Gunnison River Basin
Current Conditions and Forecasts

Aspinall Unit Operation Meeting

April 24, 2008

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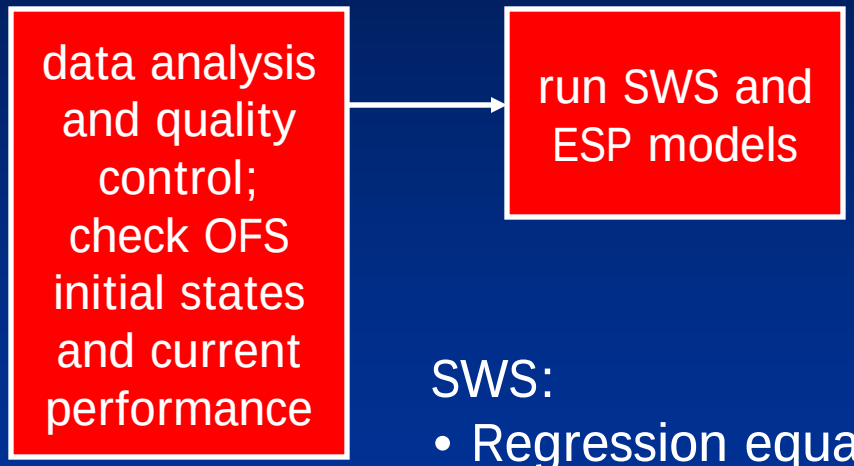
Colorado Basin River Forecast Center

Outline

- Overview of Forecast Process
- Current conditions
- Current Forecast
- Peak Flow
- Improvements / New Tools

Overview of Water Supply Forecast Process



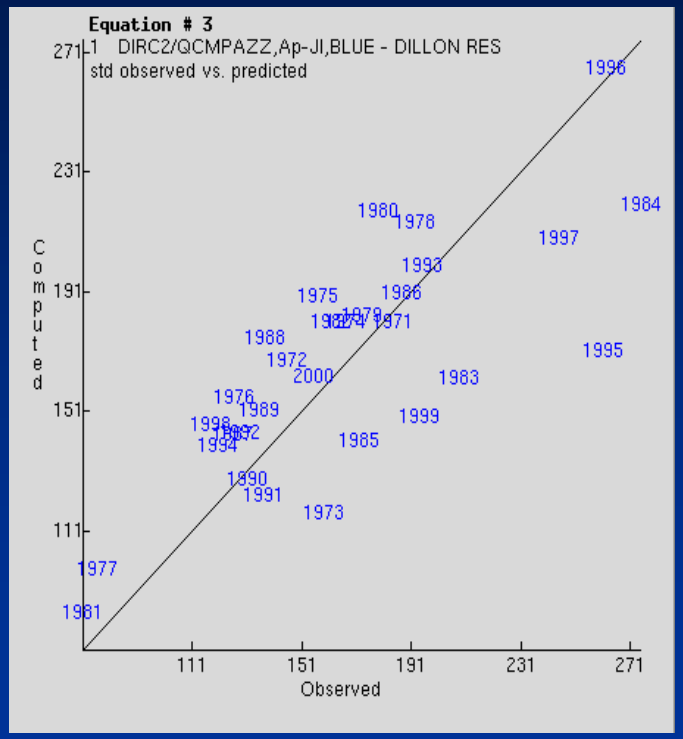
SWS:

- Regression equations that relate observed data to future seasonal streamflow volume.

ESP:

- Uses Operational Forecast System (OFS), a continuous model, for initial states and historical precipitation and temperature data to develop probabilistic forecast.

Statistical Water Supply (SWS)



File Options Actions Help

```
FREMONT PASS FMTC2/SWIRMZZ
                Apr   16.90Z    104%   *    3.197  =      54.03

HOOSIER PASS HOOC2/SWIRMZZ
                Apr   15.40Z    105%   *    2.469  =      38.02

GRIZZLY PEAK GZPC2/SWIRMZZ
                Apr   17.80Z    104%   *    1.933  =      34.41

DILLON 1E DLLC2/PPMRZZZ (Nov - Mar):
                Nov     0.67V     75%
                Dec     0.49V     59%
                Jan     0.59V     70%
                Feb     0.72V     77%
                Mar     0.96V     85%
                       -------   ------
                        3.43      74%   *    5.891  =      20.21

BRECKENRIDGE BRGC2/PPMRZZZ (Nov - Mar):
                Nov     0.91V     66%
                Dec     1.15E     88%
                Jan     1.44V    101%
                Feb     2.38Q    169%
                Mar     1.79V     99%
                       -------   ------
                        7.67     104%   *    3.474  =      26.65
                                                        --------
                                      -6.762 +          173.31  =     166.55 (   100%)
```

DIRC2	Coordinated		Model Computed		Comp. w/ Coord.		NWS Preferred.		Other Agency	
R. Max	190.00	114%	211.17	126%		%	199.62	120%	0.00	0%
Most Prob.	**150.00**	**90%**	**166.55**	**100%**		%	**155.00**	**93%**	**150.00**	**90%**
R. Min	116.00	69%	121.93	73%		%	110.38	66%	0.00	0%

Input Specification | Eqn Output/Fcst Input | Fcst Point Stats | Eqn Stats | Fcst Performance (Oper) | Fcst Performance (Calib) | Log

nextreg ver 2.2.5

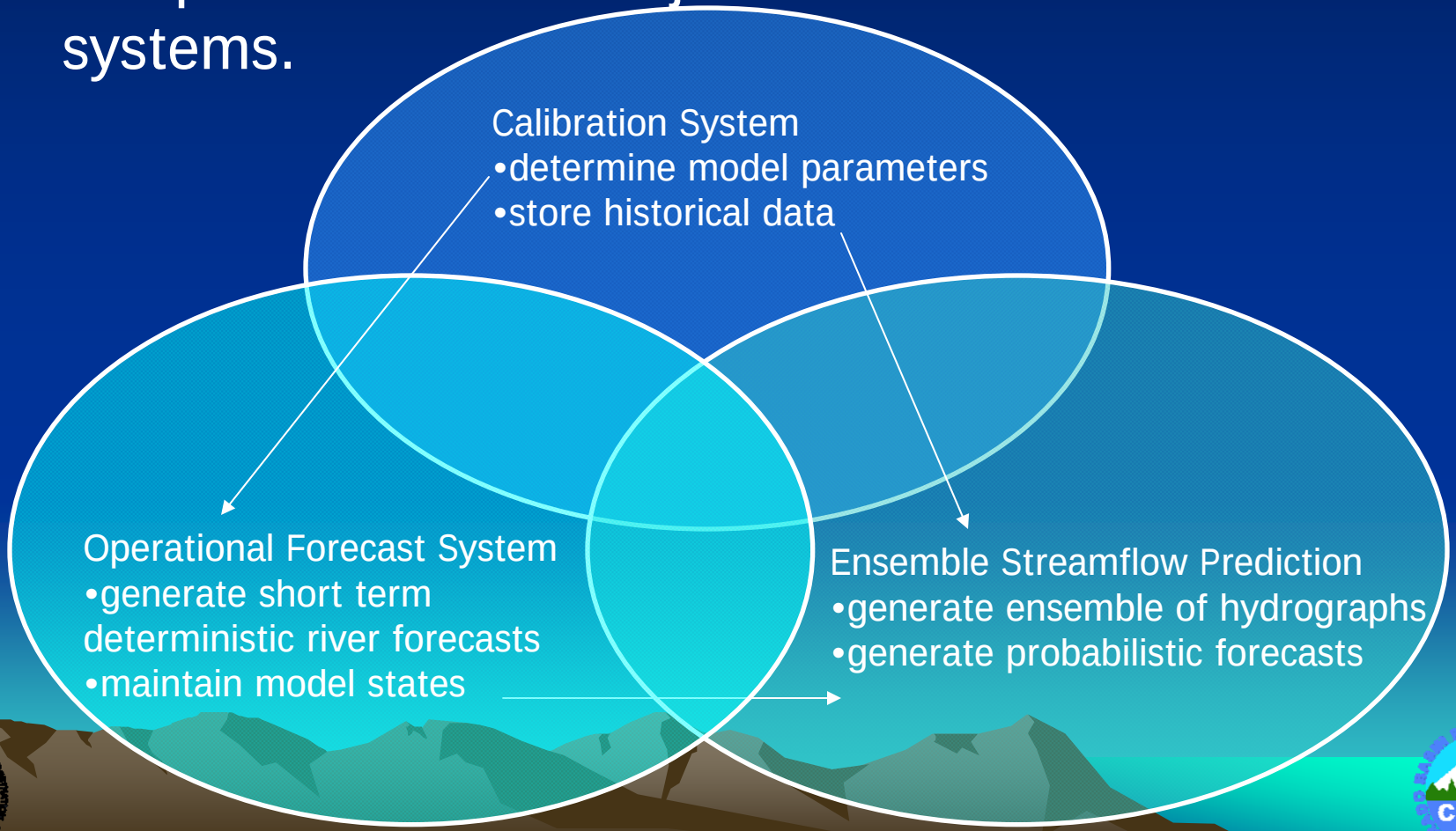
Sample Equation for April 1:

Apr-Jul volume for Dillon Reservoir

- >Apr 1 swe Fremont Pass Snotel
- >Apr 1 swe Hoosier Pass Snotel
- >Apr 1 swe Grizzly Peak Snotel
- >Nov-Mar precip Dillon
- >Nov-Mar precip Breckenridge

NWS River Forecast System

- Continuous, conceptual hydrologic model composed of three major interrelated functional systems.



