	593,479	754,853	550,000
Total April-July Mod Unreg Inflow on this Date	26,548	42,512	78,496	37,832	81,060	36,848	62,790	75,795	51,087	41,702
Total April-July Mod Unreg Inflow Remaining	10,193	509,959	248,348	237,757	390,995	269,961	315,799	517,684	703,766	508,298
Observed as a percent of April-July Total	72%	8%	24%	14%	17%	12%	17%	13%	7%	8%

1992	2004	1994	2010	1989	1991	1998	2009	2001	1995	2008	1987	1997	2005	1993
17.1	17.9	17.6	18.7	18.9	19.3	20.1	20.6	23.2	26.4	27.6	27.6	27.4	28.1	29.7
42%	50%	46%	54%	58%	63%	67%	71%	75%	79%	88%	88%	83%	96%	100%
15	13	14	12	11	10	9	8	7	6	3	3	5	2	1
11	13	12	14	15	16	17	18	19	20	23	23	21	24	25
803,651	532,747	715,458	653,418	470,125	680,093	641,825	657,267	826,273	1,141,609	977,548	1,208,662	1,022,287	1,184,293	1,135,466
137,618	109,428	68,219	126,774	119,410	132,782	63,826	49,947	88,012	89,880	138,536	162,685	77,388	163,701	146,173
666,033	423,319	647,239	526,643	350,714	547,311	577,999	607,320	738,261	1,051,729	839,012	1,045,977	944,899	1,020,592	989,294
17%	21%	10%	19%	25%	20%	10%	8%	11%	8%	14%	13%	8%	14%	13%

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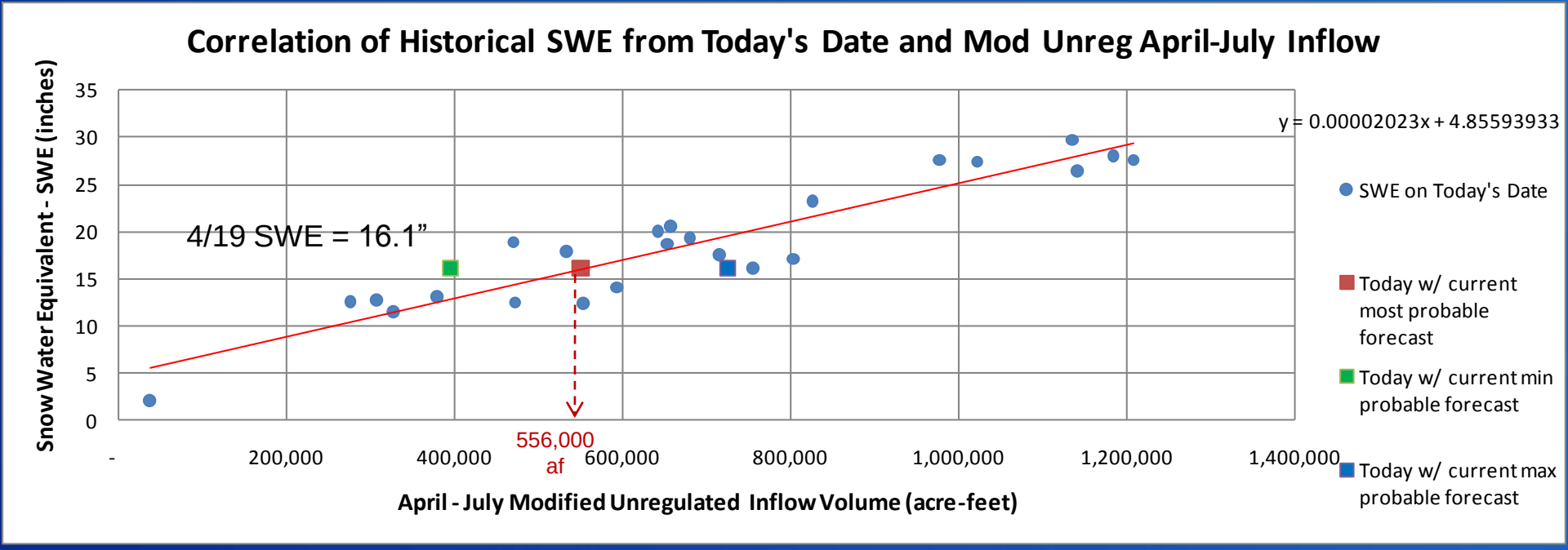
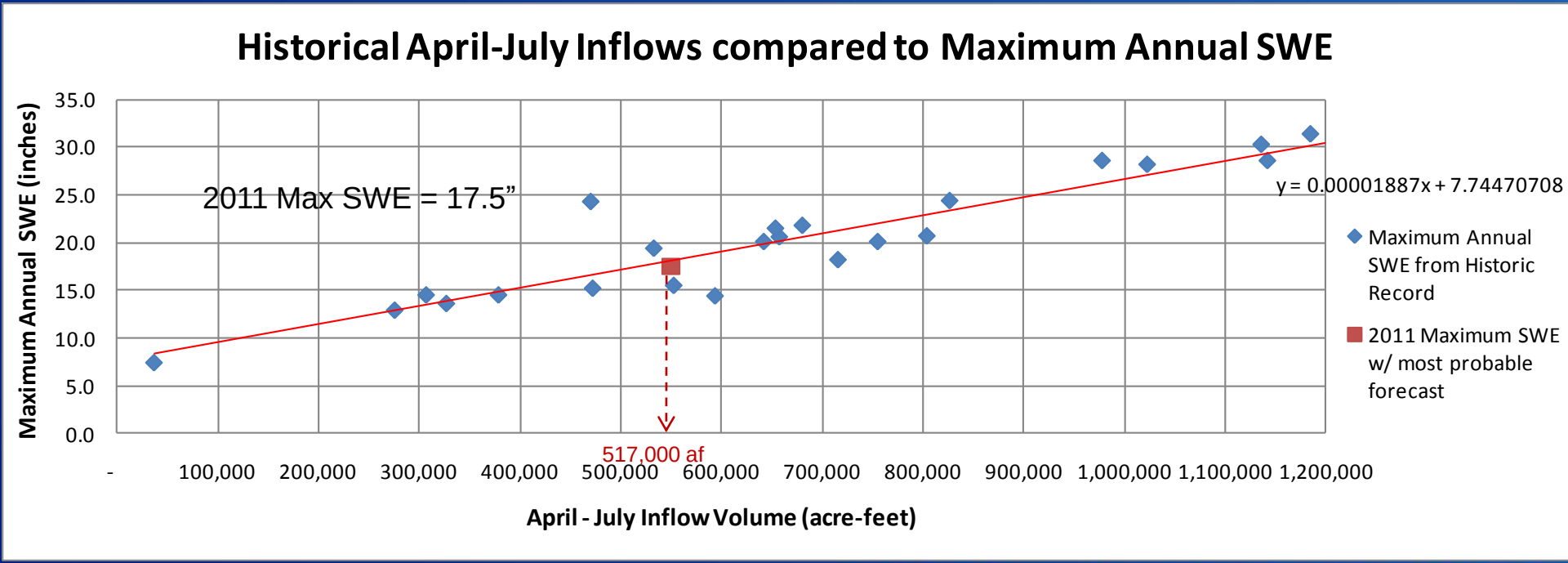
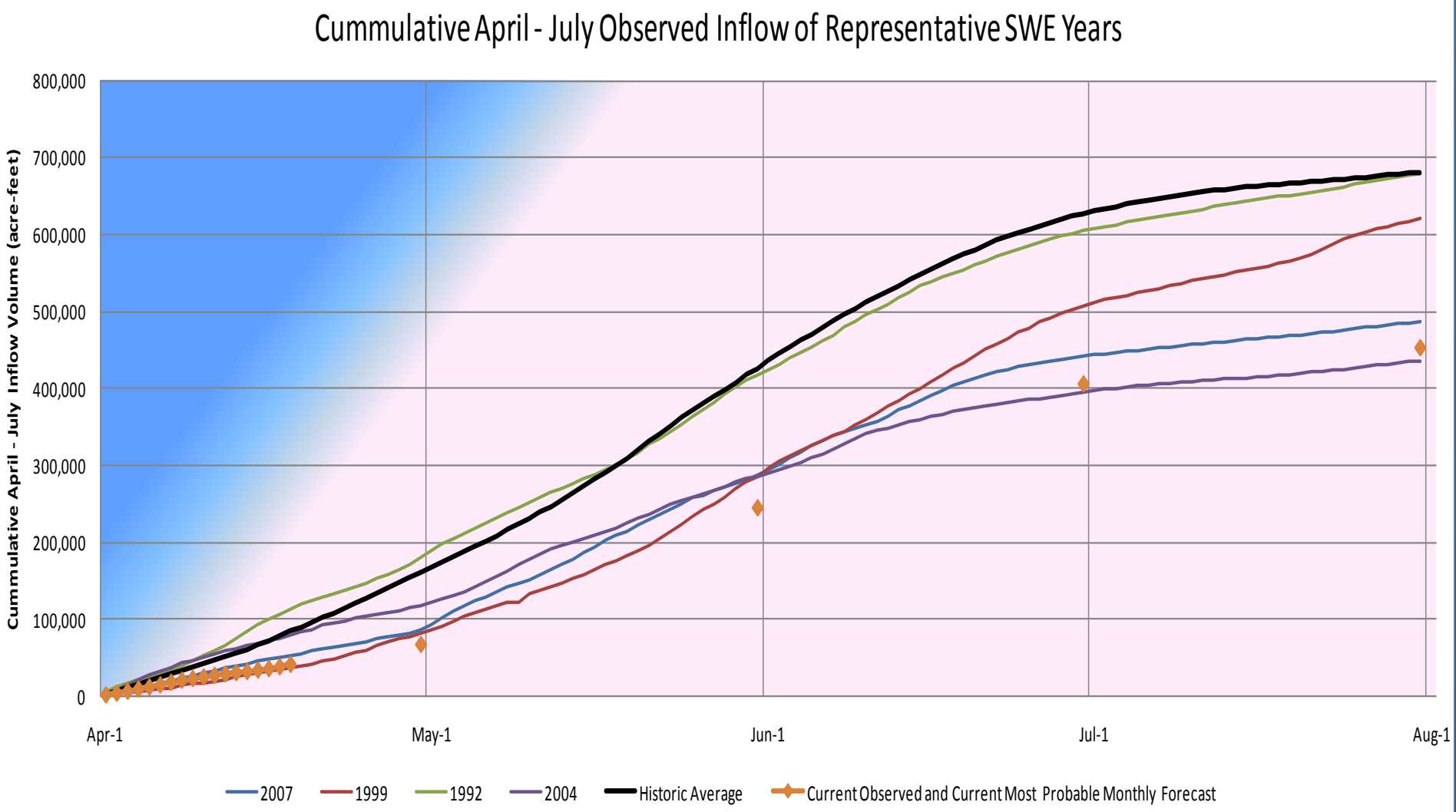

