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# Overview of the 1991 - 2020 Normal Period and Model Impacts

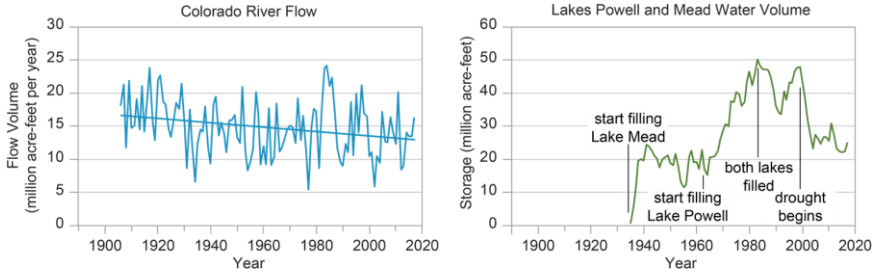
Colorado Basin River Forecast Center

Paul Miller
Service Coordination Hydrologist

# Outline

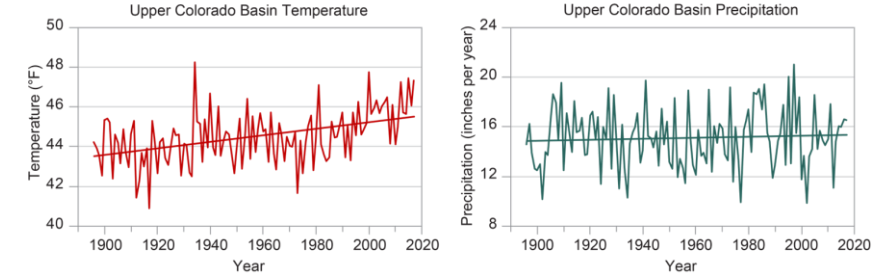
- Recalibration background and history
- New normals and trends at selected sites
- 2021 hydrologic model calibration highlights
- Upcoming Outreach

# Changes/Trends in Hydrology Related Climatology/Normals



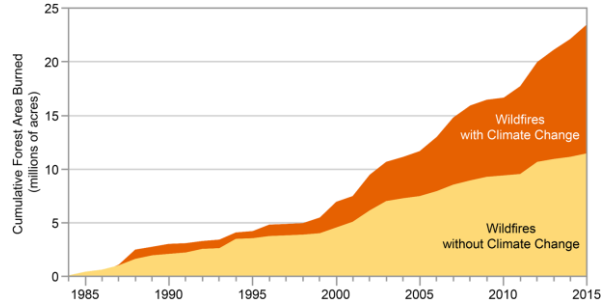


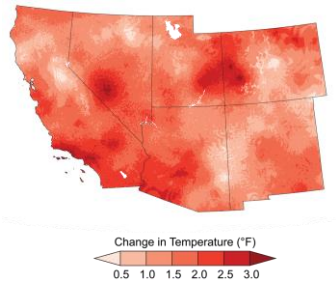


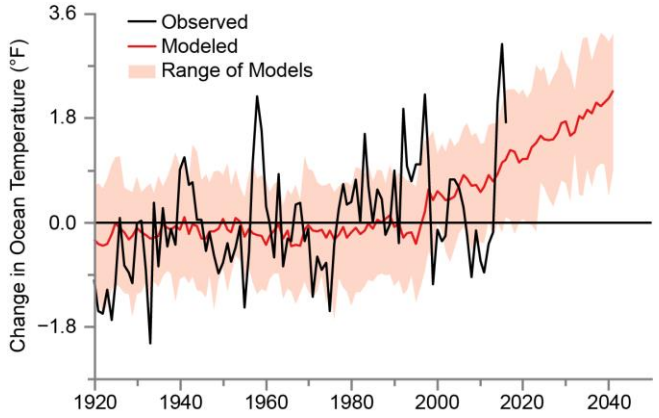









- Conform to World Meteorological Organization Standards
- Acknowledge recent trends
- Opportunity to thoroughly evaluate our model
- Adding new data and methods

# Calibration Forcing History (ESP)

30-yr forcing periods (1971 - 2000; 1975 - 2005; 1981 - 2010)

- Kept at 30 years to take advantage of the SNOTEL network
- Minimize using estimated data in earlier years; SNOTEL started in about 1978

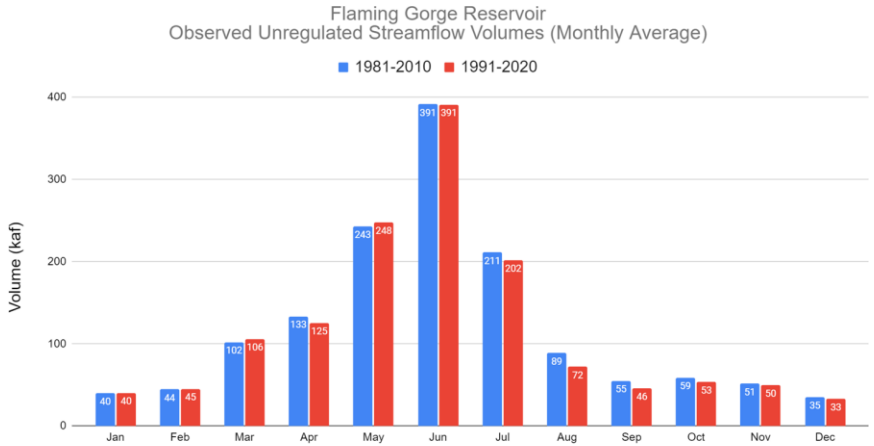
35-yr forcing period (1981 - 2015)