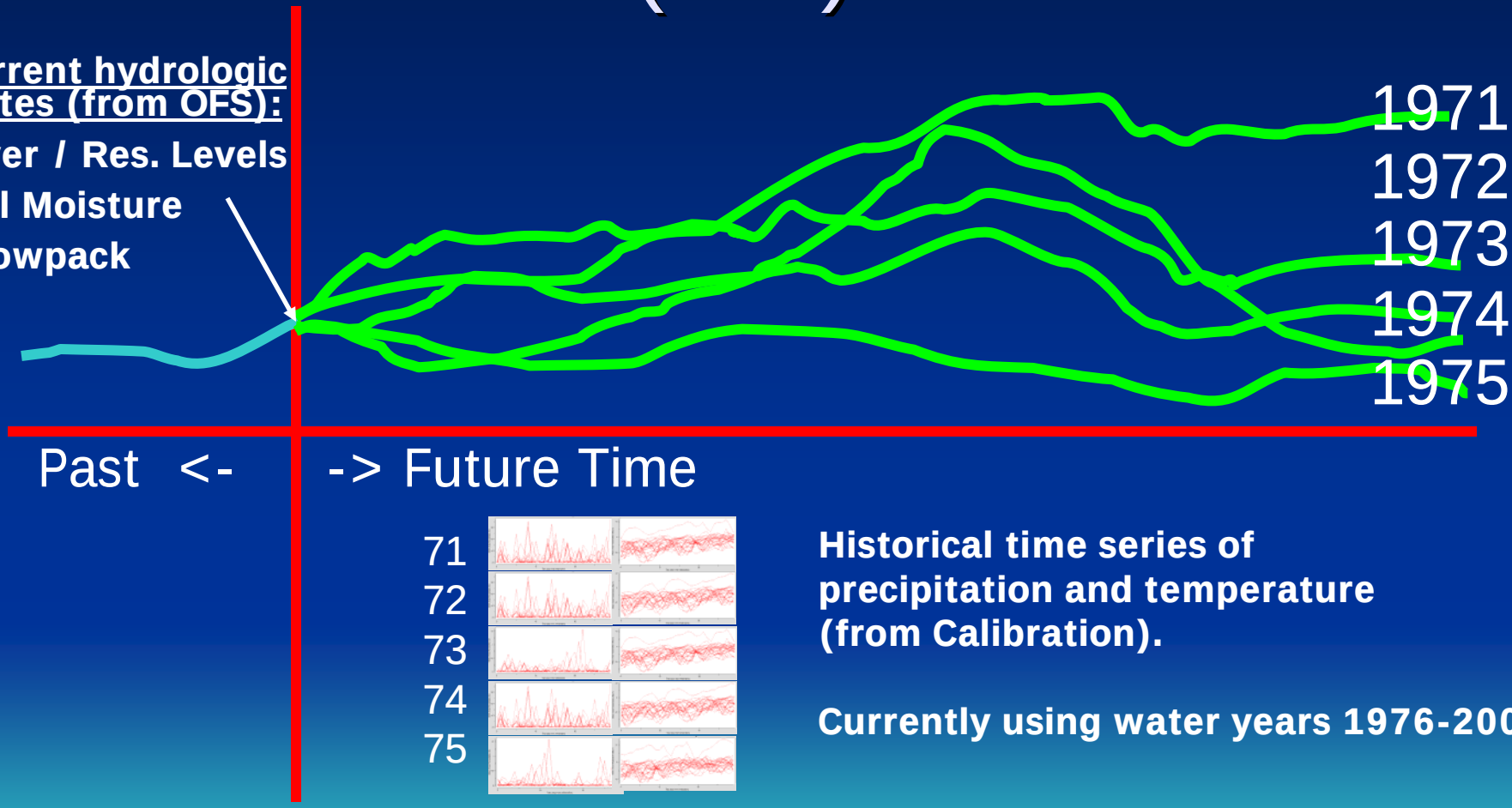
Ensemble Streamflow Prediction (ESP)

Current hydrologic states (from OFS):

River / Res. Levels

Soil Moisture

Snowpack

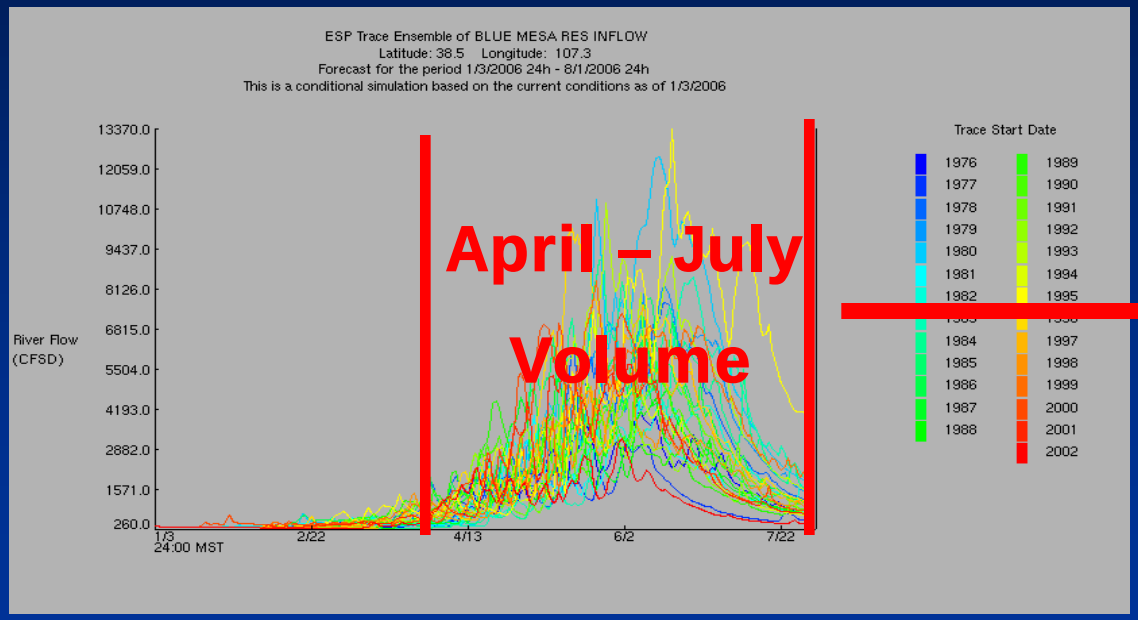


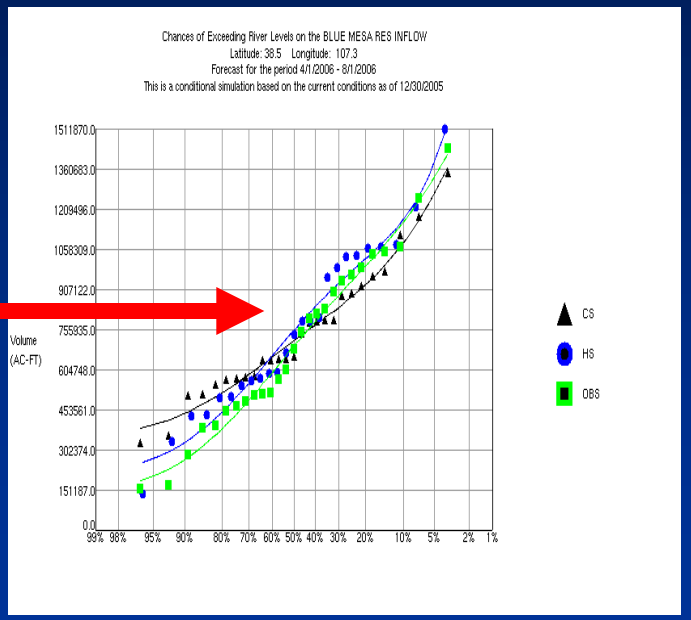
Historical time series of precipitation and temperature (from Calibration).

Currently using water years 1976-2005.

Start with current conditions – Apply each year of historical climate – Create several possible future streamflow patterns

Ensemble Streamflow Prediction (ESP)



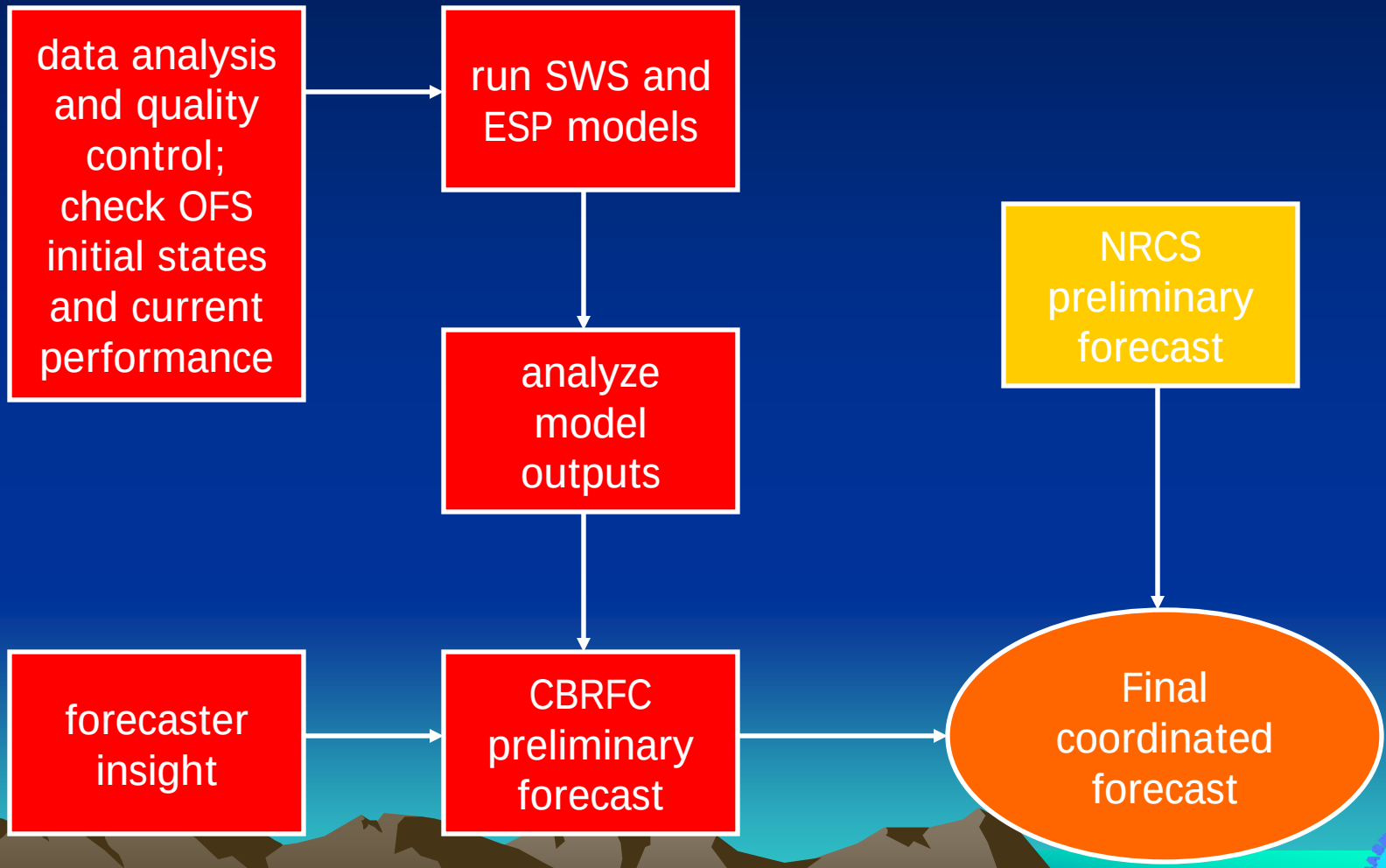


1. Select a forecast window
2. Select a forecast variable
3. Model derives a distribution function
4. 50% exceedance value = most probable forecast
5. Correct for model bias

# Exceedance Probabilities	Conditional Simulation	Historical Simulation	Historical Observed
0.900	438320.500	328520.656	262730.375
0.750	552369.562	499977.531	435810.375
0.500	711742.375	751782.938	691946.625
0.250	877104.812	973699.188	935549.938
0.100	1080490.375	1170393.125	1157333.250