Correlation of Historical SWE from Today's Date and Mod Unreg April-July Inflow
Snow Water Equivalent - SWE (inches)
35
30
25
20
15
10
5
0
-
200,000
400,000
556,000 af
600,000
800,000
1,000,000
1,200,000
1,400,000
April - July Modified Unregulated Inflow Volume (acre-feet)
4/19 SWE = 16.1"
y = 0.00002023x + 4.85593933
SWE on Today's Date
Today w/ current most probable forecast
Today w/ current min probable forecast
Today w/ current max probable forecast


Historical April-July Inflows compared to Maximum Annual SWE
Maximum Annual SWE (inches)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-
100,000
200,000
300,000
400,000
500,000
517,000 af
600,000
700,000
800,000
900,000
1,000,000
1,100,000
1,200,000
April - July Inflow Volume (acre-feet)
2011 Max SWE = 17.5"
y = 0.00001887x + 7.74470708
Maximum Annual SWE from Historic Record
2011 Maximum SWE w/ most probable forecast



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Looking Ahead to Summer/Fall

EOM	Forecasted Most Probable Mod Unreg Inflow (af)	% Average	Predicted Observed Inflow (af)	% Average
April	100,000	59%	67,562	47%
May	235,000	85%	177,070	82%
June	188,000	84%	160,786	88%
July	27,000	41%	46,819	63%
August*	25,009	56%	48,331	78%
September*	33,383	77%	45,996	86%

*Modified unregulated inflow forecasts are not adjusted for upstream regulation (such as Vallecito and San Juan-Chama Project)

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

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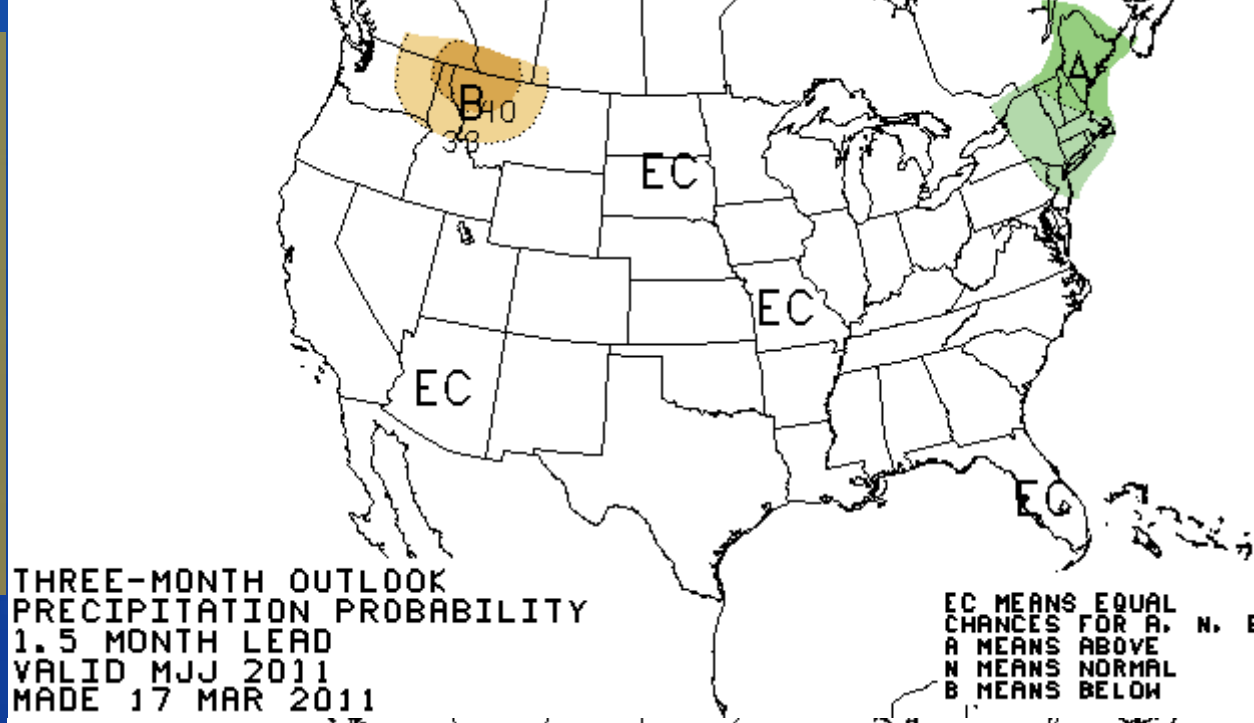
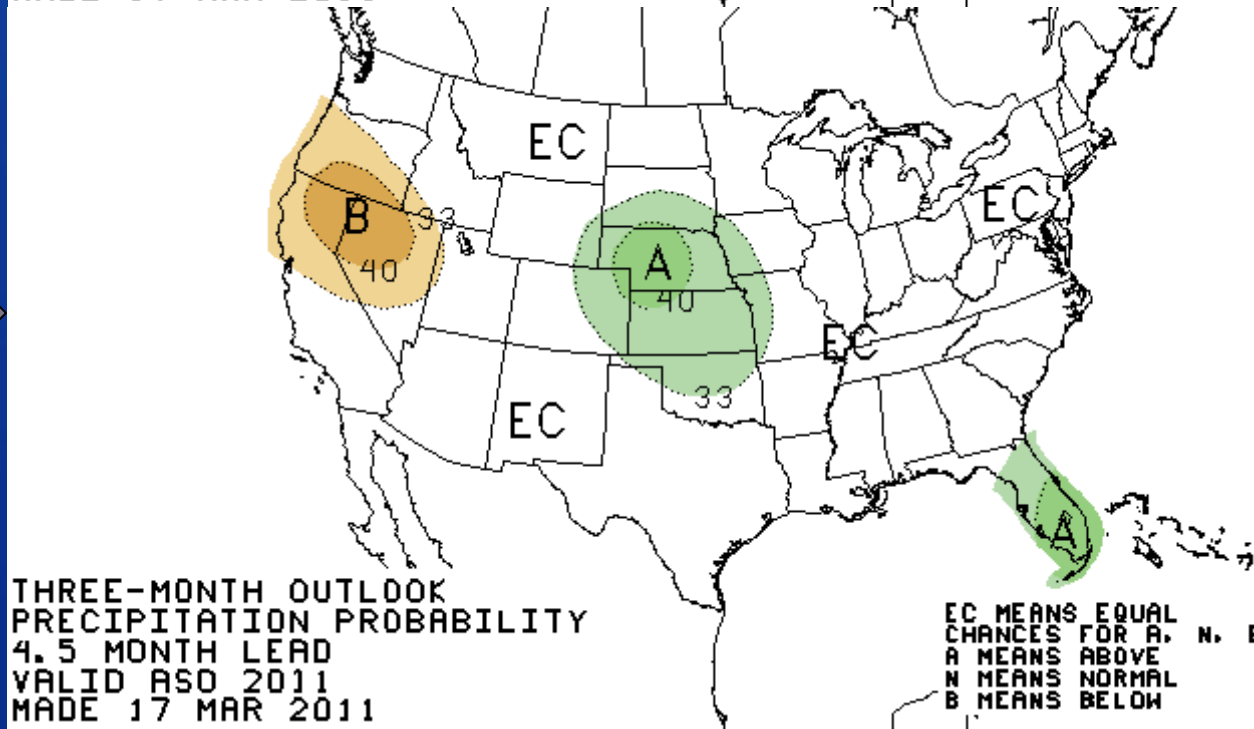
Climate Prediction Center Seasonal Precipitation Outlooks