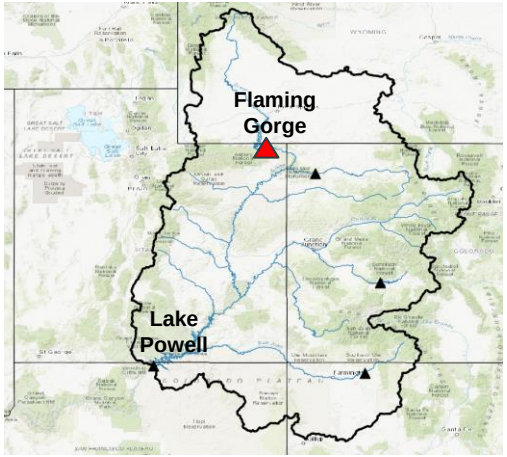
- Extended forecast record to add more recent years
- Five additional years included some record high (2011) and low (2012) runoff years
- Also expanded number of possible weather patterns
- Comparison period did not change (1981 - 2010)

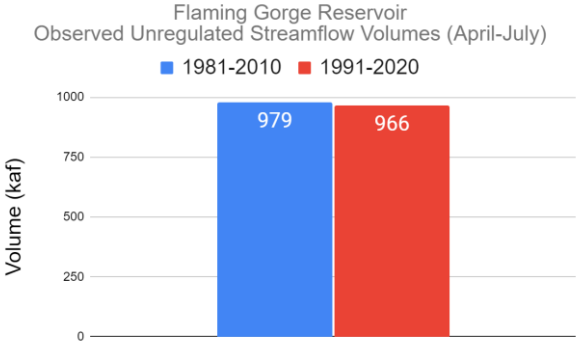
30-yr forcing period (1991 - 2020)

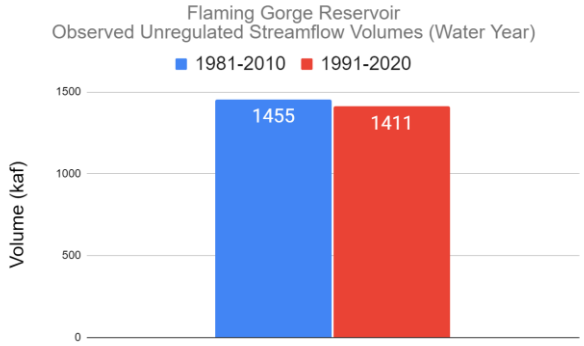
- 30-yr comparison will be updated (1991 - 2020)
- 1991 - 2020 is more representative of recent, drier, conditions
- Model calibrated over entire 40-yr POR (1981 - 2020)