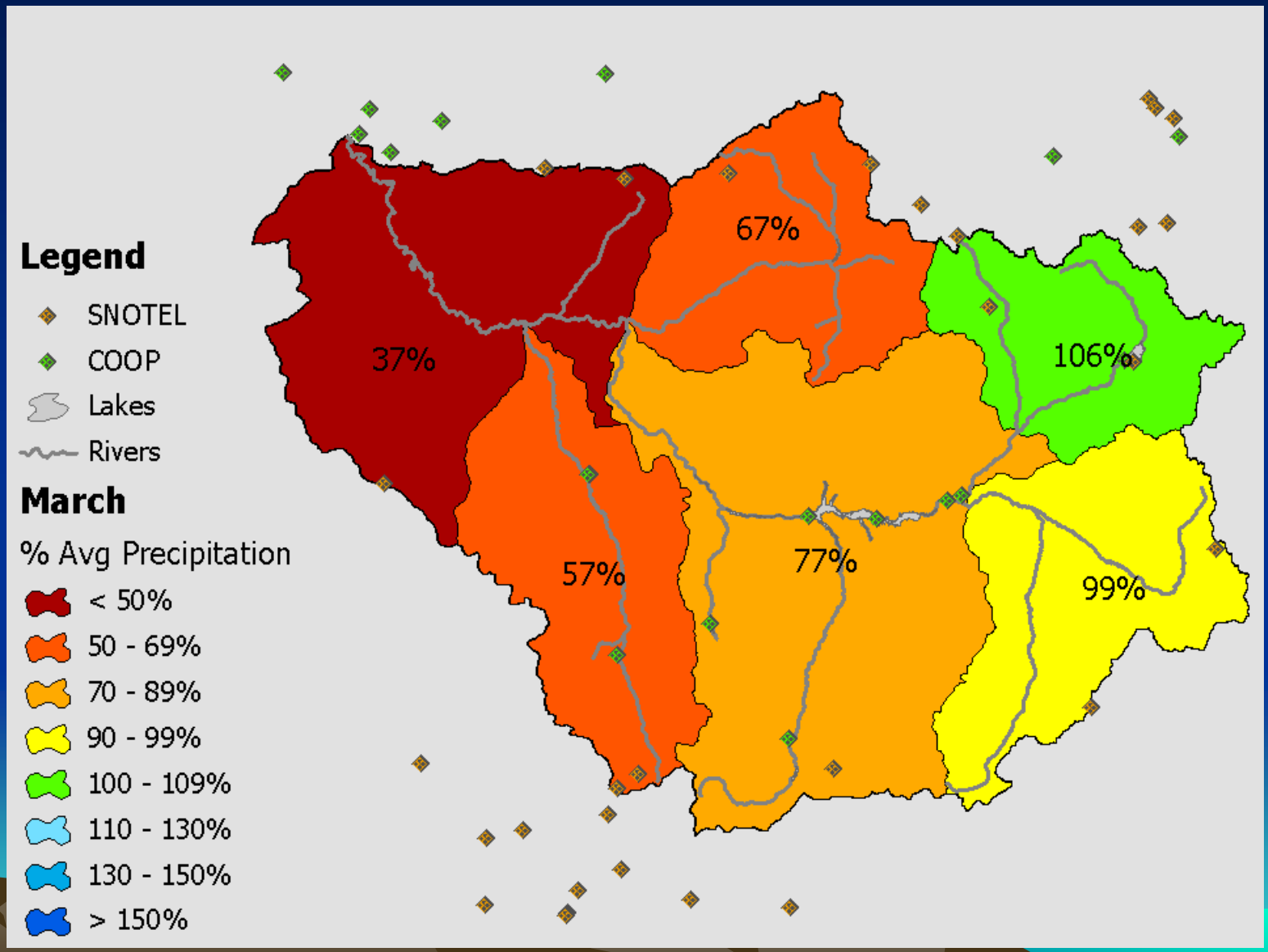
Statistics based on all years.
#

Overview of Water Supply Forecast Process

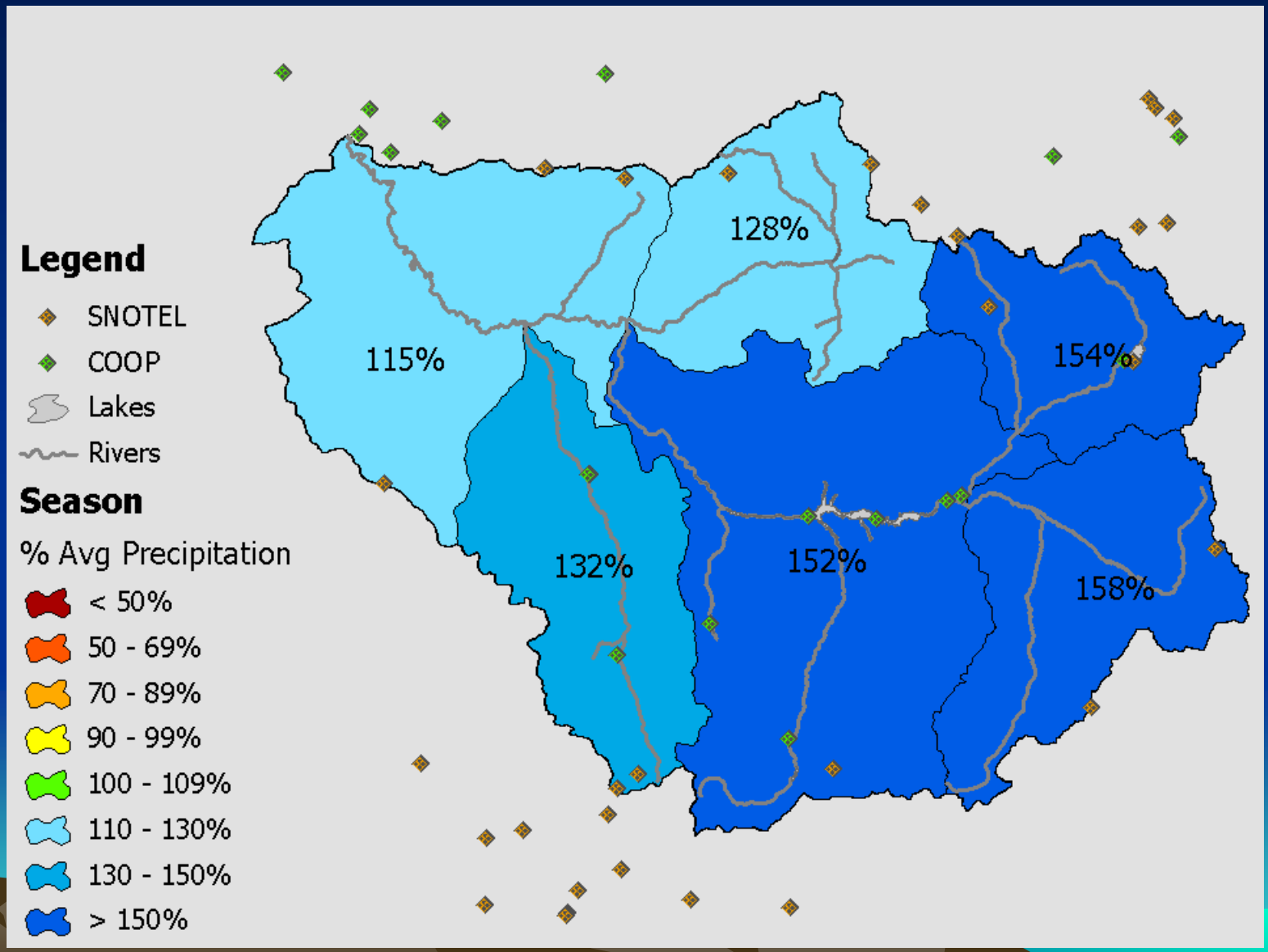


Current Conditions
Water Year 2008

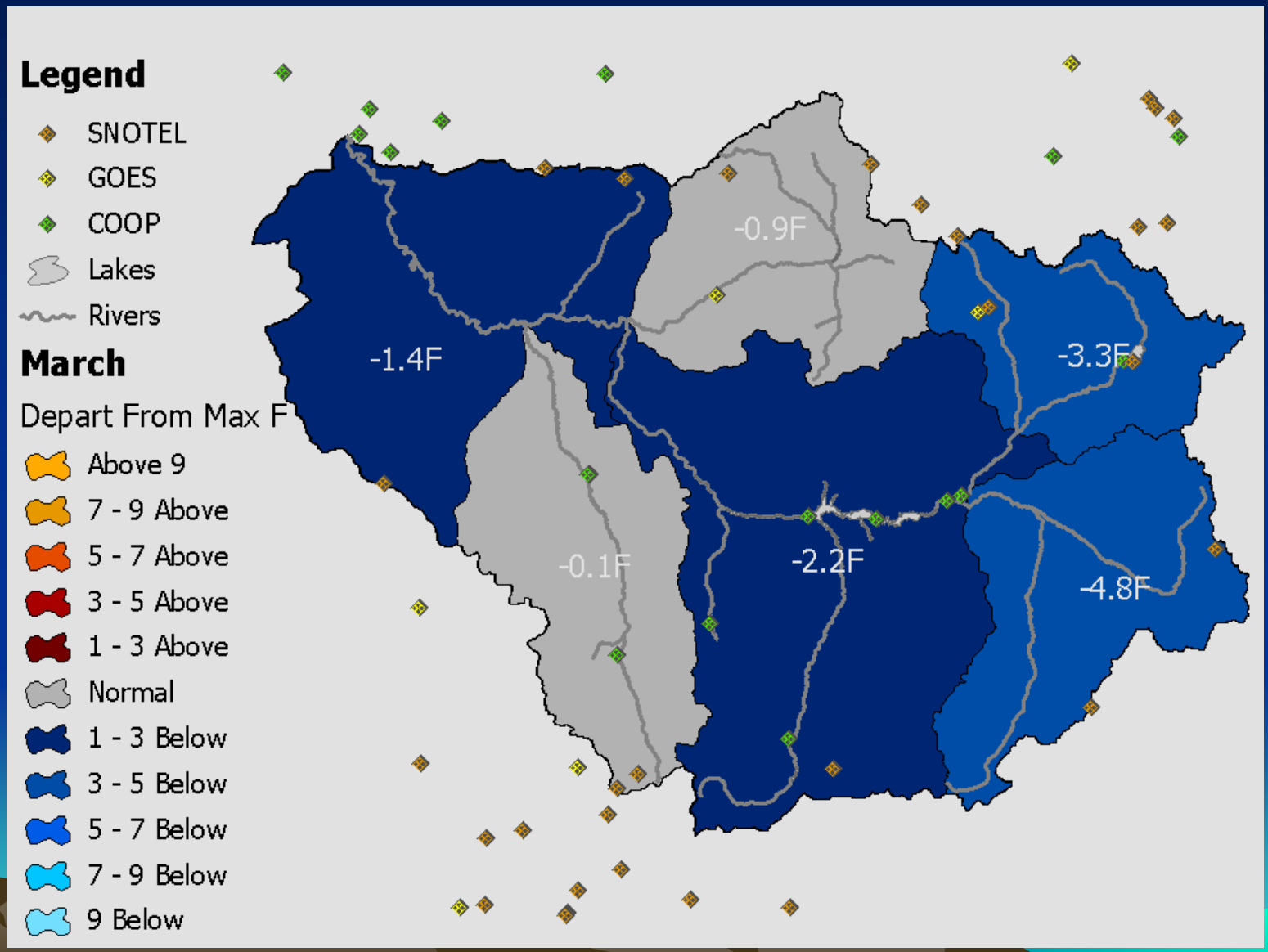