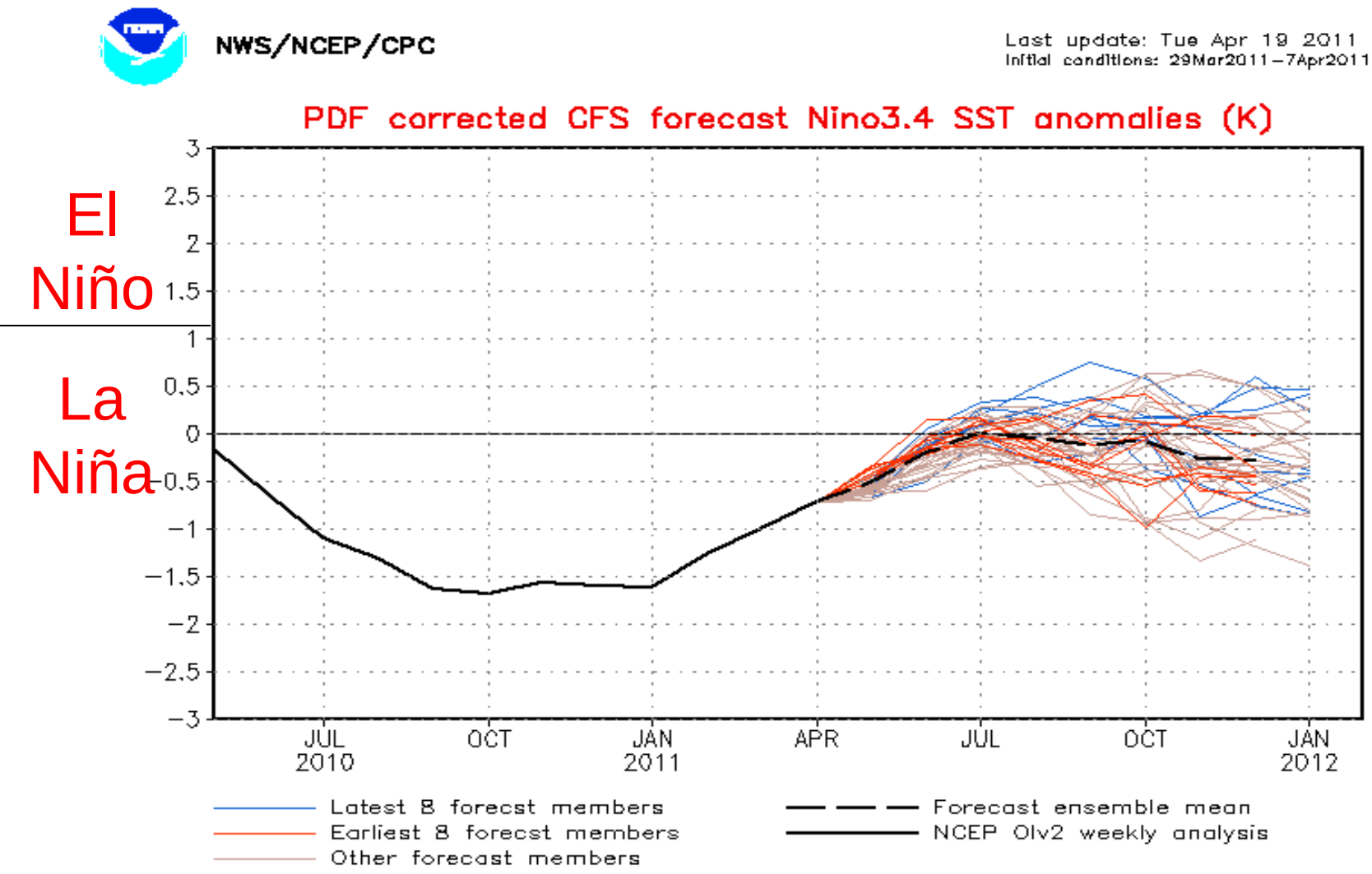
May-June-July



August-September-October



El Niño/La Niña Status?



Water Year 2011 Operations

Spring Peak Release 2011 – How Much?

- Based on the most probable forecasts and current reservoir storage, San Juan RIP Flow Recommendations call for a 1-week Spring Peak Release this year (7 days @ 5000 cfs w/ week-long ramp up/down)
- 500 cfs base release is anticipated until beginning of ramp up and after ramp down
- Inflow forecast would need to drop below ~140,000 af to eliminate SPR (not likely)
- Inflow forecast would need to increase to ~680,000 af to increase to 2-week SPR

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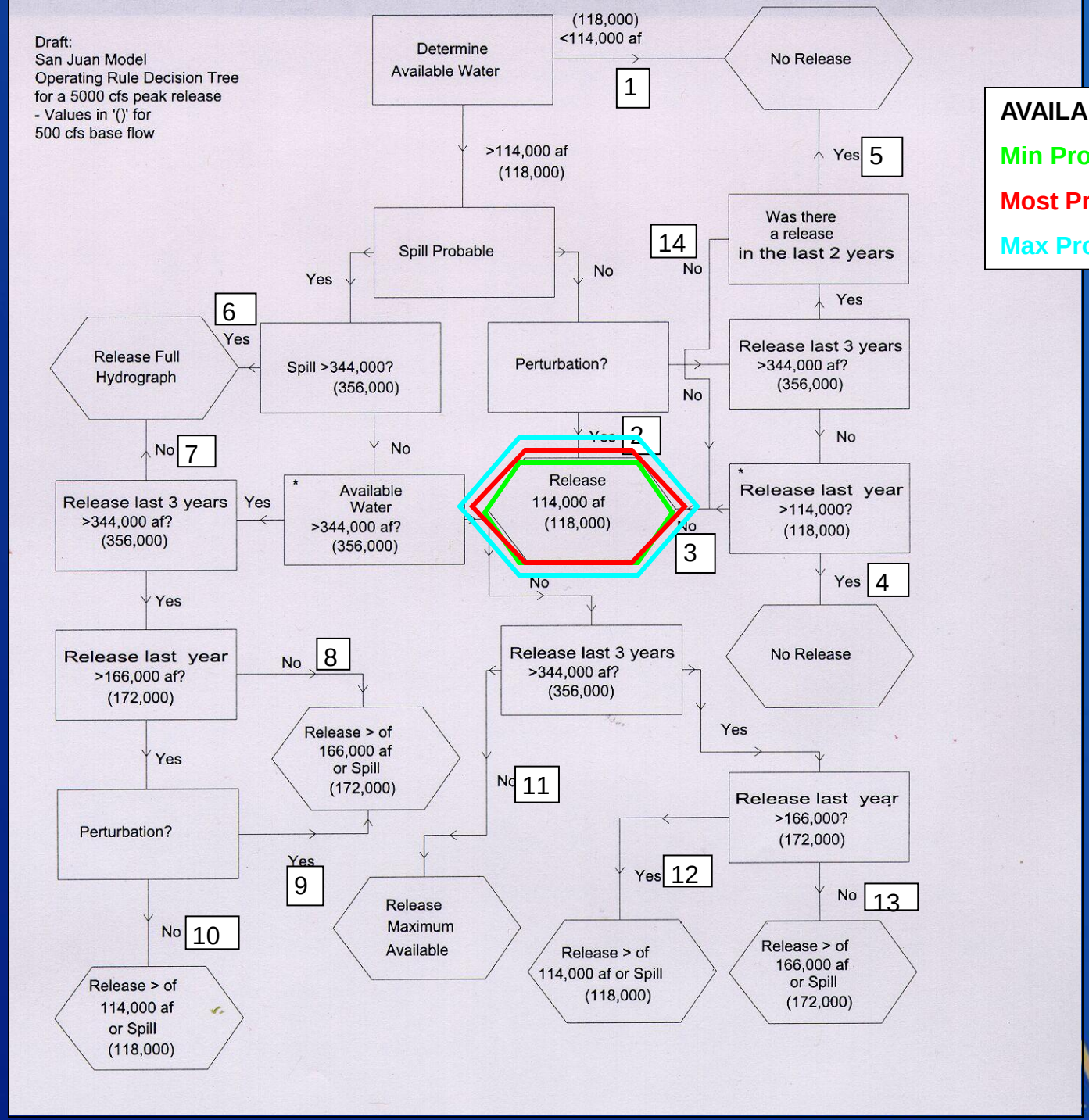

AVAILABLE WATER		PATH
Min Prob:	376,960 af	#2
Most Prob:	500,429 af	#2
Max Prob:	643,061 af	#2

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Spring Peak Release 2011 – When?