# Flaming Gorge Reservoir Observed Unregulated Inflow: 1981-2010 vs. 1991-2020



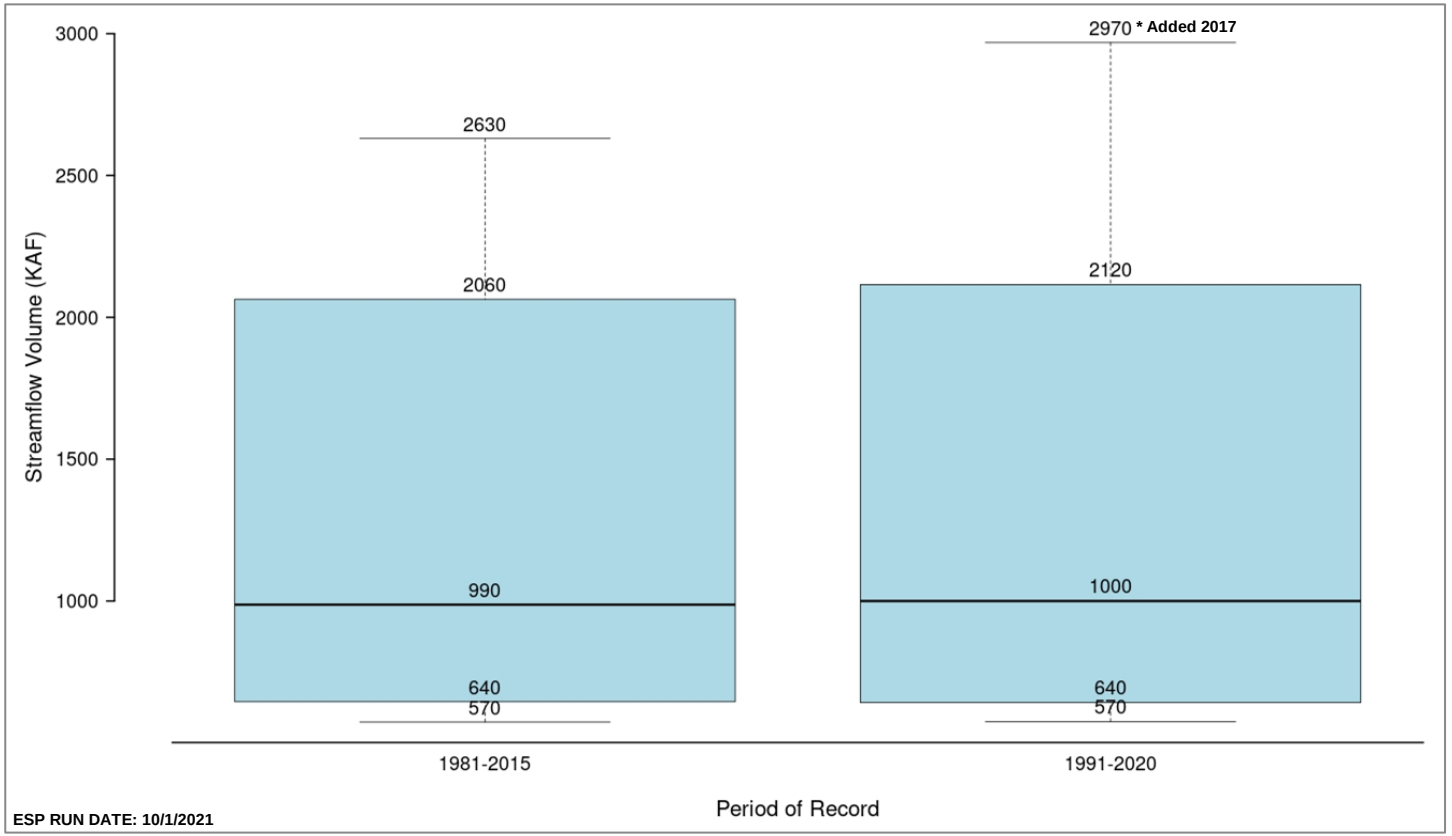



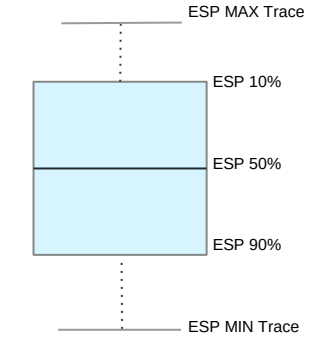




April - July: 1.3% decrease
Water Year: 3.0% decrease

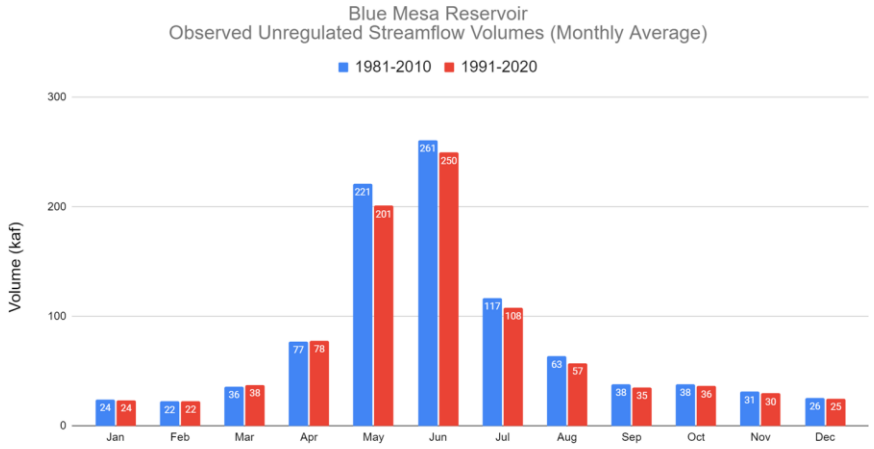
