American Rivers SW Team

We partner with local communities to:

• promote sound, flexible, and equitable strategies to improve river health;
• ensure access to clean, reliable water supplies; and
• protect our last, best ecologically and culturally important rivers.
Presentation Outline

I. Drought or Overallocation?

II. “Big River” Responses

III. Local Opportunities
Colorado River Basin
The long-term story of the Colorado River: Over-Allocation

1922 Colorado River Compact
Divided the Colorado River in “half”

1944 Mexican Treaty
Adds Allocation for Mexico

1948 Upper Colorado River Compact
Divided the Upper Basin States Allocations by %

Upper Basin “Half”
7.5 Million Acre-Feet

Lower Basin “Half”
7.5 Million Acre-Feet

(Plus 1 MAF from tributaries below Lake Powell)

7.5 + 7.5 + 1.5 = 16.5

Colorado River Compact says that Upper Basin states “shall not cause the flow of the river at Lee Ferry to be depleted” below 75 MAF over any 10-year period

The 10-year Moving average addresses the natural variability in hydrology
How did we manage to live with an over-allocated system for almost 100 years?

It took awhile for everyone but California to grow into their allocations, we have really big reservoirs – and the Upper Basin is still consuming much less than 7.5 million acre-feet/ year.
Steps towards balance

- **2003 Quantification Settlement Agreement**
  - Brought CA within its 4.4 maf allotment
  - Ag – Urban transfers

- **2007 Interim Guidelines**
  - Authorized “Intentionally Created Surplus” for storing water in Mead
  - Determined official shortage levels that would require delivery cuts. (required in 2022)

- **2019 Drought Contingency Plan**
  - More aggressive triggers for delivery cuts in Lower Basin (required in 2020)
  - Plan for a plan in the Upper Basin (Demand Management pool)
It hasn’t been enough (even without resolving undeveloped tribal water rights).

Source: John Fleck and Anne Castle, “Green Light for Adaptive Policies on the Colorado River,” in *Water*, December 2021 (Chart constructed with Bureau of Reclamation data.)
Drought/ Aridification

• **2000-2021 was the driest 22-year period since 800**

• **A Shrinking River: ave natural flows at Lees Ferry**
  • **1906 – 2022: 14.735maf** (we almost got consumption down to the long-term average)
  • **2000–2022: 12.191maf** (but the supply is a shrinking target)

Source: Bureau of Reclamation Provisional Natural Flow data- https://www.usbr.gov/lc/region/g4000/NaturalFlow/provisional.html
Total Colorado River Storage dropped from 48% of capacity to 38% from 2020-2021.

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Vacant Space (maf)</th>
<th>Live Storage (maf)</th>
<th>Water Elevation (ft)</th>
<th>Percent of Capacity (%)</th>
<th>Change in Storage (maf)</th>
<th>Change in Elevation (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fontenelle</td>
<td>0.115</td>
<td>0.230</td>
<td>6,491.82</td>
<td>67</td>
<td>-0.028</td>
<td>-2.7</td>
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<tr>
<td>Flaming Gorge</td>
<td>0.800</td>
<td>2.95</td>
<td>6,019.15</td>
<td>79</td>
<td>-0.245</td>
<td>-6.8</td>
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<tr>
<td>Blue Mesa</td>
<td>0.588</td>
<td>0.241</td>
<td>7,436.58</td>
<td>29</td>
<td>-0.198</td>
<td>-33.8</td>
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<tr>
<td>Navajo</td>
<td>0.744</td>
<td>0.951</td>
<td>6,024.10</td>
<td>56</td>
<td>-0.199</td>
<td>-19.2</td>
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<tr>
<td>Lake Powell</td>
<td>17.06</td>
<td>7.26</td>
<td>3,545.36</td>
<td>30</td>
<td>-4.11</td>
<td>-50.6</td>
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<tr>
<td>Lake Mead</td>
<td>17.10</td>
<td>9.02</td>
<td>1,067.68</td>
<td>35</td>
<td>-1.26</td>
<td>-15.5</td>
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<tr>
<td>Lake Mohave</td>
<td>0.245</td>
<td>1.57</td>
<td>638.04</td>
<td>86</td>
<td>0.041</td>
<td>1.5</td>
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<tr>
<td>Lake Havasu</td>
<td>0.030</td>
<td>0.590</td>
<td>448.49</td>
<td>95</td>
<td>0.036</td>
<td>1.9</td>
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<tr>
<td><strong>Totals</strong></td>
<td><strong>36.68</strong></td>
<td><strong>22.80</strong></td>
<td><strong>38</strong></td>
<td><strong>95</strong></td>
<td><strong>-5.97</strong></td>
<td><strong>-17.3</strong></td>
</tr>
</tbody>
</table>

* From October 1, 2020, to September 30, 2021.

Source: Bureau of Reclamation DRAFT Annual Operating Plan for Colorado River Reservoirs 2022
Extraordinary Measures

- DROA releases of an extra 161 kaf from upstream reservoirs in 2021 and 500 kaf in 2022.

- Cutting Powell releases from a planned 7.48 maf to 7 maf in early 2022.

