



NWS

# Who We Are ... Colorado Basin River Forecast Center



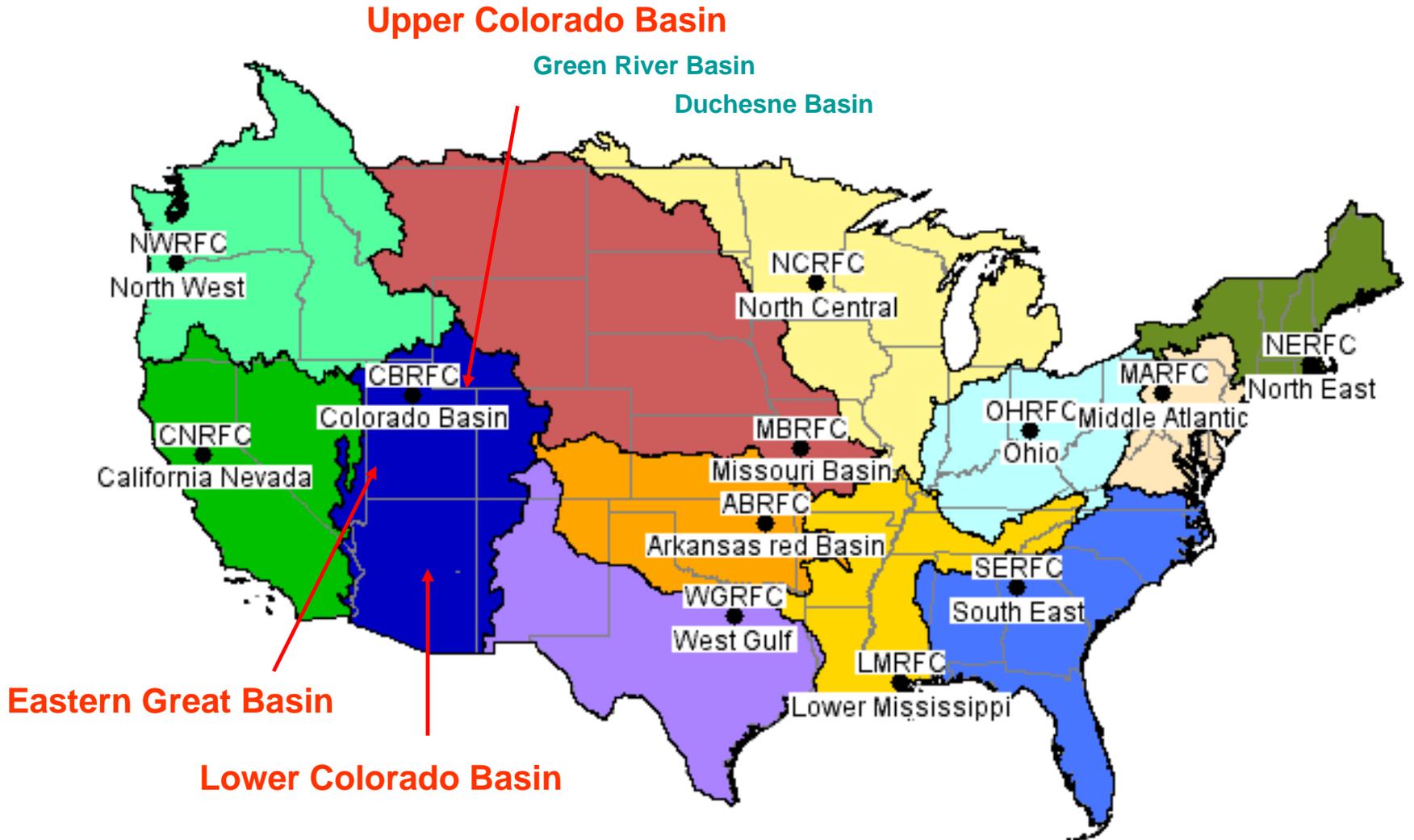
**National Oceanic Atmospheric  
Administration**

**National Weather Service**

**Colorado Basin River Forecast Center**



# Location: Salt Lake City, Utah





**NWS**

# Mission

**Warnings:** Support Grand Junction & SLC Weather Forecast Offices



**Flash Flood Guidance/Warnings**

**Continuous Updates of  
the Hydrologic Situation**



**River Forecasts/Warnings**



**Recreational Forecasts**



**Water Supply/Management**

## Focus Today: Peak Flows – Threat of Snow Melt Flooding This Spring

**What do we look at when evaluating expected peak runoff ?**

**(physical parameters / methods of analysis)**

Main Players:

Snowpack (We Have This!)

Future Precipitation / Snow

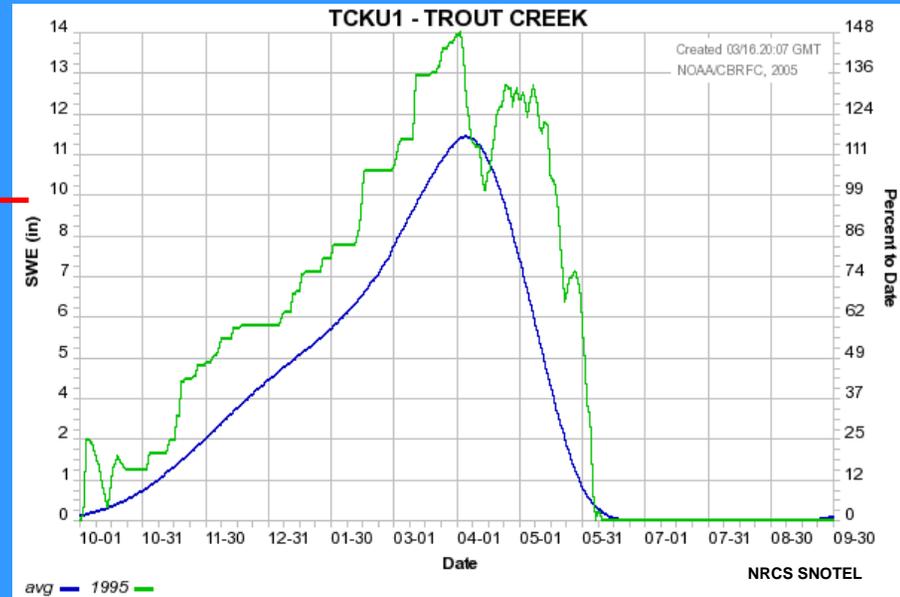
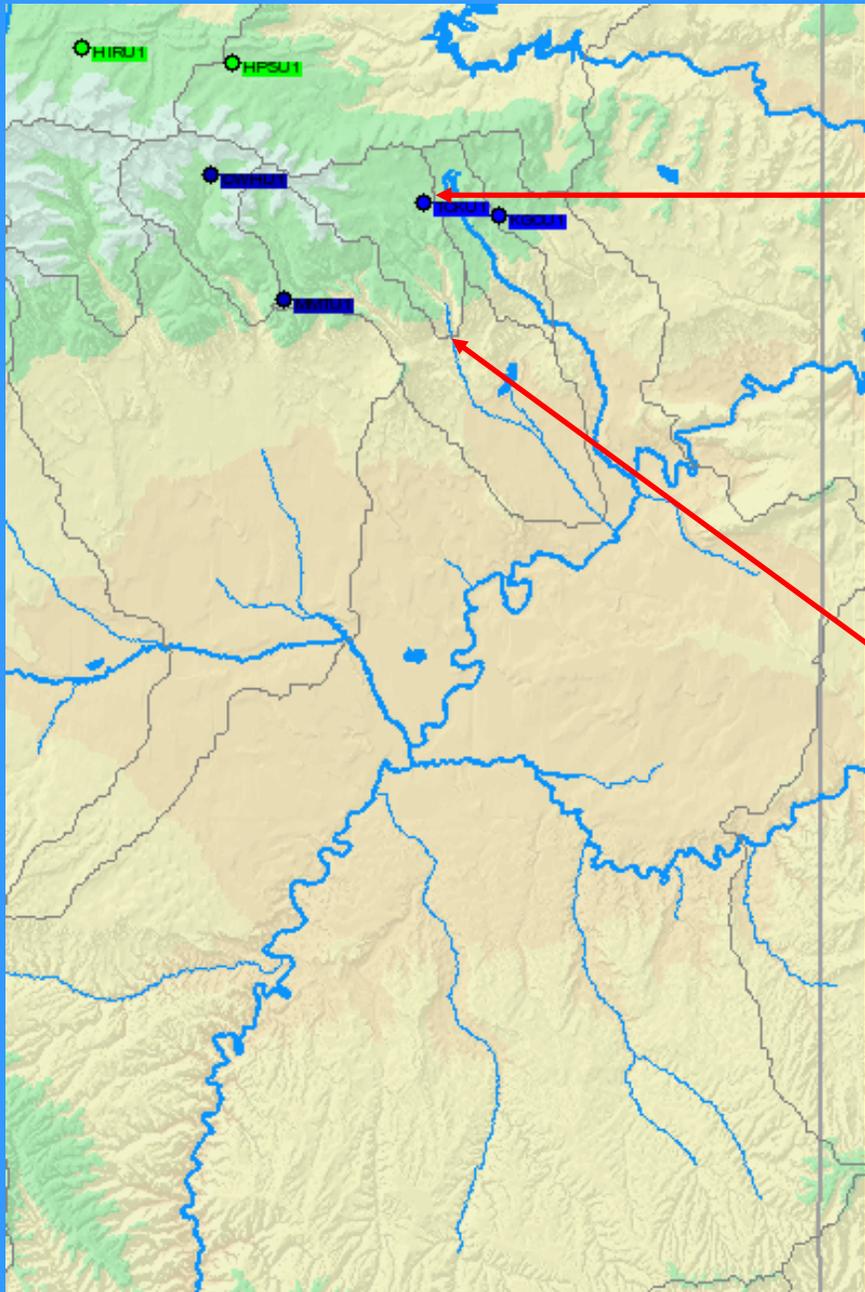
Future Temperature (How fast does the snow come off)

Soil Moisture

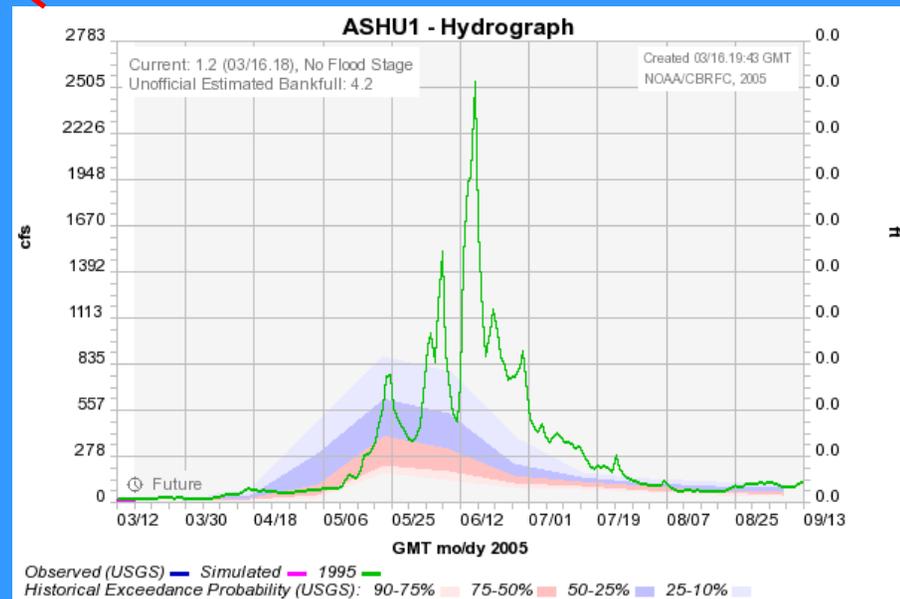
**(1) Historical Observations/Climatology: (Regression Methods)**

**Comparing: Historical Snowpack to Historical Peaks**

**Comparing: Historical Seasonal Volumes to Historical Peaks**



**1995**



## Focus Today: Peak Flows – Threat of Snow Melt Flooding This Spring

What do we look at when evaluating expected peak runoff ?

