Overview of the 1991 - 2020 Normal Period and Model Impacts

Colorado Basin River Forecast Center

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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

National Climate Assessment https://nca2018.globalchange.gov/
<table>
<thead>
<tr>
<th>Calibration Forcing History (ESP)</th>
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<tbody>
<tr>
<td>● Kept at 30 years to take advantage of the SNOTEL network</td>
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<td>● Minimize using estimated data in earlier years; SNOTEL started in about 1978</td>
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<td><strong>35-yr forcing period (1981-2015)</strong></td>
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<td>● Extended forecast record to add more recent years</td>
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<td>● Five additional years included some record high (2011) and low (2012) runoff years</td>
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<td>● Also expanded number of possible weather patterns</td>
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<td>● Comparison period did not change (1981-2010)</td>
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<td><strong>30-yr forcing period (1991-2020)</strong></td>
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<td>● 30-yr comparison will be updated (1991-2020)</td>
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<td>● 1991-2020 is more representative of recent, drier, conditions</td>
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<td>● Model calibrated over entire 40-yr POR (1981-2020)</td>
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Flaming Gorge Reservoir Observed Unregulated Inflow: 1981-2010 vs. 1991-2020

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

Department of Commerce // National Oceanic and Atmospheric Administration // 5
Water Year ESP Comparison: Flaming Gorge Reservoir

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

ESP RUN DATE: 10/1/2021
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

ESP MAX Trace
ESP 10%
ESP 50%
ESP 90%
ESP MIN Trace

ESP 10%: 10% Exceedance Probability
ESP 50%: 50% Exceedance Probability
ESP 90%: 90% Exceedance Probability

ESP RUN DATE: 10/1/2021

* From 1984
Navajo Reservoir Observed Unregulated Inflow: 1981-2010 vs. 1991-2020

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

ESP RUN DATE: 10/1/2021

ESP MAX Trace
ESP 10%
ESP 50%
ESP 90%
ESP MIN Trace

ESP 10%: 10% Exceedance Probability
ESP 50%: 50% Exceedance Probability (ESP Median)
ESP 90%: 90% Exceedance Probability
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
2016-2020 avg = 8,986 kaf

%Change: -28.7%
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
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

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+ 2 new people coming soon!

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