- Lower Basin “500+ Plan”
System Storage still dropped from 38% to 34% of capacity from 2021-now.

COLORADO RIVER SYSTEM RESERVOIR STATUS

TOTAL SYSTEM CONTENTS – 34% or 19.648 MAF

As of September 18, 2022

Lake Powell
25% 5.805 MAF
3,529.45 ft

Lake Mead
28% 7.285 MAF
1,075 ft Tier 1 Shortage
1,045 ft Tier 2b Shortage
1,044.41 ft

Wyoming
Flaming Gorge
74%

Utah
Salt Lake City

COLORADO

South Fork River Reservoir
37%

Blue Mesa
100%

Morrow Point
53%

Navajo
53%

NEVADA

3,660 ft WY 2022 Equalization Level

ARIZONA

LOWER BASIN

Upper Basin

California

Reservoir Storage (MAF)

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Current</th>
<th>Last Year</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>Mead</td>
<td>7.285</td>
<td>9.011</td>
<td>26.120</td>
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<tr>
<td>Powell</td>
<td>5.805</td>
<td>7.390</td>
<td>24.522</td>
</tr>
<tr>
<td>Fontenelle</td>
<td>0.284</td>
<td>0.236</td>
<td>0.354</td>
</tr>
<tr>
<td>Flaming Gorge</td>
<td>2.700</td>
<td>2.979</td>
<td>5.671</td>
</tr>
<tr>
<td>Blue Mesa</td>
<td>0.309</td>
<td>0.269</td>
<td>0.827</td>
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<tr>
<td>Morrow Point</td>
<td>0.117</td>
<td>0.111</td>
<td>0.117</td>
</tr>
<tr>
<td>Navajo</td>
<td>0.874</td>
<td>0.572</td>
<td>1.648</td>
</tr>
</tbody>
</table>

https://new.azwater.gov/crm/dashboard
Critical Reservoir Levels

Lake Powell Key Elevations

Lake Powell

3,700 ft
(Full pool)

3,525 ft

3,490 ft

3,370 ft

# Feet above sea level

Power pool (No longer able to use water to produce power)

Dead pool (No longer able to deliver water to Lower Colorado River Basin through dam)

The target elevation of 3,525 ft provides Lake Powell with a 35-vertical-foot buffer designed to minimize the risk of dropping below the minimum power pool elevation of 3,490 ft.

The risk: Lake Powell

Lake Powell End-of-Month Elevations
CRMMS Projections from June 2022

1 Projected Lake Powell end-of-month physical elevations from the latest CRMMS-ESP and 24-Month Study inflow scenarios.

CRMMS 2-Year Probabilistic Projections are available online at: https://www.usbr.gov/lc/region/g4000/riverops/crmms-2year-projections.html
The risk: Lake Mead

Lake Mead End-of-Month Elevations

CRMMS Projections from June 2022

Surplus Condition (>1,145 ft)
Normal Condition (1,072 to 1,145 ft)
Level 1 Shortage Condition (1,050 to 1,075 ft)
Level 2 Shortage Condition (1,025 to 1,050 ft)
Level 3 Shortage Condition (<1,025 ft)

Storage (cfs)
Pool Elevation (ft)

- 24-Month Study DROA Probable Minimum
- Historical
- 24-Month Study DROA Probable Maximum
- CRMMS-ESP Projections (30 projections)
- CRMMS-ESP Projections Range
- CRMMS-ESP Most Probable

1 Projected Lake Mead end-of-month physical elevations from the latest CRMMS-ESP and 24-Month Study inflow scenarios.

CRMMS 2-Year Probabilistic Projections are available online at: https://www.usbr.gov/lc/region/400/riverops/crmsms-2year-projections.html
Extraordinary Measures II

• Commissioner Touton called for basin states to come up with an additional 2-4 maf (beyond cuts already agreed to) or BOR would – gave 60 days.

• Upper Basin 5 Point Plan
  - Seek reauthorization of System Conservation Pilot.
  - Start working on 2023 DROA release plan.
  - Consider demand management.
  - Use BIP $ for measuring & monitoring.
  - Direct admin according to prior appropriation & enhance conservation.

• Cities pledge more conservation, 30% cut to nonfunctional turf.
Long term plans/ options:

- At the “big river” level
  - “Dumpster fire” emergency management
  - Re-negotiation of the 2007 Guidelines for managing Powell & Mead (expire in 2026)

- At the local level
  - Prep for possible return of System Conservation Program
  - Increase resilience using new funding sources
    -Experiment with less thirsty crops & upgrade infrastructure
    -Mitigate wildfire risks & enhance natural storage in headwaters
Funding available!
coagwater.org/drought-resiliency-projects

Apply by Dec 1!

We are happy to announce that there is funding available to support the design and implementation of drought resilience and innovative water conservation projects with agricultural water users and water managers. The goals of this effort are to advance strategies and on the ground projects for irrigated agriculture to adapt to reduced water supplies. Funding will support technical and financial assistance for early-stage projects that have the potential to...

Possible Projects Include
- Alternative crops or forages
- Infrastructure upgrades
- Improved water management
- Soil Health
- Herd size or grazing or stocking strategies