# Water Year ESP Comparison: Flaming Gorge Reservoir 1981-2015 vs. 1991-2020

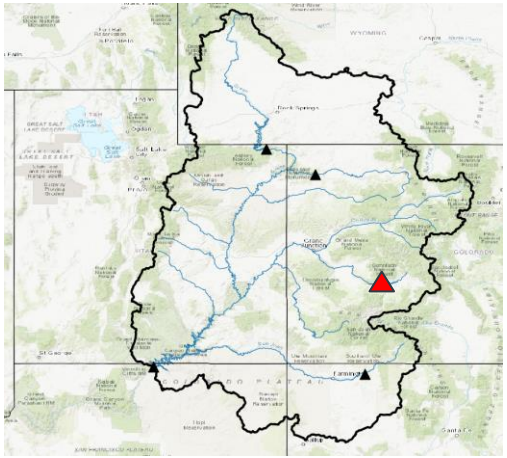


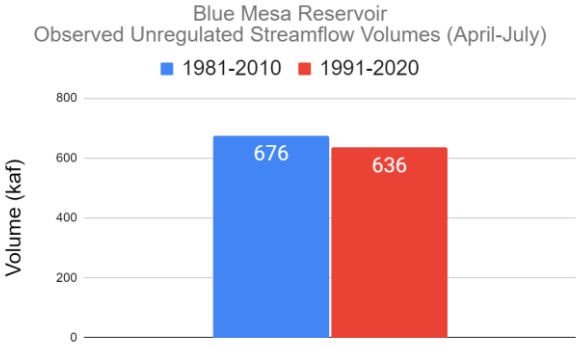



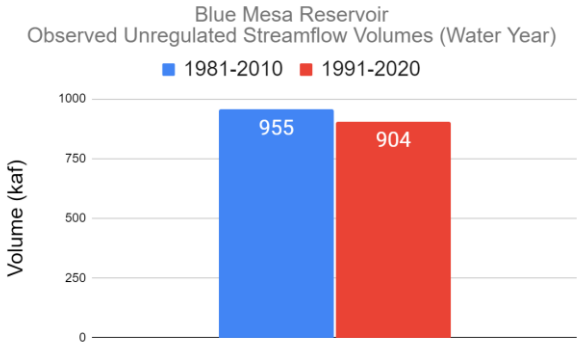

ESP 10%: 10% Exceedance Probability
ESP 50%: 50% Exceedance Probability (ESP Median)
ESP 90%: 90% Exceedance Probability