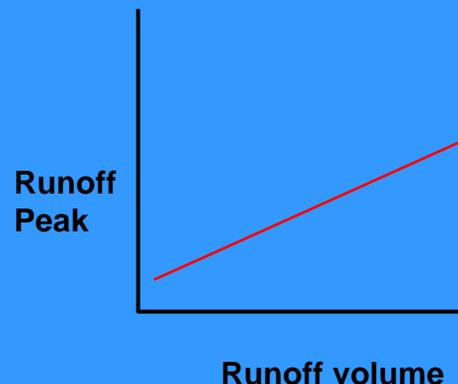
(physical parameters / methods of analysis)

### (1) Historical Observations/Climatology: (Regression Methods)

Comparing: Historical Snowpack to Historical Peaks

Comparing: Historical Seasonal Volumes to Historical Peaks

	April-July volume (acre-ft)	Peak Flow Mean-Daily-CFS	
1983	94,000	1670	June 19
1995	99,000	2530	June 16
1998	74,000	1130	May 22
1999	52,000	1250	May 26
2000	41,000	950	May 6



## Focus Today: Peak Flows – Threat of Snow Melt Flooding This Spring

**What do we look at when evaluating expected peak runoff ?**

(physical parameters / methods of analysis)

**(2) Account For All “Drivers” affecting peak flow**

**Initial Watershed Conditions**

**Antecedent Flow - Persistence**

**Soil Moisture State**

**Carryover Effect in Protracted Wet/Dry Period**

**Snow Pack**

**Reservoir Status (If Regulated Flow)**

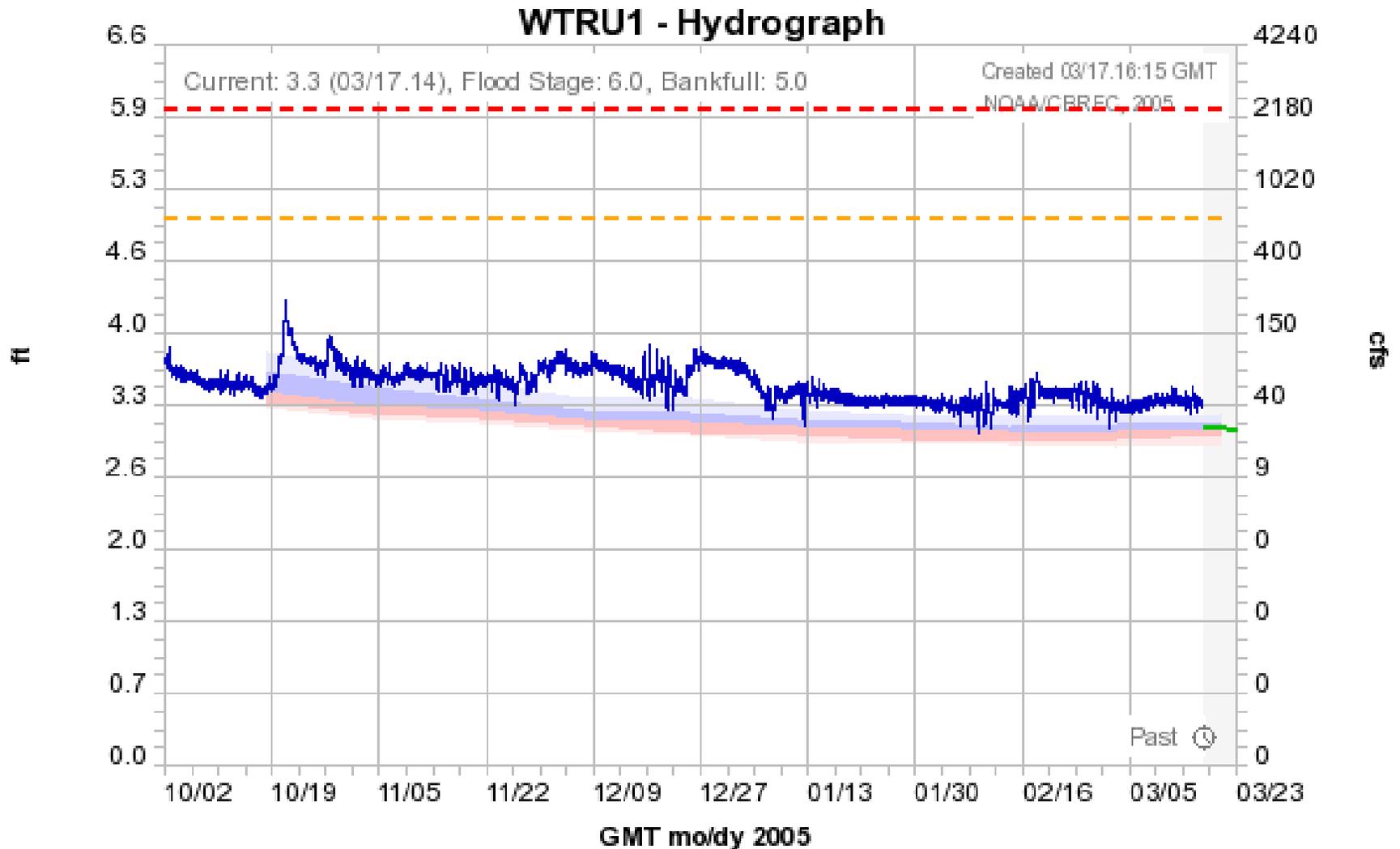
**Future Weather/Climate Variability**

**Climate Indices/Climate Forecast Models**

**El Nino Pattern?**

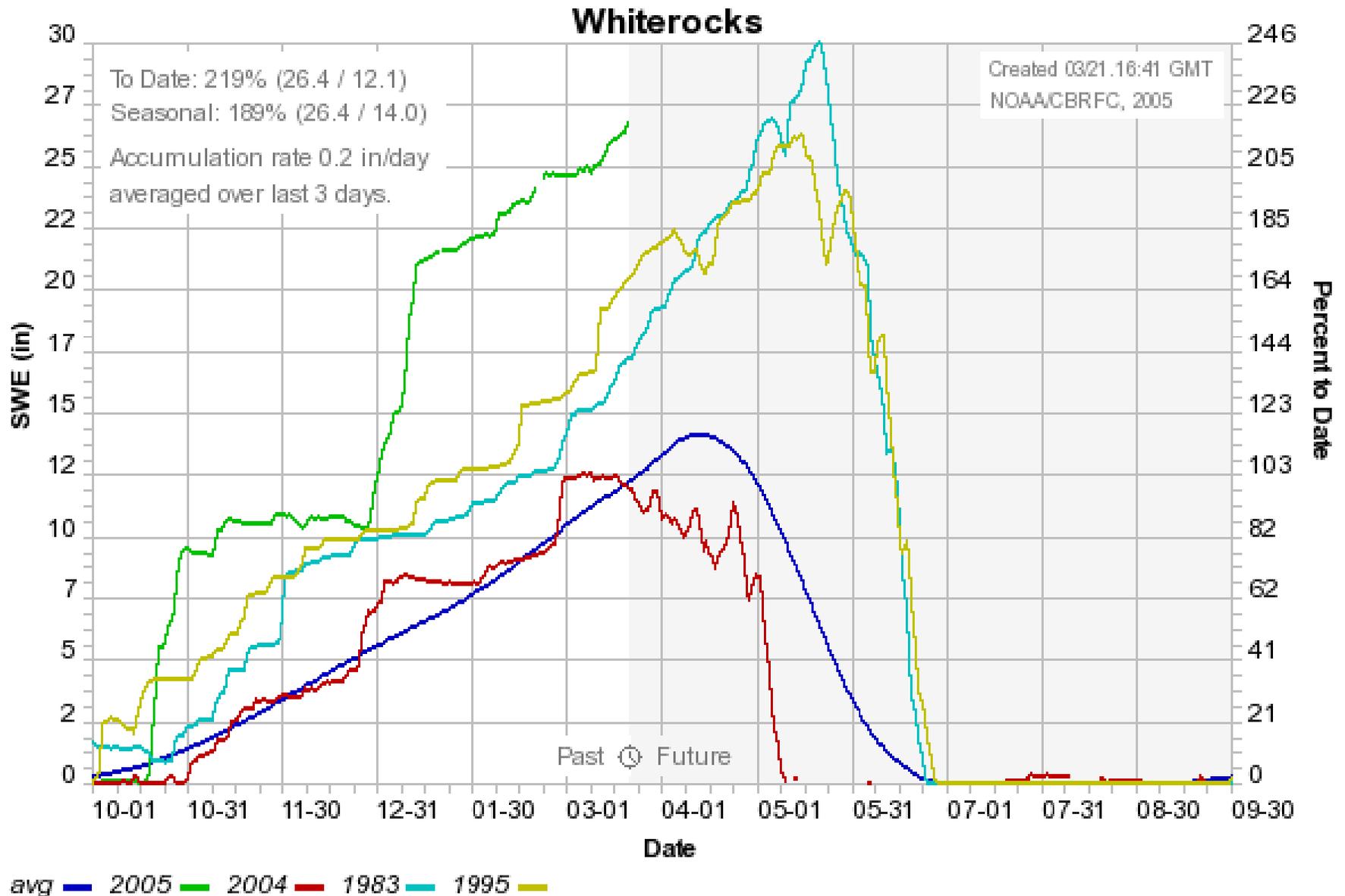
**Requires a more sophisticated method – Continuous Hydrologic Model**

# Initial Watershed Condition: Antecedent Flow for Whiterocks



Observed (USGS) — Forecast (03/17.14:00) — Bankfull 5.0 — Flood 6.0 —  
Historical Exceedance Probability (USGS): 90-75% 75-50% 50-25% 25-10%