(Factors that must be considered)

Goal: To match the peak on the Animas River to provide maximum habitat benefit in the critical habitat area of the San Juan River

- Historical Peak used in Flow Recommendations is June 4th
- Average Peak over the last 10 years (2000-2010) is May 25th
- CBRFC Animas at Farmington Peak Flow Forecast date is May 31st

Constraints:

- Adjustments cannot be made on weekends or holidays
- Maximum change of 200 cfs or 10% every 2 hours (~1000 cfs/day)

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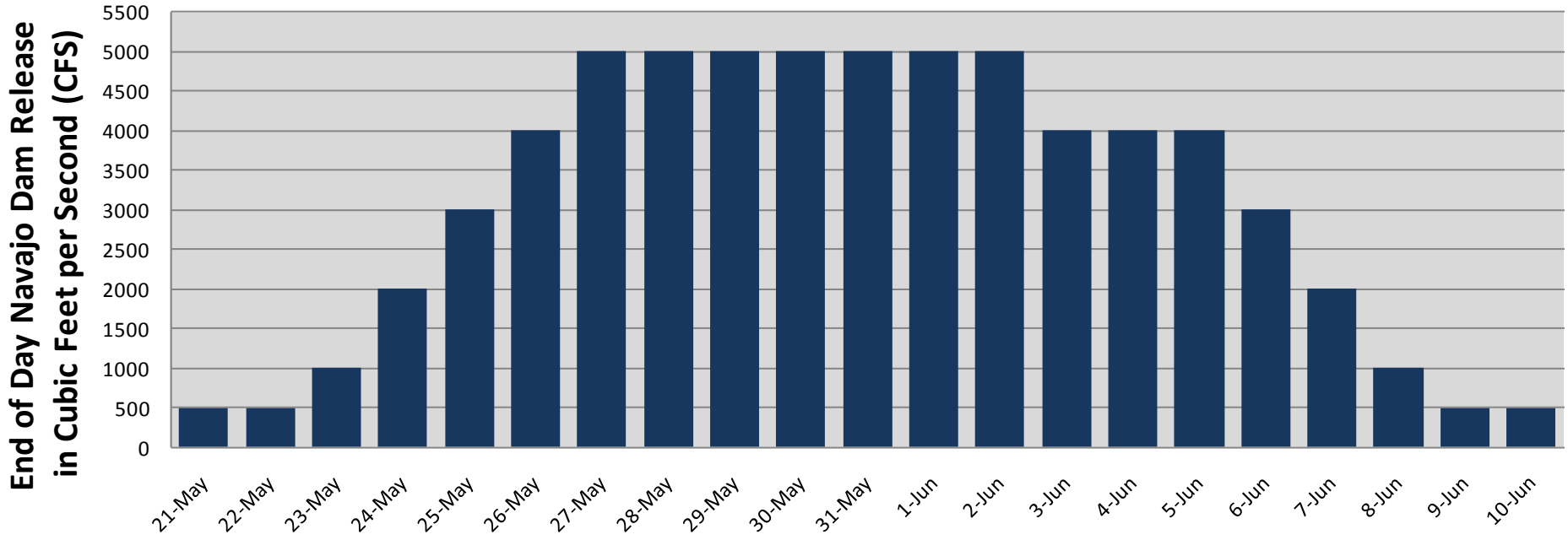
Navajo Reservoir 2011 Spring Peak Release Schedule
(as of 4/19/2011)



	21-May	22-May	23-May	24-May	25-May	26-May	27-May	28-May	29-May	30-May	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun
Release (CFS)	500	500	1000	2000	3000	4000	5000	5000	5000	5000	5000	5000	5000	4000	4000	4000	3000	2000	1000	500	500

Total Release over 500 cfs base = 108,100 acre-feet

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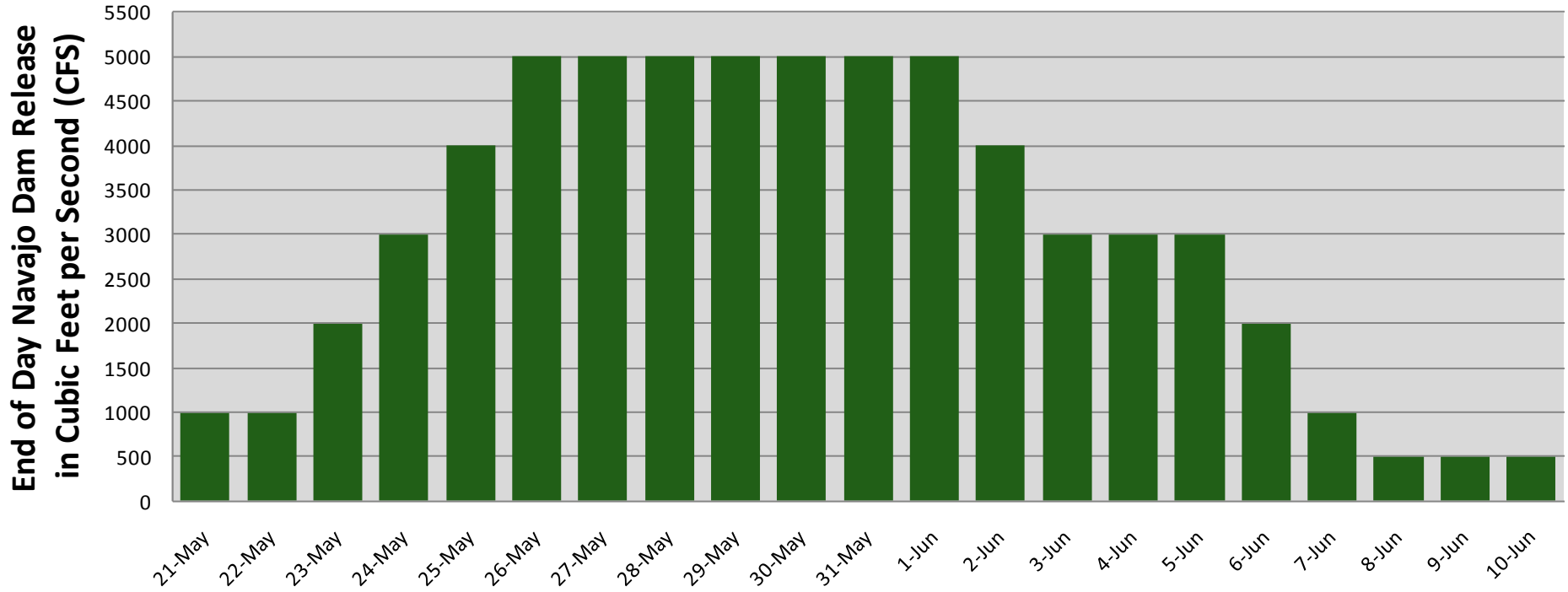
Alternative Navajo Reservoir 2011 Spring Peak Release Schedule
(as of 4/19/2011)



	21-May	22-May	23-May	24-May	25-May	26-May	27-May	28-May	29-May	30-May	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun	8-Jun	9-Jun	10-Jun
Release (CFS)	1000	1000	2000	3000	4000	5000	5000	5000	5000	5000	5000	5000	4000	3000	3000	3000	2000	1000	500	500	500

Total Release over 500 cfs base = 106,100 acre-feet

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Modeled Results Of Operation Plan