# Blue Mesa Reservoir Observed Unregulated Inflow: 1981-2010 vs. 1991-2020



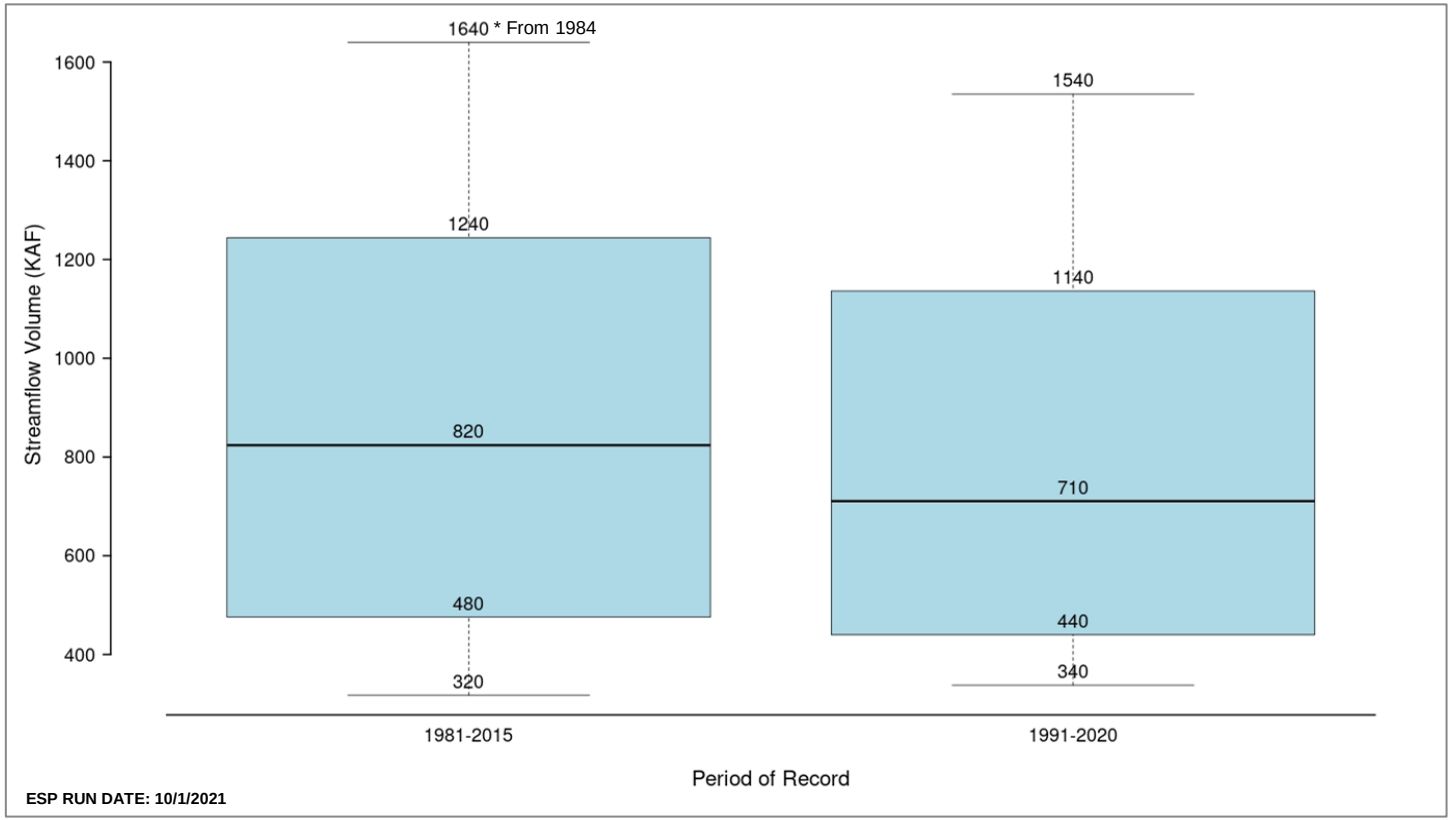





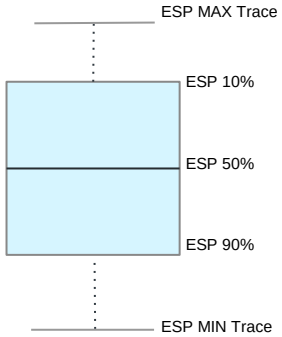




April - July: 5.9% decrease
Water Year: 5.4% decrease

# Water Year ESP Comparison: Blue Mesa Reservoir
# 1981-2015 vs. 1991-2020




ESP RUN DATE: 10/1/2021

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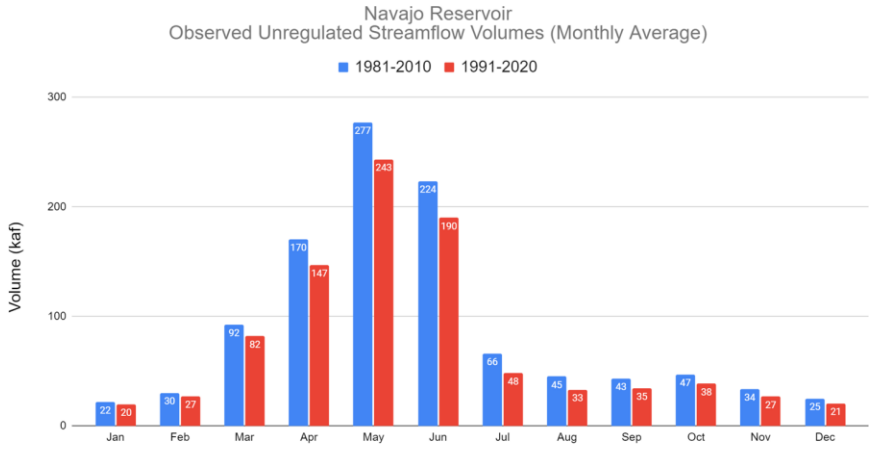
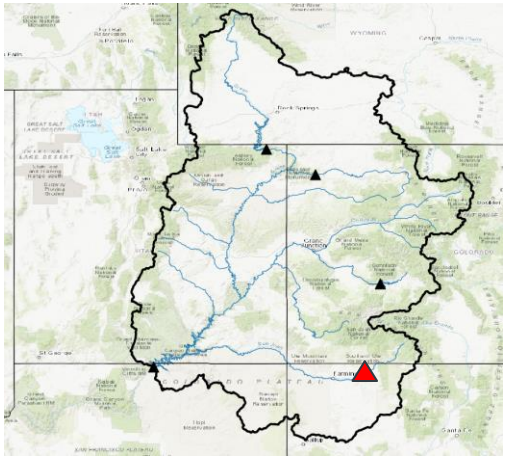
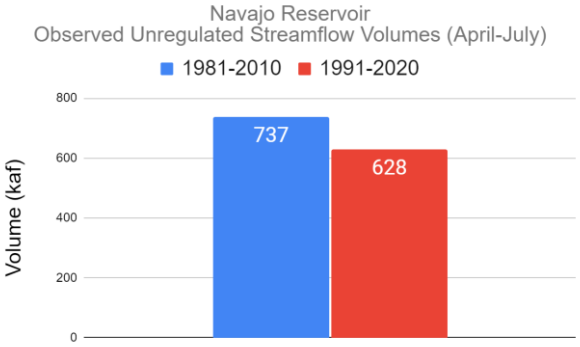
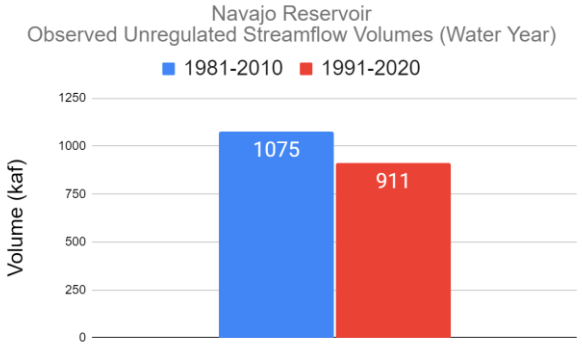
# Navajo Reservoir Observed Unregulated Inflow: 1981-2010 vs. 1991-2020