# Initial Watershed Condition: Snowpack

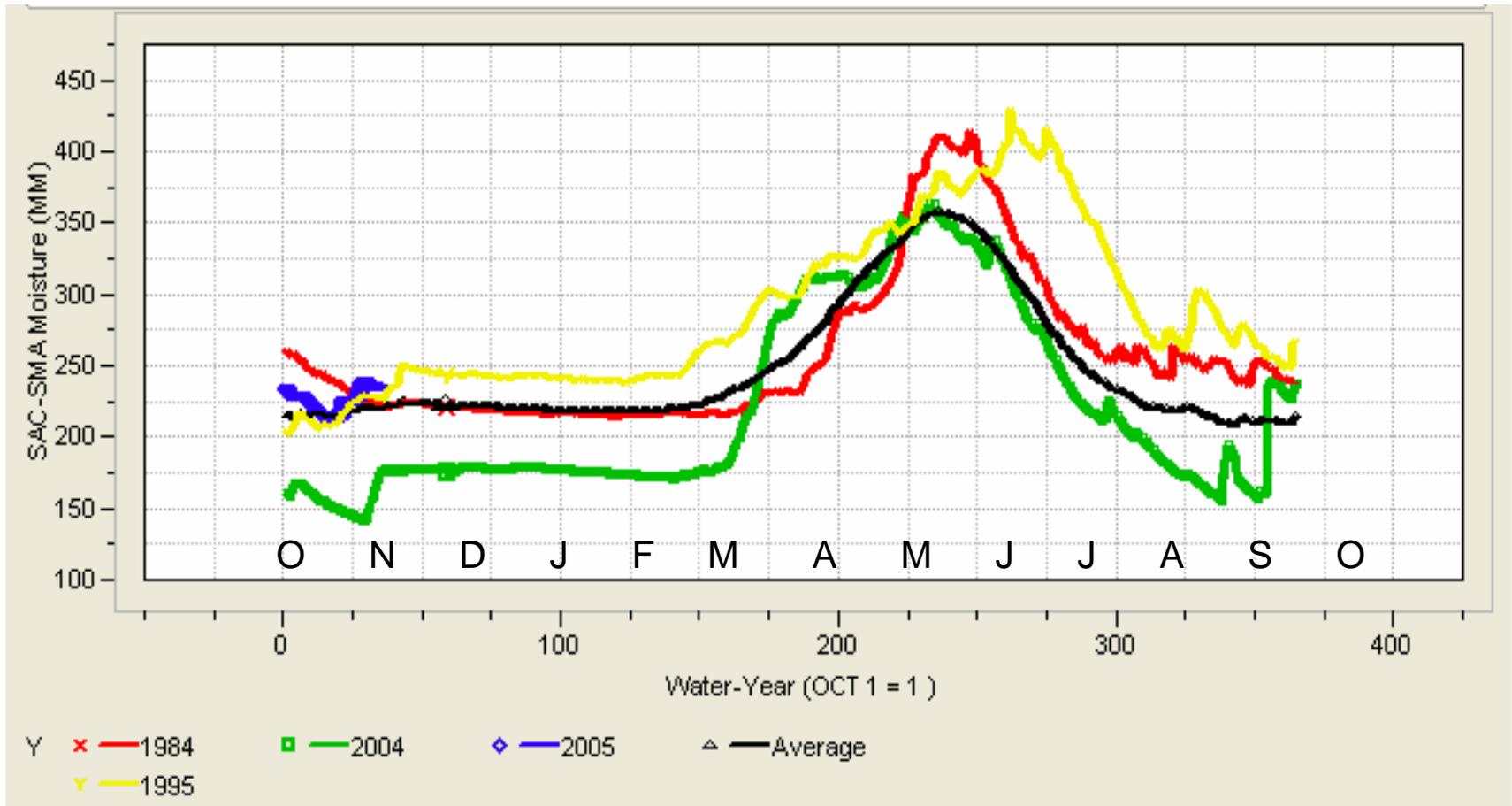


## Initial Watershed Condition: Soil Moisture

No Basin Wide/Historical Soil Moisture Network

Use: Soil Moisture Accounting Model

Sacramento Soil Moisture Accounting Model



# Peak Flow From A Continuous Hydrologic Model

Initial Conditions  
Stages  
Soil/Snow  
States

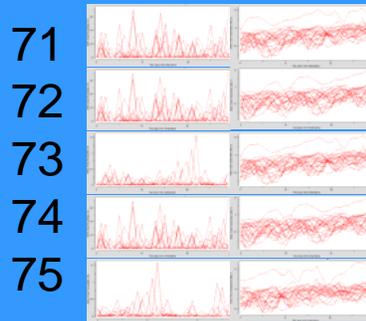
Meteorological Models:  
3 days forecast precipitation  
10 days forecast temperature

Flow Traces

1971  
1972  
1973  
1974  
1975

Past <- -> Future Time

Model continuously fed data from a variety of precipitation, snow, temperature networks.



**Climate Model Forecasts:**  
**Adjust forecast traces based on future climate expectations.**

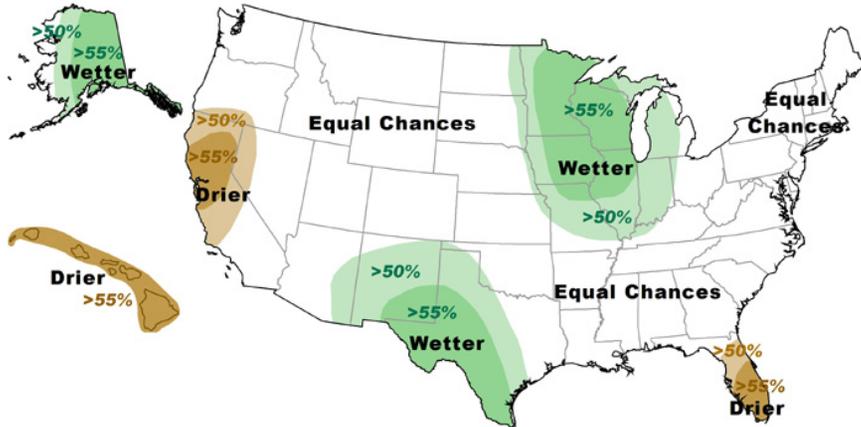
Historical Precip/Temps for Past Years  
Creates a Flow for Each Year



## Precipitation Outlook

April - June 2005

Conditions Compared to 1971-2000 Normal



## Future Climate

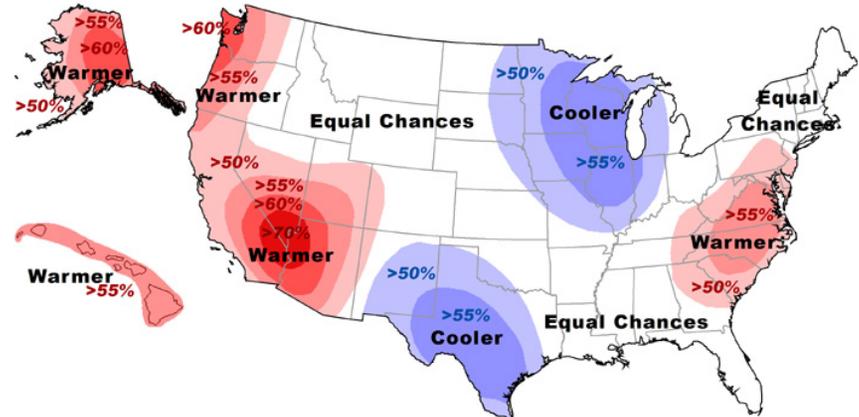
## Climate Prediction Center / NOAA



## Temperature Outlook

April - June 2005

Conditions Compared to 1971-2000 Normal

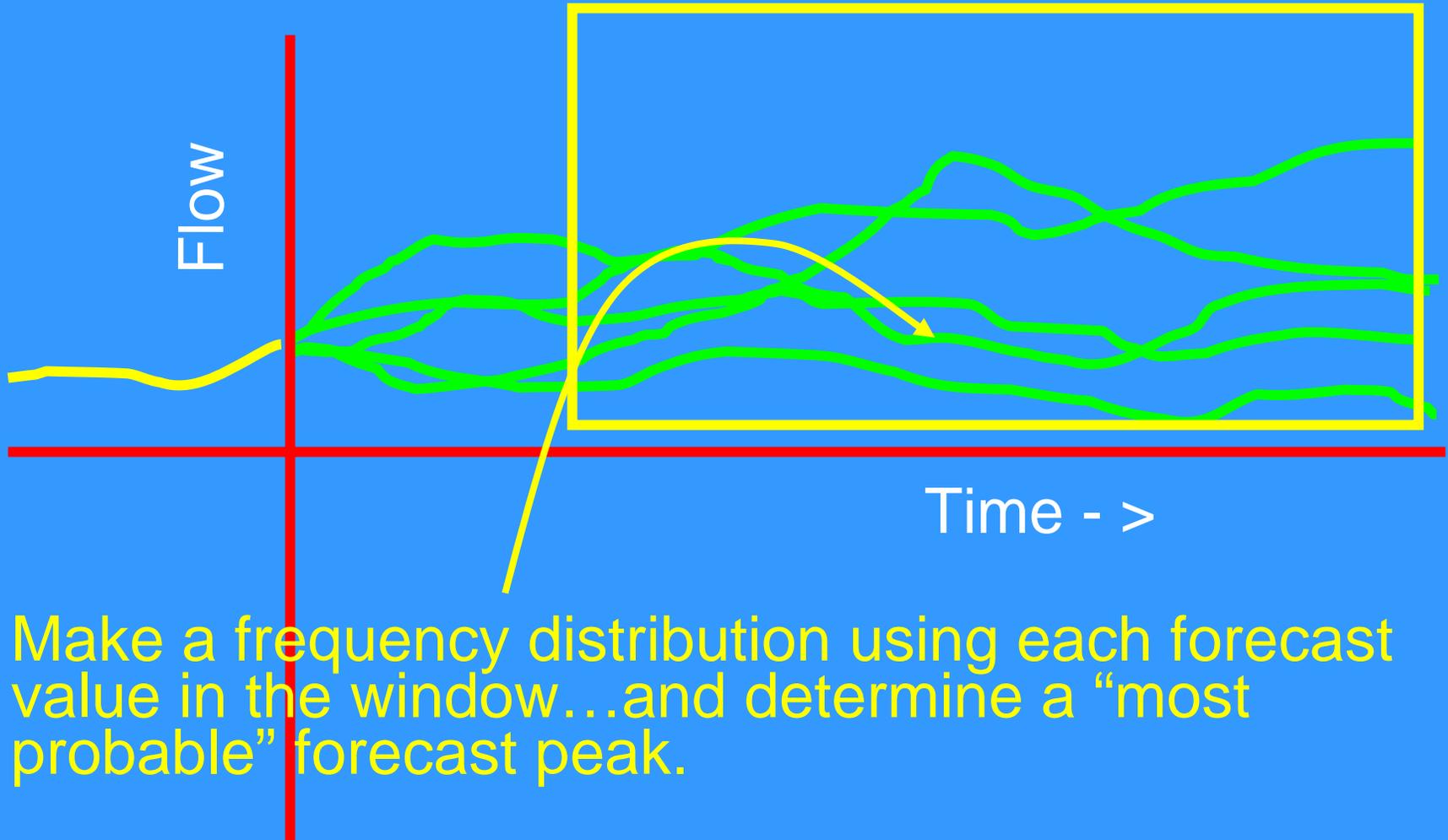




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# Making A Peak Flow Forecast