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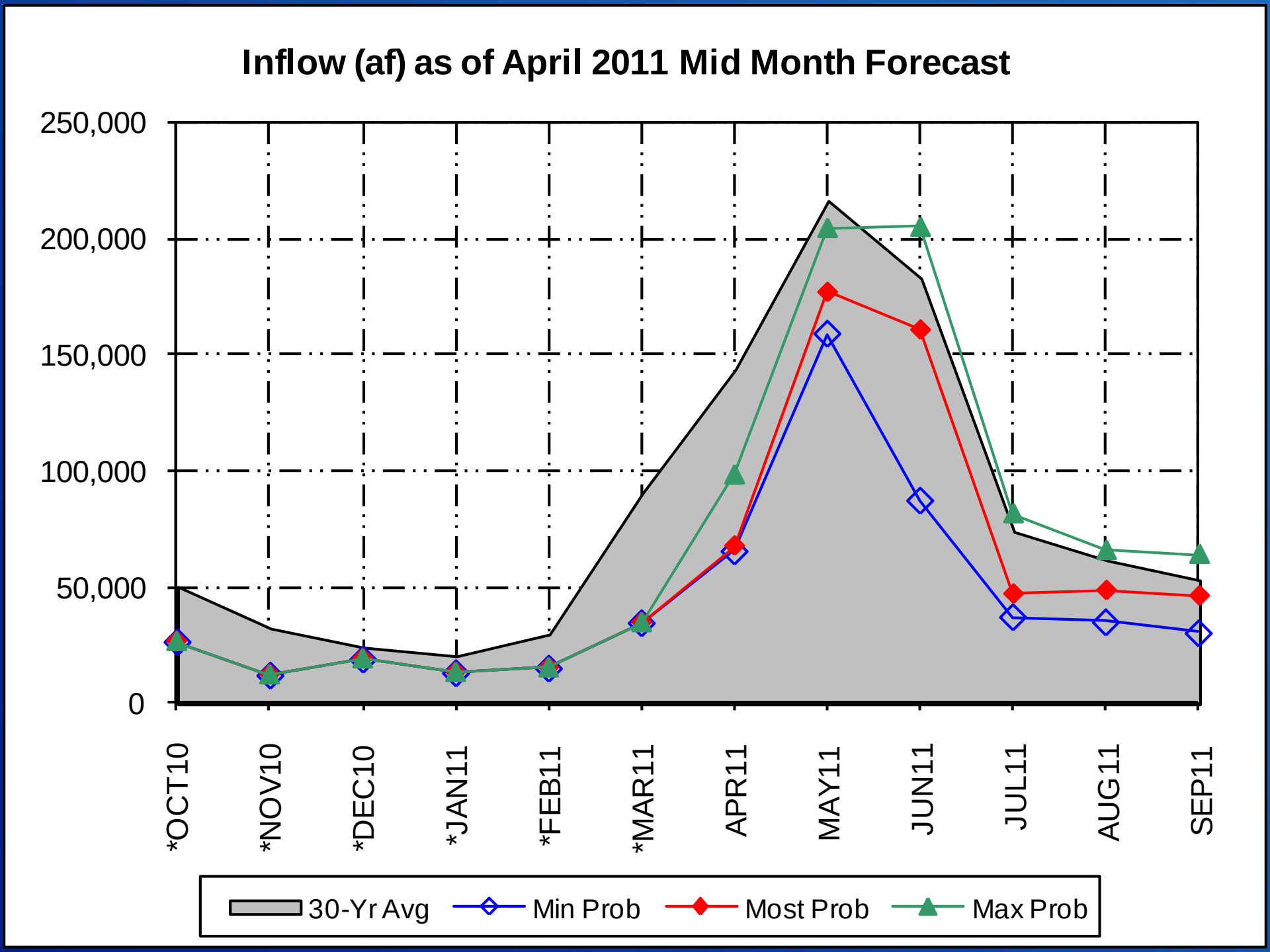
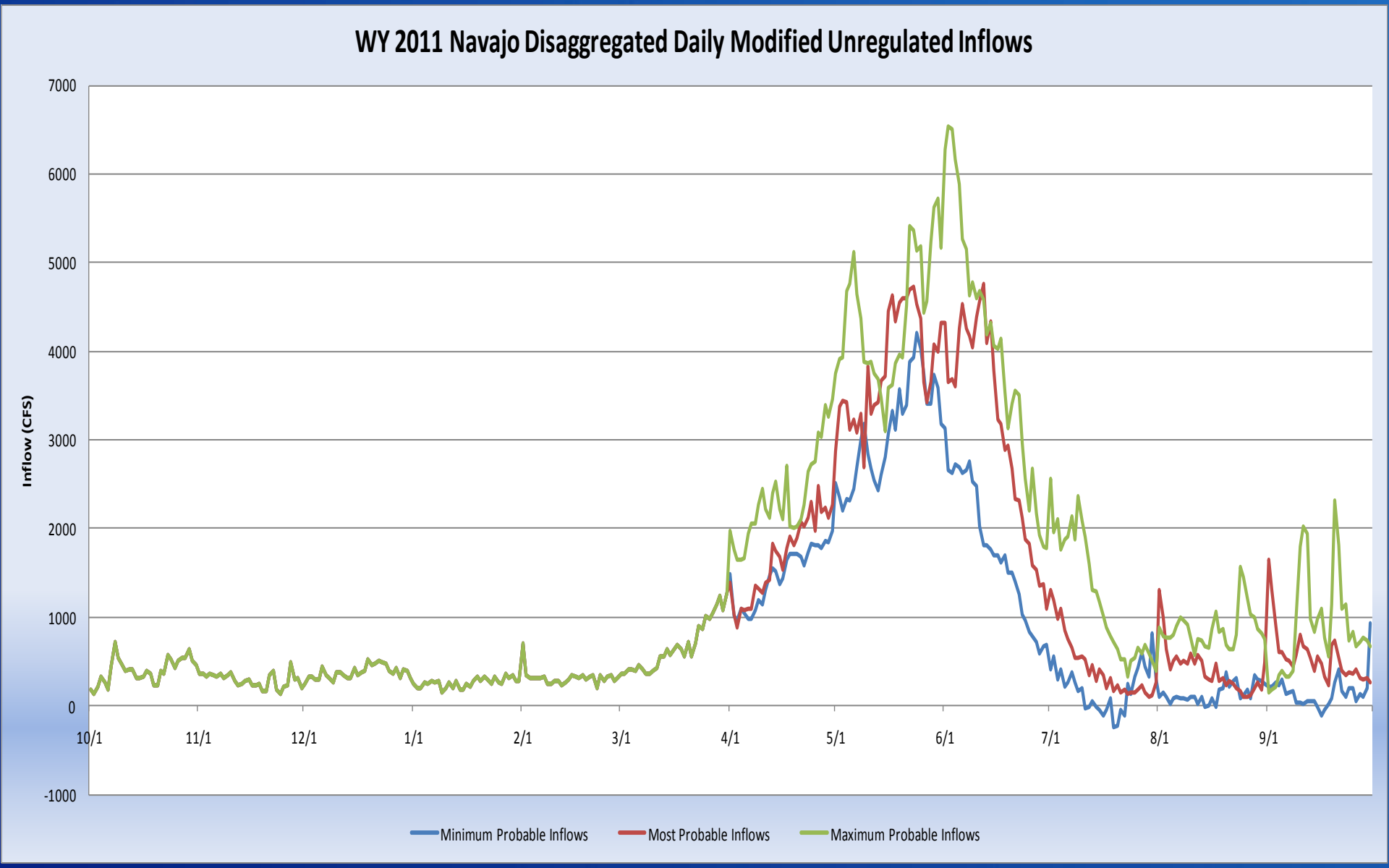

Inflow (af) as of April 2011 Mid Month Forecast
250,000
200,000
150,000
100,000
50,000
0
*OCT10
*NOV10
*DEC10
*JAN11
*FEB11
*MAR11
APR11
MAY11
JUN11
JUL11
AUG11
SEP11
30-Yr Avg
Min Prob
Most Prob
Max Prob