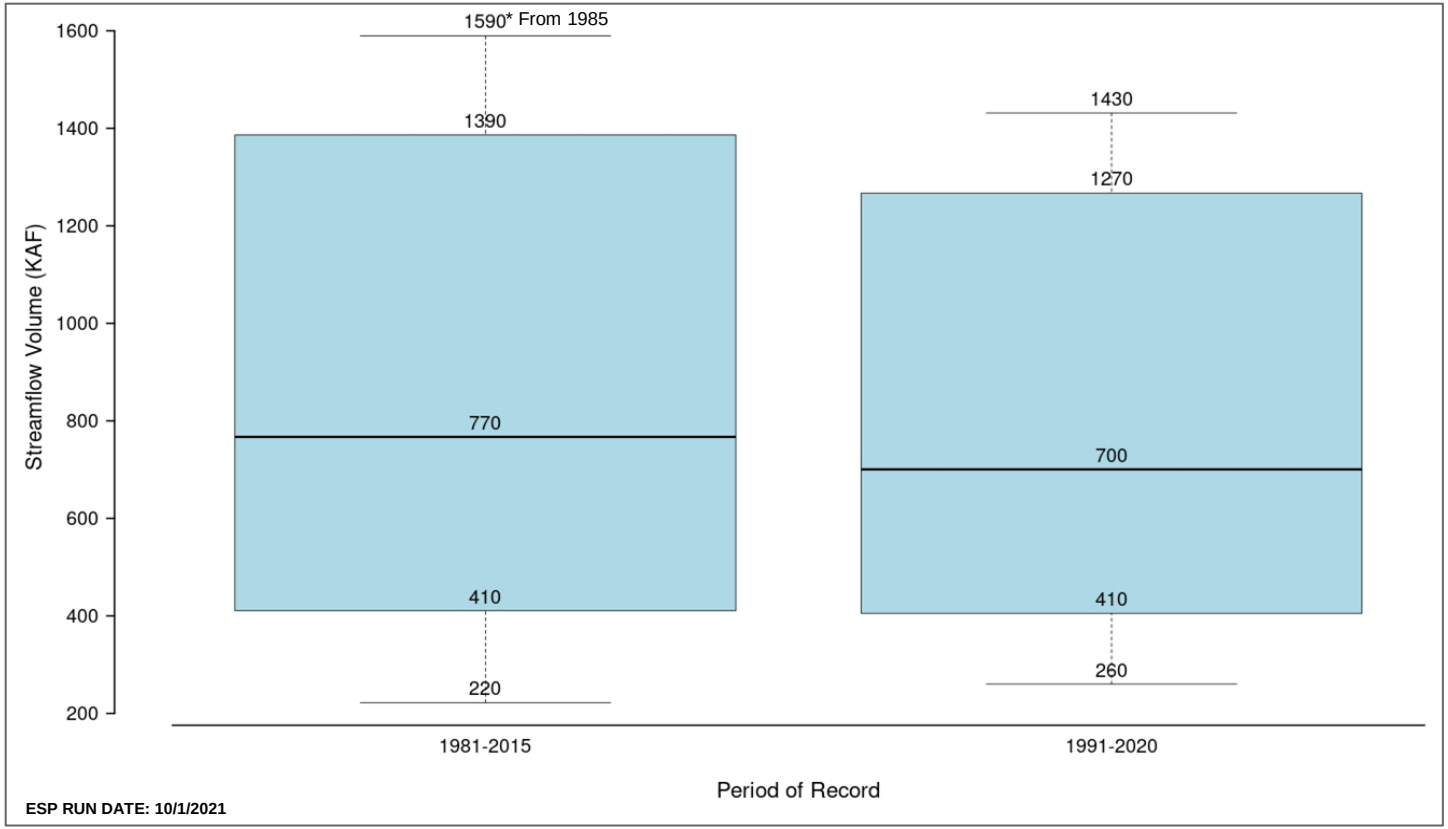



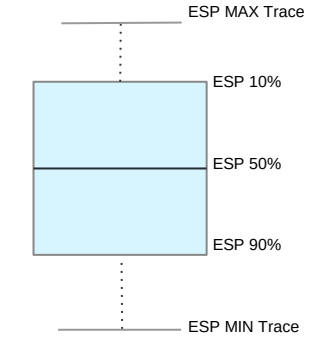



April - July: 14.8% decrease
Water Year: 15.3% decrease

# Water Year ESP Comparison: Navajo Reservoir 1981-2015 vs. 1991-2020

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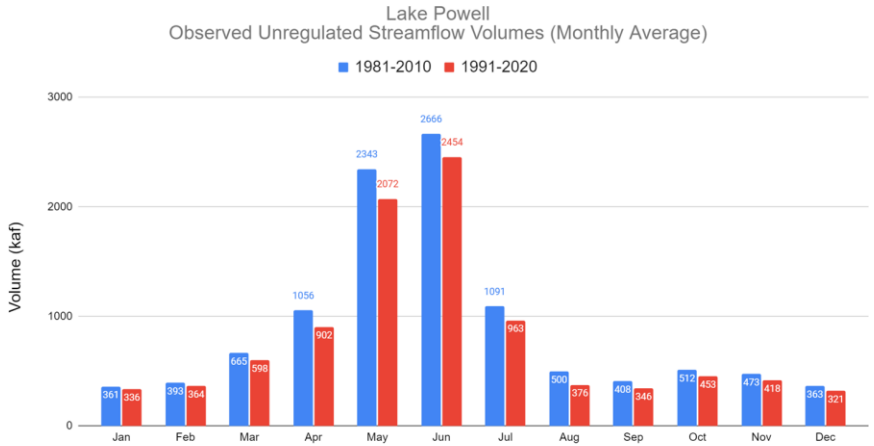
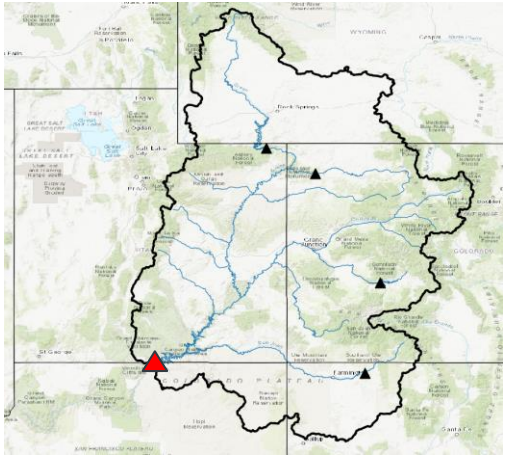
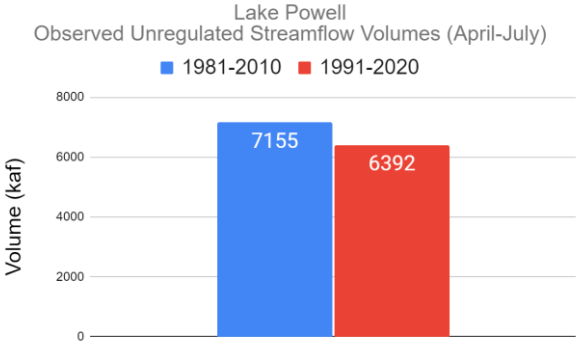
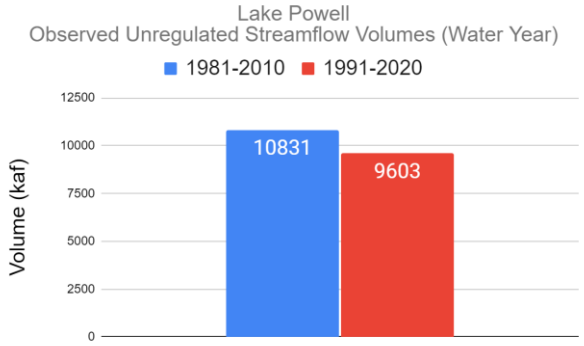
# Lake Powell Observed Unregulated Inflow: 1981-2010 vs. 1991-2020