## Peak Flow Window

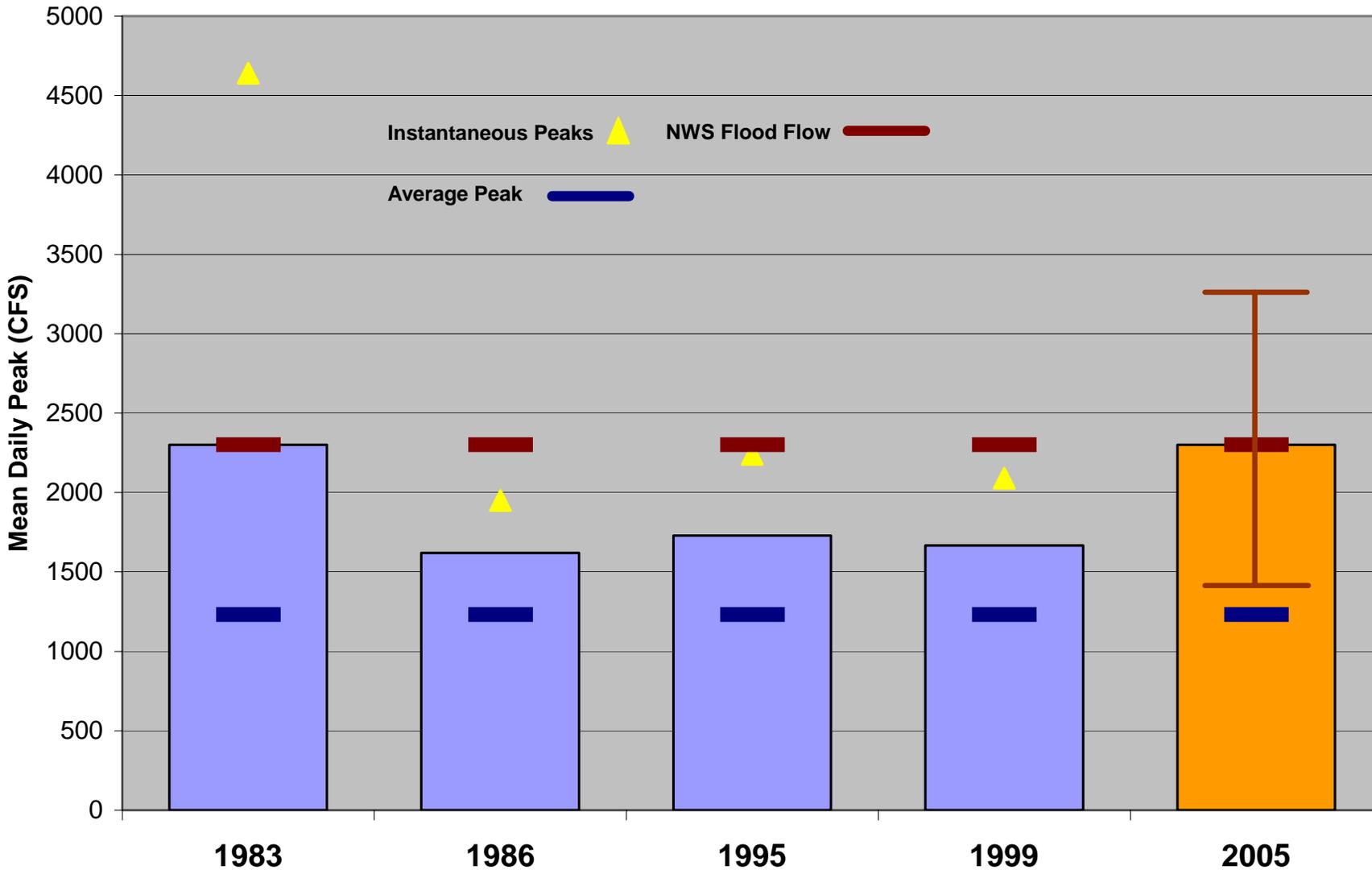


Make a frequency distribution using each forecast value in the window...and determine a "most probable" forecast peak.



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# Whiterocks River near Whiterocks



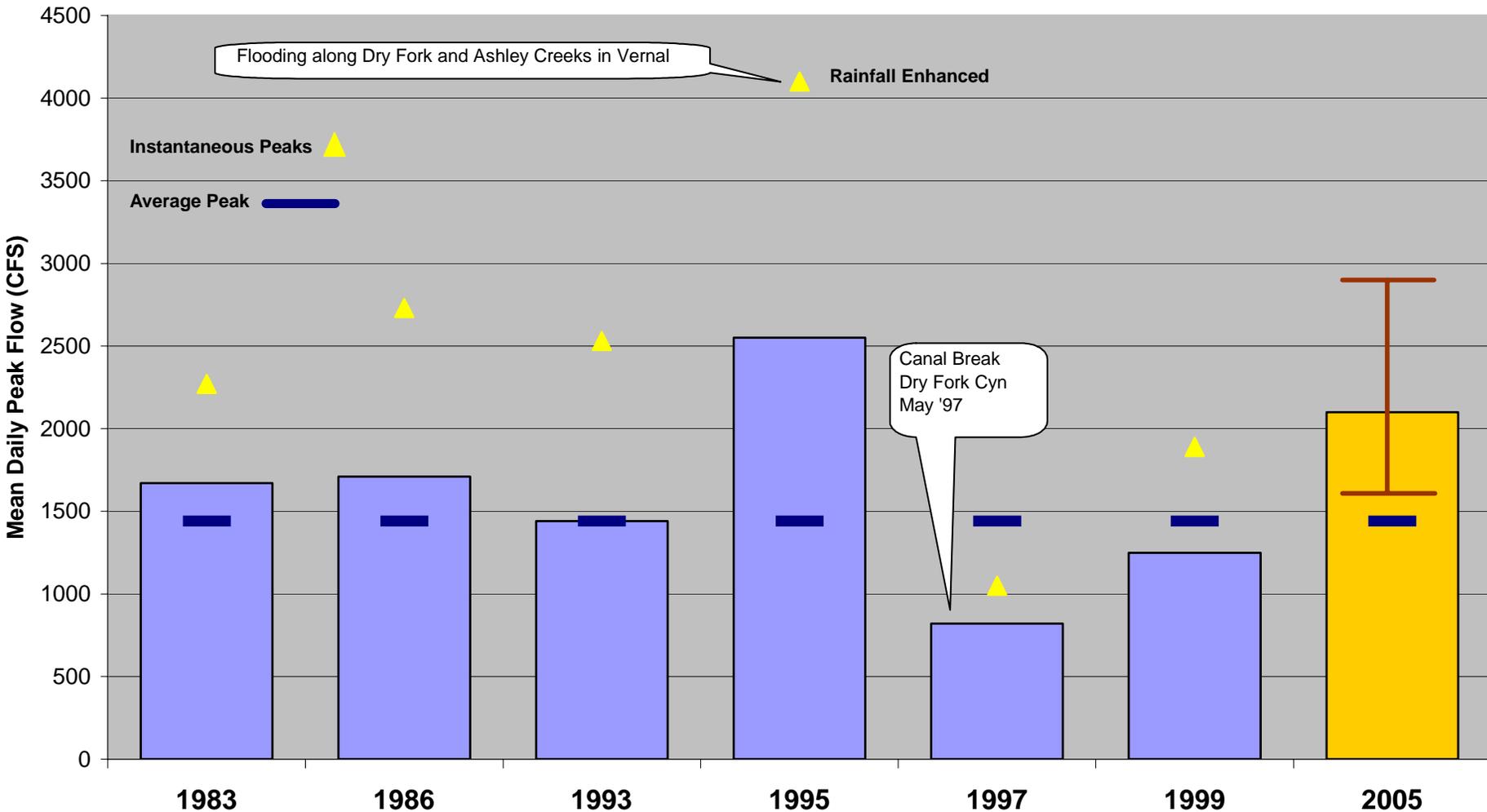


NOAA

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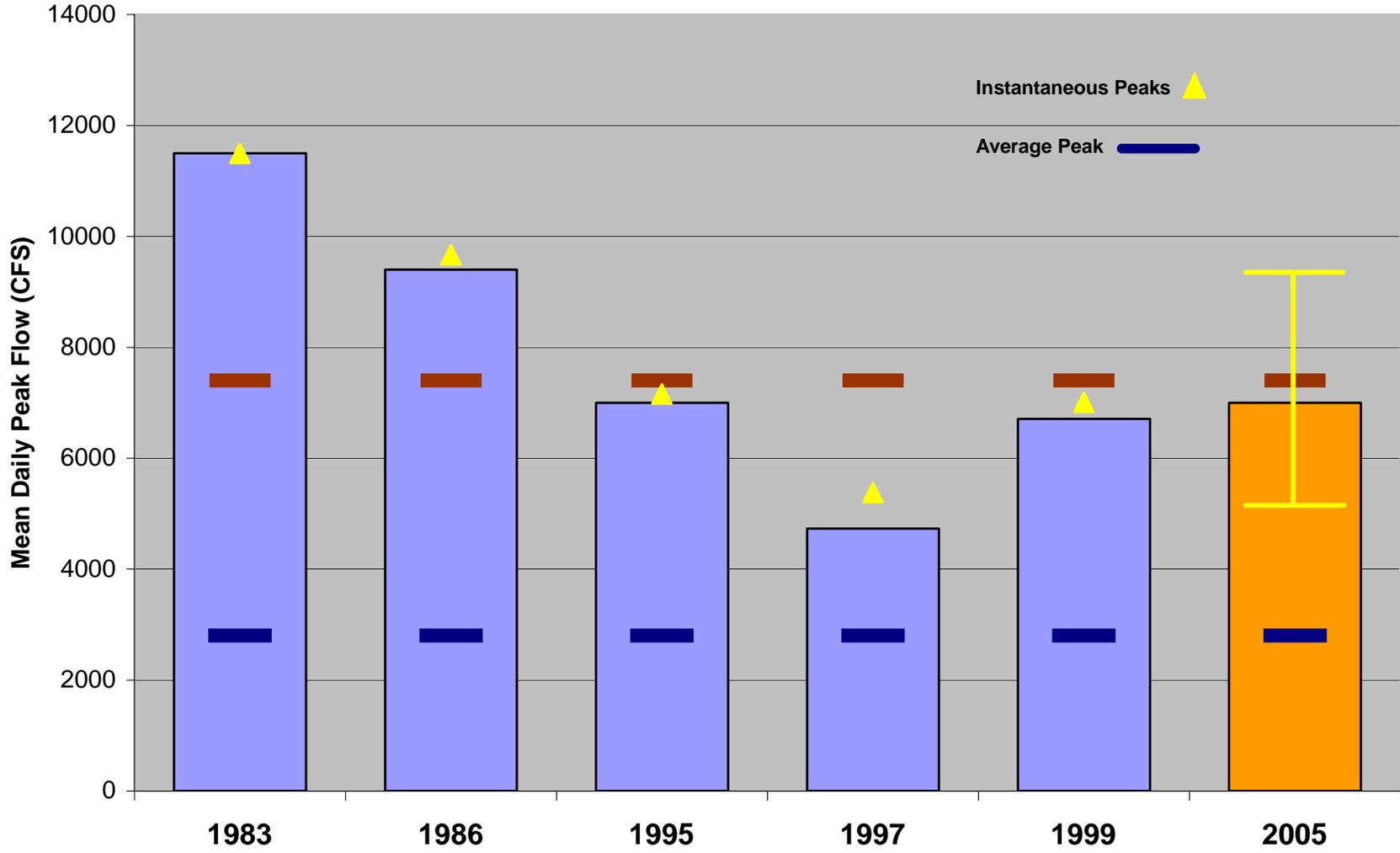
# Ashley Creek near Vernal