Precipitation March 2008



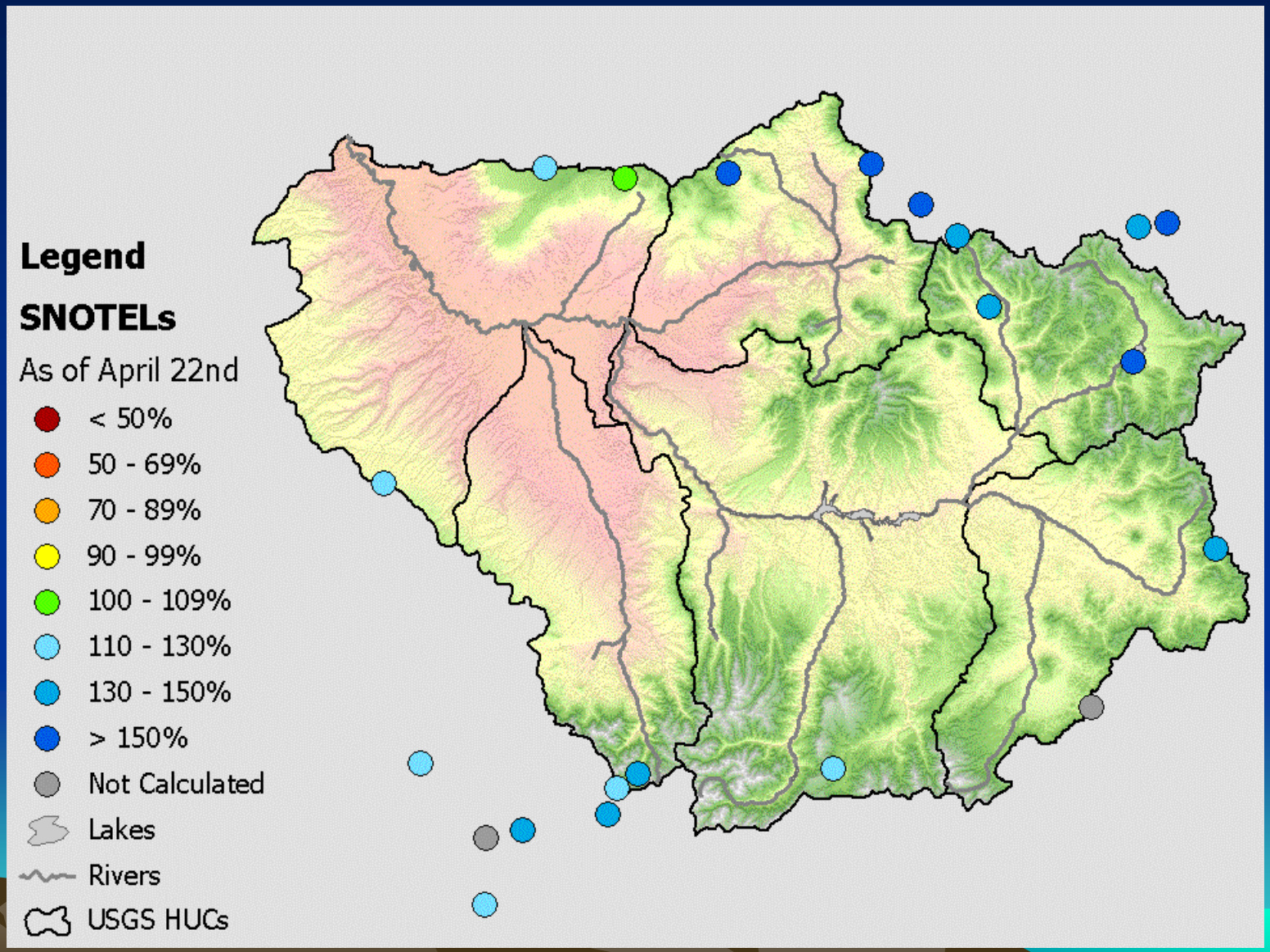
Precipitation Water Year 2008



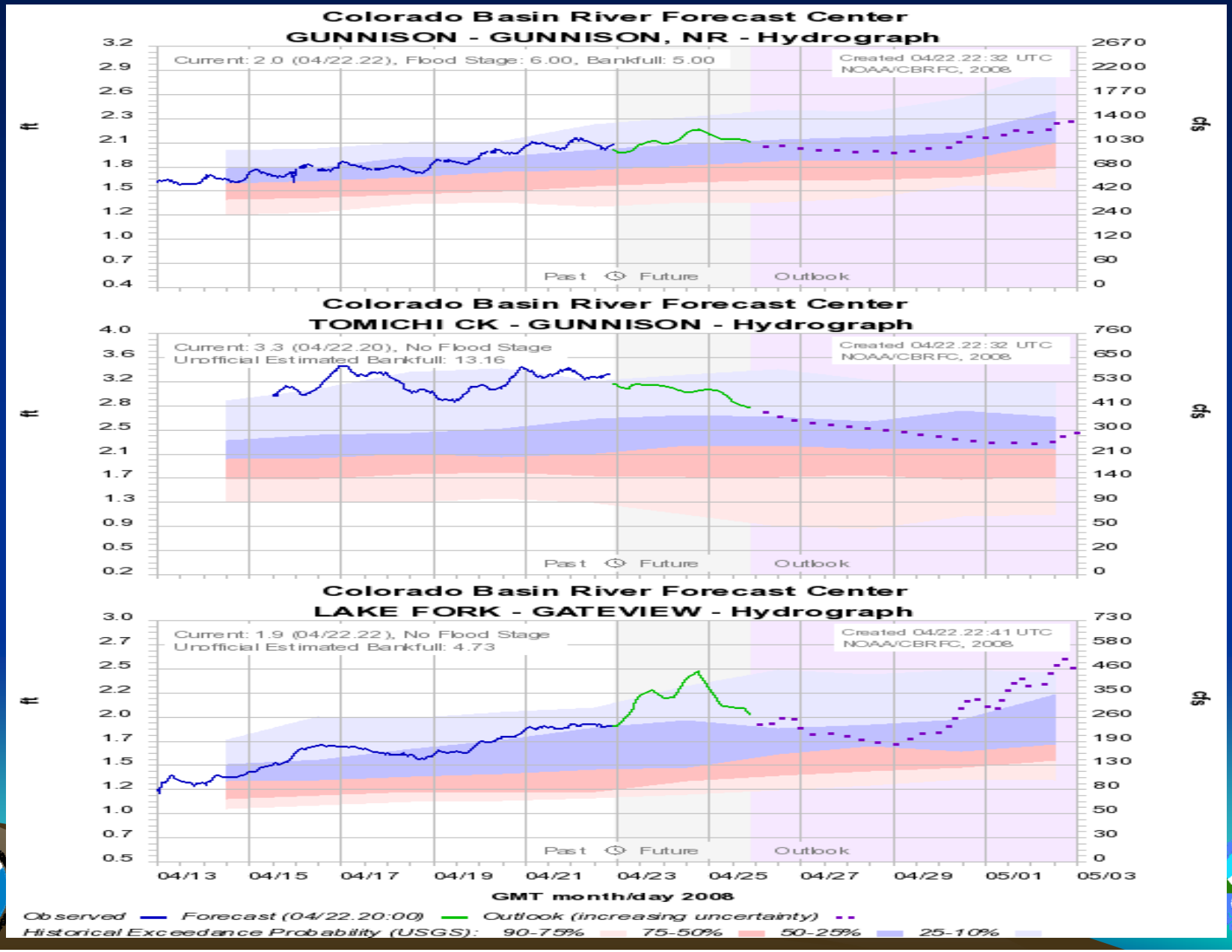
March Max Temperature Departure



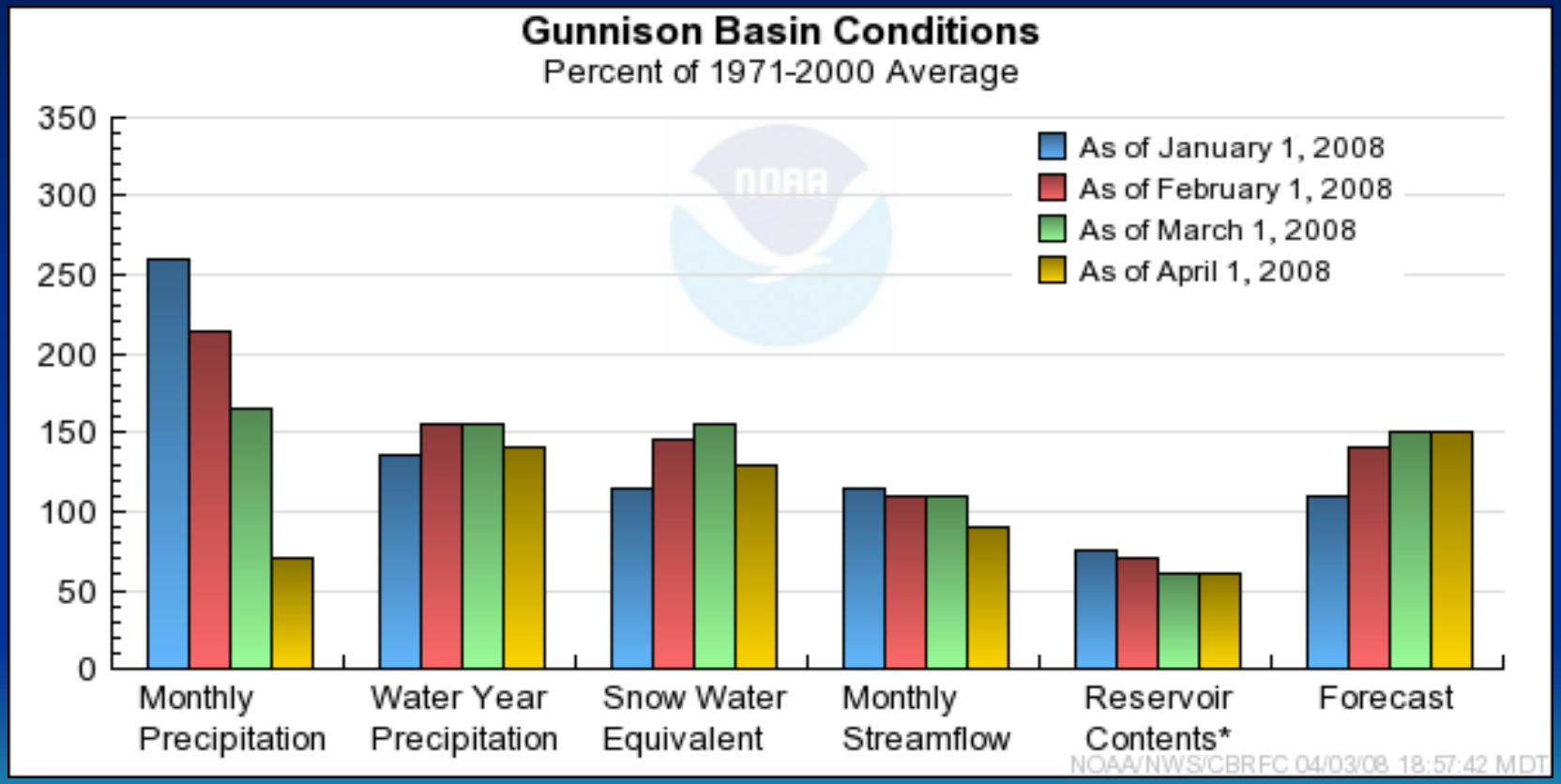
Snow Water Equivalent On April 22nd