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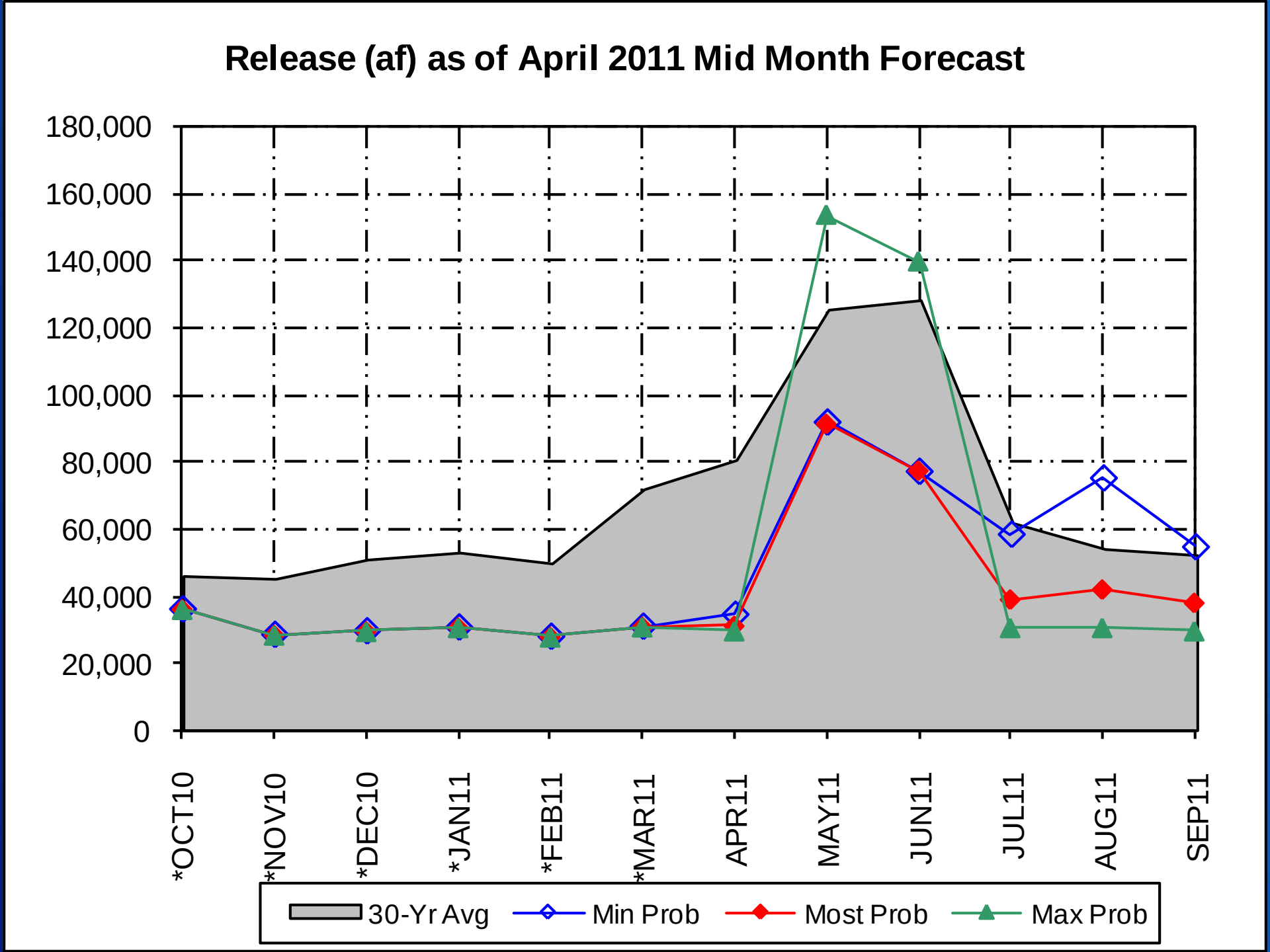
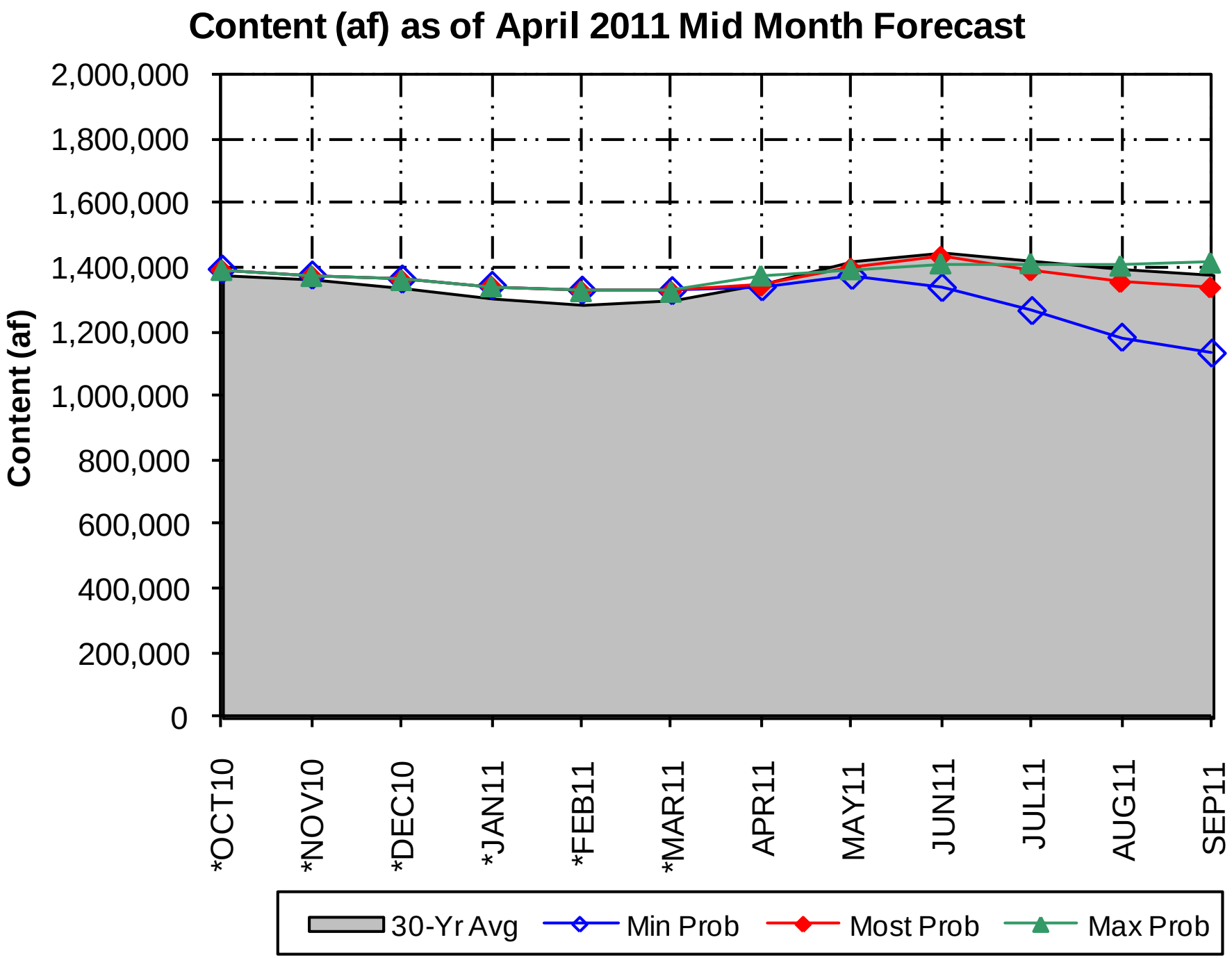
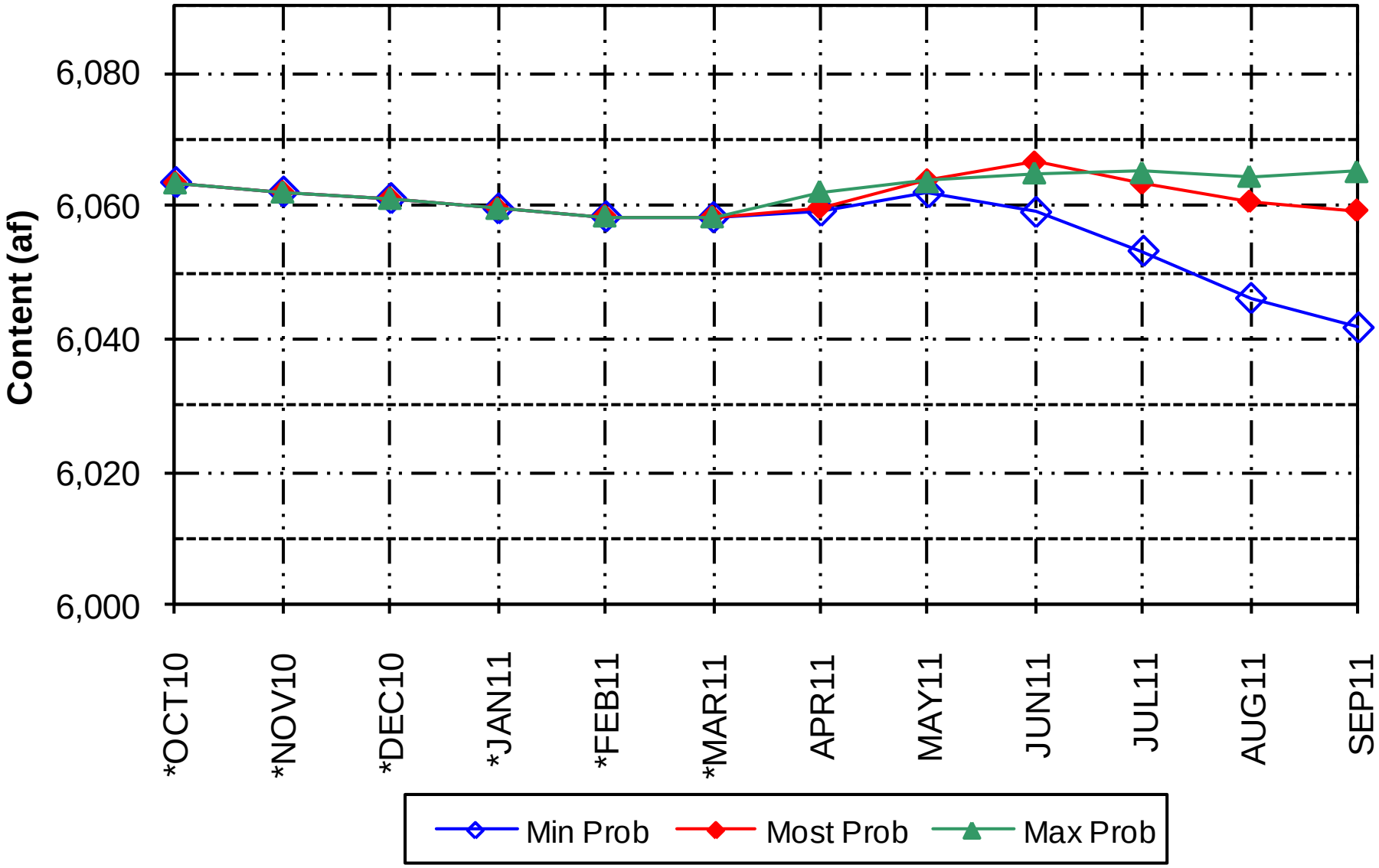

Release (af) as of April 2011 Mid Month Forecast
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
*OCT10
*NOV10
*DEC10
*JAN11
*FEB11
*MAR11
APR11
MAY11
JUN11
JUL11
AUG11
SEP11
30-Yr Avg
Min Prob
Most Prob
Max Prob


Content (af) as of April 2011 Mid Month Forecast
Content (af)
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
*OCT10
*NOV10
*DEC10
*JAN11
*FEB11
*MAR11
APR11
MAY11
JUN11
JUL11
AUG11
SEP11
30-Yr Avg
Min Prob
Most Prob
Max Prob

Elevation as of April 2011 Mid Month Forecast



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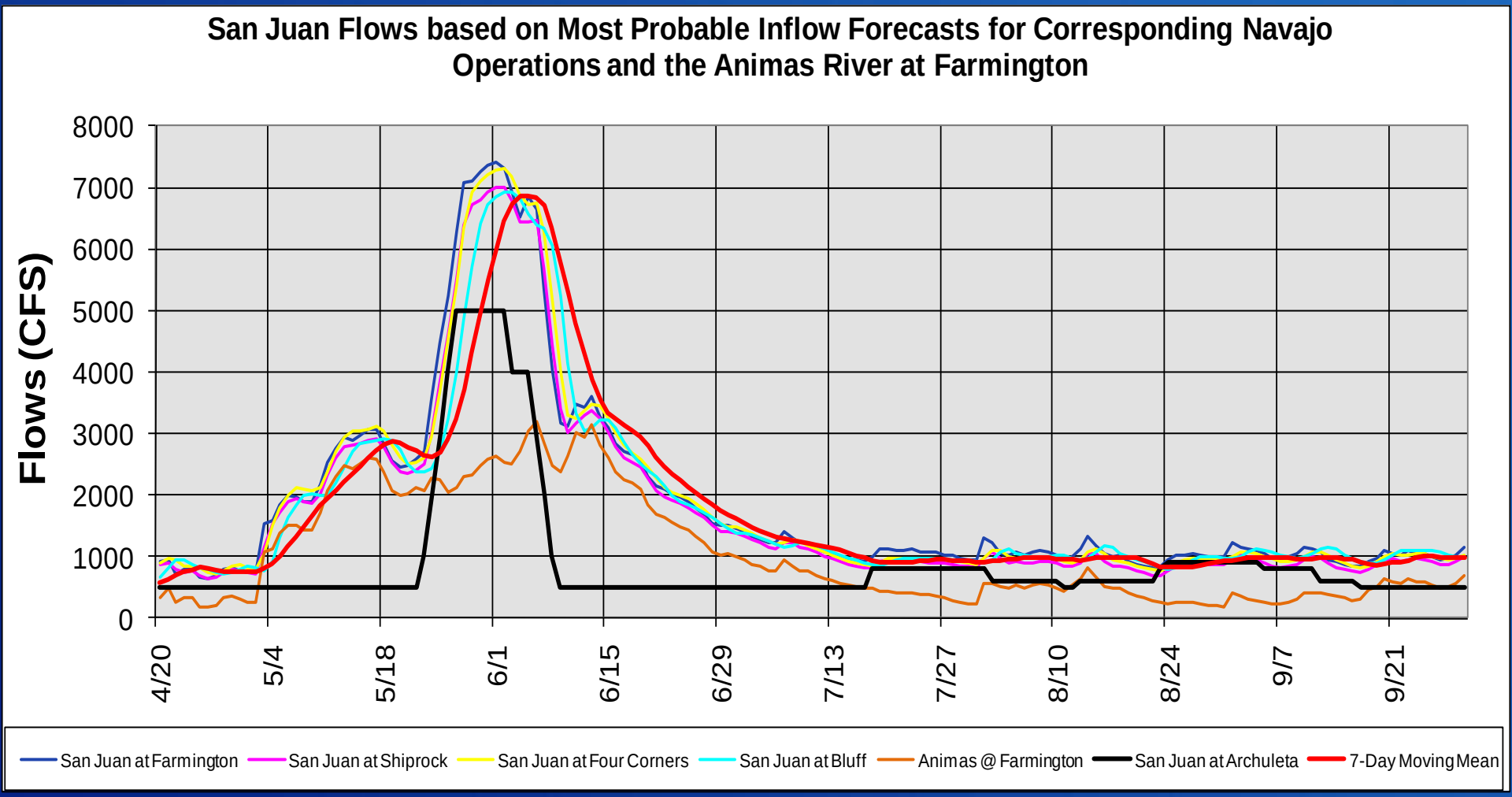
San Juan River Downstream Flows