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# Duchense River near Randlett

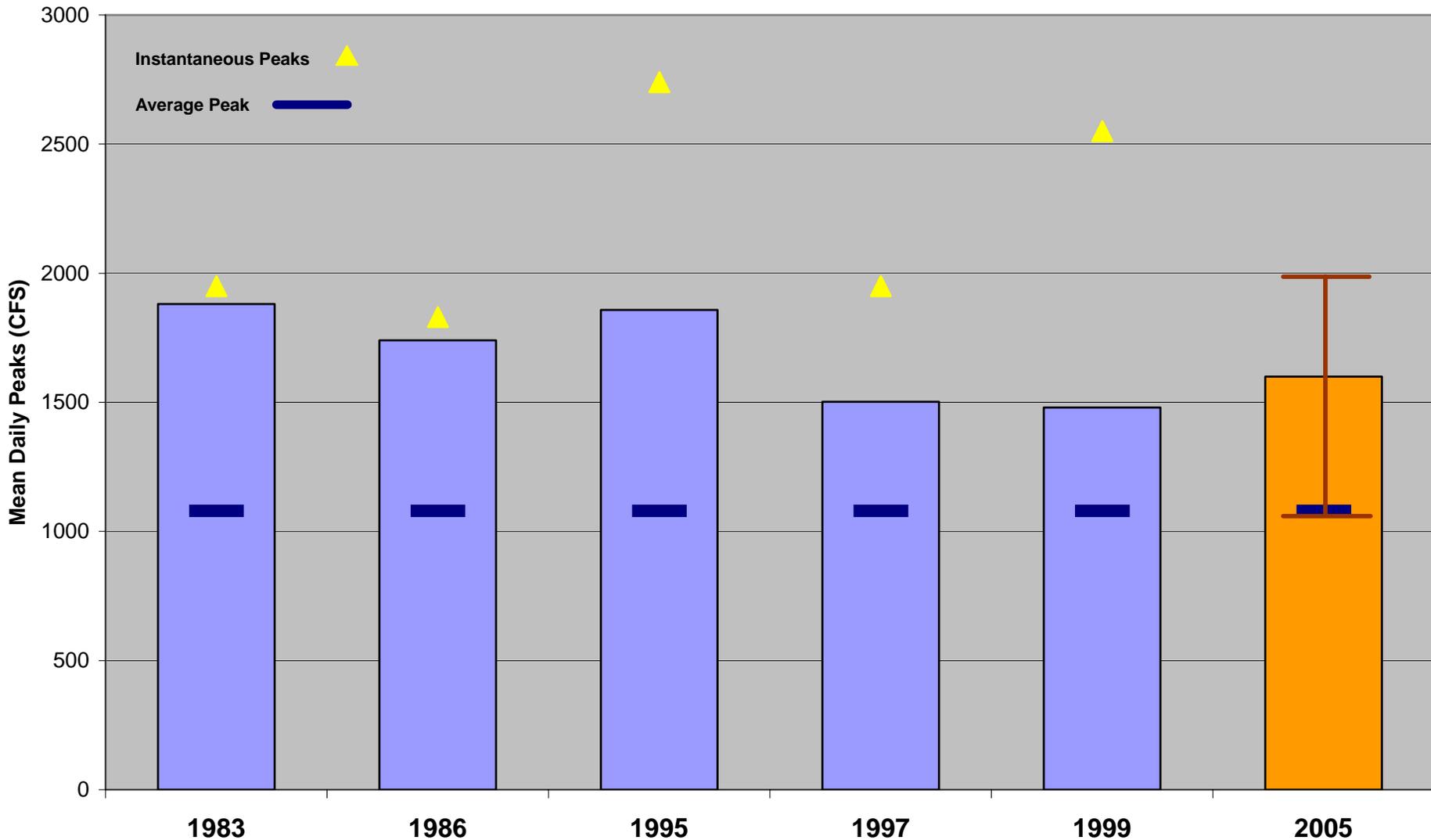


— NWS Flood Flow ▲ inst peaks



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# Lake Fork abv Moon Lake



## Bottom Line: The Flood Threat Is Significant

**Some flood related problems are possible on all Uinta south slope streams from Lake Fork east.**

**The most likely areas for flood related problems include Whiterocks, Farm Creek, Ashley Creek, Dry Fork and the Duchesne near Randlett.**

**Areas that experienced flood related problems in 1995 and 1999 will be the most susceptible this year.**

**The flood threat can be alleviated some with “moderate” warming, little or no addition to the snowpack, and no significant delay to the onset of the snow melt.**

**A delay in the onset of snowmelt into late spring (mid May or later) will increase the flood threat.**

**Any significant rain during the runoff period will have a pronounced affect on the magnitude of the streamflow.**



### Water

- River Forecasts & Data
- River Watches & Warnings
- Internal Forecast Products
- Flood Outlook & Guidance
- Recreational Forecasts
- Advanced Hydrologic Prediction Service
- Reservoirs
- Water Supply
- Snowmelt Peak Flow Data
- Webcat
- DamBreak

### Weather

- Snow
- Precipitation
- Temperature
- Freezing Level
- Text Data Products

### Climate

- Data and Indices
- Forecasts
- El Nino and MJO
- Hydroclimatology

### About the CBRFC

- Visitor Information
- Address
- Staff
- History
- Papers
- Presentations
- Projects
- Reports
- Notices
- Contact Us

### Links

- River Forecast Centers
- CBRFC Weather Offices
- NWS Regional Offices
- Data Sources

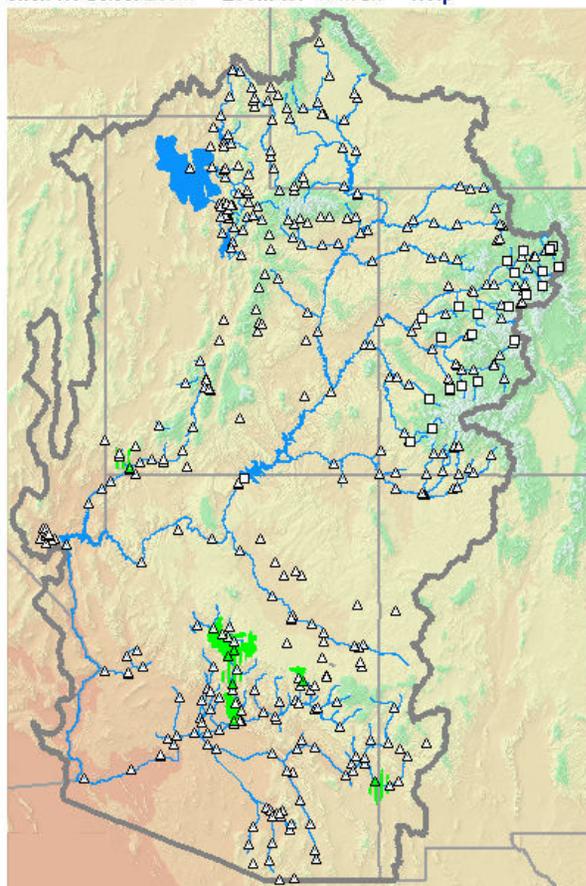
## River Forecasts & Data

Forecasts on this web page are not official and should be used only as guidance.  
**Official warnings and forecasts can be found here.**

Legend. Map data updated 03/21.18:54 GMT, 03/21.11:54 MST. Click map to zoom.

Data Type: [River Forecasts](#) | [Reservoirs](#) | [Recreational](#) | [Snow Conditions](#)

Click to: [Select Zoom](#) [Zoom to: 1x 4x 8x](#) [Help](#)



### Legend

#### Basin Conditions

- 1 = Normal, 0 = No Data
- 2 = Significant Rise
- 3 = Near Bankfull
- 4 = Above Bankfull
- 5 = Above Flood Stage
- Observed (Solid)
- Simulated (Striped)

#### Station Types

- AHPS Point
- Forecast Point
- Data Point

#### Quick Plot

NWS ID

#### Display Options

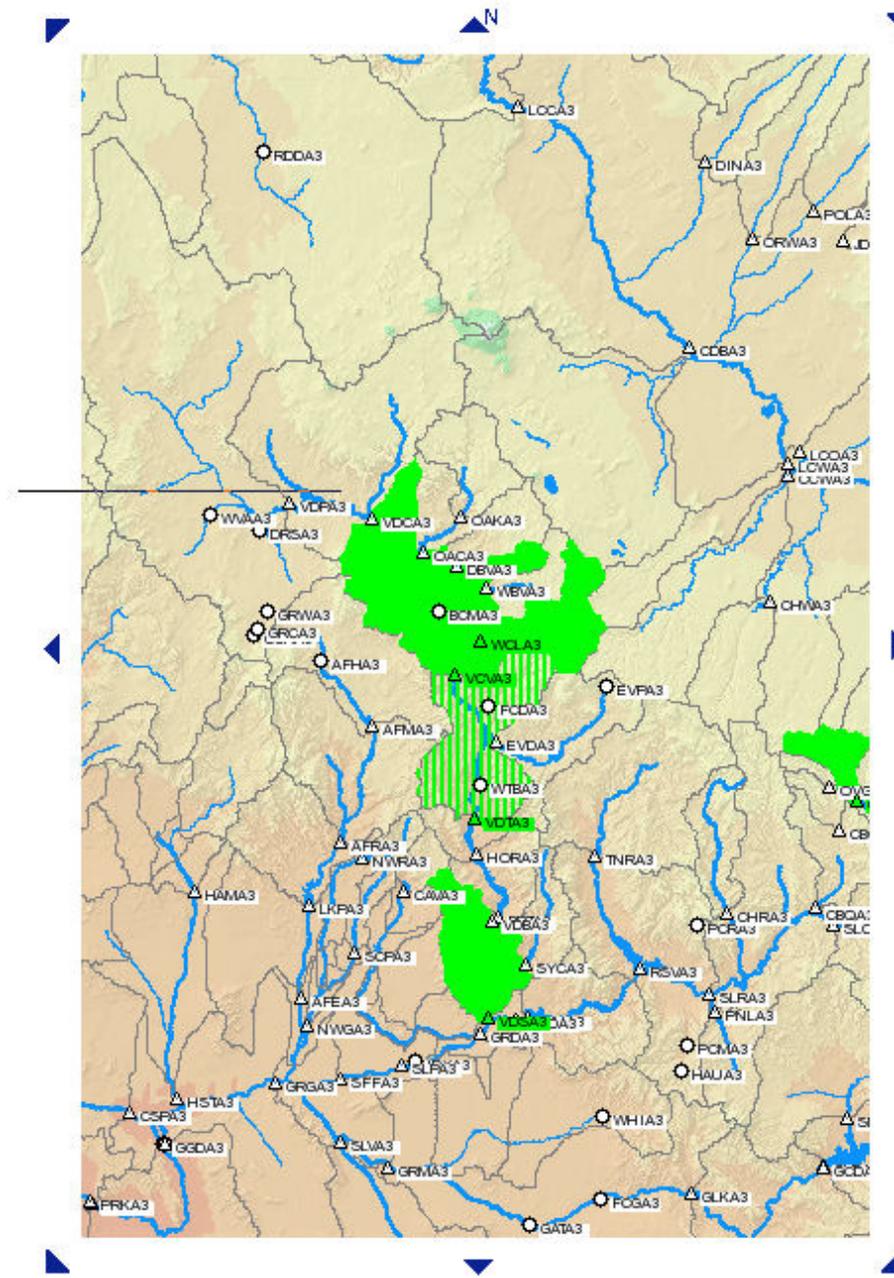
- Topography
  - States
  - RFC
  - Rivers
  - HSAs
  - Basins
  - Basins Above Normal
  - Data Points
  - Forecast Points
  - AHPS Points
  - Stations Above Normal
  - Station Labels
-