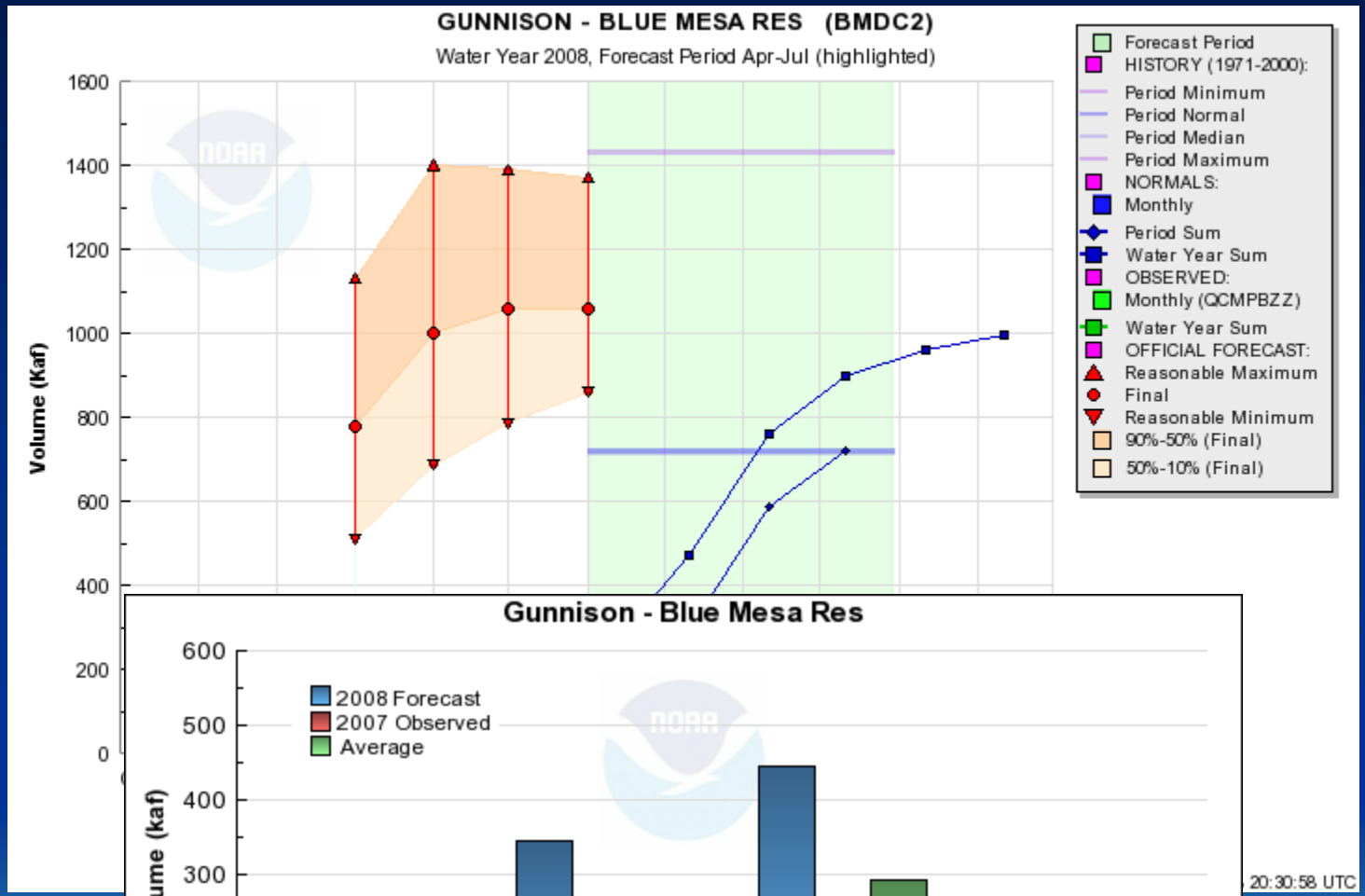
Current Stream Flow



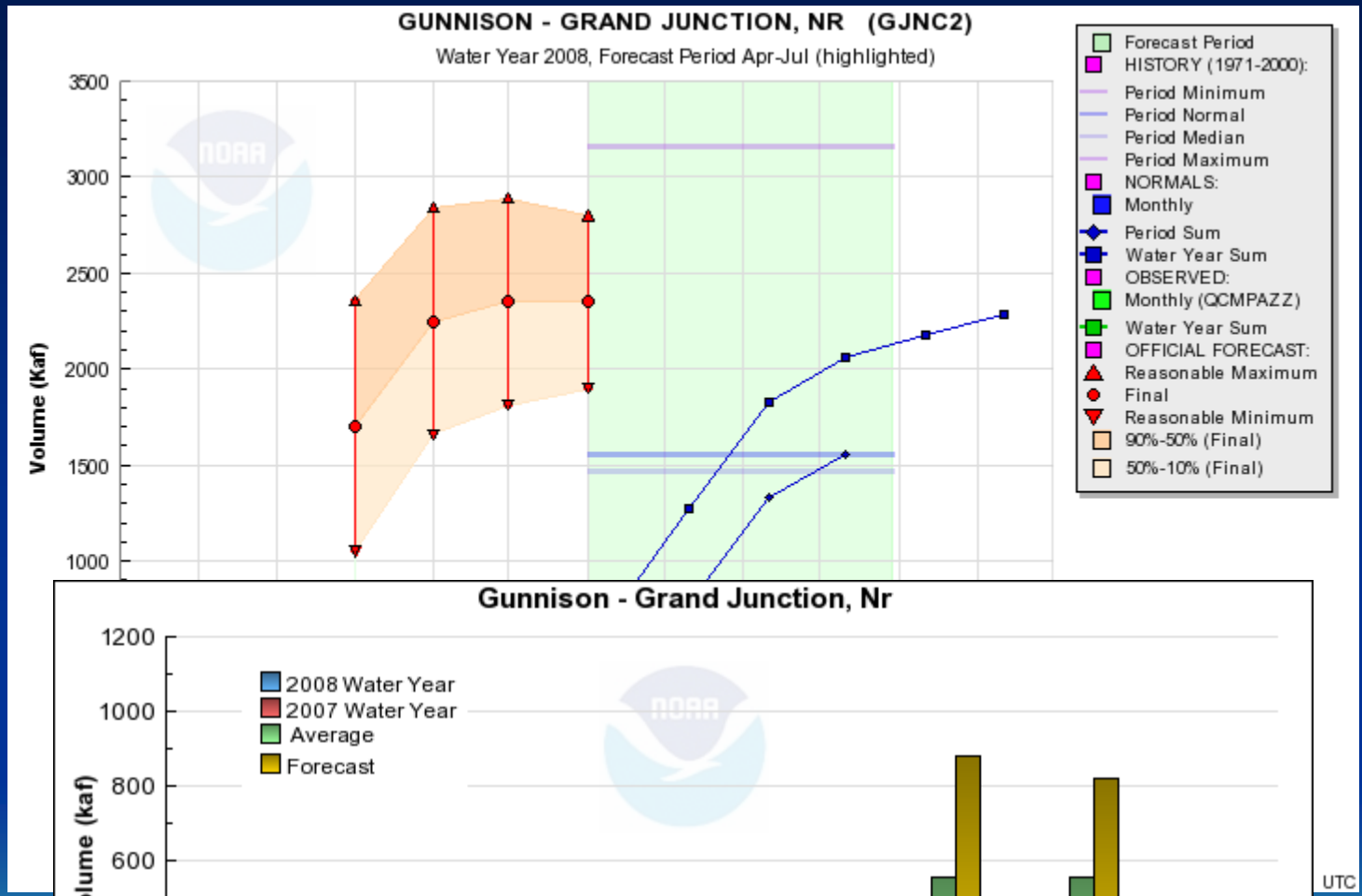
Overview of Monthly Conditions



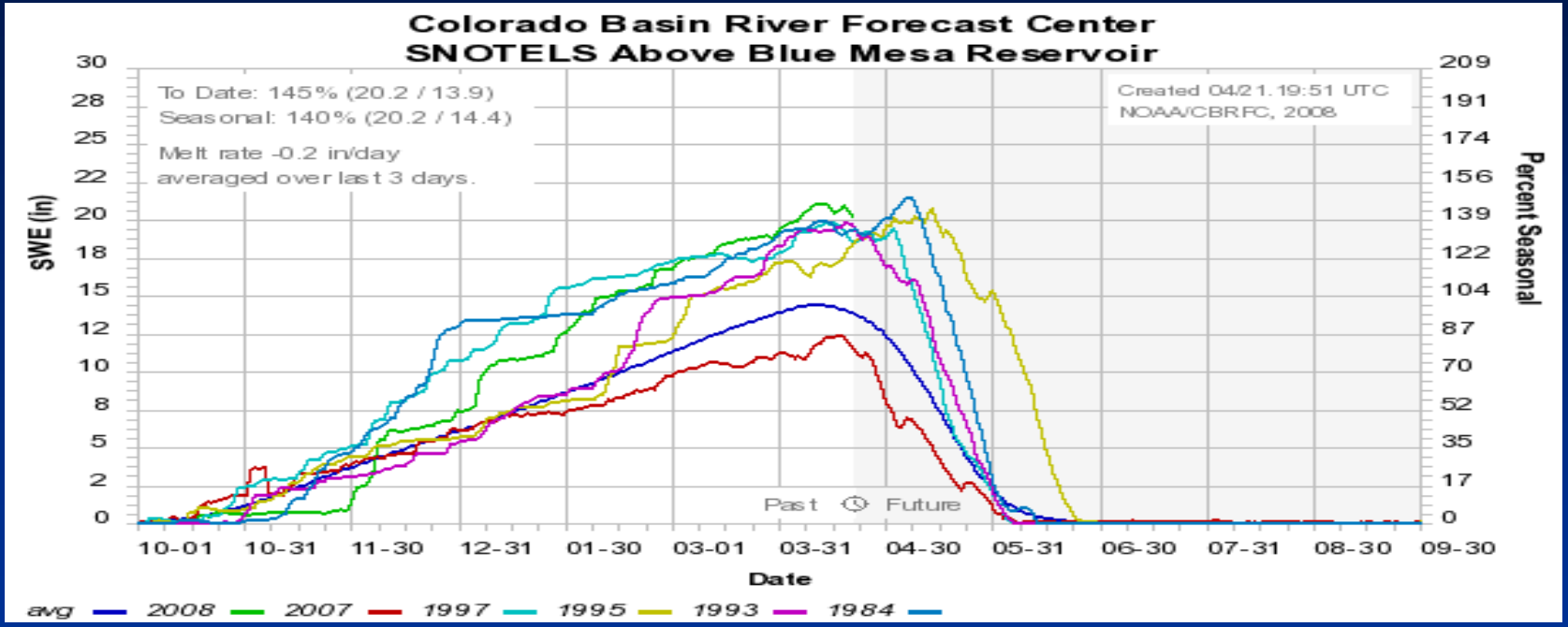
Blue Mesa Forecast



Grand Junction Forecast

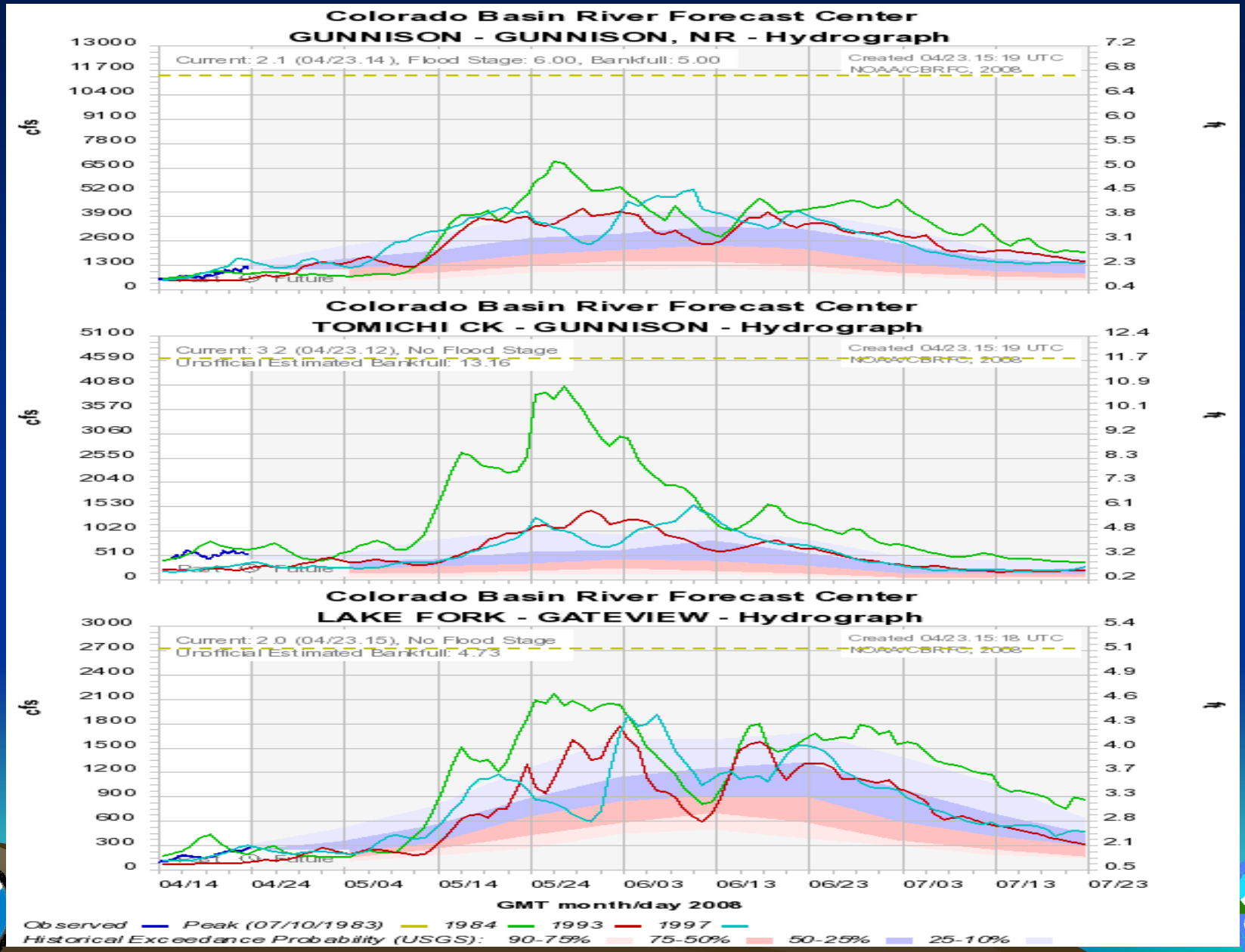