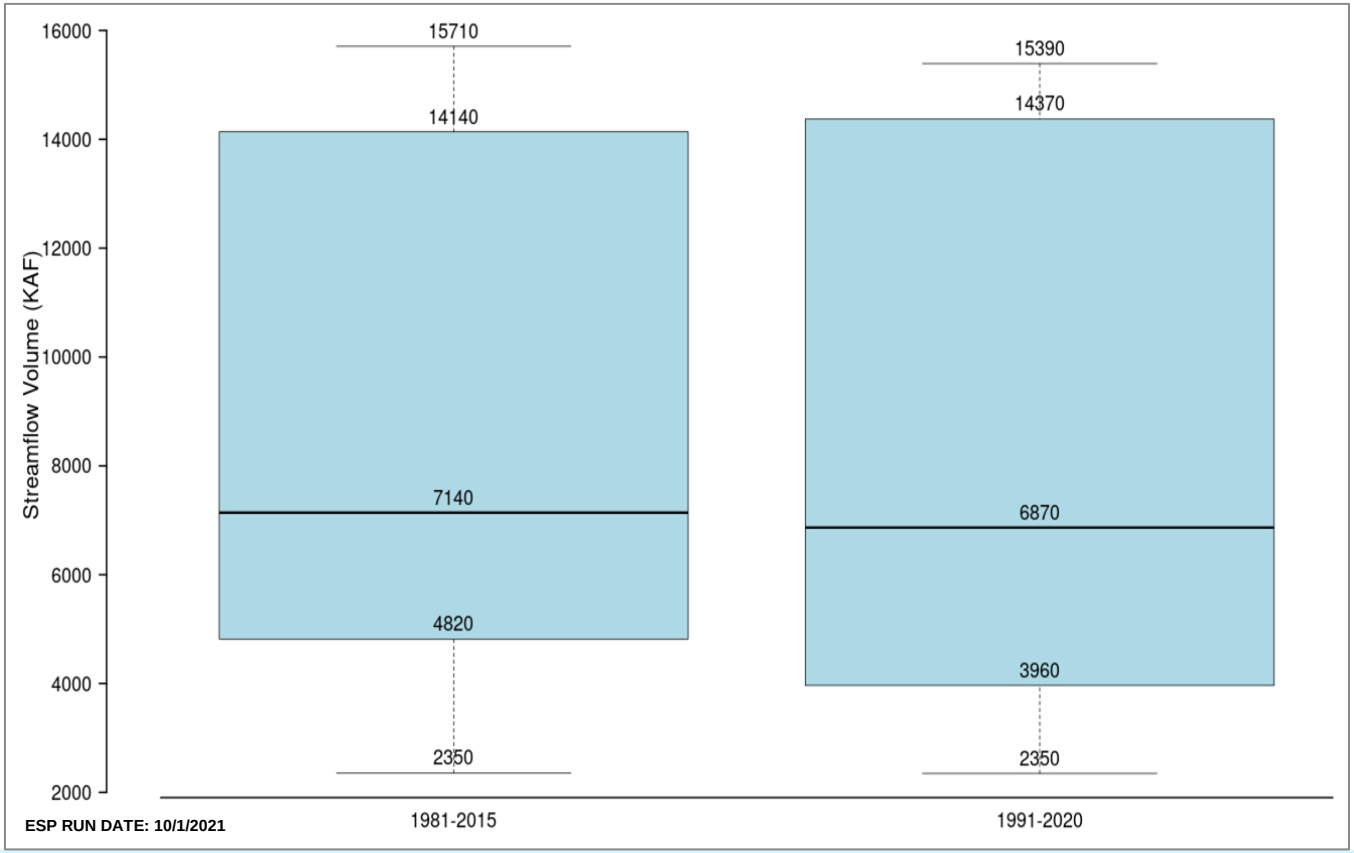



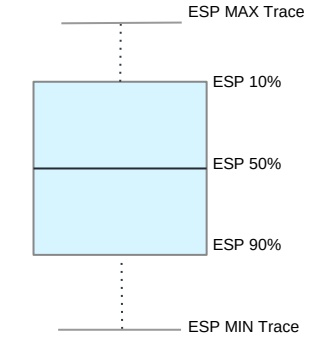



April - July: 10.7% decrease
Water Year: 11.3% decrease

# Water Year ESP Comparison: Lake Powell
# 1981-2015 vs. 1991-2020

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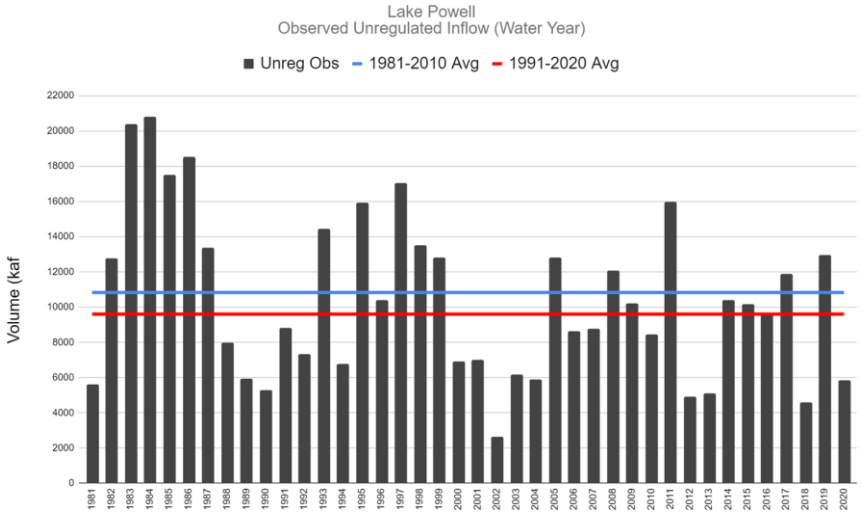
# 1981-2010 vs. 1991-2020: Lake Powell




October 1 2021 Lake Powell Forecast
for 2022 Water Year = 7400 kaf

1981-2010 % of Average = 68%
1991-2020 % of Average = 77%

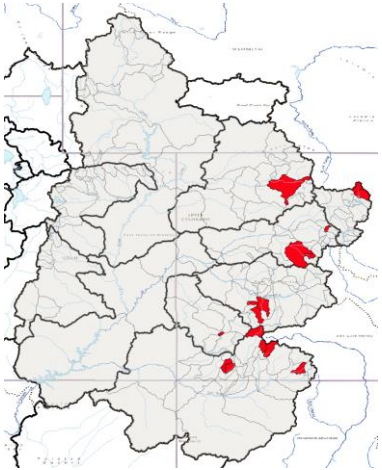
Decadal Averages:
1981-1990: 12,827 kaf
2011-2020: 9,148 kaf
%Change: -28.7%

2016-2020 avg = 8,986 kaf

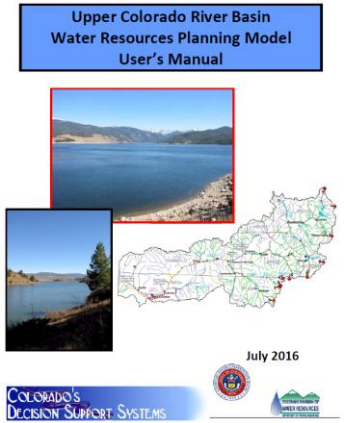
# CBRFC Hydrologic Model Calibration Update/Highlights

- CBRFC hydrologic model calibration is a continuous process that includes decades of forecaster knowledge & experience
- Model calibration period: 1981-2020
- Calibration goal: reduce model error on all time scales (daily/monthly/seasonal)

~15 new forecast locations implemented across the Upper Colorado River Basin in 2021



Implemented the most comprehensive historical consumptive use dataset in Western CO to parameterize the CBRFC's modeled unmeasured depletions:
-irrigated acreage, efficiency, demand, return flow

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# Summary

- 30-year observed unregulated streamflow volumes at the 24-month study locations