# River Forecasts & Data

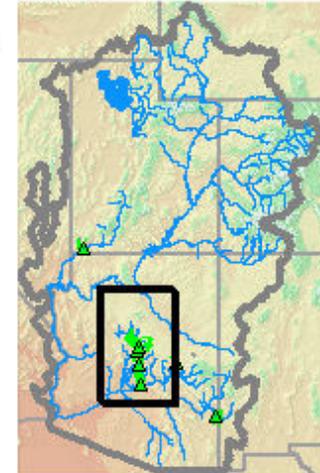
Legend. Map data updated 03/21.18:54 GMT, 03/21.11:54 MST. Place cursor over point for info, click point to select.

Data Type: [River Forecasts](#) | [Reservoirs](#) | [Recreational](#) | [Snow Conditions](#)

Click to: [Select Zoom](#) Zoom to: 1x 4x 8x [Help](#)



## Locator



## Point Info/Search

Station Name

River

NWS ID

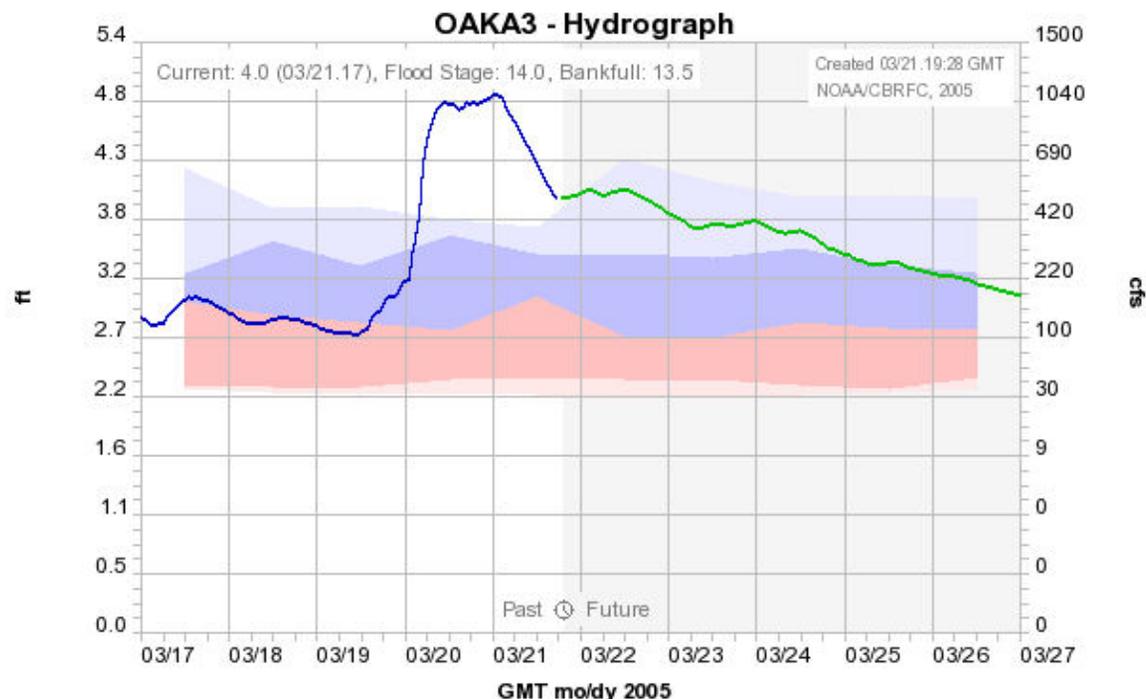
Condition

Flow (cfs)

Stage (ft)

# OAK CK - SEDONA (OAKA3)

Forecasts on this web page are not official and should be used only as guidance.  
Official warnings and forecasts can be found [here](#).



Observed (USGS) — Forecast (03/21.18:00) —  
Historical Exceedance Probability (USGS): 90-75% 75-50% 50-25% 25-10%

## Hydrograph Options

<input type="checkbox"/> Critical Stages	Years	Date
<input type="checkbox"/> Simulated	1982	03/21/05
<input type="checkbox"/> Raw Data	1983	Past Days
<input type="checkbox"/> Six Hour	1984	5
<input type="checkbox"/> Linear Flow	1985	Future Days
<input type="checkbox"/> Historical Peak	1986	5
<input type="checkbox"/> Yearly Peaks	1987	ESP
<input type="checkbox"/> Daily Maxima	1988	Off
<input checked="" type="checkbox"/> Statistics	1989	Analog Years
<input type="checkbox"/> Contingency	1990	Off
<input type="checkbox"/> Adjust		Analog Years Period
<input type="checkbox"/> Requerv		Off

## Graphs

<input type="checkbox"/> Precipitation
<input type="checkbox"/> Temperature
<input type="checkbox"/> Freezing Level
<input type="checkbox"/> Snow
<input type="checkbox"/> Soil Moisture
<input type="checkbox"/> Rating Table
<input checked="" type="checkbox"/> Hydrograph

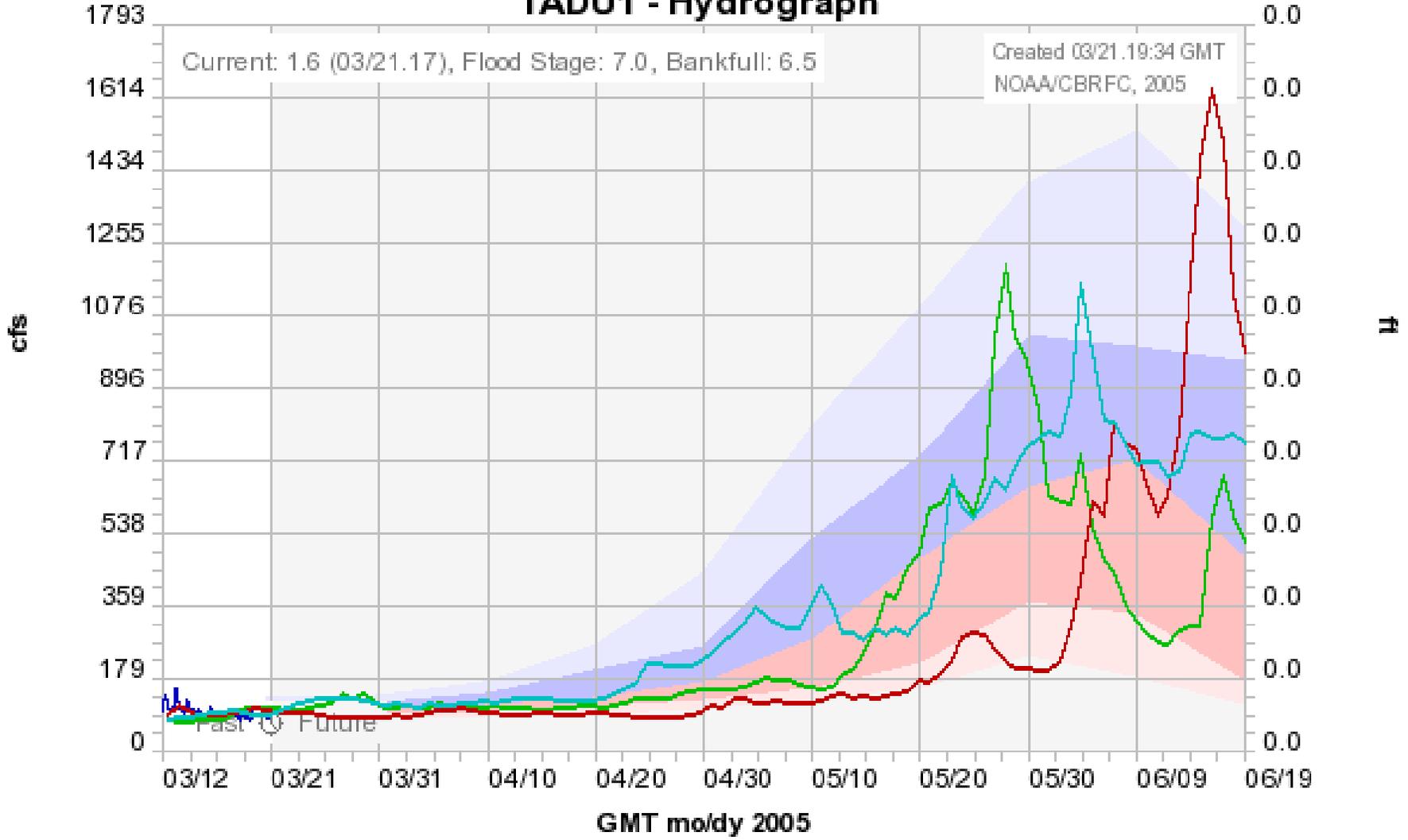
## Tabular Data

<input type="checkbox"/> Precipitation
<input type="checkbox"/> Temperature
<input type="checkbox"/> Freezing Level
<input type="checkbox"/> Snow
<input type="checkbox"/> Soil Moisture
<input type="checkbox"/> Rating Table
<input type="checkbox"/> Critical Stages
<input type="checkbox"/> Peaks
<input type="checkbox"/> Flows

## Information

<input type="checkbox"/> Gage Info
<input type="checkbox"/> Basin/Location Maps
<input type="checkbox"/> Aerial/Topo 16 mpp
<input type="checkbox"/> Photos