Forecast Compared to Previous Years



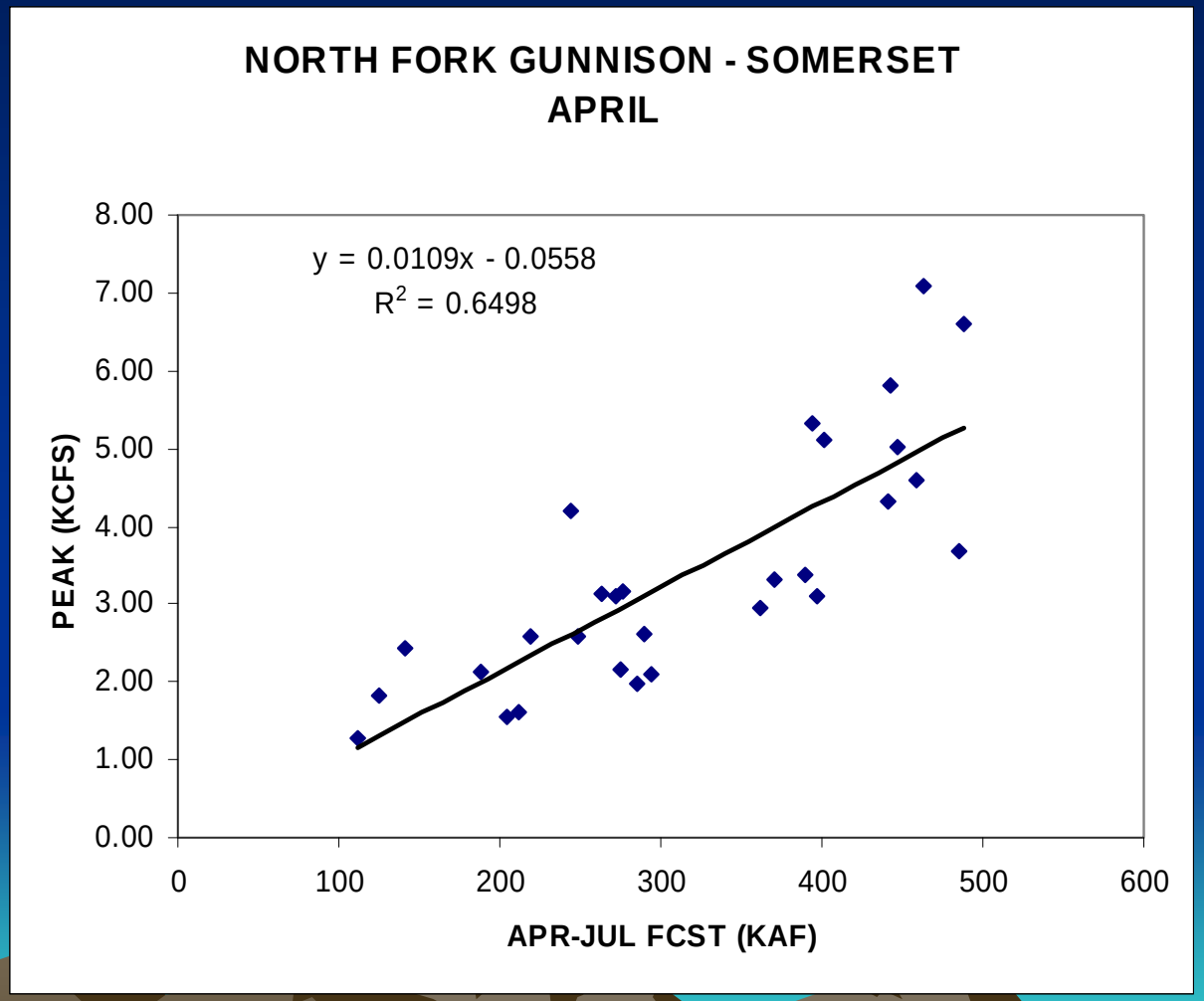
Rank	Year	Apr-Jul kaf	%Avg 720kaf
1st	1984	1433	199%
6th	1993	985	137%
2nd	1995	1242	173%
3rd	1997	1061	147%
4th	***2008***	***1060***	***147%***