Note: Assumes median losses between downstream gages

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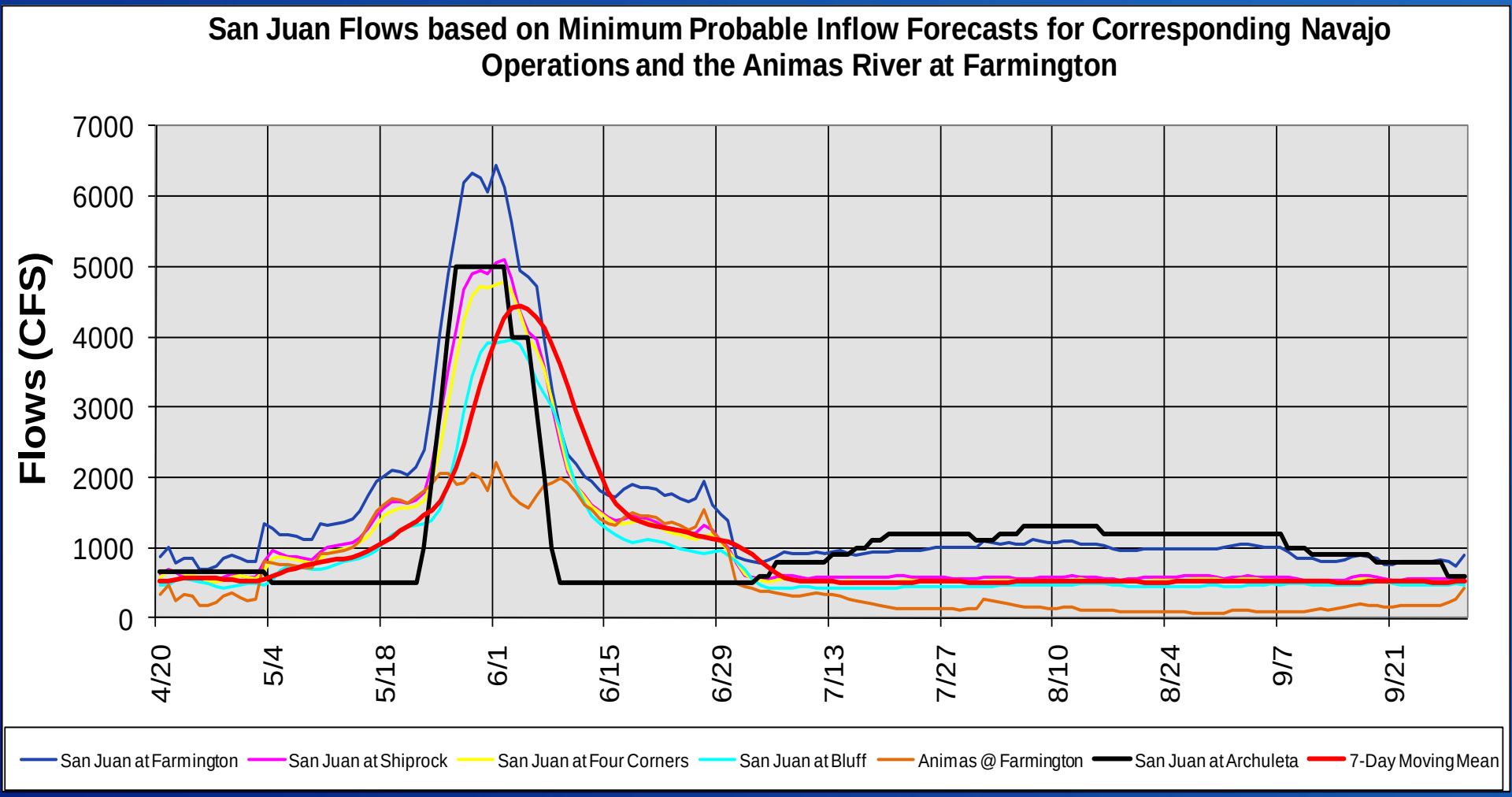
San Juan River Downstream Flows



Note: Assumes 90% exceedance
losses between downstream gages

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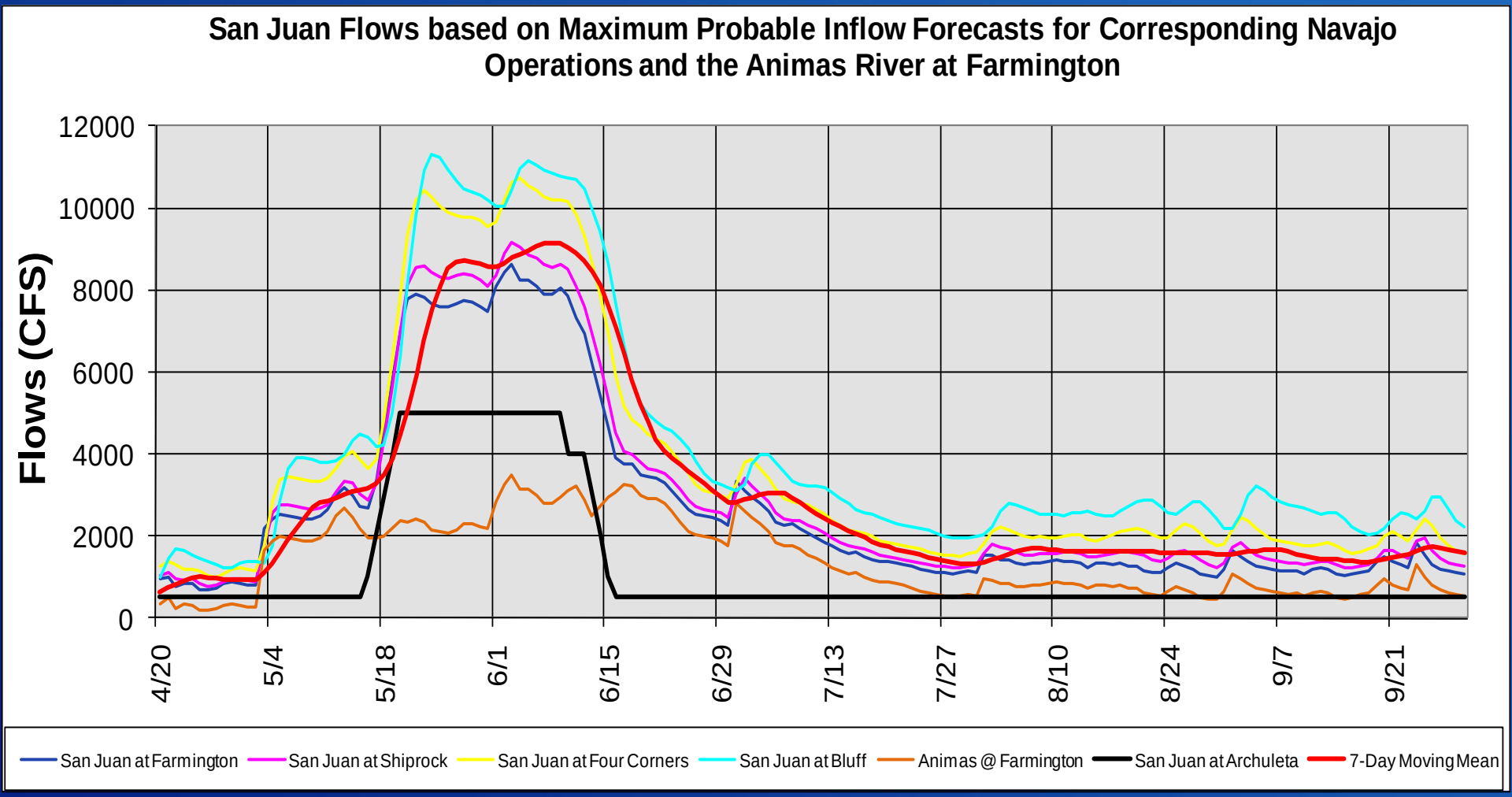
San Juan River Downstream Flows