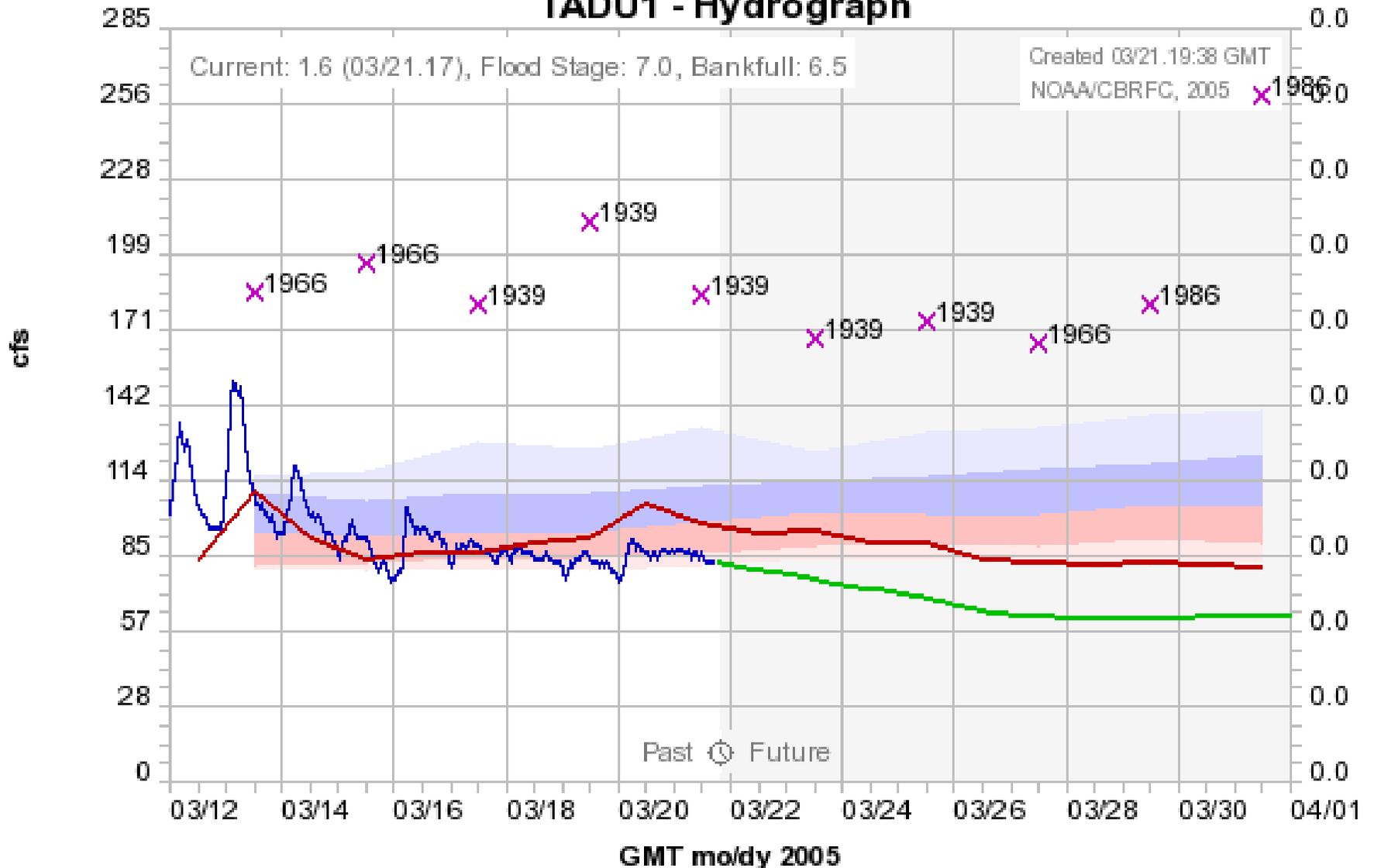
# TADU1 - Hydrograph



# TADU1 - Hydrograph

Current: 1.6 (03/21.17), Flood Stage: 7.0, Bankfull: 6.5

Created 03/21.19:38 GMT  
NOAA/GBRFG, 2005



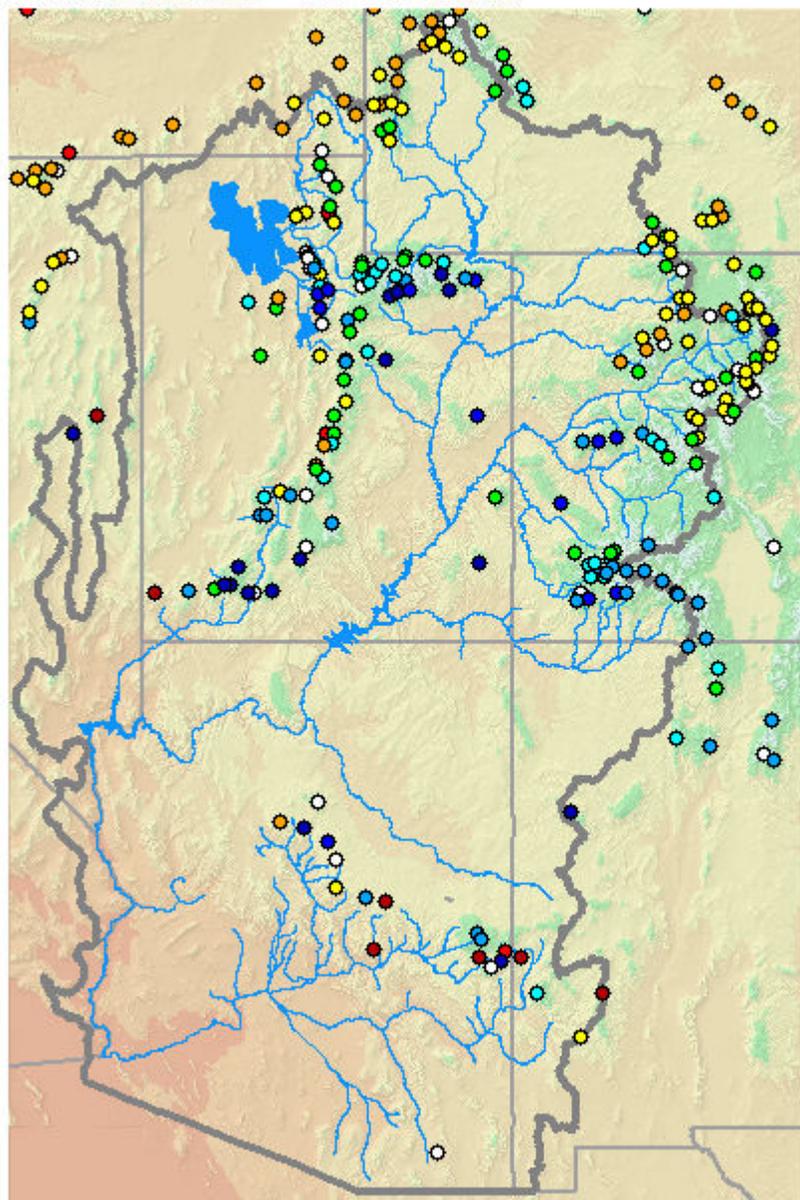
Observed (USGS) — Forecast (03/21.18:00) — Daily Maxima x 1995 —  
 Historical Exceedance Probability (USGS): 90-75% 75-50% 50-25% 25-10%

# Snow Conditions

Legend. Map data updated 03/21 13:00 GMT, 03/21 06:00 MST. Click map to zoom.

Data Type: [River Forecasts](#) | [Reservoirs](#) | [Recreational](#) | [Snow Conditions](#)

Click to: [Select](#) [Zoom](#) Zoom to: 1x 4x 8x



## Legend

### SWE (% Avg)

- No data
- < 25
- 25-50
- 50-75
- 75-90
- 90-110
- 110-125
- 125-150
- 150-175
- > 175

## Quick Plot

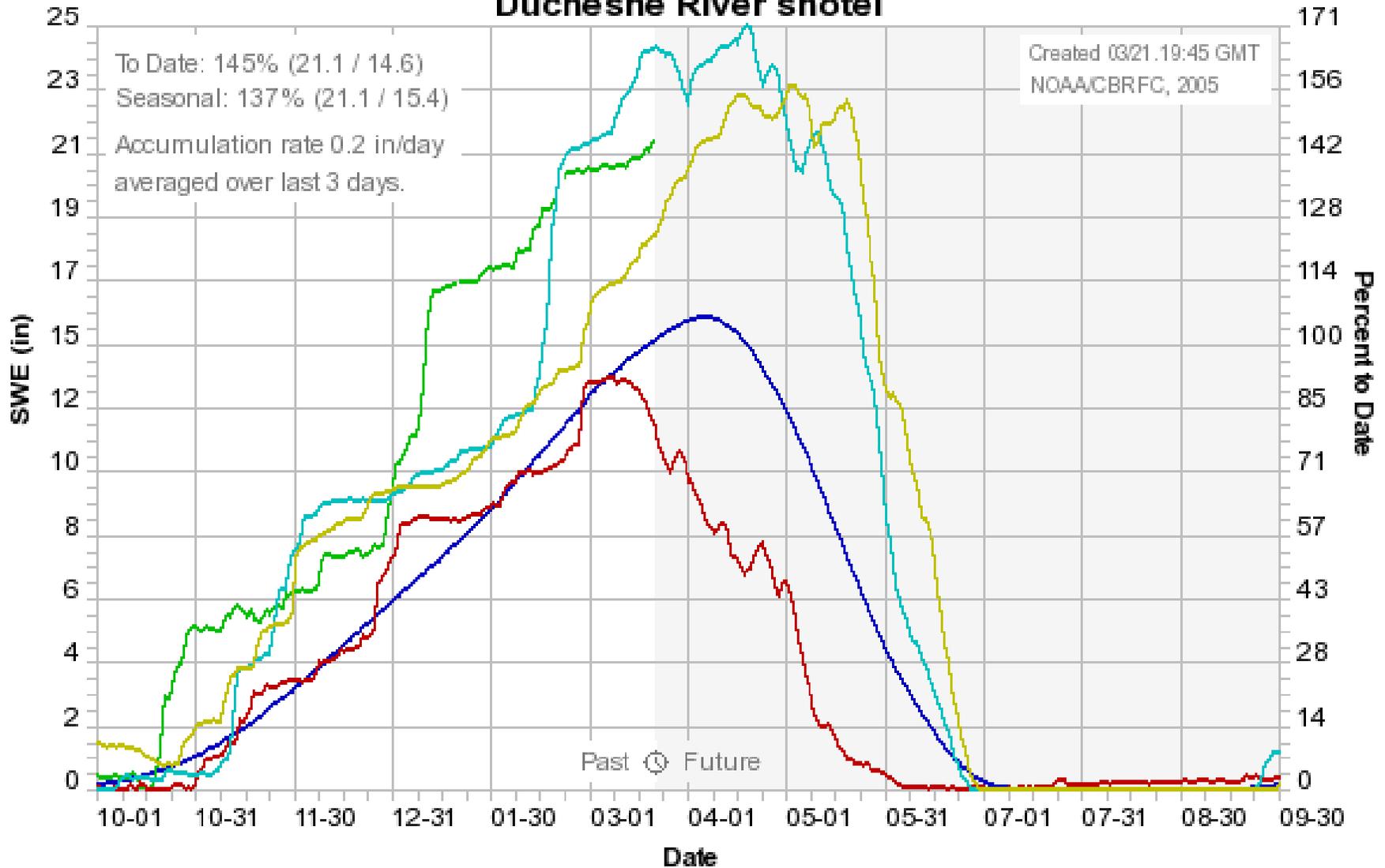
- ID
- Multiple Station
- 

## Display Options

- Topography
- States
- RFC
- Rivers
- HSAs
- Basins
- < 7000
- 7000-8000
- 8000-9000
- 9000-10000
- > 10000
- Station Labels
- 