Peak Flows into Blue Mesa

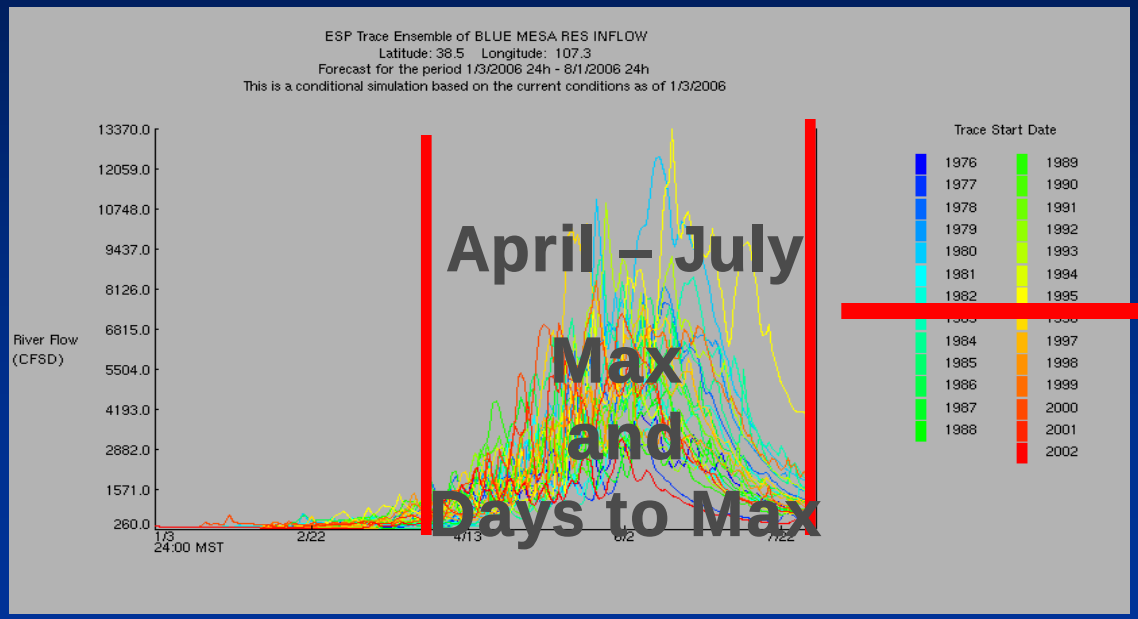


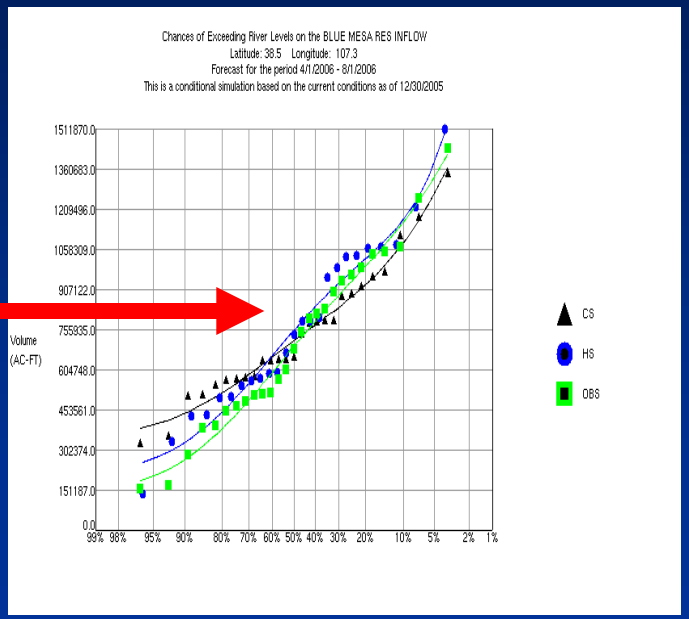
Peak Flow

Peak Regression Curves



Ensemble Streamflow Prediction (ESP)





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# Exceedance Probabilities	Conditional Simulation	Historical Simulation	Historical Observed
0.900	1211,872	411,390	441,854
0.750	1215,586	579,781	610,528
0.500	1219,720	848,439	874,053
0.250	1223,868	1241,587	1251,326
0.100	1227,619	1749,794	1729,010

North Fork Gunninson Peaks

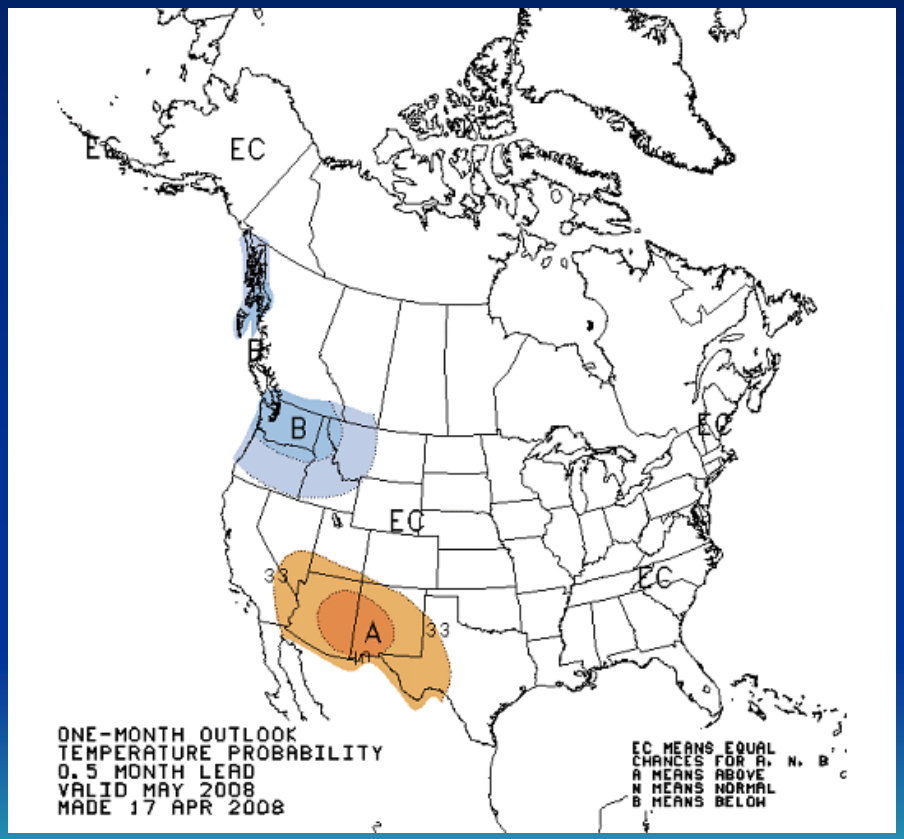
www.cbrfc.noaa.gov/product/peak/peak.cgi

Exceedance Prob.	**90%**	**75%**	**50%**	**25%**	**10%**
Somerset: average peak 3,310 cfs between 5/11 & 6/2					
CFSD	4000	4400	4900	5400	5900
Date of Peak	5/14	5/17	5/23	5/28	6/4
Cedaredge: average peak 210 cfs between 5/3 & 6/8					
CFSD	230	265	310	360	410
Date of Peak	5/14	5/18	5/23	5/29	6/5
Delta (minus flow from Crystal):					
CFSD	6000	6500	7200	8000	8750
Date of Peak	5/14	5/17	5/23	5/28	6/4