Note: Assumes 10% exceedance
losses between downstream gages

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Nearby Projects Update

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Nearby Reservoirs

(4/18/2011)

Vallecito

- Elevation = 7649.4 (68% Full, 117% of Average)
- Storage = 85,535 af
- Release = 50 cfs
- Inflow = 592 cfs

Lemon

- Elevation = 8101.6 (41% Full, 67% of Average)
- Storage = 16,329 af
- Release = 10 cfs
- Inflow = 109 cfs

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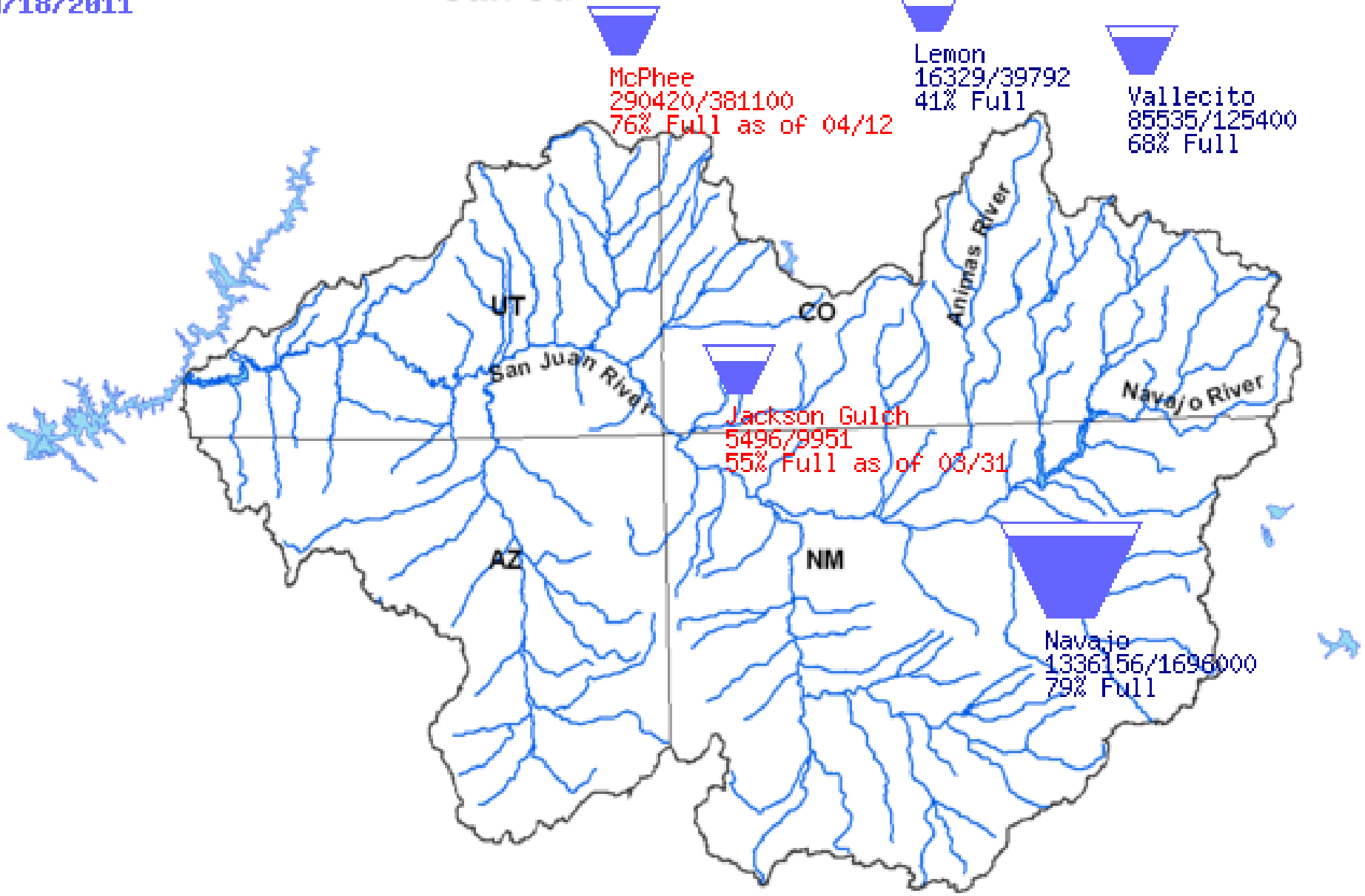
Data Current as of:
04/18/2011

San Juan River Basin



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Animas-La Plata Project

- Currently Pumping Full Capacity (+/- 280 cfs)
- Pumping resumed on March 17th
- ~10,000 acre-feet pumped this year
- Maximum diversion this year = 282 cfs
- Reservoir is 72% Full (89,378 af stored)
- Reservoir is anticipated to fill this summer
- Navajo Nation Municipal Pipeline is currently under construction

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Future Navajo Dam Maintenance Activities:

Stilling Basin Cleanout was successful

Clean up and minor repairs are being made as a result of heavy storms last year

6x13 Emergency Gate Bonnet Maintenance

- Should occur mid-August
- Flow will be diverted through auxiliary gate for 1 month to 6 weeks

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Fish & Wildlife Service
San Juan RIP Update

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Upcoming Meetings of Importance

- SJRIP Biology Committee Meeting 5/10
- SJRIP Annual Meeting 5/11
- SJRIP Coordination Committee Meeting 5/12

All meetings held at Ft. Lewis College

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Reports from other Agencies

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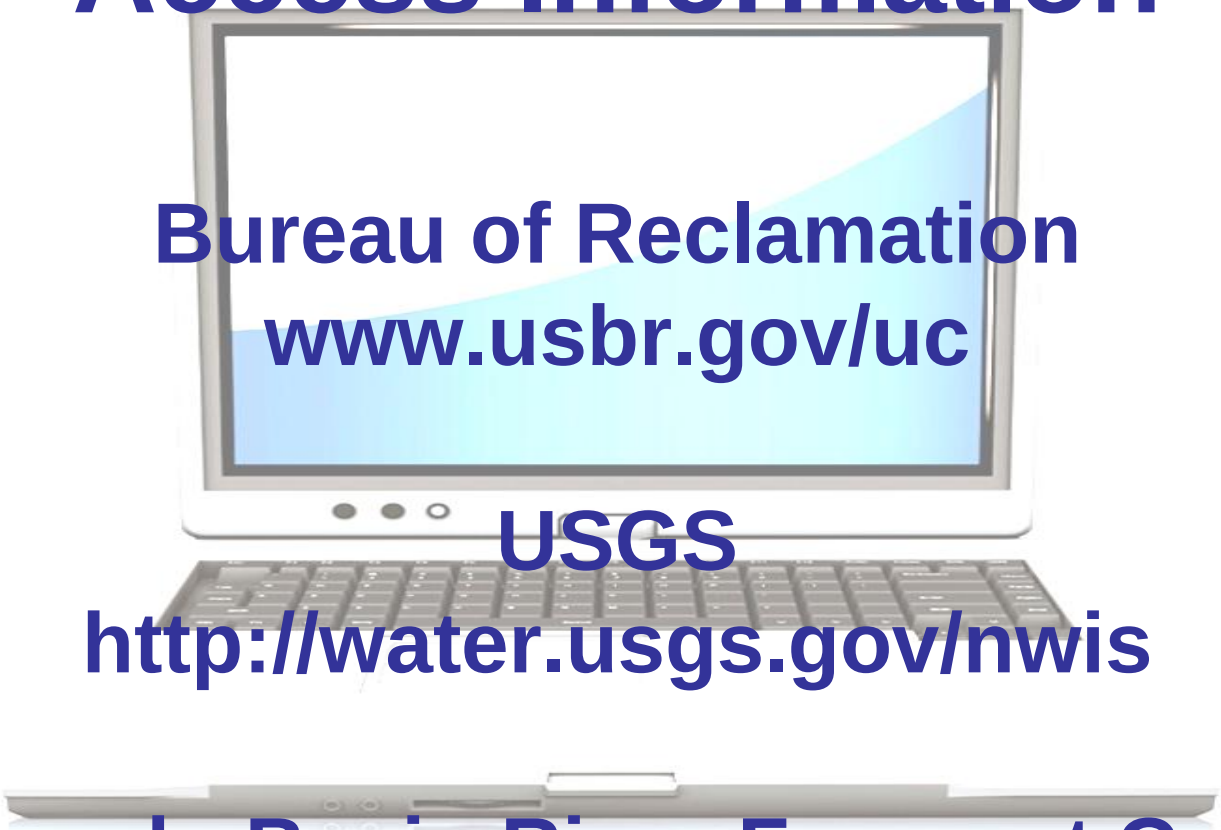
Questions from the Audience

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

Reclamation Contacts:

Ryan Christianson

970-385-6590, rchristianson@usbr.gov

Ruth Swickard

970-385-6523, rswickard@usbr.gov

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Summary

- After being well above average in December, precipitation has been below average for most of the winter and into spring
- Most Probable April–July Inflow Forecast is 75% of average
- There will likely be a 1-Week Spring Peak Release (7-days @5000 cfs with weeklong ramp up and downs
- Likely Minimum (Base) Release = 500 cfs (before and after SPR)
- Downstream flows are likely to below average
- Increased releases may be necessary to meet Target Base Flows

- Next Operations Meeting: August ?, 2011

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