—Key Stations—

# Duchesne River snotel



Created 03/21 19:45 GMT  
NOAA/CBRFC, 2005

Past ⌚ Future

avg 2005 2004 1986 1983



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**Real-time Hydrologic Model Forecast Traces and States:**

**[www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)**

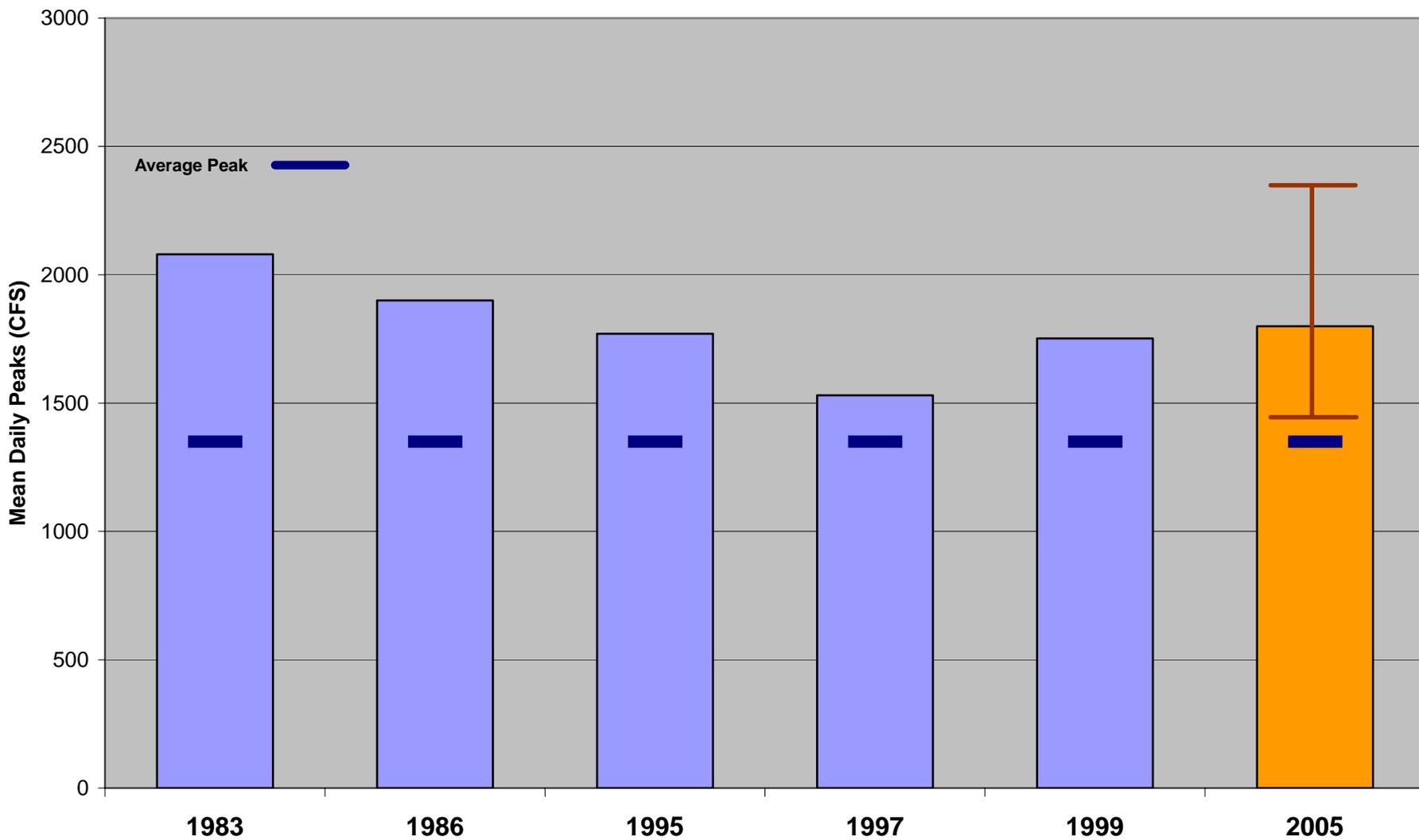
**Official Forecasts and Warnings:**

Grand Junction Weather Forecast Office

Salt Lake City Weather Forecast Office



# Rock Creek Upper Stillwater Inflow



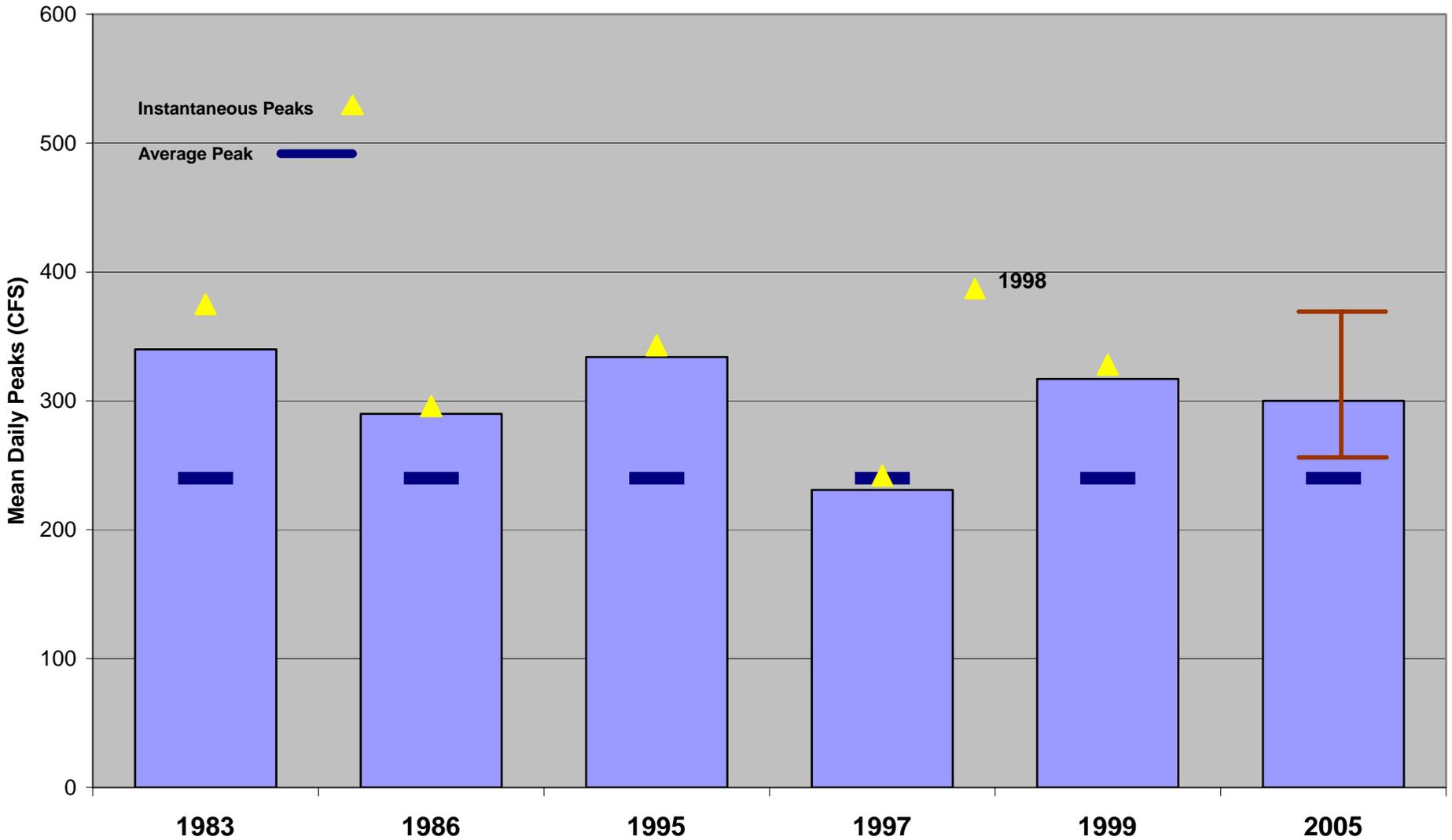


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# Big Brush Creek abv Red Fleet



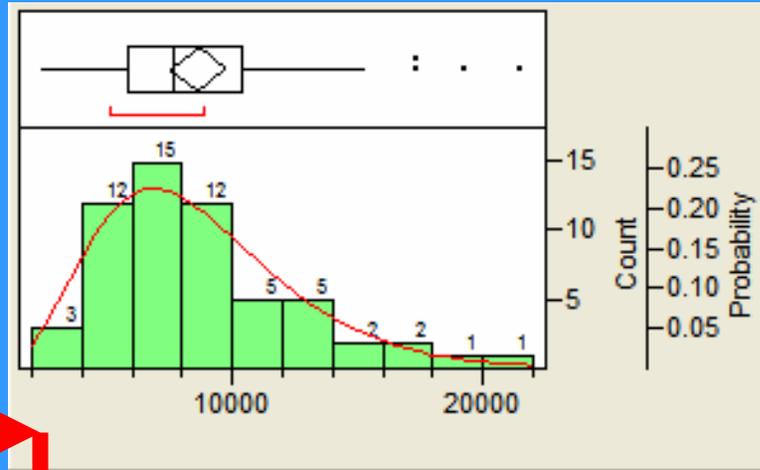
# Probability Concept

## Raw Data

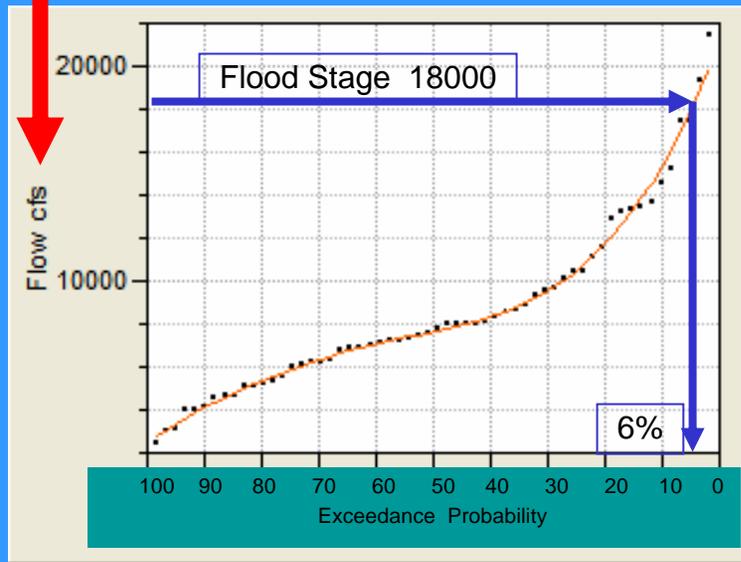
### (Ensemble Members)

21500	8690	6240
19300	8600	6200
17400	8350	6100
17400	8110	5960
15200	8040	5590
14600	8040	5300
13700	8040	5250
13500	8040	5150
13300	7780	5140
13200	7600	4710
12900	7420	4680
11600	7380	4570
11100	7190	4110
10400	7190	4010
10400	7130	4010
10100	6970	3100
9640	6930	2990
9560	6870	2410
9310	6750	
8850	6350	

## Window



Frequency Diagram (PDF)



Cumulative Frequency Diagram (CDF)