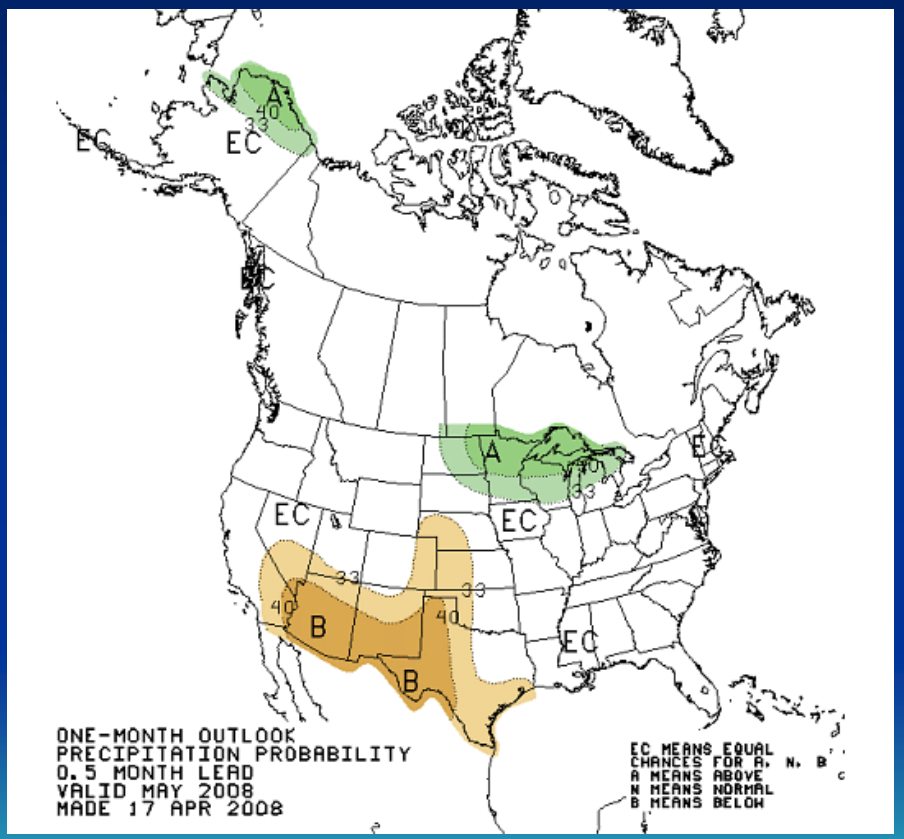
Climate Forecast

Climate Forecast

1 Month Temperature Forecast

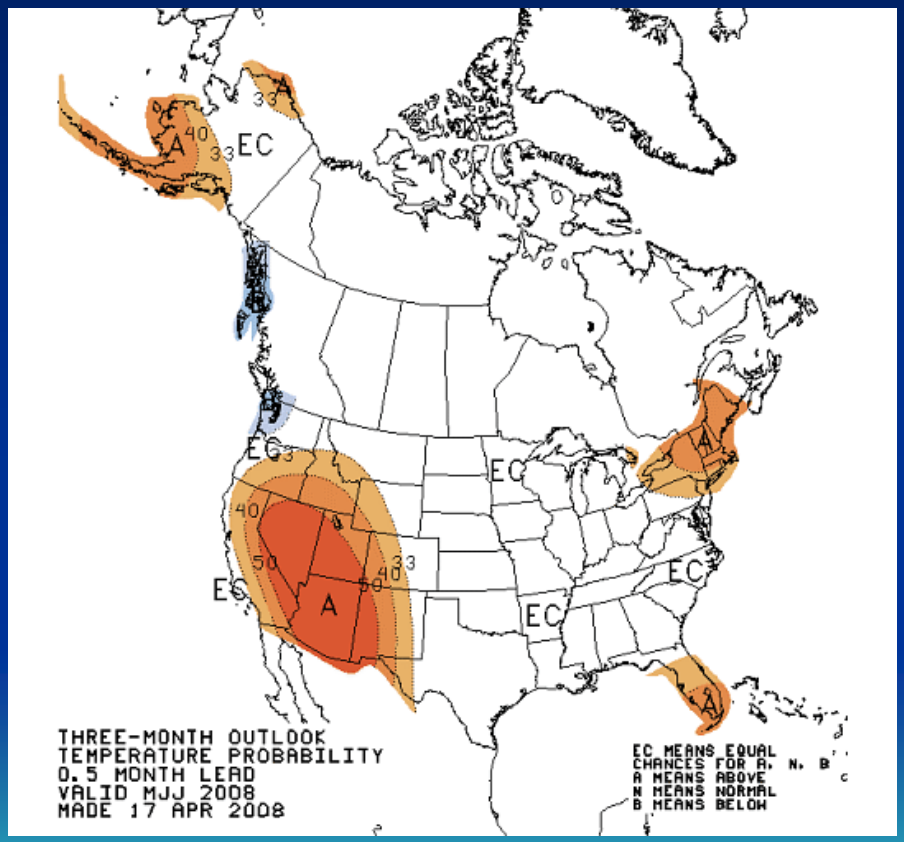


1 Month Precipitation Forecast

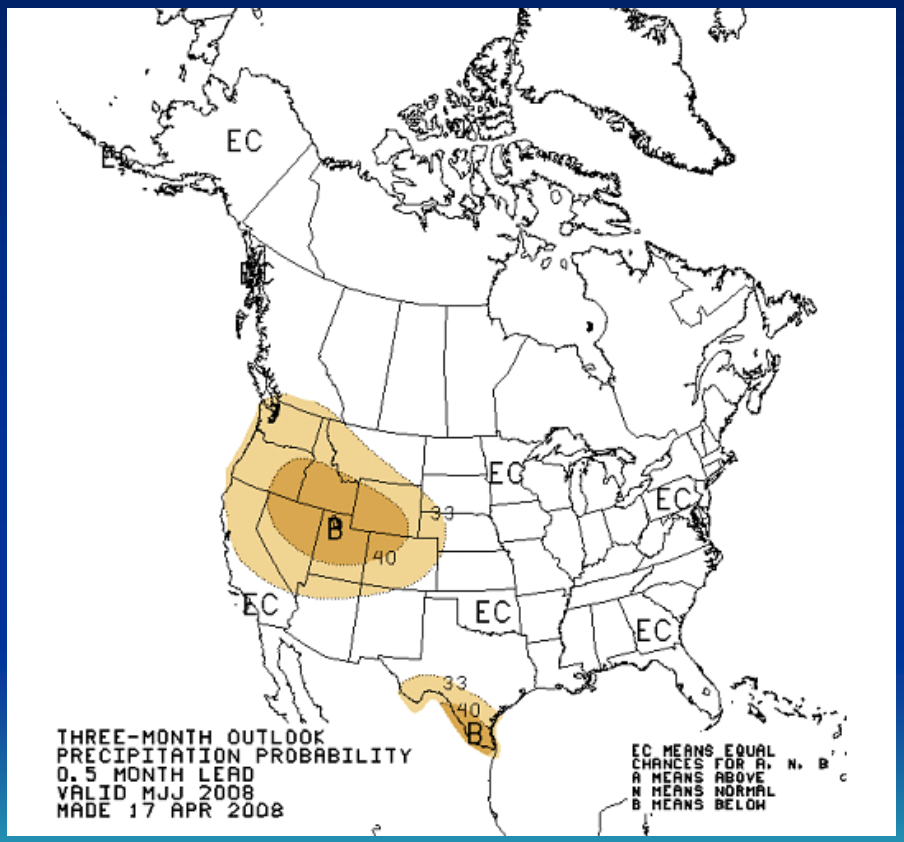


Climate Forecast

3 Month Temperature Forecast



3 Month Precipitation Forecast



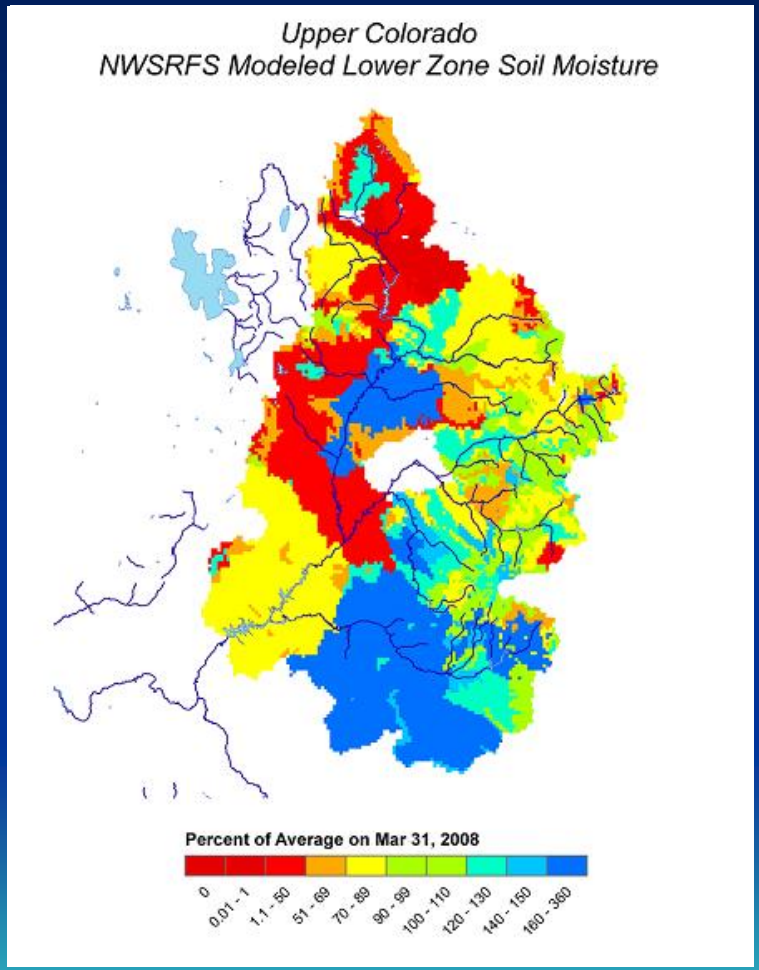
Improvements / New Tools

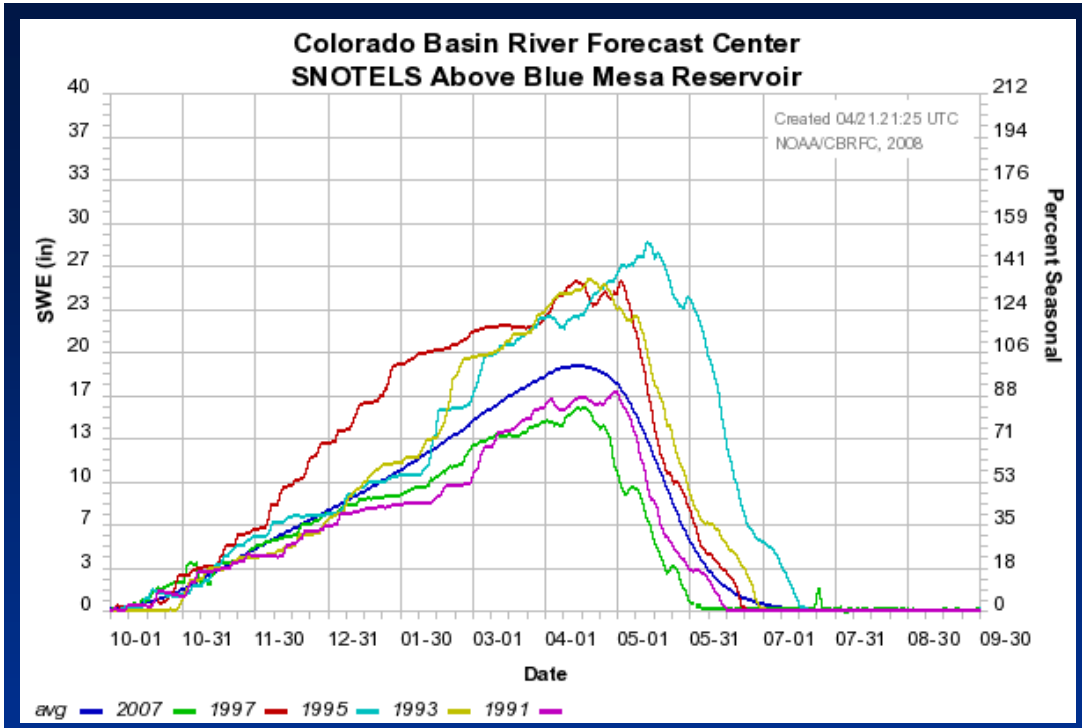
Current:

- Added 2003 to 2005 data to ESP historical time series. Full ESP period now Water Years 1976 to 2005.
- New technique for looking at soil moisture

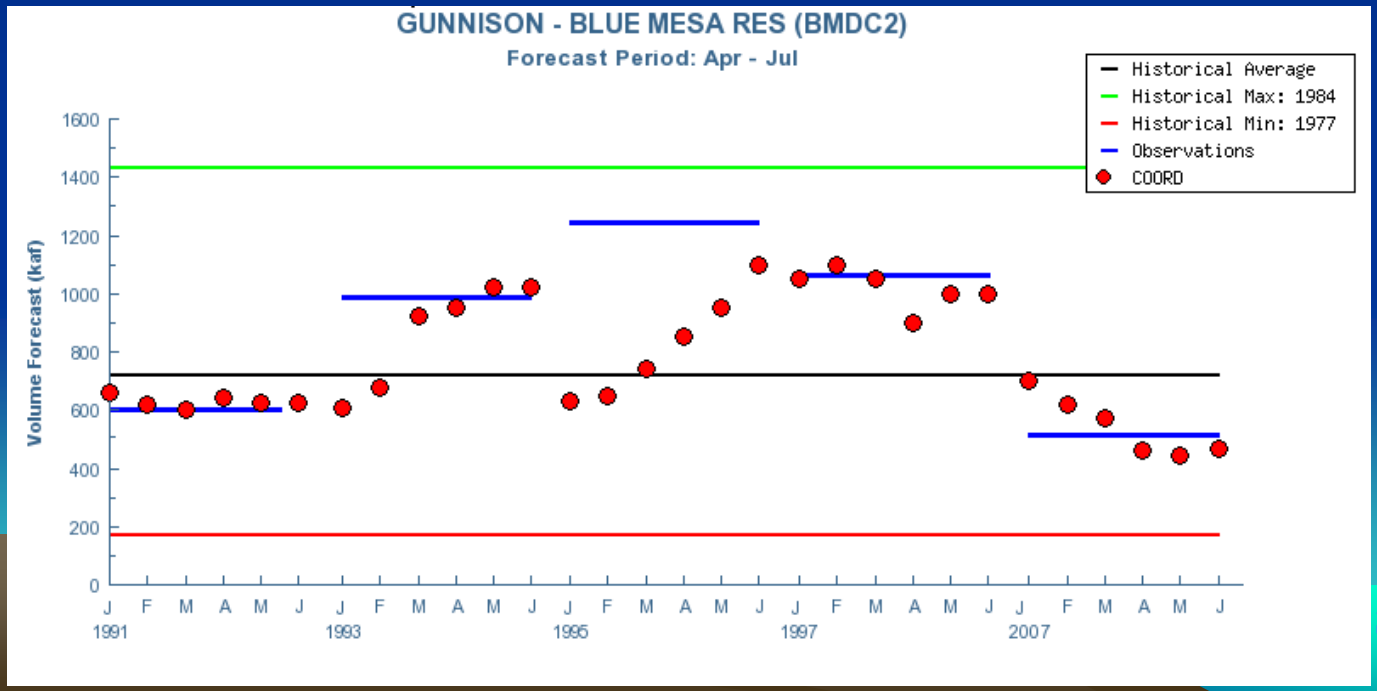
Future:

- CHPS (Community Hydrologic Prediction System)
- Verification Tools





www.nwrfc.noaa.gov/westernwater



Contact Information

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