  - 1991-2020 volumes are less than 1981-2010 volumes (on average)
  - magnitude of volume decreases increase from north to south
  - Lake Powell ~10% lower

- CBRFC ESP distribution comparison at the 24-month study locations
  - minor changes in northern basins
  - larger changes (drier) in southern basins

# Upcoming Outreach

- Calibration Outreach
  - Detailed presentation all about our recent calibration
  - Multiple dates to hopefully reach everyone
  - Look for dates sent out via e-mail and posted to our website in the near future

- CBRFC Water Year In Review 2021

# CBRFC Contacts

**Basin Focal Points and Forecasters**

Ashley Nielson – Gunnison, San Juan, Dolores, Lake Powell
ashley.nielson@noaa.gov

Brenda Alcorn - Green River, Duchesne, Yampa River Basins
brenda.alcorn@noaa.gov

Cody Moser – Upper Colorado Mainstem
cody.moser@noaa.gov

Patrick Kormos – Great Basin
patrick.kormos@noaa.gov

Trevor Grout - Lower Basin
trevor.grout@noaa.gov

Brent Bernard – Hydrologist
brent.bernard@noaa.gov

Tracy Cox - Hydrometeorologist
tracy.cox@noaa.gov

\+ 2 new people coming soon!

Michelle Stokes – Hydrologist In Charge
michelle.stokes@noaa.gov

Paul Miller– Service Coordination Hydrologist
paul.miller@noaa.gov

John Lhotak – Development and Operations Hydrologist
john.lhotak@noaa.gov

CBRFC Webpage
https://www.cbrfc.noaa.gov/

CBRFC Operations
cbrfc.operations@noaa.gov
801-524-4004