SLIDES: The Colorado River: Innovation in the Face of Scarcity

Anne J. Castle

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THE COLORADO RIVER

Innovation in the Face of Scarcity

Anne J Castle

2015 Martz Summer Conference
Getches-Wilkinson Center, University of Colorado
May 12, 2015
The Basin - From the headwaters to the sea

Source: U.S. Bureau of Reclamation
THE BASIC MATH

• 1922 Compact divided the river 50/50
  – Lower Basin gets 7.5 MAF
  – Upper Basin gets 7.5 MAF, but bears the risk of shortage
  – Upper and Lower Basin will share equally any amounts owed to Mexico

• 1944 Treaty guarantees 1.5 MAF to Mexico

• 16.5 MAF in total obligations
Historic Drought in the Colorado River

April – July Inflows to Lake Powell (Source: US Bureau of Reclamation)
Lake Mead Annual Water Budget

Inflow = 9.0 MAF
Outflow = 9.6 MAF
Mead Evap = 0.6 MAF
Balance = 1.2 MAF

Source: US Bureau of Reclamation
Colorado River Basin Water Supply and Demand Study

Executive Summary

- Joint effort among Bureau of Reclamation and seven Basin States
- Estimated supply and demand for the next 50 years
- Forecast 3.2 MAF shortfall by 2060
Projected Supply/Demand

Historical Supply and Use¹ and Projected Future Colorado River Basin Water Supply and Demand

Source: US Bureau of Reclamation
So What’s Being Done?

- 2007 Interim Guidelines
- 7 State Drought Contingency Planning
- Minute 319 with Mexico
2007 Interim Guidelines

- Sharing of shortage and surplus
- Equalization of lake levels
- Banking of water - Intentionally Created Surplus
# 2007 Interim Guidelines
## Lower Basin Shortage Sharing
(in acre feet)

<table>
<thead>
<tr>
<th>Lake Mead Elevation</th>
<th>California (4.4 MAF)</th>
<th>Arizona (2.8 MAF)</th>
<th>Nevada (0.3 MAF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1075’ – 1050’</td>
<td>0</td>
<td>320,000</td>
<td>13,000</td>
</tr>
<tr>
<td>1050’ – 1025’</td>
<td>0</td>
<td>400,000</td>
<td>17,000</td>
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<tr>
<td>Below 1025’</td>
<td>0</td>
<td>480,000</td>
<td>20,000</td>
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</tbody>
</table>
Upper Basin 3-Prong Approach

• Weather Modification
• Extended Operations of Upper Basin Reservoirs
  – Flaming Gorge in particular
• Demand Reduction
  – Irrigation efficiency
  – Voluntary Fallowing
Lower Basin MOU

- 5-Year Goal
  - 1.5 – 3.0 MAF
  - ½ over next 3 years
- 3-Year “best efforts” commitments
  - MWD – 300,000 af
  - SNWA – 45,000 af
  - CAWCD – 345,000 af
  - USBR – 50,000 af
System Conservation Agreement

- Leadership by major municipalities in drought contingency actions
- Demonstrate the capabilities of voluntary water conservation measures
System Conservation Agreement

- Parties – Denver Water, Southern Nevada Water Authority, Central Arizona Water Conservation District, and Reclamation

- Goal = voluntary, measurable reduction of consumptive use of Colorado River water
  - Sole purpose is to increase storage levels

- $11 million in funding for pilot program
  - $2M each from municipalities
  - $3M from Reclamation
System Conservation Agreement
Upper Basin

• $2.75 million to be spent in Upper Basin
• Upper Colorado River Commission will serve as contracting entity
• Request for pre-proposals issued May 8
  – Due June 17
  – Selection by July 1 for 2015 proposals
  – Second round of pre-proposals for 2016 due Nov. 1
System Conservation Agreement
Lower Basin

• Program administered by Reclamation
• 17 proposals received in response to initial request
  – Water reuse
  – Landscape conversions
  – Land fallowing
  – Conveyance improvements
Minute 319

- Signed November 2012
- Effective for 5 years, expires at end of 2017
- Addresses shortage sharing, but much more
Participants

- US Federal Government
  - Dept. of State and IBWC
  - Dept. of the Interior (Reclamation and FWS)
- Mexican Federal Government
- 7 Colorado River Basin States
- Key water districts/funders (MWD, SNWA, CAWCD)
- Multiple environmental NGOs/funders
  - US and Mexican
Minute 319 Components

• Operational
  – Sharing of shortage and surplus
  – Extension ability of Mexico to defer deliveries and store water in US reservoirs

• Infrastructure
  – $21M in US investment in efficiency in Mexico

• Environmental
  – Pulse and base flows
# New Shortage Sharing Schedule

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<th>Mexico (1.5 MAF)</th>
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<td>0</td>
<td>480,000</td>
<td>20,000</td>
<td>125,000</td>
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Environmental

• Base flow – 52,696 af
  – Water to be developed by environmental NGOs
  – Established Colorado River Delta Water Trust
  – Raised $10 million to purchase rights

• Pulse flow – 105,392 af
  – Source of water = Mexican surplus
  – ½ of pulse flow water generated by $21M infrastructure investment
Colorado River Delta in 1948
Morelos Dam – the River disappears
Opening the Gate
The leading edge
Note: The path shown for the Colorado River (blue line) is the general alignment of the river channel. The actual path of the pulse flow may vary.

Minute 319 Pulse Flow
Pulse Progress

This Data is being provided as a public record by the Bureau of Reclamation. Reclamation makes no warranties, either expressed or implied, with respect to this data. Its quality or fitness for a particular purpose or use. Reclamation makes no warranty with respect to the accuracy of the data provided, and in no event will be liable for direct, indirect, consequential or incidental damages resulting from any inaccuracies in the data. The user should review and evaluate the data received to determine its suitability of use for their activities.

Map Data Provisional. Awaiting Finalization.
May 12, 2014
Almost there
May 15, 2014

The river and the sea meet once again
Lessons Learned

• Front of Pulse – Slower, Deeper, Wider

• Turbidity – Virtually None

• The human element – reconnection of the communities to the River
SAN LUIS BRIDGE OVER THE COLORADO
SAN LUIS RIO COLORADO, SONORA, MEXICO
Update from Colorado River Delta: A Community Gets its River Back
By Jennifer Pitt of Environmental Defense Fund in Water Currents on April 9, 2014
Significant Achievements

• Federal government, 7 States, multiple water agencies, and NGOs all involved in discussions about sustainability of the Colorado River
• Little (not zero) major litigation over the last 10 years
• Litigation viewed as failure
• Failure is not an option
Innovation Deficit

- Annual Lake Mead deficit – 1.2 MAF
- Maximum agreed shortage sharing – 625,000 acre feet
- Lower Basin MOU – “best efforts” to produce 740,000 acre feet over 3 years, approximately 250,000 per year
- System Conservation Agreement – at best around 11,000 acre feet